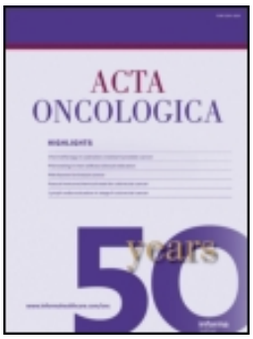

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ORIGINAL ARTICLE

Occupation and cancer – follow-up of 15 million people in five Nordic countries

EERO PUKKALA[1,2], JAN IVAR MARTINSEN[3], ELSEBETH LYNGE[4], HOLMFRIDUR KOLBRUN GUNNARSDOTTIR[5], PÄR SPARÉN[6], LAUFEY TRYGGVADOTTIR[7], ELISABETE WEIDERPASS[3,6,8,9] & KRISTINA KJAERHEIM[3]

[1]*Finnish Cancer Registry, Institute for Statistical and Epidemiological Cancer Research, Pieni Roobertinkatu 9, FI-00130 Helsinki, Finland,* [2]*School of Public Health, University of Tampere, Tampere, Finland,* [3]*Cancer Registry of Norway, Oslo, Norway,* [4]*University of Copenhagen, Denmark,* [5]*Research Center for Occupational Health & Working Life, Reykjavik, Iceland,* [6]*Karolinska Institute, Stockholm, Sweden,* [7]*Icelandic Cancer Registry, Reykjavik, Iceland,* [8]*Samfundet Folkhalsan, Helsinki, Finland and* [9]*University of Tromsø, Norway*

Abstract

We present up to 45 years of cancer incidence data by occupational category for the Nordic populations. The study covers the 15 million people aged 30–64 years in the 1960, 1970, 1980/1981 and/or 1990 censuses in Denmark, Finland, Iceland, Norway and Sweden, and the 2.8 million incident cancer cases diagnosed in these people in a follow-up until about 2005. The study was undertaken as a cohort study with linkage of individual records based on the personal identity codes used in all the Nordic countries.

In the censuses, information on occupation for each person was provided through free text in self-administered questionnaires. The data were centrally coded and computerised in the statistical offices. For the present study, the original occupational codes were reclassified into 53 occupational categories and one group of economically inactive persons.

All Nordic countries have a nation-wide registration of incident cancer cases during the entire study period. For the present study the incident cancer cases were classified into 49 primary diagnostic categories. Some categories have been further divided according to sub-site or morphological type. The observed number of cancer cases in each group of persons defined by country, sex, age, period and occupation was compared with the expected number calculated from the stratum specific person years and the incidence rates for the national population. The result was presented as a standardised incidence ratio, SIR, defined as the observed number of cases divided by the expected number. For all cancers combined (excluding non-melanoma skin cancer), the study showed a wide variation among men from an SIR of 0.79 (95% confidence interval 0.66–0.95) in domestic assistants to 1.48 (1.43–1.54) in waiters. The occupations with the highest SIRs also included workers producing beverage and tobacco, seamen and chimney sweeps. Among women, the SIRs varied from 0.58 (0.37–0.87) in seafarers to 1.27 (1.19–1.35) in tobacco workers. Low SIRs were found for farmers, gardeners and teachers.

Our study was able to repeat most of the confirmed associations between occupations and cancers. It is known that almost all mesotheliomas are associated with asbestos exposure. Accordingly, plumbers, seamen and mechanics were the occupations with the highest risk in the present study. Mesothelioma was the cancer type showing the largest relative differences between the occupations. Outdoor workers such as fishermen, gardeners and farmers had the highest risk of lip cancer, while the lowest risk was found among indoor workers such as physicians and artistic workers.

Studies of nasal cancer have shown increased risks associated with exposure to wood dust, both for those in furniture making and for those exposed exclusively to soft wood like the majority of Nordic woodworkers. We observed an SIR of 1.84 (1.66–2.04) in male and 1.88 (0.90–3.46) in female woodworkers. For nasal adenocarcinoma, the SIR in males was as high as 5.50 (4.60–6.56).

Male waiters and tobacco workers had the highest risk of lung cancer, probably attributable to active and passive smoking. Miners and quarry workers also had a high risk, which might be related to their exposure to silica dust and radon daughters. Among women, tobacco workers and engine operators had a more than fourfold risk as compared with the lung cancer risk among farmers, gardeners and teachers. The occupational risk patterns were quite similar in all main histological subtypes of lung cancer.

Correspondence: Prof. Eero Pukkala, Finnish Cancer Registry, Helsinki, Finland. E-mail: eero.pukkala@cancer.fi

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Bladder cancer is considered as one of the cancer types most likely to be related to occupational carcinogens. Waiters had the highest risk of bladder cancer in men and tobacco workers in women, and the low-risk categories were the same ones as for lung cancer. All this can be accounted for by smoking. The second-highest SIRs were among chimney sweeps and hairdressers. Chimney sweeps are exposed to carcinogens such as polycyclic aromatic hydrocarbons from the chimney soot, and hairdressers' work environment is also rich in chemical agents.

Exposure to the known hepatocarcinogens, the Hepatitis B virus and aflatoxin, is rare in the Nordic countries, and a large proportion of primary liver cancers can therefore be attributed to alcohol consumption. The highest risks of liver cancer were seen in occupational categories with easy access to alcohol at the work place or with cultural traditions of high alcohol consumption, such as waiters, cooks, beverage workers, journalists and seamen.

The risk of colon cancer has been related to sedentary work. The findings in the present study did not strongly indicate any protective role of physical activity. Colon cancer was one of the cancer types showing the smallest relative variation in incidence between occupational categories. The occupational variation in the risk of female breast cancer (the most common cancer type in the present series, 373 361 cases) was larger, and there was a tendency of physically demanding occupations to show SIRs below unity. Women in occupations which require a high level of education have, on average, a higher age at first child-birth and elevated breast cancer incidence. Women in occupational categories with the highest average number of children had markedly lower incidence. In male breast cancer (2 336 cases), which is not affected by the dominating reproductive factors, there was a suggestion of an increase in risk in occupations characterised by shift work. Night-shift work was recently classified as probably carcinogenic, with human evidence based on breast cancer research.

The most common cancer among men in the present cohort was prostate cancer (339 973 cases). Despite the huge number of cases, we were unable to demonstrate any occupation-related risks. The observed small occupational variation could be easily explained by varying PSA test frequency.

The Nordic countries are known for equity and free and equal access to health care for all citizens. The present study shows that the risk of cancer, even under these circumstances, is highly dependent on the person's position in the society. Direct occupational hazards seem to explain only a small percentage of the observed variation – but still a large number of cases – while indirect factors such as life style changes related to longer education and decreasing physical activity become more important.

This publication is the first one from the extensive Nordic Occupational Cancer (NOCCA) project. Subsequent studies will focus on associations between specific work-related factors and cancer diseases with the aim to identify exposure-response patterns. In addition to the cancer data demonstrated in the present publication, the NOCCA project produced Nordic Job Exposure Matrix (described in separate articles in this issue of Acta Oncologica) that transforms information about occupational title histories to quantitative estimates of specific exposures. The third essential component is methodological development related to analysis and interpretation of results based on averaged information of exposures and co-factors in the occupational categories.

Abbreviations: CI, Confidence Interval, ICD, International Classification of Diseases, ICD-O, International Classification of Diseases for Oncology, ISCO, International Standard Classification of Occupation, NYK, Nordisk Yrkesklassifisering (Nordic Classification of Occupation), PY, Person years, Obs, Observed number of cancer cases, SIR, Standardised Incidence Ratio, NHL, Non-Hodgkin's lymphoma

Introduction

A study published in 1999 reported occupational cancer risk estimates in four Nordic countries based on data from the 1970 censuses in Denmark, Finland, Norway and Sweden, and a subsequent follow-up of cancer incidence of 20 years [1]. Those data have been extensively used in both Nordic and international contexts, and there was an evident need to update and extend the results. In addition, a need has been expressed to develop analytic approaches to utilise the data, which is unique both in terms of size and accuracy, for tracing exposure-response associations between work-related variables and cancer. That was the reason to start the Nordic Occupational Cancer (NOCCA) project which aims at joining the Nordic data and researcher skills (http://www.cancerregistry.fi/eng/research/AID159.html). As the first output of the NOCCA project, we present here a study similar to the previous Nordic study [1] but updated and extended in several dimensions.

Tabulation of cancer by occupational categories builds on tradition from the occupational mortality studies, and therefore also the term "occupational cancer" is often used in studies where the information on occupation and industry comes from the data collected for each citizen in a census. To ensure correspondence between numerator and denominator, these studies should preferably be based on linkage between individual census and cancer registration records. The use of unique personal identity codes given to all residents and systematically recorded in every register including personal data facilitates such a record linkage in the most accurate way. In the Nordic countries personal identity codes have been widely used since the 1960s for administrative purposes such as payment of salaries, taxation, bank accounts, social security, health insurance, hospitalisation, etc. The use of the personal identity codes is thus a part of daily life ensuring a high quality of the data. All five countries have computerised central population registers with daily updates on births, deaths, immigrations and emigrations.

The computerised registration of census data by personal identity codes started in Norway and Sweden in 1960, in Finland and Denmark in 1970, and in Iceland in 1981. Because central administrative registers also include much demographic information, the incentive to undertake traditional censuses has diminished by time. The detailed information on occupation and industry for each citizen is, however, difficult to obtain from routine registers. Denmark was the first country in the world to abolish traditional censuses. In the first register-based census in Denmark from 1981 the information on occupation came primarily from tax-forms, and 5% of the work force ended up being registered only as wage-earners without further information [2]. The Danish part of the present study is therefore based solely on the 1970 census. Sweden kept the traditional censuses throughout the 20th century, and the present study includes data from the 1960, 1970, 1980, and 1990 censuses. In Finland, data from the 1960 census only exists in manual forms and could not be used, and in Norway the 1990 census included only a sample of the Norwegian population and was therefore excluded from the present study. Iceland has a long census tradition, but the only census available with computerised data is from 1981.

National cancer registration started in 1943 in Denmark, in 1953 in Finland and Norway, in 1955 in Iceland, and in 1958 in Sweden. The first linkage study of occupational cancer was based on the 1960 census from Sweden, with the creation of the so-called Cancer-Environment Register [3]. A linkage has also been performed between the Swedish 1970 census and the cancer register [4]. Comprehensive studies on occupational cancer based on data from the 1970 censuses have been published in Denmark [5] and Finland [6]. In Norway, studies for selected occupational categories have been undertaken based on the 1970 census [7,8]. This is the first time the Icelandic census is used as a study base.

The standardisation of occupations for the present studies was facilitated by the previous Nordic collaborative projects on occupational cancer mortality [9] and incidence [1].

The occupational cancer study presented here includes 1) data from five Nordic countries, 2) data from up to four consecutive decennial censuses, 3) data for main cancer sites, as well as for several specific histological categories and subsites, and for a number of rare cancer sites seldom studied by occupation, and 4) data from a follow-up period of up to 45 years (1961–2005). The study cohort covers 15 million residents of Nordic countries, followed for a total of 385 million person years, and developing 2.8 million cancer cases during the follow-up. It thus constitutes the largest cohort study on occupational cancer incidence ever published.

This is the first publication to come out from the extensive study Nordic Occupational Cancer (NOCCA) project and should be considered as a base document for the numerous subsequent studies focusing on associations between specific work-related factors and well-defined cancer diseases with the aim to identify exposure-response patterns. In addition to the cancer data demonstrated in the present publication, the NOCCA project produces the Nordic Job Exposure Matrix (JEM) that transforms information of occupational title histories to quantitative estimates of specific exposures. The third essential component is methodological development targeted at better interpretation of results based on averaged information of exposures and co-factors in the occupational categories. The JEM work is described in a separate article in this issue of Acta Oncologica.

The Nordic countries

The Nordic countries comprise five states: Denmark, Finland, Iceland, Norway and Sweden, and three autonomous territories, the Faroe Islands, Greenland and Åland. The Faroe Islands and Greenland are both part of the kingdom of Denmark, but are not included in the present study. Åland is part of the republic of Finland, and is included in the Finnish data. Denmark, Norway and Sweden are monarchies whereas Finland and Iceland are republics.

The Nordic countries share a long history. Iceland came under the Norwegian king in 1262. The three kingdoms of Denmark, Norway and Sweden (including Finland), dating back to the 10–13th centuries, were united in the Kalmar Union in 1397. After Sweden had broken out in 1523, Denmark and Norway were in a political union, including also the Norwegian dependencies of Iceland, the Faroe Islands, and Greenland. This Dano-Norwegian union was dissolved in 1814. Norway then entered a union with Sweden, while Iceland, the Faroe Islands, and Greenland remained with Denmark. The Swedish-Norwegian union was dissolved in 1905. Finland, formerly constituting the eastern third of Sweden, in 1809 became an autonomous Grand Duchy within the Russian Empire, but declared its independence in 1917. Iceland was until 1944 part of the Danish monarchy. The Faroe Islands and Greenland are today autonomous provinces of Denmark with home rule. Denmark joined the European Union in 1973, Finland and Sweden in 1995. Iceland and Norway are not EU members.

In the Second World War (WWII), Norway and Finland were combat zones, while the other Nordic countries did not participate directly in the warfare. The living conditions in Norway and Finland were thus heavily affected by the war, whereas this was not the case to the same extent in the other countries. Norway and Denmark were occupied by the Germans. Finland fought the Winter War and the continuation war against the Soviet Union. Iceland was occupied by Great Britain in May of 1940 (a friendly occupation) but one year later made a defense agreement with USA. Sweden kept its neutrality.

The Nordic countries cover a total area of 3.5 million km^2. If Greenland and the islands of Svalbard and Jan Mayen are excluded, the remaining part of the Nordic countries covers an area of 1.2 million km^2. The northernmost parts of Norway, Finland, and Sweden are located north of the Arctic Circle, and thus experience winter without sunrise and midnight sun in summertime. This area is sparsely populated. Denmark and Finland are flat countries, whereas mountainous areas are found in the central and northern parts of Norway and in the northern part of Sweden. Iceland is a mountainous island situated in the North Atlantic with glaciers, volcanoes, and geothermal activity.

Climate

The climate in the Nordic countries is determined by two factors, their northern latitude and the existence of the Gulf Stream in the Atlantic Ocean. The climate is temperate but with variation between the southern and northern parts and between the coastal and inland areas. During winter, average temperatures are fairly low. The five capitals, Copenhagen, Helsinki, Reykjavik, Oslo, and Stockholm, are all located by the sea, which reduces the temperature variation (Table 1) [10].

Annual exposure to carcinogenic UV light at sea level in the southernmost regions of the Nordic countries (southern Denmark, latitude 55°N) is about 30% and in the northernmost parts of the other Nordic countries (latitude about 70°N) approximately 20% of the respective exposure at equator [11].

Table 1. Mean temperature in five Nordic capitals in the years 1961–1990 [10].

	January	July
Helsinki	−6.9	16.6
Copenhagen	0.1	16.4
Oslo	−4.3	16.4
Reykjavik	−0.5	10.6
Stocholm	−2.8	17.2

Population

The total population in the Nordic countries has doubled during the last hundred years, comprising 24.7 million in 2005 (Figure 1) [12]. The population density varies from 127 per km^2 in Denmark to 3 per km^2, in Iceland. In Norway and Denmark around 30–40% and in Iceland more than 60% of the population live in the vicinity of the capital [13].

The population in the Nordic countries is getting older, partly due to the fact that the death rate has fallen for almost all age groups and partly because the number of births has been low over the past 30 years. As of the year 2005, the percentage of 80 years or older was highest (over 5%) in Sweden. The fertility rate has fallen in all the Nordic countries but is still relatively high compared to most industrialised countries [14]. From 1970 to 2004, the fertility rate among women 15–49 years in Denmark decreased from 1.95 to 1.78; in Finland from 1.83 to 1.80; in Iceland from 2.81 to 2.04; in Norway from 2.50 to 1.83; and in Sweden from 1.92 to 1.75.

A great majority of people in the five Nordic countries are Caucasian. Following WWII Sweden experienced labour immigration from Central and Western European countries, in addition to immigration from the other Nordic countries. From 1954 there has been a completely common labour market between the Nordic countries. However, apart from a substantial movement from Finland to Sweden, this did not significantly influence the labour markets in the individual countries. Labour immigration from Southern Europe and outside Europe started in Sweden from the early 1960s, and came to Denmark and Norway by the late 1960s. From the

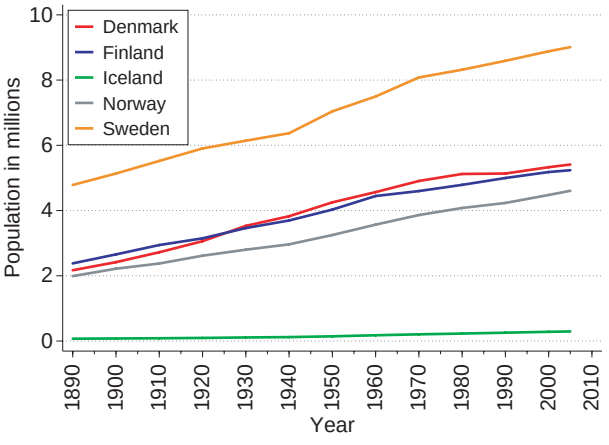


Figure 1. Population in the Nordic countries in 1890–2005, in millions [12].

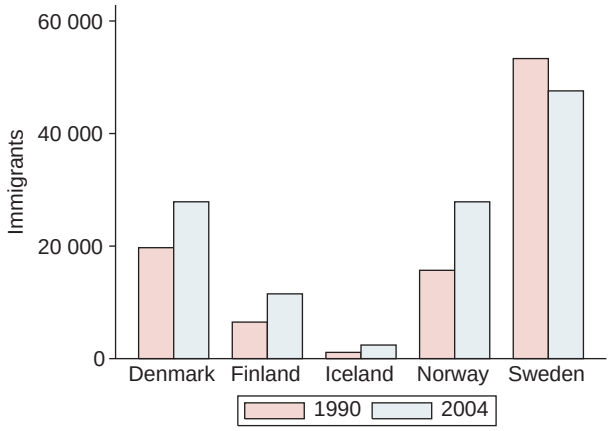


Figure 2. Number of immigrants to the Nordic countries [13].

early 1970s immigration from countries outside the Nordic common market was stopped, only allowing family reunions. By joining the European Union Denmark in 1973 and Sweden and Finland in 1995 became part of the joint European labour market. In general, labour immigration has been mainly from Western countries, while refugee and family related immigration has been mainly from non-Western countries [15].

Culture

The Danish, Icelandic, Norwegian and Swedish languages are of the same origin whereas Finnish belongs to an entirely different language family. About 6% of the Finnish population have Swedish as their mother tongue, and both Finnish and Swedish are official languages in Finland. The Sami people are indigenous people living in the northern parts of Finland, Norway, Sweden and Russia. They speak Sami languages.

Elementary schools have been compulsory in all Nordic countries for more than a century. In Denmark, schooling has been compulsory since 1814. In Sweden, six years of schooling was made mandatory in 1882, in Norway, seven years has been mandatory since 1889. Today, 9–10 years of schooling is compulsory in all countries, after which most students will pursue some form of further training. The number of students finishing higher education increased very much during the second half of the 20th century. In Denmark, Norway and Sweden, 13% and in Finland 8% of men aged 35–54 years in 1970, had 13 or more years of education. The respective proportions for women were 10% in Sweden; 7% in Finland; 6% in Norway and 5% in Denmark [16]. In Iceland 15% of all 20-year-olds passed the matriculation examination in the school year 1970/1971, whereas 29% and 45% passed this examination in the years 1980/1981 and 1989/1990, respectively [17]. The percentage of people with a tertiary level education according to the International Standard Classification of Education, which typically begins at the end of full time compulsory education, varied in 2003–2004 from 20% in Denmark to 26% in Finland among persons between the ages of 15 and 74. In the five countries, more women than men now have the highest level of education in the population of those aged 25–74, and more women are enrolled in high-level education institutions than men [13]. The number of doctoral and licentiate degrees awarded each year is growing fast. In 1990 the total number of doctoral degrees awarded in the Nordic countries was about 3 400, but in 2002 the number exceeded 7 100 [18].

In all five Nordic countries a vast majority of the population are Lutherans. In Finland, the Orthodox church (1% of the population) also has the status of state church. However, full freedom of religion is granted by the constitutions of the five countries. The extent to which religion plays a role in daily life varies between groups and regions, but has in general been decreasing by time. The Nordic countries are now confronting new challenges with immigrants that are followers of various religions [19].

Industry

Agriculture is still important in most Nordic countries, although its economic significance has declined in parallel with the increase of the service sector, as has been the case in most other European countries. In Denmark and Finland, more than half of the arable land is used for grain production, in Denmark 65%, in Finland 55% but in Sweden 42%. Iceland, being mountainous and volcanic has scarce arable land. The main agricultural activity in Iceland is sheep farming and dairy production. The importance of forestry and paper production is illustrated by the fact that more than half of the area in Sweden and Finland, and one fourth of the area in Norway are covered by forest. Forestry is still a major industry in Finland and Sweden and to a lesser extent in Norway. Fishing has for a long time been an important industry in Norway and in Iceland and still is, especially in certain regions. Oil production by the Norwegians in the North Sea started on a larger scale in the mid 1970s.

Hydro- and geothermal power are major sources of energy in the Nordic countries, as compared to other OECD countries. In Iceland and Norway hydro-geothermal power constitute a major share of the overall energy supply, whereas Denmark depends almost entirely on thermal power generated from coal, oil and gas. Iceland depends almost

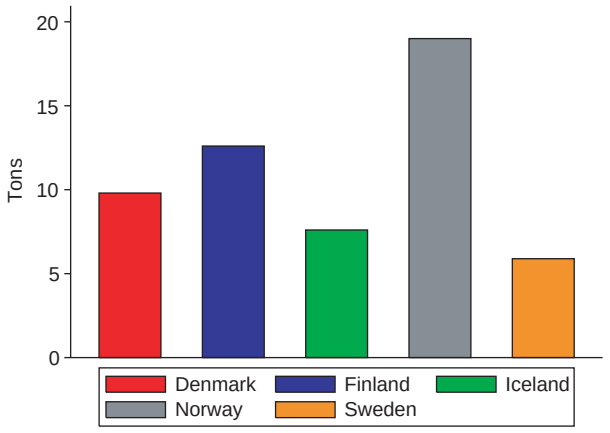


Figure 3. CO_2 emission in tons per capita in the Nordic countries in 2004 [20].

entirely upon hydropower resources for its production of electricity. Nuclear power is Sweden's most important source of energy, in Finland it provides 18% of the energy supply. With their oil fields in the North Sea, Denmark and especially Norway have a very large production of oil and gas [13]. Iron mining has been important in Sweden and to a lesser extent in Norway, where on the other hand, the cheap supply of energy has formed the basis for, e.g., the smelting of aluminium, both in Norway [1] and in Iceland.

In agreement with the Kyoto Protocol, EU nations have agreed to cut the emission of carbon dioxide to 8% below the level in 1990. Emission of carbon dioxide varies across the Nordic countries (Figure 3) [20]. In Denmark, Finland and Norway, the emission of greenhouse-gases in 2003 was still 7–8% above the 1990 level while the emission was lower in Sweden and especially in Iceland [13].

Living conditions

The gross domestic product has increased in all Nordic countries and is among the highest in the world. The population of the Nordic countries is now largely urbanised. The share of one- and two-family houses out of the entire building stock is highest in Denmark (almost 60%) and Åland (almost 70%), lowest in Sweden with 45%. Norway and Iceland have the highest percentage of large dwellings with five rooms or more plus kitchen [13]. Private ownership of dwellings is common.

In 1970 Sweden had the highest number per capita of cars (0.31), telephones (0.58) and televisions (0.32) in the Nordic countries. In Finland the numbers were only 0.19; 0.30 and 0.24 [21]. In 2005 Iceland had the highest density of private cars with 0.60 cars per capita, followed by Sweden with 0.46, Finland 0.45, Norway 0.43, and Denmark 0.35 per capita [13].

Along with the Netherlands, the Nordic countries rank with the highest digital literacy as reflected by the percentage of individuals aged 16 to 74 using the internet regularly [22]. The proportion of households in 2005 with access to internet was 75% in Denmark, 54% in Finland, 84% in Iceland, 64% in Norway, and 73% in Sweden [14]. The Nordic populations were the first ones to adapt large scale use of mobile phones.

Food consumption

Across the Nordic countries, there were important differences in the average consumption of the main food components in 1970 [23]. The average milk consumption in Finland was 263 kg per person per year whereas the consumption in the other countries varied from 172 to 193 kg per person. Denmark had a high consumption of meat and offals with 84 kg per person, or close to a quarter of a kilogram per person per day. The consumption of meat and offals in the other countries was between 43 and 56 kg per person. Fish consumption was highest in Norway (40 kg per person) and lowest in Finland (13 kg per person). The consumption of vegetables, fruit and berries in Sweden in 1970 was 122 kg per person, twice as much as in Finland, with the consumption in Denmark and Norway being in between.

In parallel with the economic development, dietary habits have changed in all Nordic countries. The consumption of fat and sugar has increased, while the consumption of food items rich in carbohydrate has decreased [24]. The consumption of low-fat milk and margarine has increased, while the total fat consumption has decreased. There has been a gradual increase in the consumption of fruit and vegetables in all countries. Consumption of potatoes was high in all countries in 1970, ranging from 73 to 89 kg per person [23]. Except for in Sweden, consumption of potatoes has decreased in later decades [24]. Until the 1980s meat consumption increased, but has, except for in Denmark, been stable since then. The lowest consumption of meat has continuously been in Norway, where in 1990 the mean intake per inhabitant was 54 kg, and highest in Denmark, with 105 kg per inhabitant (Table 2) [25]. Overall dietary fat intake has decreased in Finland, Norway, and Sweden, but not in Denmark [24].

In 2005, Denmark was the Nordic record holder of the consumption of beef and veal (28 kg per person in 1970) pork (58 kg), poultry (23 kg), and cheese (24 kg) [13]. Consumption of lamb and sheep was the highest in Iceland (23 kg per person). Icelanders and Norwegians consumed by far more

Table 2. Food consumption (kg per person) in 1990 in the Nordic countries [25].

	Denmark	Finland	Iceland	Norway	Sweden
Flour	75	78	.	79	69
Potatoes (1)	65	64	50	70	84
Vegetables, crucif	69 (2,3)	54	31	54	54
Fruit, berries, nuts	54	91	38	79	94
Meat	105	67	71	54	61
Egg	14	11	11	11	13
Milk	121	178	191	172	129
Cheese	15	13	10	13	17
Butter	9	8	5	3	5
Margarine (4)	15	8	.	12	11
Sugar, honey	37	35	55	41	43

. Numbers are missing.
(1) Potato products have been counted as fresh potatoes.
(2) Numbers from 1985.
(3) Excluding marmalade, juice, dried fruits.
(4) Including light margarine calculated at 80% fat.

fish than the other Nordic people, while the Icelanders accounted for the lowest consumption of vegetables.

Alcohol consumption

The average consumption of alcohol has varied over time and between countries (Figure 4) [26]. A general increase has been seen in all countries except Denmark in the later years.

The proportion of abstainers among adult men in 1985 ranged from 3% in Denmark to 23% in Sweden, whereas the proportions of abstainers among adult women ranged from 7% in Denmark to 37% in Sweden [27] (Figure 5).

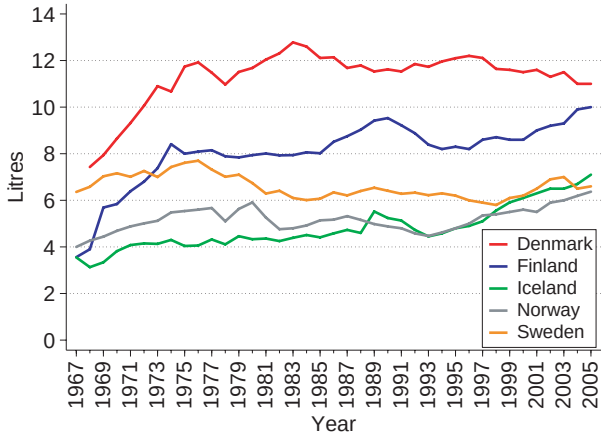


Figure 4. Alcohol consumption in litres of pure alcohol in the Nordic countries [26].

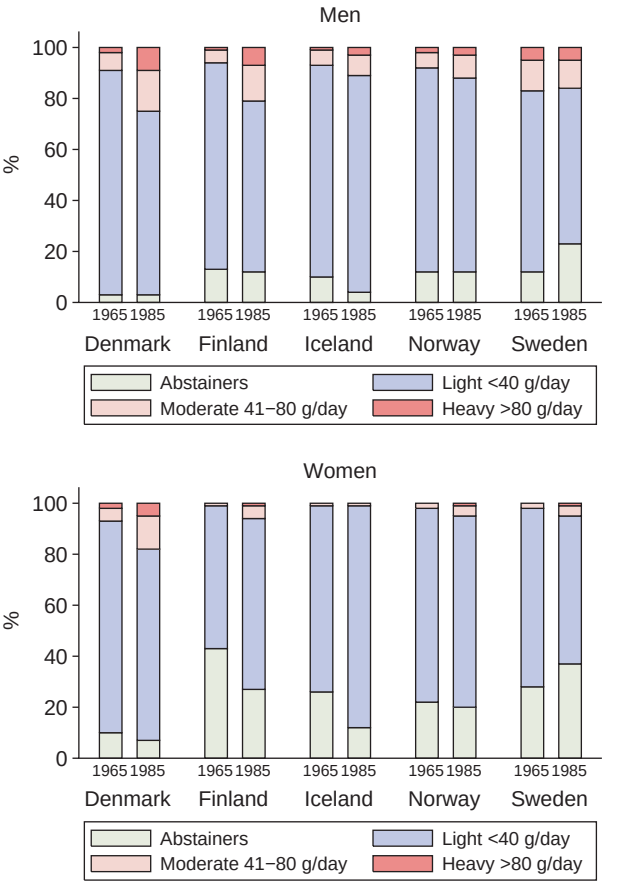


Figure 5. Drinking habits in 1965 and 1985 in the Nordic countries. By gender [27].

Tobacco use

Tobacco consumption in Denmark was higher than in the other Nordic countries already in 1920 [28]. In 1970 on average 68% of men and 47% of women in Denmark were smokers [29]. The numbers were 54% for men and 37% for women in Norway in 1973–1977 [30]. In Sweden, about 56% of men smoked in 1968, whereas the proportion of smokers in women varied from 46% in the 15–24 years old to 17% in the 55–64 years old [31]. In Finland, practically all tobacco consumption until the early 1960s was attributable to men; thereafter the prevalence of smokers among men was halved to about 30% and among women increased to about 30% [32].

Smoking has decreased in all Nordic countries during the last decades (Figure 6) but direct comparison between the Nordic countries is somewhat difficult as the age-span in the official statistics

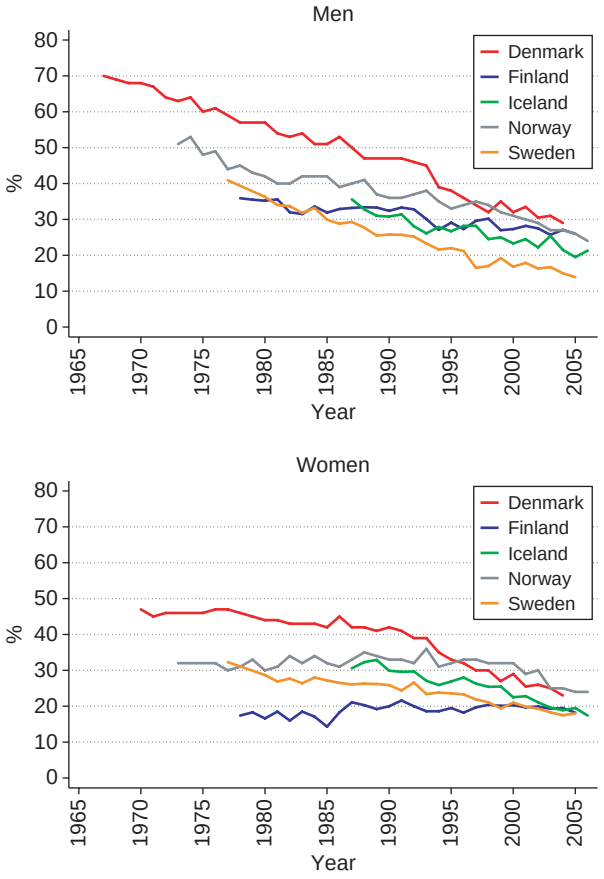


Figure 6. Proportion of daily smokers in the Nordic countries. Men and women [14].

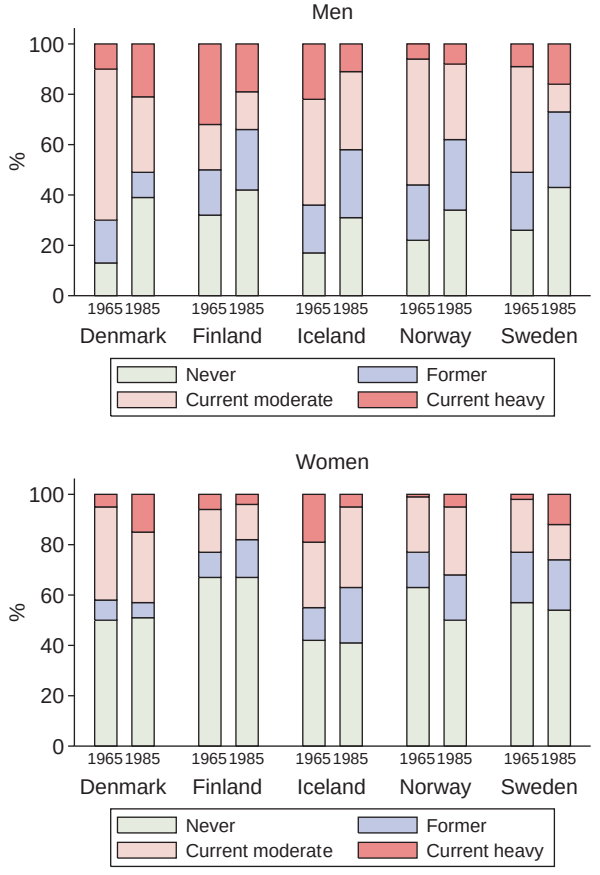


Figure 7. Smoking habits in 1965 and 1985 in the Nordic countries. By gender [33].

varies from 13+ in Denmark, 15–64 in Finland, 15–79 in Iceland, 16–74 in Norway and 16–84 in Sweden [13].

Both in 1965 and 1985, there were more male than female ever smokers, and the proportion among men decreased consistently over time (Figure 7) [33]. Among women the proportion of ever smokers remained largely unchanged over the period 1965–1985. The percentage of smokers declines with the educational level in all the Nordic countries [34].

In Sweden, snuff-taking has for a long time been more common than in the other Nordic countries. Until 1995 it was almost exclusively men who took snuff, but in recent years women have also started to do so. In 2004–2005 27% of men (16–84 years) and 5% of women in Sweden took snuff [35]. The proportion of snuff-takers has increased in Sweden by 6% since the end of the 1980s until 2004–2005. In Norway snuff-taking is a new habit, introduced during the 1990s parallel with the decreasing smoking prevalence. In 2005 14% of Norwegian men aged 16–24 years and 10% of men aged 25–44 years used snuff on a regular basis [36]. The respective proportions among women were 4% and 2%.

Health and health care

Life expectancy in the five Nordic countries is among the highest in the world and has risen during the last decades (Table 3).

Finnish women and men have, in the period between 1960 and 2005, on average gained about

Table 3. Life expectancy at birth (in years) in the Nordic countries 1960 and 2005 [14].

	Women		Men	
	1960	2005	1960	2005
Denmark	74.4	80.2	70.4	75.6
Finland	72.5	82.3	65.5	75.5
Iceland	75.5	83.1	70.7	79.2
Norway	75.8	82.5	71.3	77.7
Sweden	74.9	82.8	71.2	78.4

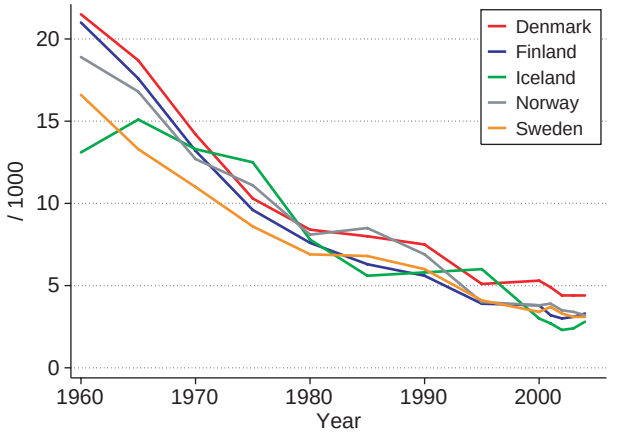


Figure 8. Infant mortality per 1 000 live births in the Nordic countries in 1960–2004 [37].

10 years in life expectancy, and all other Nordic populations 5 to 9 years. Icelandic men could expect to live longer than any other men included in OECD statistics in 2005. The differences in life expectancy between the Nordic countries are mostly due to mortality differences in adult life. Infant mortality in the Nordic countries is low (Figure 8) [37].

In the Nordic countries, the health service is financed through taxes or through compulsory health insurance schemes to a large extent. There are well-established primary health care systems and well-developed hospital services. Employees on sick leave either receive their salary or are compensated by special cash allowances. The self-employed ensure themselves.

In all of the Nordic countries social assistance is granted if all other support options have been exhausted and all citizens are guaranteed a certain level of income at retirement and disability [13].

Occupational history of the study population

The population included in the present study was born between 1896 and 1960 (see Materials and methods). People in the oldest birth cohorts typically started working around the age of 15, in the period between 1910 and 1920. Due to the increasing duration of education, many persons in the youngest birth cohorts started their working careers around the age of 25 or even higher. The normal time for retirement in the Nordic countries has been between 65 and 70 years. Thus, persons included in this study have participated in the labour market from the years before World War I until after the turn of the millennium, covering a period of enormous changes in the types of economic activities and the structure of the labour force in the Nordic countries, as well as in living and working conditions.

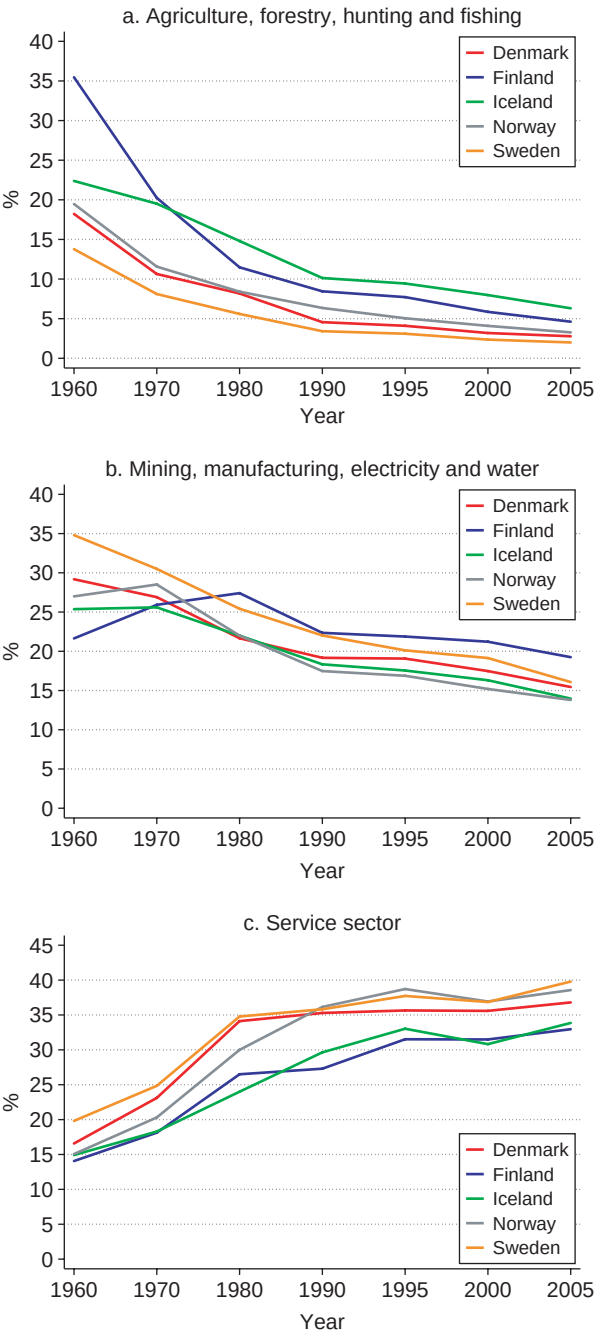


Figure 9. Proportion of work force by sector in the Nordic countries, both genders combined [12,38,39].

One of the main changes has been the decline in the proportion of the population working in agriculture, forestry, hunting and fishing. In 1900 the labour force in all the Nordic countries was largely working in the agricultural sector. The reduction of workers in agriculture came latest to Finland. As much as 63% of Finnish men worked in agriculture in 1930, a much larger proportion than in the other countries. In 1960 the proportion of persons (men and women combined) in agriculture were

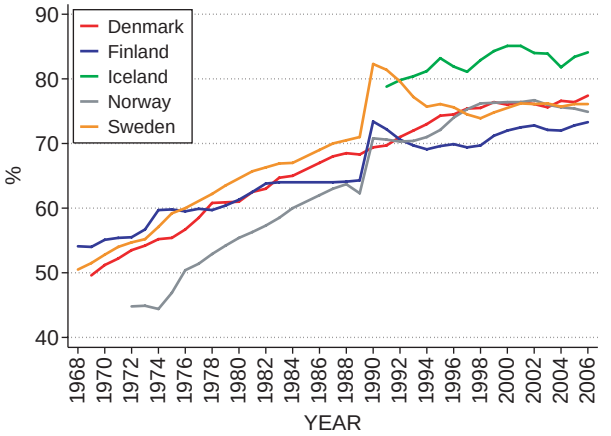


Figure 10. Percentage of economically active women in the Nordic countries [40].

18% in Denmark, 36% in Finland, 22% in Iceland, 20% in Norway, and 14% in Sweden (Figure 9a) [12,38,39]. Around 2005, only 2–6% in each country were occupied in the primary sector. Still, meat and dairy products in Denmark and fish and fish products in Iceland and Norway have remained important export products.

Around 1900, only 11% of the labour force in Finland was employed in the industrial sector, compared to 26% in Norway and 29% in Sweden. In pre-WWII Denmark, small scale industrial enterprises producing for the home market were common. Industrial development related to, e.g., steel, copper, and timber came earliest to Sweden. Following the war, Sweden also had the advantage of an intact industrial base and its natural resources in the expansion of its industry. In Finland, there was rapid growth specifically in the metal industry after WWII due to peace requirements after the war.

Cheap hydro-electric power formed the basis for the early development of large industries in Norway (e.g. aluminium and fertilizer industry). In Norway, the maximum proportion of employees in the industrial sector (29%) was in 1970 (Figure 9b). From the 1970s on, economic growth in Norway has largely been based on the production of North Sea oil, but only a small proportion of the labour force is directly engaged in this. The substantial economic growth in the post war period in Iceland was driven mainly by industrialisation of the fishing sector. Around 2005, 3% of the labour force was employed in fishing.

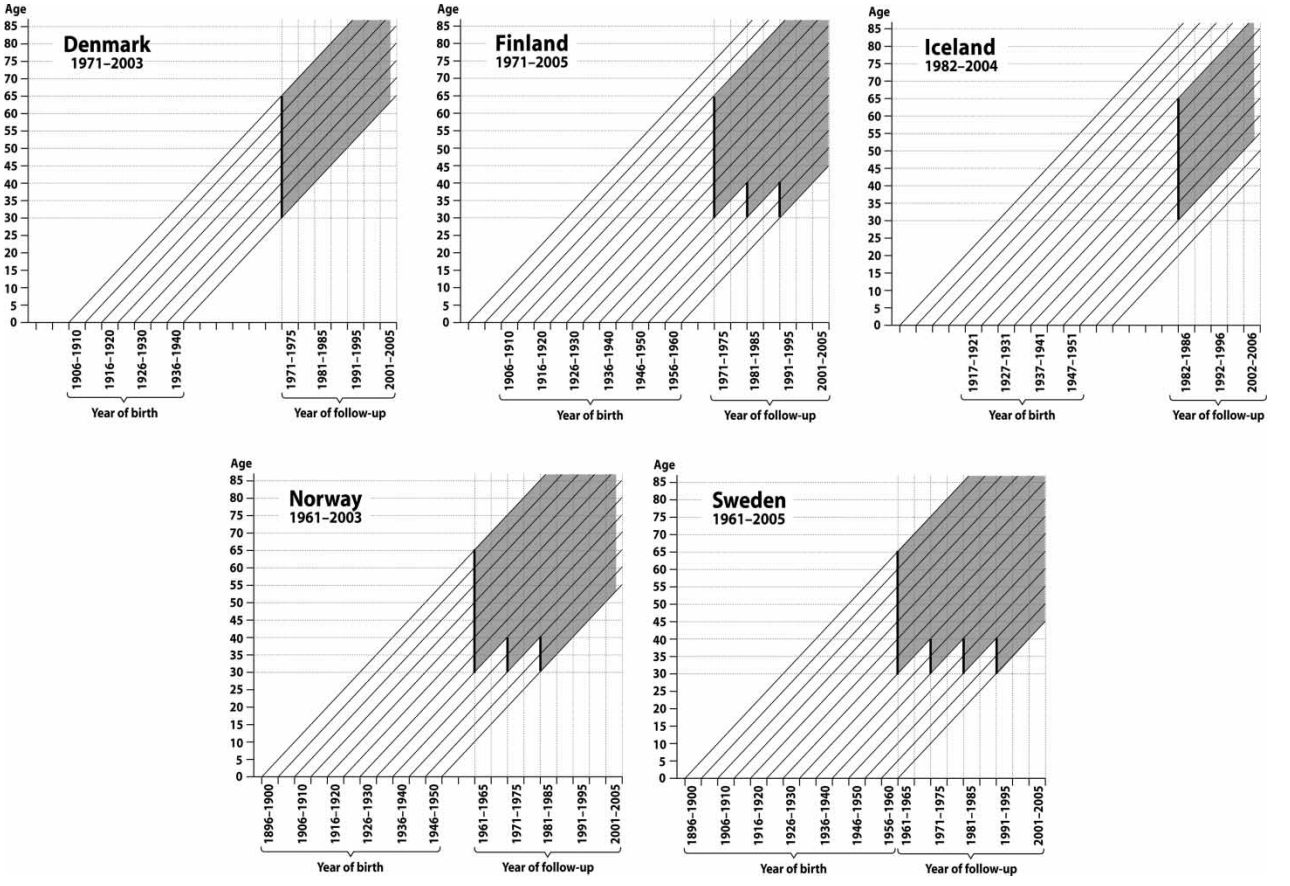


Figure 11. Time windows of follow-up of the study cohort defined by year of birth and age, by country. Bold vertical lines indicate time of baseline census used for allocation of the occupational category.

The tertiary sector includes public and private service work as well as wholesale and retail trade, restaurants and hotels, finance, insurance, real estate and business service. In all Nordic countries, employment in the tertiary sector has increased from comprising 15–20% of the labour force in 1960 to 30–40% in 2005 (Figure 9c). Another important change from the 1960s was the increasing labour market participation of women (Figure 10) [40]. The activity rates have been increasing steadily in all Nordic countries up to 73–84% in 2005, i.e., not much lower than among the men. These major changes seen from 1960 to 1980 coincided with the growth of the welfare states, urbanisation, a decrease in the agricultural sector and a growing service sector. The growth of the female labour force participation came later in Iceland and Norway than in Denmark and Sweden, while the level was high in Finland already in 1960.

Material and methods

Study population

The study base consists of persons participating in any computerised population census in the Nordic countries in 1990 or earlier (Figure 11). In Denmark, the 1970 census took place on November 9. In Finland the 1970, 1980 and 1990 censuses took place on December 31 of the census year. In Iceland the census took place on January 31, 1981. In Norway the 1960, 1970 and 1980 censuses took place on November 1. In Sweden the 1960, 1970, and 1990 censuses took place on November 1, while the 1980 census took place on September 15. The study cohort included people aged 30–64 years still alive and living in the country on January 1 in the year following the census. The cohort includes 14.9 million persons: 2.0 million from Denmark, 3.4 million from Finland, 0.1 million from Iceland, 2.6 million from Norway and 6.8 million from Sweden.

In the Icelandic census of 1981 it was compulsory for all individuals born 1964 or before to fill out the self-administered questionnaire on personal questions. In the other countries, the heads of households had to fill out self-administered questionnaires for all members of the household and for the dwelling.

A system of giving unique personal identity codes to all residents was introduced in Sweden in 1947, in Iceland in 1953, in Norway in 1964 (but including all persons alive in 1960), in Finland in 1967, and in Denmark in 1968. This personal identity code, name, address, marital status, education, economic activity, occupation, and industry were recorded for each person. All questionnaires were centrally coded and computerised in the national statistical offices.

Economic activity

In Denmark all persons who were gainfully employed at the time of the census or were temporarily absent from work due to illness, unemployment, vacation, or military service were classified as economically active. A fairly similar definition was used in Sweden.

In Finland, only people who at the time of the census were gainfully employed for at least half of the industry's normal working hours or were temporarily absent were considered economically active. In Iceland, those who were gainfully employed the week before the day of the census, January 31, 1981 or were temporarily absent from work due to illness or vacation that week, were classified as economically active.

In Norway, only persons who reported at least 100 hours of gainful employment during the last 12 months before the census or were temporarily absent were classified as economically active in the censuses of 1970 and 1980. In 1960, no specific requirement was set for the number of working hours, and occupational activity was defined only as having a main occupation. In addition, the work of married women in family businesses, e.g., in farming, was not counted as occupational activity. This has been suggested to account for about 29 000 women [41].

Occupation

The basis of the coding of occupations was free text information on education, occupation, industry, and name and address of employer at the time of the census. In Finland, Norway and Sweden, occupation was coded according to national adaptations of the Nordic Occupational Classification, usually abbreviated to NYK [42]. NYK is a Nordic adaptation of the International Standard Classification of Occupations (ISCO) from 1958 [43]. The first digit of NYK, as well as ISCO 1958 codes, indicates major occupational categories, two digits level about 70 minor occupational categories, and three digits level more than 300 specific occupations. The national code values may differ, but the coding principle is similar in Finland, Norway and Sweden.

Occupation was coded in Iceland according to a national adaptation of ISCO-68 [44]. For the present study, a conversion was made to ISCO-58 by instructions from the International Labour Organisation given in the ISCO 1968 manual.

In Denmark, occupation was coded according to a special national nomenclature with a distinction

between self-employed persons, family workers, salaried employees, skilled workers, and unskilled workers – a total of 218 codes were possible. Entities similar to those used in NYK were formed by combining these occupational codes with the 245 codes for industry.

For the present study, the original national occupation codes were converted to a common classification with 53 relatively specific, but not too small, occupational categories, and an additional category of economically inactive persons (Appendix 1, available in the online version of the journal. Please find this material with the direct link to the article: http://www.informaworld.com/10.1080/0284 1860902913546). Descriptions of work included in each of the categories are provided in Appendix 2.

The numbers of persons in the study by gender, country and occupational category are shown in Appendix 3.

Follow-up for cancer incidence

A person entered the cohort on January 1 of the year after the first available census where s/he participated, provided that s/he was 30-64 years old./he participated, provided that s/he 30–64 years old. Person-years were then counted until the date of emigration, death or to December 31 of the following years: in Denmark 2003, in Finland 2005, in Iceland 2004, in Norway 2003, and in Sweden 2005 (Figure 11). The source of the data on dates of death and emigration in all countries was the Central Population Register. The numbers of person years by gender, country and occupational category are shown in Appendix 4.

The cancer registration in Denmark is based on notifications from clinical hospital departments, supplemented with notifications from practising specialists in dermatology and gynaecology, and with autopsy reports from pathology departments. Throughout the period, the notifications were supplemented with information on cancer cases reported on death certificates. From 1988 onwards linkage was also made with the Hospital Discharge Register, and from 2002 onwards also with the Pathology Register. In 1971–1977 the cancer cases were coded according to an extended version of the International Classification on Diseases, version 7, (ICD-7) [45], and from 1978 onwards according to the International Classification on Diseases for Oncology, version 1 (ICD-O-1) [46].

Cancer registration in Finland started in 1953 and the reporting has been compulsory since 1961. Registration of new cases of cancer is based on reports from clinical and pathological departments, private clinics, general practitioners, and information from the causes of death registry. The incident cancer cases were coded for topography according to the ICD-7 [45] and for morphology according to MOTNAC 1951 [47], both nomenclatures extended to correspond to the practical new needs of classification.

In Iceland, cancer registration has from the start (1955) been based on information from all pathology laboratories in the country. This information is complemented by information from cytology and haematology laboratories, by notifications from hospitals and health centres and by death certificates. Topography was coded according to ICD-7 [45] and morphology according to ICD-O-1 [46].

Cancer registration in Norway has been based on compulsory reporting of new cases of cancer from clinical and pathological departments, private clinics, general practitioners and information from the causes of death registry since 1953. The pathology reports provide histological, cytological or autopsy information. Since 1998, the Patient Administrative Data (PAD) system in hospitals has been used as an additional source of information. Cancer cases diagnosed before 1993 are coded according to ICD-7. From 1993 ICD-O-2 has been used, with a semi-automatic conversion back to ICD-7 codes, which have been used in the classification of cancer in the present study. MOTNAC was used for the coding of morphology until 1993, but was then replaced by ICD-O-2.

The cancer registration in Sweden in 1958–1982 was based on reports from hospital clinicians and from hospital pathologists. Private practitioners have been required to report cancer cases since 1983. Notifications were collected and centrally coded in Stockholm until 1984, when the coding was fully decentralised to the six oncology centres (founded during the period 1976 to 1984) The coding is done simultaneously in several versions; 1958 until now in ICD-7, 1987 until now in ICD-9, 1993 until now ICD-O-2, and 2005 until now in ICD-O-3. The histology has been coded with three digits according to the statistical codes for human tumours by the WHO from 1956 [48]. Unlike the other Nordic countries, Sweden does not register cancer cases based on death certificate only, and does not trace back missing cases that could be identified via death certificates.

Combined cancer incidence

The cancer cases have been grouped into 49 main categories and 27 diagnostic sub groups based on the national topography and morphology coding systems (Appendix 5 and 6).

Minor differences have occurred over time and between countries in the definition and coding of multiple primary tumours. In the present study only the first incident cancer within a given diagnostic group of this particular type was included in the Danish and Icelandic data. In the tabulation of "All sites", only the first cancer of any type diagnosed within a persons risk period was included in Denmark and the first cancer diagnosed within each diagnostic group in Iceland. This method creates slight incomparability of absolute risk estimates between Denmark and Iceland and the other Nordic countries, but has virtually no effect on relative risk estimates.

The incident cancer cases included in the present study involve all invasive cancers and also benign brain tumours. The non-melanoma skin cancers were excluded from the "All sites" category because basal cell carcinomas of the skin could not be separated from the group "Other skin cancers" (primarily squamous cell carcinomas) in the Danish data. Close to 3 million primary incident cancer cases are included in the present study; 570 000 from Denmark, 500 000 from Finland, 15 000 from Iceland, 560 000 from Norway, and 1.3 million from Sweden.

Standardised incidence ratio

The relative level of the cancer incidence of an occupational category is described by the standardised incidence ratio (SIR), with the cancer incidence rates for the entire national study populations used as reference rates. For each country, gender and occupational category, the observed number of cancer cases and person years were stratified into eight 5-year attained age categories; 30–34; 35–39; . . . , 85+ years; and 5-year calendar periods (Figure 11).

For a given gender (g), the SIR for a given occupational category (o) in a given country (c) is then calculated as

$$\mathrm{SIR}_{goc} = \frac{\sum_a \sum_p Obs_{gocap}}{\left\{ \sum_a \sum_p PY_{gocap} \frac{\sum_o Obs_{gocap}}{\sum_o PY_{gocap}} \right\}}$$

where Obs = observed number of cancer cases; PY = person years; a = age; p = period. The denominator in the equation is the expected number of cancer cases for the given gender, occupational category and country. The SIR for the five countries together is calculated from the numerator and the denominator sums across the countries.

For each SIR the exact 95% confidence interval (CI) was defined assuming a Poisson distribution of the observed number of cases.

Method of presentation

The observed numbers of cancer cases and the SIRs for each Nordic country, and the respective information for the five countries combined together with the 95% confidence interval for the SIR are presented in tables for each diagnostic group and gender. Each of the 54 occupational categories is one row in a table. Such tabulations for some of the very rare cancer categories and for subsites or histological sub-categories are, however, available only in electronic format (http://astra.cancer.fi/NOCCA)

In cells where the observed numbers of cancers are zero, the expected numbers of cancer cases are presented in squared brackets. All SIRs for which the upper limit of the confidence interval is below 1.0 are printed in green, and all SIRs for which the lower limit of the confidence interval is above 1.0 are printed in red.

On the webpage (http://astra.cancer.fi/NOCCA/Incidence/results-by-occupation) there are also similar tabulations for each of the 54 occupational categories, and gender where all cancer categories are presented. The results are also available in Excel format allowing the reader to combine columns from several tables, and in a semicolon separated text file suitable for importing data to various software.

Whenever data are available on cancer incidence in the combined Nordic cancer incidence statistical tool NORDCAN, the site, gender and country specific incidence trends (smoothed with the Lowess method) are shown in graphs preceding the occupation-specific results [49].

Results: Cancer incidence by cancer site

Lip cancer

The incidence of lip cancer in the Nordic countries was five to ten times higher in men than in women still in the 1980s, but due to a strong decrease among males, the difference is now small (Figure 12). The rates have been highest in Finland, twice as high as in Sweden.

In the present study the highest SIR among men was observed among fishermen (SIR 2.27, 95% CI 2.05–2.51). Other high SIRs that were elevated in several countries were seen among farmers, gardeners, forestry workers, miners (many of whom work in open quarries) and miscellaneous construction workers (Table 4). The SIR was lowest (0.28,

0.16–0.46) among the physicians, followed by artistic workers, printers and waiters.

In women, there were no occupations with systematically increased or decreased SIRs in all countries (Table 5). Female farmers had a significantly decreased risk of lip cancer in Denmark and Sweden.

Comment. All eight occupations with significant SIRs >1.20 in males include a major part of outdoor work, while the lowest SIRs are in indoor occupations. This fits well with earlier findings indicating that men living in rural areas and in particular those employed in outdoor occupations such as fishermen and farmers have the highest risk of lip cancer [50–52]. The risk has been ascribed to exposure to sunlight and smoking [53]. The pattern of high-risk occupations of lip cancer is very different from the respective pattern of lung cancer. This is in accordance with the observation that smoking is a major risk factor of lip cancer only in interaction with outdoor exposure [53]. The strong decrease in lip cancer incidence rates is in accordance with the decreasing proportion of farmers in the Nordic countries.

The small numbers of female lip cancer do not allow conclusions of occupational pattern among them. The low SIRs among female farmers indicate that women on farms have had less outdoor work than men.

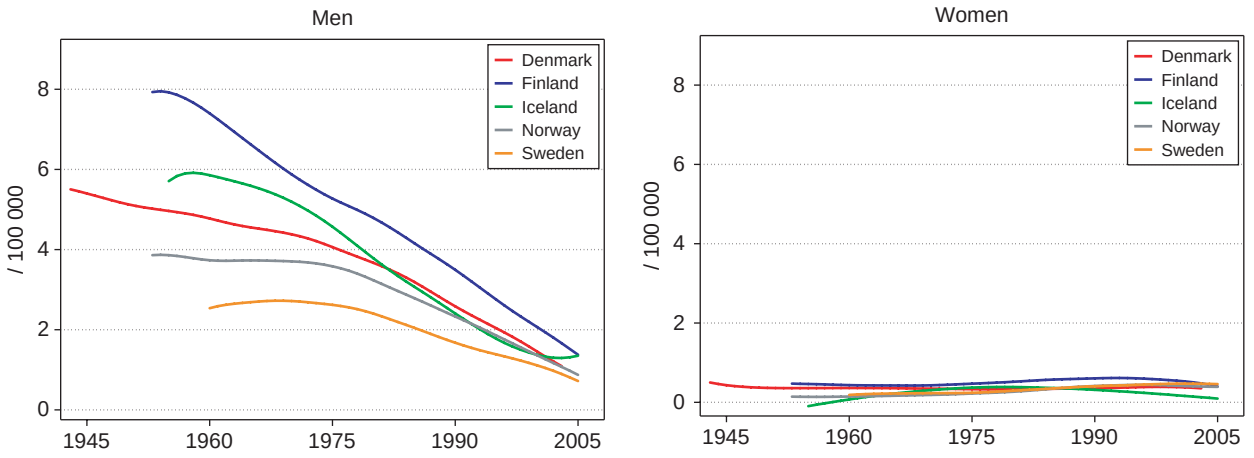


Figure 12. Age standardised (World) incidence rates for lip cancer 1943–2005, by country and gender. Modified from NORDCAN [49].

Tongue cancer

Cancer of the tongue is rare, but incidence rates in men have approximately doubled from 1960 to 2003 (Figure 13). Rates were lowest in Iceland and, during the last 10 years, highest in Denmark. Among women, rates are approximately half of that among

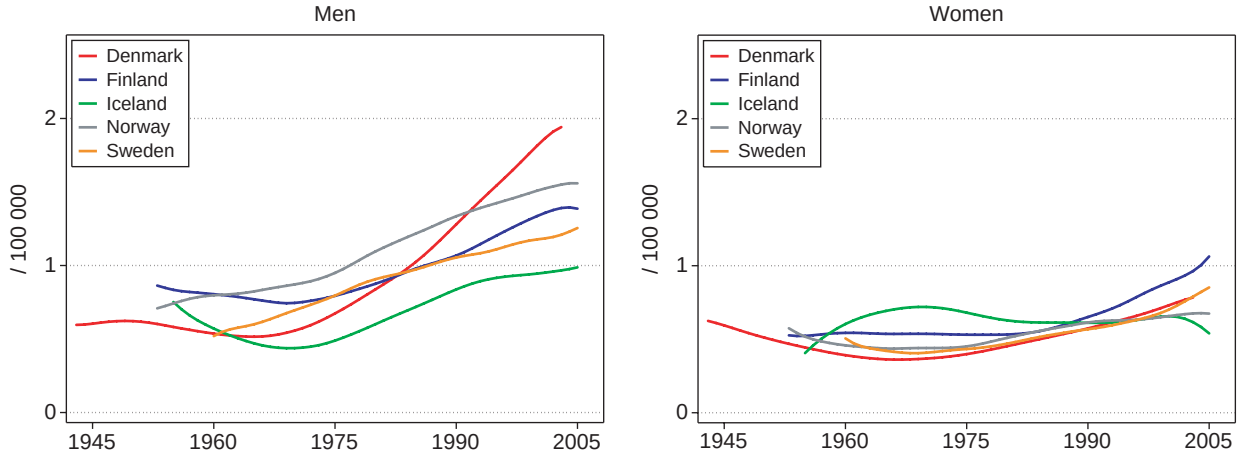


Figure 13. Age standardised (World) incidence rates for cancer of the tongue 1943–2005, by country and gender. Modified from NORDCAN [49].

Table 4. Observed number of lip cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	74	0.44	78	0.49	1	1.16	43	0.47	290	**0.66**	486	0.56	0.52—0.62
2	Laboratory assistants	1	0.30	3	0.81	[0.17]	0.00	3	0.62	2	1.51	9	0.68	0.31—1.28
3	Physicians	1	0.07	[8.94]	0.00	[0.38]	0.00	5	0.37	10	0.52	16	0.28	0.16—0.46
4	Dentists	1	0.24	[2.00]	0.00	[0.08]	0.00	6	0.98	6	0.59	13	0.58	0.31—0.99
5	Nurses	1	5.29	[0.29]	0.00	[0.00]	0.00	1	2.61	[0.52]	0.00	2	1.44	0.17—5.21
6	Assistant nurses	4	1.01	1	4.68	[0.04]	0.00	1	0.40	4	0.59	10	0.75	0.36—1.37
7	"Other health workers"	2	0.16	6	0.62	[0.10]	0.00	1	0.19	15	0.86	24	0.54	0.34—0.80
8	Teachers	33	0.44	26	0.38	1	0.74	31	0.44	45	0.42	136	0.42	0.36—0.50
9	Religious workers etc	14	0.43	9	0.26	[0.94]	0.00	15	0.39	44	0.53	82	0.43	0.34—0.54
10	Artistic workers	3	0.31	3	0.22	[0.26]	0.00	4	0.35	10	0.37	20	0.32	0.20—0.50
11	Journalists	2	0.44	1	0.15	1	6.78	3	0.62	5	0.39	12	0.41	0.21—0.72
12	Administrators	74	0.38	39	0.36	1	0.37	71	0.50	94	0.49	279	0.44	0.39—0.49
13	Clerical workers	33	0.40	46	0.60	2	0.66	45	0.43	113	0.57	239	0.52	0.45—0.59
14	Sales agents	27	0.62	51	0.48	2	1.32	65	0.51	157	0.55	302	0.54	0.48—0.60
15	Shop workers	90	0.46	25	0.62	1	0.97	31	0.69	51	0.58	198	0.54	0.47—0.62
16	Farmers	621	1.56	952	1.53	10	2.18	578	1.45	978	1.68	3 139	1.57	1.51—1.62
17	Gardeners	69	1.25	120	1.53	[0.15]	0.00	133	1.44	355	1.76	677	1.58	1.47—1.71
18	Fishermen	57	3.33	14	1.79	1	0.51	232	1.92	80	3.65	384	2.27	2.05—2.51
19	Forestry workers	18	2.22	124	1.35	[0.02]	0.00	114	1.58	189	1.29	445	1.40	1.27—1.53
20	Miners and quarry workers	3	1.27	21	1.44	[0.03]	0.00	29	1.56	45	1.28	98	1.39	1.13—1.69
21	Seamen	28	1.58	23	1.25	[0.62]	0.00	92	1.06	42	1.42	185	1.21	1.05—1.40
22	Transport workers	34	0.82	44	0.76	[1.44]	0.00	35	0.74	91	0.95	204	0.84	0.73—0.96
23	Drivers	199	1.54	156	0.91	2	1.06	127	1.00	262	1.14	746	1.13	1.05—1.22
24	Postal workers	22	0.86	9	0.34	[0.27]	0.00	19	0.73	32	0.61	82	0.63	0.50—0.78
25	Textile workers	12	0.50	15	0.78	[0.50]	0.00	22	0.75	48	0.74	97	0.70	0.57—0.86
26	Shoe and leather workers	2	0.34	3	0.35	[0.11]	0.00	10	0.76	17	0.62	32	0.58	0.39—0.82
27	Smelting workers	44	0.87	29	1.02	1	1.54	40	1.03	81	0.81	195	0.89	0.78—1.03
28	Mechanics	113	0.81	94	0.57	[1.67]	0.00	118	0.68	376	0.90	701	0.78	0.73—0.84
29	Plumbers	9	0.73	20	0.73	[0.30]	0.00	13	0.67	38	0.79	80	0.74	0.59—0.92
30	Welders	–	–	12	0.53	[0.10]	0.00	26	1.27	47	0.93	85	0.91	0.72—1.12
31	Electrical workers	19	0.59	50	0.75	1	1.05	70	0.93	132	0.97	272	0.87	0.77—0.98
32	Wood workers	100	1.01	216	1.06	2	1.83	248	1.15	321	1.02	887	1.06	0.99—1.13
33	Painters	18	0.57	30	0.73	[0.41]	0.00	24	0.65	45	0.51	117	0.59	0.49—0.71
34	"Other construction workers"	255	2.05	162	1.21	3	1.49	58	1.39	248	1.46	726	1.54	1.43—1.65
35	Bricklayers	42	1.18	18	0.84	–	–	26	1.19	31	0.75	117	0.98	0.81—1.17
36	Printers	5	0.23	7	0.44	[0.31]	0.00	6	0.29	18	0.41	36	0.35	0.25—0.49
37	Chemical process workers	24	1.14	29	1.00	1	4.70	62	1.22	86	1.12	202	1.14	0.99—1.31
38	Food workers	64	0.95	20	0.94	3	1.60	46	0.82	57	0.77	190	0.86	0.75—0.99
39	Beverage workers	10	1.28	[1.51]	0.00	[0.03]	0.00	[0.39]	0.00	6	1.33	16	1.12	0.64—1.82
40	Tobacco workers	2	1.45	1	4.23	[0.00]	0.00	1	1.08	[0.31]	0.00	4	1.40	0.38—3.59
41	Glass makers etc	52	1.30	28	0.92	[0.32]	0.00	21	0.82	106	1.32	207	1.17	1.02—1.34
42	Packers	42	1.18	81	1.20	[1.08]	0.00	71	0.83	161	1.05	355	1.03	0.93—1.15
43	Engine operators	55	1.54	88	1.08	[1.22]	0.00	42	0.99	131	1.14	316	1.15	1.03—1.28
44	Public safety workers	20	0.58	30	0.61	2	2.13	25	0.72	46	0.72	123	0.67	0.56—0.80
45	Cooks and stewards	2	0.82	[2.53]	0.00	[0.39]	0.00	15	1.05	9	0.82	26	0.85	0.56—1.25
46	Domestic assistants	[0.03]	0.00	[0.22]	0.00	[0.00]	0.00	[0.10]	0.00	[0.68]	0.00	[1.02]	0.00	0.00—3.61
47	Waiters	[4.95]	0.00	1	0.43	[0.03]	0.00	3	0.46	3	0.53	7	0.36	0.14—0.74
48	Building caretakers	33	0.92	34	0.75	1	2.02	15	0.82	71	1.21	154	0.97	0.83—1.14
49	Chimney sweeps	1	1.14	6	1.78	–	–	[1.84]	0.00	4	1.07	11	1.12	0.56—2.00
50	Hairdressers	3	0.29	[0.92]	0.00	[0.05]	0.00	3	0.56	7	0.47	13	0.41	0.22—0.70
51	Launderers	2	0.39	1	1.11	[0.05]	0.00	3	0.93	4	0.38	10	0.50	0.24—0.93
52	Military personnel	4	0.24	8	0.61	–	–	19	0.76	35	0.95	66	0.72	0.55—0.91
53	"Other workers"	132	1.25	53	0.98	3	0.76	238	1.42	251	1.34	677	1.31	1.21—1.41
54	Economically inactive	169	1.68	444	1.28	6	2.24	87	0.95	261	0.94	967	1.18	1.11—1.26
1–54	All categories	2 645	1.00	3 231	1.00	45	1.00	2 996	1.00	5 560	1.00	14 477	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 5. Observed number of lip cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	[1.17]	0.00	4	1.33	[0.02]	0.00	1	1.63	6	1.08	11	1.06	0.53—1.90
2	Laboratory assistants	[0.82]	0.00	1	0.54	[0.03]	0.00	[0.77]	0.00	1	0.64	2	0.40	0.05—1.44
3	Physicians	[0.41]	0.00	1	1.49	[0.00]	0.00	[0.31]	0.00	1	0.79	2	0.75	0.09—2.72
4	Dentists	[0.35]	0.00	[1.17]	0.00	[0.00]	0.00	[0.26]	0.00	1	1.00	1	0.36	0.01—2.00
5	Nurses	6	0.83	12	1.28	[0.13]	0.00	5	0.83	21	1.24	44	1.11	0.81—1.49
6	Assistant nurses	12	**2.44**	11	0.96	[0.18]	0.00	7	1.17	34	1.17	64	1.24	0.95—1.58
7	"Other health workers"	2	0.48	7	0.82	[0.04]	0.00	8	1.35	18	**1.82**	35	1.23	0.86—1.71
8	Teachers	15	1.68	14	0.70	[0.22]	0.00	7	0.62	36	0.95	72	0.92	0.72—1.16
9	Religious workers etc	1	0.83	5	0.77	[0.03]	0.00	3	1.05	8	0.64	17	0.74	0.43—1.18
10	Artistic workers	1	1.53	[1.41]	0.00	[0.03]	0.00	[0.86]	0.00	2	0.83	3	0.56	0.12—1.64
11	Journalists	[0.13]	0.00	1	1.01	[0.01]	0.00	[0.23]	0.00	2	1.79	3	1.22	0.25—3.55
12	Administrators	2	0.53	5	1.58	1	38.52	1	0.35	6	1.08	15	0.97	0.54—1.60
13	Clerical workers	34	0.97	46	0.76	[0.68]	0.00	24	0.68	108	1.17	212	0.94	0.83—1.08
14	Sales agents	2	5.96	9	0.81	[0.08]	0.00	6	1.14	12	0.89	29	0.96	0.64—1.38
15	Shop workers	20	0.81	31	0.80	[0.48]	0.00	36	1.19	59	1.02	146	0.96	0.81—1.13
16	Farmers	7	**0.39**	40	1.25	[0.40]	0.00	21	0.96	[5.37]	**0.00**	68	0.88	0.68—1.12
17	Gardeners	2	0.88	102	1.18	[0.01]	0.00	16	1.24	16	1.07	136	1.17	0.99—1.38
18	Fishermen	[0.09]	0.00	[0.17]	0.00	[0.01]	0.00	1	6.40	[0.05]	0.00	1	2.09	0.05—11.65
19	Forestry workers	[0.02]	0.00	[0.31]	0.00	[0.00]	0.00	[0.23]	0.00	[0.33]	0.00	[0.90]	0.00	0.00—4.12
20	Miners and quarry workers	[0.00]	0.00	[0.15]	0.00	[0.00]	0.00	[0.01]	0.00	[0.08]	0.00	[0.24]	0.00	0.00—15.42
21	Seamen	–	–	[0.02]	0.00	–	–	[0.04]	0.00	[0.01]	0.00	[0.07]	0.00	0.00—55.30
22	Transport workers	[0.02]	0.00	1	0.45	[0.02]	0.00	[0.16]	0.00	3	3.33	4	1.20	0.33—3.06
23	Drivers	1	1.67	[0.77]	0.00	[0.01]	0.00	[0.61]	0.00	3	1.36	4	0.95	0.26—2.44
24	Postal workers	2	1.55	6	0.49	[0.16]	0.00	12	1.74	16	0.99	36	0.98	0.68—1.35
25	Textile workers	5	0.62	29	1.00	[0.34]	0.00	7	0.61	38	1.11	79	0.95	0.76—1.19
26	Shoe and leather workers	[0.58]	0.00	3	0.85	[0.02]	0.00	[0.80]	0.00	[2.58]	0.00	3	0.40	0.08—1.17
27	Smelting workers	[0.14]	0.00	[0.85]	0.00	[0.00]	0.00	[0.09]	0.00	[0.68]	0.00	[1.75]	0.00	0.00—2.10
28	Mechanics	1	0.74	3	0.90	[0.00]	0.00	[0.96]	0.00	4	0.58	8	0.64	0.28—1.26
29	Plumbers	[0.02]	0.00	[0.01]	0.00	–	–	[0.01]	0.00	[0.01]	0.00	[0.04]	0.00	0.00—93.16
30	Welders	–	–	[0.21]	0.00	[0.00]	0.00	[0.07]	0.00	[0.26]	0.00	[0.54]	0.00	0.00—6.86
31	Electrical workers	1	0.53	2	1.20	[0.00]	0.00	2	1.96	2	0.52	7	0.83	0.34—1.72
32	Wood workers	[0.64]	0.00	8	1.05	[0.00]	0.00	[0.35]	0.00	2	1.75	10	1.03	0.49—1.89
33	Painters	[0.02]	0.00	2	2.41	[0.00]	0.00	[0.08]	0.00	[0.31]	0.00	2	1.61	0.20—5.82
34	"Other construction workers"	[0.02]	0.00	6	1.79	[0.00]	0.00	[0.03]	0.00	[0.04]	0.00	6	1.74	0.64—3.79
35	Bricklayers	[0.00]	0.00	[0.10]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.11]	0.00	0.00—34.41
36	Printers	1	1.38	3	0.88	[0.03]	0.00	2	2.12	4	1.39	10	1.25	0.60—2.31
37	Chemical process workers	[1.16]	0.00	4	2.15	[0.01]	0.00	2	2.38	1	0.43	7	1.13	0.45—2.33
38	Food workers	4	0.70	9	0.89	1	1.58	10	1.80	8	1.14	32	1.10	0.75—1.56
39	Beverage workers	[0.51]	0.00	[0.59]	0.00	[0.00]	0.00	[0.05]	0.00	1	2.27	1	0.63	0.02—3.49
40	Tobacco workers	2	2.81	[0.34]	0.00	–	–	[0.19]	0.00	[0.27]	0.00	2	1.33	0.16—4.80
41	Glass makers etc	[1.35]	0.00	8	1.20	[0.02]	0.00	3	1.67	10	1.63	21	1.31	0.81—2.01
42	Packers	1	2.52	16	1.34	[0.07]	0.00	5	1.15	6	0.65	28	1.07	0.71—1.55
43	Engine operators	[0.01]	0.00	5	2.76	[0.00]	0.00	[0.06]	0.00	1	1.76	6	2.45	0.90—5.33
44	Public safety workers	[0.04]	0.00	1	2.45	[0.01]	0.00	[0.58]	0.00	1	1.33	2	1.11	0.13—4.02
45	Cooks and stewards	[0.02]	0.00	13	0.96	[0.26]	0.00	7	1.09	8	0.58	28	0.82	0.55—1.19
46	Domestic assistants	18	**1.96**	16	1.24	[0.08]	0.00	20	1.22	37	1.04	91	1.23	0.99—1.51
47	Waiters	2	1.37	2	**0.19**	[0.02]	0.00	7	1.05	15	1.05	26	0.79	0.52—1.16
48	Building caretakers	30	1.14	59	1.22	[0.51]	0.00	21	0.73	45	1.23	155	1.10	0.94—1.29
49	Chimney sweeps	[0.00]	0.00	[0.02]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.03]	0.00	0.00—125.55
50	Hairdressers	1	0.62	2	0.52	[0.02]	0.00	[1.70]	0.00	6	1.01	9	0.69	0.31—1.30
51	Launderers	2	0.67	3	0.72	[0.08]	0.00	3	1.20	5	0.67	13	0.75	0.40—1.29
52	Military personnel	[0.01]	0.00	[0.02]	0.00	–	–	[0.01]	0.00	[0.02]	0.00	[0.06]	0.00	0.00—59.73
53	"Other workers"	11	1.48	13	0.93	[0.47]	0.00	13	0.88	20	1.23	57	1.08	0.81—1.39
54	Economically inactive	208	1.01	365	1.01	5	2.71	204	1.04	718	0.96	1 500	0.99	0.94—1.04
1–54	All categories	394	1.00	868	1.00	7	1.00	454	1.00	1 285	1.00	3 008	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

men. A small increase has been seen during the period.

Consistently high SIRs for men were observed among waiters (SIR 4.43, 3.18–6.01), beverage manufacturing workers, cooks and stewards, hairdressers, and artistic workers (Table 6). The Nordic combined SIR was elevated for journalists, based on elevations in Finland, Norway and Sweden. Seamen had elevated risks in Denmark and Norway. Low SIRs were observed among male farmers (0.51, 0.45–0.57), gardeners, forestry workers, teachers and fishermen.

High SIRs among women were seen in artistic workers (driven by 4 cases in Denmark) and waiters (Table 7). Clerical workers also had a significant excess, driven by Sweden and Denmark. In Sweden there were seven cases of tongue cancer among chemical process workers (which was not observed among males). Consistently low SIRs were observed among nurses (0.69, 0.49–0.95) and launderers and dry cleaning workers (0.50, 0.24–0.93).

Comment. Both tobacco and alcohol are established risk factors, while the consumption of fruit and/or vegetables has frequently been seen to reduce risk [50]. Infection with human papilloma virus entails an increased risk. There are no established occupational risk factors for cancer of the tongue, although it cannot be excluded that exposure to inhaled organic or inorganic dust may play a role. The high risk groups identified in the present study are mostly groups where smoking and drinking prevalence also has been shown to be high.. For male hairdressers and female chemical process workers, it is possible that occupational exposures contribute to risk.

Cancer of the salivary glands

Cancer in the salivary glands, mainly seen in the parotid gland, is rare. The rates have been stable through the period both among men and women, with the exception of higher rates seen among Danish men and women during the 1960s (Figure 14).

At the combined Nordic level no male occupation had a significantly elevated risk. At the national level, physicians in Norway (SIR 2.91, 95% CI 1.26–5.73) and dentists in Denmark (4.61, 1.26–11.81) had high SIRs. Forestry workers, wood workers, and smelter and metal foundry workers all had low risks (Table 8).

Among women, clerical workers had a combined SIR of 1.14 (1.02–1.28), driven by the large number of cases in Sweden. Consistently low SIRs were seen in the group of other health and medical workers (Table 9).

Comment. Therapeutic and diagnostic radiation and UV radiation to the head and neck are established risk factors for cancer of the salivary glands [50]. Alcohol, tobacco, and viral infections play a minor role, if any. The observed occupational variations in risk are most probably due to chance.

Cancer of the oral cavity

In both men and women, cancer of the mouth has increased by approximately 50% in Finland, Norway and Sweden, and with 200% in Denmark (Figure 15).

Among men, elevated risks were seen for waiters (SIR 5.05, 95% CI 3.91–6.41), cooks and stewards, seamen, journalists and artistic workers. Low risks were observed for farmers (0.55, 0.50–0.60), gardeners, teachers and forestry workers (Table 10).

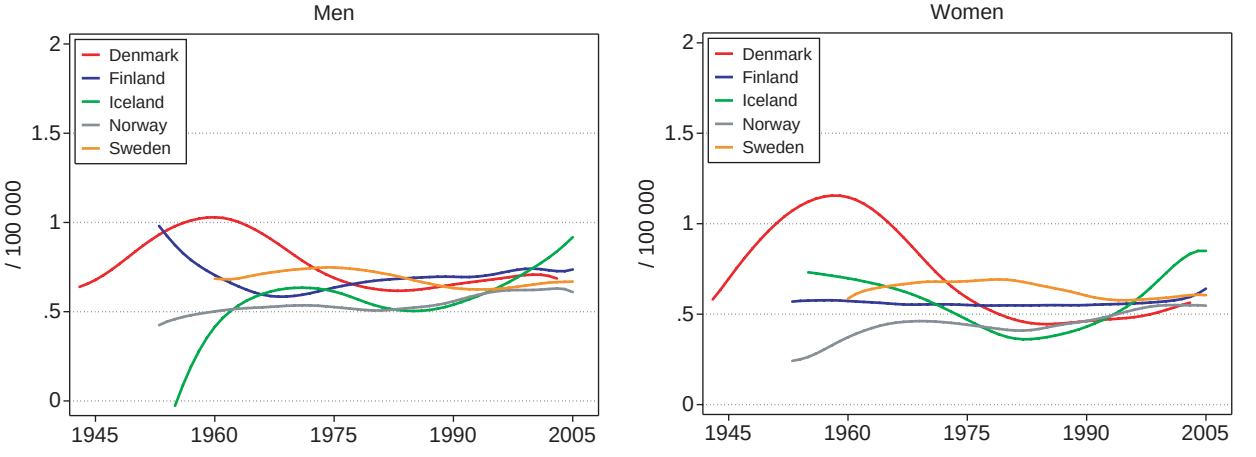


Figure 14. Age standardised (World) incidence rates for cancer of the salivary glands 1943–2005, by country and gender. Modified from NORDCAN [49].

Table 6. Observed number of cancer of the tongue among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	46	0.74	59	0.85	[0.56]	0.00	40	0.76	191	0.87	336	0.83	0.75—0.92
2	Laboratory assistants	2	1.65	4	2.21	[0.11]	0.00	1	0.42	2	1.30	9	1.28	0.58—2.42
3	Physicians	3	0.63	4	1.00	[0.20]	0.00	8	1.26	12	1.13	27	1.04	0.68—1.51
4	Dentists	1	0.65	3	3.72	[0.05]	0.00	3	1.07	9	1.84	16	1.59	0.91—2.57
5	Nurses	[0.08]	0.00	[0.32]	0.00	[0.00]	0.00	[0.44]	0.00	[1.00]	0.00	[1.85]	0.00	0.00—2.00
6	Assistant nurses	1	0.65	[0.32]	0.00	[0.03]	0.00	[1.01]	0.00	5	1.24	6	0.87	0.32—1.88
7	"Other health workers"	1	0.24	2	0.55	[0.06]	0.00	4	1.61	8	0.93	15	0.79	0.44—1.31
8	Teachers	17	0.61	18	0.66	1	1.30	14	0.37	46	0.77	96	0.63	0.51—0.76
9	Religious workers etc	11	1.10	17	1.02	[0.51]	0.00	15	0.82	44	0.91	87	0.93	0.74—1.15
10	Artistic workers	9	2.79	9	1.69	1	7.11	9	1.74	28	2.07	56	2.05	1.55—2.66
11	Journalists	1	0.62	7	2.73	[0.08]	0.00	3	1.26	13	2.04	24	1.84	1.18—2.75
12	Administrators	71	1.12	40	1.01	2	1.66	72	1.17	93	1.20	278	1.14	1.02—1.29
13	Clerical workers	23	0.78	20	0.81	2	1.42	61	1.33	89	1.04	195	1.04	0.90—1.20
14	Sales agents	16	1.01	40	1.08	1	1.42	58	1.12	165	1.30	280	1.21	1.07—1.35
15	Shop workers	66	1.06	27	1.57	[0.51]	0.00	21	0.96	59	1.45	173	1.21	1.05—1.41
16	Farmers	36	0.33	107	0.77	3	1.52	58	0.46	79	0.44	283	0.51	0.45—0.57
17	Gardeners	11	0.71	15	0.64	[0.07]	0.00	20	0.62	36	0.51	82	0.58	0.46—0.71
18	Fishermen	4	0.65	1	0.52	2	1.44	27	0.65	6	0.80	40	0.68	0.49—0.93
19	Forestry workers	[2.21]	0.00	26	0.94	[0.01]	0.00	16	0.69	20	0.38	62	0.59	0.45—0.76
20	Miners and quarry workers	[0.70]	0.00	4	0.87	[0.02]	0.00	7	0.97	12	0.88	23	0.88	0.56—1.32
21	Seamen	17	2.33	5	0.79	[0.35]	0.00	72	1.86	14	1.14	108	1.66	1.38—2.01
22	Transport workers	9	0.65	15	0.88	[0.65]	0.00	20	1.06	37	0.92	81	0.89	0.71—1.11
23	Drivers	50	1.04	74	1.21	1	0.99	77	1.37	115	1.07	317	1.16	1.04—1.29
24	Postal workers	7	0.69	11	1.21	[0.12]	0.00	12	1.15	25	1.08	55	1.04	0.78—1.35
25	Textile workers	9	1.21	7	1.30	[0.21]	0.00	7	0.68	27	1.18	50	1.08	0.80—1.43
26	Shoe and leather workers	2	1.16	1	0.43	[0.04]	0.00	7	1.66	11	1.28	21	1.24	0.77—1.90
27	Smelting workers	19	0.98	5	0.58	[0.30]	0.00	13	0.87	41	1.08	78	0.96	0.76—1.20
28	Mechanics	59	1.16	56	0.90	[1.00]	0.00	80	1.02	173	0.90	368	0.96	0.86—1.06
29	Plumbers	5	1.06	11	1.04	[0.16]	0.00	9	0.96	21	0.95	46	0.98	0.72—1.31
30	Welders	–	–	16	1.42	[0.06]	0.00	11	1.00	31	1.16	58	1.18	0.90—1.53
31	Electrical workers	14	1.07	17	0.61	1	1.61	36	1.03	76	1.10	144	0.99	0.84—1.16
32	Wood workers	25	0.75	40	0.71	1	1.86	64	0.78	78	0.66	208	0.72	0.63—0.82
33	Painters	12	1.06	20	1.57	1	4.76	14	1.01	46	1.31	93	1.27	1.03—1.56
34	"Other construction workers"	43	1.13	39	1.06	1	0.86	19	1.08	72	1.12	174	1.10	0.95—1.28
35	Bricklayers	17	1.40	8	1.36	–	–	15	1.85	15	0.99	55	1.33	1.00—1.73
36	Printers	9	1.07	6	0.89	[0.18]	0.00	16	1.72	27	1.32	58	1.28	0.98—1.66
37	Chemical process workers	7	1.06	13	1.28	[0.10]	0.00	18	1.00	32	1.12	70	1.10	0.86—1.39
38	Food workers	24	1.05	5	0.69	1	1.17	24	1.14	34	1.17	88	1.08	0.87—1.33
39	Beverage workers	11	4.03	[0.45]	0.00	[0.01]	0.00	[0.36]	0.00	7	4.34	18	3.49	2.07—5.51
40	Tobacco workers	2	5.35	[0.08]	0.00	[0.00]	0.00	[0.31]	0.00	1	7.14	3	3.31	0.68—9.67
41	Glass makers etc	10	0.77	12	1.11	[0.16]	0.00	9	0.82	33	1.01	64	0.95	0.73—1.21
42	Packers	15	1.38	27	1.30	[0.49]	0.00	49	1.56	82	1.44	173	1.44	1.24—1.67
43	Engine operators	13	1.03	33	1.06	1	1.45	21	1.01	42	0.81	110	0.94	0.78—1.13
44	Public safety workers	5	0.46	13	0.76	[0.47]	0.00	16	1.16	29	0.92	63	0.86	0.66—1.09
45	Cooks and stewards	6	6.02	3	2.27	1	4.22	13	1.90	17	2.74	40	2.56	1.83—3.49
46	Domestic assistants	[0.01]	0.00	[0.06]	0.00	[0.00]	0.00	[0.07]	0.00	2	2.67	2	2.26	0.27—8.16
47	Waiters	11	5.62	4	2.97	[0.03]	0.00	13	4.64	13	4.16	41	4.43	3.18—6.01
48	Building caretakers	13	1.17	12	0.90	[0.19]	0.00	9	1.22	23	0.98	57	1.03	0.78—1.33
49	Chimney sweeps	1	2.94	[0.99]	0.00	–	–	2	2.73	3	1.71	6	1.57	0.58—3.42
50	Hairdressers	7	2.24	[0.30]	0.00	[0.03]	0.00	5	2.46	12	2.16	24	2.17	1.39—3.23
51	Launderers	[1.54]	0.00	1	3.28	[0.02]	0.00	[1.19]	0.00	3	0.76	4	0.57	0.16—1.46
52	Military personnel	7	0.99	5	0.77	–	–	12	0.96	20	1.11	44	1.00	0.72—1.34
53	"Other workers"	76	2.06	28	1.75	1	0.55	46	0.80	66	0.96	217	1.20	1.05—1.37
54	Economically inactive	49	1.84	111	1.46	2	1.39	55	1.69	184	1.59	401	1.59	1.44—1.75
1–54	All categories	873	1.00	1 001	1.00	23	1.00	1 201	1.00	2 329	1.00	5 427	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 7. Observed number of cancer of the tongue among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	5	3.01	3	0.59	[0.05]	0.00	[0.97]	0.00	3	0.42	11	0.73	0.37—1.31
2	Laboratory assistants	1	0.81	2	0.72	[0.06]	0.00	1	0.86	1	0.41	5	0.65	0.21—1.52
3	Physicians	[0.55]	0.00	1	0.78	[0.01]	0.00	[0.48]	0.00	2	1.14	3	0.74	0.15—2.15
4	Dentists	[0.49]	0.00	3	2.41	[0.01]	0.00	2	4.91	1	0.79	6	1.76	0.65—3.83
5	Nurses	9	0.93	9	0.64	[0.35]	0.00	8	0.86	12	**0.56**	38	**0.69**	0.49—0.95
6	Assistant nurses	4	0.56	17	1.24	[0.49]	0.00	7	0.77	30	0.77	58	0.84	0.64—1.08
7	"Other health workers"	6	1.08	10	0.90	[0.09]	0.00	6	0.66	12	0.91	34	0.87	0.60—1.22
8	Teachers	13	1.04	33	1.32	1	1.70	18	1.02	58	1.15	123	1.16	0.97—1.38
9	Religious workers etc	1	0.60	11	0.82	[0.09]	0.00	1	0.23	18	1.04	31	0.84	0.57—1.19
10	Artistic workers	4	**4.77**	3	1.41	[0.07]	0.00	2	1.54	4	1.26	13	1.73	0.92—2.96
11	Journalists	[0.19]	0.00	1	0.75	[0.02]	0.00	2	5.73	1	0.67	4	1.18	0.32—3.03
12	Administrators	4	0.80	3	0.66	[0.06]	0.00	6	1.38	4	0.54	17	0.80	0.46—1.27
13	Clerical workers	67	**1.34**	98	1.19	1	0.52	58	1.08	149	**1.27**	373	**1.22**	1.10—1.35
14	Sales agents	1	2.25	4	**0.34**	[0.20]	0.00	9	1.17	17	1.02	31	0.84	0.57—1.20
15	Shop workers	34	1.02	48	1.14	2	1.61	42	0.96	78	1.16	204	1.09	0.95—1.25
16	Farmers	10	**0.42**	24	0.94	2	2.19	36	1.19	5	0.71	77	0.88	0.70—1.10
17	Gardeners	3	0.99	63	0.87	[0.03]	0.00	14	0.79	15	0.85	95	0.86	0.69—1.05
18	Fishermen	[0.12]	0.00	1	5.95	[0.03]	0.00	[0.23]	0.00	[0.06]	0.00	1	1.64	0.04—9.15
19	Forestry workers	[0.03]	0.00	[0.32]	0.00	[0.01]	0.00	1	3.12	[0.40]	0.00	1	0.93	0.02—5.16
20	Miners and quarry workers	[0.00]	0.00	[0.13]	0.00	[0.00]	0.00	[0.02]	0.00	[0.10]	0.00	[0.25]	0.00	0.00—14.66
21	Seamen	–	–	[0.04]	0.00	[0.00]	0.00	[0.05]	0.00	[0.01]	0.00	[0.11]	0.00	0.00—33.46
22	Transport workers	[0.03]	0.00	[2.00]	0.00	[0.03]	0.00	[0.25]	0.00	[1.11]	0.00	[3.43]	0.00	0.00—1.08
23	Drivers	3	3.56	2	1.97	[0.02]	0.00	[0.92]	0.00	2	0.67	7	1.21	0.49—2.49
24	Postal workers	2	1.14	12	0.96	[0.44]	0.00	6	0.57	22	1.13	42	0.94	0.68—1.27
25	Textile workers	10	0.90	26	0.93	[0.80]	0.00	14	0.86	46	1.20	96	1.01	0.82—1.24
26	Shoe and leather workers	1	1.21	2	0.58	[0.04]	0.00	2	1.74	[2.88]	0.00	5	0.60	0.19—1.40
27	Smelting workers	[0.20]	0.00	2	2.48	[0.00]	0.00	[0.14]	0.00	[0.87]	0.00	2	0.99	0.12—3.57
28	Mechanics	1	0.50	[3.74]	**0.00**	[0.01]	0.00	2	1.42	10	1.16	13	0.82	0.44—1.41
29	Plumbers	[0.02]	0.00	[0.01]	0.00	–	–	[0.01]	0.00	[0.02]	0.00	[0.05]	0.00	0.00—68.22
30	Welders	–	–	[0.31]	0.00	[0.00]	0.00	[0.11]	0.00	1	2.78	1	1.29	0.03—7.17
31	Electrical workers	2	0.71	4	1.57	[0.01]	0.00	1	0.67	1	0.21	8	0.68	0.30—1.35
32	Wood workers	1	1.07	10	1.43	[0.01]	0.00	[0.52]	0.00	1	0.67	12	1.21	0.62—2.11
33	Painters	[0.04]	0.00	1	1.20	[0.00]	0.00	[0.11]	0.00	[0.39]	0.00	1	0.73	0.02—4.05
34	"Other construction workers"	1	36.64	3	1.10	[0.00]	0.00	[0.05]	0.00	[0.06]	0.00	4	1.40	0.38—3.58
35	Bricklayers	[0.01]	0.00	[0.10]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.11]	0.00	0.00—34.93
36	Printers	2	1.91	7	1.93	[0.06]	0.00	[1.41]	0.00	7	1.97	16	1.65	0.94—2.68
37	Chemical process workers	[1.64]	0.00	[1.82]	0.00	[0.03]	0.00	1	0.82	7	**2.53**	8	1.07	0.46—2.11
38	Food workers	11	1.36	7	0.74	3	1.92	7	0.89	10	1.22	38	1.08	0.77—1.48
39	Beverage workers	2	2.66	[0.52]	0.00	[0.00]	0.00	[0.07]	0.00	[0.52]	0.00	2	1.07	0.13—3.87
40	Tobacco workers	[1.04]	0.00	[0.30]	0.00	–	–	[0.28]	0.00	[0.32]	0.00	[1.93]	0.00	0.00—1.91
41	Glass makers etc	[1.99]	0.00	7	1.05	[0.04]	0.00	2	0.76	13	1.77	22	1.18	0.74—1.78
42	Packers	2	3.54	13	1.11	1	6.62	7	1.12	12	1.09	35	1.18	0.82—1.64
43	Engine operators	[0.02]	0.00	1	0.52	[0.00]	0.00	[0.10]	0.00	[0.79]	0.00	1	0.35	0.01—1.96
44	Public safety workers	[0.06]	0.00	[0.48]	0.00	[0.03]	0.00	[0.80]	0.00	[1.09]	0.00	[2.47]	0.00	0.00—1.50
45	Cooks and stewards	[0.02]	0.00	12	0.89	[0.58]	0.00	11	1.21	16	0.98	39	0.99	0.70—1.35
46	Domestic assistants	9	0.72	16	1.07	[0.17]	0.00	26	1.09	31	**0.66**	82	0.84	0.66—1.04
47	Waiters	5	2.33	15	1.31	[0.07]	0.00	13	1.35	22	1.36	55	**1.39**	1.05—1.81
48	Building caretakers	36	1.00	47	1.03	1	0.82	44	1.06	49	1.08	177	1.04	0.90—1.21
49	Chimney sweeps	[0.00]	0.00	[0.02]	0.00	–	–	[0.01]	0.00	[0.00]	0.00	[0.03]	0.00	0.00—115.41
50	Hairdressers	4	1.79	4	0.90	[0.06]	0.00	4	1.60	10	1.39	22	1.34	0.84—2.03
51	Launderers	1	0.25	1	0.28	[0.21]	0.00	1	0.28	7	0.83	10	**0.50**	0.24—0.93
52	Military personnel	[0.02]	0.00	1	19.70	–	–	[0.01]	0.00	[0.04]	0.00	1	8.19	0.21—45.61
53	"Other workers"	13	1.26	21	1.46	2	1.65	18	0.84	17	0.84	71	1.05	0.82—1.33
54	Economically inactive	262	0.97	291	0.97	4	1.00	296	1.02	845	0.97	1 698	0.98	0.94—1.03
1–54	All categories	530	1.00	839	1.00	17	1.00	668	1.00	1 539	1.00	3 593	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 8. Observed number of cancer of the salivary glands among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	25	0.71	47	1.26	1	2.63	16	0.74	147	1.01	236	0.98	0.86—1.11
2	Laboratory assistants	[0.70]	0.00	1	1.06	[0.07]	0.00	1	0.98	1	1.23	3	0.85	0.17—2.47
3	Physicians	1	0.34	1	0.46	[0.15]	0.00	8	**2.91**	8	1.16	18	1.21	0.72—1.91
4	Dentists	4	**4.61**	[0.45]	0.00	[0.04]	0.00	1	0.81	2	0.61	7	1.19	0.48—2.45
5	Nurses	[0.04]	0.00	[0.15]	0.00	[0.00]	0.00	[0.15]	0.00	1	1.92	1	1.16	0.03—6.48
6	Assistant nurses	2	2.37	1	7.02	[0.02]	0.00	[0.46]	0.00	2	0.79	5	1.25	0.41—2.92
7	"Other health workers"	6	2.42	1	0.49	[0.05]	0.00	2	1.87	5	0.87	14	1.23	0.67—2.06
8	Teachers	19	1.21	21	1.39	[0.55]	0.00	18	1.15	43	1.12	101	1.18	0.97—1.44
9	Religious workers etc	5	0.77	12	1.40	[0.38]	0.00	6	0.76	34	1.11	57	1.06	0.80—1.37
10	Artistic workers	[1.99]	0.00	1	0.34	[0.10]	0.00	3	1.31	13	1.44	17	1.04	0.61—1.67
11	Journalists	1	1.06	[1.42]	0.00	[0.06]	0.00	[1.02]	0.00	6	1.41	7	0.91	0.36—1.87
12	Administrators	38	0.97	30	1.35	[1.04]	0.00	33	1.21	55	1.00	156	1.08	0.92—1.26
13	Clerical workers	32	**1.84**	15	1.03	1	0.85	17	0.82	65	1.08	130	1.14	0.96—1.36
14	Sales agents	3	**0.33**	17	0.80	1	1.72	26	1.10	107	**1.22**	154	1.08	0.92—1.27
15	Shop workers	52	1.32	14	1.49	1	2.52	15	1.58	23	0.82	105	1.21	1.00—1.47
16	Farmers	64	0.84	101	1.08	1	0.58	65	1.02	124	0.87	355	0.94	0.85—1.04
17	Gardeners	4	**0.37**	12	0.84	[0.06]	0.00	14	0.88	56	1.04	86	0.91	0.73—1.12
18	Fishermen	5	1.39	2	1.59	1	1.06	17	0.83	9	1.58	34	1.06	0.74—1.49
19	Forestry workers	1	0.64	9	0.54	[0.01]	0.00	11	0.94	27	0.69	48	**0.69**	0.51—0.92
20	Miners and quarry workers	[0.47]	0.00	4	1.48	[0.01]	0.00	7	2.08	5	0.51	16	0.97	0.56—1.58
21	Seamen	2	0.51	6	1.65	1	3.84	17	0.99	4	0.45	30	0.89	0.60—1.27
22	Transport workers	5	0.60	13	1.26	[0.55]	0.00	9	1.02	45	**1.56**	72	1.26	0.99—1.59
23	Drivers	27	0.98	30	0.86	2	2.59	22	0.88	73	1.00	154	0.96	0.82—1.12
24	Postal workers	7	1.28	8	1.52	[0.10]	0.00	10	**2.10**	17	1.06	42	1.33	0.96—1.79
25	Textile workers	5	1.04	3	0.89	[0.18]	0.00	9	1.78	20	1.16	37	1.21	0.85—1.67
26	Shoe and leather workers	2	1.68	[1.47]	0.00	[0.04]	0.00	[2.12]	0.00	6	0.89	8	0.69	0.30—1.36
27	Smelting workers	9	0.82	4	0.77	[0.25]	0.00	3	0.43	20	0.72	36	**0.71**	0.49—0.98
28	Mechanics	23	0.78	36	1.03	1	1.37	25	0.72	129	0.98	214	0.92	0.81—1.06
29	Plumbers	2	0.76	4	0.68	[0.12]	0.00	3	0.74	11	0.72	20	0.72	0.44—1.11
30	Welders	–	–	3	0.51	[0.04]	0.00	8	1.73	9	**0.51**	20	0.71	0.44—1.10
31	Electrical workers	8	1.13	11	0.73	1	2.28	18	1.16	59	1.28	97	1.15	0.94—1.41
32	Wood workers	18	0.89	30	0.86	1	2.32	39	1.01	65	**0.75**	153	**0.85**	0.72—0.99
33	Painters	4	0.61	10	1.31	[0.17]	0.00	2	0.31	23	0.91	39	0.85	0.60—1.16
34	"Other construction workers"	25	0.99	20	0.88	2	2.30	4	0.51	44	0.94	95	0.92	0.74—1.12
35	Bricklayers	12	1.64	1	0.27	–	–	6	1.56	9	0.81	28	1.08	0.72—1.56
36	Printers	4	0.84	3	0.81	[0.13]	0.00	9	**2.20**	14	1.01	30	1.13	0.76—1.61
37	Chemical process workers	4	0.94	6	1.03	[0.08]	0.00	7	0.81	19	0.91	36	0.91	0.64—1.26
38	Food workers	14	1.01	2	0.47	[0.70]	0.00	9	0.91	28	1.33	53	1.06	0.80—1.39
39	Beverage workers	1	0.60	1	3.77	[0.01]	0.00	[0.12]	0.00	2	1.68	4	1.22	0.33—3.14
40	Tobacco workers	[0.27]	0.00	[0.05]	0.00	[0.00]	0.00	[0.15]	0.00	[0.10]	0.00	[0.57]	0.00	0.00—6.49
41	Glass makers etc	3	0.37	5	0.81	[0.12]	0.00	2	0.41	31	1.34	41	0.97	0.69—1.31
42	Packers	10	1.38	8	0.64	[0.41]	0.00	14	0.94	36	0.86	68	0.89	0.69—1.12
43	Engine operators	10	1.34	13	0.75	[0.51]	0.00	11	1.24	34	0.95	68	0.97	0.76—1.23
44	Public safety workers	11	1.66	4	0.41	1	2.72	6	0.94	23	1.09	45	1.02	0.74—1.36
45	Cooks and stewards	1	1.82	[0.69]	0.00	[0.17]	0.00	3	1.02	5	1.26	9	1.08	0.50—2.06
46	Domestic assistants	[0.01]	0.00	[0.04]	0.00	[0.00]	0.00	[0.03]	0.00	[0.41]	0.00	[0.48]	0.00	0.00—7.67
47	Waiters	2	1.77	1	1.49	[0.02]	0.00	2	1.61	4	1.95	9	1.76	0.80—3.34
48	Building caretakers	11	1.51	5	0.62	[0.17]	0.00	4	1.21	19	1.15	39	1.10	0.79—1.51
49	Chimney sweeps	[0.19]	0.00	[0.59]	0.00	–	–	[0.33]	0.00	1	0.83	1	0.43	0.01—2.40
50	Hairdressers	4	1.95	[0.18]	0.00	[0.02]	0.00	[0.96]	0.00	3	0.73	7	0.96	0.39—1.98
51	Launderers	[1.02]	0.00	[0.18]	0.00	[0.02]	0.00	[0.56]	0.00	2	0.69	2	0.43	0.05—1.54
52	Military personnel	3	0.81	4	1.16	–	–	6	1.07	11	0.90	24	0.96	0.62—1.43
53	"Other workers"	26	1.16	16	1.66	1	0.66	32	1.15	52	1.03	127	1.14	0.95—1.35
54	Economically inactive	27	1.20	61	1.18	2	1.95	13	0.84	91	1.13	194	1.13	0.98—1.30
1–54	All categories	542	1.00	597	1.00	18	1.00	553	1.00	1 642	1.00	3 352	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 9. Observed number of cancer of the salivary glands among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	[1.35]	0.00	3	0.82	[0.05]	0.00	1	1.50	9	1.25	13	1.01	0.54—1.72
2	Laboratory assistants	[0.97]	0.00	3	1.53	[0.07]	0.00	2	2.46	1	0.44	6	0.98	0.36—2.14
3	Physicians	[0.46]	0.00	1	1.10	[0.01]	0.00	[0.34]	0.00	2	1.17	3	0.88	0.18—2.56
4	Dentists	[0.40]	0.00	[0.88]	0.00	[0.00]	0.00	1	3.51	2	1.60	3	1.06	0.22—3.11
5	Nurses	8	1.00	7	0.70	1	3.53	8	1.24	22	1.03	46	1.00	0.73—1.33
6	Assistant nurses	6	1.05	3	**0.31**	[0.36]	0.00	8	1.28	32	0.83	49	0.81	0.60—1.07
7	"Other health workers"	2	0.43	4	0.50	[0.08]	0.00	5	0.79	9	0.69	20	**0.63**	0.38—0.97
8	Teachers	7	0.69	15	0.84	[0.52]	0.00	10	0.82	52	1.07	84	0.94	0.75—1.17
9	Religious workers etc	[1.37]	0.00	12	1.26	[0.08]	0.00	5	1.69	11	0.66	28	0.91	0.61—1.32
10	Artistic workers	[0.71]	0.00	1	0.66	[0.06]	0.00	1	1.11	2	0.64	4	0.63	0.17—1.62
11	Journalists	[0.15]	0.00	1	1.05	[0.02]	0.00	[0.24]	0.00	1	0.68	2	0.71	0.09—2.55
12	Administrators	4	0.95	2	0.62	[0.04]	0.00	2	0.68	8	1.12	16	0.91	0.52—1.48
13	Clerical workers	45	1.10	58	0.99	2	1.34	42	1.11	145	**1.23**	292	**1.14**	1.02—1.28
14	Sales agents	[0.38]	0.00	9	1.08	[0.14]	0.00	6	1.14	15	0.90	30	0.98	0.66—1.39
15	Shop workers	30	1.07	24	0.81	[0.88]	0.00	28	0.91	68	0.97	150	0.94	0.80—1.10
16	Farmers	17	0.86	15	0.83	1	1.78	24	1.20	6	0.89	63	0.97	0.74—1.24
17	Gardeners	5	1.96	53	1.03	[0.02]	0.00	15	1.26	22	1.21	95	1.13	0.92—1.39
18	Fishermen	[0.10]	0.00	1	8.40	[0.03]	0.00	[0.16]	0.00	[0.06]	0.00	1	2.14	0.05—11.93
19	Forestry workers	[0.03]	0.00	[0.22]	0.00	[0.00]	0.00	[0.22]	0.00	1	2.47	1	1.13	0.03—6.32
20	Miners and quarry workers	[0.00]	0.00	[0.09]	0.00	–	–	[0.01]	0.00	[0.10]	0.00	[0.21]	0.00	0.00—17.97
21	Seamen	–	–	[0.03]	0.00	[0.00]	0.00	[0.04]	0.00	[0.01]	0.00	[0.08]	0.00	0.00—45.06
22	Transport workers	[0.03]	0.00	[1.43]	0.00	[0.02]	0.00	[0.17]	0.00	1	0.85	1	0.35	0.01—1.97
23	Drivers	[0.69]	0.00	1	1.39	[0.01]	0.00	[0.63]	0.00	1	0.34	2	0.40	0.05—1.45
24	Postal workers	[1.46]	0.00	10	1.13	1	3.55	5	0.68	23	1.15	39	1.03	0.73—1.41
25	Textile workers	12	1.30	15	0.75	[0.41]	0.00	9	0.78	31	0.77	67	0.82	0.64—1.05
26	Shoe and leather workers	[0.68]	0.00	2	0.82	[0.02]	0.00	1	1.21	3	0.97	6	0.85	0.31—1.85
27	Smelting workers	[0.16]	0.00	2	3.50	[0.00]	0.00	[0.10]	0.00	1	1.14	3	1.75	0.36—5.12
28	Mechanics	4	2.47	3	1.13	[0.01]	0.00	1	0.99	5	0.56	13	0.92	0.49—1.57
29	Plumbers	[0.02]	0.00	[0.01]	0.00	–	–	[0.01]	0.00	[0.01]	0.00	[0.05]	0.00	0.00—79.95
30	Welders	–	–	[0.22]	0.00	[0.00]	0.00	[0.08]	0.00	1	2.83	1	1.54	0.04—8.60
31	Electrical workers	1	0.44	[1.82]	0.00	[0.00]	0.00	[1.10]	0.00	1	0.20	2	**0.20**	0.02—0.71
32	Wood workers	[0.76]	0.00	5	1.01	[0.01]	0.00	1	2.75	1	0.67	7	0.92	0.37—1.90
33	Painters	[0.03]	0.00	[0.60]	0.00	[0.00]	0.00	[0.08]	0.00	1	2.52	1	0.91	0.02—5.05
34	"Other construction workers"	[0.02]	0.00	4	2.04	[0.00]	0.00	[0.03]	0.00	[0.05]	0.00	4	1.93	0.53—4.94
35	Bricklayers	[0.00]	0.00	[0.07]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.08]	0.00	0.00—47.70
36	Printers	[0.85]	0.00	3	1.16	[0.04]	0.00	[1.00]	0.00	4	1.09	7	0.86	0.35—1.77
37	Chemical process workers	1	0.74	1	0.78	[0.01]	0.00	1	1.13	1	0.35	4	0.62	0.17—1.59
38	Food workers	5	0.75	4	0.60	1	1.02	3	0.54	5	0.59	18	0.63	0.38—1.00
39	Beverage workers	2	3.25	[0.37]	0.00	[0.00]	0.00	[0.05]	0.00	2	3.75	4	2.56	0.70—6.55
40	Tobacco workers	[0.85]	0.00	[0.21]	0.00	–	–	1	4.98	[0.33]	0.00	1	0.63	0.02—3.51
41	Glass makers etc	[1.60]	0.00	4	0.84	[0.03]	0.00	2	1.06	7	0.91	13	0.82	0.43—1.40
42	Packers	1	2.15	6	0.72	[0.08]	0.00	5	1.13	9	0.79	21	0.85	0.52—1.30
43	Engine operators	[0.01]	0.00	1	0.73	[0.00]	0.00	[0.07]	0.00	[0.77]	0.00	1	0.45	0.01—2.50
44	Public safety workers	[0.05]	0.00	[0.34]	0.00	[0.02]	0.00	[0.53]	0.00	1	0.95	1	0.50	0.01—2.81
45	Cooks and stewards	[0.02]	0.00	11	1.14	1	3.25	6	0.96	18	1.08	36	1.10	0.77—1.52
46	Domestic assistants	18	**1.73**	6	0.57	[0.08]	0.00	17	1.04	45	0.98	86	1.03	0.82—1.27
47	Waiters	1	0.57	9	1.10	[0.04]	0.00	8	1.17	20	1.17	38	1.12	0.79—1.54
48	Building caretakers	33	1.10	29	0.90	2	2.97	34	1.19	50	1.10	148	1.08	0.92—1.27
49	Chimney sweeps	[0.00]	0.00	[0.02]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.02]	0.00	0.00—153.18
50	Hairdressers	[1.80]	0.00	4	1.26	[0.05]	0.00	2	1.12	9	1.21	15	1.05	0.59—1.74
51	Launderers	6	1.76	[2.51]	0.00	[0.09]	0.00	5	2.01	6	0.68	17	0.98	0.57—1.57
52	Military personnel	[0.02]	0.00	[0.03]	0.00	–	–	[0.01]	0.00	[0.03]	0.00	[0.10]	0.00	0.00—38.52
53	"Other workers"	5	0.59	12	1.17	1	1.38	13	0.87	18	0.88	49	0.89	0.66—1.18
54	Economically inactive	229	1.01	252	**1.19**	1	0.41	193	0.95	899	1.00	1 574	1.02	0.97—1.07
1–54	All categories	442	1.00	596	1.00	11	1.00	465	1.00	1 571	1.00	3 085	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

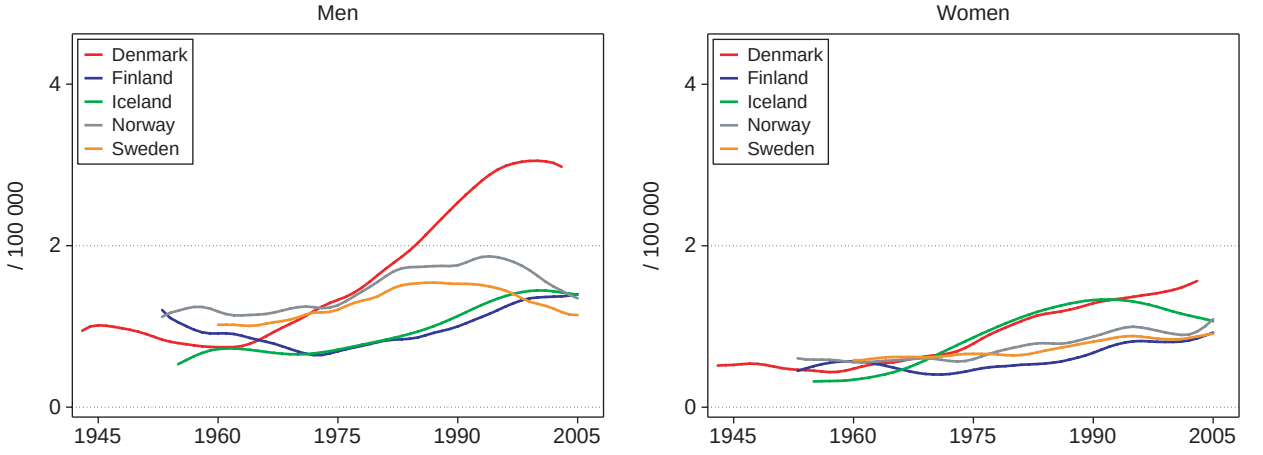


Figure 15. Age standardised (World) incidence rates for cancer of the oral cavity 1943–2005, by country and gender. Modified from NORDCAN [49].

Female journalists (2.82, 1.46–4.92), waiters, mechanics and iron metalworkers, launderers and dry cleaners, and the group packers, loaders and warehouse workers had elevated risks. Farmers, shoe and leather workers, and shop managers and assistants were low risk groups among the women (Table 11).

Comment. Tobacco and alcohol are the major risk factors for oral cancer, both separately and in combination [50]. Infection with human papilloma virus entails an increased risk [54], while a high consumption of fruit and/or vegetables reduces risk. Direct occupational exposures appear to have little effect [55].

Pharyngeal cancer

The incidence of pharyngeal cancer has increased by 50–100% for men and been relatively stable for women in all countries, except in Denmark, where rates have quadrupled among men and tripled among women (Figure 16).

Risk was consistently high among male waiters (SIR 6.22, 95% CI 5.16–7.50), beverage manufacture workers, cooks and stewards, chimney sweeps, artistic workers, seamen and journalists. Male hairdressers in Norway and Sweden had elevated risks. The low risk occupational categories comprise farmers (0.41, 0.38–0.45), forestry workers, gardeners, teachers, and physicians (Table 12).

Female tobacco workers, artistic workers and waiters had elevated risks in some, but not all, countries. Low risks were seen among teachers (0.64, 0.51–0.80), other health and medical workers and farmers (Table 13).

Subsite analyses of oropharynx (http://astra.cancer.fi/NOCCA/Incidence/oropharynx) and nasopharynx (http://astra.cancer.fi/NOCCA/Incidence/nasopharynx) in general gave similar results. Female laundry workers however had an elevated risk of nasopharyngeal cancer (2.04, 1.02–3.65).

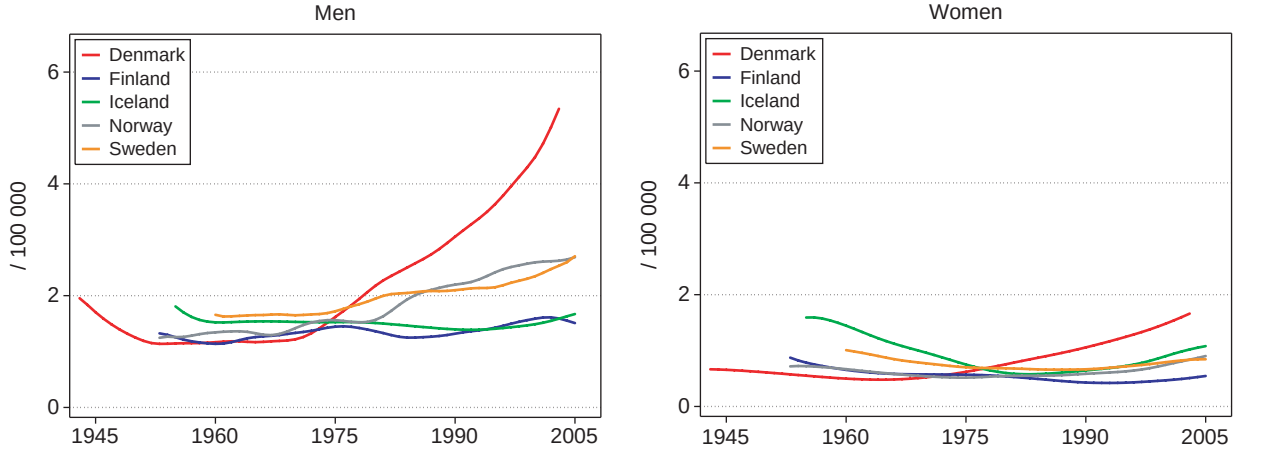


Figure 16. Age standardised (World) incidence rates for cancer of the pharynx 1943–2005, by country and gender. Modified from NORDCAN [49].

Table 10. Observed number of cancer of the oral cavity among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	105	0.87	55	0.79	2	2.43	40	0.57	262	0.85	464	0.82	0.74—0.89
2	Laboratory assistants	6	2.55	1	0.54	[0.15]	0.00	3	0.93	1	0.55	11	1.17	0.58—2.09
3	Physicians	9	0.95	5	1.22	[0.31]	0.00	4	0.46	14	0.97	32	0.87	0.59—1.22
4	Dentists	4	1.35	2	2.45	[0.10]	0.00	1	0.26	8	1.16	15	1.02	0.57—1.68
5	Nurses	[0.15]	0.00	[0.32]	0.00	[0.00]	0.00	1	2.09	1	1.04	2	1.05	0.13—3.78
6	Assistant nurses	3	1.02	[0.32]	0.00	[0.03]	0.00	3	2.10	2	0.39	8	0.81	0.35—1.60
7	"Other health workers"	4	0.49	3	0.82	[0.08]	0.00	4	1.20	9	0.76	20	0.74	0.45—1.14
8	Teachers	31	0.58	24	0.87	2	1.74	29	0.58	64	0.78	150	0.70	0.60—0.82
9	Religious workers etc	18	0.89	12	0.72	[0.70]	0.00	25	1.01	54	0.86	109	0.87	0.72—1.05
10	Artistic workers	9	1.40	14	2.59	[0.19]	0.00	7	0.98	30	1.59	60	1.58	1.20—2.03
11	Journalists	5	1.60	5	1.93	[0.11]	0.00	3	0.94	15	1.70	28	1.57	1.04—2.27
12	Administrators	132	1.04	31	0.77	1	0.57	81	0.95	131	1.15	376	1.02	0.92—1.13
13	Clerical workers	52	0.90	27	1.08	5	2.72	52	0.81	139	1.12	275	1.01	0.89—1.13
14	Sales agents	42	1.36	33	0.88	1	1.01	89	1.21	235	1.29	400	1.23	1.12—1.36
15	Shop workers	141	1.13	20	1.14	[0.67]	0.00	22	0.73	67	1.14	250	1.08	0.95—1.22
16	Farmers	92	0.40	89	0.64	1	0.38	134	0.70	153	0.53	469	0.55	0.50—0.60
17	Gardeners	20	0.62	16	0.67	[0.08]	0.00	35	0.72	75	0.68	146	0.68	0.58—0.80
18	Fishermen	17	1.42	[1.92]	0.00	1	0.51	57	0.92	9	0.78	84	0.94	0.75—1.16
19	Forestry workers	1	0.22	22	0.78	[0.02]	0.00	22	0.63	59	0.74	104	0.70	0.58—0.85
20	Miners and quarry workers	[1.44]	0.00	7	1.50	1	28.93	9	0.86	11	0.54	28	0.76	0.50—1.10
21	Seamen	38	2.75	11	1.72	1	2.00	98	1.81	43	2.37	191	2.05	1.78—2.36
22	Transport workers	30	1.10	14	0.82	[0.90]	0.00	25	0.91	57	0.96	126	0.95	0.80—1.13
23	Drivers	89	0.96	47	0.76	1	0.70	89	1.14	137	0.90	363	0.94	0.85—1.04
24	Postal workers	19	0.99	12	1.31	1	7.01	11	0.74	39	1.18	82	1.08	0.86—1.34
25	Textile workers	15	1.00	5	0.91	1	4.19	14	0.92	33	0.94	68	0.95	0.74—1.21
26	Shoe and leather workers	4	1.12	2	0.85	[0.05]	0.00	7	1.10	18	1.32	31	1.19	0.81—1.70
27	Smelting workers	42	1.12	4	0.46	1	2.51	19	0.88	46	0.81	112	0.90	0.74—1.08
28	Mechanics	90	0.91	80	1.27	[1.41]	0.00	105	0.96	269	0.98	544	0.99	0.91—1.08
29	Plumbers	17	1.87	11	1.02	[0.21]	0.00	19	1.48	26	0.82	73	1.13	0.88—1.42
30	Welders	–	–	18	1.56	[0.09]	0.00	8	0.54	33	0.89	59	0.93	0.71—1.20
31	Electrical workers	30	1.21	29	1.03	1	1.15	52	1.07	94	0.97	206	1.04	0.90—1.19
32	Wood workers	47	0.71	45	0.79	2	2.76	100	0.84	125	0.71	319	0.76	0.68—0.85
33	Painters	35	1.58	22	1.69	1	3.21	34	1.69	68	1.31	160	1.49	1.28—1.74
34	"Other construction workers"	93	1.20	47	1.26	1	0.64	35	1.42	113	1.18	289	1.22	1.09—1.37
35	Bricklayers	36	1.50	9	1.52	–	–	14	1.18	28	1.22	87	1.34	1.07—1.65
36	Printers	20	1.23	6	0.87	[0.28]	0.00	17	1.33	41	1.41	84	1.29	1.03—1.59
37	Chemical process workers	14	1.05	9	0.87	[0.13]	0.00	27	1.02	35	0.82	85	0.91	0.73—1.13
38	Food workers	39	0.86	11	1.49	2	2.12	35	1.15	48	1.10	135	1.06	0.89—1.25
39	Beverage workers	11	2.05	1	2.25	[0.01]	0.00	1	2.30	3	1.23	16	1.84	1.05—2.98
40	Tobacco workers	1	1.26	[0.09]	0.00	[0.00]	0.00	1	2.19	[0.20]	0.00	2	1.30	0.16—4.70
41	Glass makers etc	23	0.89	11	1.01	[0.19]	0.00	25	1.62	46	0.96	105	1.05	0.86—1.27
42	Packers	31	1.40	27	1.29	[0.57]	0.00	61	1.34	74	0.87	193	1.11	0.96—1.27
43	Engine operators	18	0.73	28	0.88	[0.96]	0.00	31	1.10	73	0.98	150	0.94	0.80—1.10
44	Public safety workers	26	1.17	13	0.75	[0.63]	0.00	22	1.12	43	0.98	104	1.00	0.83—1.22
45	Cooks and stewards	7	3.67	3	2.30	1	2.97	30	3.22	23	2.81	64	3.04	2.34—3.88
46	Domestic assistants	[0.02]	0.00	[0.05]	0.00	[0.00]	0.00	[0.08]	0.00	[0.76]	0.00	[0.92]	0.00	0.00—4.02
47	Waiters	30	7.98	4	3.01	[0.04]	0.00	9	2.31	24	5.65	67	5.05	3.91—6.41
48	Building caretakers	30	1.33	16	1.19	[0.22]	0.00	14	1.35	33	0.99	93	1.16	0.94—1.42
49	Chimney sweeps	2	3.07	1	1.00	–	–	1	0.96	6	2.40	10	1.93	0.92—3.54
50	Hairdressers	4	0.62	1	3.29	[0.05]	0.00	6	2.06	16	1.90	27	1.49	0.98—2.16
51	Launderers	2	0.64	1	3.26	[0.02]	0.00	2	1.15	4	0.66	9	0.80	0.37—1.52
52	Military personnel	12	0.90	5	0.76	–	–	17	0.97	34	1.33	68	1.08	0.84—1.37
53	"Other workers"	112	1.55	22	1.36	2	0.81	91	1.08	112	1.08	339	1.22	1.09—1.35
54	Economically inactive	82	1.42	130	1.72	2	1.20	71	1.55	312	1.90	597	1.73	1.60—1.87
1–54	All categories	1 740	1.00	1 011	1.00	31	1.00	1 712	1.00	3 395	1.00	7 889	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 11. Observed number of cancer of the oral cavity among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	5	1.32	5	1.04	[0.08]	0.00	[1.43]	0.00	8	0.81	18	0.90	0.53—1.43
2	Laboratory assistants	2	0.72	3	1.14	[0.12]	0.00	2	1.10	2	0.74	9	0.90	0.41—1.71
3	Physicians	[1.26]	0.00	1	0.86	[0.03]	0.00	1	1.34	3	1.33	5	0.92	0.30—2.14
4	Dentists	[1.12]	0.00	2	1.57	[0.01]	0.00	1	1.54	2	1.12	5	1.04	0.34—2.42
5	Nurses	20	0.90	19	1.44	[0.67]	0.00	11	0.76	22	0.73	72	0.89	0.70—1.13
6	Assistant nurses	16	1.00	13	0.97	[1.00]	0.00	15	1.05	46	0.88	90	0.93	0.75—1.14
7	"Other health workers"	8	0.63	9	0.84	[0.18]	0.00	12	0.83	15	0.86	44	0.79	0.58—1.06
8	Teachers	26	0.92	28	1.15	1	0.89	17	**0.62**	58	0.85	130	0.87	0.73—1.03
9	Religious workers etc	4	1.05	11	0.90	[0.18]	0.00	5	0.74	20	0.90	40	0.89	0.63—1.21
10	Artistic workers	2	1.02	1	0.50	[0.15]	0.00	3	1.45	11	**2.56**	17	1.62	0.95—2.60
11	Journalists	1	2.40	4	3.15	[0.03]	0.00	4	**7.35**	3	1.50	12	**2.82**	1.46—4.92
12	Administrators	11	0.95	4	0.92	[0.14]	0.00	9	1.31	7	0.71	31	0.95	0.64—1.34
13	Clerical workers	133	1.17	78	0.99	3	0.82	80	0.92	186	1.12	480	1.07	0.98—1.17
14	Sales agents	2	1.95	16	1.35	[0.45]	0.00	20	1.58	27	1.12	65	1.30	1.00—1.66
15	Shop workers	64	0.83	34	0.82	3	1.16	61	0.83	101	0.98	263	0.88	0.78—1.00
16	Farmers	27	**0.50**	24	0.86	1	0.47	43	0.84	13	1.34	108	**0.74**	0.62—0.90
17	Gardeners	4	0.57	57	**0.76**	[0.07]	0.00	29	0.95	32	1.18	122	0.87	0.73—1.04
18	Fishermen	[0.28]	0.00	1	6.01	[0.06]	0.00	[0.38]	0.00	1	11.21	2	2.07	0.25—7.48
19	Forestry workers	[0.07]	0.00	1	3.01	[0.01]	0.00	[0.56]	0.00	[0.58]	0.00	1	0.64	0.02—3.59
20	Miners and quarry workers	[0.00]	0.00	[0.14]	0.00	[0.00]	0.00	[0.03]	0.00	[0.14]	0.00	[0.31]	0.00	0.00—11.88
21	Seamen	–	–	[0.04]	0.00	[0.00]	0.00	[0.09]	0.00	[0.02]	0.00	[0.15]	0.00	0.00—25.34
22	Transport workers	1	12.98	2	1.00	[0.08]	0.00	[0.39]	0.00	2	1.23	5	1.20	0.39—2.81
23	Drivers	1	0.52	1	1.03	[0.03]	0.00	4	2.72	7	1.76	13	1.55	0.83—2.65
24	Postal workers	5	1.24	12	0.96	2	2.20	13	0.76	24	0.82	56	0.88	0.66—1.14
25	Textile workers	26	1.02	35	1.22	4	2.07	23	0.83	62	1.02	150	1.04	0.88—1.22
26	Shoe and leather workers	1	0.53	[3.48]	0.00	[0.10]	0.00	[1.96]	0.00	3	0.65	4	**0.33**	0.09—0.85
27	Smelting workers	1	2.19	[0.81]	0.00	[0.00]	0.00	1	4.60	2	1.63	4	1.48	0.40—3.78
28	Mechanics	5	1.10	8	2.17	[0.01]	0.00	2	0.85	20	1.62	35	**1.53**	1.06—2.12
29	Plumbers	[0.05]	0.00	[0.01]	0.00	–	–	[0.02]	0.00	[0.02]	0.00	[0.09]	0.00	0.00—41.60
30	Welders	–	–	1	3.43	[0.00]	0.00	[0.17]	0.00	[0.46]	0.00	1	1.09	0.03—6.06
31	Electrical workers	8	1.26	1	0.41	[0.02]	0.00	2	0.80	6	0.87	17	0.93	0.54—1.49
32	Wood workers	1	0.47	5	0.70	[0.03]	0.00	[0.85]	0.00	3	1.46	9	0.74	0.34—1.41
33	Painters	[0.08]	0.00	1	1.19	[0.01]	0.00	[0.19]	0.00	[0.56]	0.00	1	0.60	0.02—3.32
34	"Other construction workers"	[0.06]	0.00	2	0.70	[0.00]	0.00	[0.08]	0.00	[0.07]	0.00	2	0.65	0.08—2.34
35	Bricklayers	[0.01]	0.00	[0.10]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.12]	0.00	0.00—30.57
36	Printers	2	0.84	6	1.66	[0.14]	0.00	1	0.43	8	1.53	17	1.24	0.72—1.99
37	Chemical process workers	2	0.53	[1.84]	0.00	[0.07]	0.00	1	0.49	3	0.72	6	0.51	0.19—1.10
38	Food workers	26	1.41	6	0.62	4	1.13	12	0.90	16	1.27	64	1.11	0.86—1.42
39	Beverage workers	4	2.34	[0.54]	0.00	[0.01]	0.00	[0.11]	0.00	[0.80]	0.00	4	1.26	0.34—3.22
40	Tobacco workers	7	**2.94**	[0.31]	0.00	–	–	[0.46]	0.00	[0.49]	0.00	7	1.92	0.77—3.96
41	Glass makers etc	3	0.67	8	1.18	[0.09]	0.00	10	**2.27**	12	1.08	33	1.23	0.85—1.73
42	Packers	2	1.55	11	0.92	1	2.69	14	1.32	26	**1.56**	54	1.32	0.99—1.72
43	Engine operators	[0.04]	0.00	3	1.57	[0.00]	0.00	[0.14]	0.00	[1.02]	0.00	3	0.96	0.20—2.81
44	Public safety workers	[0.14]	0.00	1	2.10	1	13.55	[1.35]	0.00	2	1.47	4	1.18	0.32—3.02
45	Cooks and stewards	[0.05]	0.00	11	0.80	[1.45]	0.00	17	1.11	38	**1.53**	66	1.19	0.92—1.51
46	Domestic assistants	25	0.87	14	0.93	[0.45]	0.00	33	0.83	56	0.86	128	0.86	0.72—1.02
47	Waiters	13	**2.68**	22	**1.94**	1	6.84	31	**1.92**	46	**1.82**	113	**1.96**	1.63—2.35
48	Building caretakers	96	1.16	62	**1.33**	3	1.05	75	1.08	61	0.92	297	1.11	0.99—1.24
49	Chimney sweeps	[0.01]	0.00	[0.02]	0.00	–	–	[0.01]	0.00	[0.00]	0.00	[0.04]	0.00	0.00—89.92
50	Hairdressers	3	0.59	4	0.92	[0.11]	0.00	4	0.97	11	1.04	22	0.91	0.57—1.38
51	Launderers	9	0.96	1	0.27	2	3.96	10	1.66	28	**2.10**	50	**1.52**	1.13—2.00
52	Military personnel	[0.05]	0.00	[0.04]	0.00	–	–	[0.02]	0.00	[0.04]	0.00	[0.15]	0.00	0.00—24.73
53	"Other workers"	38	**1.61**	19	1.31	5	1.84	37	1.04	27	0.92	126	1.19	1.00—1.42
54	Economically inactive	626	0.99	316	0.98	7	0.72	495	1.04	1 310	0.96	2 754	0.98	0.95—1.02
1–54	All categories	1 230	1.00	863	1.00	38	1.00	1 098	1.00	2 330	1.00	5 559	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 12. Observed number of cancer of the pharynx among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	118	0.81	73	0.86	1	0.99	48	0.55	361	0.78	601	0.77	0.71—0.83
2	Laboratory assistants	2	0.71	1	0.44	[0.18]	0.00	4	1.02	4	1.24	11	0.89	0.44—1.59
3	Physicians	7	0.62	2	0.41	[0.34]	0.00	10	0.96	15	0.67	34	0.69	0.48—0.96
4	Dentists	4	1.11	[1.00]	0.00	[0.10]	0.00	1	0.21	6	0.58	11	0.56	0.28—0.99
5	Nurses	[0.19]	0.00	[0.38]	0.00	[0.00]	0.00	1	1.50	[2.13]	0.00	1	0.30	0.01—1.65
6	Assistant nurses	[3.60]	0.00	1	2.64	[0.04]	0.00	1	0.60	8	0.93	10	0.70	0.34—1.29
7	"Other health workers"	9	0.92	6	1.32	[0.09]	0.00	6	1.49	15	0.82	36	0.98	0.69—1.36
8	Teachers	48	0.74	19	0.57	3	2.30	25	0.40	80	0.63	175	0.61	0.52—0.70
9	Religious workers etc	22	0.92	29	1.41	1	1.18	19	0.64	93	0.91	164	0.93	0.80—1.08
10	Artistic workers	19	2.47	14	2.11	1	4.50	20	2.34	62	2.17	116	2.24	1.87—2.69
11	Journalists	9	2.39	8	2.50	[0.13]	0.00	5	1.29	20	1.47	42	1.71	1.23—2.31
12	Administrators	160	1.07	51	1.03	4	2.19	104	1.04	179	1.09	498	1.07	0.98—1.17
13	Clerical workers	81	1.16	32	1.03	3	1.46	58	0.76	205	1.12	379	1.04	0.94—1.15
14	Sales agents	35	0.94	48	1.03	1	0.93	100	1.17	339	1.25	523	1.18	1.09—1.29
15	Shop workers	168	1.14	24	1.14	1	1.32	35	0.96	113	1.31	341	1.17	1.05—1.30
16	Farmers	64	0.25	107	0.58	1	0.36	91	0.44	172	0.43	435	0.41	0.38—0.45
17	Gardeners	15	0.40	24	0.81	[0.09]	0.00	29	0.54	93	0.60	161	0.59	0.50—0.68
18	Fishermen	19	1.31	2	0.79	3	1.28	57	0.82	12	0.74	93	0.88	0.71—1.08
19	Forestry workers	1	0.19	21	0.59	[0.02]	0.00	14	0.36	48	0.42	84	0.44	0.35—0.54
20	Miners and quarry workers	4	2.36	7	1.20	[0.03]	0.00	14	1.16	10	0.34	35	0.71	0.50—0.99
21	Seamen	32	1.87	14	1.76	2	3.71	140	2.16	53	2.00	241	2.06	1.82—2.34
22	Transport workers	20	0.62	17	0.78	[0.97]	0.00	30	0.95	85	0.99	152	0.88	0.75—1.03
23	Drivers	137	1.22	74	0.97	3	1.87	111	1.19	265	1.16	590	1.15	1.06—1.25
24	Postal workers	20	0.86	9	0.79	[0.17]	0.00	21	1.20	54	1.09	104	1.02	0.84—1.24
25	Textile workers	16	0.90	6	0.87	[0.27]	0.00	10	0.59	38	0.77	70	0.77	0.60—0.97
26	Shoe and leather workers	2	0.48	4	1.34	[0.05]	0.00	6	0.85	29	1.53	41	1.23	0.89—1.67
27	Smelting workers	60	1.31	7	0.64	[0.44]	0.00	30	1.20	65	0.80	162	0.99	0.85—1.15
28	Mechanics	137	1.14	71	0.91	1	0.62	137	1.05	393	0.96	739	1.00	0.93—1.07
29	Plumbers	10	0.89	7	0.53	[0.25]	0.00	17	1.09	38	0.81	72	0.82	0.64—1.04
30	Welders	–	–	14	1.00	[0.10]	0.00	22	1.20	57	1.01	93	1.05	0.85—1.28
31	Electrical workers	37	1.20	36	1.04	[1.01]	0.00	45	0.77	124	0.84	242	0.89	0.78—1.01
32	Wood workers	59	0.75	63	0.86	1	1.27	117	0.86	210	0.83	450	0.83	0.76—0.91
33	Painters	37	1.38	31	1.91	[0.31]	0.00	31	1.34	77	1.02	176	1.24	1.07—1.44
34	"Other construction workers"	81	0.89	72	1.50	1	0.55	42	1.43	150	1.08	346	1.12	1.01—1.24
35	Bricklayers	38	1.31	11	1.44	–	–	20	1.47	46	1.41	115	1.39	1.16—1.67
36	Printers	31	1.55	6	0.72	[0.30]	0.00	13	0.84	64	1.46	114	1.30	1.08—1.56
37	Chemical process workers	20	1.26	12	0.94	[0.14]	0.00	28	0.92	57	0.92	117	0.97	0.81—1.16
38	Food workers	59	1.08	11	1.21	[1.15]	0.00	49	1.39	64	1.02	183	1.13	0.97—1.30
39	Beverage workers	23	3.52	[0.57]	0.00	[0.02]	0.00	2	3.35	7	1.98	32	2.84	1.94—4.01
40	Tobacco workers	1	1.08	[0.10]	0.00	[0.00]	0.00	[0.52]	0.00	[0.30]	0.00	1	0.54	0.01—3.01
41	Glass makers etc	27	0.88	12	0.88	1	4.43	24	1.31	70	1.00	134	1.01	0.85—1.19
42	Packers	39	1.49	34	1.28	[0.64]	0.00	85	1.61	166	1.34	324	1.41	1.26—1.57
43	Engine operators	30	1.01	30	0.77	1	0.92	30	0.87	106	0.95	197	0.91	0.79—1.05
44	Public safety workers	17	0.65	10	0.47	1	1.38	17	0.75	53	0.79	98	0.71	0.58—0.86
45	Cooks and stewards	17	7.14	6	3.75	[0.38]	0.00	27	2.38	26	1.97	76	2.63	2.07—3.29
46	Domestic assistants	[0.03]	0.00	[0.06]	0.00	[0.00]	0.00	[0.11]	0.00	3	1.89	3	1.68	0.35—4.90
47	Waiters	35	7.46	7	4.24	[0.04]	0.00	32	6.91	36	5.40	110	6.22	5.16—7.50
48	Building caretakers	33	1.24	19	1.10	[0.24]	0.00	12	0.98	51	1.01	115	1.07	0.89—1.29
49	Chimney sweeps	2	2.49	3	2.34	–	–	4	3.29	8	2.12	17	2.41	1.40—3.85
50	Hairdressers	5	0.66	[0.39]	0.00	[0.06]	0.00	10	2.97	25	2.10	40	1.72	1.23—2.34
51	Launderers	[3.64]	0.00	[0.38]	0.00	[0.02]	0.00	3	1.51	13	1.52	16	1.10	0.63—1.78
52	Military personnel	15	0.93	5	0.64	–	–	18	0.86	31	0.82	69	0.83	0.65—1.05
53	"Other workers"	149	1.70	30	1.44	3	1.13	108	1.14	191	1.28	481	1.35	1.24—1.48
54	Economically inactive	99	1.42	191	1.77	2	0.94	110	2.01	509	2.00	911	1.86	1.74—1.99
1–54	All categories	2 073	1.00	1 281	1.00	35	1.00	1 993	1.00	4 999	1.00	10 381	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 13. Observed number of cancer of the pharynx among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	3	1.06	2	0.61	[0.05]	0.00	1	0.99	2	0.22	8	0.49	0.21—0.97
2	Laboratory assistants	3	1.33	1	0.58	[0.07]	0.00	[1.22]	0.00	[3.18]	0.00	4	0.47	0.13—1.21
3	Physicians	3	3.27	[0.80]	0.00	[0.01]	0.00	[0.50]	0.00	1	0.45	4	0.89	0.24—2.29
4	Dentists	2	2.47	2	2.55	[0.01]	0.00	[0.41]	0.00	2	1.28	6	1.68	0.62—3.65
5	Nurses	16	1.00	3	0.34	1	2.92	8	0.83	20	0.74	48	0.78	0.57—1.03
6	Assistant nurses	16	1.29	2	0.24	1	2.36	5	0.53	53	1.08	77	0.97	0.76—1.21
7	"Other health workers"	4	0.44	3	0.44	[0.10]	0.00	4	0.42	17	1.02	28	0.66	0.44—0.96
8	Teachers	13	0.61	10	0.64	[0.60]	0.00	10	0.55	43	0.69	76	0.64	0.51—0.80
9	Religious workers etc	4	1.44	10	1.15	[0.09]	0.00	3	0.68	17	0.77	34	0.89	0.62—1.25
10	Artistic workers	1	0.77	2	1.49	[0.08]	0.00	5	3.79	7	1.74	15	1.86	1.04—3.07
11	Journalists	1	3.14	1	1.20	[0.02]	0.00	2	5.51	3	1.59	7	2.04	0.82—4.21
12	Administrators	14	1.78	5	1.69	[0.06]	0.00	2	0.46	10	1.08	31	1.27	0.86—1.80
13	Clerical workers	99	1.15	65	1.24	1	0.56	62	1.09	177	1.21	404	1.17	1.07—1.29
14	Sales agents	2	2.77	7	0.93	[0.21]	0.00	8	1.05	27	1.29	44	1.19	0.86—1.60
15	Shop workers	56	1.04	22	0.84	1	0.85	34	0.75	75	0.90	188	0.90	0.78—1.03
16	Farmers	13	0.34	26	1.50	1	1.19	25	0.88	7	0.78	72	0.77	0.60—0.97
17	Gardeners	5	1.02	31	0.67	[0.03]	0.00	8	0.47	22	1.01	66	0.74	0.57—0.94
18	Fishermen	[0.20]	0.00	[0.11]	0.00	[0.03]	0.00	[0.24]	0.00	[0.08]	0.00	[0.65]	0.00	0.00—5.65
19	Forestry workers	[0.05]	0.00	[0.20]	0.00	[0.00]	0.00	[0.33]	0.00	[0.49]	0.00	[1.08]	0.00	0.00—3.41
20	Miners and quarry workers	[0.00]	0.00	[0.09]	0.00	[0.00]	0.00	[0.02]	0.00	[0.12]	0.00	[0.23]	0.00	0.00—15.90
21	Seamen	–	–	[0.03]	0.00	–	–	[0.06]	0.00	[0.02]	0.00	[0.10]	0.00	0.00—36.80
22	Transport workers	[0.05]	0.00	[1.25]	0.00	[0.03]	0.00	[0.26]	0.00	3	2.07	3	0.98	0.20—2.88
23	Drivers	3	2.09	[0.64]	0.00	[0.02]	0.00	[0.94]	0.00	4	1.07	7	1.03	0.41—2.13
24	Postal workers	2	0.70	8	1.02	1	2.43	9	0.82	25	1.02	45	0.97	0.71—1.29
25	Textile workers	24	1.30	19	1.06	[0.64]	0.00	13	0.78	31	0.65	87	0.86	0.69—1.06
26	Shoe and leather workers	3	2.15	6	2.75	[0.04]	0.00	[1.20]	0.00	2	0.55	11	1.31	0.65—2.34
27	Smelting workers	1	2.90	[0.51]	0.00	[0.00]	0.00	1	6.77	1	0.92	3	1.44	0.30—4.20
28	Mechanics	4	1.11	2	0.83	[0.01]	0.00	1	0.66	15	1.38	22	1.19	0.75—1.81
29	Plumbers	[0.02]	0.00	[0.01]	0.00	–	–	[0.01]	0.00	[0.02]	0.00	[0.06]	0.00	0.00—61.70
30	Welders	–	–	1	4.98	[0.00]	0.00	[0.12]	0.00	[0.46]	0.00	1	1.28	0.03—7.14
31	Electrical workers	10	1.98	1	0.61	[0.01]	0.00	3	1.81	6	0.99	20	1.38	0.85—2.14
32	Wood workers	2	1.24	3	0.68	[0.01]	0.00	[0.55]	0.00	3	1.60	8	0.94	0.41—1.86
33	Painters	[0.06]	0.00	[0.53]	0.00	[0.00]	0.00	[0.12]	0.00	[0.49]	0.00	[1.21]	0.00	0.00—3.05
34	"Other construction workers"	[0.04]	0.00	1	0.57	[0.00]	0.00	[0.05]	0.00	[0.07]	0.00	1	0.52	0.01—2.89
35	Bricklayers	[0.01]	0.00	[0.06]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.07]	0.00	0.00—51.43
36	Printers	1	0.56	2	0.87	[0.05]	0.00	1	0.68	3	0.66	7	0.69	0.28—1.42
37	Chemical process workers	[2.75]	0.00	[1.17]	0.00	[0.02]	0.00	2	1.54	8	2.31	10	1.15	0.55—2.11
38	Food workers	17	1.25	3	0.51	2	1.47	11	1.37	13	1.28	46	1.18	0.86—1.57
39	Beverage workers	3	2.39	[0.33]	0.00	[0.00]	0.00	[0.07]	0.00	1	1.54	4	1.73	0.47—4.43
40	Tobacco workers	7	3.97	[0.18]	0.00	–	–	1	3.39	[0.40]	0.00	8	3.03	1.31—5.97
41	Glass makers etc	5	1.43	2	0.47	[0.04]	0.00	4	1.43	13	1.41	24	1.21	0.78—1.81
42	Packers	4	4.15	5	0.68	[0.13]	0.00	7	1.07	20	1.45	36	1.25	0.88—1.73
43	Engine operators	[0.04]	0.00	5	4.06	[0.00]	0.00	[0.10]	0.00	1	1.01	6	2.54	0.93—5.54
44	Public safety workers	[0.09]	0.00	[0.31]	0.00	[0.02]	0.00	1	1.35	[1.43]	0.00	1	0.39	0.01—2.15
45	Cooks and stewards	[0.03]	0.00	10	1.14	[0.47]	0.00	16	1.79	15	0.74	41	1.06	0.76—1.44
46	Domestic assistants	14	0.68	7	0.70	[0.13]	0.00	16	0.67	66	1.10	103	0.90	0.74—1.09
47	Waiters	10	2.73	13	1.79	[0.05]	0.00	10	1.00	31	1.55	64	1.56	1.20—2.00
48	Building caretakers	70	1.20	37	1.24	[0.99]	0.00	51	1.20	60	1.06	218	1.16	1.01—1.32
49	Chimney sweeps	[0.00]	0.00	[0.01]	0.00	–	–	[0.01]	0.00	[0.00]	0.00	[0.02]	0.00	0.00—150.33
50	Hairdressers	5	1.33	7	2.43	[0.05]	0.00	3	1.14	10	1.11	25	1.37	0.88—2.02
51	Launderers	4	0.62	1	0.44	1	6.87	4	1.10	12	1.15	22	0.96	0.60—1.45
52	Military personnel	[0.03]	0.00	[0.03]	0.00	–	–	[0.01]	0.00	[0.05]	0.00	[0.13]	0.00	0.00—28.26
53	"Other workers"	23	1.36	14	1.52	2	1.94	20	0.91	29	1.15	88	1.18	0.95—1.46
54	Economically inactive	374	0.92	209	1.03	4	1.18	324	1.12	1 079	0.99	1 990	1.00	0.95—1.04
1–54	All categories	841	1.00	548	1.00	15	1.00	675	1.00	1 934	1.00	4 013	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Comment. Cancer of the pharynx, except nasopharynx, has the same risk factors as oral cancer, alcohol and tobacco being the main aetiological agents [50,56]. The high risk occupations observed here are those mostly working with the production or distribution of these products or having easy access to them, or those which belong to work cultures where liberal attitudes towards drinking and smoking have been prevalent. There are some indications that the inhalation of organic or inorganic dust may be associated with elevated risk, which may have contributed to the high risks among male hairdressers and chimney sweeps.

Oesophageal cancer

For both genders the risk of oesophageal cancer has been relatively stable in Norway and Sweden, and in Danish women. The incidence rate among men in Denmark has more than doubled since 1980. Finnish men and women and Icelandic women have experienced a large decrease in risk and Icelandic men a more moderate decrease in risk (Figure 17).

High risks were seen among male waiters (SIR 3.34, 95% CI 2.75–4.07), beverage manufacture workers, cooks and stewards, chimney sweeps and seamen (Table 14). The SIRs for adenocarcinoma (http://astra.cancer.fi/NOCCA/Incidence/oesophagus-adenocarcinoma) in these occupational categories tended to be less increased. Physicians (0.49, 0.36–0.67), teachers, dentists, farmers, other health and medical workers, religious, juridical and other workers form the most important low risk groups.

Among women, waitresses had an elevated SIR (1.35, 1.13–1.62) as well as women working on ships in Finland and Sweden (based on 2 and 1 case, respectively). Low SIRs were observed among nurses (0.68, 0.53–0.85), assistant nurses, teachers and farmers (Table 15).

Comment. Squamous cell carcinoma of the oesophagus is strongly linked to alcohol and tobacco, while adenocarcinoma is mainly associated with obesity [57]. Consumption of fruits and vegetables appear to convey a protective effect in both types. Differences in alcohol consumption and tobacco smoking are probably major factors behind the observed distribution of risk, which is mainly confined to squamous cell carcinoma. An effect of exposure to combustion products has been suggested [58,59], possibly contributing to the high risk seen among chimney sweeps.

Stomach cancer

The incidence of stomach cancer in the Nordic countries is two times higher in men than in women (Figure 18). Fifty years ago, the rates in Iceland were among the highest in the world, and were, as well as the Finnish rates, markedly higher than in the other three Nordic countries. Along with the decline in incidence during the past decades, the differences between the Nordic countries have become negligible.

In the present study the highest SIR among the men were observed among fishermen (SIR 1.36, 95% CI 1.29–1.43). Other SIRs that were elevated in all, or most, countries were among seamen, miners, chimney sweeps, "other construction workers" and several other groups of unskilled workers (Table 16). The SIRs were lowest among dentists (0.45, 0.34–0.58), physicians, journalists, religious workers, teachers and several other professions characterised by high educational level and high social status. For cancers of the gastric cardia (http://

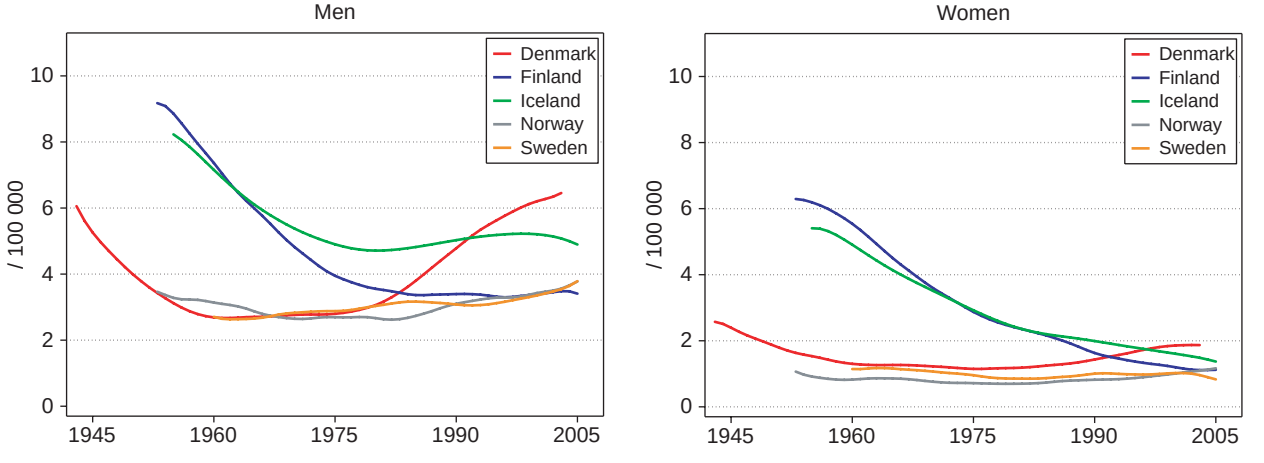


Figure 17. Age standardised (World) incidence rates for oesophageal cancer 1943–2005, by country and gender. Modified from NORDCAN [49].

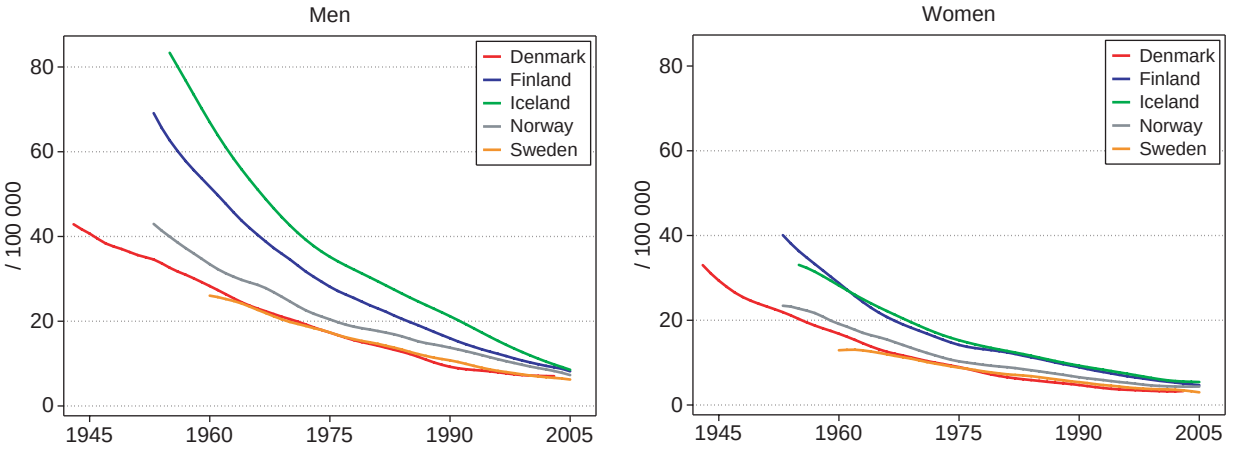


Figure 18. Age standardised (World) incidence rates for stomach cancer 1943–2005, by country and gender. Modified from NORDCAN [49].

astra.cancer.fi/NOCCA/Incidence/stomach-cardia), beverage workers (1.77, 1.14–2.61) and fishermen (1.38, 1.22–1.57) had elevated SIRs and physicians decreased SIR (0.70, 0.50–0.95).

In women, the highest SIR was among "other construction workers" (1.37, 1.03–1.78), followed by electrical workers, mechanics and other unskilled workers (Table 17). The SIR was lowest (0.42, 0.23–0.69) among the physicians, followed by journalists, teachers and administrators. The results were consistent, both within genders and within the Nordic countries. For cardia cancer in women the numbers were too small for conclusions to be drawn.

Comment. The SIRs were consistently high for unskilled workers and low for occupations characterised by a high educational level and a high social status [60]. The strongest risk factor identified to date is chronic bacterial infection with *Helicobacter pylori* [61]. Another established risk factor is a diet poor in fruits and vegetables and rich in red meat and processed meat [62], salt and salted food [61]. For gastric cancers of the cardia, smoking is an established risk factor, whereas *H. pylori* infection is not [61]. Smoking may also be weakly related to non-cardia gastric cancer.

Stomach cancer is not usually thought to have a strong occupational aetiology. However, work-related exposure to airborne particles, especially cement- and silica dust, has repeatedly been associated with increased risk [63]. The increased SIRs in the present study for miners, chimney sweeps and construction workers fit with those findings.

Cancer of the small intestine

Cancer of the small intestine is a rare disease in the Nordic countries with an increasing trend (Figure 19).

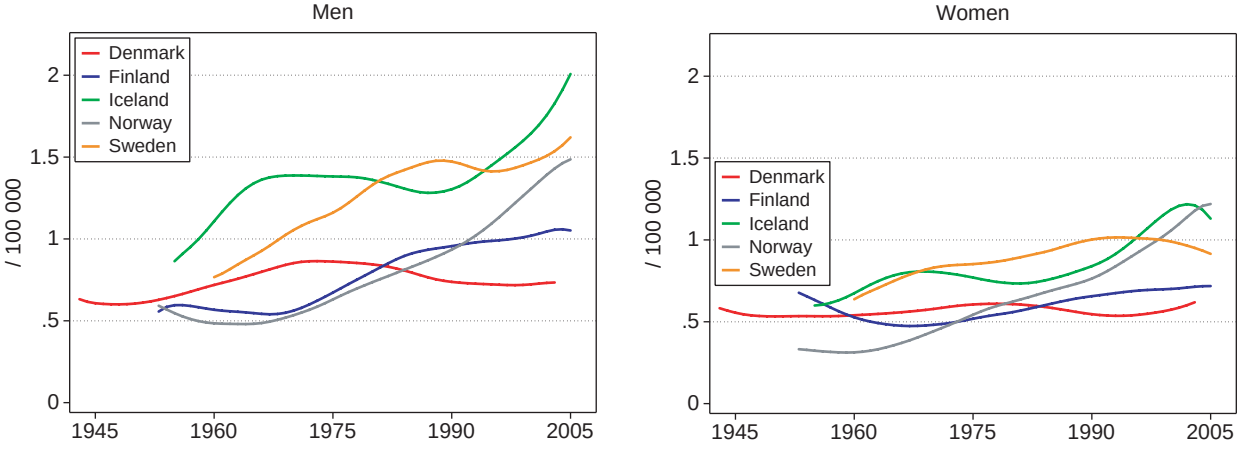


Figure 19. Age standardised (World) incidence rates for cancer of the small intestine 1943–2005, by country and gender. Modified from NORDCAN [49].

Table 14. Observed number of oesophageal cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	233	0.82	121	0.67	5	1.60	70	0.57	590	0.78	1 019	0.76	0.71—0.80
2	Laboratory assistants	6	1.06	3	0.67	[0.57]	0.00	9	1.50	2	0.53	20	0.98	0.60—1.51
3	Physicians	14	0.62	3	0.29	[1.26]	0.00	8	0.49	17	0.49	42	0.49	0.36—0.67
4	Dentists	5	0.73	[2.23]	0.00	1	3.29	4	0.54	10	0.58	20	0.59	0.36—0.91
5	Nurses	[0.33]	0.00	[0.55]	0.00	[0.00]	0.00	[0.64]	0.00	3	1.74	3	0.92	0.19—2.70
6	Assistant nurses	4	0.59	[0.50]	0.00	[0.13]	0.00	3	1.07	13	1.10	20	0.91	0.55—1.40
7	"Other health workers"	10	0.50	8	0.79	[0.35]	0.00	5	0.80	14	0.49	37	0.57	0.40—0.78
8	Teachers	75	0.61	24	0.32	2	0.44	43	0.48	128	0.65	272	0.55	0.49—0.62
9	Religious workers etc	39	0.78	28	0.68	2	0.64	19	0.41	102	0.68	190	0.66	0.57—0.76
10	Artistic workers	10	0.64	14	0.96	[0.82]	0.00	17	1.25	68	1.47	109	1.20	0.99—1.45
11	Journalists	12	1.59	4	0.57	1	2.11	6	1.01	27	1.26	50	1.18	0.87—1.55
12	Administrators	308	1.00	80	0.70	7	0.87	157	0.96	311	1.06	863	0.97	0.91—1.04
13	Clerical workers	100	0.73	67	0.89	13	1.41	111	0.89	312	0.99	603	0.91	0.84—0.99
14	Sales agents	56	0.77	88	0.82	2	0.43	158	1.09	505	1.11	809	1.03	0.96—1.10
15	Shop workers	317	1.02	51	1.13	2	0.63	78	1.41	172	1.17	620	1.11	1.02—1.20
16	Farmers	384	0.67	456	0.85	4	0.29	230	0.56	470	0.59	1 544	0.66	0.63—0.70
17	Gardeners	71	0.86	62	0.83	[0.45]	0.00	71	0.70	214	0.73	418	0.76	0.69—0.84
18	Fishermen	39	1.34	7	1.01	10	1.41	119	0.92	30	0.97	205	1.01	0.88—1.15
19	Forestry workers	13	1.08	113	1.31	[0.06]	0.00	64	0.85	162	0.76	352	0.91	0.82—1.01
20	Miners and quarry workers	2	0.53	16	1.16	[0.12]	0.00	21	1.01	61	1.17	100	1.10	0.91—1.34
21	Seamen	46	1.42	31	1.66	5	2.44	162	1.58	88	1.93	332	1.65	1.48—1.83
22	Transport workers	55	0.80	41	0.77	3	0.70	47	0.86	135	0.88	281	0.84	0.75—0.94
23	Drivers	263	1.17	186	1.07	5	0.85	204	1.38	468	1.24	1 126	1.21	1.14—1.28
24	Postal workers	28	0.63	32	1.20	1	1.21	27	0.93	73	0.88	161	0.87	0.75—1.02
25	Textile workers	39	1.02	17	0.94	[1.42]	0.00	20	0.63	89	0.95	165	0.90	0.77—1.05
26	Shoe and leather workers	8	0.86	7	0.88	[0.31]	0.00	14	1.02	55	1.48	84	1.23	0.98—1.52
27	Smelting workers	116	1.30	26	0.95	[1.89]	0.00	48	1.12	136	0.92	326	1.06	0.95—1.18
28	Mechanics	268	1.13	162	0.93	7	1.24	236	1.15	739	1.08	1 412	1.08	1.02—1.14
29	Plumbers	25	1.16	34	1.17	1	1.07	32	1.35	92	1.16	184	1.19	1.03—1.38
30	Welders	–	–	26	0.94	[0.33]	0.00	26	0.99	89	0.99	141	0.98	0.83—1.15
31	Electrical workers	69	1.20	80	1.09	5	1.51	83	0.91	220	0.93	457	0.99	0.90—1.08
32	Wood workers	144	0.89	194	1.04	4	1.17	187	0.77	353	0.77	882	0.84	0.78—0.89
33	Painters	75	1.40	40	1.02	[1.36]	0.00	50	1.23	141	1.06	306	1.14	1.02—1.28
34	"Other construction workers"	239	1.20	168	1.39	12	1.80	66	1.39	330	1.32	815	1.31	1.22—1.40
35	Bricklayers	74	1.27	19	0.98	–	–	26	1.08	61	1.02	180	1.11	0.96—1.29
36	Printers	53	1.39	18	1.01	[1.09]	0.00	31	1.27	98	1.36	200	1.30	1.13—1.50
37	Chemical process workers	34	1.00	31	1.05	3	4.81	57	1.05	98	0.88	223	0.97	0.85—1.11
38	Food workers	114	1.02	27	1.26	6	1.10	80	1.30	144	1.28	371	1.19	1.07—1.31
39	Beverage workers	44	3.20	4	2.78	[0.09]	0.00	[0.63]	0.00	13	2.03	61	2.73	2.09—3.51
40	Tobacco workers	5	2.36	[0.25]	0.00	[0.01]	0.00	[0.96]	0.00	[0.50]	0.00	5	1.30	0.42—3.03
41	Glass makers etc	65	1.00	39	1.26	2	2.12	36	1.22	126	1.03	268	1.07	0.95—1.21
42	Packers	89	1.56	78	1.21	3	0.96	153	1.65	293	1.32	616	1.40	1.30—1.52
43	Engine operators	62	1.04	88	1.02	5	1.26	63	1.22	204	1.10	422	1.09	0.99—1.20
44	Public safety workers	48	0.89	35	0.70	1	0.34	49	1.25	87	0.80	220	0.86	0.76—0.99
45	Cooks and stewards	8	1.78	6	2.01	4	3.03	41	2.40	37	1.93	96	2.13	1.72—2.60
46	Domestic assistants	[0.05]	0.00	[0.20]	0.00	[0.00]	0.00	[0.14]	0.00	3	1.98	3	1.57	0.32—4.60
47	Waiters	41	4.34	7	2.37	[0.14]	0.00	21	2.83	31	3.12	100	3.34	2.75—4.07
48	Building caretakers	55	0.95	28	0.66	1	0.73	28	1.38	98	1.14	210	1.01	0.88—1.16
49	Chimney sweeps	1	0.64	9	2.90	–	–	5	2.43	9	1.45	24	1.86	1.19—2.76
50	Hairdressers	13	0.80	1	1.10	1	5.21	7	1.18	23	1.05	45	1.00	0.73—1.33
51	Launderers	8	1.00	2	2.26	[0.13]	0.00	8	2.27	10	0.64	28	0.99	0.66—1.44
52	Military personnel	28	0.93	14	0.88	–	–	30	0.91	66	1.04	138	0.97	0.82—1.14
53	"Other workers"	277	1.53	65	1.29	14	1.18	204	1.16	365	1.35	925	1.34	1.26—1.43
54	Economically inactive	191	1.14	461	1.54	9	1.08	154	1.62	659	1.60	1 474	1.50	1.43—1.58
1–54	All categories	4 283	1.00	3 121	1.00	141	1.00	3 388	1.00	8 644	1.00	19 577	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 15. Observed number of oesophageal cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	7	1.35	7	0.87	[0.09]	0.00	[1.37]	0.00	9	0.75	23	0.86	0.54—1.29
2	Laboratory assistants	2	0.54	7	1.46	[0.14]	0.00	1	0.55	[2.35]	0.00	10	0.78	0.37—1.44
3	Physicians	7	**4.10**	[1.83]	0.00	[0.03]	0.00	1	1.32	[2.51]	0.00	8	1.17	0.50—2.30
4	Dentists	2	1.32	[3.13]	0.00	[0.01]	0.00	2	2.99	2	0.88	6	0.79	0.29—1.72
5	Nurses	20	0.66	13	**0.54**	[0.82]	0.00	5	**0.35**	35	0.92	73	**0.68**	0.53—0.85
6	Assistant nurses	20	0.91	19	0.67	1	0.79	9	0.63	54	0.85	103	**0.80**	0.66—0.97
7	"Other health workers"	19	1.10	13	0.62	[0.22]	0.00	10	0.68	18	0.87	60	0.81	0.62—1.04
8	Teachers	40	1.06	36	**0.70**	[1.39]	0.00	26	0.94	60	**0.70**	162	**0.79**	0.68—0.93
9	Religious workers etc	5	0.98	16	0.87	[0.23]	0.00	6	0.87	22	0.87	49	0.87	0.65—1.16
10	Artistic workers	5	1.87	1	0.26	[0.18]	0.00	3	1.38	8	1.51	17	1.20	0.70—1.93
11	Journalists	1	1.75	[2.55]	0.00	[0.04]	0.00	2	3.67	3	1.25	6	0.98	0.36—2.14
12	Administrators	18	1.12	6	0.69	[0.17]	0.00	7	0.95	19	1.53	50	1.12	0.83—1.48
13	Clerical workers	162	1.05	123	**0.78**	4	0.88	89	0.99	276	**1.31**	654	1.06	0.98—1.14
14	Sales agents	2	1.42	17	**0.58**	1	1.74	15	1.03	46	1.35	81	1.01	0.80—1.26
15	Shop workers	111	1.04	90	0.93	4	1.23	78	0.98	143	0.97	426	0.98	0.90—1.08
16	Farmers	49	**0.66**	101	1.12	1	0.37	43	**0.73**	12	0.85	206	**0.86**	0.75—0.98
17	Gardeners	8	0.83	213	0.97	[0.10]	0.00	19	**0.55**	46	1.16	286	0.94	0.84—1.06
18	Fishermen	[0.38]	0.00	1	2.33	[0.07]	0.00	[0.40]	0.00	[0.13]	0.00	1	0.71	0.02—3.96
19	Forestry workers	[0.10]	0.00	[0.80]	0.00	[0.01]	0.00	1	1.64	1	1.25	2	0.86	0.10—3.11
20	Miners and quarry workers	[0.01]	0.00	[0.42]	0.00	[0.01]	0.00	[0.03]	0.00	[0.18]	0.00	[0.63]	0.00	0.00—5.82
21	Seamen	–	–	2	**36.17**	[0.00]	0.00	[0.09]	0.00	1	**67.80**	3	**18.63**	3.84—54.45
22	Transport workers	[0.11]	0.00	4	0.74	[0.10]	0.00	[0.39]	0.00	1	0.48	5	0.62	0.20—1.44
23	Drivers	5	1.86	1	0.51	[0.03]	0.00	5	**3.25**	5	1.03	16	1.45	0.83—2.35
24	Postal workers	8	1.42	35	1.13	2	1.75	16	0.87	34	0.85	95	0.99	0.80—1.21
25	Textile workers	29	0.81	83	1.11	3	1.19	35	1.10	90	0.98	240	1.01	0.89—1.15
26	Shoe and leather workers	4	1.52	8	0.90	[0.13]	0.00	2	0.90	10	1.45	24	1.16	0.74—1.72
27	Smelting workers	[0.65]	0.00	2	0.96	[0.01]	0.00	[0.21]	0.00	5	**3.26**	7	1.56	0.63—3.22
28	Mechanics	5	0.79	8	0.92	[0.02]	0.00	3	1.19	16	1.00	32	0.95	0.65—1.34
29	Plumbers	[0.06]	0.00	[0.01]	0.00	–	–	[0.02]	0.00	[0.02]	0.00	[0.11]	0.00	0.00—34.85
30	Welders	–	–	[0.55]	0.00	[0.00]	0.00	[0.16]	0.00	[0.50]	0.00	[1.21]	0.00	0.00—3.04
31	Electrical workers	8	0.90	6	1.37	[0.02]	0.00	2	0.76	10	1.13	26	1.05	0.69—1.54
32	Wood workers	2	0.68	13	0.68	[0.03]	0.00	1	1.14	2	0.78	18	0.71	0.42—1.12
33	Painters	1	8.75	2	0.97	[0.01]	0.00	[0.20]	0.00	2	2.75	5	1.60	0.52—3.74
34	"Other construction workers"	[0.09]	0.00	10	1.17	[0.00]	0.00	[0.08]	0.00	[0.07]	0.00	10	1.14	0.54—2.09
35	Bricklayers	[0.02]	0.00	[0.25]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.28]	0.00	0.00—13.29
36	Printers	3	0.89	8	0.92	[0.18]	0.00	2	0.79	10	1.40	23	1.05	0.67—1.58
37	Chemical process workers	6	1.13	5	1.04	[0.09]	0.00	4	1.79	7	1.19	22	1.20	0.75—1.82
38	Food workers	25	0.97	22	0.86	5	1.10	18	1.19	31	**1.66**	101	1.12	0.93—1.37
39	Beverage workers	5	2.01	1	0.65	[0.01]	0.00	[0.12]	0.00	1	0.82	7	1.30	0.52—2.69
40	Tobacco workers	3	0.88	1	1.19	–	–	3	**5.64**	[0.68]	0.00	7	1.28	0.52—2.64
41	Glass makers etc	5	0.79	19	1.11	1	8.18	6	1.26	20	1.30	51	1.17	0.87—1.54
42	Packers	4	2.21	39	1.30	2	4.13	12	1.03	23	0.97	80	1.18	0.94—1.47
43	Engine operators	[0.05]	0.00	3	0.66	[0.01]	0.00	[0.14]	0.00	4	3.49	7	1.18	0.48—2.44
44	Public safety workers	[0.21]	0.00	[1.11]	0.00	[0.10]	0.00	[1.53]	0.00	3	2.06	3	0.68	0.14—1.99
45	Cooks and stewards	[0.07]	0.00	36	1.01	3	1.57	17	0.95	40	1.06	96	1.03	0.83—1.26
46	Domestic assistants	43	1.07	36	1.00	1	1.68	39	0.85	78	0.88	197	0.93	0.81—1.07
47	Waiters	16	**2.31**	23	0.89	[0.19]	0.00	27	1.52	53	**1.43**	119	**1.35**	1.13—1.62
48	Building caretakers	111	0.95	135	1.05	2	0.53	84	1.10	110	1.17	442	1.05	0.96—1.16
49	Chimney sweeps	[0.01]	0.00	[0.05]	0.00	–	–	[0.01]	0.00	[0.00]	0.00	[0.07]	0.00	0.00—49.31
50	Hairdressers	6	0.87	6	0.59	[0.14]	0.00	8	1.81	18	1.29	38	1.07	0.76—1.47
51	Launderers	17	1.29	13	1.22	[0.67]	0.00	9	1.30	28	1.37	67	1.29	1.00—1.64
52	Military personnel	[0.07]	0.00	1	20.68	–	–	[0.02]	0.00	1	31.72	2	**12.03**	1.46—43.44
53	"Other workers"	41	1.24	33	0.91	2	0.58	29	0.75	50	1.22	155	1.02	0.87—1.19
54	Economically inactive	878	1.00	1 137	**1.09**	17	1.32	606	1.07	1 962	**0.95**	4 600	1.01	0.98—1.04
1–54	All categories	1 703	1.00	2 355	1.00	49	1.00	1 245	1.00	3 369	1.00	8 721	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 16. Observed number of stomach cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	453	0.79	581	0.79	4	0.45	362	0.66	2 298	0.84	3 698	0.80	0.78—0.83
2	Laboratory assistants	5	0.43	9	0.50	3	1.77	30	1.01	10	1.24	57	0.83	0.63—1.07
3	Physicians	35	0.72	13	0.31	3	0.82	51	0.58	63	0.52	165	0.54	0.47—0.63
4	Dentists	9	0.67	2	0.21	[0.81]	0.00	16	0.40	30	0.47	57	0.45	0.34—0.58
5	Nurses	2	3.45	[1.82]	0.00	[0.02]	0.00	2	0.92	5	1.36	9	1.09	0.50—2.07
6	Assistant nurses	11	0.82	5	3.34	1	2.52	17	1.07	56	1.30	90	1.21	0.97—1.49
7	"Other health workers"	38	0.89	37	0.83	[1.03]	0.00	30	0.87	84	0.77	189	0.81	0.71—0.94
8	Teachers	170	0.69	213	0.69	12	0.90	343	0.76	460	0.69	1 198	0.71	0.67—0.75
9	Religious workers etc	84	0.75	102	0.60	5	0.54	158	0.63	372	0.70	721	0.67	0.63—0.72
10	Artistic workers	33	0.93	50	0.80	2	0.81	48	0.67	116	0.70	249	0.74	0.65—0.83
11	Journalists	7	0.44	16	0.52	[1.43]	0.00	15	0.49	57	0.72	95	0.60	0.49—0.74
12	Administrators	545	0.81	368	0.73	25	1.03	713	0.78	832	0.69	2 483	0.75	0.72—0.78
13	Clerical workers	245	0.83	293	0.84	29	1.04	501	0.77	1 067	0.86	2 135	0.83	0.80—0.87
14	Sales agents	131	0.85	397	0.83	9	0.65	735	0.89	1 518	0.86	2 790	0.86	0.83—0.89
15	Shop workers	598	0.85	146	0.78	8	0.84	251	0.91	466	0.86	1 469	0.86	0.81—0.90
16	Farmers	1 320	0.97	2 963	1.07	31	0.76	2 580	0.95	3 899	1.02	10 793	1.01	0.99—1.03
17	Gardeners	173	0.89	329	0.94	2	1.47	529	0.88	1 349	1.04	2 382	0.97	0.94—1.01
18	Fishermen	80	1.27	35	0.99	25	1.21	1 113	1.41	175	1.23	1 428	1.36	1.29—1.43
19	Forestry workers	28	0.96	467	1.16	[0.20]	0.00	442	0.92	1 017	1.08	1 954	1.05	1.01—1.10
20	Miners and quarry workers	4	0.44	87	1.35	[0.32]	0.00	145	1.23	312	1.41	548	1.33	1.22—1.45
21	Seamen	88	1.34	90	1.08	7	1.16	678	1.27	212	1.15	1 075	1.23	1.16—1.30
22	Transport workers	134	0.93	221	0.88	12	0.92	283	0.96	548	0.94	1 198	0.93	0.88—0.98
23	Drivers	562	1.17	803	1.06	24	1.35	879	1.11	1 579	1.12	3 847	1.11	1.08—1.15
24	Postal workers	78	0.91	109	0.91	3	1.18	165	0.97	301	0.90	656	0.92	0.85—0.99
25	Textile workers	98	1.09	74	0.86	5	1.14	193	1.02	406	0.98	776	0.99	0.92—1.06
26	Shoe and leather workers	25	1.09	33	0.84	1	1.03	104	1.19	186	1.03	349	1.05	0.95—1.17
27	Smelting workers	217	1.14	152	1.18	8	1.37	250	1.01	694	1.10	1 321	1.10	1.04—1.16
28	Mechanics	535	1.04	752	0.99	25	1.51	1 126	1.05	2 756	1.07	5 194	1.05	1.02—1.08
29	Plumbers	51	1.12	125	1.01	3	1.07	134	1.12	349	1.17	662	1.12	1.04—1.21
30	Welders	–	–	120	1.12	2	2.05	114	0.95	345	1.13	581	1.09	1.00—1.18
31	Electrical workers	114	0.97	312	1.01	9	0.93	508	1.08	835	0.99	1 778	1.02	0.97—1.07
32	Wood workers	349	0.97	962	1.06	9	0.89	1 456	1.04	2 128	1.05	4 904	1.04	1.01—1.07
33	Painters	110	0.95	182	0.99	2	0.50	248	1.03	557	0.99	1 099	1.00	0.94—1.06
34	"Other construction workers"	576	1.21	685	1.16	25	1.28	332	1.25	1 301	1.19	2 919	1.20	1.15—1.24
35	Bricklayers	140	1.06	89	0.95	–	–	168	1.20	292	1.12	689	1.10	1.02—1.18
36	Printers	72	0.89	72	0.96	2	0.64	121	0.91	265	0.97	532	0.94	0.87—1.03
37	Chemical process workers	101	1.26	130	0.99	6	3.11	354	1.07	567	1.15	1 158	1.12	1.06—1.18
38	Food workers	280	1.12	98	1.02	18	1.06	411	1.14	528	1.13	1 335	1.12	1.06—1.18
39	Beverage workers	40	1.24	8	1.16	1	3.70	2	0.97	30	1.01	81	1.14	0.91—1.42
40	Tobacco workers	3	0.55	1	0.90	[0.02]	0.00	6	0.99	1	0.52	11	0.75	0.38—1.35
41	Glass makers etc	174	1.16	153	1.10	3	1.03	161	1.00	541	1.06	1 032	1.07	1.01—1.14
42	Packers	164	1.18	359	1.18	7	0.72	673	1.21	1 148	1.16	2 351	1.18	1.13—1.23
43	Engine operators	159	1.22	413	1.12	13	1.10	317	1.21	809	1.12	1 711	1.15	1.09—1.20
44	Public safety workers	113	0.93	224	0.99	9	1.01	230	1.03	398	0.99	974	0.99	0.93—1.06
45	Cooks and stewards	11	1.13	10	0.80	5	1.29	97	1.10	83	1.21	206	1.13	0.98—1.29
46	Domestic assistants	[0.11]	0.00	1	0.93	[0.01]	0.00	[0.59]	0.00	6	1.28	7	1.08	0.44—2.23
47	Waiters	28	1.28	10	0.85	1	2.71	30	0.74	55	1.59	124	1.14	0.95—1.35
48	Building caretakers	157	1.15	225	1.10	5	1.15	144	1.21	425	1.10	956	1.12	1.06—1.20
49	Chimney sweeps	9	2.73	15	1.00	–	–	17	1.45	25	1.07	66	1.24	0.96—1.58
50	Hairdressers	27	0.70	3	0.69	1	1.92	36	1.03	91	0.99	158	0.93	0.79—1.08
51	Launderers	21	1.13	5	1.22	2	4.53	20	0.96	69	1.06	117	1.07	0.90—1.29
52	Military personnel	45	0.82	47	0.78	–	–	138	0.92	203	0.91	433	0.89	0.81—0.98
53	"Other workers"	481	1.16	254	1.04	35	0.97	1 206	1.08	1 386	1.15	3 362	1.11	1.08—1.15
54	Economically inactive	704	1.38	1 837	1.10	22	0.84	664	1.03	1 986	1.05	5 213	1.10	1.07—1.13
1–54	All categories	9 637	1.00	14 687	1.00	424	1.00	19 346	1.00	35 291	1.00	79 385	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 17. Observed number of stomach cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	12	0.79	38	0.82	[0.42]	0.00	5	0.51	59	0.86	114	0.81	0.68—0.98
2	Laboratory assistants	11	1.08	26	0.98	[0.69]	0.00	15	1.06	12	1.01	64	1.01	0.77—1.28
3	Physicians	3	0.60	7	0.63	[0.15]	0.00	1	0.16	4	0.29	15	0.42	0.23—0.69
4	Dentists	1	0.22	15	0.99	[0.05]	0.00	2	0.33	14	1.06	32	0.82	0.56—1.16
5	Nurses	85	0.94	120	0.90	3	0.80	102	0.97	164	0.75	474	0.86	0.78—0.94
6	Assistant nurses	61	0.97	141	0.95	2	0.37	86	0.85	399	1.12	689	1.03	0.95—1.11
7	"Other health workers"	42	0.81	111	0.97	2	1.99	106	0.91	101	0.87	362	0.90	0.82—1.00
8	Teachers	80	0.73	193	0.73	4	0.62	152	0.67	332	0.66	761	0.69	0.64—0.74
9	Religious workers etc	11	0.73	88	0.79	[1.03]	0.00	61	1.14	101	0.69	261	0.80	0.71—0.90
10	Artistic workers	7	0.83	10	0.48	[0.84]	0.00	17	0.92	28	0.92	62	0.79	0.60—1.01
11	Journalists	1	0.59	7	0.52	[0.21]	0.00	5	1.18	6	0.44	19	0.57	0.34—0.89
12	Administrators	31	0.62	37	0.80	[0.77]	0.00	50	0.78	63	0.84	181	0.77	0.67—0.89
13	Clerical workers	389	0.87	712	0.85	22	1.07	535	0.73	984	0.83	2 642	0.82	0.79—0.85
14	Sales agents	4	0.94	140	0.97	2	0.81	122	0.87	190	0.86	458	0.90	0.82—0.98
15	Shop workers	343	1.06	465	0.96	15	1.06	630	0.96	849	0.97	2 302	0.98	0.94—1.02
16	Farmers	192	0.87	429	1.08	12	1.04	503	0.95	108	1.10	1 244	0.99	0.94—1.05
17	Gardeners	27	0.94	1 025	1.01	[0.39]	0.00	317	1.05	269	1.11	1 638	1.03	0.98—1.08
18	Fishermen	1	0.91	5	2.45	3	9.22	1	0.32	3	3.70	13	1.76	0.94—3.02
19	Forestry workers	[0.29]	0.00	4	1.04	[0.05]	0.00	5	1.07	3	0.63	12	0.88	0.46—1.54
20	Miners and quarry workers	[0.02]	0.00	2	1.03	[0.02]	0.00	[0.21]	0.00	[0.97]	0.00	2	0.63	0.08—2.29
21	Seamen	–	–	[0.37]	0.00	[0.00]	0.00	[0.71]	0.00	[0.09]	0.00	[1.16]	0.00	0.00—3.19
22	Transport workers	[0.32]	0.00	21	0.81	1	2.34	7	2.26	17	1.35	46	1.09	0.80—1.45
23	Drivers	8	1.01	15	1.45	[0.16]	0.00	8	0.65	32	1.18	63	1.09	0.84—1.39
24	Postal workers	12	0.70	130	0.86	3	0.60	133	0.85	227	0.99	505	0.90	0.82—0.98
25	Textile workers	113	1.06	363	1.01	15	1.45	317	1.04	617	1.05	1 425	1.04	0.99—1.10
26	Shoe and leather workers	11	1.41	39	0.90	3	5.55	28	1.34	49	1.13	130	1.12	0.94—1.33
27	Smelting workers	3	1.56	8	0.79	[0.02]	0.00	1	0.71	12	1.44	24	1.10	0.71—1.64
28	Mechanics	24	1.32	44	1.01	[0.07]	0.00	24	1.11	128	1.38	220	1.25	1.10—1.43
29	Plumbers	[0.21]	0.00	[0.08]	0.00	–	–	1	8.17	[0.08]	0.00	1	2.00	0.05—11.15
30	Welders	–	–	5	1.68	[0.00]	0.00	1	0.99	2	0.75	8	1.20	0.52—2.37
31	Electrical workers	37	1.45	28	1.14	1	11.80	27	1.25	62	1.23	155	1.27	1.09—1.49
32	Wood workers	10	1.18	101	1.11	1	6.40	7	1.07	14	0.97	133	1.10	0.93—1.30
33	Painters	[0.35]	0.00	11	1.07	[0.04]	0.00	2	1.29	5	1.17	18	1.09	0.65—1.72
34	"Other construction workers"	[0.29]	0.00	54	1.37	[0.02]	0.00	1	1.60	1	2.36	56	1.37	1.03—1.78
35	Bricklayers	[0.05]	0.00	2	1.68	–	–	[0.03]	0.00	[0.01]	0.00	2	1.56	0.19—5.65
36	Printers	14	1.41	39	0.90	[0.75]	0.00	35	1.50	56	1.30	144	1.19	1.01—1.41
37	Chemical process workers	18	1.13	32	1.38	[0.38]	0.00	16	0.79	42	1.18	108	1.13	0.94—1.37
38	Food workers	85	1.12	128	1.05	23	1.20	153	1.12	137	1.14	526	1.11	1.02—1.21
39	Beverage workers	11	1.44	6	0.83	[0.05]	0.00	2	2.21	12	1.48	31	1.29	0.88—1.84
40	Tobacco workers	14	1.34	5	1.27	–	–	5	0.89	3	0.77	27	1.13	0.74—1.64
41	Glass makers etc	12	0.66	93	1.12	1	1.96	47	1.13	98	1.07	251	1.07	0.94—1.21
42	Packers	10	1.88	168	1.15	2	1.01	117	1.16	166	1.15	463	1.16	1.06—1.27
43	Engine operators	[0.14]	0.00	19	0.83	[0.03]	0.00	2	2.19	12	2.11	33	1.12	0.77—1.57
44	Public safety workers	2	2.79	12	2.18	[0.39]	0.00	13	1.03	9	1.05	36	1.30	0.91—1.79
45	Cooks and stewards	[0.22]	0.00	200	1.17	7	0.90	175	1.03	244	0.97	626	1.04	0.96—1.12
46	Domestic assistants	126	1.04	172	0.97	3	1.24	420	0.99	628	1.10	1 349	1.04	0.99—1.10
47	Waiters	25	1.21	128	0.98	1	1.27	185	1.19	248	1.07	587	1.09	1.00—1.18
48	Building caretakers	359	1.01	623	1.03	18	1.15	724	1.14	697	1.16	2 421	1.10	1.05—1.14
49	Chimney sweeps	[0.04]	0.00	[0.26]	0.00	–	–	[0.08]	0.00	[0.01]	0.00	[0.39]	0.00	0.00—9.53
50	Hairdressers	15	0.74	51	1.00	[0.62]	0.00	25	0.64	79	0.99	170	0.89	0.76—1.03
51	Launderers	46	1.15	50	1.01	2	0.73	71	1.09	163	1.21	332	1.14	1.02—1.27
52	Military personnel	[0.21]	0.00	[0.34]	0.00	–	–	[0.12]	0.00	[0.17]	0.00	[0.83]	0.00	0.00—4.43
53	"Other workers"	102	1.01	185	1.05	14	0.95	333	1.02	288	1.13	922	1.06	0.99—1.13
54	Economically inactive	3 033	1.03	4 853	1.04	49	0.91	6 256	1.03	13 464	1.01	27 655	1.02	1.01—1.03
1–54	All categories	5 391	1.00	11 160	1.00	209	1.00	11 851	1.00	21 201	1.00	49 812	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Only a modest occupational variation was found in the incidence of small intestine cancer. Among men, postal workers topped the list with an SIR of 1.32 (95% CI 1.04–1.65), and forestry workers (0.76, 0.63–0.93), gardeners and farmers were at the bottom (Table 18). For women (Table 19), the only occupational category with a statistically significant value different from 1 was glass, ceramic and tile workers (0.55, 0.31–0.91).

Comment. Tumours occurring in the small intestine can be adenocarcinomas (30–40%), carcinoid (about 35%), lymphomas (15–20%; included in non-Hodgkin lymphoma in the present study), or sarcomas (10–15%). Little is known about environmental determinants of small intestinal cancer. So far, no occupational studies have convincingly indicated any associations between exposure to occupational agents and small intestine cancer [64].

Colon cancer

The incidence of colon cancer in the Nordic countries varies about 1.5-fold. It is slightly higher in men than in women (Figure 20). In males, the rates in Norway have been twofold as compared to the rates in Finland, and incidence rates are increasing in all Nordic countries in both males and females.

The highest SIRs among men were observed in chimney sweeps (SIR 1.52, 95% CI 1.25–1.84), waiters, beverage workers and administrators (Table 20). The SIRs were lowest in forestry workers (0.75, 0.71–0.78), farmers and gardeners.

Among women, the variation in colon cancer incidence was small. Only printers, chemical process workers and administrators had significant SIRs greater than 1.1, and only farmers and gardeners had SIRs smaller than 0.9 (Table 21).

Comment. Several dietary factors, e.g. a high consumption of animal fat and meat have been suggested to increase the risk of colon cancer, while other factors, e.g. a high consumption of fibre, fruit and vegetables, have been suggested to decrease the risk [65]. Physical activity protects against colon cancer. The joint exposures to tobacco and alcohol drinking could contribute to the increased risk in beverage workers and waiters.

For women, the variation in colon cancer incidence is relatively small between professions. Even among men the differences in SIR between different occupational categories is rather small. According to previous research, sedentary work, such as work done for example by highly educated workers, seems to be related to increased risk of colon cancer [66]. The effect of physical activity is not strongly reflected to the occupational risk pattern of our study. The occupational categories with highest SIRs (male waiters and chimney sweeps) do not generally imply sedentary work.

Rectal cancer

The incidence of rectal cancer is higher in men than in women in all Nordic countries. Rates have been consistently high in Denmark and have increased in the other countries, especially in Norway (Figure 21).

The incidence of rectal cancer was highest among male waiters (SIR 1.41, 95% CI 1.21–1.65) and beverage workers (1.40, 1.16–1.68). None of the significantly low SIRs among the men were below 0.85 (Table 22). In women the

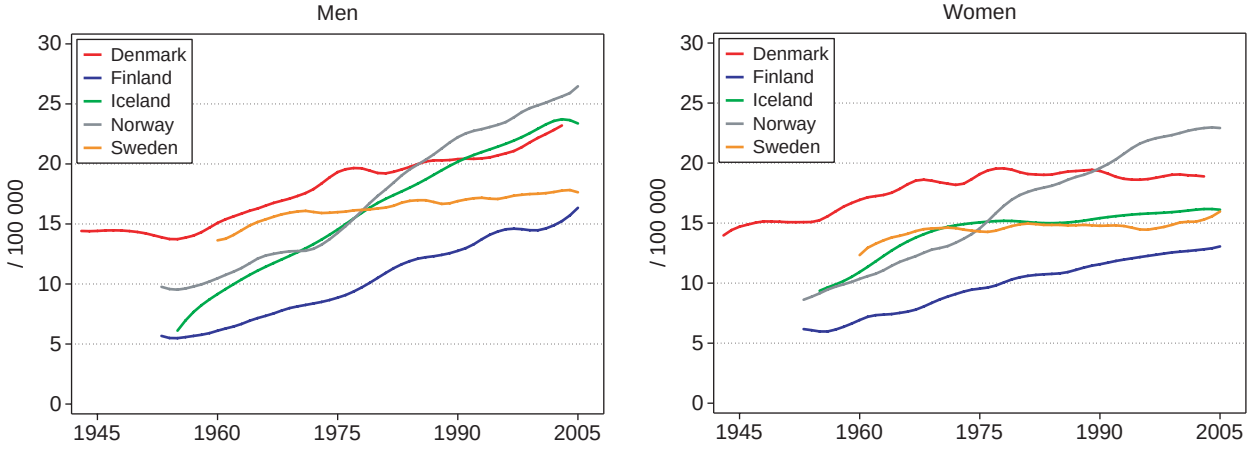


Figure 20. Age standardised (World) incidence rates for colon cancer 1943–2005, by country and gender. Modified from NORDCAN [49].

Table 18. Observed number of cancer of the small intestine among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	52	1.11	58	1.05	2	1.74	32	0.80	324	1.00	468	1.00	0.92—1.10
2	Laboratory assistants	1	1.06	2	1.46	[0.21]	0.00	1	0.54	2	1.15	6	0.98	0.36—2.14
3	Physicians	5	1.29	2	0.63	[0.41]	0.00	8	1.60	18	1.20	33	1.20	0.83—1.69
4	Dentists	2	1.80	[0.65]	0.00	[0.11]	0.00	[2.23]	0.00	7	0.97	9	0.80	0.36—1.51
5	Nurses	[0.05]	0.00	1	4.78	[0.00]	0.00	[0.26]	0.00	[0.99]	0.00	1	0.66	0.02—3.69
6	Assistant nurses	1	0.90	1	5.05	[0.05]	0.00	2	2.44	5	0.94	9	1.20	0.55—2.27
7	"Other health workers"	2	0.59	4	1.31	[0.12]	0.00	3	1.58	15	1.21	24	1.15	0.74—1.71
8	Teachers	23	1.13	33	**1.47**	1	0.65	24	0.84	95	1.13	176	1.12	0.97—1.30
9	Religious workers etc	9	1.03	13	1.02	1	0.96	15	1.06	70	1.07	108	1.06	0.88—1.28
10	Artistic workers	2	0.73	6	1.38	[0.28]	0.00	3	0.73	24	1.22	35	1.12	0.78—1.56
11	Journalists	[1.27]	0.00	3	1.41	[0.17]	0.00	2	1.10	11	1.20	16	1.10	0.63—1.79
12	Administrators	48	0.90	47	**1.40**	1	0.41	55	1.13	143	1.18	294	**1.13**	1.01—1.27
13	Clerical workers	22	0.94	21	0.97	5	1.80	39	1.05	155	**1.18**	242	1.12	0.99—1.27
14	Sales agents	11	0.90	40	1.26	2	1.41	52	1.24	227	**1.19**	332	**1.19**	1.07—1.33
15	Shop workers	60	1.11	8	0.58	1	1.02	20	1.17	77	1.25	166	1.12	0.97—1.31
16	Farmers	73	**0.70**	129	0.91	2	0.52	92	0.84	244	**0.78**	540	**0.81**	0.74—0.88
17	Gardeners	10	0.68	14	0.66	[0.12]	0.00	27	0.97	93	**0.79**	144	**0.80**	0.68—0.94
18	Fishermen	10	2.02	3	1.60	4	1.48	35	0.99	8	0.65	60	1.05	0.80—1.35
19	Forestry workers	[2.19]	0.00	20	0.80	[0.02]	0.00	23	1.14	58	**0.68**	101	**0.76**	0.63—0.93
20	Miners and quarry workers	[0.68]	0.00	2	0.50	[0.04]	0.00	8	1.35	21	0.99	31	0.97	0.66—1.38
21	Seamen	7	1.32	9	1.66	1	1.44	30	0.97	22	1.16	69	1.13	0.88—1.43
22	Transport workers	11	0.95	13	0.82	[1.31]	0.00	17	1.07	66	1.02	107	0.98	0.81—1.18
23	Drivers	39	1.03	54	1.04	1	0.50	57	1.29	175	1.10	326	1.10	0.99—1.23
24	Postal workers	11	1.53	6	0.76	1	4.15	9	1.08	50	**1.44**	77	**1.32**	1.04—1.65
25	Textile workers	13	**1.91**	4	0.80	1	2.52	10	1.13	48	1.28	76	**1.30**	1.02—1.63
26	Shoe and leather workers	4	2.35	1	0.46	[0.08]	0.00	2	0.55	20	1.38	27	1.22	0.81—1.78
27	Smelting workers	9	0.60	8	1.04	1	1.68	20	1.63	44	**0.73**	82	0.86	0.68—1.07
28	Mechanics	41	1.01	54	1.04	2	1.03	55	0.89	279	0.96	431	0.97	0.88—1.06
29	Plumbers	6	1.67	5	0.58	1	3.22	8	1.10	41	1.23	61	1.15	0.88—1.47
30	Welders	–	–	7	0.82	[0.12]	0.00	14	1.65	39	1.01	60	1.08	0.82—1.38
31	Electrical workers	13	1.38	19	0.85	1	0.81	34	1.23	113	1.12	180	1.11	0.96—1.29
32	Wood workers	22	0.79	40	0.76	[1.06]	0.00	68	0.99	171	0.91	301	0.89	0.80—1.00
33	Painters	9	0.98	10	0.89	[0.44]	0.00	6	0.53	57	1.04	82	0.94	0.75—1.17
34	"Other construction workers"	41	1.15	35	1.02	5	2.21	14	1.00	99	0.98	194	1.04	0.90—1.19
35	Bricklayers	7	0.69	4	0.73	–	–	10	1.47	26	1.07	47	1.00	0.74—1.34
36	Printers	7	1.10	6	1.12	1	2.64	8	1.10	32	1.06	54	1.09	0.82—1.42
37	Chemical process workers	2	0.33	9	1.04	[0.19]	0.00	9	0.60	55	1.22	75	1.00	0.79—1.26
38	Food workers	24	1.24	5	0.80	3	1.93	14	0.81	41	0.89	87	0.96	0.77—1.18
39	Beverage workers	3	1.24	[0.41]	0.00	[0.02]	0.00	[0.24]	0.00	3	1.19	6	1.07	0.39—2.33
40	Tobacco workers	2	5.06	[0.07]	0.00	[0.00]	0.00	1	3.95	[0.21]	0.00	3	3.21	0.66—9.38
41	Glass makers etc	10	0.87	14	1.53	[0.28]	0.00	5	0.57	59	1.17	88	1.10	0.88—1.36
42	Packers	9	0.87	27	1.46	1	1.10	20	0.77	76	0.85	133	0.92	0.77—1.09
43	Engine operators	9	0.88	29	1.13	[1.34]	0.00	12	0.75	86	1.11	136	1.04	0.88—1.23
44	Public safety workers	3	**0.32**	15	1.03	1	1.11	14	1.24	44	0.96	77	0.94	0.74—1.17
45	Cooks and stewards	2	2.65	1	1.00	1	2.13	5	0.95	7	0.83	16	1.01	0.57—1.63
46	Domestic assistants	[0.01]	0.00	[0.06]	0.00	[0.00]	0.00	[0.05]	0.00	2	2.42	2	2.13	0.26—7.71
47	Waiters	3	1.83	3	3.10	[0.05]	0.00	3	1.36	2	0.46	11	1.20	0.60—2.14
48	Building caretakers	14	1.36	11	0.91	[0.36]	0.00	7	1.20	32	0.91	64	1.00	0.77—1.28
49	Chimney sweeps	[0.26]	0.00	1	1.12	–	–	1	1.70	4	1.54	6	1.38	0.51—3.01
50	Hairdressers	3	1.02	[0.26]	0.00	[0.06]	0.00	1	0.61	10	1.12	14	1.01	0.55—1.69
51	Launderers	1	0.70	[0.26]	0.00	[0.03]	0.00	1	1.01	10	1.56	12	1.31	0.68—2.30
52	Military personnel	5	1.06	2	0.39	–	–	13	1.28	27	0.99	47	1.00	0.73—1.32
53	"Other workers"	37	1.17	11	0.76	4	1.10	40	0.84	94	0.87	186	0.90	0.78—1.04
54	Economically inactive	46	**1.40**	78	1.07	1	0.38	27	1.09	139	0.84	291	0.98	0.87—1.10
1–54	All categories	744	1.00	888	1.00	45	1.00	976	1.00	3 570	1.00	6 223	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 19. Observed number of cancer of the small intestine among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	4	2.01	3	0.67	[0.08]	0.00	1	0.70	13	1.06	21	1.04	0.64—1.58
2	Laboratory assistants	1	0.71	4	1.59	[0.13]	0.00	[1.77]	0.00	1	0.32	6	0.67	0.25—1.46
3	Physicians	1	1.52	2	1.81	[0.02]	0.00	1	1.40	2	0.73	6	1.14	0.42—2.49
4	Dentists	1	1.70	3	2.56	[0.01]	0.00	[0.59]	0.00	5	2.27	9	1.97	0.90—3.74
5	Nurses	16	1.37	14	1.09	1	1.61	16	1.14	35	0.94	82	1.07	0.85—1.33
6	Assistant nurses	12	1.43	12	0.94	[0.82]	0.00	22	1.56	71	1.10	117	1.16	0.97—1.39
7	"Other health workers"	5	0.75	11	1.09	[0.18]	0.00	14	1.01	22	1.02	52	0.99	0.74—1.30
8	Teachers	16	1.10	26	1.12	1	0.95	19	0.73	88	1.05	150	1.01	0.86—1.18
9	Religious workers etc	4	2.02	13	1.12	[0.16]	0.00	4	0.62	30	1.12	51	1.08	0.81—1.42
10	Artistic workers	[1.05]	0.00	2	1.05	[0.14]	0.00	1	0.52	5	0.94	8	0.77	0.33—1.52
11	Journalists	[0.22]	0.00	3	2.46	[0.03]	0.00	[0.53]	0.00	4	1.63	7	1.57	0.63—3.24
12	Administrators	6	0.96	3	0.73	[0.11]	0.00	11	1.73	14	1.17	34	1.18	0.82—1.65
13	Clerical workers	62	1.04	76	1.01	2	0.61	77	0.93	210	1.01	427	1.00	0.91—1.09
14	Salesagents	[0.54]	0.00	9	0.82	[0.36]	0.00	16	1.44	27	0.91	52	0.99	0.74—1.29
15	Shop workers	37	0.90	27	**0.68**	[2.09]	0.00	69	1.00	137	1.04	270	0.95	0.84—1.07
16	Farmers	26	0.91	15	0.62	3	1.96	44	0.97	11	0.94	99	0.89	0.72—1.08
17	Gardeners	3	0.81	74	1.05	[0.05]	0.00	28	1.03	34	0.98	139	1.02	0.86—1.21
18	Fishermen	[0.14]	0.00	[0.16]	0.00	[0.05]	0.00	[0.36]	0.00	[0.11]	0.00	[0.82]	0.00	0.00—4.50
19	Forestry workers	[0.04]	0.00	[0.31]	0.00	[0.01]	0.00	2	3.83	[0.73]	0.00	2	1.24	0.15—4.49
20	Miners and quarry workers	[0.00]	0.00	[0.13]	0.00	[0.00]	0.00	[0.03]	0.00	[0.17]	0.00	[0.33]	0.00	0.00—11.11
21	Seamen	–	–	[0.04]	0.00	[0.00]	0.00	1	12.11	[0.02]	0.00	1	7.20	0.18—40.12
22	Transport workers	[0.04]	0.00	1	0.52	[0.05]	0.00	1	2.63	1	0.49	3	0.68	0.14—1.97
23	Drivers	2	1.95	1	1.07	[0.03]	0.00	[1.39]	0.00	6	1.21	9	1.08	0.49—2.05
24	Postal workers	2	0.92	11	0.93	2	2.73	13	0.82	48	1.28	76	1.11	0.88—1.39
25	Textile workers	8	0.58	34	1.27	[1.23]	0.00	26	1.06	76	0.98	144	1.00	0.85—1.18
26	Shoe and leather workers	1	0.99	2	0.60	[0.06]	0.00	2	1.13	7	1.18	12	0.99	0.51—1.74
27	Smelting workers	[0.25]	0.00	[0.77]	0.00	[0.00]	0.00	[0.21]	0.00	4	2.58	4	1.43	0.39—3.67
28	Mechanics	5	2.08	6	1.70	[0.01]	0.00	2	0.90	14	0.89	27	1.13	0.75—1.65
29	Plumbers	[0.02]	0.00	[0.01]	0.00	–	–	[0.02]	0.00	[0.02]	0.00	[0.07]	0.00	0.00—52.85
30	Welders	–	–	[0.28]	0.00	[0.00]	0.00	[0.17]	0.00	[0.57]	0.00	[1.02]	0.00	0.00—3.60
31	Electrical workers	5	1.48	2	0.87	[0.01]	0.00	1	0.42	5	0.57	13	0.77	0.41—1.32
32	Wood workers	[1.12]	0.00	8	1.19	[0.02]	0.00	1	1.22	3	1.16	12	1.06	0.55—1.86
33	Painters	[0.04]	0.00	[0.79]	0.00	[0.01]	0.00	1	5.48	[0.70]	0.00	1	0.58	0.01—3.23
34	"Other construction workers"	[0.03]	0.00	1	0.38	[0.00]	0.00	[0.07]	0.00	[0.08]	0.00	1	0.35	0.01—1.95
35	Bricklayers	[0.01]	0.00	[0.09]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.11]	0.00	0.00—34.69
36	Printers	2	1.55	3	0.88	[0.11]	0.00	[2.12]	0.00	5	0.75	10	0.74	0.35—1.35
37	Chemical process workers	3	1.47	2	1.15	[0.05]	0.00	4	2.11	9	1.70	18	1.63	0.97—2.58
38	Food workers	10	1.01	14	1.55	3	1.18	10	0.83	21	1.31	58	1.17	0.89—1.51
39	Beverage workers	[0.96]	0.00	1	1.99	[0.01]	0.00	[0.11]	0.00	[1.01]	0.00	1	0.39	0.01—2.15
40	Tobacco workers	4	3.04	2	7.01	–	–	[0.41]	0.00	[0.64]	0.00	6	2.27	0.83—4.93
41	Glass makers etc	2	0.83	2	0.31	[0.07]	0.00	2	0.49	9	0.64	15	**0.55**	0.31—0.91
42	Packers	1	1.44	14	1.24	1	3.94	13	1.32	23	1.09	52	1.20	0.90—1.58
43	Engine operators	[0.02]	0.00	2	1.09	[0.00]	0.00	[0.14]	0.00	1	0.78	3	0.91	0.19—2.67
44	Public safety workers	[0.08]	0.00	[0.44]	0.00	[0.04]	0.00	[1.21]	0.00	2	1.22	2	0.59	0.07—2.12
45	Cooks and stewards	[0.03]	0.00	14	1.10	2	2.16	16	1.19	34	1.10	66	1.14	0.88—1.45
46	Domestic assistants	19	1.23	11	0.80	[0.27]	0.00	35	0.99	73	0.91	138	0.95	0.81—1.13
47	Waiters	2	0.75	11	1.02	[0.10]	0.00	16	1.07	32	1.00	61	1.01	0.77—1.29
48	Building caretakers	39	0.86	34	0.78	1	0.53	65	1.01	88	1.07	227	0.96	0.84—1.09
49	Chimney sweeps	[0.00]	0.00	[0.02]	0.00	–	–	[0.01]	0.00	[0.00]	0.00	[0.04]	0.00	0.00—103.96
50	Hairdressers	3	1.12	3	0.72	[0.10]	0.00	5	1.30	13	0.98	24	1.00	0.64—1.48
51	Launderers	4	0.79	3	0.88	[0.30]	0.00	4	0.74	18	1.07	29	0.93	0.63—1.34
52	Military personnel	[0.03]	0.00	1	21.70	–	–	[0.02]	0.00	[0.05]	0.00	1	7.26	0.18—40.47
53	"Other workers"	9	0.70	17	1.26	2	1.02	28	0.84	36	0.98	92	0.94	0.75—1.15
54	Economicallyinactive	351	1.01	303	1.03	10	1.54	409	1.01	1 696	0.98	2 769	1.00	0.96—1.04
1–54	All categories	666	1.00	800	1.00	28	1.00	980	1.00	2 933	1.00	5 407	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

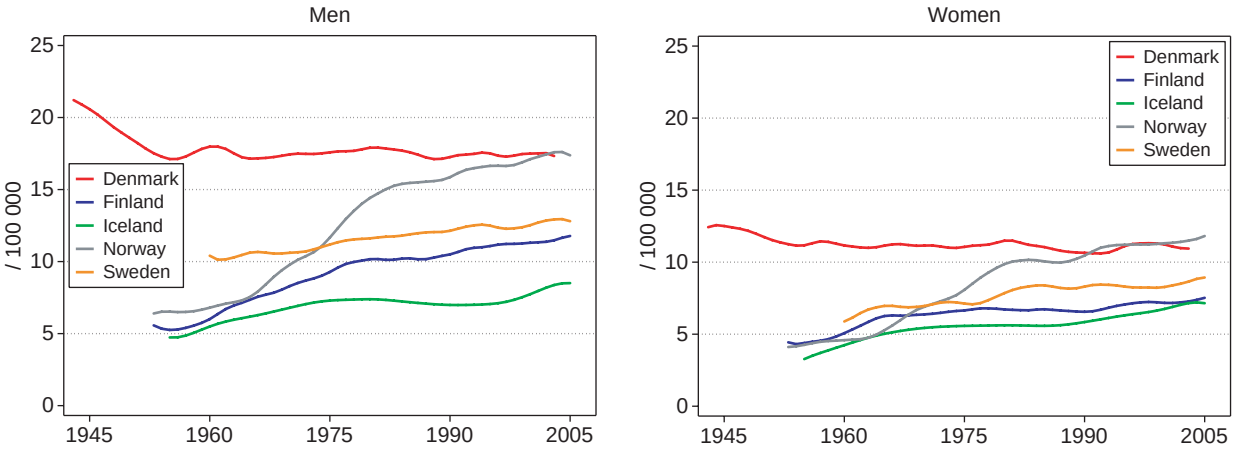


Figure 21. Age standardised (World) incidence rates for rectal cancer 1943–2005, by country and gender. Modified from NORDCAN [49].

SIRs were high among chimney sweeps (6.71, 1.38–19.61, based on only 3 cases), and tobacco manufacture workers (Table 23). A low SIR was observed among the female beverage manufacture workers (0.59, 0.36–0.92).

Comment. The variation in rectal cancer risk between occupational categories is very small. Workers in tobacco manufacturing may smoke more than the general population, and hence the increased risk among females working in tobacco manufacturing may be explained by smoking, which is an established risk factor of rectal cancer [65]. The increased risk among male and decreased risk among female beverage workers may well be an example of a situation where the men and women under the same occupational code do different types of work. Men may work mainly with beer brewing, while women with other types of beverages. Earlier studies suggest that alcohol consumption – which may be high among brewery workers – may increase the risk of rectal cancer. Lack of physical activity or sedentary work has not been clearly associated with the risk of rectal cancer [66].

Liver cancer

Liver cancer is rare in the Nordic countries. The pattern is very similar in the two genders, although with a lower rate among women (Figure 22).

Among men, waiters (SIR 4.22, 95% CI 3.47–5.13), cooks, beverage workers, journalists and seamen ranked as the five groups with the highest risk. At the other end of the scale were farmers (0.47, 0.45–0.50), gardeners, forestry workers, teachers, fishermen and wood workers (Table 24).

In women, the risk of primary liver cancer did not vary much across the different occupations (Table 25). Significantly elevated risks were seen

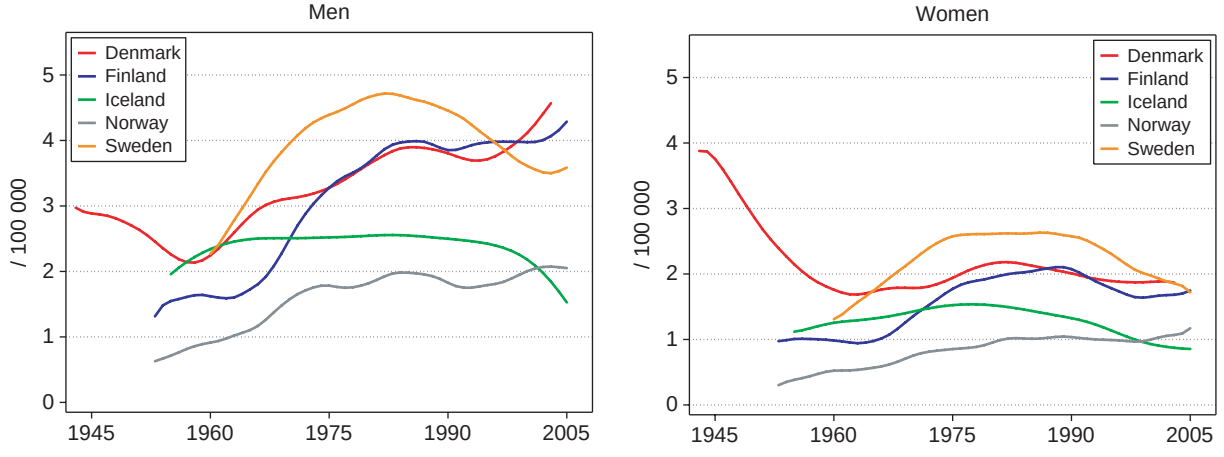


Figure 22. Age standardised (World) incidence rates for liver cancer 1943–2005, by country and gender. Modified from NORDCAN [49].

Table 20. Observed number of colon cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	1 514	**1.10**	855	**1.21**	12	0.92	956	1.02	4 518	**1.08**	7 855	**1.09**	1.06—1.11
2	Laboratory assistants	23	0.85	14	0.82	2	0.81	59	1.29	13	0.75	111	1.01	0.84—1.22
3	Physicians	139	**1.20**	57	**1.40**	6	1.11	139	1.11	202	1.08	543	**1.14**	1.05—1.24
4	Dentists	38	1.16	8	0.93	2	1.56	63	1.12	106	1.11	217	1.12	0.98—1.28
5	Nurses	1	0.67	2	0.96	[0.02]	0.00	5	1.10	10	1.30	18	1.14	0.67—1.80
6	Assistant nurses	38	1.17	1	0.56	[0.57]	0.00	21	0.97	54	0.86	114	0.95	0.79—1.15
7	"Other health workers"	85	0.86	36	0.91	2	1.39	44	0.93	171	1.07	338	0.97	0.88—1.08
8	Teachers	597	0.99	297	1.00	22	1.13	685	1.00	1 094	1.03	2 695	1.01	0.97—1.05
9	Religious workers etc	308	**1.18**	192	**1.22**	19	1.49	394	**1.11**	962	**1.20**	1 875	**1.18**	1.13—1.24
10	Artistic workers	82	1.03	71	1.25	5	1.42	121	1.16	275	1.09	554	**1.11**	1.02—1.21
11	Journalists	51	**1.37**	34	1.24	2	1.02	40	0.89	139	**1.19**	266	**1.16**	1.03—1.31
12	Administrators	1 875	**1.19**	615	**1.36**	33	0.97	1 502	**1.19**	1 946	**1.17**	5 971	**1.20**	1.17—1.23
13	Clerical workers	767	**1.13**	337	**1.13**	48	1.26	1 051	**1.11**	1 992	**1.13**	4 195	**1.13**	1.09—1.16
14	Sales agents	450	**1.27**	495	**1.17**	21	1.09	1 268	**1.16**	2 805	**1.10**	5 039	**1.14**	1.11—1.17
15	Shop workers	1 760	**1.11**	202	1.14	24	**1.82**	437	1.04	857	1.05	3 280	**1.09**	1.05—1.13
16	Farmers	2 143	**0.68**	1 692	**0.80**	28	**0.49**	2 439	**0.77**	3 724	**0.80**	10 026	**0.76**	0.75—0.78
17	Gardeners	321	**0.72**	253	**0.85**	2	1.13	623	**0.80**	1 408	**0.84**	2 607	**0.81**	0.78—0.85
18	Fishermen	154	1.09	22	0.80	32	1.06	892	**0.91**	171	0.95	1 271	**0.94**	0.89—0.99
19	Forestry workers	43	**0.66**	206	**0.60**	[0.28]	0.00	452	**0.79**	942	**0.77**	1 643	**0.75**	0.71—0.78
20	Miners and quarry workers	18	0.92	56	1.03	1	1.98	155	0.99	264	0.90	494	0.94	0.86—1.03
21	Seamen	195	**1.31**	91	1.24	13	1.50	813	1.05	285	1.12	1 397	**1.11**	1.05—1.17
22	Transport workers	346	1.02	262	**1.19**	14	0.78	451	1.08	888	1.01	1 961	1.04	1.00—1.09
23	Drivers	1 139	1.06	766	**1.11**	27	1.07	1 280	**1.15**	2 217	**1.07**	5 429	**1.09**	1.06—1.12
24	Postal workers	189	0.91	130	**1.23**	4	1.21	257	**1.19**	498	1.07	1 078	**1.08**	1.02—1.15
25	Textile workers	178	0.90	99	**1.39**	6	1.03	259	1.05	586	**1.09**	1 128	**1.07**	1.01—1.13
26	Shoe and leather workers	54	1.10	26	0.84	[1.25]	0.00	120	1.17	257	**1.19**	457	**1.14**	1.04—1.25
27	Smelting workers	440	1.04	123	1.15	6	0.75	351	1.09	809	0.97	1 729	1.02	0.97—1.07
28	Mechanics	1 180	1.02	716	1.05	10	**0.42**	1 677	**1.08**	3 803	1.00	7 386	1.02	1.00—1.05
29	Plumbers	117	1.15	108	0.96	3	0.75	189	1.07	496	**1.13**	913	**1.09**	1.03—1.17
30	Welders	–	–	101	0.96	[1.44]	0.00	187	0.93	457	0.94	745	0.94	0.87—1.01
31	Electrical workers	288	1.08	296	1.03	13	0.92	722	1.05	1 296	1.01	2 615	1.03	0.99—1.07
32	Wood workers	740	**0.91**	661	**0.89**	9	0.63	1 731	**0.93**	2 337	**0.88**	5 478	**0.90**	0.88—0.93
33	Painters	260	0.99	162	1.05	7	1.20	324	1.06	757	1.00	1 510	1.02	0.97—1.07
34	"Other construction workers"	941	**0.92**	417	**0.88**	32	1.14	345	0.97	1 387	0.98	3 122	**0.95**	0.92—0.98
35	Bricklayers	295	1.01	61	0.79	–	–	164	0.90	328	0.96	848	0.95	0.88—1.01
36	Printers	232	**1.28**	77	1.13	4	0.87	215	**1.19**	430	1.08	958	**1.15**	1.08—1.23
37	Chemical process workers	188	1.08	101	0.87	1	0.38	384	0.95	595	0.94	1 269	0.95	0.90—1.01
38	Food workers	499	**0.90**	87	1.03	22	0.99	454	0.98	610	0.96	1 672	**0.95**	0.90—0.99
39	Beverage workers	88	**1.32**	6	1.06	[0.37]	0.00	3	0.66	45	1.25	142	**1.25**	1.06—1.48
40	Tobacco workers	16	1.40	1	0.99	[0.03]	0.00	10	1.45	2	0.72	29	1.31	0.88—1.88
41	Glass makers etc	291	**0.88**	109	0.90	4	1.03	252	**1.14**	662	0.96	1 318	0.97	0.91—1.02
42	Packers	304	1.03	269	1.07	10	0.77	811	**1.18**	1 294	1.03	2 688	**1.07**	1.03—1.11
43	Engine operators	288	0.98	355	1.05	21	1.25	386	1.01	1 076	1.05	2 126	1.03	0.99—1.08
44	Public safety workers	341	**1.21**	218	1.11	14	1.16	332	1.11	730	**1.23**	1 635	**1.18**	1.13—1.24
45	Cooks and stewards	21	1.01	15	1.28	5	0.90	107	0.83	111	1.09	259	0.96	0.85—1.09
46	Domestic assistants	[0.23]	0.00	[0.88]	0.00	[0.02]	0.00	[1.05]	0.00	11	1.45	11	1.13	0.56—2.01
47	Waiters	67	**1.54**	7	0.63	[0.58]	0.00	84	**1.51**	62	1.17	220	**1.34**	1.18—1.53
48	Building caretakers	292	0.98	169	1.01	9	1.62	164	1.10	554	**1.15**	1 188	**1.08**	1.02—1.14
49	Chimney sweeps	20	**2.71**	15	1.25	–	–	23	1.50	46	1.36	104	**1.52**	1.25—1.84
50	Hairdressers	84	0.98	2	0.60	[0.82]	0.00	39	0.88	149	**1.19**	274	1.06	0.94—1.19
51	Launderers	46	1.10	4	1.16	1	1.88	26	0.98	90	1.01	167	1.03	0.89—1.20
52	Military personnel	166	**1.20**	70	1.11	–	–	265	1.05	401	**1.13**	902	**1.12**	1.05—1.19
53	"Other workers"	920	1.04	182	0.93	56	1.12	1 252	0.95	1 408	**0.92**	3 818	**0.96**	0.93—0.99
54	Economically inactive	995	**1.13**	1 007	0.98	38	1.13	561	**0.87**	2 167	0.97	4 768	0.99	0.96—1.02
1–54	All categories	21 627	1.00	12 158	1.00	590	1.00	25 584	1.00	48 497	1.00	108 456	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 21. Observed number of colon cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	77	1.06	88	1.22	1	0.94	32	0.94	203	1.03	401	1.06	0.97—1.17
2	Laboratory assistants	49	0.99	42	1.01	2	1.22	40	0.88	30	0.74	163	0.91	0.78—1.06
3	Physicians	21	0.85	17	0.98	[0.36]	0.00	21	1.13	50	1.20	109	1.07	0.88—1.29
4	Dentists	23	1.06	21	0.96	1	8.14	21	1.28	38	1.04	104	1.08	0.89—1.30
5	Nurses	428	0.98	210	1.00	4	0.46	352	0.98	620	1.01	1 614	0.99	0.94—1.04
6	Assistant nurses	302	1.00	219	0.97	13	1.05	379	1.04	995	0.97	1 908	0.99	0.94—1.03
7	"Other health workers"	239	0.95	182	1.04	1	0.42	376	1.03	325	0.96	1 123	0.99	0.93—1.05
8	Teachers	563	1.06	432	1.07	11	0.73	678	1.00	1 338	0.98	3 022	1.01	0.97—1.05
9	Religious workers etc	68	0.93	185	1.05	5	2.13	186	1.09	393	0.95	837	1.00	0.93—1.07
10	Artistic workers	33	0.82	35	1.11	3	1.58	44	0.82	80	0.94	195	0.92	0.80—1.06
11	Journalists	15	**1.88**	17	0.82	[0.46]	0.00	10	0.74	32	0.82	74	0.91	0.71—1.14
12	Administrators	262	1.11	62	0.91	[1.68]	0.00	190	1.08	236	**1.19**	750	**1.11**	1.03—1.19
13	Clerical workers	2 297	**1.06**	1 424	**1.11**	57	1.21	2 398	**1.06**	3 709	**1.10**	9 885	**1.08**	1.06—1.10
14	Sales agents	27	1.31	214	1.05	9	1.62	346	1.02	559	1.06	1 155	1.05	0.99—1.12
15	Shop workers	1 556	1.01	770	1.06	32	1.00	2 057	1.04	2 456	**1.06**	6 871	**1.04**	1.01—1.06
16	Farmers	942	**0.87**	424	**0.82**	14	**0.55**	1 286	**0.90**	174	**0.82**	2 840	**0.87**	0.84—0.90
17	Gardeners	113	**0.81**	1 197	**0.84**	3	3.46	749	**0.87**	602	0.97	2 664	**0.88**	0.84—0.91
18	Fishermen	8	1.48	5	1.68	1	1.31	3	**0.30**	2	1.00	19	0.90	0.54—1.41
19	Forestry workers	3	2.14	2	0.35	[0.10]	0.00	15	0.96	12	0.95	32	0.90	0.62—1.27
20	Miners and quarry workers	[0.09]	0.00	1	0.39	[0.03]	0.00	[0.68]	0.00	1	0.35	2	0.32	0.04—1.17
21	Seamen	–	–	1	1.70	[0.00]	0.00	1	0.44	[0.26]	0.00	2	0.64	0.08—2.32
22	Transport workers	[1.54]	0.00	46	1.23	1	1.07	13	1.32	35	1.02	95	1.13	0.92—1.38
23	Drivers	34	0.91	18	1.14	[0.35]	0.00	34	0.90	74	0.95	160	0.94	0.81—1.10
24	Postal workers	105	**1.30**	234	1.05	13	1.16	480	1.07	652	1.03	1 484	**1.06**	1.01—1.12
25	Textile workers	516	1.02	548	1.07	15	0.67	872	**1.15**	1 523	**1.06**	3 474	**1.08**	1.04—1.11
26	Shoe and leather workers	29	0.79	61	0.98	[1.17]	0.00	44	0.82	112	1.03	246	0.94	0.83—1.06
27	Smelting workers	8	0.89	11	0.75	[0.05]	0.00	5	0.96	21	0.84	45	0.84	0.61—1.12
28	Mechanics	96	1.12	57	0.90	[0.17]	0.00	63	1.00	260	1.00	476	1.01	0.92—1.11
29	Plumbers	[1.02]	0.00	[0.13]	0.00	–	–	1	2.41	[0.28]	0.00	1	0.54	0.01—3.02
30	Welders	–	–	2	0.44	[0.01]	0.00	7	1.76	5	0.60	14	0.82	0.45—1.38
31	Electrical workers	133	1.11	41	1.08	[0.17]	0.00	72	1.08	122	0.85	368	1.00	0.90—1.11
32	Wood workers	49	1.21	103	**0.79**	[0.33]	0.00	19	0.87	35	0.84	206	0.88	0.77—1.01
33	Painters	1	0.65	21	1.41	[0.09]	0.00	8	1.55	8	0.69	38	1.14	0.81—1.56
34	"Other construction workers"	2	1.58	52	0.96	[0.05]	0.00	3	1.50	1	0.83	58	0.98	0.75—1.27
35	Bricklayers	[0.26]	0.00	[1.81]	0.00	–	–	[0.10]	0.00	[0.03]	0.00	[2.21]	0.00	0.00—1.67
36	Printers	57	1.23	77	1.23	1	0.59	60	0.99	132	1.16	327	**1.15**	1.03—1.28
37	Chemical process workers	80	1.08	38	1.15	3	3.73	73	**1.32**	98	1.06	292	**1.14**	1.02—1.28
38	Food workers	350	0.96	170	0.97	43	1.02	370	1.01	285	0.98	1 218	0.98	0.93—1.04
39	Beverage workers	36	1.05	4	0.40	[0.10]	0.00	5	1.61	21	1.12	66	0.99	0.77—1.27
40	Tobacco workers	43	0.92	8	1.41	–	–	10	0.80	10	0.92	71	0.93	0.73—1.18
41	Glass makers etc	91	1.06	122	1.02	[1.12]	0.00	121	1.02	286	**1.17**	620	**1.09**	1.01—1.18
42	Packers	31	1.23	224	1.05	4	0.92	308	1.06	372	1.00	939	1.04	0.97—1.10
43	Engine operators	1	1.66	28	0.84	[0.06]	0.00	4	1.16	13	0.69	46	0.82	0.60—1.09
44	Public safety workers	3	0.99	7	0.89	[0.86]	0.00	43	1.15	26	1.06	79	1.07	0.85—1.34
45	Cooks and stewards	2	2.01	261	1.08	28	**1.66**	467	**1.11**	502	**0.87**	1 260	1.00	0.95—1.06
46	Domestic assistants	554	0.96	241	0.97	6	1.17	1 009	**0.93**	1 319	0.96	3 129	**0.95**	0.92—0.99
47	Waiters	108	1.14	230	**1.18**	3	1.70	488	**1.11**	579	0.99	1 408	**1.07**	1.02—1.13
48	Building caretakers	1 553	**0.93**	764	**0.91**	38	1.13	1 791	0.95	1 435	0.98	5 581	**0.95**	0.92—0.97
49	Chimney sweeps	[0.20]	0.00	1	2.62	–	–	[0.28]	0.00	[0.02]	0.00	1	1.13	0.03—6.30
50	Hairdressers	95	0.97	86	1.16	[1.49]	0.00	126	1.15	243	1.08	550	1.08	1.00—1.18
51	Launderers	193	1.02	55	0.80	2	0.35	149	0.89	324	1.02	723	0.97	0.90—1.04
52	Military personnel	[0.98]	0.00	2	3.46	–	–	1	2.22	[0.57]	0.00	3	1.17	0.24—3.41
53	"Other workers"	472	1.00	244	0.96	31	0.96	916	0.96	693	1.08	2 356	1.00	0.96—1.04
54	Economically inactive	13 154	1.00	6 086	1.01	115	1.00	12 539	0.99	31 314	0.99	63 208	0.99	0.99—1.00
1–54	All categories	24 822	1.00	15 390	1.00	460	1.00	29 285	1.00	52 355	1.00	122 312	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 22. Observed number of rectal cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	954	1.00	643	**1.13**	4	0.85	523	**0.91**	2 915	0.99	5 039	1.00	0.97—1.03
2	Laboratory assistants	21	1.11	11	0.79	2	2.16	33	1.18	17	1.28	84	1.12	0.89—1.38
3	Physicians	74	0.92	23	0.69	3	1.54	53	**0.69**	125	0.95	278	**0.86**	0.76—0.97
4	Dentists	24	1.05	4	0.57	[0.43]	0.00	40	1.17	66	1.00	134	1.02	0.86—1.21
5	Nurses	[1.03]	0.00	3	1.83	[0.01]	0.00	1	0.34	5	0.83	9	0.77	0.35—1.46
6	Assistant nurses	21	0.93	2	1.40	[0.21]	0.00	11	0.84	36	0.80	70	0.85	0.66—1.08
7	"Other health workers"	70	1.01	47	**1.45**	1	1.87	25	0.86	96	0.86	239	0.99	0.87—1.12
8	Teachers	358	**0.86**	223	0.92	7	0.99	371	**0.88**	646	**0.86**	1 605	**0.87**	0.83—0.92
9	Religious workers etc	195	1.07	146	1.13	6	1.28	224	1.04	527	0.93	1 098	1.00	0.94—1.06
10	Artistic workers	59	1.06	59	1.27	1	0.78	78	1.23	164	0.92	361	1.05	0.94—1.16
11	Journalists	24	0.93	27	1.19	[0.71]	0.00	26	0.94	72	0.88	149	0.94	0.80—1.10
12	Administrators	1 153	1.05	398	1.08	12	0.97	839	**1.09**	1 210	1.05	3 612	**1.07**	1.03—1.10
13	Clerical workers	438	0.92	269	1.10	16	1.15	580	1.01	1 300	1.06	2 603	1.03	0.99—1.07
14	Sales agents	252	1.02	379	1.09	6	0.84	752	**1.13**	1 996	**1.13**	3 385	**1.11**	1.08—1.15
15	Shop workers	1 135	1.03	165	1.14	3	0.62	275	1.07	577	1.01	2 155	1.03	0.99—1.08
16	Farmers	1 764	**0.81**	1 563	**0.89**	12	0.58	1 544	**0.81**	2 753	**0.88**	7 636	**0.85**	0.83—0.87
17	Gardeners	275	0.89	204	**0.84**	[0.65]	0.00	427	0.91	1 129	0.98	2 035	**0.94**	0.90—0.98
18	Fishermen	107	1.07	14	0.62	14	1.28	526	**0.88**	130	1.06	791	0.93	0.87—1.00
19	Forestry workers	38	0.83	215	**0.76**	[0.10]	0.00	298	**0.86**	761	**0.91**	1 312	**0.87**	0.82—0.92
20	Miners and quarry workers	13	0.94	46	1.03	[0.18]	0.00	77	0.80	170	**0.84**	306	**0.86**	0.76—0.96
21	Seamen	114	1.09	67	1.11	[3.18]	0.00	517	1.09	187	1.06	885	**1.08**	1.01—1.15
22	Transport workers	231	0.98	186	1.04	5	0.76	280	1.11	629	1.04	1 331	1.04	0.99—1.10
23	Drivers	815	1.08	636	**1.12**	10	1.09	785	**1.14**	1 509	1.04	3 755	**1.08**	1.05—1.12
24	Postal workers	126	0.87	89	1.03	[1.23]	0.00	151	1.14	321	0.99	687	1.00	0.93—1.08
25	Textile workers	178	**1.28**	56	0.95	1	0.46	154	1.04	394	1.07	783	**1.10**	1.02—1.17
26	Shoe and leather workers	39	1.13	25	0.97	2	4.27	74	1.19	159	1.09	299	1.11	0.99—1.24
27	Smelting workers	309	1.03	86	0.97	2	0.67	213	1.08	575	1.00	1 185	1.02	0.96—1.08
28	Mechanics	806	0.99	550	0.99	10	1.15	1 003	1.05	2 628	0.99	4 997	1.00	0.97—1.03
29	Plumbers	93	**1.30**	101	1.09	[1.43]	0.00	130	1.19	329	1.07	653	**1.12**	1.04—1.21
30	Welders	–	–	77	0.89	[0.53]	0.00	141	1.14	378	1.10	596	1.08	0.99—1.16
31	Electrical workers	209	1.11	215	0.92	4	0.77	436	1.03	925	1.02	1 789	1.02	0.97—1.07
32	Wood workers	561	0.99	603	0.99	6	1.14	1 096	0.97	1 722	0.95	3 988	0.97	0.94—1.00
33	Painters	220	**1.20**	123	0.96	4	1.84	201	1.08	583	**1.12**	1 131	**1.11**	1.05—1.18
34	"Other construction workers"	705	0.97	402	1.02	13	1.27	222	1.01	962	0.99	2 304	0.99	0.95—1.03
35	Bricklayers	237	**1.15**	71	1.12	–	–	126	1.13	264	1.12	698	**1.13**	1.05—1.22
36	Printers	129	1.01	63	1.11	1	0.58	133	**1.19**	315	**1.13**	641	**1.11**	1.03—1.20
37	Chemical process workers	140	1.14	91	0.96	1	1.03	281	1.13	455	1.05	968	**1.07**	1.01—1.14
38	Food workers	388	0.99	68	0.98	11	1.35	284	1.00	510	**1.16**	1 261	1.06	1.00—1.12
39	Beverage workers	71	**1.49**	4	0.86	[0.13]	0.00	5	1.69	32	1.29	112	**1.40**	1.16—1.68
40	Tobacco workers	6	0.74	1	1.19	[0.01]	0.00	2	0.47	3	1.55	12	0.79	0.41—1.38
41	Glass makers etc	251	1.08	103	1.04	2	1.41	144	1.05	481	1.01	981	1.04	0.97—1.10
42	Packers	216	1.03	241	**1.15**	7	1.47	501	**1.18**	953	**1.10**	1 918	**1.12**	1.07—1.17
43	Engine operators	236	**1.14**	291	1.05	8	1.32	267	1.12	707	0.99	1 509	1.05	0.99—1.10
44	Public safety workers	213	1.09	183	1.14	5	1.15	212	**1.17**	442	1.06	1 055	**1.10**	1.04—1.17
45	Cooks and stewards	13	0.88	16	1.70	3	1.47	91	1.15	82	1.13	205	1.15	1.00—1.32
46	Domestic assistants	1	6.14	2	2.92	[0.00]	0.00	2	3.09	3	0.53	8	1.12	0.48—2.21
47	Waiters	51	**1.62**	6	0.67	[0.21]	0.00	57	**1.66**	45	1.19	159	**1.41**	1.21—1.65
48	Building caretakers	220	1.05	138	1.00	5	2.41	93	1.00	330	0.99	786	1.01	0.94—1.09
49	Chimney sweeps	5	0.97	12	1.19	–	–	10	1.06	24	1.01	51	1.05	0.78—1.38
50	Hairdressers	64	1.07	2	0.70	[0.29]	0.00	24	0.89	110	**1.28**	200	1.13	0.99—1.30
51	Launderers	29	0.99	2	0.69	[0.20]	0.00	16	0.98	51	0.83	98	0.89	0.72—1.08
52	Military personnel	118	**1.24**	45	0.88	–	–	162	1.06	243	0.99	568	1.04	0.96—1.13
53	"Other workers"	689	**1.10**	160	0.98	16	0.87	793	0.99	1 121	1.06	2 779	1.04	1.00—1.08
54	Economically inactive	698	1.07	911	1.00	13	1.04	320	**0.80**	1 419	**0.91**	3 361	**0.95**	0.92—0.98
1–54	All categories	15 156	1.00	10 067	1.00	216	1.00	15 629	1.00	33 586	1.00	74 654	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 23. Observed number of rectal cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	42	1.30	51	1.15	[0.48]	0.00	10	0.66	112	1.05	215	1.08	0.94—1.23
2	Laboratory assistants	14	0.63	22	0.86	1	1.39	15	0.75	28	1.09	80	0.85	0.67—1.06
3	Physicians	7	0.65	12	1.12	1	7.32	7	0.86	26	1.10	53	0.99	0.74—1.30
4	Dentists	10	1.04	21	1.61	[0.05]	0.00	9	1.27	19	0.98	59	1.20	0.91—1.55
5	Nurses	176	0.91	141	1.09	2	0.56	139	0.88	287	0.87	745	0.92	0.85—0.99
6	Assistant nurses	121	0.90	128	0.93	3	0.59	145	0.91	576	1.02	973	0.97	0.91—1.04
7	"Other health workers"	102	0.92	121	1.13	[1.02]	0.00	175	1.10	182	0.97	580	1.03	0.95—1.11
8	Teachers	218	0.93	216	0.88	3	0.49	282	0.95	729	0.99	1 448	0.95	0.90—1.00
9	Religious workers etc	32	0.99	109	0.99	1	1.06	65	0.87	216	0.93	423	0.94	0.85—1.03
10	Artistic workers	18	1.03	16	0.83	[0.80]	0.00	19	0.82	50	1.07	103	0.96	0.79—1.17
11	Journalists	4	1.12	10	0.79	1	5.12	5	0.84	20	0.94	40	0.92	0.65—1.25
12	Administrators	106	1.02	39	0.93	[0.67]	0.00	71	0.93	110	1.03	326	0.99	0.89—1.10
13	Clerical workers	1 028	1.07	898	1.15	20	1.01	1 093	1.12	1 871	1.03	4 910	1.08	1.05—1.11
14	Sales agents	15	1.66	122	0.99	1	0.46	164	1.14	297	1.09	599	1.09	1.01—1.18
15	Shop workers	718	1.06	453	1.03	16	1.24	899	1.06	1 259	1.06	3 345	1.05	1.02—1.09
16	Farmers	417	0.88	279	0.92	10	1.03	469	0.78	100	0.92	1 275	0.85	0.81—0.90
17	Gardeners	59	0.96	752	0.89	1	3.00	327	0.91	302	0.96	1 441	0.91	0.87—0.96
18	Fishermen	2	0.84	2	1.13	[0.31]	0.00	3	0.71	[1.02]	0.00	7	0.72	0.29—1.48
19	Forestry workers	[0.62]	0.00	[3.42]	0.00	[0.04]	0.00	10	1.52	4	0.61	14	0.81	0.44—1.36
20	Miners and quarry workers	[0.04]	0.00	[1.53]	0.00	[0.01]	0.00	[0.31]	0.00	[1.52]	0.00	[3.41]	0.00	0.00—1.08
21	Seamen	–	–	[0.37]	0.00	[0.00]	0.00	1	1.03	[0.16]	0.00	1	0.66	0.02—3.70
22	Transport workers	1	1.48	25	1.12	[0.36]	0.00	3	0.69	20	1.10	49	1.07	0.79—1.41
23	Drivers	18	1.08	11	1.14	[0.15]	0.00	14	0.85	42	0.97	85	0.99	0.79—1.22
24	Postal workers	28	0.78	147	1.10	6	1.34	185	0.96	335	1.01	701	1.00	0.93—1.08
25	Textile workers	245	1.09	291	0.95	2	0.24	381	1.19	744	1.04	1 663	1.06	1.01—1.11
26	Shoe and leather workers	19	1.16	28	0.74	[0.43]	0.00	31	1.36	63	1.16	141	1.07	0.91—1.26
27	Smelting workers	4	1.00	8	0.90	[0.02]	0.00	2	0.86	6	0.44	20	0.70	0.43—1.08
28	Mechanics	34	0.89	38	0.99	[0.08]	0.00	25	0.93	133	0.96	230	0.95	0.83—1.08
29	Plumbers	[0.44]	0.00	[0.08]	0.00	–	–	1	5.51	[0.17]	0.00	1	1.15	0.03—6.42
30	Welders	–	–	3	1.05	[0.00]	0.00	4	2.24	7	1.45	14	1.48	0.81—2.48
31	Electrical workers	62	1.16	17	0.72	[0.07]	0.00	35	1.22	81	1.06	195	1.07	0.93—1.23
32	Wood workers	16	0.88	81	1.04	[0.13]	0.00	7	0.74	19	0.84	123	0.96	0.80—1.14
33	Painters	[0.69]	0.00	6	0.67	[0.04]	0.00	4	1.81	8	1.29	18	0.99	0.59—1.57
34	"Other construction workers"	2	3.55	33	1.02	[0.02]	0.00	1	1.16	[0.70]	0.00	36	1.05	0.73—1.45
35	Bricklayers	[0.11]	0.00	1	0.94	–	–	[0.05]	0.00	1	49.94	2	1.61	0.20—5.82
36	Printers	21	1.01	48	1.26	[0.68]	0.00	39	1.49	56	0.94	164	1.13	0.97—1.32
37	Chemical process workers	38	1.15	24	1.20	[0.31]	0.00	22	0.93	49	1.02	133	1.06	0.90—1.26
38	Food workers	161	1.00	108	1.03	15	0.91	133	0.85	181	1.23	598	1.02	0.94—1.11
39	Beverage workers	12	0.78	1	0.17	[0.04]	0.00	[1.33]	0.00	6	0.64	19	0.59	0.36—0.92
40	Tobacco workers	36	1.71	2	0.59	–	–	9	1.67	11	1.96	58	1.64	1.24—2.12
41	Glass makers etc	43	1.12	79	1.09	[0.45]	0.00	49	0.96	119	0.94	290	1.00	0.90—1.13
42	Packers	11	0.98	134	1.05	6	3.65	127	1.03	202	1.05	480	1.05	0.96—1.15
43	Engine operators	2	7.15	19	0.94	[0.02]	0.00	[1.54]	0.00	7	0.65	28	0.85	0.57—1.23
44	Public safety workers	3	2.20	3	0.63	[0.31]	0.00	13	0.84	23	1.64	42	1.17	0.84—1.58
45	Cooks and stewards	[0.44]	0.00	159	1.09	4	0.64	190	1.07	298	1.03	651	1.05	0.97—1.14
46	Domestic assistants	238	0.93	154	1.03	3	1.62	440	0.96	732	1.01	1 567	0.99	0.94—1.04
47	Waiters	45	1.06	139	1.18	1	1.46	203	1.09	311	1.05	699	1.09	1.01—1.17
48	Building caretakers	710	0.96	495	0.98	17	1.36	809	1.01	760	1.01	2 791	0.99	0.96—1.03
49	Chimney sweeps	[0.08]	0.00	1	4.22	–	–	2	17.37	[0.01]	0.00	3	6.71	1.38—19.61
50	Hairdressers	48	1.11	45	1.00	1	1.63	36	0.77	126	1.06	256	1.01	0.89—1.14
51	Launderers	77	0.92	37	0.91	[2.06]	0.00	82	1.16	151	0.96	347	0.98	0.88—1.09
52	Military personnel	[0.43]	0.00	[0.38]	0.00	–	–	[0.20]	0.00	1	2.68	1	0.72	0.02—4.02
53	"Other workers"	247	1.18	140	0.92	9	0.71	440	1.08	349	1.05	1 185	1.06	1.00—1.13
54	Economically inactive	5 759	0.99	3 560	1.00	55	1.27	5 292	0.99	15 692	0.99	30 358	0.99	0.98—1.00
1–54	All categories	10 969	1.00	9 229	1.00	179	1.00	12 487	1.00	26 721	1.00	59 585	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

among smelter and metal foundry workers (2.11, 1.09–3.68), tobacco manufacture workers, waitresses, building caretakers and cleaners. The lowest risks were observed among farmers (0.66, 0.57–0.77), teachers and those working with religious, juridical and other humanistic work.

Only 59 and 57 cases of hemangiosarcoma (http://astra.cancer.fi/NOCCA/Incidence/liver-hemangiosarcoma) were diagnosed among men and women, respectively. There were no occupational categories with significantly elevated risk.

Comment. The occurrence of liver cancer is causally related to the consumption of alcoholic beverages [67]. Exposure to other known hepatocarcinogens, Hepatitis B and C viruses and aflatoxins, is relatively low in the Nordic countries. High risks can therefore be expected in occupational categories which, on the basis of easy availability of alcohol or cultural traditions, have high alcohol consumption. On the other hand, possible direct occupational factors may be hidden behind the strong effect of alcohol. Thus, the risk pattern of men fits well with the image of high alcohol consumption in various occupations, whereas chemical factors might contribute to the highest SIRs in women.

Hemangiosarcoma is associated with occupational exposure to vinylchloride arsenic, and thorotrast, an X-ray contrast medium used before 1960 [68]. Because of the rarity of both the exposures and the disease, it was not possible see any association between these factors.

Cancer of the gallbladder and biliary tract

The incidence of gallbladder cancer was highest in Denmark around 1975 and in Sweden and Finland around 1985, while the incidence continues to increase in Iceland and Norway (Figure 23). The cancer has been more frequent in women than in men.

For men, the high risk groups were cooks and stewards (SIR 1.56, 95% CI 1.03–2.27), "other workers" and drivers (Table 26). The low risk groups were farmers (0.75, 0.70–0.80), forestry workers, gardeners and woodworkers. Two groups of women had a statistically significant but not very high excess risk of gallbladder cancer, these being building caretakers (1.13, 1.06–1.21) and economically inactive women (mainly housewives). A number of occupational categories of women had deficit risks of gallbladder cancer. The lowest SIRs were found in dentists (0.39, 0.14–0.85), nurses, assistant nurses, and teachers (Table 27).

Comment. The presence of gallstones – a relatively common condition, in particular among women aged 50 or more years – is associated with a risk of developing cancer of the gallbladder [69]. We have no information on the prevalence of gallstones over occupational categories. Body fatness is associated with increased risk, while no dietary factors have so far been conclusively linked with risk [70]. Smoking [71], and alcohol consumption [70] do not seem to be causally linked with the development of gallbladder cancer. The overall impact of occupational exposures on gallbladder cancer is probably very small [69], although some previous studies found inconsistent associations with chemical workers, painters, pesticide manufacturers, vinyl chloride workers, munition workers exposed to dinitrotoluene, textile workers, cellulose triacetate fiber manufacturing, workers in petroleum refining, paper mills, chemical processing, shoemaking and repairing, asbestos related occupations, and exposure to solvents such as methylene chloride and trichlorinated hydrocarbons. Findings

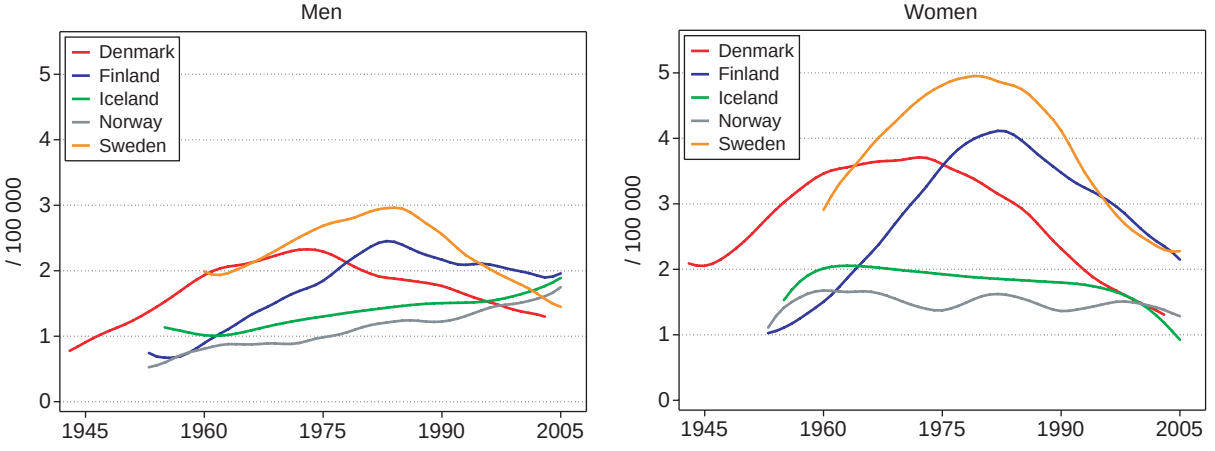


Figure 23. Age standardised (World) incidence rates for cancer of the gallbladder 1943–2005, by country and gender. Modified from NORDCAN [49].

Table 24. Observed number of liver cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	180	0.89	182	0.93	1	0.72	52	0.78	641	0.86	1 056	0.87	0.82—0.93
2	Laboratory assistants	8	1.96	7	1.48	[0.26]	0.00	1	0.30	[2.85]	0.00	16	1.05	0.60—1.70
3	Physicians	13	0.79	15	1.32	2	3.37	12	1.28	22	0.66	64	0.90	0.70—1.15
4	Dentists	8	1.68	1	0.41	[0.13]	0.00	3	0.72	16	0.94	28	0.98	0.65—1.42
5	Nurses	2	9.17	[0.49]	0.00	[0.00]	0.00	[0.31]	0.00	[1.40]	0.00	2	0.83	0.10—2.99
6	Assistant nurses	3	0.62	[0.40]	0.00	[0.06]	0.00	1	0.61	14	1.21	18	0.98	0.58—1.54
7	"Other health workers"	15	1.03	12	1.05	[0.17]	0.00	7	1.96	25	0.87	59	1.01	0.77—1.30
8	Teachers	55	0.63	72	0.86	4	1.89	26	0.52	126	0.67	283	0.69	0.61—0.78
9	Religious workers etc	22	0.59	41	0.94	1	0.69	16	0.61	163	1.13	243	0.96	0.85—1.09
10	Artistic workers	15	1.28	22	1.37	2	5.07	10	1.29	65	1.45	114	1.41	1.17—1.69
11	Journalists	13	2.36	15	1.90	[0.22]	0.00	5	1.51	41	1.95	74	1.95	1.53—2.45
12	Administrators	261	1.14	147	1.13	1	0.25	114	1.20	351	1.15	874	1.15	1.07—1.23
13	Clerical workers	110	1.09	90	1.03	6	1.33	55	0.78	332	1.04	593	1.02	0.94—1.10
14	Sales agents	72	1.36	170	1.39	4	1.78	113	1.35	628	1.37	987	1.37	1.29—1.46
15	Shop workers	268	1.15	59	1.19	[1.53]	0.00	29	0.94	175	1.20	531	1.16	1.06—1.26
16	Farmers	152	0.35	376	0.57	4	0.59	122	0.49	411	0.46	1 065	0.47	0.45—0.50
17	Gardeners	38	0.60	69	0.79	[0.22]	0.00	33	0.55	205	0.65	345	0.66	0.59—0.73
18	Fishermen	19	0.88	4	0.48	2	0.62	68	0.89	18	0.53	111	0.78	0.64—0.93
19	Forestry workers	1	0.11	73	0.72	[0.03]	0.00	19	0.42	172	0.76	265	0.69	0.61—0.78
20	Miners and quarry workers	1	0.34	23	1.44	[0.05]	0.00	13	1.08	63	1.16	100	1.17	0.96—1.43
21	Seamen	48	2.07	24	1.13	1	1.03	122	2.10	75	1.61	270	1.80	1.60—2.03
22	Transport workers	58	1.14	63	0.97	2	0.95	32	1.02	157	1.00	312	1.02	0.91—1.14
23	Drivers	213	1.29	230	1.16	4	1.42	108	1.28	451	1.21	1 006	1.22	1.15—1.30
24	Postal workers	21	0.67	33	1.07	1	2.41	21	1.27	92	1.08	168	1.02	0.88—1.19
25	Textile workers	22	0.75	23	1.07	3	4.17	20	1.06	98	0.98	166	0.97	0.84—1.14
26	Shoe and leather workers	6	0.82	11	1.17	[0.16]	0.00	6	0.74	49	1.18	72	1.08	0.85—1.36
27	Smelting workers	70	1.07	21	0.66	2	2.14	25	1.01	159	1.03	277	1.00	0.89—1.12
28	Mechanics	182	1.04	191	0.98	3	1.14	126	1.08	670	0.98	1 172	1.00	0.94—1.06
29	Plumbers	24	1.53	43	1.34	1	2.22	20	1.52	104	1.32	192	1.37	1.19—1.58
30	Welders	–	–	32	1.11	[0.15]	0.00	10	0.69	78	0.92	120	0.93	0.78—1.11
31	Electrical workers	35	0.85	80	0.99	1	0.65	53	1.04	243	1.06	412	1.02	0.93—1.13
32	Wood workers	113	0.94	232	1.04	2	1.21	93	0.66	357	0.72	797	0.81	0.76—0.87
33	Painters	45	1.13	61	1.34	1	1.50	24	1.01	126	0.91	257	1.03	0.91—1.17
34	"Other construction workers"	130	0.84	145	1.02	3	0.95	24	0.88	287	1.09	589	1.00	0.92—1.08
35	Bricklayers	52	1.19	29	1.25	–	–	24	1.70	61	0.96	166	1.15	0.99—1.34
36	Printers	42	1.52	27	1.40	1	1.98	27	1.97	87	1.22	184	1.39	1.20—1.60
37	Chemical process workers	21	0.80	30	0.89	[0.30]	0.00	32	1.00	112	0.94	195	0.93	0.80—1.07
38	Food workers	62	0.74	18	0.73	2	0.73	39	1.09	139	1.19	260	0.99	0.87—1.11
39	Beverage workers	31	2.91	1	0.59	[0.04]	0.00	[0.31]	0.00	17	2.47	49	2.50	1.85—3.31
40	Tobacco workers	2	1.17	1	3.45	[0.00]	0.00	1	1.79	2	4.02	6	1.96	0.72—4.27
41	Glass makers etc	49	0.98	28	0.80	[0.45]	0.00	24	1.43	113	0.89	214	0.93	0.82—1.07
42	Packers	50	1.12	93	1.24	2	1.27	78	1.44	288	1.22	511	1.24	1.14—1.36
43	Engine operators	52	1.18	106	1.10	1	0.53	28	0.98	216	1.16	403	1.13	1.02—1.25
44	Public safety workers	46	1.14	66	1.15	1	0.71	29	1.27	114	1.07	256	1.12	0.99—1.27
45	Cooks and stewards	10	3.03	6	1.89	[0.61]	0.00	20	2.09	55	2.99	91	2.60	2.09—3.19
46	Domestic assistants	[0.04]	0.00	[0.25]	0.00	[0.00]	0.00	[0.07]	0.00	4	2.84	4	2.26	0.62—5.78
47	Waiters	33	4.54	9	3.01	[0.06]	0.00	22	5.19	37	3.94	101	4.22	3.47—5.13
48	Building caretakers	44	0.98	52	1.04	[0.71]	0.00	16	1.37	97	1.06	209	1.05	0.92—1.20
49	Chimney sweeps	1	0.87	5	1.38	–	–	1	0.84	12	1.96	19	1.57	0.94—2.45
50	Hairdressers	13	1.04	1	0.98	[0.08]	0.00	9	2.61	34	1.49	57	1.43	1.08—1.85
51	Launderers	5	0.82	3	2.95	[0.07]	0.00	5	2.42	16	0.98	29	1.13	0.76—1.63
52	Military personnel	22	1.08	11	0.65	–	–	15	0.83	57	0.92	105	0.90	0.74—1.08
53	"Other workers"	228	1.65	78	1.33	3	0.51	119	1.14	315	1.09	743	1.25	1.16—1.34
54	Economically inactive	220	1.52	482	1.43	7	1.75	79	1.53	702	1.64	1 490	1.54	1.46—1.62
1–54	All categories	3 206	1.00	3 613	1.00	68	1.00	1 951	1.00	8 892	1.00	17 730	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 25. Observed number of liver cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	6	1.07	5	0.50	1	16.52	2	1.58	14	0.72	28	0.77	0.51—1.11
2	Laboratory assistants	2	0.52	9	1.52	[0.10]	0.00	[1.75]	0.00	4	0.99	15	0.96	0.54—1.58
3	Physicians	[1.85]	0.00	2	0.85	1	37.51	[0.71]	0.00	3	0.74	6	0.67	0.24—1.45
4	Dentists	4	2.41	2	0.59	[0.01]	0.00	[0.65]	0.00	3	0.83	9	0.97	044—1.83
5	Nurses	29	0.88	20	0.67	1	1.67	10	0.75	66	1.09	126	0.92	0.77—1.09
6	Assistant nurses	31	1.32	38	1.12	[0.85]	0.00	10	0.73	84	0.83	163	0.94	0.81—1.10
7	"Other health workers"	22	1.17	27	1.05	[0.16]	0.00	19	1.35	23	0.69	91	0.99	0.79—1.21
8	Teachers	31	0.78	50	0.83	[0.99]	0.00	16	0.62	99	**0.72**	196	**0.74**	0.65—0.85
9	Religious workers etc	2	0.36	19	0.81	[0.16]	0.00	10	1.53	28	**0.68**	59	**0.77**	0.58—0.99
10	Artistic workers	4	1.34	3	0.66	[0.14]	0.00	3	1.43	12	1.42	22	1.21	0.76—1.83
11	Journalists	[0.63]	0.00	2	0.66	[0.03]	0.00	[0.51]	0.00	3	0.78	5	0.62	0.20—1.45
12	Administrators	19	1.06	6	0.60	1	7.81	5	0.72	13	0.65	44	0.80	0.58—1.07
13	Clerical workers	145	0.87	178	0.95	2	0.62	75	0.86	334	1.00	734	0.94	0.88—1.01
14	Sales agents	[1.55]	0.00	30	0.93	3	**7.37**	14	1.00	47	0.86	94	0.92	0.74—1.12
15	Shop workers	114	0.97	111	0.99	2	0.89	70	0.89	257	1.11	554	1.02	0.94—1.11
16	Farmers	50	**0.62**	58	**0.66**	1	0.54	45	0.76	13	**0.57**	167	**0.66**	0.57—0.77
17	Gardeners	9	0.85	194	**0.82**	[0.06]	0.00	25	0.71	56	0.90	284	**0.83**	0.74—0.93
18	Fishermen	1	2.44	[0.48]	0.00	[0.05]	0.00	1	2.59	[0.20]	0.00	2	1.31	0.16—4.74
19	Forestry workers	[0.11]	0.00	[0.89]	0.00	[0.01]	0.00	[0.61]	0.00	2	1.59	2	0.70	0.08—2.51
20	Miners and quarry workers	[0.01]	0.00	[0.42]	0.00	[0.00]	0.00	[0.03]	0.00	[0.28]	0.00	[0.73]	0.00	0.00—5.03
21	Seamen	–	–	[0.08]	0.00	–	–	[0.09]	0.00	[0.03]	0.00	[0.19]	0.00	0.00—19.22
22	Transport workers	[0.12]	0.00	7	1.14	[0.07]	0.00	[0.38]	0.00	6	1.77	13	1.29	0.69—2.21
23	Drivers	5	1.70	1	0.43	[0.02]	0.00	[1.47]	0.00	9	1.17	15	1.04	0.58—1.71
24	Postal workers	8	1.28	40	1.14	2	2.47	17	0.95	68	1.09	135	1.10	0.93—1.30
25	Textile workers	51	1.28	85	1.04	1	0.61	27	0.86	150	1.03	314	1.05	0.94—1.17
26	Shoe and leather workers	1	0.34	11	1.11	[0.08]	0.00	3	1.35	16	1.46	31	1.19	0.81—1.69
27	Smelting workers	2	2.77	4	1.70	[0.00]	0.00	[0.19]	0.00	6	2.48	12	**2.11**	1.09—3.68
28	Mechanics	5	0.73	10	1.02	[0.01]	0.00	3	1.20	33	1.29	51	1.14	0.85—1.50
29	Plumbers	[0.07]	0.00	[0.02]	0.00	–	–	[0.02]	0.00	[0.03]	0.00	[0.13]	0.00	0.00—28.50
30	Welders	–	–	3	4.52	[0.00]	0.00	[0.14]	0.00	1	1.23	4	2.46	0.67—6.30
31	Electrical workers	5	0.52	9	1.67	[0.01]	0.00	4	1.53	17	1.21	35	1.10	0.77—1.53
32	Wood workers	1	0.31	16	0.76	[0.02]	0.00	1	1.20	3	0.73	21	0.72	0.44—1.10
33	Painters	[0.13]	0.00	5	2.12	[0.01]	0.00	[0.20]	0.00	[1.15]	0.00	5	1.30	0.42—3.04
34	"Other construction workers"	[0.10]	0.00	13	1.43	[0.00]	0.00	[0.08]	0.00	[0.12]	0.00	13	1.38	0.74—2.36
35	Bricklayers	[0.02]	0.00	[0.28]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.30]	0.00	0.00—12.10
36	Printers	6	1.62	11	1.12	[0.13]	0.00	2	0.81	19	**1.67**	38	1.38	0.98—1.90
37	Chemical process workers	4	0.67	7	1.32	[0.06]	0.00	5	2.24	7	0.75	23	1.01	0.64—1.51
38	Food workers	24	0.84	25	0.89	7	2.30	17	1.13	32	1.07	105	1.00	0.83—1.22
39	Beverage workers	4	1.41	1	0.61	[0.01]	0.00	[0.12]	0.00	4	2.05	9	1.37	0.63—2.60
40	Tobacco workers	8	2.07	1	1.08	–	–	1	1.87	3	2.82	13	**2.04**	1.08—3.48
41	Glass makers etc	9	1.30	28	1.48	[0.08]	0.00	6	1.26	26	1.07	69	1.25	0.98—1.59
42	Packers	2	1.00	33	0.98	[0.32]	0.00	8	0.69	49	1.31	92	1.08	0.87—1.33
43	Engine operators	[0.05]	0.00	7	1.35	[0.00]	0.00	[0.12]	0.00	3	1.66	10	1.39	0.67—2.56
44	Public safety workers	[0.26]	0.00	[1.21]	0.00	[0.06]	0.00	1	0.67	1	0.41	2	0.37	0.04—1.33
45	Cooks and stewards	[0.08]	0.00	46	1.19	[1.25]	0.00	15	0.86	65	1.08	126	1.07	0.90—1.27
46	Domestic assistants	38	0.85	38	0.99	[0.39]	0.00	38	0.86	111	**0.78**	225	**0.83**	0.73—0.95
47	Waiters	14	1.80	34	1.14	[0.13]	0.00	26	1.48	81	**1.38**	155	**1.36**	1.16—1.59
48	Building caretakers	147	1.12	174	**1.27**	[2.46]	0.00	92	1.23	187	**1.25**	600	**1.21**	1.12—1.31
49	Chimney sweeps	[0.01]	0.00	[0.06]	0.00	–	–	[0.01]	0.00	[0.00]	0.00	[0.08]	0.00	0.00—43.69
50	Hairdressers	9	1.21	15	1.31	[0.09]	0.00	8	1.83	20	0.91	52	1.15	0.86—1.50
51	Launderers	26	**1.76**	17	1.49	[0.44]	0.00	8	1.16	33	1.01	84	**1.27**	1.01—1.57
52	Military personnel	1	13.01	[0.07]	0.00	–	–	[0.02]	0.00	[0.06]	0.00	1	4.58	0.12—25.52
53	"Other workers"	36	0.97	41	1.02	2	0.85	33	0.87	67	1.03	179	0.98	0.85—1.14
54	Economically inactive	1 046	1.03	1 050	1.03	9	1.07	580	1.08	3 257	1.00	5 942	1.02	0.99—1.04
1–54	All categories	1 921	1.00	2 486	1.00	33	1.00	1 200	1.00	5 335	1.00	10 975	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 26. Observed number of cancer of the gallbladder among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	103	0.99	90	0.87	[0.79]	0.00	35	0.71	281	1.06	509	0.98	0.89—1.06
2	Laboratory assistants	2	0.95	2	0.82	[0.14]	0.00	1	0.41	1	1.27	6	0.75	0.28—1.64
3	Physicians	10	1.13	6	1.01	1	3.06	11	1.56	8	0.69	36	1.07	0.75—1.47
4	Dentists	1	0.41	1	0.76	[0.09]	0.00	2	0.64	6	0.97	10	0.76	0.36—1.40
5	Nurses	[0.11]	0.00	[0.27]	0.00	[0.00]	0.00	[0.23]	0.00	1	3.50	1	1.12	0.03—6.23
6	Assistant nurses	1	0.41	[0.22]	0.00	[0.03]	0.00	3	2.46	6	1.48	10	1.26	0.60—2.31
7	"Other health workers"	13	1.67	3	0.50	[0.08]	0.00	2	0.75	10	0.96	28	1.04	0.69—1.50
8	Teachers	38	0.84	45	1.03	1	0.86	31	0.83	68	1.04	183	0.95	0.82—1.10
9	Religious workers etc	26	1.26	27	1.16	[0.77]	0.00	21	1.06	44	0.87	118	1.03	0.86—1.23
10	Artistic workers	9	1.40	8	0.94	[0.20]	0.00	4	0.70	16	1.00	37	1.00	0.71—1.38
11	Journalists	2	0.69	5	1.20	[0.12]	0.00	[2.46]	0.00	11	1.45	18	1.04	0.62—1.65
12	Administrators	103	0.84	69	0.98	2	0.97	74	1.05	127	1.09	375	0.98	0.89—1.09
13	Clerical workers	45	0.83	43	0.91	2	0.89	51	0.99	138	1.15	279	1.02	0.90—1.14
14	Sales agents	30	1.07	58	0.90	[1.16]	0.00	76	1.23	184	1.08	348	1.07	0.96—1.18
15	Shop workers	140	1.10	30	1.16	[0.77]	0.00	19	0.84	50	0.95	239	1.04	0.92—1.18
16	Farmers	185	0.74	322	0.89	6	1.78	119	0.64	244	0.66	876	0.75	0.70—0.80
17	Gardeners	29	0.81	50	1.07	[0.10]	0.00	34	0.77	99	0.79	212	0.84	0.74—0.96
18	Fishermen	10	0.87	5	1.08	3	1.65	65	1.16	10	0.73	93	1.06	0.86—1.30
19	Forestry workers	6	1.12	45	0.84	[0.02]	0.00	26	0.78	72	0.79	149	0.81	0.69—0.96
20	Miners and quarry workers	2	1.20	11	1.30	[0.03]	0.00	13	1.49	15	0.71	41	1.02	0.73—1.39
21	Seamen	13	1.09	13	1.14	2	3.81	57	1.35	15	0.85	100	1.19	0.98—1.45
22	Transport workers	30	1.15	30	0.86	1	0.93	19	0.84	50	0.88	130	0.92	0.77—1.09
23	Drivers	97	1.11	114	1.10	1	0.67	81	1.32	149	1.09	442	1.13	1.03—1.24
24	Postal workers	8	0.51	16	0.98	[0.20]	0.00	7	0.57	39	1.21	70	0.91	0.71—1.15
25	Textile workers	18	1.10	11	0.96	[0.33]	0.00	11	0.79	48	1.21	88	1.08	0.86—1.33
26	Shoe and leather workers	6	1.44	3	0.59	[0.07]	0.00	8	1.33	21	1.22	38	1.17	0.82—1.60
27	Smelting workers	42	1.21	23	1.35	[0.46]	0.00	24	1.33	58	0.96	147	1.12	0.96—1.32
28	Mechanics	102	1.09	102	0.99	[1.44]	0.00	92	1.09	261	1.05	557	1.05	0.96—1.14
29	Plumbers	10	1.21	15	0.90	[0.23]	0.00	11	1.15	27	0.93	63	0.99	0.76—1.27
30	Welders	–	–	17	1.14	[0.08]	0.00	12	1.15	39	1.32	68	1.24	0.96—1.57
31	Electrical workers	24	1.13	40	0.95	[0.84]	0.00	34	0.91	88	1.08	186	1.02	0.88—1.17
32	Wood workers	45	0.69	117	0.97	1	1.17	96	0.92	154	0.79	413	0.85	0.77—0.93
33	Painters	21	1.00	28	1.16	2	5.60	15	0.86	60	1.12	126	1.08	0.91—1.28
34	"Other construction workers"	82	0.94	76	1.00	1	0.60	20	1.01	82	0.78	261	0.90	0.80—1.02
35	Bricklayers	33	1.37	14	1.12	–	–	15	1.46	25	0.99	87	1.21	0.97—1.49
36	Printers	12	0.82	9	0.89	[0.29]	0.00	11	1.09	33	1.25	65	1.06	0.81—1.35
37	Chemical process workers	18	1.24	22	1.25	[0.15]	0.00	26	1.11	55	1.16	121	1.18	0.98—1.41
38	Food workers	53	1.17	8	0.62	2	1.58	31	1.18	40	0.89	134	1.02	0.86—1.21
39	Beverage workers	7	1.21	1	1.10	[0.02]	0.00	[0.23]	0.00	[2.82]	0.00	8	0.82	0.35—1.61
40	Tobacco workers	1	1.01	[0.15]	0.00	[0.00]	0.00	[0.40]	0.00	[0.18]	0.00	1	0.58	0.01—3.21
41	Glass makers etc	25	0.92	21	1.13	1	4.49	16	1.31	42	0.85	105	0.98	0.81—1.18
42	Packers	31	1.23	43	1.08	4	5.44	39	0.99	104	1.10	221	1.11	0.97—1.26
43	Engine operators	25	1.06	55	1.09	[1.01]	0.00	21	1.01	74	1.06	175	1.06	0.91—1.23
44	Public safety workers	25	1.13	31	1.02	1	1.38	16	0.96	55	1.42	128	1.18	0.99—1.40
45	Cooks and stewards	1	0.57	3	1.73	[0.34]	0.00	10	1.42	13	2.00	27	1.56	1.03—2.27
46	Domestic assistants	[0.02]	0.00	[0.16]	0.00	[0.00]	0.00	1	17.42	1	2.50	2	3.12	0.38—11.28
47	Waiters	5	1.27	4	2.50	[0.04]	0.00	2	0.65	3	0.91	14	1.17	0.64—1.96
48	Building caretakers	25	1.01	26	0.96	[0.33]	0.00	12	1.39	40	1.09	103	1.06	0.87—1.28
49	Chimney sweeps	[0.60]	0.00	1	0.52	–	–	[0.86]	0.00	1	0.44	2	0.36	0.04—1.28
50	Hairdressers	10	1.41	[0.53]	0.00	[0.05]	0.00	4	1.58	12	1.36	26	1.37	0.89—2.01
51	Launderers	1	0.29	2	3.70	[0.03]	0.00	5	3.31	11	1.76	19	1.62	0.97—2.53
52	Military personnel	12	1.21	6	0.69	–	–	12	0.92	19	0.88	49	0.92	0.68—1.22
53	"Other workers"	89	1.18	22	0.70	4	1.35	94	1.22	140	1.21	349	1.16	1.04—1.28
54	Economically inactive	127	1.37	242	1.30	[1.94]	0.00	52	1.32	247	1.39	668	1.34	1.24—1.45
1–54	All categories	1 753	1.00	1 935	1.00	35	1.00	1 441	1.00	3 397	1.00	8 561	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 27. Observed number of cancer of the gallbladder among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	5	0.60	6	0.36	[0.08]	0.00	3	1.38	21	0.71	35	0.62	0.43—0.86
2	Laboratory assistants	4	0.75	11	1.08	[0.13]	0.00	4	1.29	4	0.88	23	0.99	0.63—1.48
3	Physicians	4	1.48	4	1.02	[0.03]	0.00	1	0.76	[5.75]	0.00	9	0.66	0.30—1.25
4	Dentists	2	0.82	1	0.17	[0.01]	0.00	1	0.82	2	0.35	6	0.39	0.14—0.85
5	Nurses	31	0.63	26	0.51	1	1.33	14	0.59	63	0.66	135	0.61	0.52—0.73
6	Assistant nurses	25	0.74	49	0.83	1	0.90	19	0.80	101	0.65	195	0.72	0.62—0.82
7	"Other health workers"	20	0.71	44	0.99	[0.20]	0.00	23	0.90	43	0.86	130	0.88	0.74—1.04
8	Teachers	43	0.74	95	0.91	[1.28]	0.00	34	0.71	147	0.67	319	0.74	0.67—0.83
9	Religious workers etc	4	0.49	34	0.88	1	4.85	9	0.77	34	0.56	82	0.69	0.55—0.85
10	Artistic workers	2	0.43	9	1.16	[0.17]	0.00	5	1.30	6	0.46	22	0.75	0.47—1.13
11	Journalists	[0.92]	0.00	4	0.76	[0.04]	0.00	[0.92]	0.00	4	0.68	8	0.62	0.27—1.22
12	Administrators	20	0.73	9	0.52	[0.16]	0.00	10	0.76	31	0.98	70	0.78	0.61—0.99
13	Clerical workers	203	0.84	276	0.85	7	1.68	150	0.95	392	0.75	1 028	0.82	0.77—0.87
14	Sales agents	2	0.86	60	1.05	[0.53]	0.00	28	1.01	84	0.89	174	0.96	0.83—1.11
15	Shop workers	171	0.96	199	1.01	2	0.67	132	0.93	354	0.91	858	0.94	0.88—1.01
16	Farmers	116	0.96	136	0.85	2	0.80	101	0.92	42	1.02	397	0.91	0.83—1.01
17	Gardeners	8	0.50	393	0.93	[0.09]	0.00	68	1.06	98	0.91	567	0.93	0.86—1.01
18	Fishermen	2	3.31	[0.82]	0.00	[0.07]	0.00	[0.69]	0.00	[0.35]	0.00	2	0.79	0.10—2.85
19	Forestry workers	[0.16]	0.00	[1.57]	0.00	[0.01]	0.00	[1.07]	0.00	1	0.48	1	0.20	0.01—1.14
20	Miners and quarry workers	[0.01]	0.00	1	1.29	[0.00]	0.00	[0.05]	0.00	1	2.29	2	1.57	0.19—5.67
21	Seamen	–	–	[0.14]	0.00	–	–	[0.16]	0.00	[0.03]	0.00	[0.33]	0.00	0.00—11.29
22	Transport workers	[0.18]	0.00	8	0.74	[0.10]	0.00	1	1.50	6	1.12	15	0.88	0.49—1.45
23	Drivers	3	0.69	2	0.50	[0.03]	0.00	2	0.75	13	1.08	20	0.87	0.53—1.34
24	Postal workers	11	1.15	69	1.12	[1.07]	0.00	30	0.91	93	0.91	203	0.98	0.85—1.12
25	Textile workers	65	1.10	147	1.01	2	0.89	53	0.88	226	0.88	493	0.94	0.86—1.03
26	Shoe and leather workers	2	0.46	14	0.79	[0.12]	0.00	4	0.96	20	1.05	40	0.88	0.63—1.20
27	Smelting workers	1	0.94	1	0.24	[0.00]	0.00	[0.33]	0.00	5	1.33	7	0.75	0.30—1.55
28	Mechanics	10	1.01	13	0.75	[0.02]	0.00	4	0.88	48	1.17	75	1.03	0.81—1.29
29	Plumbers	[0.12]	0.00	[0.03]	0.00	–	–	[0.03]	0.00	[0.03]	0.00	[0.21]	0.00	0.00—17.66
30	Welders	–	–	1	0.88	[0.00]	0.00	[0.24]	0.00	1	0.87	2	0.79	0.10—2.85
31	Electrical workers	20	1.44	15	1.62	[0.02]	0.00	3	0.65	20	0.90	58	1.16	0.88—1.50
32	Wood workers	10	2.14	39	1.04	[0.03]	0.00	3	2.01	6	0.94	58	1.16	0.88—1.50
33	Painters	[0.19]	0.00	3	0.72	[0.01]	0.00	[0.35]	0.00	1	0.54	4	0.60	0.16—1.55
34	"Other construction workers"	[0.16]	0.00	16	0.98	[0.00]	0.00	[0.14]	0.00	[0.17]	0.00	16	0.95	0.54—1.54
35	Bricklayers	[0.03]	0.00	[0.50]	0.00	–	–	[0.01]	0.00	[0.00]	0.00	[0.54]	0.00	0.00—6.86
36	Printers	6	1.09	16	0.92	[0.16]	0.00	2	0.43	17	0.90	41	0.88	0.63—1.20
37	Chemical process workers	8	0.91	4	0.43	[0.08]	0.00	6	1.46	20	1.28	38	1.00	0.71—1.37
38	Food workers	55	1.31	48	0.96	4	0.98	26	0.93	51	0.97	184	1.04	0.90—1.20
39	Beverage workers	6	1.40	3	1.01	[0.01]	0.00	[0.21]	0.00	1	0.28	10	0.91	0.44—1.67
40	Tobacco workers	9	1.55	2	1.22	–	–	4	3.82	1	0.57	16	1.56	0.89—2.54
41	Glass makers etc	8	0.80	28	0.83	[0.11]	0.00	16	1.85	34	0.84	86	0.93	0.74—1.14
42	Packers	6	2.03	61	1.02	[0.43]	0.00	26	1.22	60	0.95	153	1.03	0.88—1.21
43	Engine operators	[0.07]	0.00	7	0.76	[0.01]	0.00	[0.22]	0.00	1	0.39	8	0.67	0.29—1.31
44	Public safety workers	[0.41]	0.00	3	1.42	[0.09]	0.00	5	1.82	5	1.45	13	1.47	0.79—2.52
45	Cooks and stewards	[0.12]	0.00	56	0.82	3	1.78	37	1.09	114	1.05	210	0.99	0.86—1.13
46	Domestic assistants	59	0.88	41	0.60	2	3.83	77	0.90	258	1.06	437	0.94	0.86—1.03
47	Waiters	9	0.79	49	0.94	2	11.83	30	0.93	94	0.92	184	0.93	0.80—1.07
48	Building caretakers	217	1.09	272	1.12	5	1.50	139	1.02	323	1.24	956	1.13	1.06—1.21
49	Chimney sweeps	[0.02]	0.00	[0.11]	0.00	–	–	[0.02]	0.00	[0.00]	0.00	[0.15]	0.00	0.00—24.49
50	Hairdressers	9	0.83	16	0.80	[0.12]	0.00	9	1.12	27	0.77	61	0.82	0.63—1.06
51	Launderers	21	0.94	18	0.88	3	5.09	12	0.92	55	0.95	109	0.95	0.79—1.15
52	Military personnel	[0.12]	0.00	[0.11]	0.00	–	–	[0.03]	0.00	[0.06]	0.00	[0.31]	0.00	0.00—11.75
53	"Other workers"	58	1.05	71	1.00	3	0.96	71	1.02	105	0.95	308	0.99	0.89—1.11
54	Economically inactive	1 712	1.05	2 091	1.11	6	0.53	1 174	1.06	6 186	1.07	11 169	1.07	1.05—1.09
1–54	All categories	2 967	1.00	4 471	1.00	44	1.00	2 336	1.00	9 219	1.00	19 037	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

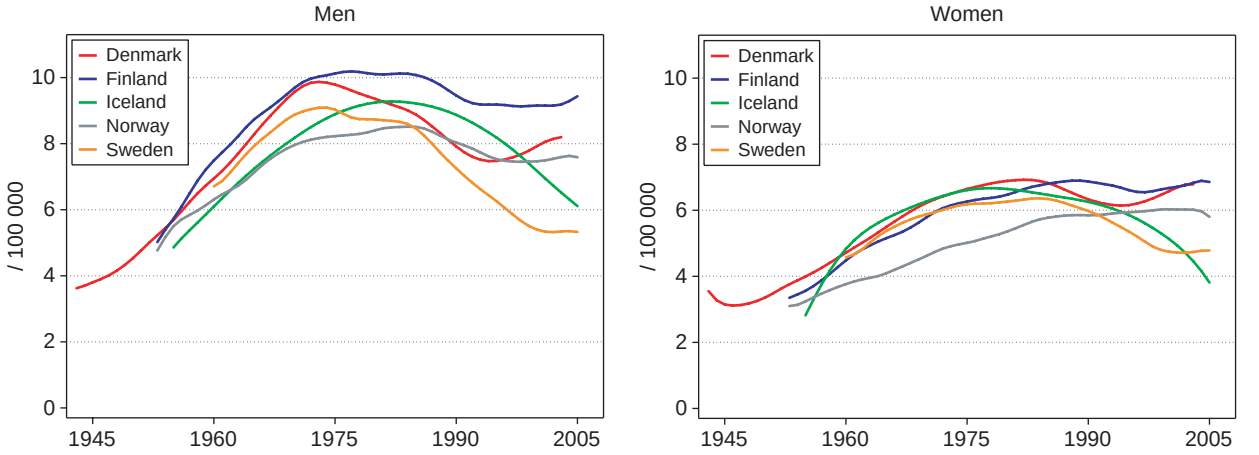


Figure 24. Age standardised (World) incidence rates for pancreatic cancer 1943–2005, by country and gender. Modified from NORDCAN [49].

of our study do not support a role of any of the specific occupational exposures.

Cancer of the pancreas

The incidence of pancreatic cancer in the Nordic countries is 50% higher in men than in women (Figure 24). In both genders and for all countries, the incidence increased until the mid 1970s, and after that it decreased in men and plateaued in women.

In the present study the highest SIR among men was observed among beverage workers (SIR 1.70, 95% CI 1.35–2.11), followed by waiters, chimney sweeps, cooks and stewards (Table 28). The SIR was lowest among farmers (0.81, 0.78–0.83) and gardeners.

In women, the highest significant SIRs were seen among drivers (1.32, 1.04–1.64) and mechanics (Table 29). The SIR was lowest among forestry workers (0.39, 0.13–0.91) and farmers.

Comment. Cigarette smoking is the most consistent and strongest risk factor for cancer of the pancreas [72]. The distribution of SIRs is also largely in accordance with what is known about smoking prevalence among the occupational categories. An association has been suggested with exposure to metals, metalworking fluids containing PAHs, nitrosamines and chlorinated hydrocarbons [72]. From the present results, findings among chimney sweeps might well be related to exposure to PAHs.

Cancer of the nose and nasal sinuses

Nasal cancer is rare. Rates are somewhat higher in men than in women and have been fairly constant (Figure 25).

In men, the SIR was highest among woodworkers (SIR 1.84, 95% CI 1.66–2.04), consistently in all Nordic countries. In Norway, smelting workers and glass, ceramic and tile workers also had increased

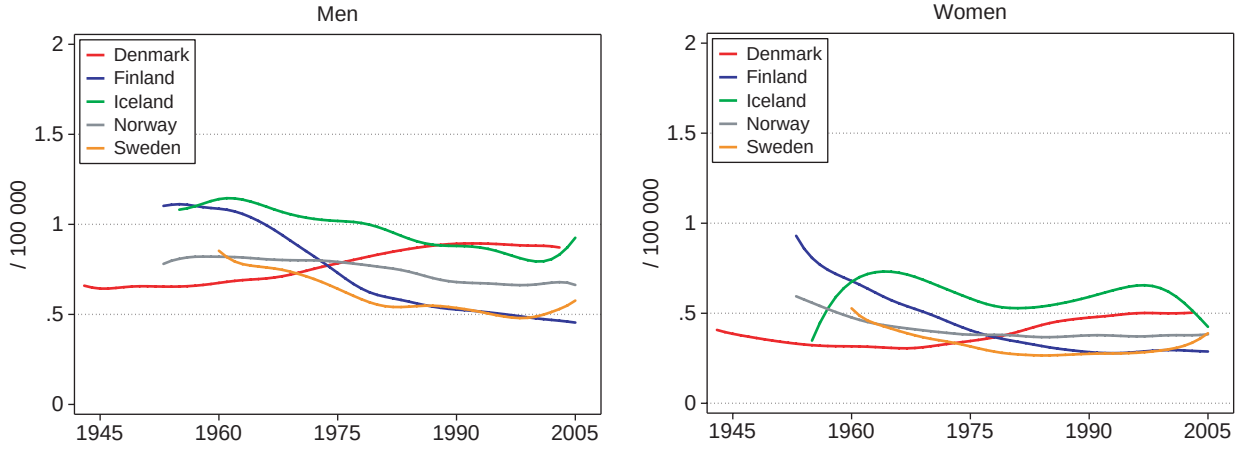


Figure 25. Age standardised (World) incidence rates for nasal cancer 1943–2005, by country and gender. Modified from NORDCAN [49].

Table 28. Observed number of pancreatic cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	482	0.99	463	0.93	6	1.25	256	0.81	1 570	0.95	2 777	0.94	0.90—0.97
2	Laboratory assistants	10	1.01	15	1.24	3	3.24	19	1.18	6	0.91	53	1.16	0.87—1.52
3	Physicians	45	1.11	37	1.29	1	0.51	45	0.98	74	1.00	202	1.06	0.92—1.21
4	Dentists	14	1.22	3	0.49	[0.48]	0.00	18	0.88	33	0.87	68	0.89	0.69—1.13
5	Nurses	[0.51]	0.00	[1.33]	0.00	[0.01]	0.00	1	0.67	2	0.67	3	0.47	0.10—1.38
6	Assistant nurses	9	0.78	1	0.87	[0.23]	0.00	12	1.48	31	1.20	53	1.13	0.84—1.48
7	"Other health workers"	41	1.14	21	0.74	[0.53]	0.00	25	1.42	69	1.07	156	1.06	0.90—1.24
8	Teachers	191	0.91	163	0.77	5	0.70	202	0.83	377	0.90	938	0.86	0.81—0.92
9	Religious workers etc	87	0.94	106	0.95	5	1.06	99	0.76	308	0.95	605	0.91	0.84—0.99
10	Artistic workers	28	0.96	43	1.06	1	0.78	42	1.11	118	1.17	232	1.10	0.97—1.26
11	Journalists	9	0.67	21	1.05	1	1.35	17	1.05	58	1.22	106	1.08	0.90—1.31
12	Administrators	569	1.01	319	0.98	11	0.89	457	0.98	728	1.07	2 084	1.02	0.97—1.06
13	Clerical workers	250	1.01	215	0.99	19	1.36	336	0.98	739	1.03	1 559	1.01	0.96—1.06
14	Sales agents	154	1.18	304	0.99	5	0.71	457	1.10	1 138	1.10	2 058	1.09	1.04—1.13
15	Shop workers	648	1.12	113	0.89	5	1.02	161	1.08	363	1.11	1 290	1.09	1.03—1.15
16	Farmers	814	0.74	1 354	0.85	7	0.34	1 042	0.82	1 607	0.80	4 824	0.81	0.78—0.83
17	Gardeners	116	0.73	181	0.84	2	2.97	235	0.79	616	0.87	1 150	0.83	0.79—0.88
18	Fishermen	63	1.18	26	1.27	14	1.20	427	1.12	66	0.86	596	1.10	1.01—1.19
19	Forestry workers	11	0.47	235	0.93	[0.11]	0.00	155	0.68	498	0.97	899	0.88	0.83—0.94
20	Miners and quarry workers	5	0.67	50	1.25	[0.19]	0.00	69	1.16	132	1.06	256	1.11	0.98—1.25
21	Seamen	82	1.45	59	1.11	2	0.62	331	1.18	106	1.00	580	1.16	1.07—1.26
22	Transport workers	112	0.91	185	1.16	6	0.91	159	1.04	351	1.01	813	1.03	0.96—1.10
23	Drivers	482	1.18	557	1.12	11	1.17	437	1.06	945	1.12	2 432	1.12	1.08—1.16
24	Postal workers	74	0.99	83	1.09	2	1.62	85	1.02	196	1.02	440	1.03	0.94—1.13
25	Textile workers	72	0.97	52	0.99	3	1.42	117	1.25	197	0.87	441	0.98	0.90—1.08
26	Shoe and leather workers	18	0.97	18	0.78	2	4.31	50	1.21	89	0.94	177	1.00	0.86—1.15
27	Smelting workers	160	0.99	73	0.93	1	0.34	128	1.04	388	1.10	750	1.04	0.97—1.12
28	Mechanics	458	1.06	467	0.95	8	0.89	634	1.12	1 641	1.07	3 208	1.06	1.02—1.09
29	Plumbers	35	0.91	92	1.13	[1.46]	0.00	64	1.01	212	1.19	403	1.11	1.00—1.22
30	Welders	–	–	79	1.06	1	1.85	70	1.02	198	1.03	348	1.04	0.93—1.15
31	Electrical workers	117	1.16	229	1.12	7	1.32	247	1.00	513	1.00	1 113	1.04	0.98—1.10
32	Wood workers	298	1.00	553	1.01	3	0.57	666	0.95	1 001	0.90	2 521	0.94	0.91—0.98
33	Painters	92	0.94	118	1.04	3	1.42	107	0.91	321	1.02	641	0.99	0.92—1.07
34	"Other construction workers"	410	1.05	378	1.07	6	0.57	152	1.13	574	0.95	1 520	1.02	0.97—1.07
35	Bricklayers	115	1.05	50	0.88	–	–	67	0.96	156	1.08	388	1.02	0.92—1.13
36	Printers	83	1.21	60	1.22	5	2.95	86	1.28	172	1.06	406	1.16	1.06—1.28
37	Chemical process workers	70	1.06	76	0.90	[0.98]	0.00	178	1.11	298	1.10	622	1.07	0.99—1.16
38	Food workers	199	0.95	81	1.32	7	0.84	205	1.15	255	0.97	747	1.04	0.96—1.11
39	Beverage workers	48	1.79	10	2.41	[0.14]	0.00	5	3.55	19	1.20	82	1.70	1.35—2.11
40	Tobacco workers	3	0.68	1	1.39	[0.01]	0.00	6	2.11	[1.13]	0.00	10	1.10	0.53—2.02
41	Glass makers etc	132	1.06	88	1.00	1	0.68	90	1.09	259	0.90	570	0.98	0.90—1.06
42	Packers	104	0.92	253	1.36	12	2.49	316	1.17	642	1.19	1 327	1.19	1.13—1.26
43	Engine operators	110	1.01	240	0.99	5	0.80	158	1.14	457	1.08	970	1.05	0.99—1.12
44	Public safety workers	92	0.91	162	1.14	5	1.10	133	1.18	271	1.13	663	1.10	1.02—1.19
45	Cooks and stewards	11	1.34	12	1.47	1	0.48	66	1.42	53	1.26	143	1.34	1.13—1.57
46	Domestic assistants	[0.09]	0.00	[0.61]	0.00	[0.01]	0.00	[0.36]	0.00	2	0.66	2	0.49	0.06—1.76
47	Waiters	29	1.58	14	1.80	1	4.60	23	1.11	33	1.53	100	1.45	1.19—1.77
48	Building caretakers	136	1.21	107	0.87	2	0.97	82	1.41	239	1.14	566	1.12	1.03—1.22
49	Chimney sweeps	4	1.42	14	1.55	–	–	10	1.70	16	1.15	44	1.39	1.01—1.87
50	Hairdressers	27	0.85	6	2.38	1	3.34	16	0.93	62	1.20	112	1.08	0.90—1.30
51	Launderers	21	1.37	4	1.57	1	4.89	17	1.66	35	0.95	78	1.19	0.94—1.49
52	Military personnel	52	1.08	35	0.80	–	–	85	1.01	121	0.88	293	0.93	0.83—1.05
53	"Other workers"	368	1.06	143	0.98	19	1.04	546	1.03	677	1.03	1 753	1.03	0.99—1.08
54	Economically inactive	433	1.09	993	1.18	19	1.45	261	0.94	1 067	1.07	2 773	1.10	1.06—1.14
1–54	All categories	7 993	1.00	8 962	1.00	219	1.00	9 672	1.00	20 099	1.00	46 945	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 29. Observed number of pancreatic cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	21	0.91	35	0.90	1	2.36	10	1.13	74	1.10	141	1.02	0.86—1.20
2	Laboratory assistants	15	0.96	21	0.91	2	3.18	17	1.36	6	**0.45**	61	0.94	0.72—1.20
3	Physicians	7	0.93	9	0.99	[0.14]	0.00	3	0.58	12	0.86	31	0.86	0.59—1.22
4	Dentists	3	0.44	9	0.69	[0.05]	0.00	9	1.92	9	0.71	30	0.81	0.55—1.15
5	Nurses	129	0.95	111	0.95	4	1.20	84	0.87	199	0.93	527	0.93	0.86—1.02
6	Assistant nurses	94	0.98	131	1.00	4	0.85	90	0.92	342	0.96	661	0.97	0.89—1.04
7	"Other health workers"	93	1.20	98	0.98	[0.92]	0.00	92	0.91	120	1.03	403	1.02	0.92—1.12
8	Teachers	167	1.02	217	0.93	8	1.41	144	**0.77**	435	**0.90**	971	**0.91**	0.85—0.97
9	Religious workers etc	18	0.80	87	0.94	[0.89]	0.00	47	1.00	126	0.88	278	0.91	0.81—1.02
10	Artistic workers	9	0.73	16	0.91	[0.69]	0.00	23	1.52	26	0.88	74	0.98	0.77—1.23
11	Journalists	2	0.78	5	**0.43**	[0.17]	0.00	6	1.63	12	0.89	25	0.79	0.51—1.17
12	Administrators	78	1.06	43	1.11	[0.62]	0.00	65	1.28	77	1.10	263	1.12	1.00—1.27
13	Clerical workers	699	1.03	756	1.04	19	1.07	599	0.95	1 252	**1.07**	3 325	1.03	1.00—1.07
14	Sales agents	1	**0.16**	131	1.06	[2.03]	0.00	100	0.96	204	1.06	436	1.02	0.93—1.12
15	Shop workers	479	0.99	428	0.99	10	0.85	550	0.97	862	1.05	2 329	1.00	0.96—1.05
16	Farmers	247	**0.74**	290	**0.87**	11	1.19	356	**0.82**	63	0.78	967	**0.81**	0.76—0.87
17	Gardeners	48	1.11	859	0.96	[0.31]	0.00	214	**0.83**	176	**0.79**	1 297	**0.91**	0.86—0.96
18	Fishermen	[1.68]	0.00	[1.81]	0.00	1	3.60	4	1.44	1	1.38	6	0.82	0.30—1.79
19	Forestry workers	1	2.28	1	0.29	[0.04]	0.00	[4.43]	**0.00**	3	0.67	5	**0.39**	0.13—0.91
20	Miners and quarry workers	[0.04]	0.00	[1.61]	0.00	[0.01]	0.00	1	5.44	2	2.03	3	1.06	0.22—3.11
21	Seamen	–	–	[0.30]	0.00	[0.00]	0.00	[0.63]	0.00	[0.09]	0.00	[1.02]	0.00	0.00—3.61
22	Transport workers	1	2.05	27	1.16	[0.32]	0.00	2	0.74	16	1.35	46	1.19	0.87—1.59
23	Drivers	11	0.92	8	0.88	[0.13]	0.00	11	1.03	48	**1.75**	78	**1.32**	1.04—1.64
24	Postal workers	28	1.09	123	0.91	5	1.23	123	0.96	249	1.12	528	1.03	0.94—1.12
25	Textile workers	202	**1.25**	306	0.98	6	0.73	254	1.10	506	0.97	1 274	1.03	0.98—1.09
26	Shoe and leather workers	14	1.18	29	0.76	1	2.42	29	**1.79**	45	1.16	118	1.12	0.93—1.34
27	Smelting workers	2	0.68	9	1.00	[0.02]	0.00	1	0.74	13	1.52	25	1.14	0.74—1.69
28	Mechanics	38	1.37	47	1.24	[0.06]	0.00	24	1.33	101	1.12	210	**1.20**	1.05—1.38
29	Plumbers	[0.30]	0.00	[0.07]	0.00	–	–	[0.11]	0.00	[0.09]	0.00	[0.57]	0.00	0.00—6.50
30	Welders	–	–	3	1.14	[0.00]	0.00	[1.01]	0.00	6	2.11	9	1.39	0.64—2.64
31	Electrical workers	34	0.87	21	1.00	[0.06]	0.00	20	1.07	50	1.01	125	0.97	0.82—1.16
32	Wood workers	10	0.77	76	0.94	[0.12]	0.00	6	0.99	19	1.32	111	0.97	0.81—1.17
33	Painters	[0.52]	0.00	13	1.44	[0.03]	0.00	2	1.40	6	1.47	21	1.39	0.86—2.12
34	"Other construction workers"	[0.42]	0.00	35	1.01	[0.02]	0.00	[0.56]	0.00	1	2.41	36	1.00	0.70—1.39
35	Bricklayers	[0.08]	0.00	[1.09]	0.00	–	–	[0.03]	0.00	[0.01]	0.00	[1.20]	0.00	0.00—3.07
36	Printers	17	1.12	38	1.01	1	1.53	15	0.84	49	1.22	120	1.08	0.90—1.29
37	Chemical process workers	32	1.33	26	1.28	[0.31]	0.00	14	0.86	32	0.97	104	1.11	0.91—1.34
38	Food workers	136	1.17	99	0.92	13	0.84	126	1.15	104	0.98	478	1.05	0.96—1.15
39	Beverage workers	25	**2.16**	4	0.64	[0.04]	0.00	1	1.16	4	0.57	34	1.32	0.92—1.85
40	Tobacco workers	22	1.40	2	0.57	–	–	5	1.28	3	0.80	32	1.19	0.81—1.68
41	Glass makers etc	37	1.32	65	0.89	[0.40]	0.00	36	1.05	97	1.13	235	1.06	0.93—1.20
42	Packers	13	1.60	115	0.89	4	2.51	87	1.03	138	1.04	357	1.00	0.90—1.11
43	Engine operators	[0.21]	0.00	19	0.94	[0.02]	0.00	[0.89]	0.00	8	1.26	27	0.98	0.64—1.42
44	Public safety workers	[1.06]	0.00	2	0.43	[0.31]	0.00	6	0.54	12	1.44	20	0.79	0.48—1.22
45	Cooks and stewards	1	3.15	132	0.89	6	0.97	124	0.96	250	**1.17**	513	1.03	0.94—1.12
46	Domestic assistants	191	1.05	148	1.00	2	1.06	314	0.96	482	0.96	1 137	0.98	0.92—1.04
47	Waiters	43	1.37	122	1.06	1	1.50	149	1.16	232	1.11	547	**1.13**	1.04—1.23
48	Building caretakers	564	1.05	571	**1.09**	16	1.30	619	**1.14**	637	**1.19**	2 407	**1.12**	1.08—1.17
49	Chimney sweeps	[0.05]	0.00	[0.24]	0.00	–	–	1	12.38	[0.01]	0.00	1	2.68	0.07—14.91
50	Hairdressers	32	1.05	48	1.09	[0.58]	0.00	41	1.29	97	**1.25**	218	**1.18**	1.03—1.35
51	Launderers	77	**1.27**	40	0.93	5	2.34	59	1.16	124	1.07	305	1.12	1.00—1.25
52	Military personnel	[0.31]	0.00	[0.29]	0.00	–	–	[0.12]	0.00	[0.19]	0.00	[0.91]	0.00	0.00—4.07
53	"Other workers"	162	1.07	153	1.00	13	1.09	290	1.05	278	**1.20**	896	**1.09**	1.02—1.16
54	Economically inactive	4 140	0.97	3 970	1.03	37	0.87	4 082	1.01	11 294	**0.98**	23 523	0.99	0.98—1.00
1–54	All categories	7 943	1.00	9 498	1.00	170	1.00	8 855	1.00	18 902	1.00	45 368	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

SIRs. The lowest SIRs were observed among military personnel (0.43, 0.22–0.77), teachers, gardeners, and farmers (Table 30).

Female woodworkers had an elevated SIR (1.88, 0.90–3.46). The SIR was borderline significant among female packers, loaders and warehouse workers (1.52, 0.99–2.23), based on the high SIR in Norway (10 cases; Table 31).

The SIR for adenocarcinoma of the nose among male woodworkers was 5.50 (4.60–6.56). Among women, there were only 141 cases of nasal cancer classified as adenocarcinoma and no significant findings (http://astra.cancer.fi/NOCCA/Incidence/nose-adenocarcinoma).

Comment. Several occupations and industrial exposures have been associated with an increased risk of nasal cancer [73]. However, due to the rarity of these tumours, the identification of high risk groups has frequently been based on few cases. There has been little evidence of non-occupational causes for this disease. Relative risks well in excess of 5–10 in the boot and shoe manufacturing industries have been reported [74]. Shoe and leather workers are exposed to dust from leather and to benzene from the glue [75]. In the earlier Nordic study based on census occupations and follow-up from 1971–1991 [1], shoe and leather workers experienced the highest risk of nasal cancer with an SIR of 2.94 (95% CI 1.47–5.26). In the present follow-up there was no longer any such excess risk, possibly reflecting decreasing exposure levels in the shoe and leather industry.

In the present study, woodworkers had the highest SIR, and the excess was consistent over countries and genders. Most of the available cohort and case-control studies of nasal cancer have shown increased risks associated with exposure to wood dust [76]. The highest relative risk ever reported for any occupational risk (RR 500) is the one between hard wood dust and sinonasal adenocarcinoma [77]. Our study did not replicate such an extreme risk, but an SIR of 5.50, possibly because the majority of woodworkers in the Nordic countries are exposed to soft wood.

An excess risk of nasal cancer in workers exposed to benzene in gasoline vapours has been reported [78], but the present study did not suggest such associations. Increased risk of nasal cancer has also been found to be associated with exposures to employment in the nickel process industry [79]. In the present study, nickel process workers are included in the broad group of smelting workers. An elevated SIR was seen in Norway where an important nickel refinery is located [80].

Laryngeal cancer

The gender ratio for larynx cancer is large, with rates being 12–20 times higher for men than for women in Finland and approximately 5–12 times higher in the other countries, throughout the period. In Finnish men, rates peaked during the 1960s and have been decreasing ever since. In the other countries the incidence increased until around 1990 (Figure 26).

Elevated SIRs were seen in several groups, most pronounced among male waiters (SIR 3.52, 95% CI 2.90–4.27), beverage manufacture workers, cooks and stewards, seamen, and hairdressers. Male farmers (0.46, 0.44–0.49), laboratory assistants, teachers and physicians were all at low risk (Table 32).

Among women, "other construction workers" (7.39, 3.54–13.58), public and safety protection workers (5 cases), mechanics, waitresses, printers,

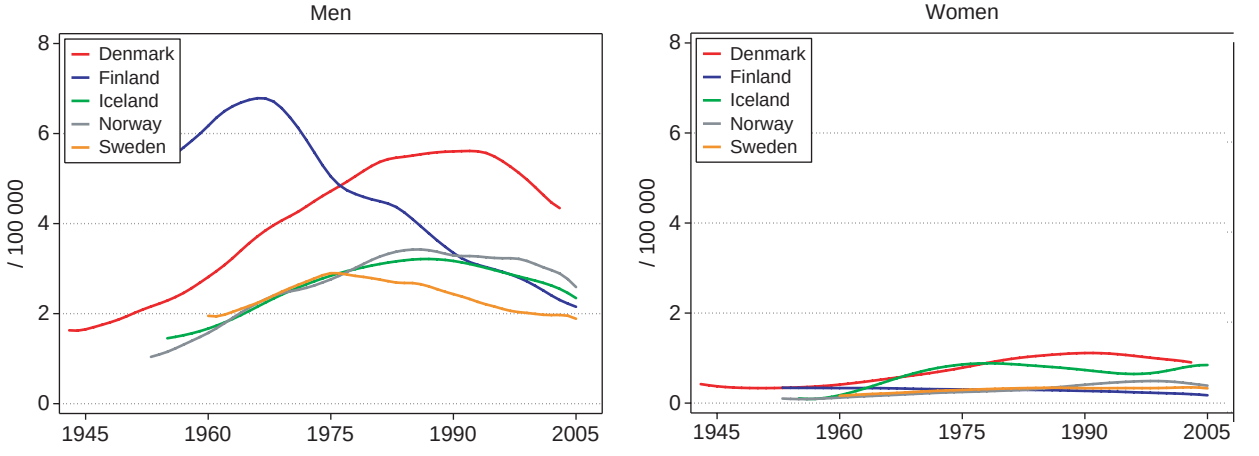


Figure 26. Age standardised (World) incidence rates for laryngeal cancer 1943–2005, by country and gender. Modified from NORDCAN [49].

Table 30. Observed number of nasal cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	56	1.15	24	0.78	[0.47]	0.00	15	0.56	111	0.88	206	0.88	0.77—1.01
2	Laboratory assistants	1	1.04	[0.76]	0.00	[0.08]	0.00	[1.33]	0.00	[0.62]	0.00	1	0.27	0.01—1.48
3	Physicians	3	0.75	[1.75]	0.00	[0.19]	0.00	5	1.37	4	0.70	12	0.78	0.40—1.37
4	Dentists	[1.17]	0.00	1	2.75	[0.05]	0.00	2	1.22	[2.85]	0.00	3	0.49	0.10—1.45
5	Nurses	[0.05]	0.00	[0.11]	0.00	[0.00]	0.00	[0.16]	0.00	1	3.01	1	1.54	0.04—8.58
6	Assistant nurses	2	1.72	[0.10]	0.00	[0.02]	0.00	[0.64]	0.00	4	1.90	6	1.49	0.55—3.25
7	"Other health workers"	3	0.87	2	1.15	[0.05]	0.00	[1.45]	0.00	4	0.82	9	0.78	0.36—1.48
8	Teachers	21	0.99	6	0.48	[0.66]	0.00	11	0.55	22	0.68	60	0.69	0.53—0.89
9	Religious workers etc	6	0.67	9	1.28	[0.46]	0.00	12	1.14	19	0.75	46	0.88	0.65—1.18
10	Artistic workers	3	1.09	4	1.63	[0.13]	0.00	2	0.65	3	0.39	12	0.74	0.38—1.30
11	Journalists	[1.30]	0.00	1	0.83	[0.07]	0.00	1	0.75	4	1.10	6	0.80	0.29—1.73
12	Administrators	54	0.99	25	1.31	2	1.70	43	1.16	40	0.81	164	1.02	0.87—1.19
13	Clerical workers	25	1.06	13	1.03	2	1.46	23	0.83	42	0.79	105	0.89	0.73—1.07
14	Sales agents	14	1.12	15	0.83	[0.67]	0.00	21	0.64	68	0.88	118	0.84	0.70—1.00
15	Shop workers	45	0.83	8	1.03	[0.48]	0.00	14	1.13	28	1.15	95	0.95	0.77—1.17
16	Farmers	65	0.61	72	0.84	3	1.48	83	0.88	118	0.87	341	0.81	0.72—0.90
17	Gardeners	6	0.40	12	0.97	[0.07]	0.00	14	0.60	40	0.81	72	0.72	0.56—0.91
18	Fishermen	9	1.81	1	0.89	2	1.82	36	1.21	8	1.51	56	1.33	1.00—1.72
19	Forestry workers	2	0.92	16	1.09	[0.01]	0.00	19	1.09	38	1.05	75	1.06	0.84—1.33
20	Miners and quarry workers	1	1.50	2	0.84	[0.02]	0.00	3	0.63	6	0.67	12	0.72	0.37—1.25
21	Seamen	6	1.12	1	0.32	1	3.32	21	0.91	12	1.55	41	1.03	0.74—1.40
22	Transport workers	13	1.10	6	0.64	[0.63]	0.00	13	1.05	24	0.93	56	0.93	0.70—1.21
23	Drivers	40	1.05	23	0.77	[0.88]	0.00	46	1.36	75	1.18	184	1.11	0.96—1.28
24	Postal workers	4	0.53	2	0.44	[0.12]	0.00	8	1.20	18	1.27	32	0.97	0.66—1.37
25	Textile workers	4	0.59	4	1.37	[0.21]	0.00	9	1.24	21	1.33	38	1.15	0.82—1.58
26	Shoe and leather workers	6	3.62	2	1.56	[0.04]	0.00	3	0.94	6	0.93	17	1.35	0.79—2.16
27	Smelting workers	15	1.00	3	0.66	[0.28]	0.00	22	2.24	26	1.03	66	1.20	0.93—1.53
28	Mechanics	40	0.99	31	1.05	[0.87]	0.00	55	1.18	105	0.91	231	0.99	0.87—1.13
29	Plumbers	2	0.55	3	0.61	[0.14]	0.00	2	0.37	20	1.50	27	0.99	0.65—1.44
30	Welders	–	–	5	1.05	[0.05]	0.00	8	1.37	16	1.07	29	1.13	0.76—1.62
31	Electrical workers	5	0.52	11	0.87	[0.50]	0.00	24	1.16	39	0.99	79	0.95	0.76—1.19
32	Wood workers	74	2.64	46	1.46	1	1.94	74	1.35	160	2.04	355	1.84	1.66—2.04
33	Painters	14	1.52	4	0.61	[0.19]	0.00	7	0.75	18	0.80	43	0.90	0.65—1.21
34	"Other construction workers"	39	1.12	36	1.75	1	1.00	10	0.92	51	1.19	137	1.24	1.05—1.47
35	Bricklayers	9	0.89	3	0.91	–	–	4	0.73	13	1.28	29	1.00	0.67—1.43
36	Printers	8	1.24	1	0.33	[0.15]	0.00	5	0.91	8	0.66	22	0.81	0.51—1.22
37	Chemical process workers	9	1.51	7	1.40	[0.09]	0.00	10	0.80	21	1.10	47	1.10	0.81—1.46
38	Food workers	13	0.67	3	0.84	2	2.42	13	0.92	16	0.84	47	0.83	0.61—1.10
39	Beverage workers	6	2.58	[0.24]	0.00	[0.02]	0.00	[0.13]	0.00	2	1.79	8	2.09	0.90—4.12
40	Tobacco workers	1	2.63	1	24.56	[0.00]	0.00	1	4.44	[0.08]	0.00	3	4.10	0.85—11.98
41	Glass makers etc	10	0.88	6	1.14	1	6.87	14	2.09	19	0.91	50	1.13	0.84—1.49
42	Packers	10	0.99	13	1.19	1	2.12	14	0.66	39	1.02	77	0.95	0.75—1.19
43	Engine operators	8	0.78	18	1.23	1	1.65	11	0.95	34	1.08	72	1.05	0.82—1.32
44	Public safety workers	9	0.93	12	1.42	[0.45]	0.00	8	0.89	13	0.72	42	0.92	0.66—1.24
45	Cooks and stewards	2	2.69	[0.55]	0.00	1	5.15	2	0.52	6	1.81	11	1.27	0.63—2.27
46	Domestic assistants	[0.01]	0.00	[0.03]	0.00	[0.00]	0.00	[0.03]	0.00	[0.31]	0.00	[0.39]	0.00	0.00—9.58
47	Waiters	3	1.94	1	1.86	[0.02]	0.00	1	0.59	3	1.74	8	1.45	0.63—2.86
48	Building caretakers	14	1.38	10	1.40	[0.19]	0.00	5	1.08	9	0.60	38	1.02	0.72—1.41
49	Chimney sweeps	[0.26]	0.00	1	1.87	–	–	[0.47]	0.00	1	0.96	2	0.86	0.10—3.12
50	Hairdressers	2	0.69	[0.15]	0.00	[0.03]	0.00	3	2.21	3	0.81	8	0.98	0.42—1.94
51	Launderers	4	2.80	[0.15]	0.00	[0.02]	0.00	[0.81]	0.00	4	1.51	8	1.58	0.68—3.12
52	Military personnel	1	0.20	1	0.36	–	–	3	0.42	6	0.57	11	0.43	0.22—0.77
53	"Other workers"	38	1.23	6	0.70	1	0.58	39	0.95	40	0.86	124	0.96	0.81—1.15
54	Economically inactive	22	0.78	49	1.07	2	1.61	31	1.38	77	1.03	181	1.05	0.91—1.22
1–54	All categories	747	1.00	520	1.00	21	1.00	770	1.00	1 465	1.00	3 523	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 31. Observed number of nasal cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	1	0.70	1	0.51	[0.05]	0.00	1	1.82	5	1.34	8	1.04	0.45—2.05
2	Laboratory assistants	[1.01]	0.00	[1.13]	0.00	[0.08]	0.00	1	1.39	[1.00]	0.00	1	0.25	0.01—1.41
3	Physicians	[0.48]	0.00	[0.48]	0.00	[0.02]	0.00	[0.31]	0.00	[0.84]	0.00	[2.11]	0.00	0.00—1.74
4	Dentists	[0.43]	0.00	1	1.80	[0.01]	0.00	[0.27]	0.00	1	1.50	2	1.04	0.13—3.75
5	Nurses	8	0.95	4	0.70	1	2.41	4	0.72	11	0.98	28	0.89	0.59—1.29
6	Assistant nurses	7	1.16	5	0.82	[0.53]	0.00	3	0.56	21	1.08	36	0.96	0.67—1.33
7	"Other health workers"	6	1.23	2	0.42	[0.12]	0.00	5	0.88	3	0.46	16	0.73	0.42—1.18
8	Teachers	12	1.14	8	0.74	[0.71]	0.00	8	0.74	27	1.05	55	0.94	0.71—1.22
9	Religious workers etc	[1.44]	0.00	2	0.41	[0.11]	0.00	[2.67]	0.00	7	0.84	9	0.52	0.24—0.98
10	Artistic workers	[0.74]	0.00	2	2.39	[0.09]	0.00	[0.85]	0.00	1	0.62	3	0.72	0.15—2.12
11	Journalists	[0.16]	0.00	1	1.81	[0.02]	0.00	[0.21]	0.00	1	1.34	2	1.18	0.14—4.28
12	Administrators	3	0.67	1	0.55	[0.08]	0.00	[2.85]	0.00	2	0.53	6	0.46	0.17—1.01
13	Clerical workers	37	0.86	44	1.28	3	1.40	38	1.09	69	1.11	191	1.08	0.94—1.25
14	Sales agents	[0.40]	0.00	4	0.75	1	4.00	8	1.42	12	1.27	25	1.19	0.77—1.76
15	Shop workers	27	0.91	17	0.88	[1.42]	0.00	24	0.80	32	0.81	100	0.84	0.69—1.02
16	Farmers	15	0.72	9	0.71	1	0.95	18	0.81	3	0.75	46	0.76	0.55—1.01
17	Gardeners	1	0.37	37	1.02	[0.03]	0.00	9	0.69	15	1.44	62	0.99	0.76—1.28
18	Fishermen	[0.11]	0.00	[0.08]	0.00	[0.04]	0.00	[0.15]	0.00	[0.04]	0.00	[0.40]	0.00	0.00—9.17
19	Forestry workers	[0.03]	0.00	[0.15]	0.00	[0.00]	0.00	[0.22]	0.00	[0.22]	0.00	[0.62]	0.00	0.00—5.92
20	Miners and quarry workers	[0.00]	0.00	[0.06]	0.00	[0.00]	0.00	[0.01]	0.00	[0.05]	0.00	[0.13]	0.00	0.00—28.73
21	Seamen	–	–	[0.02]	0.00	–	–	[0.03]	0.00	[0.01]	0.00	[0.06]	0.00	0.00—64.46
22	Transport workers	[0.03]	0.00	2	2.06	[0.04]	0.00	[0.15]	0.00	[0.62]	0.00	2	1.11	0.13—4.00
23	Drivers	1	1.36	1	2.36	[0.02]	0.00	[0.59]	0.00	4	2.69	6	1.85	0.68—4.02
24	Postal workers	[1.58]	0.00	5	0.86	1	2.00	10	1.43	13	1.17	29	1.11	0.75—1.60
25	Textile workers	11	1.12	12	0.90	[0.85]	0.00	9	0.73	27	1.13	59	0.98	0.75—1.27
26	Shoe and leather workers	1	1.38	2	1.22	[0.05]	0.00	1	1.16	[1.80]	0.00	4	0.79	0.21—2.02
27	Smelting workers	[0.17]	0.00	1	2.60	[0.00]	0.00	[0.08]	0.00	[0.45]	0.00	1	0.92	0.02—5.11
28	Mechanics	3	1.74	[1.68]	0.00	[0.01]	0.00	1	1.03	7	1.50	11	1.21	0.61—2.17
29	Plumbers	[0.02]	0.00	[0.00]	0.00	–	–	[0.01]	0.00	[0.01]	0.00	[0.03]	0.00	0.00—110.64
30	Welders	–	–	[0.13]	0.00	[0.00]	0.00	[0.06]	0.00	[0.17]	0.00	[0.36]	0.00	0.00—10.33
31	Electrical workers	3	1.25	1	0.96	[0.01]	0.00	2	1.96	4	1.55	10	1.42	0.68—2.60
32	Wood workers	3	3.71	4	1.18	[0.01]	0.00	[0.32]	0.00	3	3.92	10	1.88	0.90—3.46
33	Painters	[0.03]	0.00	[0.40]	0.00	[0.00]	0.00	[0.08]	0.00	[0.21]	0.00	[0.72]	0.00	0.00—5.15
34	"Other construction workers"	[0.02]	0.00	1	0.71	[0.00]	0.00	[0.03]	0.00	[0.03]	0.00	1	0.68	0.02—3.76
35	Bricklayers	[0.00]	0.00	[0.05]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.05]	0.00	0.00—70.69
36	Printers	[0.91]	0.00	[1.65]	0.00	[0.07]	0.00	1	1.01	4	1.98	5	0.89	0.29—2.07
37	Chemical process workers	1	0.70	[0.87]	0.00	[0.03]	0.00	2	2.28	2	1.24	5	1.04	0.34—2.42
38	Food workers	10	1.41	3	0.66	2	1.16	9	1.56	7	1.41	31	1.29	0.87—1.83
39	Beverage workers	2	3.03	1	3.89	[0.00]	0.00	[0.04]	0.00	[0.32]	0.00	3	2.33	0.48—6.82
40	Tobacco workers	1	1.10	[0.15]	0.00	–	–	[0.22]	0.00	[0.19]	0.00	1	0.69	0.02—3.83
41	Glass makers etc	2	1.17	1	0.32	[0.05]	0.00	2	1.08	6	1.42	11	1.00	0.50—1.80
42	Packers	3	**6.05**	7	1.26	[0.17]	0.00	10	**2.25**	6	0.94	26	1.52	0.99—2.23
43	Engine operators	[0.01]	0.00	1	1.13	[0.00]	0.00	[0.05]	0.00	[0.37]	0.00	1	0.76	0.02—4.22
44	Public safety workers	[0.05]	0.00	[0.20]	0.00	[0.03]	0.00	[0.55]	0.00	1	1.98	1	0.75	0.02—4.15
45	Cooks and stewards	[0.02]	0.00	8	1.27	[0.64]	0.00	5	0.73	7	0.71	20	0.85	0.52—1.31
46	Domestic assistants	11	0.99	9	1.40	[0.19]	0.00	13	0.76	31	1.22	64	1.06	0.82—1.35
47	Waiters	2	1.08	3	0.58	[0.07]	0.00	7	1.03	8	0.82	20	0.84	0.52—1.30
48	Building caretakers	28	0.87	31	1.43	3	2.29	34	1.20	18	0.70	114	1.04	0.87—1.25
49	Chimney sweeps	[0.00]	0.00	[0.01]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.02]	0.00	0.00—204.43
50	Hairdressers	3	1.60	3	1.54	[0.07]	0.00	[1.75]	0.00	7	1.76	13	1.35	0.72—2.31
51	Launderers	5	1.37	2	1.13	[0.21]	0.00	3	1.13	4	0.76	14	1.03	0.56—1.73
52	Military personnel	[0.02]	0.00	[0.02]	0.00	–	–	[0.01]	0.00	[0.02]	0.00	[0.06]	0.00	0.00—64.05
53	"Other workers"	9	1.00	4	0.61	1	0.75	12	0.82	11	0.97	37	0.86	0.61—1.19
54	Economically inactive	253	1.05	156	1.04	6	1.35	243	1.08	529	0.98	1 187	1.02	0.97—1.08
1–54	All categories	469	1.00	396	1.00	19	1.00	483	1.00	909	1.00	2 276	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 32. Observed number of laryngeal cancer among men in the Nordic countries and standardised incidence ratios1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	266	0.83	95	0.50	1	0.47	71	0.52	466	0.81	899	0.74	0.69—0.79
2	Laboratory assistants	4	0.63	3	0.64	[0.38]	0.00	4	0.61	[2.68]	0.00	11	0.53	0.27—0.96
3	Physicians	17	0.66	4	0.37	1	1.29	13	0.76	12	0.47	47	0.59	0.43—0.78
4	Dentists	8	1.04	[2.28]	0.00	[0.22]	0.00	4	0.52	14	1.09	26	0.85	0.55—1.24
5	Nurses	[0.38]	0.00	[0.51]	0.00	[0.01]	0.00	[0.78]	0.00	[1.22]	0.00	[2.89]	0.00	0.00—1.28
6	Assistant nurses	6	0.78	[0.47]	0.00	[0.09]	0.00	1	0.34	14	1.57	21	1.04	0.65—1.60
7	"Other health workers"	13	0.58	10	0.91	[0.21]	0.00	7	1.05	22	1.01	52	0.84	0.63—1.10
8	Teachers	75	0.53	32	0.41	1	0.35	46	0.48	99	0.68	253	0.55	0.48—0.62
9	Religious workers etc	47	0.83	27	0.63	1	0.53	31	0.64	78	0.70	184	0.70	0.61—0.81
10	Artistic workers	17	0.97	19	1.22	[0.52]	0.00	16	1.10	40	1.14	92	1.11	0.89—1.36
11	Journalists	10	1.18	9	1.16	2	6.53	3	0.47	26	1.59	50	1.27	0.95—1.68
12	Administrators	323	0.92	108	0.88	6	1.28	156	0.91	254	1.14	847	0.97	0.91—1.04
13	Clerical workers	131	0.85	61	0.74	5	0.96	115	0.87	261	1.08	573	0.93	0.86—1.01
14	Sales agents	93	1.14	118	1.00	7	2.58	193	1.28	428	1.22	839	1.19	1.12—1.28
15	Shop workers	344	0.99	49	1.01	5	2.67	52	0.86	130	1.16	580	1.02	0.94—1.10
16	Farmers	252	0.38	413	0.69	1	0.14	148	0.37	238	0.39	1 052	0.46	0.44—0.49
17	Gardeners	52	0.56	55	0.67	[0.24]	0.00	56	0.54	128	0.57	291	0.58	0.51—0.65
18	Fishermen	52	1.61	5	0.65	6	1.18	160	1.21	18	0.75	241	1.20	1.05—1.36
19	Forestry workers	11	0.81	119	1.21	[0.04]	0.00	36	0.48	89	0.54	255	0.73	0.64—0.82
20	Miners and quarry workers	4	0.96	16	1.00	[0.08]	0.00	24	1.09	36	0.88	80	0.96	0.76—1.20
21	Seamen	62	1.75	30	1.47	4	3.06	196	1.75	86	2.41	378	1.85	1.67—2.04
22	Transport workers	85	1.10	49	0.80	[2.50]	0.00	65	1.12	114	0.96	313	0.98	0.88—1.10
23	Drivers	346	1.39	233	1.21	4	1.05	244	1.51	399	1.37	1 226	1.37	1.29—1.45
24	Postal workers	48	0.96	33	1.12	[0.44]	0.00	26	0.87	65	1.02	172	0.99	0.85—1.15
25	Textile workers	47	1.10	25	1.27	1	1.35	30	0.91	79	1.09	182	1.08	0.94—1.25
26	Shoe and leather workers	11	1.06	15	1.71	[0.15]	0.00	18	1.30	43	1.49	87	1.40	1.12—1.73
27	Smelting workers	130	1.32	40	1.32	1	0.90	60	1.33	143	1.24	374	1.29	1.17—1.43
28	Mechanics	285	1.08	213	1.12	2	0.54	268	1.20	588	1.11	1 356	1.12	1.06—1.18
29	Plumbers	21	0.89	26	0.82	1	1.71	28	1.07	73	1.20	149	1.04	0.89—1.22
30	Welders	–	–	42	1.43	[0.22]	0.00	28	0.94	76	1.11	146	1.14	0.97—1.34
31	Electrical workers	82	1.29	75	0.94	1	0.45	109	1.10	210	1.17	477	1.13	1.03—1.23
32	Wood workers	170	0.94	200	0.95	2	0.99	193	0.77	254	0.72	819	0.82	0.77—0.88
33	Painters	70	1.18	54	1.23	1	1.22	58	1.37	120	1.17	303	1.22	1.09—1.36
34	"Other construction workers"	256	1.16	201	1.43	5	1.18	64	1.26	225	1.16	751	1.23	1.15—1.32
35	Bricklayers	75	1.16	19	0.86	–	–	29	1.15	44	0.95	167	1.05	0.90—1.23
36	Printers	44	1.05	25	1.33	[0.69]	0.00	29	1.12	75	1.36	173	1.21	1.04—1.41
37	Chemical process workers	58	1.53	42	1.29	[0.36]	0.00	72	1.28	75	0.87	247	1.16	1.02—1.31
38	Food workers	166	1.34	25	1.07	6	1.99	86	1.34	96	1.11	379	1.26	1.14—1.39
39	Beverage workers	43	2.89	3	1.91	[0.05]	0.00	2	2.64	11	2.20	59	2.65	2.02—3.42
40	Tobacco workers	2	0.85	[0.26]	0.00	[0.00]	0.00	2	2.03	[0.39]	0.00	4	1.00	0.27—2.57
41	Glass makers etc	81	1.12	37	1.08	1	1.80	40	1.26	125	1.32	284	1.22	1.08—1.37
42	Packers	87	1.37	94	1.29	[1.74]	0.00	140	1.45	215	1.24	536	1.32	1.21—1.43
43	Engine operators	80	1.20	116	1.23	2	0.79	65	1.15	172	1.21	435	1.20	1.09—1.32
44	Public safety workers	60	0.98	45	0.81	[1.74]	0.00	55	1.34	73	0.89	233	0.97	0.85—1.10
45	Cooks and stewards	14	2.88	7	2.20	1	1.14	47	2.51	27	1.84	96	2.27	1.84—2.77
46	Domestic assistants	[0.05]	0.00	[0.19]	0.00	[0.00]	0.00	1	6.52	[1.10]	0.00	1	0.67	0.02—3.73
47	Waiters	59	5.91	4	1.29	[0.09]	0.00	23	2.86	16	2.05	102	3.52	2.90—4.27
48	Building caretakers	86	1.34	54	1.13	[0.68]	0.00	40	1.90	75	1.14	255	1.28	1.13—1.45
49	Chimney sweeps	2	1.16	4	1.09	–	–	[2.19]	0.00	7	1.46	13	1.05	0.56—1.80
50	Hairdressers	13	0.71	1	0.99	[0.13]	0.00	12	1.94	40	2.35	66	1.55	1.20—1.97
51	Launderers	4	0.44	1	1.01	[0.07]	0.00	5	1.35	15	1.23	25	0.96	0.62—1.42
52	Military personnel	31	0.91	13	0.78	–	–	33	0.91	53	1.10	130	0.96	0.81—1.14
53	"Other workers"	318	1.61	77	1.33	10	1.45	200	1.12	230	1.10	835	1.28	1.20—1.37
54	Economically inactive	226	1.32	516	1.50	7	1.40	125	1.40	448	1.41	1 322	1.42	1.35—1.50
1–54	All categories	4 787	1.00	3 462	1.00	85	1.00	3 529	1.00	6 625	1.00	18 488	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 33. Observed number of laryngeal cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	5	1.50	[1.62]	0.00	[0.05]	0.00	[0.68]	0.00	4	0.98	9	0.92	0.42—1.75
2	Laboratory assistants	2	0.79	1	1.01	[0.09]	0.00	[0.82]	0.00	2	1.67	5	0.89	0.29—2.07
3	Physicians	1	0.91	[0.39]	0.00	[0.01]	0.00	[0.32]	0.00	[0.97]	0.00	1	0.36	0.01—2.00
4	Dentists	[0.96]	0.00	1	2.21	[0.01]	0.00	[0.27]	0.00	1	1.41	2	0.83	0.10—3.01
5	Nurses	8	0.42	[4.98]	0.00	[0.40]	0.00	3	0.46	2	0.17	13	0.30	0.16—0.52
6	Assistant nurses	13	0.89	1	0.19	1	2.12	2	0.30	24	1.09	41	0.84	0.60—1.13
7	"Other health workers"	9	0.83	[4.07]	0.00	[0.12]	0.00	8	1.24	10	1.37	27	0.94	0.62—1.36
8	Teachers	8	0.32	3	0.32	[0.70]	0.00	6	0.50	17	0.62	34	0.46	0.32—0.64
9	Religious workers etc	3	0.91	4	0.98	[0.10]	0.00	[3.01]	0.00	3	0.33	10	0.51	0.25—0.95
10	Artistic workers	2	1.27	1	1.39	[0.09]	0.00	1	1.13	2	1.13	6	1.19	0.44—2.60
11	Journalists	1	2.74	[0.48]	0.00	[0.02]	0.00	[0.25]	0.00	[0.83]	0.00	1	0.51	0.01—2.87
12	Administrators	15	1.55	[1.56]	0.00	[0.07]	0.00	2	0.70	6	1.56	23	1.28	0.81—1.92
13	Clerical workers	94	0.92	35	1.16	2	0.98	47	1.21	65	0.94	243	1.00	0.89—1.14
14	Sales agents	1	1.13	3	0.67	[0.21]	0.00	1	0.21	14	1.61	19	0.99	0.60—1.55
15	Shop workers	56	0.85	8	0.47	1	0.79	30	0.95	42	1.04	137	0.88	0.74—1.04
16	Farmers	15	0.32	7	0.68	3	3.43	8	0.41	2	0.61	35	0.43	0.30—0.60
17	Gardeners	5	0.83	19	0.60	[0.03]	0.00	5	0.42	5	0.47	34	0.56	0.39—0.79
18	Fishermen	1	4.09	[0.07]	0.00	[0.04]	0.00	[0.17]	0.00	[0.03]	0.00	1	1.83	0.05—10.18
19	Forestry workers	[0.07]	0.00	[0.13]	0.00	[0.00]	0.00	[0.24]	0.00	[0.23]	0.00	[0.67]	0.00	0.00—5.50
20	Miners and quarry workers	[0.00]	0.00	[0.06]	0.00	[0.00]	0.00	[0.01]	0.00	[0.06]	0.00	[0.13]	0.00	0.00—27.37
21	Seamen	–	–	[0.01]	0.00	–	–	[0.04]	0.00	[0.01]	0.00	[0.06]	0.00	0.00—62.94
22	Transport workers	[0.07]	0.00	2	2.29	[0.03]	0.00	[0.18]	0.00	3	4.66	5	2.79	0.90—6.50
23	Drivers	3	1.73	[0.37]	0.00	[0.02]	0.00	[0.64]	0.00	6	3.48	9	2.00	0.92—3.80
24	Postal workers	2	0.57	2	0.39	[0.44]	0.00	7	0.94	10	0.84	21	0.74	0.46—1.13
25	Textile workers	19	0.85	7	0.61	[0.63]	0.00	8	0.75	18	0.82	52	0.77	0.58—1.01
26	Shoe and leather workers	1	0.59	3	2.07	[0.03]	0.00	[0.78]	0.00	4	2.33	8	1.41	0.61—2.78
27	Smelting workers	[0.41]	0.00	1	2.88	[0.00]	0.00	1	9.54	[0.54]	0.00	2	1.42	0.17—5.14
28	Mechanics	8	1.87	5	3.34	1	95.06	4	3.93	9	1.74	27	2.25	1.48—3.28
29	Plumbers	[0.03]	0.00	[0.00]	0.00	–	–	[0.01]	0.00	[0.01]	0.00	[0.05]	0.00	0.00—77.74
30	Welders	–	–	1	8.65	[0.00]	0.00	[0.08]	0.00	1	4.86	2	4.93	0.60—17.81
31	Electrical workers	12	2.02	3	3.31	[0.01]	0.00	2	1.78	4	1.38	21	1.93	1.19—2.95
32	Wood workers	1	0.52	3	0.99	[0.01]	0.00	1	2.58	2	2.31	7	1.12	0.45—2.31
33	Painters	[0.07]	0.00	[0.35]	0.00	[0.00]	0.00	1	11.65	1	4.42	2	2.70	0.33—9.75
34	"Other construction workers"	[0.05]	0.00	10	8.09	[0.00]	0.00	[0.03]	0.00	[0.03]	0.00	10	7.39	3.54—13.58
35	Bricklayers	[0.01]	0.00	[0.04]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.05]	0.00	0.00—69.36
36	Printers	3	1.40	3	2.08	[0.06]	0.00	4	4.19	4	1.91	14	2.09	1.14—3.51
37	Chemical process workers	2	0.60	[0.77]	0.00	[0.03]	0.00	2	2.33	2	1.23	6	0.91	0.33—1.97
38	Food workers	30	1.82	3	0.76	2	1.40	5	0.93	6	1.30	46	1.44	1.06—1.92
39	Beverage workers	5	3.27	[0.22]	0.00	[0.00]	0.00	[0.05]	0.00	[0.28]	0.00	5	2.39	0.78—5.58
40	Tobacco workers	5	2.35	[0.13]	0.00	–	–	[0.18]	0.00	[0.20]	0.00	5	1.89	0.62—4.42
41	Glass makers etc	6	1.45	3	1.09	[0.04]	0.00	2	1.06	7	1.57	18	1.36	0.80—2.14
42	Packers	1	0.85	6	1.22	[0.13]	0.00	5	1.11	5	0.78	17	0.99	0.58—1.59
43	Engine operators	[0.04]	0.00	4	4.97	[0.00]	0.00	[0.07]	0.00	[0.48]	0.00	4	2.87	0.78—7.35
44	Public safety workers	[0.11]	0.00	1	5.84	[0.02]	0.00	[0.54]	0.00	4	7.33	5	3.61	1.17—8.42
45	Cooks and stewards	[0.04]	0.00	4	0.75	[0.47]	0.00	12	2.08	16	1.88	32	1.59	1.09—2.24
46	Domestic assistants	32	1.28	5	0.92	[0.13]	0.00	12	0.76	21	0.87	70	0.99	0.77—1.25
47	Waiters	19	4.33	8	1.75	[0.05]	0.00	10	1.49	18	1.92	55	2.19	1.65—2.85
48	Building caretakers	101	1.40	27	1.43	1	0.99	40	1.36	46	1.86	215	1.47	1.29—1.68
49	Chimney sweeps	[0.00]	0.00	[0.01]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.02]	0.00	0.00—183.92
50	Hairdressers	2	0.46	9	5.30	[0.06]	0.00	4	2.31	6	1.40	21	1.74	1.07—2.65
51	Launderers	7	0.87	5	3.25	1	7.50	4	1.69	5	1.08	22	1.31	0.82—1.99
52	Military personnel	[0.04]	0.00	[0.02]	0.00	–	–	[0.01]	0.00	[0.02]	0.00	[0.09]	0.00	0.00—43.20
53	"Other workers"	38	1.86	5	0.88	[1.07]	0.00	23	1.52	15	1.33	81	1.51	1.20—1.88
54	Economically inactive	486	0.97	134	1.08	4	1.11	169	1.01	462	0.93	1 255	0.97	0.92—1.03
1–54	All categories	1 022	1.00	337	1.00	16	1.00	429	1.00	874	1.00	2 678	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

electrical workers, hairdressers, cooks and stewards, building caretakers and cleaners and food workers were at elevated risk (Table 33). Low risks were seen among nurses (0.30, 0.16–0.52), farmers, teachers, religious workers, and gardeners.

Comment. The separate and joint effects of tobacco and alcohol account for the major proportion of larynx cancer cases [81]. Occupational factors related to risk include exposure to sulphur acid mist and asbestos, and possibly to solvents and wood dust. Most of the variation in risk across occupations can probably be explained by smoking and drinking habits.

Lung cancer

Lung cancer was the second most frequent cancer in men in the present study and number four among women. The lung cancer incidence among men reached its peak in the early 1970s in Finland and then began to fall (Figure 27). The peak came later in the other countries. The rates have been much lower in women but are increasing.

The highest SIRs in men were observed among waiters (SIR 1.90, 95% CI 1.75–2.05), tobacco manufacture workers, seamen, miners and quarry workers, cooks and stewards, chimney sweeps, plumbers and beverage manufacture workers. The SIRs were lowest among male nurses (0.40, 0.19–0.73), teachers, dentists, physicians, farmers, religious workers and gardeners (Table 34).

Among women the highest SIRs were found among engine operators (2.61, 2.19–3.11), tobacco workers, and "other construction workers". Painters, waiters, beverage workers, transport workers, electrical workers, printers, welders, mechanics, packers, chemical process workers, drivers and glass makers also had significant SIRs above 1.4. The lowest SIRs among women were found among farmers (0.46, 0.44–0.49), followed by gardeners and teachers (Table 35).

The occupational SIR patterns were similar for adenocarcinoma, squamous cell carcinoma, small cell carcinoma and other and unspecified types of lung cancer (Table 36).

Comment. Although tobacco smoking is the main cause of lung cancer, the attributable fraction of occupational exposures is estimated to up to 20% [82,83]. Some occupational exposures act in concert with smoking to synergistically increase risk [84–86]. The International Agency for Research on Cancer has listed a wide range of occupational lung carcinogens [87].

Throughout our study period there has been an invert social gradient in smoking, so that those with higher education and in higher socio-economic positions quit smoking, while those in manual work and with a lower education continued or started smoking [6,88–90]. In the present study, the occupational categories with high SIRs are all manual workers with low education likely to smoke more than others.

Much of the observed variation in risk can be explained by smoking habits. Tobacco workers are known to have had easy access to tobacco. Waiters have until recently been heavily exposed to passive smoking in addition to their own smoking. Many of the high SIR occupations are also likely to be exposed to various known or suspected occupational carcinogens [82]. Miners and quarry workers may be exposed to radon, silica dust, diesel exhaust, and asbestos; plumbers to asbestos; smelting workers

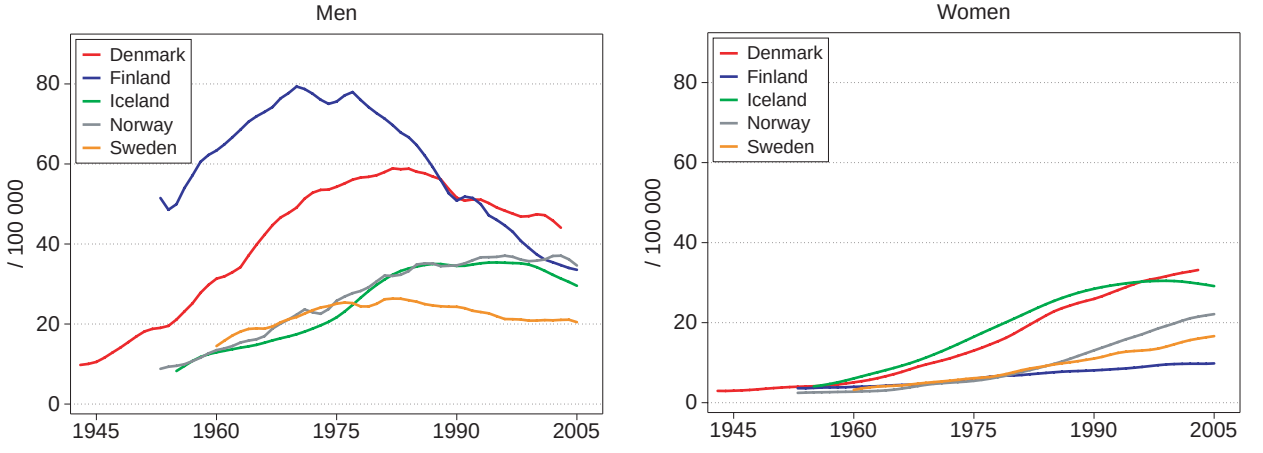


Figure 27. Age standardised (World) incidence rates for lung cancer 1943–2005, by country and gender. Modified from NORDCAN [49].

Table 34. Observed number of lung cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	3 019	0.91	1 503	0.58	9	0.41	855	0.61	5 154	0.93	10 540	0.82	0.80—0.83
2	Laboratory assistants	70	1.04	55	0.89	3	0.71	51	0.75	17	0.70	196	0.87	0.75—1.00
3	Physicians	144	0.53	45	0.30	6	0.67	82	0.46	178	0.73	455	0.53	0.49—0.58
4	Dentists	36	0.46	9	0.27	[2.08]	0.00	55	0.68	59	0.47	159	0.50	0.43—0.58
5	Nurses	[3.48]	0.00	1	0.20	1	23.30	4	0.56	4	0.42	10	0.40	0.19—0.73
6	Assistant nurses	61	0.78	1	0.25	[0.97]	0.00	24	0.76	84	1.01	170	0.86	0.74—1.00
7	"Other health workers"	210	0.87	93	0.59	1	0.41	62	0.90	199	0.95	565	0.83	0.76—0.90
8	Teachers	769	0.54	371	0.33	17	0.52	428	0.43	834	0.59	2 419	0.49	0.47—0.51
9	Religious workers etc	377	0.61	296	0.51	22	1.03	253	0.50	783	0.75	1 731	0.62	0.60—0.65
10	Artistic workers	160	0.82	142	0.65	8	1.36	146	0.95	391	1.16	847	0.93	0.87—1.00
11	Journalists	85	0.94	76	0.69	6	1.80	59	0.89	169	1.08	395	0.93	0.84—1.02
12	Administrators	3 415	0.90	1 000	0.56	49	0.86	1 523	0.84	1 992	0.92	7 979	0.83	0.81—0.85
13	Clerical workers	1 412	0.85	936	0.75	64	1.00	1 177	0.84	2 432	1.04	6 021	0.90	0.88—0.92
14	Sales agents	855	0.98	1 365	0.80	44	1.35	1 604	1.01	3 796	1.12	7 664	1.01	0.99—1.03
15	Shop workers	3 803	0.98	518	0.78	20	0.90	598	0.95	1 204	1.10	6 143	0.98	0.95—1.00
16	Farmers	3 465	0.47	7 611	0.77	49	0.52	1 995	0.46	2 417	0.40	15 537	0.56	0.55—0.57
17	Gardeners	808	0.77	1 056	0.84	4	1.36	637	0.57	1 361	0.61	3 866	0.68	0.66—0.71
18	Fishermen	461	1.29	127	1.02	78	1.52	1 654	1.17	227	0.96	2 547	1.16	1.12—1.21
19	Forestry workers	139	0.88	2 074	1.41	[0.47]	0.00	486	0.60	878	0.54	3 577	0.88	0.85—0.91
20	Miners and quarry workers	48	0.97	450	1.93	1	1.18	325	1.40	621	1.57	1 445	1.58	1.50—1.67
21	Seamen	547	1.43	353	1.19	23	1.57	2 036	1.74	624	1.82	3 583	1.62	1.57—1.68
22	Transport workers	896	1.07	729	0.78	37	1.22	601	0.97	1 201	1.03	3 464	0.96	0.93—1.00
23	Drivers	3 762	1.37	2 897	1.05	46	1.07	2 415	1.44	3 762	1.34	12 882	1.28	1.26—1.31
24	Postal workers	536	1.05	312	0.72	4	0.70	278	0.88	653	1.06	1 783	0.95	0.90—0.99
25	Textile workers	527	1.07	291	0.95	6	0.62	309	0.87	721	1.02	1 854	0.99	0.94—1.04
26	Shoe and leather workers	133	1.08	148	1.07	5	2.34	159	1.07	297	1.04	742	1.06	0.99—1.14
27	Smelting workers	1 488	1.38	586	1.28	16	1.18	715	1.50	1 422	1.27	4 227	1.34	1.30—1.38
28	Mechanics	3 595	1.24	2 979	1.10	43	1.07	3 123	1.34	6 463	1.27	16 203	1.24	1.22—1.26
29	Plumbers	399	1.55	591	1.33	8	1.20	420	1.55	807	1.37	2 225	1.42	1.36—1.48
30	Welders	–	–	443	1.17	2	0.83	444	1.44	909	1.38	1 798	1.33	1.27—1.40
31	Electrical workers	777	1.15	1 055	0.96	26	1.09	1 072	1.04	1 780	1.03	4 710	1.03	1.00—1.06
32	Wood workers	2 085	1.05	3 801	1.16	17	0.71	2 370	0.88	2 668	0.77	10 941	0.96	0.94—0.97
33	Painters	858	1.30	792	1.21	8	0.81	593	1.32	1 167	1.17	3 418	1.23	1.19—1.28
34	"Other construction workers"	3 075	1.19	3 402	1.59	45	0.96	741	1.40	2 217	1.18	9 480	1.32	1.29—1.35
35	Bricklayers	899	1.24	477	1.40	–	–	344	1.28	513	1.13	2 233	1.25	1.20—1.30
36	Printers	545	1.20	236	0.91	9	1.16	325	1.21	711	1.33	1 826	1.20	1.14—1.26
37	Chemical process workers	534	1.21	522	1.11	6	1.34	786	1.32	857	1.02	2 705	1.15	1.11—1.19
38	Food workers	1 700	1.22	342	1.00	45	1.18	861	1.26	1 000	1.18	3 948	1.19	1.16—1.23
39	Beverage workers	275	1.54	19	0.78	2	3.31	7	0.98	65	1.33	368	1.42	1.28—1.57
40	Tobacco workers	51	1.76	8	2.07	[0.05]	0.00	18	1.74	7	1.87	84	1.79	1.43—2.21
41	Glass makers etc	1 007	1.21	537	1.08	7	1.06	470	1.42	1 034	1.12	3 055	1.18	1.14—1.22
42	Packers	883	1.18	1 390	1.28	21	0.96	1 449	1.42	2 170	1.29	5 913	1.30	1.26—1.33
43	Engine operators	815	1.11	1 501	1.13	25	0.89	828	1.43	1 679	1.22	4 848	1.20	1.17—1.23
44	Public safety workers	686	1.02	688	0.85	16	0.78	476	1.09	787	1.00	2 653	0.97	0.93—1.01
45	Cooks and stewards	89	1.64	41	0.99	17	1.81	292	1.51	240	1.74	679	1.56	1.44—1.68
46	Domestic assistants	1	1.74	[3.29]	0.00	[0.03]	0.00	3	1.93	6	0.64	10	0.68	0.32—1.24
47	Waiters	248	2.03	40	1.04	1	1.04	145	1.73	169	2.32	603	1.90	1.75—2.05
48	Building caretakers	978	1.30	738	1.01	10	1.05	317	1.45	752	1.18	2 795	1.19	1.15—1.24
49	Chimney sweeps	30	1.58	62	1.14	–	–	41	1.77	79	1.71	212	1.49	1.30—1.70
50	Hairdressers	241	1.14	12	0.79	2	1.48	87	1.33	218	1.32	560	1.22	1.12—1.33
51	Launderers	121	1.18	15	1.04	[0.92]	0.00	59	1.50	158	1.33	353	1.28	1.15—1.42
52	Military personnel	292	0.87	137	0.63	–	–	372	0.97	494	1.06	1 295	0.92	0.88—0.98
53	"Other workers"	2 981	1.29	1 121	1.29	97	1.15	2 128	1.12	2 186	1.07	8 513	1.18	1.16—1.21
54	Economically inactive	3 010	1.19	8 195	1.47	70	1.19	1 032	1.15	3 761	1.23	16 068	1.33	1.31—1.35
1–54	All categories	53 401	1.00	52 189	1.00	996	1.00	37 334	1.00	64 377	1.00	208 297	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 35. Observed number of lung cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	91	1.06	51	0.91	1	0.42	26	1.05	145	0.96	314	0.98	0.88—1.10
2	Laboratory assistants	60	0.91	36	1.09	5	1.38	24	0.82	37	0.71	162	0.88	0.76—1.03
3	Physicians	24	0.86	13	0.97	[0.65]	0.00	5	0.45	20	0.54	62	0.68	0.52—0.88
4	Dentists	11	0.45	10	0.63	[0.27]	0.00	5	0.54	20	0.78	46	0.61	0.45—0.81
5	Nurses	351	0.72	121	0.73	10	0.56	143	0.60	306	0.70	931	0.69	0.65—0.74
6	Assistant nurses	447	1.19	163	0.91	17	0.69	241	0.99	814	1.00	1 682	1.03	0.98—1.08
7	"Other health workers"	185	0.67	108	0.78	[4.99]	0.00	189	0.83	243	0.88	725	0.79	0.73—0.84
8	Teachers	373	0.59	186	0.59	12	0.39	215	0.51	559	0.55	1 345	0.55	0.53—0.58
9	Religious workers etc	48	0.57	92	0.66	2	0.43	70	0.65	292	0.84	504	0.74	0.68—0.81
10	Artistic workers	28	0.70	26	1.07	3	0.77	27	0.88	81	1.25	165	1.01	0.87—1.17
11	Journalists	11	1.14	33	2.06	1	1.01	8	0.91	38	1.23	91	1.37	1.10—1.68
12	Administrators	285	1.16	71	1.35	3	0.91	88	0.91	134	0.94	581	1.07	0.99—1.16
13	Clerical workers	2 652	1.01	1 255	1.25	79	0.82	1 427	1.04	2 964	1.18	8 377	1.10	1.08—1.13
14	Sales agents	19	0.85	191	1.26	10	0.93	180	1.17	368	1.22	768	1.20	1.12—1.29
15	Shop workers	1 776	1.06	603	1.07	75	1.19	1 169	1.07	1 617	1.19	5 240	1.10	1.07—1.13
16	Farmers	516	0.44	192	0.54	20	0.42	301	0.47	60	0.51	1 089	0.46	0.44—0.49
17	Gardeners	105	0.69	544	0.52	3	1.91	183	0.46	233	0.67	1 068	0.54	0.51—0.58
18	Fishermen	7	1.13	2	0.90	1	0.63	4	0.68	1	0.89	15	0.89	0.50—1.46
19	Forestry workers	2	1.21	4	0.94	1	4.60	7	0.83	10	1.23	24	1.06	0.68—1.57
20	Miners and quarry workers	[0.11]	0.00	1	0.54	[0.04]	0.00	2	4.25	[2.16]	0.00	3	0.65	0.13—1.89
21	Seamen	–	–	1	2.15	[0.00]	0.00	[1.37]	0.00	[0.28]	0.00	1	0.47	0.01—2.63
22	Transport workers	6	3.53	60	2.08	2	1.18	12	1.89	34	1.52	114	1.87	1.56—2.25
23	Drivers	54	1.21	20	1.60	1	1.31	23	1.03	112	1.75	210	1.46	1.27—1.67
24	Postal workers	85	0.96	172	1.00	18	0.82	238	0.94	449	1.08	962	1.01	0.95—1.08
25	Textile workers	759	1.32	361	0.94	31	0.79	397	1.14	791	1.12	2 339	1.14	1.09—1.19
26	Shoe and leather workers	53	1.22	43	0.89	1	0.49	25	0.98	69	1.25	191	1.09	0.95—1.26
27	Smelting workers	21	1.96	14	1.23	[0.10]	0.00	5	1.31	22	1.14	62	1.37	1.05—1.75
28	Mechanics	189	1.70	82	1.67	[0.39]	0.00	62	1.77	272	1.49	605	1.60	1.48—1.73
29	Plumbers	1	1.45	[0.11]	0.00	–	–	[0.30]	0.00	2	6.17	3	2.10	0.43—6.14
30	Welders	–	–	5	1.35	[0.02]	0.00	5	1.64	15	1.89	25	1.70	1.10—2.51
31	Electrical workers	289	1.86	57	1.89	1	3.09	77	1.96	164	1.60	588	1.79	1.66—1.95
32	Wood workers	74	1.48	103	1.03	1	1.58	20	1.45	37	1.18	235	1.20	1.06—1.36
33	Painters	3	1.60	20	1.72	[0.17]	0.00	9	2.96	15	1.88	47	1.90	1.40—2.53
34	"Other construction workers"	3	2.12	88	2.17	[0.10]	0.00	1	0.85	4	3.42	96	2.17	1.75—2.65
35	Bricklayers	[0.27]	0.00	1	0.76	–	–	[0.08]	0.00	[0.04]	0.00	1	0.59	0.01—3.27
36	Printers	74	1.33	72	1.49	8	2.46	54	1.69	153	2.12	361	1.71	1.54—1.90
37	Chemical process workers	153	1.77	20	0.79	2	1.33	41	1.42	75	1.36	291	1.48	1.32—1.66
38	Food workers	529	1.25	158	1.19	120	1.51	227	1.27	213	1.41	1 247	1.29	1.22—1.37
39	Beverage workers	82	2.05	10	1.33	[0.21]	0.00	3	1.65	15	1.65	110	1.88	1.56—2.26
40	Tobacco workers	128	2.30	6	1.42	–	–	23	4.10	12	1.74	169	2.33	2.01—2.71
41	Glass makers etc	161	1.50	115	1.26	3	1.44	102	1.58	224	1.48	605	1.45	1.34—1.57
42	Packers	48	1.59	230	1.41	10	1.27	238	1.56	331	1.53	857	1.50	1.41—1.61
43	Engine operators	5	4.61	68	2.61	1	9.61	7	2.74	44	2.43	125	2.61	2.19—3.11
44	Public safety workers	1	0.35	8	1.38	1	0.67	22	1.21	29	1.37	61	1.23	0.94—1.58
45	Cooks and stewards	1	0.94	191	1.06	24	0.81	199	1.07	346	1.25	761	1.13	1.05—1.21
46	Domestic assistants	709	1.11	153	0.84	6	0.68	465	0.90	923	1.08	2 256	1.02	0.98—1.07
47	Waiters	276	2.40	320	2.12	7	2.08	396	1.74	525	1.71	1 524	1.89	1.80—1.99
48	Building caretakers	2 319	1.26	818	1.31	68	1.12	1 262	1.25	1 190	1.41	5 657	1.29	1.26—1.32
49	Chimney sweeps	[0.11]	0.00	[0.32]	0.00	–	–	[0.15]	0.00	[0.03]	0.00	[0.61]	0.00	0.00—6.06
50	Hairdressers	105	0.94	81	1.43	1	0.33	86	1.46	223	1.48	496	1.30	1.19—1.42
51	Launderers	269	1.31	58	1.13	13	1.33	89	1.15	183	1.24	612	1.25	1.15—1.35
52	Military personnel	[1.07]	0.00	[0.51]	0.00	–	–	1	2.93	[0.79]	0.00	1	0.37	0.01—2.06
53	"Other workers"	719	1.37	230	1.21	61	1.01	528	1.02	540	1.40	2 078	1.23	1.18—1.29
54	Economically inactive	12 141	0.94	4 032	0.97	244	1.17	5 086	1.01	14 458	0.90	35 961	0.94	0.93—0.95
1–54	All categories	26 248	1.00	11 299	1.00	867	1.00	14 017	1.00	29 412	1.00	81 843	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 36. Standardised incidence ratio for histological subtypes of lung cancer, 1961–2005, by gender and occupational category. Only occupations with more than 30 observed cases in sum are listed.

		Men				Women			
No	Occupational category	Adeno-carcinoma	Small cell carcinoma	Squamous cell carcinoma	Other Types	Adeno-carcinoma	Small cell carcinoma	Squamous cell carcinoma	Other types
1	Technical workers, etc	0.93	0.69	0.79	0.79	1.10	0.71	1.01	0.89
2	Laboratory assistants	0.91	0.88	0.74	0.81	0.89	0.74	1.03	0.88
3	Physicians	0.69	0.40	0.53	0.49	0.81	0.39	0.94	0.45
4	Dentists	0.55	0.51	0.42	0.45	0.83	0.62	0.39	0.62
5	Nurses	–	–	–	–	0.75	0.46	0.76	0.67
6	Assistant nurses	0.55	0.63	1.13	0.88	1.07	0.94	1.04	0.94
7	"Other health workers"	0.93	0.70	0.87	0.77	0.88	0.85	0.66	0.83
8	Teachers	0.58	0.38	0.44	0.50	0.67	0.37	0.41	0.56
9	Religious workers etc	0.80	0.55	0.59	0.61	0.76	0.64	0.74	0.83
10	Artistic workers	1.05	1.10	0.90	0.84	0.98	0.89	1.02	1.36
11	Journalists	0.97	1.11	0.90	0.83	1.43	0.88	1.20	1.74
12	Administrators	0.93	0.71	0.79	0.80	0.95	0.98	1.17	1.13
13	Clerical workers	0.98	0.81	0.87	0.93	1.16	1.09	1.04	1.17
14	Sales agents	1.06	0.95	0.99	1.04	1.25	1.16	1.33	1.13
15	Shop workers	1.00	0.89	0.98	0.99	1.09	1.06	1.12	1.15
16	Farmers	0.54	0.62	0.55	0.61	0.55	0.34	0.41	0.48
17	Gardeners	0.62	0.73	0.69	0.67	0.69	0.41	0.42	0.54
18	Fishermen	1.07	1.23	1.23	1.12	–	–	–	–
19	Forestry workers	0.74	1.08	0.87	0.91	–	–	–	–
20	Miners and quarry workers	1.20	1.59	1.75	1.67	–	–	–	–
21	Seamen	1.71	1.58	1.58	1.63	–	–	–	–
22	Transport workers	0.99	0.98	0.95	0.90	1.69	1.83	2.10	1.75
23	Drivers	1.24	1.29	1.33	1.20	1.57	1.79	1.63	1.23
24	Postal workers	1.04	0.79	0.93	0.93	0.94	1.06	1.06	1.04
25	Textile workers	1.08	0.85	1.00	0.93	1.16	1.08	1.13	1.08
26	Shoe and leather workers	1.01	0.99	1.15	1.07	1.19	1.55	0.98	0.91
27	Smelting workers	1.33	1.46	1.32	1.26	1.17	1.08	1.65	1.34
28	Mechanics	1.27	1.25	1.25	1.21	1.34	1.90	1.99	1.47
29	Plumbers	1.40	1.50	1.38	1.40	–	–	–	–
30	Welders	1.51	1.24	1.35	1.24	–	–	–	–
31	Electrical workers	0.98	0.99	1.09	1.00	1.75	2.10	1.75	1.70
32	Wood workers	0.92	1.02	0.97	0.92	1.04	1.37	1.24	1.18
33	Painters	1.16	1.28	1.26	1.17	1.59	1.33	3.06	1.84
34	"Other construction workers"	1.19	1.54	1.34	1.39	1.82	2.74	3.24	1.75
35	Bricklayers	1.21	1.38	1.20	1.30	–	–	–	–
36	Printers	1.22	1.05	1.21	1.20	1.53	2.19	1.86	1.75
37	Chemical process workers	1.07	1.25	1.16	1.03	1.47	2.07	1.37	1.01
38	Food workers	1.06	1.13	1.27	1.17	1.15	1.50	1.50	1.22
39	Beverage workers	1.31	1.04	1.52	1.09	1.30	3.02	1.64	1.55
40	Tobacco workers	1.24	2.65	1.93	1.93	2.32	3.67	2.08	2.15
41	Glass makers etc	1.07	1.33	1.23	1.12	1.35	1.69	1.41	1.38
42	Packers	1.20	1.28	1.34	1.33	1.38	1.77	1.63	1.41
43	Engine operators	1.18	1.22	1.25	1.16	2.24	2.97	3.07	2.58
44	Public safety workers	1.02	0.92	0.93	0.99	1.22	1.67	0.76	1.34
45	Cooks and stewards	1.72	1.22	1.53	1.53	1.21	1.46	1.00	1.02
46	Domestic assistants	–	–	–	–	1.08	0.99	1.01	0.96
47	Waiters	2.05	1.69	1.77	2.05	1.66	1.88	2.36	1.79
48	Building caretakers	1.17	1.17	1.20	1.11	1.17	1.47	1.45	1.27
49	Chimney sweeps	1.38	1.11	1.42	1.61	–	–	–	–
50	Hairdressers	1.33	0.94	1.21	1.35	1.38	1.19	1.28	1.53
51	Launderers	1.28	1.03	1.31	1.29	1.33	1.43	1.46	1.00
52	Military personnel	1.04	0.85	0.91	0.95	–	–	–	–
53	"Other workers"	1.15	1.21	1.18	1.13	1.16	1.30	1.27	1.16
54	Economically inactive	1.18	1.29	1.30	1.44	0.93	0.92	0.92	0.95
1–54	All categories	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

e.g. to arsenic, nickel and chromium compounds; welders to welding fumes, nickel and chromium compounds; drivers to diesel exhaust; bricklayers and other construction workers to silica dust and asbestos; and chemical workers and mechanics to mixed exposures. A high prevalence of cigarette smoking and an excess risk of lung cancer have been demonstrated among seamen [91–93]. Among seamen working in the machine room, exposure to asbestos, polyaromatic hydrocarbons and oil mist may also contribute to the elevated lung cancer risk.

In the present study the lowest SIRs for lung cancer were seen among those with a high level of education, such as physicians, dentists, nurses and teachers, but also among farmers. These groups smoke less than others [5,32,94].

The findings for the histological subtypes of lung cancer did not suggest that aetiological factors would be specific to one subtype only.

Mesothelioma in the pleura/peritoneum

Mesothelioma is a rare disease. Of all mesotheliomas, over 80% are of pleural origin. Figure 28 shows the time trends for pleural cancer, the great majority of which are the mesothelioma type. Pleural cancer has increased in men, but the incidence has always remained low in women.

Despite the rareness of mesothelioma, 14 of the 53 occupational categories had a statistically significant excess risk in men, and 18 of the groups had a statistically significant deficit risk. In men, the risk varied almost by 20-fold from an SIR of 4.74 (95% CI 4.18–5.38) in plumbers to 0.22 (0.04–0.63) among the journalists. The high risk occupational categories include seamen, mechanics, electrical workers, smelting workers, welders and painters (Table 37). In women, only a few occupations have a statistically significant excess or deficit risk. The high risk groups were woodworkers (2.12, 1.06–3.80), glass makers, textile workers and building caretakers. The low risk groups included farmers (0.65, 0.43–0.96) and gardeners (Table 38).

Comment. Asbestos exposure is the overwhelming cause of mesothelioma [95], and the proportion attributable to asbestos has been estimated to be about 85% [82].

An increased risk of mesothelioma has been convincingly shown in occupational categories exposed to asbestos: miners, insulation workers, manufacturers of cement, textiles, thermoelectric power plant workers, oil refining, pulp and paper production, petroleum industry, cigarette and filter manufacturing and the railroad industry [95]. All occupational categories with increased mesothelioma risk in our study involve exposure to asbestos, while the low risk categories were probably unexposed.

Breast cancer

Breast cancer accounts for nearly one third of all incident cancer among women in the Nordic countries. The incidence is a 100-fold higher than among men, and has been rising rapidly during the past five decades (Figure 29). During most of the period the incidence was highest in Denmark and lowest in Finland. An increase in the rates was observed along with the implementation of the organised mammography (breast cancer screening programmes) e.g. in Finland (1986) and Norway (1994).

In the present study, the risk among males was highest among journalists (SIR 2.72, 95% CI 1.49–4.56), followed by cooks and stewards, printers, artistic workers and building caretakers. It was

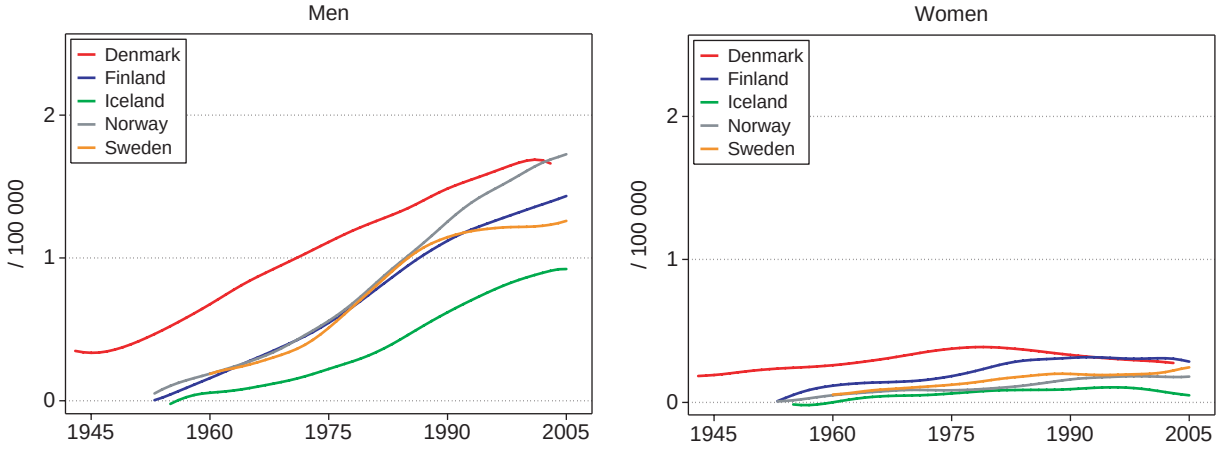


Figure 28. Age standardised (World) incidence rates for pleural cancer 1943–2005, by country and gender. Modified from NORDCAN [49].

Table 37. Observed number of mesothelioma in the pleura/peritoneum among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	136	1.53	98	1.43	[0.59]	0.00	46	0.97	285	1.17	565	1.26	1.16—1.36
2	Laboratory assistants	1	0.56	3	1.70	1	8.64	2	0.93	2	1.27	9	1.22	0.56—2.32
3	Physicians	4	0.56	2	0.50	[0.23]	0.00	2	0.36	5	0.44	13	0.46	0.24—0.79
4	Dentists	1	0.47	[0.79]	0.00	[0.06]	0.00	1	0.40	2	0.37	4	0.37	0.10—0.94
5	Nurses	[0.10]	0.00	[0.23]	0.00	[0.00]	0.00	[0.30]	0.00	1	1.52	1	0.78	0.02—4.33
6	Assistant nurses	[2.15]	0.00	1	4.58	[0.02]	0.00	[0.91]	0.00	5	1.35	6	0.86	0.31—1.86
7	"Other health workers"	5	0.79	2	0.55	[0.06]	0.00	1	0.48	6	0.67	14	0.67	0.36—1.12
8	Teachers	14	0.36	14	0.49	[0.85]	0.00	13	0.40	39	0.59	80	0.48	0.38—0.60
9	Religious workers etc	7	0.44	13	0.83	[0.53]	0.00	6	0.38	25	0.51	51	0.53	0.40—0.70
10	Artistic workers	6	1.20	4	0.74	1	6.92	5	1.08	9	0.61	25	0.84	0.54—1.24
11	Journalists	[2.40]	0.00	2	0.77	[0.08]	0.00	[2.06]	0.00	1	0.15	3	0.22	0.04—0.63
12	Administrators	87	0.89	34	0.82	1	0.77	37	0.69	55	0.64	214	0.76	0.67—0.87
13	Clerical workers	28	0.64	26	1.01	1	0.71	23	0.55	67	0.71	145	0.70	0.59—0.82
14	Sales agents	14	0.60	32	0.83	[0.75]	0.00	26	0.57	78	0.56	150	0.61	0.52—0.71
15	Shop workers	63	0.64	12	0.68	[0.50]	0.00	9	0.46	31	0.68	115	0.63	0.53—0.76
16	Farmers	32	0.18	54	0.35	1	0.49	18	0.16	51	0.26	156	0.24	0.21—0.28
17	Gardeners	9	0.34	6	0.24	[0.06]	0.00	13	0.43	17	0.22	45	0.28	0.20—0.38
18	Fishermen	4	0.43	1	0.49	1	0.74	16	0.43	4	0.49	26	0.44	0.29—0.65
19	Forestry workers	1	0.26	10	0.33	[0.01]	0.00	7	0.33	11	0.19	29	0.26	0.17—0.37
20	Miners and quarry workers	1	0.83	5	1.02	[0.02]	0.00	4	0.62	10	0.68	20	0.73	0.45—1.13
21	Seamen	26	2.53	18	2.68	1	2.84	61	1.74	37	2.77	143	2.18	1.85—2.56
22	Transport workers	21	0.97	15	0.81	2	2.96	10	0.56	37	0.80	85	0.81	0.65—1.00
23	Drivers	56	0.78	56	0.86	1	0.96	24	0.48	63	0.54	200	0.66	0.57—0.75
24	Postal workers	9	0.64	8	0.86	[0.11]	0.00	5	0.56	11	0.45	33	0.58	0.40—0.82
25	Textile workers	9	0.73	3	0.51	[0.20]	0.00	6	0.62	21	0.83	39	0.73	0.52—1.00
26	Shoe and leather workers	2	0.67	1	0.40	[0.04]	0.00	3	0.80	4	0.44	10	0.54	0.26—1.00
27	Smelting workers	101	3.53	6	0.65	1	3.29	22	1.66	46	1.12	176	1.90	1.64—2.20
28	Mechanics	187	2.46	104	1.63	[0.98]	0.00	148	2.11	412	1.95	851	2.02	1.88—2.16
29	Plumbers	27	3.92	36	3.29	1	6.34	47	5.68	129	5.29	240	4.74	4.18—5.38
30	Welders	–	–	22	1.98	[0.06]	0.00	20	1.99	49	1.66	91	1.79	1.44—2.20
31	Electrical workers	31	1.69	70	2.52	1	1.61	62	1.98	128	1.70	292	1.90	1.70—2.13
32	Wood workers	109	2.13	84	1.39	[0.54]	0.00	145	1.92	156	1.23	494	1.57	1.44—1.71
33	Painters	22	1.28	30	2.22	[0.23]	0.00	19	1.55	73	1.92	144	1.77	1.51—2.09
34	"Other construction workers"	56	0.88	53	1.34	2	1.77	33	2.17	124	1.80	268	1.42	1.26—1.60
35	Bricklayers	20	1.07	13	2.07	–	–	16	2.15	28	1.68	77	1.57	1.24—1.96
36	Printers	11	0.90	4	0.59	[0.20]	0.00	6	0.75	14	0.63	35	0.71	0.49—0.99
37	Chemical process workers	14	1.28	10	0.93	[0.10]	0.00	25	1.58	45	1.49	94	1.39	1.12—1.70
38	Food workers	16	0.45	5	0.65	[0.76]	0.00	5	0.27	12	0.37	38	0.40	0.28—0.55
39	Beverage workers	3	0.67	1	2.12	1	82.99	[0.28]	0.00	2	1.21	7	1.02	0.41—2.09
40	Tobacco workers	2	2.91	[0.09]	0.00	[0.00]	0.00	[0.26]	0.00	[0.15]	0.00	2	1.68	0.20—6.07
41	Glass makers etc	17	0.81	15	1.36	1	6.97	14	1.44	50	1.42	97	1.26	1.02—1.53
42	Packers	19	1.03	24	1.10	[0.44]	0.00	30	1.09	60	1.01	133	1.04	0.88—1.23
43	Engine operators	34	1.78	41	1.26	2	2.95	26	1.45	54	0.96	157	1.24	1.06—1.45
44	Public safety workers	14	0.81	14	0.79	[0.46]	0.00	13	1.06	33	0.98	74	0.91	0.71—1.14
45	Cooks and stewards	[1.45]	0.00	[1.13]	0.00	1	4.27	4	0.68	5	0.81	10	0.67	0.32—1.23
46	Domestic assistants	[0.02]	0.00	[0.05]	0.00	[0.00]	0.00	[0.06]	0.00	[0.50]	0.00	[0.62]	0.00	0.00—5.92
47	Waiters	3	0.97	1	0.89	[0.03]	0.00	[2.43]	0.00	2	0.62	6	0.61	0.22—1.32
48	Building caretakers	16	0.86	12	0.86	1	5.47	12	1.95	28	1.21	69	1.11	0.86—1.41
49	Chimney sweeps	1	1.99	2	1.90	–	–	[0.64]	0.00	5	2.63	8	1.95	0.84—3.85
50	Hairdressers	2	0.38	[0.29]	0.00	[0.04]	0.00	[1.78]	0.00	2	0.32	4	0.29	0.08—0.75
51	Launderers	1	0.39	1	3.23	[0.02]	0.00	1	0.94	4	0.90	7	0.83	0.34—1.72
52	Military personnel	12	1.28	2	0.30	–	–	14	1.14	17	0.83	45	0.92	0.67—1.23
53	"Other workers"	65	1.11	11	0.67	1	0.53	44	0.90	58	0.80	179	0.90	0.78—1.04
54	Economically inactive	46	0.82	65	0.91	1	0.78	18	0.82	108	0.99	238	0.92	0.81—1.04
1–54	All categories	1 365	1.00	1 046	1.00	23	1.00	1 062	1.00	2 521	1.00	6 017	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 38. Observed number of mesothelioma in the pleura/peritoneum among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	[1.16]	0.00	2	0.94	[0.00]	0.00	1	3.29	3	1.24	6	1.00	0.37—2.17
2	Laboratory assistants	[0.81]	0.00	4	3.10	[0.00]	0.00	[0.37]	0.00	1	1.55	5	1.60	0.52—3.74
3	Physicians	[0.38]	0.00	2	3.94	[0.00]	0.00	[0.14]	0.00	1	1.83	3	1.91	0.39—5.57
4	Dentists	1	2.96	1	1.69	[0.00]	0.00	[0.11]	0.00	[0.43]	0.00	2	1.36	0.16—4.92
5	Nurses	6	0.88	2	0.30	[0.03]	0.00	4	1.37	7	0.96	19	0.80	0.48—1.26
6	Assistant nurses	1	0.21	5	0.72	1	18.60	8	**2.62**	14	1.10	29	1.05	0.70—1.50
7	"Other health workers"	4	1.03	4	0.75	[0.01]	0.00	2	0.70	5	1.17	15	0.92	0.51—1.52
8	Teachers	8	0.96	15	1.24	[0.05]	0.00	4	0.77	15	0.93	42	1.00	0.72—1.36
9	Religious workers etc	[1.14]	0.00	3	0.56	[0.01]	0.00	[1.35]	0.00	7	1.33	10	0.76	0.37—1.41
10	Artistic workers	1	1.63	2	2.13	[0.01]	0.00	[0.38]	0.00	3	2.89	6	2.01	0.74—4.38
11	Journalists	[0.13]	0.00	1	1.59	[0.00]	0.00	1	9.20	[0.48]	0.00	2	1.48	0.18—5.35
12	Administrators	2	0.55	3	1.51	[0.01]	0.00	3	2.42	[2.30]	0.00	8	0.87	0.38—1.72
13	Clerical workers	42	1.22	44	1.13	[0.19]	0.00	18	1.05	42	1.03	146	1.11	0.94—1.30
14	Sales agents	1	3.14	11	1.93	[0.03]	0.00	2	1.01	5	0.91	19	1.40	0.84—2.19
15	Shop workers	23	0.95	20	0.91	[0.14]	0.00	18	1.28	34	1.35	95	1.11	0.90—1.36
16	Farmers	9	0.55	5	**0.40**	[0.11]	0.00	8	0.93	4	1.91	26	**0.65**	0.43—0.96
17	Gardeners	3	1.40	26	**0.65**	[0.00]	0.00	4	0.74	2	0.31	35	**0.65**	0.45—0.90
18	Fishermen	[0.08]	0.00	[0.08]	0.00	[0.00]	0.00	1	13.42	[0.02]	0.00	1	3.76	0.10—20.97
19	Forestry workers	[0.02]	0.00	[0.16]	0.00	[0.00]	0.00	[0.11]	0.00	[0.14]	0.00	[0.44]	0.00	0.00—8.38
20	Miners and quarry workers	[0.00]	0.00	[0.07]	0.00	–	–	[0.01]	0.00	[0.03]	0.00	[0.11]	0.00	0.00—32.79
21	Seamen	–	–	[0.02]	0.00	–	–	[0.02]	0.00	[0.00]	0.00	[0.04]	0.00	0.00—96.38
22	Transport workers	[0.02]	0.00	3	2.70	[0.00]	0.00	[0.08]	0.00	[0.40]	0.00	3	1.85	0.38—5.41
23	Drivers	2	3.31	1	2.05	[0.00]	0.00	[0.28]	0.00	1	1.02	4	1.70	0.46—4.35
24	Postal workers	1	0.79	9	1.37	[0.05]	0.00	3	0.94	11	1.52	24	1.31	0.84—1.95
25	Textile workers	10	1.23	19	1.29	1	9.16	4	0.88	26	**1.81**	60	**1.44**	1.10—1.85
26	Shoe and leather workers	2	3.36	2	1.08	[0.00]	0.00	[0.33]	0.00	[1.11]	0.00	4	1.03	0.28—2.63
27	Smelting workers	[0.15]	0.00	[0.44]	0.00	[0.00]	0.00	[0.05]	0.00	[0.31]	0.00	[0.94]	0.00	0.00—3.91
28	Mechanics	1	0.70	4	2.11	[0.00]	0.00	1	2.23	2	0.65	8	1.17	0.51—2.31
29	Plumbers	[0.01]	0.00	[0.00]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.03]	0.00	0.00—142.40
30	Welders	–	–	[0.15]	0.00	–	–	[0.04]	0.00	[0.12]	0.00	[0.30]	0.00	0.00—12.30
31	Electrical workers	3	1.50	1	0.86	[0.00]	0.00	1	2.00	4	2.34	9	1.67	0.76—3.18
32	Wood workers	2	3.03	9	**2.34**	[0.00]	0.00	[0.18]	0.00	[0.51]	0.00	11	**2.12**	1.06—3.80
33	Painters	[0.03]	0.00	1	2.24	[0.00]	0.00	[0.04]	0.00	[0.14]	0.00	1	1.54	0.04—8.58
34	"Other construction workers"	[0.02]	0.00	3	1.97	[0.00]	0.00	[0.01]	0.00	[0.02]	0.00	3	1.90	0.39—5.57
35	Bricklayers	[0.00]	0.00	1	19.68	–	–	[0.00]	0.00	[0.00]	0.00	1	17.73	0.45—98.76
36	Printers	[0.77]	0.00	2	1.08	[0.01]	0.00	1	2.48	2	1.57	5	1.16	0.38—2.71
37	Chemical process workers	[1.22]	0.00	[0.97]	0.00	[0.00]	0.00	1	2.70	1	0.98	2	0.56	0.07—2.02
38	Food workers	5	0.86	6	1.19	[0.19]	0.00	5	2.13	7	2.36	23	1.40	0.89—2.11
39	Beverage workers	[0.58]	0.00	[0.28]	0.00	[0.00]	0.00	[0.02]	0.00	1	5.48	1	0.93	0.02—5.19
40	Tobacco workers	[0.80]	0.00	1	6.20	–	–	[0.07]	0.00	[0.12]	0.00	1	0.87	0.02—4.83
41	Glass makers etc	3	2.10	7	1.99	[0.00]	0.00	1	1.22	5	1.84	16	**1.89**	1.08—3.06
42	Packers	3	**7.30**	7	1.12	[0.02]	0.00	[1.99]	0.00	5	1.24	15	1.18	0.66—1.95
43	Engine operators	[0.01]	0.00	3	2.94	–	–	[0.03]	0.00	1	3.85	4	3.02	0.82—7.74
44	Public safety workers	[0.05]	0.00	[0.22]	0.00	[0.00]	0.00	[0.24]	0.00	1	3.14	1	1.20	0.03—6.66
45	Cooks and stewards	[0.02]	0.00	9	1.33	[0.08]	0.00	3	1.22	6	1.07	18	1.21	0.72—1.91
46	Domestic assistants	16	1.75	3	0.44	[0.03]	0.00	4	0.59	9	0.61	32	0.85	0.58—1.20
47	Waiters	2	1.25	8	1.36	[0.01]	0.00	5	1.70	7	1.15	22	1.33	0.84—2.02
48	Building caretakers	25	0.93	33	1.40	[0.16]	0.00	14	1.06	27	**1.76**	99	**1.25**	1.02—1.52
49	Chimney sweeps	[0.00]	0.00	[0.01]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.02]	0.00	0.00—212.47
50	Hairdressers	1	0.64	[2.18]	0.00	[0.01]	0.00	[0.76]	0.00	2	0.76	3	0.42	0.09—1.23
51	Launderers	2	0.66	4	2.06	[0.03]	0.00	1	0.97	3	0.97	10	1.10	0.53—2.02
52	Military personnel	[0.02]	0.00	[0.02]	0.00	–	–	[0.00]	0.00	[0.01]	0.00	[0.05]	0.00	0.00—71.35
53	"Other workers"	10	1.32	7	0.97	[0.15]	0.00	4	0.59	8	1.15	29	1.01	0.68—1.45
54	Economically inactive	204	0.98	132	0.86	[0.48]	0.00	58	0.90	276	**0.87**	670	**0.90**	0.84—0.97
1–54	All categories	393	1.00	425	1.00	2	1.00	180	1.00	548	1.00	1 548	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

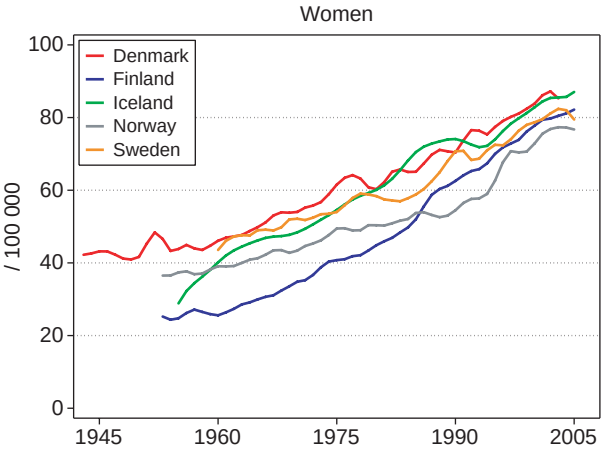


Figure 29. Age standardised (World) incidence rates for breast cancer 1943–2005, by country. Modified from NORDCAN [49].

lowest in engine operators (0.63, 0.42–0.90) and forestry workers (Table 39).

In women, the occupational groups with the highest SIRs were military personnel (1.57, 1.03–2.30), dentists, journalists, physicians, administrators and artistic workers (Table 40). The SIR was lowest among fishermen (0.69, 0.50–0.92); followed by forestry workers, wood workers, gardeners and farmers.

The contrast between the highest and the lowest SIRs was somewhat stronger for lobular cancer (around 10% of breast cancer; http://astra.cancer.fi/NOCCA/Incidence/breast-lobular), than for ductal cancer (around 80% of breast cancer; http://astra.cancer.fi/NOCCA/Incidence/breast-ductal). The highest SIR for the lobular type was 1.79 (1.39–2.28) for journalists, followed by physicians (1.71, 1.36–2.13), dentists (1.66, 1.22–2.20) and administrators (1.51, 1.34–1.71). The lowest SIRs were seen for engine operators (0.43, 0.24–0.72) and woodworkers (0.53, 0.39–0.71).

Comment. Among men, the occupations with the highest incidence were characterised by shift- or night work. Shift work that involves night work (and thus circadian disruption) has been classified by the International Agency for Cancer Research as probably carcinogenic to humans, with the human evidence based on breast cancer research [96]. In the present study the results for women were less suggestive of an association with shift or night work. This could be related to the fact that for women, the most important non-genetic risk factors for breast cancer are hormonal factors, strongly connected with reproductive behaviour [97].

Young age at first birth and an increasing number of births are associated with lowered risk. The present results showed the highest SIRs in occupations that require high education and cause women to postpone their first childbirth. Other established risk factors for breast cancer include ionising radiation, lack of physical activity, high body mass index and alcohol consumption. These factors were not particularly reflected in the present results, except for a tendency for occupations with high levels of physical activity to have the lowest SIRs. The contrasts seen between occupations were considerably higher among men than women, which might indicate a stronger occupationally related aetiology among the men.

Cervical cancer

Incidence of cervical cancer has decreased in all Nordic countries since the 1960s, except for in Norway where the decrease started in the mid 1970s (Figure 30). This can mainly be explained by the introduction of organised screening programmes. The lowest rate, in Finland, has always been less than half of the highest rate, in Denmark.

The highest SIRs were seen among beverage manufacture workers (SIR 2.01, 95% CI 1.51–2.61), "other construction workers", waiters, tobacco manufacture workers, drivers and electrical workers. The SIRs were lowest among the dentists (0.48, 0.30–0.74), physicians, teachers, farmers and nurses (Table 41).

Comment. Infection with oncogenic types of human papilloma virus (HPV) is the main cause of cervical cancer [98]. Tobacco has an independent role in cervical cancer carcinogenesis.

In previous research, high rates have been found among cleaners, food preparation workers and wait-

Table 39. Observed number of breast cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	32	1.01	24	1.30	2	3.15	10	0.68	103	1.05	171	1.04	0.90—1.21
2	Laboratory assistants	[0.62]	0.00	[0.47]	0.00	[0.12]	0.00	1	1.42	[0.46]	0.00	1	0.42	0.01—2.34
3	Physicians	4	1.50	1	0.92	1	3.90	1	0.51	4	0.89	11	1.05	0.52—1.88
4	Dentists	[0.76]	0.00	[0.23]	0.00	[0.06]	0.00	3	3.45	2	0.89	5	1.20	0.39—2.80
5	Nurses	[0.04]	0.00	[0.07]	0.00	[0.00]	0.00	1	12.43	[0.25]	0.00	1	2.29	0.06—12.75
6	Assistant nurses	1	1.34	[0.06]	0.00	[0.03]	0.00	[0.33]	0.00	1	0.63	2	0.73	0.09—2.63
7	"Other health workers"	3	1.34	1	1.00	[0.07]	0.00	1	1.34	6	1.58	11	1.40	0.70—2.50
8	Teachers	11	0.79	9	1.18	[0.93]	0.00	13	1.19	34	1.33	67	1.14	0.88—1.44
9	Religious workers etc	3	0.50	6	1.41	[0.60]	0.00	6	1.07	17	0.86	32	0.89	0.61—1.25
10	Artistic workers	4	2.22	3	2.05	[0.16]	0.00	6	**3.68**	5	0.83	18	1.63	0.97—2.57
11	Journalists	1	1.18	[0.70]	0.00	[0.09]	0.00	1	1.41	12	**4.28**	14	**2.72**	1.49—4.56
12	Administrators	36	1.00	15	1.35	[1.47]	0.00	15	0.76	51	1.33	117	1.10	0.91—1.31
13	Clerical workers	16	1.04	11	1.53	2	1.19	20	1.36	49	1.19	98	1.22	0.99—1.49
14	Sales agents	9	1.12	18	**1.71**	1	1.18	12	0.70	60	1.01	100	1.04	0.86—1.27
15	Shop workers	41	1.15	4	0.86	[0.61]	0.00	4	0.61	17	0.90	66	0.99	0.77—1.26
16	Farmers	58	0.81	29	**0.63**	4	1.63	50	1.01	86	0.82	227	**0.83**	0.72—0.94
17	Gardeners	9	0.90	7	0.99	[0.08]	0.00	9	0.76	39	1.02	64	0.95	0.73—1.22
18	Fishermen	4	1.26	1	1.61	1	0.66	14	0.92	5	1.23	25	1.02	0.66—1.50
19	Forestry workers	2	1.37	4	0.49	[0.01]	0.00	7	0.78	17	**0.62**	30	**0.65**	0.44—0.93
20	Miners and quarry workers	2	4.66	1	0.76	[0.03]	0.00	6	2.46	8	1.19	17	1.55	0.90—2.49
21	Seamen	4	1.20	2	1.11	[0.41]	0.00	10	0.83	7	1.18	23	0.98	0.62—1.46
22	Transport workers	6	0.78	6	1.19	[0.78]	0.00	7	1.06	21	1.05	40	1.00	0.71—1.36
23	Drivers	14	**0.58**	7	**0.41**	[1.17]	0.00	13	0.74	56	1.15	90	0.83	0.66—1.02
24	Postal workers	2	0.42	1	0.39	[0.14]	0.00	5	1.46	11	1.01	19	0.87	0.52—1.36
25	Textile workers	2	0.46	2	1.19	1	4.04	5	1.32	10	0.82	20	0.90	0.55—1.39
26	Shoe and leather workers	1	0.92	[0.72]	0.00	[0.05]	0.00	1	0.63	5	1.02	7	0.84	0.34—1.73
27	Smelting workers	11	1.16	1	0.39	2	5.74	4	0.79	16	0.84	34	0.93	0.64—1.30
28	Mechanics	31	1.20	18	1.05	[1.16]	0.00	25	1.03	84	0.94	158	1.00	0.86—1.17
29	Plumbers	1	0.44	1	0.34	[0.18]	0.00	2	0.72	8	0.78	12	0.65	0.34—1.14
30	Welders	–	–	5	1.72	[0.07]	0.00	3	0.96	13	1.13	21	1.19	0.74—1.82
31	Electrical workers	13	**2.17**	3	0.40	[0.69]	0.00	15	1.39	20	0.66	51	0.92	0.68—1.21
32	Wood workers	14	0.77	13	0.76	[0.65]	0.00	23	0.80	59	0.97	109	0.87	0.72—1.05
33	Painters	7	1.20	3	0.80	[0.26]	0.00	8	1.68	19	1.10	37	1.16	0.82—1.60
34	"Other construction workers"	18	0.79	13	1.18	1	0.77	5	0.89	22	0.68	59	0.81	0.61—1.04
35	Bricklayers	6	0.92	2	1.13	–	–	1	0.35	9	1.15	18	0.95	0.56—1.50
36	Printers	7	1.71	2	1.09	1	4.61	4	1.41	20	**2.14**	34	**1.86**	1.28—2.59
37	Chemical process workers	8	2.08	6	2.08	[0.12]	0.00	9	1.42	14	0.96	37	1.33	0.94—1.84
38	Food workers	13	1.04	3	1.43	[0.99]	0.00	2	0.28	16	1.09	34	0.91	0.63—1.27
39	Beverage workers	2	1.37	[0.13]	0.00	[0.02]	0.00	1	12.82	[0.84]	0.00	3	1.19	0.24—3.47
40	Tobacco workers	[0.25]	0.00	[0.03]	0.00	[0.00]	0.00	[0.11]	0.00	[0.07]	0.00	[0.45]	0.00	0.00—8.16
41	Glass makers etc	7	0.95	2	0.66	1	5.49	5	1.44	7	**0.44**	22	0.73	0.46—1.11
42	Packers	3	0.46	13	**2.14**	[0.57]	0.00	8	0.74	27	0.93	51	0.96	0.72—1.27
43	Engine operators	3	0.45	7	0.81	2	2.55	4	0.66	13	**0.54**	29	**0.63**	0.42—0.90
44	Public safety workers	8	1.28	4	0.83	2	3.54	10	**2.13**	18	1.28	42	1.38	0.99—1.86
45	Cooks and stewards	2	4.35	1	3.10	1	3.76	6	**2.97**	1	0.40	11	1.97	0.98—3.52
46	Domestic assistants	[0.01]	0.00	[0.02]	0.00	[0.00]	0.00	[0.02]	0.00	[0.22]	0.00	[0.27]	0.00	0.00—13.86
47	Waiters	1	1.07	[0.32]	0.00	[0.03]	0.00	4	**4.59**	1	0.78	6	1.74	0.64—3.79
48	Building caretakers	13	**1.97**	7	1.78	[0.24]	0.00	1	0.42	18	1.58	39	**1.59**	1.13—2.17
49	Chimney sweeps	[0.17]	0.00	[0.28]	0.00	–	–	[0.24]	0.00	1	1.25	1	0.67	0.02—3.74
50	Hairdressers	2	1.06	[0.09]	0.00	[0.04]	0.00	2	2.95	3	1.05	7	1.26	0.51—2.60
51	Launderers	[0.95]	0.00	[0.09]	0.00	[0.02]	0.00	[0.41]	0.00	3	1.47	3	0.86	0.18—2.50
52	Military personnel	4	1.24	2	1.16	–	–	4	1.05	7	0.85	17	1.00	0.58—1.60
53	"Other workers"	26	1.33	7	1.50	2	0.91	23	1.11	26	0.74	84	1.02	0.81—1.26
54	Economically inactive	21	1.18	29	1.16	3	1.84	12	1.06	76	**1.40**	141	**1.28**	1.09—1.51
1–54	All categories	486	1.00	294	1.00	27	1.00	402	1.00	1 127	1.00	2 336	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

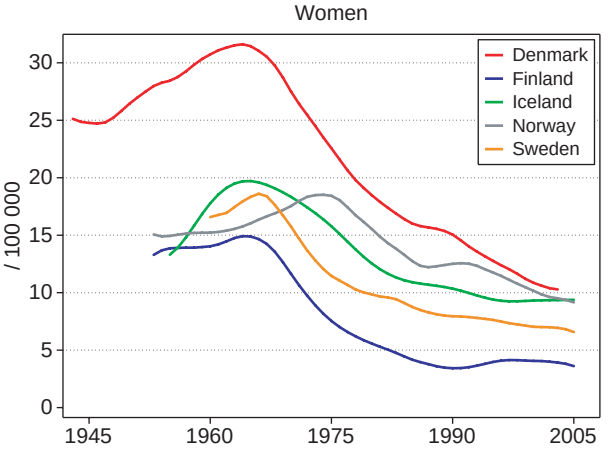


Figure 30. Age standardised (World) incidence rates for cancer of the cervix uteri 1943–2005, by country. Modified from NORDCAN [49].

resses, although these studies did not take HPV infection into account. There is a possibility that participation in the screening programmes varies by occupational category.

Corpus uteri – endometrial cancer

Incidence of cancer of the corpus uteri in the Nordic countries has been increasing steadily during the last decades, and currently SIRs are rather similar in all Nordic countries (Figure 31).

Artistic workers (SIR 1.22, 95% CI 1.07–1.40), journalists (1.23, 0.99–1.51) and dentists (1.24, 1.00–1.51) had the highest risk of cancer of corpus uteri, while female beverage workers and drivers presented the lowest risk, respectively (0.68, 0.47–0.96 and 0.69 0.56–0.84) (Table 42).

Comment. The differences between occupations with low and high risks were very small, and no real patterns emerged in our analysis. Endometrial cancer is clearly associated with obesity and the use of hormone replacement therapy, in particular when estrogens are administered without concomitant use of progestins, or when progestins are not added to estrogens during all days of the month [99,100]. Smoking decreases risk. So far, no occupational or environmental risk factors for endometrial cancer have been identified, and in this sense, it is not at all surprising that we did not find work related associations.

Choriocarcinoma

There were only 127 cases of choriocarcinoma in all Nordic countries during the entire follow-up period (http://astra.cancer.fi/NOCCA/Incidence/choriocarcinoma).

No occupations were identified with high or low risk for choriocarcinoma. Many of the observations of choriocarcinoma were done in economically inactive women (54 cases) who presented a weak

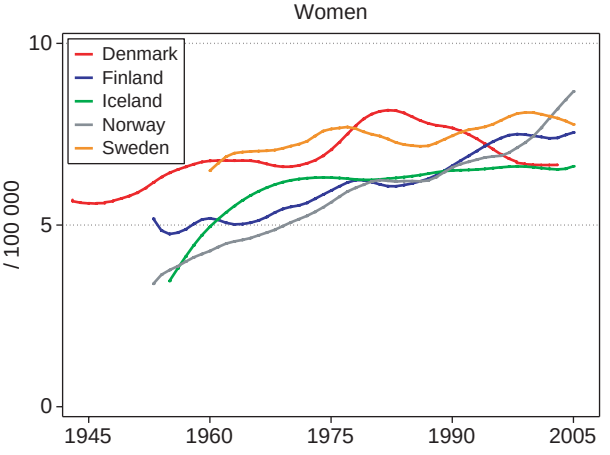


Figure 31. Age standardised (World) incidence rates for cancer of the corpus uteri 1943–2005, by country. Modified from NORDCAN

Table 40. Observed number of breast cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	248	1.23	771	1.32	8	0.94	156	1.36	1 130	1.18	2 313	1.24	1.19—1.29
2	Laboratory assistants	192	1.21	358	1.18	15	1.25	167	1.29	457	1.20	1 189	1.21	1.14—1.28
3	Physicians	108	1.61	211	1.41	1	0.57	66	1.23	316	1.28	702	1.35	1.25—1.45
4	Dentists	102	1.74	184	1.57	1	1.31	53	1.26	198	1.24	538	1.42	1.31—1.55
5	Nurses	1 324	1.13	2 024	1.31	60	1.17	1 153	1.13	3 121	1.14	7 682	1.18	1.15—1.20
6	Assistant nurses	809	0.92	1 300	0.94	63	0.91	923	0.94	4 965	0.96	8 060	0.95	0.93—0.97
7	"Other health workers"	835	1.25	1 367	1.18	19	1.21	1 008	1.05	2 019	1.13	5 248	1.14	1.11—1.17
8	Teachers	1 971	1.27	3 467	1.35	109	1.16	2 231	1.16	7 537	1.18	15 315	1.22	1.20—1.24
9	Religious workers etc	230	1.14	1 918	1.19	20	1.47	570	1.21	2 822	1.18	5 560	1.19	1.16—1.22
10	Artistic workers	130	1.32	300	1.30	10	0.90	166	1.22	515	1.24	1 121	1.26	1.18—1.33
11	Journalists	34	1.51	181	1.29	5	1.63	53	1.36	277	1.38	550	1.36	1.25—1.48
12	Administrators	784	1.35	689	1.40	8	1.05	563	1.26	1 123	1.19	3 167	1.28	1.24—1.33
13	Clerical workers	7 672	1.25	10 490	1.20	343	1.24	6 903	1.21	17 656	1.17	43 064	1.20	1.19—1.21
14	Sales agents	63	1.19	1 171	1.07	32	1.21	813	1.16	2 073	1.09	4 152	1.10	1.06—1.13
15	Shop workers	4 067	1.03	4 049	1.01	157	0.96	4 309	1.00	7 611	0.99	20 193	1.00	0.99—1.02
16	Farmers	2 001	0.71	1 489	0.79	90	0.82	2 176	0.82	697	0.89	6 453	0.78	0.76—0.80
17	Gardeners	283	0.79	4 230	0.74	4	1.07	1 184	0.75	1 599	0.83	7 300	0.76	0.74—0.78
18	Fishermen	8	0.55	7	0.47	7	1.49	17	0.74	5	0.72	44	0.69	0.50—0.92
19	Forestry workers	4	1.05	22	0.73	[0.59]	0.00	19	0.62	40	0.84	85	0.75	0.60—0.93
20	Miners and quarry workers	[0.23]	0.00	14	1.32	[0.07]	0.00	1	0.48	9	0.71	24	0.94	0.60—1.39
21	Seamen	–	–	4	0.79	[0.02]	0.00	1	0.18	3	1.39	8	0.63	0.27—1.23
22	Transport workers	2	0.51	217	1.30	6	1.45	34	1.22	139	0.96	398	1.15	1.04—1.27
23	Drivers	78	0.77	74	0.69	1	0.43	84	0.88	331	0.84	568	0.81	0.75—0.88
24	Postal workers	207	1.01	1 204	1.05	44	0.84	1 170	1.11	2 566	1.09	5 191	1.08	1.05—1.11
25	Textile workers	1 243	0.94	2 519	1.01	85	1.01	1 538	1.02	3 957	0.99	9 342	0.99	0.97—1.01
26	Shoe and leather workers	103	1.04	334	1.08	9	1.92	88	0.81	307	0.99	841	1.01	0.94—1.08
27	Smelting workers	17	0.70	55	0.77	1	4.23	16	1.03	100	0.88	189	0.84	0.73—0.97
28	Mechanics	213	0.86	306	0.85	2	1.87	152	1.05	1 041	0.95	1 714	0.93	0.88—0.97
29	Plumbers	1	0.51	1	0.97	–	–	[1.15]	0.00	4	1.69	6	0.92	0.34—2.01
30	Welders	–	–	22	0.65	[0.12]	0.00	10	0.76	42	0.82	74	0.75	0.59—0.95
31	Electrical workers	338	0.97	271	0.95	1	1.22	167	1.04	568	0.92	1 345	0.95	0.90—1.00
32	Wood workers	89	0.79	439	0.73	1	0.60	58	1.07	138	0.71	725	0.75	0.70—0.81
33	Painters	6	1.41	71	0.93	[0.49]	0.00	14	1.19	41	0.84	132	0.93	0.78—1.10
34	"Other construction workers"	[3.23]	0.00	190	0.90	[0.31]	0.00	2	0.42	8	0.96	200	0.88	0.76—1.01
35	Bricklayers	1	1.52	3	0.35	–	–	[0.27]	0.00	[0.30]	0.00	4	0.41	0.11—1.05
36	Printers	157	1.24	386	1.13	6	0.74	192	1.37	468	1.08	1 209	1.15	1.09—1.22
37	Chemical process workers	187	0.96	146	0.90	2	0.62	108	0.88	283	0.88	726	0.90	0.84—0.97
38	Food workers	800	0.82	689	0.85	164	0.84	628	0.85	796	0.90	3 077	0.86	0.83—0.89
39	Beverage workers	90	1.02	44	1.03	1	2.26	6	0.86	54	1.01	195	1.02	0.88—1.17
40	Tobacco workers	137	1.11	21	0.85	–	–	25	0.95	39	1.03	222	1.04	0.92—1.19
41	Glass makers etc	207	0.85	510	0.84	4	0.74	260	0.99	825	0.94	1 806	0.91	0.87—0.95
42	Packers	62	0.91	1 007	0.95	16	0.92	588	0.97	1 199	0.95	2 872	0.95	0.92—0.99
43	Engine operators	4	1.65	157	0.86	[0.28]	0.00	11	1.01	83	0.75	255	0.83	0.73—0.94
44	Public safety workers	7	1.09	65	1.36	6	1.73	81	1.12	158	1.01	317	1.11	0.99—1.24
45	Cooks and stewards	3	1.20	1 158	0.95	70	1.09	787	0.98	1 675	0.99	3 693	0.98	0.94—1.01
46	Domestic assistants	1 316	0.89	1 346	0.92	19	1.09	2 003	0.93	5 226	0.93	9 910	0.93	0.91—0.94
47	Waiters	297	1.16	1 072	0.96	9	1.11	948	1.01	1 745	0.98	4 071	0.99	0.96—1.03
48	Building caretakers	3 692	0.87	3 291	0.83	102	0.76	3 404	0.86	4 463	0.87	14 952	0.86	0.84—0.87
49	Chimney sweeps	[0.36]	0.00	1	0.51	–	–	[0.49]	0.00	[0.23]	0.00	1	0.33	0.01—1.84
50	Hairdressers	300	1.10	432	0.99	9	0.90	265	1.02	977	1.09	1 983	1.06	1.01—1.10
51	Launderers	426	0.90	250	0.88	16	0.84	257	0.79	808	0.93	1 757	0.89	0.85—0.94
52	Military personnel	5	2.06	10	1.52	–	–	3	2.00	8	1.32	26	1.57	1.03—2.30
53	"Other workers"	1 270	1.04	1 213	0.92	145	0.99	2 029	0.96	2 165	0.92	6 822	0.95	0.93—0.98
54	Economically inactive	30 068	0.97	22 004	0.96	491	0.98	25 539	0.99	87 868	0.96	165 970	0.97	0.96—0.97
1–54	All categories	62 191	1.00	73 754	1.00	2 162	1.00	62 999	1.00	172 255	1.00	373 361	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 41. Observed number of cancer of the cervix uteri among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	34	0.96	28	0.96	[1.01]	0.00	21	1.10	89	0.80	172	0.88	0.75—1.02
2	Laboratory assistants	21	0.76	15	1.00	3	2.29	14	0.66	38	1.00	91	0.88	0.71—1.08
3	Physicians	5	0.43	5	0.68	[0.18]	0.00	2	0.22	21	0.78	33	0.59	0.41—0.83
4	Dentists	3	0.29	5	0.72	[0.07]	0.00	4	0.54	9	0.48	21	0.48	0.30—0.74
5	Nurses	101	0.50	47	0.62	6	1.18	102	0.65	214	0.68	470	0.62	0.57—0.68
6	Assistant nurses	166	1.08	61	0.81	5	0.69	140	0.96	607	1.05	979	1.02	0.96—1.09
7	"Other health workers"	56	0.48	41	0.66	1	0.60	116	0.76	161	0.81	375	0.70	0.64—0.78
8	Teachers	151	0.57	75	0.55	8	0.81	175	0.55	436	0.63	845	0.59	0.55—0.63
9	Religious workers etc	26	0.74	55	0.73	1	0.71	46	0.61	184	0.69	312	0.69	0.62—0.77
10	Artistic workers	20	1.17	13	1.11	1	0.96	14	0.61	51	1.07	99	0.98	0.80—1.20
11	Journalists	3	0.75	8	1.10	1	3.41	6	0.94	23	1.03	41	1.01	0.73—1.38
12	Administrators	100	0.97	25	0.98	[0.64]	0.00	74	1.05	118	1.12	317	1.04	0.93—1.16
13	Clerical workers	975	0.90	446	0.99	27	0.97	815	0.85	1 746	1.02	4 009	0.95	0.92—0.98
14	Sales agents	12	1.28	52	0.78	4	1.72	108	0.94	271	1.18	447	1.06	0.96—1.16
15	Shop workers	710	1.02	224	1.00	19	1.23	692	1.00	1 141	1.19	2 786	1.07	1.04—1.12
16	Farmers	238	0.49	144	0.93	2	0.22	246	0.61	55	0.62	685	0.60	0.55—0.64
17	Gardeners	44	0.70	287	0.71	[0.34]	0.00	147	0.60	154	0.65	632	0.66	0.61—0.72
18	Fishermen	2	0.78	[0.94]	0.00	[0.46]	0.00	8	2.35	2	2.42	12	1.47	0.76—2.56
19	Forestry workers	1	1.48	[1.66]	0.00	[0.06]	0.00	8	1.71	8	1.45	17	1.35	0.79—2.17
20	Miners and quarry workers	[0.04]	0.00	2	2.63	[0.01]	0.00	1	3.25	1	0.75	4	1.63	0.44—4.16
21	Seamen	–	–	1	3.80	[0.00]	0.00	[0.86]	0.00	[0.25]	0.00	1	0.72	0.02—4.04
22	Transport workers	[0.70]	0.00	18	1.60	[0.33]	0.00	4	0.83	25	1.31	47	1.30	0.96—1.73
23	Drivers	22	1.21	11	2.03	[0.22]	0.00	23	1.58	66	1.55	122	1.51	1.26—1.80
24	Postal workers	31	0.85	50	0.72	2	0.45	158	0.88	255	0.89	496	0.86	0.79—0.94
25	Textile workers	298	1.26	180	1.16	6	0.87	284	1.08	586	1.10	1 354	1.13	1.07—1.19
26	Shoe and leather workers	24	1.35	18	0.95	[0.41]	0.00	26	1.32	64	1.51	132	1.33	1.12—1.58
27	Smelting workers	11	2.51	3	0.68	[0.02]	0.00	4	1.78	16	1.27	34	1.43	0.99—2.01
28	Mechanics	68	1.52	20	0.98	[0.09]	0.00	28	1.11	161	1.25	277	1.26	1.12—1.42
29	Plumbers	[0.32]	0.00	[0.05]	0.00	–	–	[0.17]	0.00	[0.24]	0.00	[0.78]	0.00	0.00—4.72
30	Welders	–	–	1	0.62	[0.01]	0.00	5	2.46	6	1.10	12	1.31	0.68—2.30
31	Electrical workers	100	1.59	16	1.14	[0.08]	0.00	46	1.62	91	1.23	253	1.41	1.25—1.59
32	Wood workers	29	1.43	51	1.31	[0.17]	0.00	5	0.61	24	1.09	109	1.22	1.01—1.47
33	Painters	[0.77]	0.00	10	2.14	[0.05]	0.00	2	1.04	6	1.04	18	1.36	0.81—2.15
34	"Other construction workers"	1	1.71	33	2.07	[0.03]	0.00	[0.67]	0.00	[0.86]	0.00	34	1.88	1.30—2.63
35	Bricklayers	[0.12]	0.00	2	4.12	–	–	1	25.25	[0.03]	0.00	3	4.45	0.92—13.00
36	Printers	32	1.41	20	0.97	1	1.27	36	1.47	61	1.14	150	1.23	1.05—1.44
37	Chemical process workers	61	1.73	9	0.89	[0.28]	0.00	35	1.62	45	1.11	150	1.39	1.18—1.63
38	Food workers	263	1.51	49	0.94	21	1.15	141	1.16	132	1.16	606	1.26	1.17—1.37
39	Beverage workers	31	1.90	5	1.69	[0.04]	0.00	2	1.86	17	2.42	55	2.01	1.51—2.61
40	Tobacco workers	38	1.67	[1.61]	0.00	–	–	7	1.36	8	1.66	53	1.54	1.16—2.02
41	Glass makers etc	70	1.60	50	1.36	3	5.94	58	1.25	147	1.36	328	1.39	1.25—1.55
42	Packers	15	1.23	100	1.55	1	0.66	130	1.27	222	1.39	468	1.38	1.26—1.51
43	Engine operators	[0.44]	0.00	13	1.23	[0.03]	0.00	3	1.82	13	1.13	29	1.20	0.80—1.72
44	Public safety workers	[1.21]	0.00	3	1.12	1	3.01	12	1.20	19	1.05	35	1.08	0.75—1.50
45	Cooks and stewards	1	2.23	76	0.99	8	1.44	168	1.29	290	1.33	543	1.26	1.16—1.37
46	Domestic assistants	285	1.08	79	0.92	1	0.70	340	0.98	779	1.17	1 484	1.09	1.04—1.15
47	Waiters	106	2.26	102	1.61	1	1.26	239	1.54	368	1.59	816	1.64	1.53—1.75
48	Building caretakers	990	1.30	359	1.38	9	0.79	810	1.33	937	1.54	3 105	1.38	1.34—1.43
49	Chimney sweeps	[0.05]	0.00	[0.13]	0.00	–	–	[0.07]	0.00	[0.02]	0.00	[0.28]	0.00	0.00—13.29
50	Hairdressers	52	1.10	34	1.37	[1.18]	0.00	48	1.03	148	1.36	282	1.23	1.10—1.38
51	Launderers	85	1.00	27	1.34	[1.49]	0.00	73	1.36	147	1.27	332	1.20	1.08—1.34
52	Military personnel	1	2.27	1	4.22	–	–	[0.21]	0.00	[0.61]	0.00	2	1.33	0.16—4.82
53	"Other workers"	280	1.28	96	1.18	19	1.40	341	1.01	378	1.33	1 114	1.19	1.12—1.26
54	Economically inactive	5 446	0.99	1 846	1.02	51	1.10	4 944	1.05	11 170	0.94	23 457	0.98	0.97—0.99
1–54	All categories	11 008	1.00	4 816	1.00	202	1.00	10 712	1.00	21 510	1.00	48 248	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 42. Observed number of cancer of the corpus uteri among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	54	1.10	100	1.11	[1.12]	0.00	29	1.23	188	1.04	371	1.07	0.97—1.19
2	Laboratory assistants	31	0.88	57	1.04	1	0.57	35	1.24	44	0.89	168	0.99	0.85—1.15
3	Physicians	24	1.44	25	1.13	[0.29]	0.00	17	1.50	44	1.06	110	1.19	0.99—1.44
4	Dentists	15	1.02	44	**1.85**	[0.13]	0.00	9	0.97	30	0.95	98	1.24	1.00—1.51
5	Nurses	326	**1.14**	315	**1.14**	7	0.84	210	0.94	587	1.09	1 445	**1.08**	1.03—1.14
6	Assistant nurses	178	**0.85**	258	0.89	8	0.74	229	1.03	915	0.95	1 588	**0.93**	0.89—0.98
7	"Other health workers"	215	**1.29**	263	**1.18**	2	0.86	219	1.01	288	0.90	987	1.06	1.00—1.13
8	Teachers	414	**1.14**	607	**1.21**	15	1.03	457	**1.10**	1 295	**1.06**	2 788	**1.11**	1.07—1.15
9	Religious workers etc	61	1.23	278	**1.22**	5	2.29	132	**1.29**	433	**1.12**	909	**1.18**	1.10—1.26
10	Artistic workers	30	1.21	50	1.29	5	2.74	31	1.03	96	1.23	212	**1.22**	1.07—1.40
11	Journalists	8	1.48	36	1.40	[0.49]	0.00	9	1.06	41	1.13	94	1.23	0.99—1.51
12	Administrators	179	**1.18**	105	**1.29**	4	2.69	116	1.20	181	1.06	585	**1.17**	1.08—1.27
13	Clerical workers	1 762	**1.18**	1 824	**1.13**	36	0.82	1 429	**1.09**	3 353	**1.08**	8 404	**1.11**	1.09—1.13
14	Sales agents	19	1.39	244	1.07	3	0.62	183	1.13	406	1.02	855	1.06	0.99—1.13
15	Shop workers	1 041	1.03	846	0.94	34	1.20	1 039	0.99	1 895	1.02	4 855	1.00	0.97—1.03
16	Farmers	614	**0.85**	425	0.91	19	0.91	645	1.01	157	1.03	1 860	**0.93**	0.89—0.98
17	Gardeners	81	0.86	1 427	**0.94**	2	2.90	349	0.90	506	1.04	2 365	**0.95**	0.91—0.99
18	Fishermen	2	0.55	5	1.56	1	1.35	3	0.56	[1.50]	0.00	11	0.76	0.38—1.36
19	Forestry workers	2	2.09	1	**0.15**	[0.10]	0.00	11	1.41	11	1.04	25	0.96	0.62—1.42
20	Miners and quarry workers	[0.04]	0.00	1	0.36	[0.02]	0.00	[0.44]	0.00	1	0.38	2	0.34	0.04—1.22
21	Seamen	–	–	[0.84]	0.00	[0.00]	0.00	[1.29]	0.00	[0.28]	0.00	[2.42]	0.00	0.00—1.53
22	Transport workers	1	1.00	52	1.23	1	1.33	10	1.63	33	1.14	97	1.22	0.99—1.49
23	Drivers	17	0.68	15	0.75	2	5.47	13	0.60	52	**0.68**	99	**0.69**	0.56—0.84
24	Postal workers	61	1.15	265	1.01	5	0.51	247	1.00	614	**1.13**	1 192	**1.07**	1.01—1.13
25	Textile workers	314	0.93	585	1.01	16	0.94	339	0.94	1 025	1.00	2 279	0.98	0.94—1.02
26	Shoe and leather workers	28	1.12	80	1.09	[0.89]	0.00	25	0.94	91	1.13	224	1.09	0.95—1.24
27	Smelting workers	9	1.51	19	1.10	[0.05]	0.00	1	0.29	21	0.88	50	0.99	0.73—1.30
28	Mechanics	58	0.97	63	0.82	[0.17]	0.00	24	0.69	220	0.94	365	0.90	0.81—1.00
29	Plumbers	[0.56]	0.00	[0.17]	0.00	–	–	1	3.61	[0.32]	0.00	1	0.76	0.02—4.21
30	Welders	–	–	5	0.83	[0.01]	0.00	1	0.35	10	1.12	16	0.90	0.51—1.45
31	Electrical workers	87	1.04	37	0.74	[0.14]	0.00	35	0.91	115	0.89	274	0.91	0.81—1.02
32	Wood workers	32	1.13	140	0.93	[0.29]	0.00	16	1.25	36	0.93	224	0.97	0.85—1.11
33	Painters	[1.00]	0.00	17	0.93	[0.07]	0.00	6	2.09	8	0.78	31	0.96	0.65—1.36
34	"Other construction workers"	[0.78]	0.00	53	0.91	[0.04]	0.00	3	2.79	[1.22]	0.00	56	0.91	0.69—1.18
35	Bricklayers	[0.17]	0.00	1	0.48	–	–	[0.07]	0.00	[0.04]	0.00	1	0.43	0.01—2.38
36	Printers	27	0.87	63	0.85	1	0.71	33	1.01	99	1.04	223	0.95	0.83—1.08
37	Chemical process workers	38	0.77	25	**0.65**	1	1.54	24	0.82	82	1.09	170	0.88	0.76—1.03
38	Food workers	211	**0.86**	206	1.04	20	**0.57**	152	0.85	206	0.96	795	**0.91**	0.85—0.97
39	Beverage workers	14	0.63	8	0.72	[0.09]	0.00	3	1.76	8	0.60	33	**0.68**	0.47—0.96
40	Tobacco workers	26	0.85	5	0.80	–	–	6	0.95	12	1.28	49	0.93	0.69—1.23
41	Glass makers etc	67	1.14	130	0.93	1	1.09	63	0.98	168	**0.82**	429	0.92	0.83—1.01
42	Packers	11	0.64	219	0.87	2	0.59	156	1.04	310	1.05	698	0.97	0.90—1.05
43	Engine operators	1	2.22	44	1.08	[0.04]	0.00	2	0.84	12	0.58	59	0.92	0.70—1.18
44	Public safety workers	3	1.69	7	0.82	[0.65]	0.00	15	0.90	19	0.82	44	0.87	0.63—1.16
45	Cooks and stewards	2	3.18	262	0.98	13	1.01	202	1.06	413	1.04	892	1.03	0.96—1.10
46	Domestic assistants	363	0.95	286	1.06	4	1.07	529	1.03	1 150	1.06	2 332	1.03	0.99—1.08
47	Waiters	47	**0.74**	203	**0.86**	[1.45]	0.00	194	**0.86**	361	**0.82**	805	**0.83**	0.78—0.89
48	Building caretakers	985	**0.91**	812	**0.89**	35	1.31	899	0.93	1 046	**0.92**	3 777	**0.92**	0.89—0.95
49	Chimney sweeps	[0.11]	0.00	1	1.88	–	–	[0.13]	0.00	[0.02]	0.00	1	1.26	0.03—7.03
50	Hairdressers	80	1.26	93	1.07	1	0.71	57	0.96	192	0.98	423	1.04	0.95—1.14
51	Launderers	110	0.89	65	0.88	5	1.20	57	**0.72**	200	0.91	437	**0.87**	0.80—0.96
52	Military personnel	1	1.49	[0.91]	0.00	–	–	[0.32]	0.00	[0.72]	0.00	1	0.38	0.01—2.13
53	"Other workers"	298	0.97	262	0.92	27	1.01	447	**0.90**	512	1.00	1 546	0.95	0.90—1.00
54	Economically inactive	7 676	0.98	5 807	0.99	111	1.19	5 821	1.00	22 847	0.99	42 262	0.99	0.98—1.00
1–54	All categories	15 623	1.00	16 741	1.00	387	1.00	14 533	1.00	40 333	1.00	87 617	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

non-significant elevated risk, and in clerical workers (11 cases) with a presentation of non-significant decreased risk.

Comment. No previous study has identified occupational or environmental risk factors for choriocarcinoma. This is a rare type of malignancy, and epidemiological studies are scarce, but there are indications that increasing maternal age and family history increase risk. All other hypothesised risk factors (use of oral contraceptives, HPV infections, smoking and alcohol use, paternal age, parity, endogenous hormone factors, history of other cancers) are inconsistently related to risk [101]. We are not aware of studies on risk of choriocarcinoma according to occupational categories. Given the way our database was constructed we could only count incidence rates by women (and not by pregnancy which would be more appropriate).

Ovarian cancer

Incidence of ovarian cancer, excluding borderline tumours, in the Nordic countries in the 1960s and 1970s was between 10 and 15 per 100 000, but rates have decreased in the last decades (Figure 32).

There was a somewhat increased risk of ovarian cancer, excluding borderline tumours, among printers SIR 1.25 (95% CI 1.11–1.41) and hairdressers (1.16, 1.05–1.27) in the study population. None of the occupational categories showed a markedly lowered risk of ovarian cancer (Table 43).

For borderline ovarian tumours (http://astra.cancer.fi/NOCCA/Incidence/ovary-borderline), the highest SIRs were observed among women working as printers (1.50, 1.09–2.01), mechanics (1.40, 1.10–1.75), postal workers (1.24, 1.07–1.44), cooks and stewards (1.21, 1.01–1.44). The lowest SIRs were found among physicians (0.45, 0.19–0.89), laboratory assistants (0.59, 0.36–0.91) and gardeners (0.80, 0.70–0.92).

Comment. Increased risk of ovarian cancer is associated with reproductive factors leading to incessant ovulation [102]. Previous studies have also found indications of elevated risks associated with aromatic hydrocarbon solvents, leather dust, man-made vitreous fibres, asbestos and diesel, gasoline and engine exhausts. Female hairdressers and printers have also been previously reported to be at increased risk of ovarian cancer [87,103]. In this study the occupational variation of ovarian cancer incidence was small. In most epidemiological studies borderline ovarian tumours have the same risk factors as invasive ovarian cancer. So far no occupational study has accessed the risk of borderline tumours. The findings in our study suggest that borderline ovarian tumours may share the same occupational risk factors that have been suggested for invasive ovarian cancer.

Fallopian tube cancers

Primary fallopian tube carcinoma is very rare. In Western countries, it accounts for about 1% of all female genital malignant tumours.

Derived from six cases only, a significant fourfold risk of fallopian tube cancer was shown in smelting workers SIR 4.00 (95% CI 1.47–8.70). The other work groups with a high SIR were artistic workers, hairdressers, packers and nurses (Table 44). Farming was the occupation with the lowest risk (0.67, 0.47–0.94).

Comment. The aetiology of fallopian tube cancer remains poorly known. The few existing studies

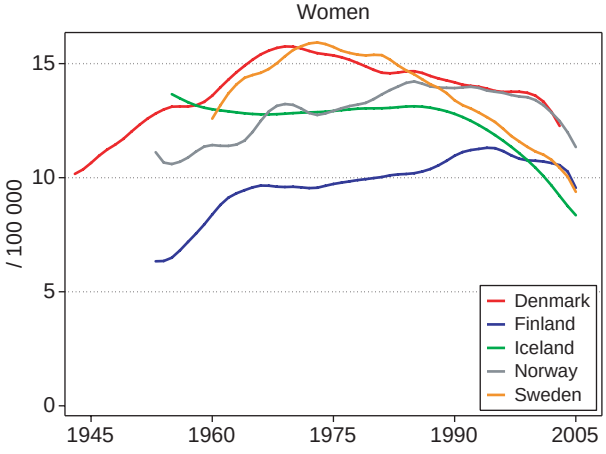


Figure 32. Age standardised (World) incidence rates for ovarian cancer 1943–2005, by country. Modified from NORDCAN [49].

Table 43. Observed number of ovarian cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	63	**1.51**	63	0.89	1	1.03	26	1.13	219	1.10	372	1.11	1.00—1.23
2	Laboratory assistants	37	1.18	49	1.24	[1.42]	0.00	22	0.80	52	0.76	160	0.95	0.82—1.11
3	Physicians	9	0.66	18	1.02	[0.25]	0.00	15	1.32	40	0.82	82	0.90	0.71—1.11
4	Dentists	12	1.00	18	1.07	[0.10]	0.00	4	0.43	32	0.95	66	0.92	0.71—1.17
5	Nurses	258	1.09	195	0.98	9	1.34	206	0.97	565	0.98	1 233	1.00	0.95—1.06
6	Assistant nurses	180	1.00	191	0.96	11	1.21	199	0.96	1 043	0.99	1 624	0.98	0.94—1.03
7	"Other health workers"	153	1.13	163	1.03	4	2.09	219	1.05	354	0.98	893	1.03	0.97—1.10
8	Teachers	365	**1.19**	395	**1.12**	7	0.59	407	1.00	1 264	0.96	2 438	1.02	0.98—1.06
9	Religious workers etc	39	0.95	219	**1.18**	2	1.10	89	0.90	487	1.04	836	1.05	0.98—1.12
10	Artistic workers	31	**1.53**	36	1.23	[1.44]	0.00	29	0.97	91	1.06	187	1.12	0.97—1.30
11	Journalists	2	0.43	24	1.29	[0.39]	0.00	6	0.73	39	0.96	71	0.98	0.76—1.23
12	Administrators	139	1.13	62	0.99	2	1.76	106	1.10	192	1.00	501	1.05	0.97—1.15
13	Clerical workers	1 404	**1.12**	1 245	**1.07**	26	0.73	1 342	1.05	3 448	**1.08**	7 465	**1.08**	1.05—1.10
14	Sales agents	10	0.91	169	1.05	4	1.04	170	1.03	467	**1.11**	820	1.07	1.00—1.15
15	Shop workers	837	1.01	643	1.07	36	**1.59**	1 071	**1.07**	1 935	**1.08**	4 522	**1.07**	1.04—1.10
16	Farmers	488	**0.85**	338	1.03	16	0.97	582	0.93	169	0.99	1 593	**0.93**	0.88—0.97
17	Gardeners	60	0.81	924	**0.92**	[0.57]	0.00	365	0.96	436	0.96	1 785	**0.94**	0.89—0.98
18	Fishermen	[2.98]	0.00	2	0.89	[0.59]	0.00	8	1.57	2	1.29	12	0.96	0.50—1.68
19	Forestry workers	3	3.82	2	0.45	[0.08]	0.00	7	0.97	16	1.52	28	1.21	0.81—1.75
20	Miners and quarry workers	[0.06]	0.00	3	1.64	[0.01]	0.00	[0.42]	0.00	[2.66]	0.00	3	0.60	0.12—1.76
21	Seamen	–	–	[0.63]	0.00	[0.00]	0.00	[1.22]	0.00	[0.40]	0.00	[2.25]	0.00	0.00—1.64
22	Transport workers	1	1.21	24	0.86	[0.59]	0.00	5	0.83	37	1.17	67	1.00	0.77—1.27
23	Drivers	18	0.84	16	1.12	[0.29]	0.00	21	1.02	85	1.04	140	1.01	0.86—1.20
24	Postal workers	50	1.14	192	1.08	4	0.53	231	0.95	552	1.04	1 029	1.03	0.97—1.09
25	Textile workers	270	0.96	435	1.11	12	0.87	453	**1.23**	1 046	**1.07**	2 216	**1.09**	1.05—1.14
26	Shoe and leather workers	24	1.14	41	0.84	[0.72]	0.00	29	1.08	96	**1.26**	190	1.09	0.95—1.26
27	Smelting workers	5	0.96	5	0.44	[0.04]	0.00	2	0.62	26	1.07	38	0.86	0.61—1.18
28	Mechanics	57	1.08	54	1.02	[0.13]	0.00	28	0.83	251	1.05	390	1.03	0.93—1.14
29	Plumbers	1	2.55	[0.13]	0.00	–	–	1	3.98	2	4.64	4	3.33	0.91—8.52
30	Welders	–	–	2	0.46	[0.01]	0.00	5	1.88	16	1.57	23	1.33	0.85—2.00
31	Electrical workers	74	1.00	25	0.68	[0.12]	0.00	32	0.86	169	**1.26**	300	1.06	0.95—1.19
32	Wood workers	31	1.30	80	0.81	[0.24]	0.00	14	1.17	51	1.25	176	1.00	0.86—1.16
33	Painters	[0.92]	0.00	8	0.66	[0.06]	0.00	5	1.85	7	0.66	20	0.76	0.46—1.17
34	"Other construction workers"	1	1.41	39	1.02	[0.04]	0.00	1	0.98	[1.54]	0.00	41	0.99	0.71—1.34
35	Bricklayers	[0.14]	0.00	[1.33]	0.00	–	–	[0.06]	0.00	[0.06]	0.00	[1.59]	0.00	0.00—2.33
36	Printers	23	0.85	67	**1.31**	1	0.86	42	1.28	128	**1.32**	261	**1.25**	1.11—1.41
37	Chemical process workers	47	1.11	41	**1.60**	[0.51]	0.00	32	1.10	66	0.89	186	1.08	0.94—1.25
38	Food workers	185	0.90	112	0.85	31	1.09	189	1.07	220	1.05	737	0.98	0.91—1.05
39	Beverage workers	21	1.06	3	0.41	1	13.97	3	1.89	6	0.46	34	0.82	0.56—1.14
40	Tobacco workers	22	0.80	4	0.97	–	–	10	1.50	15	1.71	51	1.09	0.81—1.43
41	Glass makers etc	54	1.05	118	**1.25**	[0.75]	0.00	76	1.21	212	1.06	460	**1.12**	1.03—1.23
42	Packers	10	0.69	188	1.13	4	1.47	154	1.06	332	**1.14**	688	**1.11**	1.03—1.19
43	Engine operators	1	2.02	25	0.90	[0.04]	0.00	4	1.80	19	0.86	49	0.93	0.69—1.23
44	Public safety workers	2	1.31	6	0.93	1	1.85	18	1.11	28	0.93	55	1.00	0.76—1.31
45	Cooks and stewards	[0.53]	0.00	211	1.13	9	0.86	215	1.11	459	**1.14**	894	**1.13**	1.06—1.20
46	Domestic assistants	346	1.10	208	1.03	5	1.63	523	1.02	1 230	1.02	2 312	1.03	0.99—1.08
47	Waiters	83	**1.48**	154	0.94	1	0.84	213	0.97	431	1.02	882	1.02	0.96—1.09
48	Building caretakers	900	0.99	629	1.00	23	1.07	870	0.95	1 131	0.98	3 553	0.98	0.95—1.01
49	Chimney sweeps	[0.06]	0.00	1	2.98	–	–	[0.12]	0.00	[0.04]	0.00	1	1.79	0.05—9.99
50	Hairdressers	66	1.20	77	1.24	[1.24]	0.00	71	1.19	220	1.12	434	**1.16**	1.05—1.27
51	Launderers	111	1.09	56	1.14	4	1.17	89	1.13	216	1.02	476	1.07	0.98—1.17
52	Military personnel	2	3.81	1	1.39	–	–	[0.29]	0.00	[1.06]	0.00	3	1.15	0.24—3.37
53	"Other workers"	271	1.04	192	0.96	21	0.97	468	0.97	576	**1.10**	1 528	1.03	0.97—1.08
54	Economically inactive	6 393	**0.96**	3 765	**0.94**	79	1.03	6 137	0.97	21 361	**0.97**	37 735	**0.96**	0.95—0.97
1–54	All categories	13 159	1.00	11 538	1.00	314	1.00	14 814	1.00	39 839	1.00	79 664	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 44. Observed number of cancer of the fallopian tube among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	[1.24]	0.00	5	1.29	[0.05]	0.00	[0.78]	0.00	2	0.39	7	0.63	0.25—1.30
2	Laboratory assistants	2	2.11	1	0.45	[0.06]	0.00	[0.86]	0.00	2	0.97	5	0.81	0.26—1.89
3	Physicians	[0.41]	0.00	2	2.05	[0.01]	0.00	[0.33]	0.00	1	0.74	3	0.98	0.20—2.86
4	Dentists	1	2.78	3	3.47	[0.00]	0.00	[0.26]	0.00	1	1.18	5	2.15	0.70—5.01
5	Nurses	10	1.42	24	**2.12**	[0.23]	0.00	9	1.30	17	1.16	60	**1.49**	1.14—1.92
6	Assistant nurses	5	0.92	18	1.66	1	3.11	11	1.58	20	0.72	55	1.07	0.81—1.40
7	"Other health workers"	2	0.49	10	1.16	[0.08]	0.00	11	1.70	10	1.04	33	1.15	0.79—1.61
8	Teachers	10	1.09	16	0.82	1	2.30	17	1.35	30	0.88	74	0.98	0.77—1.23
9	Religious workers etc	[1.23]	0.00	10	0.95	[0.06]	0.00	3	0.96	9	0.73	22	0.81	0.51—1.22
10	Artistic workers	[0.59]	0.00	4	2.50	[0.05]	0.00	4	**4.64**	6	2.71	14	**2.64**	1.44—4.42
11	Journalists	[0.14]	0.00	1	0.98	[0.01]	0.00	[0.26]	0.00	1	0.93	2	0.80	0.10—2.89
12	Administrators	7	1.94	3	0.89	[0.03]	0.00	2	0.72	5	1.02	17	1.16	0.68—1.86
13	Clerical workers	54	**1.43**	87	**1.35**	2	1.57	38	0.99	90	1.08	271	**1.20**	1.07—1.35
14	Sales agents	[0.33]	0.00	7	0.86	[0.10]	0.00	4	1.04	7	0.74	18	0.82	0.49—1.30
15	Shop workers	28	1.15	37	1.14	[0.70]	0.00	29	1.02	65	**1.58**	159	**1.25**	1.07—1.46
16	Farmers	8	**0.47**	9	0.65	1	2.33	15	0.98	1	0.27	34	**0.67**	0.47—0.94
17	Gardeners	1	0.45	37	0.77	[0.01]	0.00	11	1.15	9	0.88	58	0.82	0.63—1.07
18	Fishermen	[0.09]	0.00	[0.11]	0.00	[0.02]	0.00	[0.16]	0.00	[0.03]	0.00	[0.41]	0.00	0.00—8.92
19	Forestry workers	[0.02]	0.00	[0.24]	0.00	[0.00]	0.00	[0.21]	0.00	[0.26]	0.00	[0.73]	0.00	0.00—5.02
20	Miners and quarry workers	[0.00]	0.00	[0.09]	0.00	[0.00]	0.00	[0.01]	0.00	[0.07]	0.00	[0.18]	0.00	0.00—21.06
21	Seamen	–	–	[0.03]	0.00	[0.00]	0.00	[0.04]	0.00	[0.01]	0.00	[0.08]	0.00	0.00—44.93
22	Transport workers	[0.02]	0.00	2	1.46	[0.02]	0.00	1	5.32	1	1.34	4	1.70	0.46—4.36
23	Drivers	1	1.56	[0.80]	0.00	[0.01]	0.00	1	1.59	1	0.46	3	0.70	0.15—2.06
24	Postal workers	2	1.53	11	1.20	[0.20]	0.00	7	1.01	18	1.40	38	1.25	0.88—1.71
25	Textile workers	8	0.95	20	1.00	[0.30]	0.00	6	0.71	24	1.20	58	1.01	0.77—1.31
26	Shoe and leather workers	[0.63]	0.00	4	1.58	[0.02]	0.00	1	1.57	2	1.25	7	1.29	0.52—2.66
27	Smelting workers	[0.16]	0.00	2	3.39	[0.00]	0.00	[0.11]	0.00	4	**6.23**	6	**4.00**	1.47—8.70
28	Mechanics	1	0.62	3	1.06	[0.01]	0.00	1	1.06	6	1.00	11	0.97	0.48—1.73
29	Plumbers	[0.01]	0.00	[0.01]	0.00	–	–	[0.01]	0.00	[0.01]	0.00	[0.04]	0.00	0.00—96.33
30	Welders	–	–	[0.25]	0.00	[0.00]	0.00	2	**21.03**	[0.28]	0.00	2	3.17	0.38—11.44
31	Electrical workers	2	0.89	2	0.97	[0.00]	0.00	1	0.92	8	**2.37**	13	1.48	0.79—2.53
32	Wood workers	2	2.76	4	0.80	[0.01]	0.00	2	5.22	3	2.83	11	1.53	0.76—2.74
33	Painters	1	37.43	1	1.59	[0.00]	0.00	1	12.24	[0.26]	0.00	3	2.99	0.62—8.73
34	"Other construction workers"	[0.02]	0.00	1	0.56	[0.00]	0.00	[0.03]	0.00	[0.04]	0.00	1	0.53	0.01—2.95
35	Bricklayers	[0.00]	0.00	[0.07]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.08]	0.00	0.00—46.91
36	Printers	3	3.73	4	1.52	[0.03]	0.00	2	2.34	2	0.87	11	1.66	0.83—2.97
37	Chemical process workers	2	1.59	1	0.76	[0.01]	0.00	[0.76]	0.00	5	2.94	8	1.58	0.68—3.12
38	Food workers	2	0.32	6	0.90	2	2.46	9	2.03	6	1.36	25	1.11	0.72—1.64
39	Beverage workers	[0.58]	0.00	[0.36]	0.00	[0.00]	0.00	[0.05]	0.00	[0.26]	0.00	[1.25]	0.00	0.00—2.95
40	Tobacco workers	1	1.24	[0.21]	0.00	–	–	[0.14]	0.00	[0.21]	0.00	1	0.73	0.02—4.07
41	Glass makers etc	2	1.29	5	1.02	[0.02]	0.00	4	2.36	5	1.06	16	1.24	0.71—2.02
42	Packers	[0.44]	0.00	12	1.38	[0.07]	0.00	6	1.53	14	**2.12**	32	**1.62**	1.11—2.29
43	Engine operators	[0.02]	0.00	2	1.36	[0.00]	0.00	1	12.60	[0.64]	0.00	3	1.36	0.28—3.98
44	Public safety workers	[0.04]	0.00	[0.33]	0.00	[0.02]	0.00	[0.45]	0.00	1	1.29	1	0.62	0.02—3.45
45	Cooks and stewards	[0.02]	0.00	10	1.08	1	4.16	7	1.58	5	0.63	23	1.05	0.67—1.58
46	Domestic assistants	12	1.29	13	1.26	[0.06]	0.00	7	0.55	29	1.05	61	1.02	0.78—1.31
47	Waiters	6	**3.61**	6	0.69	[0.04]	0.00	5	0.85	8	0.88	25	0.99	0.64—1.46
48	Building caretakers	17	0.63	30	0.97	[0.50]	0.00	18	0.69	31	1.19	96	0.87	0.70—1.06
49	Chimney sweeps	[0.00]	0.00	[0.02]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.02]	0.00	0.00—152.94
50	Hairdressers	3	1.86	8	**2.47**	[0.05]	0.00	2	1.23	12	**2.45**	25	**2.19**	1.41—3.23
51	Launderers	7	2.33	1	0.42	[0.06]	0.00	1	0.53	3	0.72	12	1.05	0.54—1.83
52	Military personnel	[0.02]	0.00	[0.05]	0.00	–	–	[0.01]	0.00	[0.03]	0.00	[0.11]	0.00	0.00—34.80
53	"Other workers"	11	1.43	6	0.60	[0.59]	0.00	13	0.94	10	0.83	40	0.90	0.65—1.23
54	Economically inactive	173	0.91	143	**0.80**	1	0.49	106	0.87	410	**0.90**	833	**0.88**	0.82—0.94
1–54	All categories	384	1.00	571	1.00	9	1.00	358	1.00	884	1.00	2 206	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

suggest that fallopian tube cancer may have a similar aetiology as epithelial ovarian cancer. High parity may decrease risk of fallopian tube cancer [104]. Women of high socioeconomic class seem also to be at increased risk in comparison to women of low social class. We found no previous studies suggesting occupational or environmental causes of fallopian tube cancer, except for a Finnish study reporting an increased risk among academic, clerical and administrative workers, as well as private secretaries, nurses, hairdressers, barbers, and book-keepers and accountants [105]. The subjects included in the Finnish study overlap with the subjects included in the present study. Our study did not identify clear patterns of occupations associated with this malignancy, and the occupations associated with ovarian cancer were not the same as the occupations associated with fallopian tube cancers.

Cancer of the vulva

The incidence of cancer of the vulva has been around 1.5 per 100 000 in the Nordic countries, and it has been relatively stable over decades.

High SIRs were found in domestic assistants (SIR 1.16, 95% CI 1.04–1.30) and building caretakers. Low SIRs were seen in nurses (0.72, 0.58–0.88), "other health workers" and teachers (Table 45).

Comment. Cancer of the vulva is most probably related to HPV infection [106]. Nothing is known about possible occupational risk factors, and no pattern related to occupational category could be seen in the present study.

Vaginal cancer

Cancer of the vagina is rare. In our study we have only 2 725 cases, not many more than male breast cancer cases.

High SIRs were found in chemical process workers (SIR 2.61, 95% CI 1.46–4.30) and building caretakers. The lowest SIRs were found in gardeners (0.73, 0.54–0.97) and teachers (Table 46).

Comment. Cancer of the vagina is most probably related to HPV infection [106]. No occupational risk factors have been identified.

Prostate cancer

Prostate cancer was the most common cancer in the present study (340 000 cases) and accounts for nearly one third of all incident cancer among men in the Nordic countries. The incidence has increased by three to fourfold since 1960 in all countries except Denmark, where it has remained considerably lower than in the other countries (Figure 33). For Finland, Norway and Sweden the steepest rise was seen after 1990, around the time when testing for prostate specific antigen (PSA) became widely used.

In the present study the highest SIRs were observed among dentists (SIR 1.22, 95% CI 1.13–1.31), administrators and religious workers (Table 47). The SIR was lowest (0.80, 0.79–0.82) among the economically inactive, followed by forestry workers and fishermen.

Comment. Autopsies have revealed that the prevalence of latent prostate cancer is very high. More

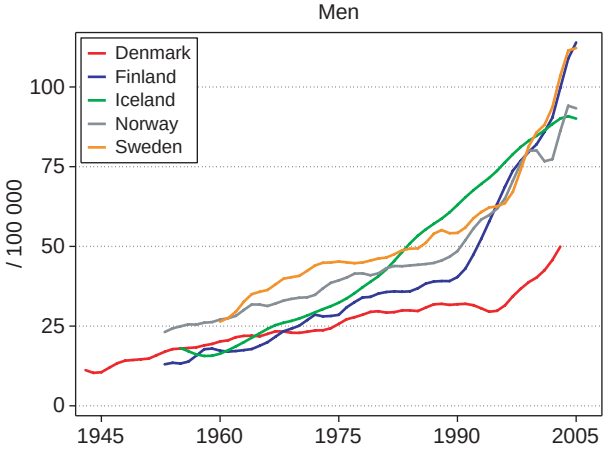


Figure 33. Age standardised (World) incidence rates for prostate cancer 1943–2005, by country. Modified from NORDCAN [49].

Table 45. Observed number of cancer of the vulva among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	5	1.31	4	0.54	[0.10]	0.00	3	1.12	9	0.54	21	0.68	0.42—1.05
2	Laboratory assistants	3	1.18	5	1.21	[0.14]	0.00	2	0.56	2	0.50	12	0.83	0.43—1.45
3	Physicians	2	1.53	[1.77]	0.00	[0.02]	0.00	[1.51]	0.00	4	1.11	6	0.73	0.27—1.59
4	Dentists	1	0.86	2	0.90	[0.01]	0.00	[1.32]	0.00	2	0.65	5	0.64	0.21—1.50
5	Nurses	20	0.86	7	**0.34**	[0.62]	0.00	25	0.92	37	**0.71**	89	**0.72**	0.58—0.88
6	Assistant nurses	16	1.01	13	0.58	1	1.04	24	0.89	81	0.93	135	0.88	0.75—1.05
7	"Other health workers"	9	0.67	12	0.69	1	5.12	20	0.71	26	0.89	68	**0.77**	0.60—0.97
8	Teachers	21	0.75	31	0.77	1	0.87	53	0.99	88	**0.76**	194	**0.81**	0.71—0.93
9	Religious workers etc	3	0.77	17	0.93	1	5.72	13	0.97	23	**0.62**	57	0.78	0.59—1.01
10	Artistic workers	5	2.31	1	0.31	[0.15]	0.00	1	0.23	4	0.55	11	0.64	0.32—1.15
11	Journalists	1	2.40	2	0.97	[0.04]	0.00	1	0.95	4	1.20	8	1.16	0.50—2.28
12	Administrators	9	0.71	9	1.28	[0.11]	0.00	12	0.83	13	0.75	43	0.83	0.60—1.12
13	Clerical workers	120	1.06	111	0.86	4	1.09	159	0.92	260	0.93	654	0.94	0.87—1.01
14	Sales agents	1	0.91	24	1.15	[0.36]	0.00	31	1.08	42	0.92	98	1.01	0.82—1.23
15	Shop workers	73	0.89	69	0.96	3	1.33	157	1.03	195	1.03	497	1.00	0.91—1.09
16	Farmers	45	0.78	63	1.16	[1.55]	0.00	94	**0.81**	21	1.09	223	0.89	0.78—1.02
17	Gardeners	6	0.80	136	0.96	[0.06]	0.00	63	0.92	60	1.20	265	0.99	0.88—1.12
18	Fishermen	[0.29]	0.00	[0.30]	0.00	[0.06]	0.00	1	1.34	[0.17]	0.00	1	0.64	0.02—3.56
19	Forestry workers	[0.07]	0.00	[0.58]	0.00	[0.01]	0.00	3	2.60	[1.04]	0.00	3	1.05	0.22—3.07
20	Miners and quarry workers	[0.00]	0.00	[0.26]	0.00	[0.00]	0.00	[0.05]	0.00	[0.23]	0.00	[0.55]	0.00	0.00—6.75
21	Seamen	–	–	[0.06]	0.00	[0.00]	0.00	[0.17]	0.00	[0.03]	0.00	[0.26]	0.00	0.00—14.28
22	Transport workers	[0.08]	0.00	5	1.37	[0.06]	0.00	[0.77]	0.00	3	1.02	8	1.07	0.46—2.10
23	Drivers	2	1.02	1	0.63	[0.03]	0.00	4	1.35	6	0.92	13	1.00	0.53—1.70
24	Postal workers	5	1.15	19	0.86	[0.72]	0.00	34	0.97	51	1.00	109	0.96	0.80—1.16
25	Textile workers	32	1.20	58	1.13	[1.32]	0.00	65	1.04	129	1.08	284	1.09	0.97—1.22
26	Shoe and leather workers	1	0.52	6	0.97	[0.08]	0.00	6	1.36	11	1.23	24	1.11	0.71—1.66
27	Smelting workers	[0.46]	0.00	6	**4.14**	[0.00]	0.00	[0.38]	0.00	1	0.50	7	1.63	0.65—3.36
28	Mechanics	5	1.14	6	0.95	[0.01]	0.00	4	0.82	22	1.03	37	1.00	0.71—1.38
29	Plumbers	[0.06]	0.00	[0.01]	0.00	–	–	[0.03]	0.00	[0.03]	0.00	[0.13]	0.00	0.00—29.02
30	Welders	–	–	[0.46]	0.00	[0.00]	0.00	[0.29]	0.00	1	1.40	1	0.68	0.02—3.77
31	Electrical workers	8	1.30	5	1.31	[0.01]	0.00	5	0.99	12	1.02	30	1.12	0.75—1.60
32	Wood workers	2	0.95	20	1.55	[0.03]	0.00	[1.63]	0.00	1	0.29	23	1.14	0.72—1.71
33	Painters	[0.08]	0.00	3	2.02	[0.01]	0.00	[0.38]	0.00	[0.98]	0.00	3	1.03	0.21—3.00
34	"Other construction workers"	[0.07]	0.00	10	1.83	[0.00]	0.00	[0.15]	0.00	[0.11]	0.00	10	1.73	0.83—3.18
35	Bricklayers	[0.01]	0.00	[0.18]	0.00	–	–	[0.01]	0.00	[0.00]	0.00	[0.20]	0.00	0.00—18.24
36	Printers	[2.41]	0.00	4	0.63	[0.11]	0.00	9	1.82	9	0.95	22	0.95	0.59—1.44
37	Chemical process workers	5	1.29	2	0.61	[0.05]	0.00	7	1.58	12	1.56	26	1.34	0.88—1.97
38	Food workers	21	1.10	22	1.26	2	0.70	28	0.94	31	1.27	104	1.11	0.92—1.35
39	Beverage workers	3	1.69	1	1.00	[0.01]	0.00	[0.23]	0.00	1	0.63	5	1.08	0.35—2.53
40	Tobacco workers	2	0.82	2	3.53	–	–	2	1.86	2	2.33	8	1.63	0.70—3.20
41	Glass makers etc	7	1.58	9	0.75	[0.08]	0.00	15	1.62	26	1.30	57	1.25	0.94—1.62
42	Packers	1	0.76	22	1.04	[0.27]	0.00	20	0.88	35	1.13	78	1.02	0.81—1.28
43	Engine operators	[0.03]	0.00	5	1.51	[0.01]	0.00	[0.25]	0.00	1	0.66	6	1.17	0.43—2.55
44	Public safety workers	[0.16]	0.00	[0.81]	0.00	[0.05]	0.00	4	1.36	4	1.76	8	1.28	0.55—2.53
45	Cooks and stewards	[0.05]	0.00	23	0.93	1	0.99	35	0.99	51	1.02	110	0.99	0.82—1.20
46	Domestic assistants	32	1.05	20	0.77	[0.29]	0.00	112	**1.27**	144	**1.19**	308	**1.16**	1.04—1.30
47	Waiters	6	1.22	31	**1.60**	1	8.36	38	1.10	47	0.97	123	1.14	0.96—1.36
48	Building caretakers	99	1.12	110	**1.29**	1	0.49	161	1.11	127	1.02	498	**1.12**	1.02—1.22
49	Chimney sweeps	[0.01]	0.00	[0.04]	0.00	–	–	[0.02]	0.00	[0.00]	0.00	[0.07]	0.00	0.00—51.04
50	Hairdressers	3	0.59	7	0.93	[0.14]	0.00	10	1.14	13	0.70	33	0.82	0.57—1.16
51	Launderers	13	1.29	4	0.58	[0.32]	0.00	17	1.24	32	1.19	66	1.14	0.88—1.45
52	Military personnel	[0.05]	0.00	1	16.96	–	–	[0.03]	0.00	1	16.55	2	**9.81**	1.19—35.43
53	"Other workers"	28	1.12	21	0.82	2	0.90	87	1.16	64	1.18	202	1.11	0.97—1.28
54	Economically inactive	709	1.01	641	1.02	13	1.73	1 128	0.99	2 667	1.01	5 158	1.01	0.98—1.04
1–54	All categories	1 324	1.00	1 570	1.00	31	1.00	2 453	1.00	4 375	1.00	9 753	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 46. Observed number of vaginal cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	3	1.82	1	0.48	[0.03]	0.00	1	1.72	7	1.36	12	1.26	0.65—2.21
2	Laboratory assistants	1	0.87	2	1.73	[0.04]	0.00	1	1.34	[1.27]	0.00	4	0.92	0.25—2.34
3	Physicians	[0.55]	0.00	[0.50]	0.00	[0.01]	0.00	[0.31]	0.00	[1.14]	0.00	[2.51]	0.00	0.00—1.47
4	Dentists	[0.49]	0.00	[0.57]	0.00	[0.00]	0.00	[0.27]	0.00	[0.94]	0.00	[2.28]	0.00	0.00—1.62
5	Nurses	14	1.45	10	1.69	[0.19]	0.00	1	**0.17**	5	**0.32**	30	0.80	0.54—1.15
6	Assistant nurses	6	0.87	7	1.13	[0.25]	0.00	3	0.52	37	1.39	53	1.16	0.87—1.52
7	"Other health workers"	2	0.36	8	1.65	[0.05]	0.00	7	1.18	13	1.45	30	1.18	0.80—1.69
8	Teachers	10	0.83	9	0.81	[0.35]	0.00	8	0.72	25	0.71	52	**0.74**	0.56—0.98
9	Religious workers etc	1	0.61	6	1.15	[0.05]	0.00	2	0.72	3	**0.27**	12	0.57	0.30—1.00
10	Artistic workers	1	1.16	[0.89]	0.00	[0.04]	0.00	[0.86]	0.00	[2.23]	0.00	1	0.20	0.01—1.14
11	Journalists	[0.18]	0.00	[0.58]	0.00	[0.01]	0.00	[0.22]	0.00	1	0.98	1	0.50	0.01—2.77
12	Administrators	13	**2.52**	2	1.02	[0.03]	0.00	2	0.71	4	0.78	21	1.39	0.86—2.12
13	Clerical workers	42	0.85	34	0.95	3	3.19	31	0.86	109	**1.26**	219	1.05	0.92—1.20
14	Sales agents	[0.46]	0.00	8	1.45	[0.10]	0.00	8	1.51	19	1.44	35	1.42	0.99—1.98
15	Shop workers	34	1.00	29	1.48	[0.58]	0.00	22	0.72	61	1.07	146	1.03	0.88—1.21
16	Farmers	12	**0.50**	15	1.10	1	2.21	20	0.95	6	1.12	54	0.84	0.63—1.09
17	Gardeners	4	1.29	26	0.69	[0.02]	0.00	12	0.95	8	0.54	50	**0.73**	0.54—0.97
18	Fishermen	[0.12]	0.00	[0.08]	0.00	[0.02]	0.00	2	**12.99**	1	20.68	3	**7.09**	1.46—20.73
19	Forestry workers	[0.03]	0.00	[0.15]	0.00	[0.00]	0.00	1	4.37	[0.31]	0.00	1	1.38	0.03—7.67
20	Miners and quarry workers	[0.00]	0.00	[0.07]	0.00	[0.00]	0.00	[0.01]	0.00	[0.07]	0.00	[0.15]	0.00	0.00—24.66
21	Seamen	–	–	[0.02]	0.00	–	–	[0.04]	0.00	[0.01]	0.00	[0.06]	0.00	0.00—61.87
22	Transport workers	[0.03]	0.00	1	0.98	[0.02]	0.00	[0.16]	0.00	1	1.13	2	0.94	0.11—3.41
23	Drivers	1	1.18	1	2.26	[0.01]	0.00	1	1.69	3	1.50	6	1.54	0.56—3.35
24	Postal workers	1	0.55	6	1.00	[0.19]	0.00	8	1.12	17	1.07	32	1.03	0.70—1.45
25	Textile workers	7	0.62	12	0.87	[0.41]	0.00	11	0.93	47	1.35	77	1.07	0.84—1.34
26	Shoe and leather workers	[0.84]	0.00	[1.68]	0.00	[0.02]	0.00	[0.85]	0.00	6	2.27	6	1.00	0.37—2.17
27	Smelting workers	[0.20]	0.00	[0.40]	0.00	[0.00]	0.00	[0.09]	0.00	3	4.75	3	2.28	0.47—6.65
28	Mechanics	3	1.51	2	1.15	[0.00]	0.00	3	3.00	7	1.07	15	1.33	0.74—2.19
29	Plumbers	[0.02]	0.00	[0.00]	0.00	–	–	[0.01]	0.00	[0.01]	0.00	[0.04]	0.00	0.00—94.10
30	Welders	–	–	1	7.59	[0.00]	0.00	[0.07]	0.00	1	4.38	2	4.68	0.57—16.92
31	Electrical workers	2	0.72	1	0.93	[0.00]	0.00	3	2.80	5	1.37	11	1.28	0.64—2.30
32	Wood workers	[0.93]	0.00	2	0.57	[0.01]	0.00	[0.34]	0.00	3	2.81	5	0.86	0.28—2.00
33	Painters	[0.04]	0.00	1	2.48	[0.00]	0.00	[0.08]	0.00	1	3.36	2	2.45	0.30—8.87
34	"Other construction workers"	[0.03]	0.00	2	1.39	[0.00]	0.00	[0.03]	0.00	[0.03]	0.00	2	1.30	0.16—4.70
35	Bricklayers	[0.01]	0.00	[0.05]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.05]	0.00	0.00—68.05
36	Printers	[1.05]	0.00	3	1.75	[0.03]	0.00	1	1.02	2	0.70	6	0.90	0.33—1.97
37	Chemical process workers	3	1.80	3	3.35	[0.01]	0.00	2	2.28	7	**3.04**	15	**2.61**	1.46—4.30
38	Food workers	6	0.73	2	0.43	1	1.25	7	1.24	10	1.41	26	0.99	0.64—1.44
39	Beverage workers	2	2.59	[0.26]	0.00	[0.00]	0.00	[0.05]	0.00	[0.46]	0.00	2	1.30	0.16—4.68
40	Tobacco workers	1	0.94	[0.15]	0.00	–	–	[0.21]	0.00	[0.27]	0.00	1	0.59	0.02—3.30
41	Glass makers etc	[1.97]	0.00	3	0.93	[0.02]	0.00	3	1.60	9	1.49	15	1.14	0.64—1.88
42	Packers	2	3.50	9	1.58	[0.07]	0.00	6	1.34	9	0.98	26	1.30	0.85—1.90
43	Engine operators	[0.02]	0.00	3	3.29	[0.00]	0.00	[0.06]	0.00	1	2.00	4	2.70	0.73—6.90
44	Public safety workers	[0.07]	0.00	[0.22]	0.00	[0.02]	0.00	[0.55]	0.00	[0.68]	0.00	[1.53]	0.00	0.00—2.42
45	Cooks and stewards	[0.02]	0.00	6	0.91	[0.32]	0.00	10	1.55	19	1.35	35	1.27	0.89—1.77
46	Domestic assistants	8	0.62	6	0.87	[0.10]	0.00	15	0.90	31	0.89	60	0.84	0.64—1.08
47	Waiters	3	1.39	8	1.50	[0.03]	0.00	11	1.62	18	1.27	40	1.40	1.00—1.91
48	Building caretakers	54	**1.45**	32	1.41	[0.64]	0.00	32	1.12	44	1.22	162	**1.30**	1.11—1.51
49	Chimney sweeps	[0.00]	0.00	[0.01]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.02]	0.00	0.00—198.01
50	Hairdressers	2	0.92	3	1.46	[0.04]	0.00	1	0.57	2	0.35	8	0.68	0.30—1.35
51	Launderers	7	1.67	3	1.64	[0.11]	0.00	2	0.78	13	1.70	25	1.53	0.99—2.26
52	Military personnel	[0.02]	0.00	[0.02]	0.00	–	–	[0.01]	0.00	[0.02]	0.00	[0.07]	0.00	0.00—56.25
53	"Other workers"	15	1.43	7	1.01	3	**4.98**	11	0.74	23	1.44	59	1.21	0.92—1.56
54	Economically inactive	287	1.01	137	0.88	1	0.42	215	1.05	714	**0.92**	1 354	0.95	0.90—1.00
1–54	All categories	547	1.00	411	1.00	9	1.00	463	1.00	1 295	1.00	2 725	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

than 20% of men who have reached the age of 50 have prostatic carcinoma that meets the histopathologic criteria for malignancy, but most of those cancers seem to have a low potential for growth [107]. Therefore, the incidence must be interpreted in the context of prostate cancer-related diagnostic activity. This is exemplified by the Danish experience during the past three decades, where both the level of diagnostic activity and the prostate cancer incidence have been lower than in the other Nordic countries [108,109]. Before the introduction of PSA testing in the late 1980s, trans-urethral resections of the prostate (TURP), widely applied as a treatment for benign prostate hyperplasia, were responsible for a large number of incidental findings of prostate cancer.

The aetiology of prostate cancer is poorly understood. Consumption of red meat and dairy products is probably associated with an increased risk, whereas tomatoes and tomato products, especially those with high lycopene content, are associated with a reduced risk [110]. There are no established occupational risk factors, but cadmium, polychlorinated biphenyls and high electromagnetic fields have been suggested. The present results do not support an association with industrial occupations, as SIRs were not elevated among miners, chemical process workers, smelting workers, welders, painters or chimney sweeps. Furthermore, the contrasts between the highest and lowest SIRs were small. On the other hand, the present results support an association with diagnostic activity, as higher SIRs were observed for occupations that are related to higher social status and thus presumably better access to health care.

Testicular cancer

Incidence in the Nordic countries has been increasing over time and is nowadays about twofold in Denmark and Norway as compared with the other Nordic countries (Figure 34). The rates in Denmark and Norway are among the highest in the world.

The highest significant excess risk of testicular cancer was found in physicians (SIR 1.48, 95% CI 1.15–1.88), followed by artistic workers, religious etc. workers, printers and administrators (Table 48). The lowest risk was observed in forestry workers (0.70, 0.54–0.88), engine operators and welders.

Sixty percent of the testicular cancers in the present series are seminomas (http://astra.cancer.fi/NOCCA/Incidence/testis-seminoma). Physicians had the highest risk of seminoma with an SIR of 1.48 (95% CI 1.07–1.99), followed by artistic workers (1.47, 1.06–1.99) and religious etc. workers (1.33, 1.14–1.56). The lowest SIRs were observed among cooks and stewards (0.56, 0.29–0.98) and forestry workers (0.64, 0.47–0.86).

The occupational category of administrators was the only one with a significantly elevated SIR of testicular non-seminoma cancer (1.21, 1.04–1.42; http://astra.cancer.fi/NOCCA/Incidence/testis-non-seminoma). The only SIRs significantly below 1.0 were observed among engine operators (0.60, 0.41–0.84) and public safety workers (0.67, 0.43–0.99).

Comment. The mean age at diagnosis of testicular cancer in the Nordic countries is only 30 years, i.e., relatively low as compared with other cancer sites. Many of the cancers were diagnosed before the starting age of follow-up in the present study

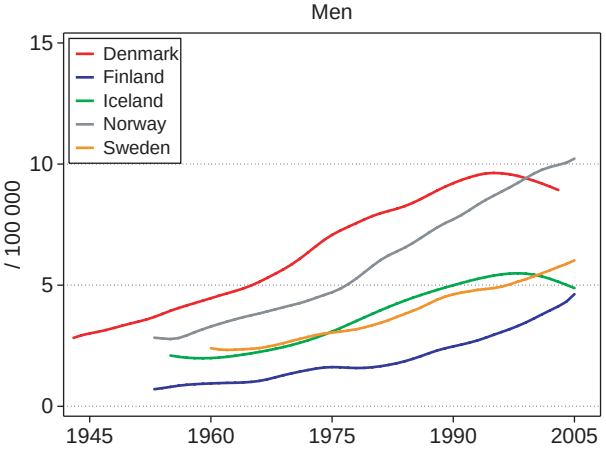


Figure 34. Age standardised (World) incidence rates for testicular cancer 1943–2005, by country. Modified from NORDCAN [49].

Table 47. Observed number of prostate cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	2 306	**1.07**	3 886	**1.17**	49	1.16	2 373	**1.06**	17 827	**1.11**	26 441	**1.11**	1.09—1.12
2	Laboratory assistants	41	0.96	82	1.04	8	1.00	118	1.07	84	1.13	333	1.06	0.95—1.18
3	Physicians	217	**1.16**	240	**1.24**	23	1.22	332	1.05	771	1.07	1 583	**1.10**	1.05—1.16
4	Dentists	62	1.21	48	1.19	1	0.24	184	**1.29**	441	**1.20**	736	**1.22**	1.13—1.31
5	Nurses	[2.23]	0.00	11	1.42	[0.03]	0.00	11	1.21	26	1.04	48	1.09	0.80—1.45
6	Assistant nurses	44	0.88	8	1.33	2	1.26	55	1.01	213	0.93	322	0.94	0.85—1.05
7	"Other health workers"	198	**1.26**	207	1.12	5	1.00	121	1.03	609	1.02	1 140	**1.08**	1.01—1.14
8	Teachers	1 023	**1.09**	1 638	**1.12**	80	1.22	1 822	**1.08**	4 485	**1.07**	9 048	**1.09**	1.06—1.11
9	Religious workers etc	474	**1.10**	873	**1.22**	65	**1.51**	1 000	**1.13**	3 423	**1.13**	5 835	**1.14**	1.11—1.17
10	Artistic workers	164	**1.27**	302	1.12	15	1.25	273	1.06	1 036	**1.08**	1 790	**1.10**	1.05—1.15
11	Journalists	66	1.12	133	1.04	8	1.21	114	1.04	441	1.00	762	1.03	0.96—1.10
12	Administrators	2 816	**1.11**	2 851	**1.31**	137	1.12	3 603	**1.14**	7 249	**1.16**	16 656	**1.17**	1.15—1.19
13	Clerical workers	1 102	1.03	1 614	**1.14**	143	1.06	2 480	**1.06**	7 119	**1.07**	12 458	**1.07**	1.05—1.09
14	Sales agents	662	**1.19**	2 151	**1.07**	85	1.23	3 084	**1.11**	10 450	**1.09**	16 432	**1.10**	1.08—1.12
15	Shop workers	2 664	1.04	838	0.99	45	0.98	1 035	1.02	3 178	1.02	7 760	1.02	1.00—1.05
16	Farmers	4 722	**0.89**	10 239	0.99	167	**0.81**	8 859	**1.04**	17 038	1.00	41 025	0.99	0.98—1.00
17	Gardeners	710	0.96	1 203	**0.84**	6	0.96	1 792	**0.90**	5 503	**0.89**	9 214	**0.89**	0.87—0.91
18	Fishermen	204	0.91	127	0.97	95	0.98	2 219	**0.88**	585	**0.89**	3 230	**0.89**	0.86—0.92
19	Forestry workers	90	0.82	1 241	**0.76**	[0.98]	0.00	1 345	**0.89**	3 839	**0.86**	6 515	**0.84**	0.82—0.87
20	Miners and quarry workers	27	0.84	252	0.99	[1.69]	0.00	358	0.92	928	**0.87**	1 565	**0.89**	0.85—0.94
21	Seamen	263	**1.17**	418	**1.19**	25	0.84	1 860	0.99	1 047	**1.12**	3 613	**1.05**	1.02—1.09
22	Transport workers	510	0.94	1 099	1.03	68	1.04	1 066	1.02	3 389	1.02	6 132	1.02	0.99—1.04
23	Drivers	1 649	0.98	3 308	0.99	74	0.85	2 736	1.01	7 737	0.99	15 504	0.99	0.98—1.01
24	Postal workers	328	1.03	513	1.02	20	**1.68**	546	0.99	1 768	1.02	3 175	1.02	0.99—1.06
25	Textile workers	284	**0.88**	381	1.10	11	**0.52**	637	1.01	1 797	**0.91**	3 110	**0.94**	0.91—0.98
26	Shoe and leather workers	70	0.86	139	0.93	2	0.43	256	0.95	812	1.05	1 279	1.00	0.95—1.06
27	Smelting workers	657	1.00	459	**0.90**	19	0.67	859	1.06	2 802	**0.91**	4 796	**0.95**	0.92—0.97
28	Mechanics	1 781	0.98	3 177	0.99	81	1.01	3 625	**0.96**	13 730	**0.96**	22 394	**0.96**	0.95—0.98
29	Plumbers	177	1.12	563	1.06	15	1.10	398	0.94	1 639	0.99	2 792	1.00	0.97—1.04
30	Welders	–	–	535	**1.10**	5	1.07	422	**0.90**	1 909	1.02	2 871	1.01	0.98—1.05
31	Electrical workers	399	0.98	1 303	0.98	39	0.85	1 679	1.00	4 875	0.99	8 295	0.99	0.97—1.01
32	Wood workers	1 219	**0.94**	3 336	**0.94**	44	0.88	4 685	0.99	9 423	**0.97**	18 707	**0.97**	0.95—0.98
33	Painters	384	0.93	721	0.98	14	0.68	764	0.99	2 758	0.99	4 641	0.98	0.96—1.01
34	"Other construction workers"	1 481	**0.88**	2 031	**0.92**	95	1.01	841	0.95	5 137	1.00	9 585	**0.96**	0.94—0.97
35	Bricklayers	487	1.04	379	1.03	–	–	432	0.93	1 218	0.96	2 516	0.98	0.94—1.02
36	Printers	295	1.05	349	1.09	15	0.97	439	0.98	1 508	1.00	2 606	1.02	0.98—1.05
37	Chemical process workers	261	0.92	483	**0.87**	8	0.87	873	**0.84**	2 126	**0.93**	3 751	**0.90**	0.87—0.93
38	Food workers	876	0.99	382	0.94	71	0.90	1 155	0.98	2 310	0.97	4 794	0.97	0.95—1.00
39	Beverage workers	111	1.05	18	0.67	[1.35]	0.00	8	0.81	124	0.95	261	0.95	0.84—1.08
40	Tobacco workers	22	1.16	4	0.78	[0.11]	0.00	13	0.73	11	1.06	50	0.95	0.71—1.26
41	Glass makers etc	499	0.94	566	1.00	18	1.34	522	0.95	2 379	**0.93**	3 984	**0.94**	0.92—0.97
42	Packers	484	1.00	1 155	0.97	40	0.87	1 752	1.00	4 424	0.97	7 855	0.98	0.96—1.00
43	Engine operators	465	1.00	1 591	0.99	61	1.08	948	1.02	3 716	0.97	6 781	0.98	0.96—1.00
44	Public safety workers	509	**1.12**	1 073	**1.16**	47	1.10	781	1.04	2 483	**1.10**	4 893	**1.11**	1.08—1.14
45	Cooks and stewards	40	1.26	42	0.84	19	1.05	311	1.01	339	0.90	751	0.96	0.89—1.03
46	Domestic assistants	1	2.94	[4.25]	**0.00**	[0.06]	0.00	2	0.82	17	0.70	20	**0.63**	0.39—0.98
47	Waiters	77	1.16	50	1.09	2	1.12	149	1.10	212	1.09	490	**1.10**	1.01—1.20
48	Building caretakers	506	1.05	782	0.99	25	1.20	389	1.02	1 759	1.01	3 461	1.01	0.98—1.05
49	Chimney sweeps	11	0.97	52	0.94	–	–	40	1.05	136	1.07	239	1.03	0.91—1.17
50	Hairdressers	138	0.99	7	**0.46**	3	1.11	111	1.00	437	0.95	696	0.95	0.88—1.02
51	Launderers	67	0.98	20	1.25	3	1.51	75	1.12	345	1.05	510	1.05	0.97—1.15
52	Military personnel	240	**1.16**	325	1.07	–	–	641	1.06	1 510	**1.11**	2 716	**1.10**	1.06—1.14
53	"Other workers"	1 401	1.00	774	**0.86**	195	1.09	3 346	0.98	5 402	0.97	11 118	**0.97**	0.95—0.99
54	Economically inactive	1 510	1.03	3 673	**0.81**	97	0.85	1 239	**0.72**	6 175	**0.78**	12 694	**0.80**	0.79—0.82
1–54	All categories	34 794	1.00	57 652	1.00	2 050	1.00	64 778	1.00	180 699	1.00	339 973	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 48. Observed number of testicular cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	128	1.01	79	1.14	[2.34]	0.00	130	1.19	343	1.04	680	1.06	0.99—1.15
2	Laboratory assistants	1	0.43	1	0.52	[0.50]	0.00	3	0.68	6	1.54	11	0.84	0.42—1.51
3	Physicians	16	1.72	4	1.00	[0.59]	0.00	18	1.55	29	1.48	67	**1.48**	1.15—1.88
4	Dentists	6	1.83	[0.83]	0.00	[0.17]	0.00	5	1.03	2	**0.27**	13	0.78	0.42—1.34
5	Nurses	1	5.12	[0.55]	0.00	[0.03]	0.00	1	0.70	4	0.92	6	0.91	0.34—1.99
6	Assistant nurses	2	0.63	[0.56]	0.00	[0.36]	0.00	4	2.40	7	0.66	13	0.80	0.42—1.36
7	"Other health workers"	11	1.40	2	0.56	[0.21]	0.00	5	1.05	11	0.71	29	0.91	0.61—1.31
8	Teachers	68	1.15	32	1.35	1	0.36	67	0.88	109	1.09	277	1.06	0.94—1.19
9	Religious workers etc	17	0.92	26	1.42	3	1.62	42	1.22	140	**1.38**	228	**1.30**	1.15—1.49
10	Artistic workers	4	0.65	11	**2.12**	2	4.14	11	1.23	32	1.45	60	**1.40**	1.07—1.80
11	Journalists	5	1.63	1	0.42	[0.32]	0.00	6	1.31	16	1.46	28	1.31	0.87—1.90
12	Administrators	121	1.04	46	**1.39**	[1.93]	0.00	110	1.10	130	**1.39**	407	**1.18**	1.07—1.30
13	Clerical workers	81	**1.37**	25	1.24	6	1.54	74	0.96	128	1.10	314	**1.14**	1.02—1.27
14	Sales agents	35	1.10	29	0.89	2	1.36	85	1.06	193	1.06	344	1.05	0.94—1.17
15	Shop workers	134	1.19	11	0.66	2	0.97	49	1.19	50	0.88	246	1.07	0.95—1.22
16	Farmers	155	**0.84**	81	1.10	5	1.21	128	1.00	152	1.07	521	0.97	0.89—1.06
17	Gardeners	21	0.80	15	0.86	[0.19]	0.00	51	1.34	70	0.99	157	1.03	0.88—1.20
18	Fishermen	11	0.95	1	0.76	9	1.13	45	0.87	6	0.83	72	0.90	0.70—1.13
19	Forestry workers	2	0.58	18	0.86	[0.06]	0.00	15	0.62	35	**0.67**	70	**0.70**	0.54—0.88
20	Miners and quarry workers	1	0.88	1	0.28	[0.12]	0.00	14	1.30	7	**0.44**	23	0.73	0.46—1.10
21	Seamen	14	0.93	12	**2.29**	[1.34]	0.00	52	0.78	12	0.74	90	0.86	0.69—1.06
22	Transport workers	22	0.92	16	1.30	[1.18]	0.00	27	1.00	55	1.15	120	1.07	0.89—1.28
23	Drivers	85	0.93	42	0.81	2	0.61	99	1.01	151	0.96	379	0.94	0.85—1.04
24	Postal workers	20	0.98	10	1.23	[0.30]	0.00	25	1.48	32	0.88	87	1.06	0.85—1.31
25	Textile workers	16	1.25	7	1.83	[0.56]	0.00	10	0.82	27	1.23	60	1.17	0.89—1.50
26	Shoe and leather workers	2	0.72	1	0.62	[0.10]	0.00	5	1.12	12	1.72	20	1.25	0.77—1.94
27	Smelting workers	31	0.80	2	0.30	1	1.07	19	0.87	37	0.87	90	0.81	0.65—1.00
28	Mechanics	99	1.00	51	0.89	2	0.41	140	1.02	209	**0.74**	501	**0.87**	0.79—0.94
29	Plumbers	7	0.72	6	0.63	[0.64]	0.00	13	0.74	34	1.09	60	0.88	0.67—1.13
30	Welders	–	–	8	0.68	1	2.79	15	0.68	33	0.77	57	**0.74**	0.56—0.96
31	Electrical workers	30	1.08	21	0.76	3	0.89	51	0.81	111	0.99	216	0.92	0.81—1.06
32	Wood workers	65	1.03	33	0.80	4	1.98	120	1.07	142	1.01	364	1.02	0.92—1.13
33	Painters	25	1.15	11	1.06	1	1.33	17	0.87	33	0.76	87	0.91	0.73—1.12
34	"Other construction workers"	54	0.85	18	0.66	8	1.50	21	0.72	57	**0.75**	158	**0.79**	0.67—0.92
35	Bricklayers	26	1.10	3	0.69	–	–	9	0.81	20	1.27	58	1.06	0.80—1.37
36	Printers	23	1.31	7	1.03	[0.73]	0.00	20	1.22	40	1.31	90	**1.25**	1.01—1.54
37	Chemical process workers	13	1.16	9	1.04	[0.28]	0.00	15	0.63	27	0.80	64	0.82	0.63—1.05
38	Food workers	39	0.92	6	0.97	[3.29]	0.00	31	1.04	31	0.90	107	0.92	0.76—1.11
39	Beverage workers	5	1.06	[0.35]	0.00	[0.05]	0.00	2	2.10	3	1.61	10	1.26	0.61—2.32
40	Tobacco workers	1	1.78	[0.07]	0.00	[0.00]	0.00	[0.37]	0.00	1	4.82	2	1.66	0.20—5.98
41	Glass makers etc	14	0.62	12	1.24	[0.62]	0.00	12	0.65	38	0.91	76	0.82	0.65—1.03
42	Packers	12	0.67	15	0.89	4	2.25	38	0.86	75	1.09	144	0.96	0.82—1.13
43	Engine operators	15	0.63	17	**0.61**	5	1.64	32	0.80	57	**0.76**	126	**0.74**	0.62—0.88
44	Public safety workers	14	0.69	10	0.68	3	2.19	24	1.14	59	1.16	110	1.02	0.84—1.23
45	Cooks and stewards	1	0.48	[1.76]	0.00	[1.14]	0.00	10	0.76	16	1.22	27	0.86	0.57—1.25
46	Domestic assistants	[0.03]	0.00	[0.05]	0.00	[0.00]	0.00	[0.17]	0.00	1	0.30	1	0.28	0.01—1.54
47	Waiters	7	1.95	[1.79]	0.00	[0.17]	0.00	4	0.82	10	1.64	21	1.27	0.79—1.94
48	Building caretakers	27	1.45	13	1.22	[0.27]	0.00	14	1.18	42	1.13	96	1.22	0.99—1.50
49	Chimney sweeps	1	1.49	[0.76]	0.00	–	–	2	1.82	4	1.50	7	1.35	0.54—2.77
50	Hairdressers	6	1.10	1	3.58	[0.12]	0.00	1	0.34	6	1.07	14	0.97	0.53—1.63
51	Launderers	3	1.18	[0.27]	0.00	[0.02]	0.00	2	1.25	5	1.20	10	1.16	0.56—2.13
52	Military personnel	14	0.94	12	1.83	–	–	32	1.47	23	0.87	81	1.16	0.92—1.44
53	"Other workers"	63	0.94	10	0.75	9	1.65	62	0.85	67	0.86	211	0.89	0.78—1.02
54	Economically inactive	44	1.12	78	**1.33**	8	1.32	64	1.21	215	1.04	409	**1.12**	1.02—1.24
1–54	All categories	1 618	1.00	814	1.00	81	1.00	1 851	1.00	3 155	1.00	7 519	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

(30 years) and were therefore excluded from the analyses. Furthermore, for the cases diagnosed shortly after the age of 30, the duration of the occupational exposures before cancer diagnosis are relatively short. The aetiology of testicular cancer is largely unknown. Men from higher social classes seem to be more affected than men in lower social classes, although the socioeconomic differences in incidence seem to be diminishing over time [111,112].

Risk factors for testicular cancer include some genetic disorders, birth defects as cryptorchidism and maldescendent testis and testicular trauma, but previous studies have not identified consistent associations between occupational exposures and testicular cancer [112–114]. One of the explanations offered is the quality of the semen, which seems to decrease along with the increasing quality of life. Many of the high-risk occupations in the present study were of high social strata, but on the other hand there was an increased risk, although not statistically significant, in occupations such as chimney sweeps, shoe and leather workers and printers that may offer hints of direct occupational risk factors such as dusts.

Penile cancer

The highest rates of "cancer of other male genitals" (code 179 in ICD-7) are observed in Denmark, and half of the incidence rates in Denmark are observed in Finland. About 95% of these rare malignancies are penile cancers. There seems to be a temporal increase in Sweden, but no clear trends in other countries (Figure 35).

Journalists have the highest risk for cancer of the penis with an SIR 2.40 (95% CI 1.55–3.54). Other occupational categories with significant elevations are drivers, packers and sales agents. The lowest risks were observed among physicians (0.51, 0.25–0.91) and teachers (Table 49).

Comment. Infection with oncogenic strains of human papilloma virus (HPV) is the major established risk factor for penile cancer [115]. Smoking has also been identified as a risk factor for penile cancer, specifically where the HPV prevalence is low. Social class is not clearly associated with the risk of penile cancer in previous studies [111,116] but the present study suggests that professions associated with high education have a decreased penile cancer risk. Earlier studies have not pointed towards any evident high-risk occupations of penile cancer and therefore, e.g., the quite strong finding of an excess risk among the Nordic journalists needs to be interpreted with caution.

Cancer of kidney and renal pelvis

Incidence of cancer of the kidney and renal pelvis in the Nordic countries varies considerably, with the highest SIR observed in Iceland (Figure 36). Incidence in men is about twice the incidence in women, but the ratio varies between countries. The incidence in Sweden turned to a decrease around the year 1980 and in Finland in the 1990s, while there is still an increasing trend in Norway for both men and women.

Among men, waiters (SIR 1.29, 95% CI 1.04–1.57), welders, and cooks and stewards have the highest risk of kidney cancer (Table 50). The lowest significant risk was seen among forestry workers (0.77, 0.72–0.82) and farmers (0.77, 0.75–0.79). None of the female occupations showed a significantly elevated risk of kidney cancer above 1.2. The

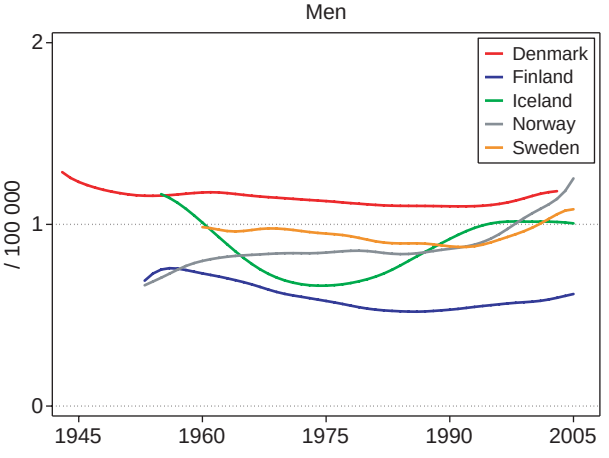


Figure 35. Age standardised (World) incidence rates for cancer of the other male genitals 1943–2005, by country. Modified from NORDCAN [49].

Table 49. Observed number of cancer of the penis among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	60	0.95	22	0.79	2	3.16	45	1.26	165	0.82	294	0.89	0.80—1.00
2	Laboratory assistants	[1.22]	0.00	2	2.80	[0.12]	0.00	2	1.16	1	0.86	5	1.01	0.33—2.36
3	Physicians	4	0.76	2	1.25	[0.25]	0.00	1	0.20	4	0.42	11	0.51	0.25—0.91
4	Dentists	2	1.31	[0.33]	0.00	[0.06]	0.00	3	1.34	1	0.22	6	0.69	0.25—1.50
5	Nurses	[0.07]	0.00	[0.12]	0.00	[0.00]	0.00	[0.21]	0.00	[0.77]	0.00	[1.17]	0.00	0.00—3.14
6	Assistant nurses	3	2.01	[0.11]	0.00	[0.03]	0.00	1	1.22	3	0.84	7	1.16	0.47—2.40
7	"Other health workers"	4	0.90	1	0.66	[0.07]	0.00	4	2.13	9	1.13	18	1.13	0.67—1.79
8	Teachers	26	0.93	8	0.73	2	2.23	17	0.62	37	0.69	90	0.75	0.60—0.92
9	Religious workers etc	8	0.67	5	0.75	2	3.26	19	1.36	36	0.84	70	0.92	0.72—1.17
10	Artistic workers	1	0.28	3	1.38	[0.16]	0.00	1	0.25	12	0.97	17	0.76	0.44—1.22
11	Journalists	3	1.79	3	2.84	[0.10]	0.00	2	1.15	17	2.91	25	2.40	1.55—3.54
12	Administrators	74	1.05	14	0.85	1	0.64	54	1.11	72	0.95	215	1.01	0.88—1.15
13	Clerical workers	32	1.04	14	1.32	1	0.56	38	1.06	92	1.12	177	1.10	0.95—1.27
14	Sales agents	18	1.12	16	1.03	1	1.10	52	1.23	138	1.15	225	1.15	1.01—1.31
15	Shop workers	80	1.13	4	0.58	[0.62]	0.00	18	1.12	36	0.94	138	1.04	0.88—1.23
16	Farmers	103	0.73	58	0.88	1	0.38	93	0.75	176	0.90	431	0.81	0.74—0.89
17	Gardeners	22	1.12	10	0.99	[0.08]	0.00	26	0.89	57	0.78	115	0.87	0.72—1.04
18	Fishermen	4	0.63	1	1.12	2	1.32	33	0.88	5	0.64	45	0.83	0.61—1.12
19	Forestry workers	2	0.70	11	0.93	[0.01]	0.00	20	0.90	63	1.19	96	1.07	0.86—1.30
20	Miners and quarry workers	1	1.17	3	1.54	[0.02]	0.00	8	1.35	16	1.20	28	1.27	0.84—1.83
21	Seamen	17	2.53	3	1.12	[0.42]	0.00	25	0.85	12	1.01	57	1.11	0.84—1.44
22	Transport workers	13	0.87	7	0.94	2	2.39	9	0.58	37	0.94	68	0.87	0.68—1.10
23	Drivers	62	1.29	27	1.07	4	3.36	58	1.36	129	1.29	280	1.29	1.15—1.45
24	Postal workers	11	1.16	3	0.78	[0.16]	0.00	11	1.27	22	0.99	47	1.06	0.78—1.41
25	Textile workers	14	1.61	2	0.84	[0.27]	0.00	7	0.76	19	0.81	42	0.96	0.69—1.29
26	Shoe and leather workers	2	0.94	3	2.89	[0.06]	0.00	3	0.75	7	0.76	15	0.91	0.51—1.51
27	Smelting workers	21	1.10	3	0.80	[0.38]	0.00	11	0.89	42	1.12	77	1.05	0.83—1.32
28	Mechanics	47	0.91	24	0.93	1	0.86	60	1.01	175	0.97	307	0.96	0.86—1.08
29	Plumbers	7	1.50	9	2.09	2	10.52	10	1.48	20	0.97	48	1.31	0.97—1.74
30	Welders	–	–	4	0.91	[0.07]	0.00	6	0.80	18	0.75	28	0.78	0.52—1.12
31	Electrical workers	15	1.23	10	0.89	[0.71]	0.00	27	1.02	54	0.85	106	0.93	0.77—1.13
32	Wood workers	25	0.69	23	0.91	[0.69]	0.00	57	0.82	97	0.82	202	0.81	0.70—0.93
33	Painters	8	0.68	9	1.65	[0.29]	0.00	7	0.60	38	1.10	62	0.97	0.75—1.25
34	"Other construction workers"	43	0.96	19	1.16	[1.36]	0.00	14	1.01	70	1.10	146	1.04	0.89—1.22
35	Bricklayers	9	0.68	4	1.55	–	–	2	0.29	13	0.85	28	0.74	0.49—1.07
36	Printers	7	0.84	1	0.37	1	4.42	6	0.84	25	1.31	40	1.07	0.76—1.45
37	Chemical process workers	5	0.66	3	0.71	[0.12]	0.00	18	1.14	29	1.02	55	0.98	0.74—1.27
38	Food workers	18	0.73	2	0.66	[1.06]	0.00	24	1.35	32	1.11	76	1.01	0.79—1.26
39	Beverage workers	6	2.08	1	5.00	[0.02]	0.00	[0.19]	0.00	3	1.85	10	2.03	0.98—3.74
40	Tobacco workers	1	2.03	[0.04]	0.00	[0.00]	0.00	1	3.62	[0.13]	0.00	2	2.12	0.26—7.67
41	Glass makers etc	14	0.97	3	0.66	[0.17]	0.00	12	1.40	31	0.98	60	1.01	0.77—1.30
42	Packers	21	1.63	6	0.67	2	3.24	33	1.23	73	1.28	135	1.27	1.07—1.50
43	Engine operators	13	0.99	14	1.10	[0.81]	0.00	18	1.20	50	1.02	95	1.05	0.85—1.28
44	Public safety workers	8	0.63	8	1.12	1	1.81	12	1.07	31	1.07	60	0.99	0.75—1.27
45	Cooks and stewards	1	1.06	[0.53]	0.00	[0.27]	0.00	3	0.60	9	1.64	13	1.06	0.57—1.82
46	Domestic assistants	[0.01]	0.00	[0.03]	0.00	[0.00]	0.00	[0.04]	0.00	1	1.64	1	1.44	0.04—8.04
47	Waiters	4	2.13	[0.53]	0.00	[0.03]	0.00	4	1.86	3	1.08	11	1.49	0.75—2.67
48	Building caretakers	7	0.54	4	0.68	[0.25]	0.00	9	1.49	23	1.00	43	0.90	0.65—1.21
49	Chimney sweeps	[0.33]	0.00	1	2.32	–	–	[0.59]	0.00	1	0.61	2	0.67	0.08—2.42
50	Hairdressers	5	1.32	[0.13]	0.00	[0.04]	0.00	1	0.58	5	0.90	11	0.98	0.49—1.75
51	Launderers	2	1.08	[0.13]	0.00	[0.02]	0.00	4	3.94	4	1.01	10	1.43	0.69—2.63
52	Military personnel	9	1.42	2	0.79	–	–	12	1.31	18	1.07	41	1.18	0.84—1.60
53	"Other workers"	41	1.05	9	1.28	2	0.84	51	0.98	75	1.09	178	1.05	0.91—1.22
54	Economically inactive	63	1.73	51	1.40	1	0.64	38	1.27	146	1.33	299	1.40	1.25—1.56
1–54	All categories	966	1.00	432	1.00	28	1.00	990	1.00	2 252	1.00	4 668	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

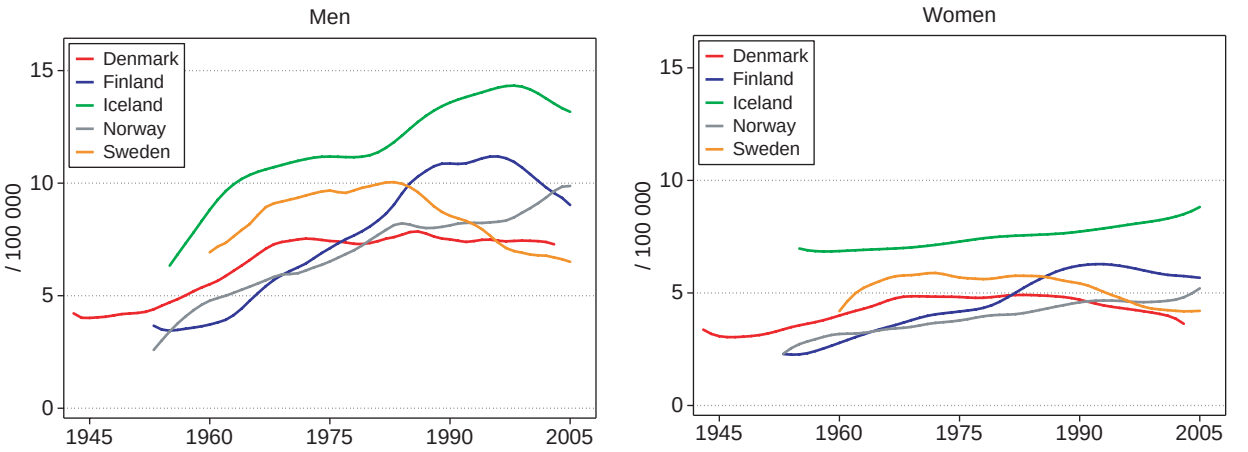


Figure 36. Age standardised (World) incidence rates for kidney cancer 1943–2005, by country and gender. Modified from NORDCAN [49].

lowest significant risks were found for women working as dentists (0.56, 0.33–0.90), technical workers and laboratory assistants (Table 51).

The variation of the SIR was essentially larger when focused on only renal pelvis cancer (http://astra.cancer.fi/NOCCA/Incidence/renal-pelvis), which constitutes about one-tenth of renal cancers. High SIRs of cancer in men for renal pelvis cancer was observed among seamen (1.52, 1.26–1.85), printers (1.39, 1.09–1.74), welders (1.39, 1.05–1.80), public safety workers (1.34, 1.12–1.61) and textile workers (1.30, 1.04–1.61). Low-risk occupational groups included forestry workers (0.48, 0.36–0.62) and farmers (0.60, 0.55–0.66). Among women, a small increase in risk was found in clerical workers (1.19, 1.08–1.31) and shop workers (1.16, 1.04–1.31). Female religious etc. workers, on the contrary had the lowest significant risk (0.53, 0.29–0.89), followed by farmers (0.57, 0.45–0.72) and gardeners (0.66, 0.50–0.86).

Comment. Kidney cancer is associated with smoking and obesity [117]. Exposures and occupations previously reported to be associated with kidney cancer in a consistent way include trichloroethylene and coke production [118]. Workers in petroleum-related and dry-cleaning industries, as well as workers exposed to gasoline, have previously been found to have an increased risk of renal cancer in Finland. In the present study relatively little variation between occupations were seen, and no occupation presented a very high or very low SIR. In particular among women, there were no indications of any increased risk of kidney cancer associated with occupations.

Work-related risks for cancer of the renal pelvis have been observed to resemble the occupational associations that are more clearly established for bladder cancer [117]. In the present study, all occupations with the highest SIR for cancer of the renal pelvis also had SIRs above 1.0 for bladder cancer (Tables 52 and 53), but the relative excess tended to be larger in renal cell cancer.

Bladder cancer

The incidence of bladder cancer in the Nordic countries is several times higher in males than in females (Figure 37). There was an increasing incidence over time until the 1980s. The increase then levelled off in all countries, and even started to decline in Denmark and Finland.

Among men, the highest SIRs were observed in waiters (SIR 1.50, 95% CI 1.32–1.69), chimney sweeps, hairdressers, assistant nurses, seamen, cooks and stewards, plumbers and beverage workers (Table 52). The SIRs were lowest among farmers (0.68, 0.67–0.70), forestry workers and gardeners.

The highest risks among women were found in tobacco workers (2.01, 1.49–2.65), printers, waiters, chemical process workers, sales agents and hairdressers (Table 53). Farmers (0.66, 0.62–0.72) and gardeners had SIRs significantly below 1.0.

Comment. Cigarette smoking is a well established cause of bladder cancer [121]. Several chemical exposures have been associated with the development of bladder cancer. They include 4-aminobiphenyl, benzidine, coal tars and pitches, mineral oils, untreated and mildly treated 2-naphthylaminec, benz[a]anthracene, benz[a]pyrene, benzidine-based dyes, 4-chloro-ortho-toluidine, dibenz[a, h] anthracene, diesel engine exhaust, 4,4 -methylene-bis(2-chloroaniline) (MOCA) and polychlorinated biphenyls [95]. Some industrial processes and occupations have also been identified as being associated with the development of bladder can-

Table 50. Observed number of kidney cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	418	1.02	652	**1.10**	6	0.67	332	0.91	2 239	**1.05**	3 647	**1.04**	1.01—1.08
2	Laboratory assistants	3	0.37	16	1.08	3	1.81	12	0.69	8	0.78	42	0.80	0.58—1.08
3	Physicians	29	0.87	41	1.19	4	1.19	35	0.75	95	0.99	204	0.95	0.83—1.09
4	Dentists	10	1.02	8	1.14	1	1.11	20	0.97	50	1.05	89	1.03	0.83—1.27
5	Nurses	1	2.17	3	1.51	[0.03]	0.00	[2.18]	0.00	3	0.60	7	0.72	0.29—1.49
6	Assistant nurses	8	0.82	2	1.07	1	2.22	4	0.50	44	1.30	59	1.10	0.83—1.41
7	"Other health workers"	25	0.85	30	0.92	2	2.17	19	1.05	83	1.02	159	0.98	0.84—1.14
8	Teachers	151	**0.85**	197	**0.79**	15	1.20	217	**0.83**	510	0.94	1 090	**0.88**	0.83—0.93
9	Religious workers etc	85	1.14	130	0.97	10	1.21	111	0.83	415	0.99	751	0.98	0.91—1.05
10	Artistic workers	26	1.11	45	0.95	4	1.81	46	1.18	135	1.04	256	1.06	0.94—1.20
11	Journalists	9	0.81	25	1.08	2	1.53	16	0.93	80	**1.32**	132	1.17	0.98—1.38
12	Administrators	469	1.02	416	**1.14**	26	1.29	479	1.02	911	**1.11**	2 301	**1.08**	1.04—1.12
13	Clerical workers	208	1.03	263	1.11	27	1.17	371	1.05	941	1.06	1 810	**1.06**	1.01—1.11
14	Sales agents	141	**1.32**	402	**1.16**	7	0.60	429	1.06	1 419	**1.10**	2 398	**1.11**	1.07—1.16
15	Shop workers	553	**1.20**	179	**1.19**	5	0.60	173	1.08	441	1.06	1 351	**1.13**	1.07—1.19
16	Farmers	563	**0.64**	1 256	**0.80**	31	0.93	862	**0.78**	1 746	**0.79**	4 458	**0.77**	0.75—0.79
17	Gardeners	102	**0.81**	185	**0.79**	1	0.90	244	**0.88**	701	**0.85**	1 233	**0.84**	0.80—0.89
18	Fishermen	61	**1.43**	19	0.93	18	0.83	393	1.11	81	0.93	572	1.08	1.00—1.18
19	Forestry workers	7	**0.38**	192	**0.69**	[0.20]	0.00	155	**0.76**	495	**0.82**	849	**0.77**	0.72—0.82
20	Miners and quarry workers	4	0.70	49	1.09	1	2.84	67	1.15	157	1.05	278	1.07	0.95—1.21
21	Seamen	59	1.27	83	**1.38**	8	1.44	339	**1.15**	139	1.06	628	**1.17**	1.08—1.26
22	Transport workers	104	1.03	187	1.08	12	1.12	187	**1.21**	466	1.06	956	**1.09**	1.02—1.16
23	Drivers	355	1.08	688	**1.19**	10	0.62	519	**1.21**	1 175	**1.09**	2 747	**1.13**	1.09—1.18
24	Postal workers	62	0.98	94	1.10	4	2.00	68	0.84	232	0.99	460	0.99	0.90—1.08
25	Textile workers	62	1.07	62	1.12	4	1.18	104	1.18	243	0.92	475	1.01	0.93—1.11
26	Shoe and leather workers	15	1.05	22	0.93	1	1.39	46	1.24	102	0.97	186	1.03	0.89—1.19
27	Smelting workers	166	**1.28**	66	**0.77**	2	0.41	138	1.15	442	1.05	814	1.07	1.00—1.15
28	Mechanics	350	1.00	622	**1.10**	16	0.99	627	1.06	2 054	**1.06**	3 669	**1.06**	1.02—1.09
29	Plumbers	41	1.31	104	1.08	2	0.78	72	1.04	252	1.12	471	**1.11**	1.02—1.22
30	Welders	–	–	112	1.20	2	2.04	105	**1.34**	314	**1.23**	533	**1.25**	1.14—1.36
31	Electrical workers	101	**1.22**	245	1.01	14	1.44	267	1.02	662	0.99	1 289	1.02	0.97—1.08
32	Wood workers	243	1.02	563	0.97	7	0.79	606	**0.90**	1 183	**0.91**	2 602	**0.93**	0.89—0.97
33	Painters	80	1.01	117	0.94	2	0.57	119	1.05	353	0.94	671	0.96	0.89—1.04
34	"Other construction workers"	300	1.00	373	0.99	11	0.59	137	1.01	667	0.94	1 488	0.97	0.92—1.02
35	Bricklayers	90	1.04	51	0.84	–	–	72	1.07	172	1.01	385	1.00	0.90—1.10
36	Printers	49	0.88	63	1.08	1	0.34	83	1.20	199	0.98	395	1.01	0.92—1.12
37	Chemical process workers	41	0.80	99	1.03	[1.61]	0.00	121	**0.81**	309	0.98	570	0.93	0.85—1.01
38	Food workers	181	1.09	89	**1.28**	11	0.79	190	1.11	341	1.07	812	**1.10**	1.03—1.18
39	Beverage workers	30	1.46	4	0.91	[0.24]	0.00	2	1.00	16	0.88	52	1.15	0.86—1.50
40	Tobacco workers	4	1.21	1	1.24	[0.01]	0.00	5	1.93	2	1.40	12	1.47	0.76—2.57
41	Glass makers etc	91	0.93	87	0.87	4	1.60	91	1.08	323	0.93	596	0.94	0.87—1.02
42	Packers	101	1.16	194	0.96	12	1.52	264	1.03	693	**1.10**	1 264	**1.07**	1.01—1.13
43	Engine operators	87	0.99	326	**1.14**	12	1.08	147	0.98	570	1.08	1 142	**1.08**	1.02—1.14
44	Public safety workers	91	1.12	174	1.09	9	1.17	144	**1.30**	350	**1.15**	768	**1.16**	1.08—1.24
45	Cooks and stewards	11	1.68	14	1.37	3	0.80	59	1.18	68	1.24	155	**1.24**	1.06—1.45
46	Domestic assistants	[0.07]	0.00	1	1.77	[0.01]	0.00	1	2.35	2	0.45	4	0.72	0.20—1.84
47	Waiters	28	**2.00**	11	1.11	[0.42]	0.00	29	1.36	28	0.97	96	**1.29**	1.04—1.57
48	Building caretakers	86	0.98	133	1.01	2	0.63	61	1.08	249	1.03	531	1.02	0.93—1.11
49	Chimney sweeps	2	0.88	8	0.81	–	–	6	1.03	26	1.47	42	1.18	0.85—1.59
50	Hairdressers	36	**1.45**	2	0.73	[0.54]	0.00	20	1.21	61	0.98	119	1.11	0.93—1.33
51	Launderers	11	0.91	3	1.06	[0.30]	0.00	10	1.02	38	0.85	62	0.89	0.68—1.14
52	Military personnel	41	0.97	76	**1.37**	–	–	118	**1.24**	182	1.02	417	**1.12**	1.02—1.24
53	"Other workers"	280	1.04	147	0.93	37	1.22	510	1.06	697	**0.91**	1 671	0.98	0.93—1.03
54	Economically inactive	304	**1.13**	785	1.01	23	1.03	239	0.98	1 225	1.05	2 576	1.04	1.00—1.08
1–54	All categories	6 375	1.00	9 716	1.00	373	1.00	9 491	1.00	24 389	1.00	50 344	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 51. Observed number of kidney cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	12	0.83	21	0.58	[0.61]	0.00	6	0.80	49	0.75	88	0.71	0.57—0.87
2	Laboratory assistants	9	0.89	16	0.74	[0.91]	0.00	6	0.61	10	0.68	41	0.72	0.52—0.97
3	Physicians	3	0.63	7	0.80	[0.16]	0.00	1	0.25	11	0.78	22	0.69	0.43—1.05
4	Dentists	2	0.47	4	0.38	[0.06]	0.00	1	0.29	10	0.84	17	0.56	0.33—0.90
5	Nurses	68	0.81	100	0.92	6	1.36	58	0.75	183	0.91	415	0.87	0.79—0.96
6	Assistant nurses	47	0.77	85	0.72	5	0.81	72	0.93	342	0.99	551	0.91	0.83—0.98
7	"Other health workers"	40	0.83	68	0.75	2	1.59	71	0.91	124	1.09	305	0.92	0.82—1.03
8	Teachers	75	0.72	205	1.00	4	0.52	120	0.82	380	0.84	784	0.86	0.80—0.92
9	Religious workers etc	7	0.49	94	1.05	1	0.85	25	0.68	117	0.84	244	0.87	0.77—0.99
10	Artistic workers	6	0.80	18	1.14	[0.96]	0.00	7	0.62	25	0.88	56	0.87	0.66—1.13
11	Journalists	[1.60]	0.00	10	0.95	[0.24]	0.00	2	0.68	11	0.85	23	0.81	0.52—1.22
12	Administrators	44	0.97	33	0.97	[0.78]	0.00	30	0.81	46	0.71	153	0.84	0.72—0.98
13	Clerical workers	420	0.97	621	0.95	24	1.00	458	0.95	1 034	0.92	2 557	0.94	0.90—0.98
14	Sales agents	3	0.75	114	1.14	5	1.91	59	0.84	158	0.93	339	0.97	0.88—1.08
15	Shop workers	298	0.99	374	1.00	14	0.91	370	0.89	763	1.01	1 819	0.98	0.94—1.03
16	Farmers	174	0.84	226	0.96	14	1.21	317	1.09	75	1.09	806	0.99	0.93—1.06
17	Gardeners	21	0.77	692	0.99	1	2.55	196	1.12	177	0.88	1 087	0.99	0.93—1.05
18	Fishermen	1	0.95	[1.46]	0.00	[0.39]	0.00	1	0.48	1	1.56	3	0.53	0.11—1.56
19	Forestry workers	[0.28]	0.00	2	0.72	[0.05]	0.00	2	0.62	5	1.21	9	0.86	0.39—1.63
20	Miners and quarry workers	[0.02]	0.00	[1.24]	0.00	[0.01]	0.00	[0.15]	0.00	1	1.06	1	0.42	0.01—2.36
21	Seamen	–	–	[0.32]	0.00	[0.00]	0.00	[0.48]	0.00	[0.09]	0.00	[0.89]	0.00	0.00—4.16
22	Transport workers	[0.30]	0.00	28	1.47	1	2.36	1	0.47	11	0.97	41	1.23	0.88—1.67
23	Drivers	6	0.80	5	0.62	[0.19]	0.00	5	0.62	28	1.05	44	0.87	0.63—1.17
24	Postal workers	13	0.82	119	1.05	6	1.14	102	1.07	230	1.11	470	1.07	0.98—1.18
25	Textile workers	113	1.12	252	0.99	11	1.12	139	0.88	472	1.04	987	1.01	0.95—1.07
26	Shoe and leather workers	1	0.13	27	0.85	2	3.90	11	0.97	42	1.20	83	0.97	0.77—1.20
27	Smelting workers	3	1.65	9	1.19	[0.02]	0.00	1	0.89	6	0.71	19	1.00	0.60—1.57
28	Mechanics	14	0.79	26	0.81	[0.09]	0.00	14	1.04	116	1.33	170	1.13	0.97—1.31
29	Plumbers	[0.17]	0.00	[0.07]	0.00	–	–	[0.09]	0.00	[0.10]	0.00	[0.43]	0.00	0.00—8.53
30	Welders	–	–	4	1.66	[0.01]	0.00	[0.88]	0.00	3	1.02	7	1.12	0.45—2.31
31	Electrical workers	29	1.17	18	0.91	[0.08]	0.00	14	0.98	53	1.11	114	1.07	0.89—1.28
32	Wood workers	13	1.57	63	0.95	[0.16]	0.00	4	0.86	10	0.71	90	0.96	0.78—1.19
33	Painters	[0.32]	0.00	6	0.77	[0.04]	0.00	[1.09]	0.00	2	0.52	8	0.61	0.26—1.21
34	"Other construction workers"	[0.25]	0.00	39	1.45	[0.03]	0.00	[0.41]	0.00	[0.41]	0.00	39	1.39	0.99—1.90
35	Bricklayers	[0.05]	0.00	[0.87]	0.00	–	–	[0.02]	0.00	[0.01]	0.00	[0.95]	0.00	0.00—3.87
36	Printers	13	1.38	28	0.88	1	1.24	14	1.08	42	1.12	98	1.06	0.86—1.29
37	Chemical process workers	19	1.27	9	0.54	[0.37]	0.00	10	0.85	35	1.15	73	0.98	0.77—1.24
38	Food workers	73	1.01	88	1.01	16	0.81	86	1.12	94	1.00	357	1.02	0.92—1.13
39	Beverage workers	12	1.71	2	0.40	[0.05]	0.00	1	1.53	3	0.50	18	0.96	0.57—1.52
40	Tobacco workers	11	1.14	3	1.07	–	–	3	1.11	5	1.41	22	1.18	0.74—1.78
41	Glass makers etc	17	0.97	49	0.81	1	1.87	27	1.07	75	0.93	169	0.92	0.79—1.07
42	Packers	3	0.59	124	1.15	2	1.03	78	1.28	123	1.01	330	1.11	1.00—1.24
43	Engine operators	[0.14]	0.00	19	1.11	[0.03]	0.00	1	1.32	3	0.45	23	0.93	0.59—1.40
44	Public safety workers	[0.61]	0.00	11	2.90	[0.39]	0.00	7	0.94	7	0.85	25	1.22	0.79—1.80
45	Cooks and stewards	[0.19]	0.00	120	1.01	8	1.08	104	1.20	176	0.95	408	1.03	0.93—1.13
46	Domestic assistants	130	1.15	108	0.91	2	0.92	192	0.85	435	0.96	867	0.95	0.89—1.02
47	Waiters	21	1.08	96	0.96	[0.83]	0.00	85	0.92	198	1.05	400	1.00	0.91—1.10
48	Building caretakers	362	1.10	446	1.08	21	1.40	444	1.13	540	1.13	1 813	1.11	1.06—1.17
49	Chimney sweeps	[0.03]	0.00	[0.21]	0.00	–	–	[0.06]	0.00	[0.01]	0.00	[0.31]	0.00	0.00—11.91
50	Hairdressers	23	1.21	34	0.92	1	1.29	21	0.90	70	0.95	149	0.97	0.82—1.14
51	Launderers	41	1.10	24	0.71	[2.45]	0.00	25	0.72	111	1.10	201	0.96	0.84—1.10
52	Military personnel	2	10.28	[0.32]	0.00	–	–	[0.10]	0.00	[0.21]	0.00	2	2.44	0.30—8.80
53	"Other workers"	100	1.08	134	1.07	17	1.13	195	0.97	221	1.05	667	1.04	0.96—1.12
54	Economically inactive	2 571	1.02	2 893	1.04	51	0.96	2 765	1.04	10 324	1.01	18 604	1.02	1.01—1.04
1–54	All categories	4 820	1.00	7 474	1.00	216	1.00	6 151	1.00	16 957	1.00	35 618	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 52. Observed number of cancer of the bladder, ureter, and urethra among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	1 776	1.03	676	0.91	9	0.72	715	0.89	4 503	1.07	7 679	1.02	1.00—1.05
2	Laboratory assistants	48	1.40	14	0.80	3	1.27	42	1.07	17	0.93	124	1.11	0.93—1.32
3	Physicians	121	0.82	51	1.20	6	1.16	107	0.99	220	1.17	505	1.03	0.94—1.12
4	Dentists	48	1.16	8	0.87	[1.23]	0.00	48	1.00	110	1.16	214	1.10	0.96—1.26
5	Nurses	1	0.53	2	1.12	[0.03]	0.00	1	0.27	7	0.88	11	0.72	0.36—1.29
6	Assistant nurses	50	1.22	1	0.70	[0.57]	0.00	28	1.48	80	1.28	159	1.28	1.09—1.49
7	"Other health workers"	121	0.97	33	0.76	1	0.72	43	1.05	172	1.08	370	1.00	0.90—1.11
8	Teachers	611	0.80	258	0.82	17	0.92	473	0.81	938	0.87	2 297	0.84	0.80—0.87
9	Religious workers etc	277	0.84	158	0.96	5	0.41	277	0.91	762	0.95	1 479	0.92	0.87—0.96
10	Artistic workers	95	0.95	65	1.07	5	1.48	98	1.09	331	1.30	594	1.17	1.08—1.27
11	Journalists	45	0.96	29	0.97	2	1.06	34	0.88	128	1.09	238	1.02	0.89—1.15
12	Administrators	2 035	1.02	517	1.03	29	0.90	1 192	1.09	1 849	1.12	5 622	1.07	1.04—1.10
13	Clerical workers	885	1.04	362	1.08	43	1.19	797	0.97	2 041	1.16	4 128	1.09	1.06—1.12
14	Sales agents	547	1.23	476	1.03	14	0.76	1 054	1.11	3 004	1.19	5 095	1.16	1.12—1.19
15	Shop workers	2 132	1.07	188	1.01	14	1.11	366	1.01	909	1.11	3 609	1.07	1.04—1.11
16	Farmers	2 282	0.57	2 135	0.84	31	0.58	2 022	0.73	2 977	0.67	9 447	0.68	0.67—0.70
17	Gardeners	429	0.77	284	0.85	1	0.61	488	0.71	1 289	0.79	2 491	0.77	0.74—0.81
18	Fishermen	205	1.16	23	0.71	34	1.15	1 005	1.17	183	1.05	1 450	1.14	1.08—1.20
19	Forestry workers	71	0.86	381	0.99	[0.26]	0.00	349	0.69	798	0.67	1 599	0.74	0.71—0.78
20	Miners and quarry workers	24	0.98	78	1.29	[0.50]	0.00	106	0.77	272	0.94	480	0.94	0.86—1.03
21	Seamen	231	1.26	108	1.34	12	1.42	813	1.21	314	1.24	1 478	1.23	1.17—1.30
22	Transport workers	486	1.12	265	1.05	13	0.76	391	1.07	952	1.07	2 107	1.08	1.03—1.12
23	Drivers	1 621	1.21	822	1.10	32	1.32	1 152	1.18	2 346	1.12	5 973	1.15	1.12—1.18
24	Postal workers	296	1.12	112	0.96	2	0.63	208	1.11	488	1.06	1 106	1.07	1.01—1.14
25	Textile workers	273	1.11	78	0.96	4	0.73	241	1.11	537	1.02	1 133	1.05	0.99—1.12
26	Shoe and leather workers	76	1.24	23	0.64	1	0.84	94	1.04	234	1.13	428	1.08	0.98—1.19
27	Smelting workers	658	1.25	142	1.17	6	0.79	316	1.12	807	0.98	1 929	1.10	1.05—1.15
28	Mechanics	1 636	1.14	773	1.05	21	0.91	1 574	1.17	4 134	1.08	8 138	1.11	1.08—1.13
29	Plumbers	166	1.31	149	1.23	5	1.31	195	1.27	507	1.15	1 022	1.21	1.14—1.29
30	Welders	–	–	131	1.22	2	1.47	198	1.15	491	0.99	822	1.06	0.99—1.13
31	Electrical workers	395	1.20	307	1.01	11	0.80	682	1.15	1 363	1.05	2 758	1.09	1.05—1.13
32	Wood workers	985	0.97	878	1.02	14	1.02	1 562	0.96	2 259	0.88	5 698	0.94	0.91—0.96
33	Painters	395	1.21	160	0.93	10	1.78	291	1.09	786	1.06	1 642	1.08	1.03—1.14
34	"Other construction workers"	1 259	0.98	583	1.07	27	1.00	336	1.09	1 387	1.01	3 592	1.02	0.98—1.05
35	Bricklayers	393	1.08	94	1.06	–	–	154	0.96	335	1.00	976	1.03	0.97—1.10
36	Printers	260	1.16	81	1.13	8	1.80	198	1.27	471	1.19	1 018	1.19	1.12—1.27
37	Chemical process workers	219	1.01	141	1.11	2	0.81	367	1.03	660	1.07	1 389	1.05	1.00—1.11
38	Food workers	790	1.14	111	1.20	23	1.09	442	1.09	702	1.11	2 068	1.12	1.07—1.17
39	Beverage workers	98	1.19	2	0.31	[0.36]	0.00	3	0.81	50	1.44	153	1.20	1.02—1.40
40	Tobacco workers	15	1.06	1	0.91	[0.03]	0.00	9	1.48	4	1.44	29	1.20	0.80—1.72
41	Glass makers etc	417	1.01	149	1.12	4	1.09	215	1.12	701	1.03	1 486	1.05	0.99—1.10
42	Packers	380	1.03	302	1.06	12	0.97	706	1.17	1 300	1.06	2 700	1.08	1.04—1.13
43	Engine operators	360	0.98	416	1.15	15	0.93	363	1.10	1 066	1.05	2 220	1.06	1.02—1.10
44	Public safety workers	430	1.22	242	1.12	8	0.69	260	1.00	625	1.05	1 565	1.09	1.04—1.15
45	Cooks and stewards	36	1.42	8	0.66	7	1.31	116	1.05	142	1.38	309	1.21	1.08—1.35
46	Domestic assistants	1	3.74	[1.04]	0.00	[0.02]	0.00	2	2.23	4	0.54	7	0.72	0.29—1.49
47	Waiters	103	1.96	11	1.00	2	3.59	50	1.03	83	1.54	249	1.50	1.32—1.69
48	Building caretakers	413	1.11	215	1.12	9	1.71	148	1.14	491	1.05	1 276	1.10	1.04—1.16
49	Chimney sweeps	16	1.74	16	1.17	–	–	15	1.12	58	1.71	105	1.49	1.23—1.81
50	Hairdressers	142	1.33	5	1.34	1	1.28	53	1.37	158	1.27	359	1.31	1.18—1.45
51	Launderers	49	0.93	4	1.05	1	2.00	30	1.28	102	1.15	186	1.10	0.95—1.27
52	Military personnel	204	1.16	62	0.98	–	–	245	1.13	404	1.12	915	1.12	1.05—1.19
53	"Other workers"	1 268	1.16	195	0.88	63	1.32	1 155	1.00	1 400	0.94	4 081	1.02	0.99—1.05
54	Economically inactive	1 189	1.14	1 391	1.10	36	1.11	443	0.81	1 934	0.90	4 993	1.00	0.97—1.02
1–54	All categories	27 063	1.00	13 716	1.00	565	1.00	22 272	1.00	47 885	1.00	111 501	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 53. Observed number of cancer of the bladder, ureter, and urethra among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	30	1.15	21	1.19	[0.45]	0.00	8	0.95	67	1.04	126	1.08	0.90—1.28
2	Laboratory assistants	17	0.93	17	1.60	[0.68]	0.00	10	0.87	14	0.98	58	1.05	0.79—1.35
3	Physicians	8	0.91	6	1.45	[0.14]	0.00	2	0.43	8	0.58	24	0.76	0.49—1.13
4	Dentists	6	0.77	6	1.02	[0.05]	0.00	3	0.72	6	0.51	21	0.71	0.44—1.08
5	Nurses	141	0.91	67	1.25	2	0.56	85	0.94	209	1.05	504	1.00	0.92—1.10
6	Assistant nurses	137	**1.25**	64	1.05	6	1.16	90	0.98	356	1.06	653	1.08	1.00—1.17
7	"Other health workers"	89	1.00	55	1.19	[1.00]	0.00	90	0.97	129	1.15	363	1.07	0.96—1.18
8	Teachers	144	**0.75**	97	0.90	2	0.33	152	0.89	415	0.94	810	**0.88**	0.82—0.94
9	Religious workers etc	27	1.03	44	1.05	2	2.16	33	0.77	126	0.92	232	0.93	0.82—1.06
10	Artistic workers	11	0.80	12	1.50	1	1.33	14	1.04	34	1.22	72	1.13	0.88—1.42
11	Journalists	[2.86]	0.00	3	0.56	[0.18]	0.00	3	0.88	9	0.71	15	0.61	0.34—1.01
12	Administrators	97	1.19	16	0.91	1	1.44	48	1.08	89	**1.38**	251	**1.20**	1.06—1.36
13	Clerical workers	893	**1.14**	374	**1.12**	20	1.04	640	**1.12**	1 335	**1.21**	3 262	**1.16**	1.12—1.20
14	Sales agents	9	1.24	71	1.27	3	1.37	100	1.14	222	**1.32**	405	**1.26**	1.15—1.39
15	Shop workers	544	1.01	216	1.08	10	0.78	538	1.06	889	**1.20**	2 197	**1.09**	1.05—1.14
16	Farmers	204	**0.53**	131	0.89	3	**0.30**	272	**0.73**	42	**0.63**	652	**0.66**	0.62—0.72
17	Gardeners	40	0.81	320	**0.78**	[0.33]	0.00	153	**0.68**	158	**0.80**	671	**0.76**	0.71—0.82
18	Fishermen	[1.94]	0.00	[0.83]	0.00	[0.31]	0.00	2	0.79	1	1.58	3	0.48	0.10—1.40
19	Forestry workers	1	1.97	[1.59]	0.00	[0.04]	0.00	2	0.50	3	0.74	6	0.59	0.22—1.28
20	Miners and quarry workers	[0.03]	0.00	[0.73]	0.00	[0.01]	0.00	1	5.80	2	2.17	3	1.61	0.33—4.72
21	Seamen	–	–	[0.14]	0.00	[0.00]	0.00	[0.58]	0.00	[0.09]	0.00	[0.80]	0.00	0.00—4.59
22	Transport workers	[0.53]	0.00	16	1.50	[0.34]	0.00	3	1.21	12	1.08	31	1.24	0.84—1.75
23	Drivers	23	**1.72**	2	0.48	1	7.32	10	1.03	28	1.09	64	1.20	0.93—1.54
24	Postal workers	33	1.15	64	1.03	6	1.34	134	1.17	202	0.99	439	1.06	0.97—1.17
25	Textile workers	190	1.06	156	1.09	10	1.14	233	**1.19**	460	1.02	1 049	**1.07**	1.01—1.14
26	Shoe and leather workers	13	0.99	17	0.97	1	2.24	16	1.15	46	1.34	93	1.17	0.95—1.44
27	Smelting workers	[3.17]	0.00	4	0.96	[0.02]	0.00	1	0.76	9	1.10	14	0.83	0.46—1.40
28	Mechanics	52	**1.66**	17	0.98	[0.07]	0.00	19	1.19	92	1.09	180	**1.21**	1.04—1.40
29	Plumbers	[0.33]	0.00	[0.03]	0.00	–	–	[0.11]	0.00	[0.10]	0.00	[0.56]	0.00	0.00—6.56
30	Welders	–	–	1	0.83	[0.00]	0.00	[0.99]	0.00	3	1.06	4	0.80	0.22—2.04
31	Electrical workers	50	1.15	5	0.52	[0.07]	0.00	20	1.18	48	1.03	123	1.05	0.88—1.26
32	Wood workers	12	0.82	32	0.87	[0.13]	0.00	1	0.18	11	0.81	56	0.79	0.60—1.02
33	Painters	2	3.64	8	1.91	[0.04]	0.00	1	0.76	4	1.06	15	1.52	0.85—2.51
34	"Other construction workers"	[0.43]	0.00	15	0.95	[0.02]	0.00	[0.51]	0.00	[0.41]	0.00	15	0.87	0.49—1.44
35	Bricklayers	1	11.27	1	1.97	–	–	[0.03]	0.00	[0.01]	0.00	2	3.16	0.38—11.41
36	Printers	29	**1.76**	24	1.39	3	4.18	21	1.35	49	1.35	126	**1.46**	1.22—1.74
37	Chemical process workers	39	**1.49**	7	0.76	[0.34]	0.00	19	1.34	38	1.28	103	**1.29**	1.07—1.57
38	Food workers	133	1.03	47	0.95	13	0.77	99	1.04	86	0.93	378	0.99	0.89—1.09
39	Beverage workers	16	1.33	3	1.05	[0.04]	0.00	[0.80]	0.00	10	1.70	29	1.34	0.90—1.93
40	Tobacco workers	32	**1.94**	4	2.46	–	–	9	**2.78**	5	1.43	50	**2.01**	1.49—2.65
41	Glass makers etc	37	1.19	29	0.87	1	2.33	46	**1.51**	88	1.12	201	**1.16**	1.01—1.33
42	Packers	7	0.78	71	1.19	3	1.71	90	1.20	143	**1.20**	314	**1.19**	1.06—1.33
43	Engine operators	[0.24]	0.00	9	0.97	[0.03]	0.00	1	1.17	4	0.63	14	0.84	0.46—1.41
44	Public safety workers	1	1.00	2	0.95	[0.34]	0.00	11	1.14	11	1.37	25	1.18	0.77—1.75
45	Cooks and stewards	[0.34]	0.00	75	1.12	8	1.21	129	1.18	192	1.06	404	1.11	1.00—1.22
46	Domestic assistants	193	0.95	69	1.04	1	0.49	292	1.04	481	1.10	1 036	1.05	0.99—1.11
47	Waiters	61	**1.82**	75	**1.42**	1	1.37	146	**1.30**	271	**1.46**	554	**1.44**	1.32—1.56
48	Building caretakers	682	**1.17**	248	1.05	8	0.61	487	1.00	521	**1.12**	1 946	**1.09**	1.04—1.14
49	Chimney sweeps	[0.06]	0.00	[0.11]	0.00	–	–	[0.07]	0.00	[0.01]	0.00	[0.25]	0.00	0.00—14.65
50	Hairdressers	43	1.25	25	1.25	[0.61]	0.00	37	1.33	88	1.21	193	**1.24**	1.08—1.43
51	Launderers	66	1.00	22	1.12	1	0.44	48	1.11	111	1.12	248	1.07	0.95—1.22
52	Military personnel	1	2.89	[0.13]	0.00	–	–	[0.11]	0.00	[0.20]	0.00	1	1.26	0.03—7.03
53	"Other workers"	199	**1.21**	66	0.94	19	1.46	223	0.91	239	**1.16**	746	1.07	0.99—1.15
54	Economically inactive	4 292	**0.96**	1 648	0.96	57	1.27	3 190	0.98	9 256	**0.93**	18 443	**0.95**	0.94—0.96
1–54	All categories	8 605	1.00	4 282	1.00	183	1.00	7 532	1.00	16 622	1.00	37 224	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

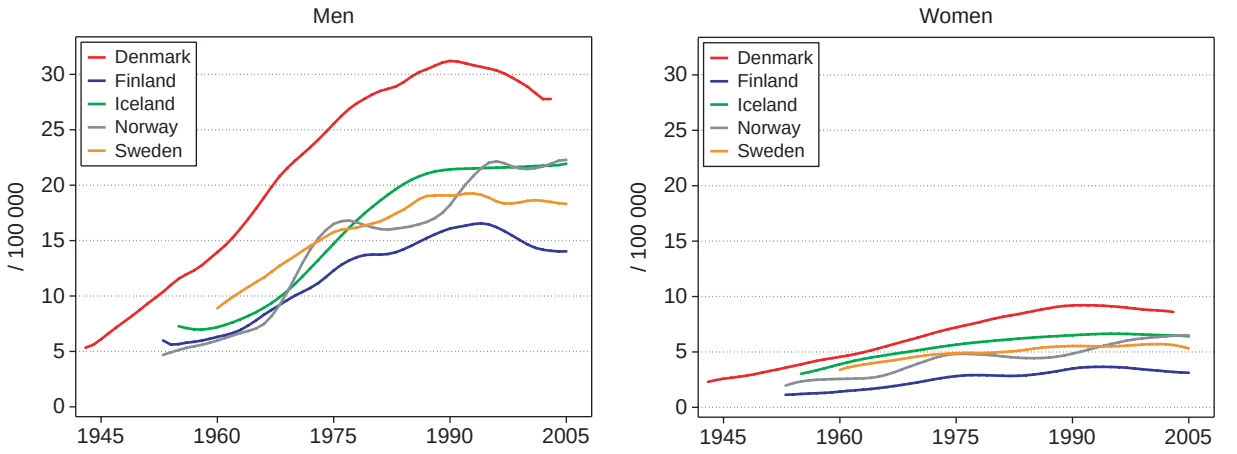


Figure 37. Age standardised (World) incidence rates for cancer of the bladder, ureter and urethra 1943–2005, by country and gender. Modified from NORDCAN [49].

cer, such as auramine manufacture, boot and shoe manufacture and repair, coal gasification, coke production, magenta manufacture, painter, rubber industry, hairdressers or barbers, petroleum refining, dry cleaning, printing processes and the textile manufacturing industry [87]. Studies of bladder cancer among workers in the dyestuffs industry, and later among rubber workers, hold an important place in the history of occupational cancer [122].

In the present study, occupations with several chemical exposures were listed among those with the highest SIRs. Waiters and tobacco workers were among those with the highest SIRs for lung cancer, and their excess risk for bladder cancer is therefore probably due to smoking as the major risk factor. Almost all occupational categories with a low SIR for bladder cancer also have a low SIR for lung cancer, such as gardeners and those working in agriculture and pedagogical work.

From the occupations with prior finding of excess risk, hairdressers and printers were also among the occupations with the highest SIRs for bladder cancer in the present study. A number of studies have found an excess of bladder cancer among workers exposed to polycyclic aromatic hydrocarbons. Chimney sweeps are exposed to chimney soot which is rich on these chemicals, a group of compounds well documented as carcinogenic [122,123].

Skin melanoma

Incidence of skin melanoma in the Nordic countries was steadily increasing until the early 1990s, both in men and women (Figure 38). After that, there was a levelling-off in Norway and Finland, but a rapid increase in Iceland.

The highest SIRs of skin melanoma in men were observed among dentists (1.65, 95% CI 1.40–1.95), physicians, administrators, journalists, religious

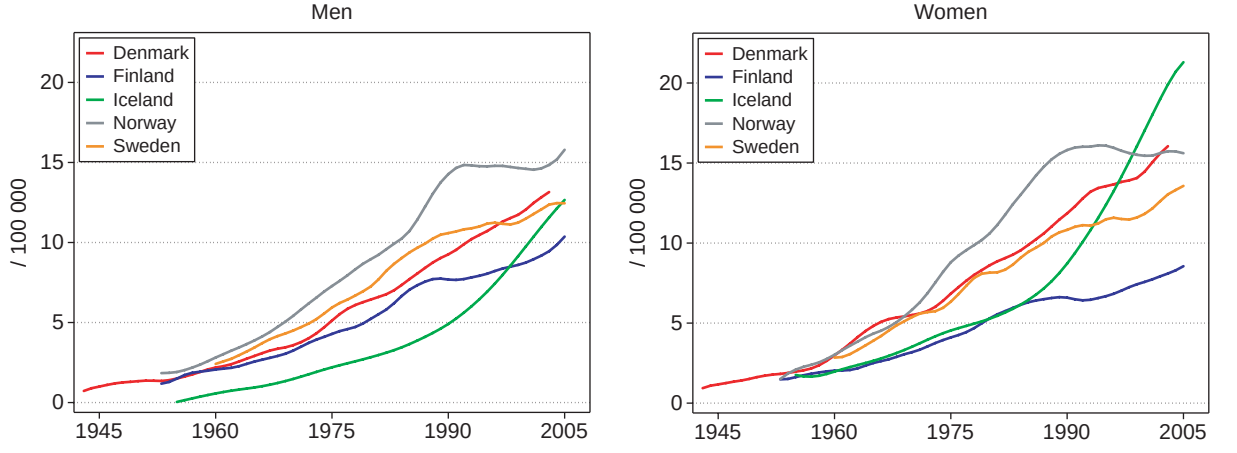


Figure 38. Age standardised (World) incidence rates for malignant melanoma of the skin 1943–2005, by country and gender. Modified from NORDCAN [49].

workers and teachers (Table 54). Rates were also above 1.20 for laboratory assistants, clerical workers, public safety workers, technical workers, postal workers, sales agents and printers. SIRs below 0.70 were seen among fishermen (0.51, 0.45–0.58), forestry workers, chimney sweeps, miners and quarry workers.

Among women, dentists also had the highest risk, with an SIR of 1.69 (1.32–2.12). Other female occupations with a significant elevated risk were public safety workers, teachers, physicians, and "other health workers" (Table 55). Engine operators (0.62, 0.38–0.96), mechanics, and wood workers had the lowest risk of skin melanoma in women.

For skin melanoma in upper limbs (http://astra.cancer.fi/NOCCA/Incidence/melanoma-upper-limbs), the highest significant SIRs in men were observed among physicians (1.78, 1.32–2.36), journalists (1.72, 1.10–2.56), religious etc. workers (1.68, 1.45–1.94), clerical workers (1.52, 1.35–1.71), administrators (1.52, 1.37–1.69) and teachers (1.48, 1.30–1.68). Fishermen and forestry workers had the lowest SIRs of 0.37 (0.21–0.60) and 0.41 (0.30–0.56), respectively. Among the women, only teachers (1.41, 1.28–1.56) and clerical workers (1.21, 1.13–1.29) presented a significantly elevated risk, while building caretakers SIR 0.75 (95% CI 0.67–0.84), and food workers SIR 0.76 (95% CI 0.58–0.99), had the lowest risk (excluding two significant SIRs based on only one observed case).

Comment. Sunburns in early ages in susceptible people are accepted as the major cause of malignant melanoma [124]. We found high SIRs among occupations of relatively high socio-economic status. Occupations with the highest SIRs for malignant melanoma, dentists, physicians and journalists, also showed significantly high SIRs for "other skin cancer" (Tables 56, 57). In the present study, fishermen and forestry workers ranked as the groups with the lowest risk of malignant melanoma in men. This may well be explained by the fact that these groups have constant sun exposure and are not burnt in the sun, as opposed to leisure time sun exposure which is often followed by sunburns.

There is little evidence in the scientific literature of an association between occupational exposures and risk of malignant melanoma, except for exposure to solar radiation [118,125].

Dentists ranked with the highest SIR for malignant melanoma in both genders and have also been found to have an increased melanoma risk in previous studies in Sweden [126,127]. Dentists are exposed through their daily work to lamps that emit no UV-B, and the levels of UV-A are so low that they are not considered to add to the risk [128].

The highest SIR in Table 54 was among male transport workers (2.82, 1.41–5.05) in Iceland. In Iceland this category includes mainly pilots. Pilots have had a chance to spend more time in sunny places (and thus having the opportunity to get sunburns) than other professions and they have 2-3-fold elevated risk of skin cancers, similarly in all Nordic countries [129].

Skin melanoma in upper limbs was studied separately to reveal the possible effects of hand contacts to carcinogenic substances at work. The variation between occupations in SIRs for melanomas in the upper limbs is larger than for all melanomas, especially for men. Printers, journalists and postal workers are on the top of the list of occupations with the highest incidence of skin melanoma of the upper limbs, which might suggest that chemicals in the printing industry would increase the risk.

Non-melanoma skin cancer, excluding basal cell carcinoma

In Denmark it was not possible to separate basal cell carcinoma from non-melanoma skin cancer before 1987. Therefore, Denmark is excluded from results related to non-melanoma skin cancer. In the other Nordic countries, the incidence has been on a steady increase (Figure 39). The rate was higher in males than in females, especially in Norway and Sweden.

The highest SIRs among men were observed in physicians (1.77, 95% CI 1.60–1.97), assistant nurses, administrators, dentists and military personnel (Table 56). The lowest SIRs were in forestry workers (0.67, 0.62–0.71), fishermen and smelting workers. In women the highest SIR was also in physicians, and the SIR was the same as for men (1.77, 1.31–2.33; Table 57). Otherwise, the occupational variation in risk among the women was small. At the lower end, fisherwomen showed an SIR of 0.17 (0.00–0.97), derived only from one case, but all other statistically significant SIRs were >0.85.

The highest SIRs for non-melanoma skin cancer in the upper limbs in men, were observed among nurses (5.50, 1.79–12.83), physicians (2.52, 1.89–3.31), seamen (1.86, 1.51–2.27), dentists (1.81, 1.05–2.90) and military personnel (1.35, 1.01–1.77) (http://astra.cancer.fi/NOCCA/Incidence/non-melanoma-upper-limbs). The SIRs were lowest in forestry workers (0.60, 0.47–0.76) and food workers (0.64, 0.46–0.86). In women, the highest SIR was among dentists (3.23, 1.55–5.95), driven by the high SIR in Norway (11.03, 4.05–24.00). Female woodworkers (1.89, 1.03–3.16) and teachers (1.29, 1.08–1.53) also had a significantly elevated incidence of non-melanoma skin cancer in the upper limbs. SIRs

Table 54. Observed number of skin melanoma among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	485	1.23	611	1.33	10	2.28	630	1.30	2 436	1.24	4 172	1.26	1.22—1.30
2	Laboratory assistants	13	1.72	11	0.92	3	3.79	33	1.61	18	1.15	78	1.38	1.09—1.72
3	Physicians	39	1.25	43	1.60	[1.36]	0.00	94	1.74	149	1.52	325	1.54	1.38—1.71
4	Dentists	21	2.15	8	1.50	[0.42]	0.00	41	1.75	66	1.52	136	1.65	1.40—1.95
5	Nurses	[0.52]	0.00	1	0.46	[0.02]	0.00	6	1.35	10	0.92	17	0.94	0.55—1.51
6	Assistant nurses	9	0.94	2	0.94	[0.29]	0.00	12	1.48	32	0.85	55	0.95	0.72—1.24
7	"Other health workers"	27	1.03	29	1.20	[0.41]	0.00	23	1.11	97	1.27	176	1.19	1.03—1.38
8	Teachers	259	1.46	268	1.47	5	0.91	401	1.20	815	1.48	1 748	1.40	1.34—1.47
9	Religious workers etc	103	1.56	174	1.59	7	1.89	214	1.38	622	1.40	1 120	1.44	1.36—1.53
10	Artistic workers	22	1.07	36	1.01	2	2.10	63	1.45	127	1.04	250	1.13	0.99—1.27
11	Journalists	17	1.68	15	0.88	1	1.69	31	1.52	89	1.56	153	1.45	1.24—1.70
12	Administrators	588	1.43	362	1.37	12	1.64	761	1.52	944	1.47	2 667	1.46	1.41—1.52
13	Clerical workers	240	1.30	201	1.23	10	1.11	525	1.37	1 038	1.41	2 014	1.37	1.31—1.43
14	Sales agents	102	1.04	272	1.10	4	0.92	537	1.31	1 393	1.27	2 308	1.24	1.20—1.30
15	Shop workers	466	1.17	122	1.06	2	0.56	198	1.05	397	1.11	1 185	1.11	1.05—1.18
16	Farmers	523	0.70	902	1.00	7	0.58	645	0.76	1 010	0.77	3 087	0.81	0.78—0.84
17	Gardeners	85	0.82	154	0.99	[0.40]	0.00	187	0.79	409	0.74	835	0.79	0.74—0.85
18	Fishermen	26	0.69	9	0.72	11	0.98	124	0.41	46	0.80	216	0.51	0.45—0.58
19	Forestry workers	10	0.68	104	0.56	[0.08]	0.00	98	0.62	208	0.51	420	0.55	0.50—0.60
20	Miners and quarry workers	1	0.22	25	0.82	[0.17]	0.00	44	0.78	62	0.57	132	0.66	0.55—0.78
21	Seamen	44	1.01	42	1.00	5	2.02	332	1.03	122	1.18	545	1.06	0.97—1.15
22	Transport workers	116	1.32	109	0.95	11	2.82	184	1.22	388	1.10	808	1.14	1.06—1.22
23	Drivers	216	0.74	337	0.82	4	0.59	357	0.77	760	0.81	1 674	0.79	0.76—0.83
24	Postal workers	74	1.19	61	1.01	[0.73]	0.00	96	1.18	272	1.37	503	1.25	1.14—1.36
25	Textile workers	31	0.66	31	0.87	1	0.79	82	1.08	211	1.19	356	1.05	0.95—1.17
26	Shoe and leather workers	7	0.63	15	0.99	[0.25]	0.00	31	1.08	62	1.01	115	0.99	0.82—1.19
27	Smelting workers	90	0.77	44	0.77	2	1.03	100	0.87	220	0.73	456	0.77	0.70—0.84
28	Mechanics	292	0.94	356	0.86	4	0.52	556	0.85	1 392	0.82	2 600	0.84	0.81—0.88
29	Plumbers	16	0.56	58	0.82	1	0.88	73	0.91	159	0.83	307	0.82	0.74—0.92
30	Welders	–	–	60	0.80	[0.48]	0.00	73	0.74	168	0.69	301	0.72	0.64—0.80
31	Electrical workers	75	0.96	191	1.03	10	2.03	296	1.00	634	1.01	1 206	1.01	0.96—1.07
32	Wood workers	176	0.84	313	0.84	8	2.13	600	0.95	782	0.84	1 879	0.87	0.83—0.91
33	Painters	72	1.03	60	0.71	1	0.67	97	0.92	245	0.86	475	0.87	0.79—0.95
34	"Other construction workers"	198	0.83	191	0.79	5	0.58	108	0.76	386	0.76	888	0.78	0.73—0.83
35	Bricklayers	91	1.20	36	0.93	–	–	47	0.76	114	0.95	288	0.97	0.87—1.09
36	Printers	67	1.30	57	1.27	[1.38]	0.00	88	1.15	219	1.23	431	1.22	1.11—1.34
37	Chemical process workers	27	0.65	68	1.00	[0.61]	0.00	132	0.99	181	0.81	408	0.88	0.79—0.96
38	Food workers	108	0.76	59	1.22	3	0.54	162	1.01	249	1.04	581	0.97	0.90—1.06
39	Beverage workers	18	1.11	2	0.68	[0.09]	0.00	4	1.10	10	0.82	34	0.97	0.67—1.36
40	Tobacco workers	5	2.06	1	1.76	[0.00]	0.00	3	1.42	[1.22]	0.00	9	1.42	0.65—2.69
41	Glass makers etc	62	0.77	66	0.92	3	2.91	88	0.98	235	0.88	454	0.89	0.81—0.97
42	Packers	43	0.63	140	1.02	3	0.95	218	0.93	381	0.86	785	0.88	0.82—0.95
43	Engine operators	68	0.87	196	0.94	[5.11]	0.00	171	0.95	363	0.81	798	0.87	0.81—0.93
44	Public safety workers	110	1.53	122	1.08	2	0.65	150	1.38	368	1.32	752	1.31	1.22—1.41
45	Cooks and stewards	5	0.85	14	1.59	[1.80]	0.00	62	1.05	53	0.93	134	1.01	0.86—1.20
46	Domestic assistants	[0.07]	0.00	[0.38]	0.00	[0.01]	0.00	[0.66]	0.00	3	0.38	3	0.33	0.07—0.97
47	Waiters	12	1.09	4	0.45	[0.23]	0.00	26	1.13	20	0.69	62	0.86	0.66—1.11
48	Building caretakers	60	0.85	73	0.83	1	0.99	62	1.07	155	0.83	351	0.87	0.78—0.96
49	Chimney sweeps	1	0.49	3	0.46	–	–	3	0.53	11	0.72	18	0.61	0.36—0.96
50	Hairdressers	20	0.98	2	1.05	[0.24]	0.00	12	0.78	63	1.41	97	1.17	0.95—1.43
51	Launderers	3	0.30	1	0.50	[0.09]	0.00	8	0.90	28	0.86	40	0.75	0.53—1.02
52	Military personnel	42	0.96	48	1.09	–	–	124	1.12	209	1.27	423	1.17	1.06—1.28
53	"Other workers"	199	0.90	105	1.00	10	0.84	327	0.80	485	0.91	1 126	0.88	0.83—0.93
54	Economically inactive	132	0.85	371	0.81	9	0.95	132	0.58	613	0.66	1 257	0.70	0.67—0.74
1–54	All categories	5 516	1.00	6 585	1.00	157	1.00	9 471	1.00	19 529	1.00	41 258	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 55. Observed number of skin melanoma among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	22	0.99	52	1.08	1	1.05	40	**1.81**	136	1.11	251	**1.16**	1.03—1.32
2	Laboratory assistants	31	**1.78**	21	0.84	1	0.81	27	1.13	59	1.10	139	1.15	0.97—1.36
3	Physicians	13	1.74	22	**1.79**	[0.16]	0.00	13	1.35	33	1.00	81	**1.30**	1.03—1.61
4	Dentists	8	1.23	20	**1.97**	[0.07]	0.00	14	**1.94**	32	**1.60**	74	**1.69**	1.32—2.12
5	Nurses	143	1.10	160	**1.25**	6	1.22	196	1.03	410	**1.20**	915	**1.15**	1.08—1.23
6	Assistant nurses	91	0.95	117	0.99	5	0.71	161	0.86	590	**0.90**	964	**0.91**	0.85—0.96
7	"Other health workers"	92	1.24	121	**1.23**	[1.60]	0.00	207	**1.19**	270	**1.17**	690	**1.19**	1.11—1.28
8	Teachers	253	**1.47**	283	**1.31**	19	**2.04**	497	**1.43**	1 025	**1.29**	2 077	**1.35**	1.29—1.41
9	Religious workers etc	29	1.29	147	1.13	1	0.75	104	1.21	376	**1.19**	657	**1.18**	1.09—1.27
10	Artistic workers	8	0.74	17	0.89	1	0.97	29	1.22	40	0.75	95	0.88	0.71—1.08
11	Journalists	2	0.81	12	1.02	[0.29]	0.00	15	**2.10**	27	1.05	56	1.18	0.89—1.53
12	Administrators	76	1.19	54	1.33	2	3.18	89	1.16	126	1.06	347	**1.15**	1.04—1.28
13	Clerical workers	790	**1.17**	851	**1.17**	29	1.05	1 327	**1.30**	2 156	**1.16**	5 153	**1.20**	1.16—1.23
14	Sales agents	7	1.19	96	1.01	3	1.29	116	1.08	241	1.09	463	1.07	0.98—1.17
15	Shop workers	451	1.04	321	0.93	16	1.04	757	1.02	900	1.03	2 445	1.01	0.97—1.05
16	Farmers	269	**0.86**	170	0.98	4	0.43	372	**0.88**	85	0.96	900	**0.89**	0.84—0.95
17	Gardeners	33	0.83	526	1.01	[0.34]	0.00	195	**0.76**	211	1.00	965	0.94	0.88—1.00
18	Fishermen	[1.62]	0.00	2	1.52	[0.45]	0.00	2	0.48	[0.80]	0.00	4	0.48	0.13—1.23
19	Forestry workers	[0.42]	0.00	[2.60]	0.00	[0.06]	0.00	4	0.74	3	0.54	7	0.50	0.20—1.02
20	Miners and quarry workers	[0.02]	0.00	[0.94]	0.00	[0.01]	0.00	[0.38]	0.00	[1.53]	0.00	[2.88]	0.00	0.00—1.28
21	Seamen	–	–	[0.43]	0.00	[0.00]	0.00	1	0.99	[0.31]	0.00	1	0.57	0.01—3.18
22	Transport workers	[0.43]	0.00	16	1.07	1	2.94	7	1.37	24	1.31	48	1.22	0.90—1.62
23	Drivers	10	0.90	10	1.13	[0.22]	0.00	13	0.76	38	0.77	71	0.82	0.64—1.03
24	Postal workers	22	0.98	108	1.08	7	1.54	210	1.15	326	**1.18**	673	**1.15**	1.06—1.24
25	Textile workers	130	0.90	197	0.90	4	0.57	215	0.94	417	0.98	963	0.94	0.88—1.00
26	Shoe and leather workers	10	0.92	22	0.81	1	2.50	12	0.71	27	0.81	72	0.81	0.64—1.02
27	Smelting workers	3	1.14	8	1.28	[0.02]	0.00	2	0.67	12	0.86	25	0.97	0.63—1.43
28	Mechanics	18	0.67	19	**0.62**	[0.09]	0.00	27	1.10	86	**0.65**	150	**0.70**	0.60—0.82
29	Plumbers	[0.22]	0.00	[0.08]	0.00	–	–	[0.22]	0.00	[0.33]	0.00	[0.85]	0.00	0.00—4.35
30	Welders	–	–	[2.72]	0.00	[0.01]	0.00	2	0.77	6	0.88	8	0.66	0.29—1.30
31	Electrical workers	34	0.90	15	0.64	[0.07]	0.00	28	1.00	55	**0.72**	132	**0.80**	0.67—0.95
32	Wood workers	9	0.73	43	0.81	[0.16]	0.00	4	0.40	21	0.87	77	**0.77**	0.61—0.96
33	Painters	[0.45]	0.00	8	1.20	[0.05]	0.00	4	1.89	2	0.34	14	0.92	0.50—1.54
34	"Other construction workers"	[0.34]	0.00	18	0.92	[0.03]	0.00	1	1.14	[1.12]	0.00	19	0.87	0.52—1.36
35	Bricklayers	[0.07]	0.00	2	2.64	–	–	[0.05]	0.00	[0.04]	0.00	2	2.16	0.26—7.80
36	Printers	8	0.58	30	1.01	[0.76]	0.00	21	0.91	51	1.00	110	0.93	0.77—1.12
37	Chemical process workers	27	1.28	11	0.78	[0.27]	0.00	22	1.10	29	0.78	89	0.96	0.77—1.18
38	Food workers	97	0.91	68	0.94	16	0.88	70	**0.60**	79	0.83	330	**0.81**	0.72—0.90
39	Beverage workers	7	0.74	4	1.04	[0.04]	0.00	1	0.79	2	0.36	14	0.69	0.38—1.17
40	Tobacco workers	11	0.83	2	0.90	–	–	[3.76]	**0.00**	2	0.46	15	0.64	0.36—1.05
41	Glass makers etc	20	0.76	44	0.83	2	4.00	47	1.06	80	**0.79**	193	**0.86**	0.74—0.99
42	Packers	10	1.35	78	0.84	2	1.33	90	0.88	130	0.90	310	0.89	0.80—1.00
43	Engine operators	1	3.91	10	0.64	[0.03]	0.00	[2.12]	0.00	9	0.63	20	**0.62**	0.38—0.96
44	Public safety workers	1	1.48	3	0.75	[0.32]	0.00	21	**1.71**	29	1.34	54	**1.39**	1.04—1.81
45	Cooks and stewards	1	3.70	96	0.90	8	1.45	113	0.93	157	0.87	375	0.91	0.82—1.00
46	Domestic assistants	147	0.90	122	0.98	1	0.71	289	**0.86**	618	0.92	1 177	**0.91**	0.86—0.96
47	Waiters	20	0.72	83	0.87	[0.78]	0.00	116	**0.74**	172	0.88	391	**0.82**	0.75—0.91
48	Building caretakers	416	**0.90**	311	0.90	8	0.70	475	**0.70**	443	**0.76**	1 653	**0.80**	0.76—0.83
49	Chimney sweeps	[0.04]	0.00	[0.17]	0.00	–	–	[0.09]	0.00	[0.03]	0.00	[0.34]	0.00	0.00—10.96
50	Hairdressers	36	1.20	36	0.97	1	0.89	44	1.00	117	1.08	234	1.06	0.93—1.21
51	Launderers	42	0.81	21	0.82	2	1.31	48	0.96	71	0.79	184	**0.84**	0.73—0.97
52	Military personnel	1	3.75	[0.50]	0.00	–	–	[0.29]	0.00	1	1.16	2	1.04	0.13—3.75
53	"Other workers"	116	0.87	101	0.88	10	0.74	375	1.03	242	0.89	844	0.94	0.88—1.01
54	Economically inactive	3 243	0.98	1 986	**0.95**	48	1.06	3 493	0.97	9 337	**0.97**	18 107	**0.97**	0.95—0.98
1–54	All categories	6 758	1.00	6 464	1.00	199	1.00	9 916	1.00	19 303	1.00	42 640	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 56. Observed number of non–melanoma skin cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	–	–	448	1.18	5	1.08	526	1.16	2 946	1.10	3 925	1.12	1.09—1.16
2	Laboratory assistants	–	–	7	0.81	1	1.19	27	1.23	10	1.12	45	1.11	0.81—1.49
3	Physicians	–	–	32	1.47	[1.96]	0.00	126	1.98	206	1.75	364	1.77	1.60—1.97
4	Dentists	–	–	2	0.41	[0.44]	0.00	30	1.08	88	1.47	120	1.29	1.08—1.54
5	Nurses	–	–	1	1.07	[0.01]	0.00	2	1.03	10	2.42	13	1.85	0.99—3.17
6	Assistant nurses	–	–	2	3.12	[0.21]	0.00	11	1.01	57	1.50	70	1.41	1.10—1.78
7	"Other health workers"	–	–	24	1.08	1	1.80	23	0.99	118	1.15	166	1.12	0.96—1.30
8	Teachers	–	–	163	1.00	5	0.72	405	1.21	817	1.24	1 390	1.19	1.13—1.26
9	Religious workers etc	–	–	97	1.15	3	0.63	221	1.25	663	1.32	984	1.28	1.21—1.37
10	Artistic workers	–	–	30	0.97	[1.29]	0.00	71	1.38	154	0.97	255	1.05	0.93—1.19
11	Journalists	–	–	12	0.79	3	4.20	21	0.96	77	1.07	113	1.03	0.85—1.24
12	Administrators	–	–	345	1.30	17	1.32	874	1.38	1 410	1.29	2 646	1.32	1.27—1.37
13	Clerical workers	–	–	195	1.11	12	0.81	520	1.13	1 372	1.23	2 099	1.19	1.14—1.24
14	Sales agents	–	–	247	1.04	5	0.68	631	1.17	1 860	1.16	2 743	1.15	1.11—1.19
15	Shop workers	–	–	86	0.91	3	0.59	204	1.02	525	1.03	818	1.01	0.94—1.08
16	Farmers	–	–	1 432	1.03	19	0.84	1 521	0.93	2 830	0.93	5 802	0.95	0.93—0.98
17	Gardeners	–	–	148	0.85	2	2.86	368	0.95	952	0.90	1 470	0.90	0.86—0.95
18	Fishermen	–	–	16	0.90	7	0.66	280	0.58	166	1.45	469	0.75	0.69—0.82
19	Forestry workers	–	–	132	0.68	[0.10]	0.00	252	0.87	446	0.59	830	0.67	0.62—0.71
20	Miners and quarry workers	–	–	37	1.22	[0.18]	0.00	78	1.04	147	0.82	262	0.92	0.82—1.04
21	Seamen	–	–	46	1.09	4	1.25	416	1.12	238	1.51	704	1.23	1.14—1.32
22	Transport workers	–	–	182	1.37	5	0.73	214	1.05	609	1.05	1 010	1.09	1.03—1.16
23	Drivers	–	–	348	0.92	7	0.77	485	0.91	1 195	0.93	2 035	0.93	0.89—0.97
24	Postal workers	–	–	63	1.03	1	0.75	87	0.84	328	1.12	479	1.05	0.96—1.14
25	Textile workers	–	–	37	0.85	5	2.12	99	0.80	345	1.01	486	0.95	0.87—1.04
26	Shoe and leather workers	–	–	16	0.83	[0.52]	0.00	43	0.85	140	1.03	199	0.97	0.84—1.11
27	Smelting workers	–	–	58	0.91	3	0.99	133	0.86	381	0.73	575	0.78	0.71—0.84
28	Mechanics	–	–	366	0.97	14	1.59	660	0.89	2 120	0.89	3 160	0.90	0.87—0.94
29	Plumbers	–	–	54	0.90	3	2.03	76	0.92	269	1.00	402	0.97	0.88—1.07
30	Welders	–	–	51	0.98	[0.49]	0.00	97	1.04	255	0.85	403	0.90	0.82—1.00
31	Electrical workers	–	–	153	1.01	4	0.79	335	1.02	799	1.00	1 291	1.01	0.96—1.07
32	Wood workers	–	–	417	0.92	4	0.72	849	0.91	1 415	0.84	2 685	0.87	0.84—0.91
33	Painters	–	–	72	0.81	[2.18]	0.00	124	0.84	414	0.87	610	0.85	0.79—0.92
34	"Other construction workers"	–	–	223	0.81	12	1.16	158	0.94	788	0.90	1 181	0.89	0.84—0.94
35	Bricklayers	–	–	36	0.78	–	–	75	0.84	188	0.87	299	0.85	0.76—0.95
36	Printers	–	–	43	1.19	2	1.18	103	1.21	268	1.10	416	1.14	1.03—1.25
37	Chemical process workers	–	–	79	1.23	[0.97]	0.00	179	0.91	331	0.85	589	0.90	0.83—0.98
38	Food workers	–	–	35	0.74	10	1.12	189	0.84	401	0.99	635	0.93	0.86—1.00
39	Beverage workers	–	–	5	1.44	[0.16]	0.00	2	1.04	16	0.75	23	0.85	0.54—1.28
40	Tobacco workers	–	–	3	5.11	[0.01]	0.00	4	1.24	1	0.58	8	1.44	0.62—2.84
41	Glass makers etc	–	–	58	0.87	3	2.02	113	1.07	413	0.96	587	0.97	0.90—1.06
42	Packers	–	–	135	0.92	5	0.97	270	0.82	748	0.97	1 158	0.93	0.87—0.98
43	Engine operators	–	–	200	1.10	11	1.77	169	0.94	589	0.95	969	0.98	0.92—1.04
44	Public safety workers	–	–	124	1.12	7	1.51	178	1.21	479	1.30	788	1.25	1.16—1.34
45	Cooks and stewards	–	–	3	0.48	1	0.50	37	0.61	54	0.88	95	0.73	0.59—0.89
46	Domestic assistants	–	–	[0.75]	0.00	[0.00]	0.00	[0.52]	0.00	4	0.92	4	0.71	0.19—1.82
47	Waiters	–	–	3	0.54	[0.21]	0.00	23	0.87	40	1.29	66	1.04	0.81—1.33
48	Building caretakers	–	–	92	0.92	1	0.43	92	1.27	274	0.92	459	0.97	0.89—1.06
49	Chimney sweeps	–	–	10	1.50	–	–	7	0.97	18	0.89	35	1.02	0.71—1.43
50	Hairdressers	–	–	[1.78]	0.00	[0.29]	0.00	24	1.13	84	1.03	108	1.03	0.85—1.25
51	Launderers	–	–	7	3.53	[0.22]	0.00	16	1.24	55	0.96	78	1.08	0.85—1.35
52	Military personnel	–	–	41	1.32	–	–	150	1.24	309	1.32	500	1.29	1.19—1.41
53	"Other workers"	–	–	95	0.84	27	1.41	690	1.07	851	0.90	1 663	0.96	0.92—1.01
54	Economically inactive	–	–	611	0.96	11	0.86	259	0.85	1 125	0.89	2 006	0.91	0.87—0.95
1–54	All categories	–	–	7 122	1.00	223	1.00	12 547	1.00	30 398	1.00	50 290	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 57. Observed number of non–melanoma skin cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	–	–	24	0.86	[0.49]	0.00	13	1.26	77	1.00	114	0.99	0.82—1.18
2	Laboratory assistants	–	–	13	0.81	1	1.34	15	1.07	16	1.07	45	0.98	0.72—1.32
3	Physicians	–	–	7	1.10	[0.14]	0.00	13	**2.22**	30	**1.89**	50	**1.77**	1.31—2.33
4	Dentists	–	–	4	**0.38**	[0.05]	0.00	11	**2.12**	26	**1.76**	41	1.35	0.97—1.83
5	Nurses	–	–	83	1.02	8	2.16	123	1.10	279	**1.14**	493	**1.12**	1.02—1.22
6	Assistant nurses	–	–	90	0.97	7	1.31	101	0.90	373	0.94	571	0.94	0.87—1.02
7	"Other health workers"	–	–	74	1.04	2	1.86	125	1.11	153	1.16	354	**1.12**	1.01—1.24
8	Teachers	–	–	166	0.97	8	1.23	268	**1.28**	625	**1.18**	1 067	**1.16**	1.10—1.24
9	Religious workers etc	–	–	60	0.95	[0.99]	0.00	74	**1.38**	171	1.05	305	1.08	0.97—1.21
10	Artistic workers	–	–	7	0.54	1	1.20	22	1.30	32	0.96	62	0.97	0.74—1.24
11	Journalists	–	–	4	0.46	[0.21]	0.00	2	0.48	32	**2.11**	38	1.35	0.95—1.85
12	Administrators	–	–	28	0.97	[0.69]	0.00	64	1.14	110	**1.40**	202	**1.23**	1.07—1.41
13	Clerical workers	–	–	488	0.93	29	1.42	787	**1.14**	1 519	**1.16**	2 823	**1.11**	1.07—1.15
14	Sales agents	–	–	90	0.95	3	1.32	111	1.02	214	1.02	418	1.00	0.91—1.11
15	Shop workers	–	–	279	**0.88**	13	0.96	733	**1.17**	914	0.98	1 939	1.03	0.98—1.07
16	Farmers	–	–	269	0.96	11	1.06	383	**0.80**	69	0.85	732	**0.86**	0.80—0.92
17	Gardeners	–	–	799	**1.14**	[0.35]	0.00	229	**0.80**	256	1.06	1 284	1.04	0.99—1.10
18	Fishermen	–	–	[1.46]	0.00	[0.33]	0.00	[3.12]	0.00	1	1.21	1	**0.17**	0.00—0.97
19	Forestry workers	–	–	[2.81]	0.00	[0.05]	0.00	6	1.19	5	1.00	11	0.85	0.43—1.53
20	Miners and quarry workers	–	–	1	0.83	[0.02]	0.00	[0.19]	0.00	3	2.74	4	1.59	0.43—4.08
21	Seamen	–	–	[0.19]	0.00	[0.00]	0.00	1	1.37	[0.10]	0.00	1	0.98	0.02—5.49
22	Transport workers	–	–	8	**0.45**	1	2.46	1	0.34	15	1.11	25	0.72	0.47—1.07
23	Drivers	–	–	9	1.36	[0.15]	0.00	11	0.93	33	1.14	53	1.11	0.83—1.45
24	Postal workers	–	–	108	1.08	5	1.07	125	0.91	268	1.09	506	1.04	0.95—1.13
25	Textile workers	–	–	239	1.00	7	0.78	209	0.87	567	0.98	1 022	0.96	0.90—1.02
26	Shoe and leather workers	–	–	29	1.02	1	2.09	15	0.88	38	0.88	83	0.93	0.74—1.15
27	Smelting workers	–	–	7	1.04	[0.02]	0.00	[1.55]	0.00	8	0.85	15	0.85	0.47—1.39
28	Mechanics	–	–	23	0.83	[0.08]	0.00	20	1.05	81	0.82	124	0.85	0.72—1.02
29	Plumbers	–	–	[0.05]	0.00	–	–	[0.11]	0.00	[0.11]	0.00	[0.27]	0.00	0.00—13.64
30	Welders	–	–	[1.83]	0.00	[0.01]	0.00	2	1.73	2	0.65	4	0.66	0.18—1.69
31	Electrical workers	–	–	15	1.04	[0.07]	0.00	11	**0.55**	55	1.00	81	0.90	0.72—1.12
32	Wood workers	–	–	81	**1.34**	[0.14]	0.00	5	0.74	14	0.88	100	1.20	0.99—1.47
33	Painters	–	–	8	1.23	[0.04]	0.00	3	1.92	3	0.66	14	1.11	0.61—1.86
34	"Other construction workers"	–	–	24	0.88	[0.02]	0.00	[0.66]	0.00	[0.49]	0.00	24	0.85	0.54—1.26
35	Bricklayers	–	–	[0.93]	0.00	–	–	[0.03]	0.00	[0.01]	0.00	[0.97]	0.00	0.00—3.80
36	Printers	–	–	22	0.79	[0.70]	0.00	14	0.76	39	0.90	75	0.83	0.65—1.04
37	Chemical process workers	–	–	15	1.00	1	3.14	14	0.83	45	1.23	75	1.09	0.86—1.37
38	Food workers	–	–	84	1.02	9	**0.52**	91	**0.78**	103	0.89	287	**0.86**	0.77—0.97
39	Beverage workers	–	–	2	0.42	[0.04]	0.00	2	2.06	4	0.55	8	0.61	0.26—1.21
40	Tobacco workers	–	–	4	1.41	–	–	1	0.28	6	1.42	11	1.03	0.52—1.85
41	Glass makers etc	–	–	49	0.89	1	2.10	36	0.99	93	0.98	179	0.96	0.83—1.11
42	Packers	–	–	95	0.98	4	2.25	79	0.88	151	1.02	329	0.98	0.88—1.09
43	Engine operators	–	–	13	0.88	[0.03]	0.00	[1.02]	0.00	3	0.43	16	0.71	0.40—1.15
44	Public safety workers	–	–	3	0.81	[0.34]	0.00	11	0.85	11	1.17	25	0.95	0.61—1.40
45	Cooks and stewards	–	–	110	0.96	3	0.45	143	1.03	204	0.88	460	0.94	0.86—1.03
46	Domestic assistants	–	–	115	1.00	[1.98]	0.00	310	0.90	460	**0.88**	885	**0.90**	0.84—0.96
47	Waiters	–	–	65	**0.76**	[0.69]	0.00	113	**0.82**	223	0.94	401	**0.87**	0.79—0.96
48	Building caretakers	–	–	363	0.90	9	0.67	504	**0.85**	488	**0.86**	1 364	**0.87**	0.82—0.92
49	Chimney sweeps	–	–	[0.14]	0.00	–	–	[0.10]	0.00	[0.01]	0.00	[0.25]	0.00	0.00—14.93
50	Hairdressers	–	–	28	0.85	[0.66]	0.00	45	1.32	95	1.06	168	1.07	0.92—1.24
51	Launderers	–	–	32	0.95	3	1.36	53	1.00	111	0.87	199	0.92	0.80—1.05
52	Military personnel	–	–	[0.16]	0.00	–	–	[0.13]	0.00	[0.22]	0.00	[0.51]	0.00	0.00—7.25
53	"Other workers"	–	–	106	0.90	8	0.60	291	0.95	221	0.88	626	**0.91**	0.84—0.99
54	Economically inactive	–	–	3 216	1.04	54	1.17	4 076	1.02	12 269	0.99	19 615	1.00	0.99—1.02
1–54	All categories	–	–	7 359	1.00	189	1.00	9 266	1.00	20 515	1.00	37 329	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

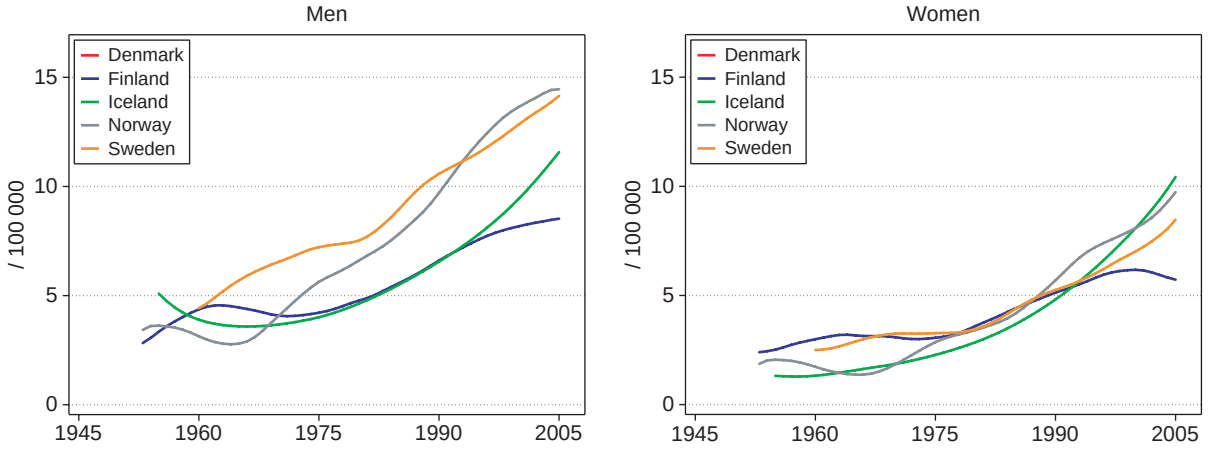


Figure 39. Age standardised (World) incidence rates for non-melanoma skin cancer 1943–2005, by country and gender. Modified from NORDCAN [49].

were significantly below 1.0 among female sales agents (0.69, 0.46–0.98) and among "other workers", i.e., economically active women not classified in any of the 52 specific occupational categories if the present study (0.60, 0.43–0.81).

Comment. Non-melanoma skin cancer and skin melanoma (Tables 54, 55) have quite similar SIRs. Several chemical compounds have been identified as associated with an increased risk of skin cancer. These include arsenic and arsenic compounds, and components of oil, tar, and combustion products such as PAHs. Cumulative solar exposure is also considered a skin carcinogen, which in the context of outdoor occupations is related to work [130]. In our study, however, we did not identify patterns of SIRs that could be related to either occupational solar exposure or chemical exposures. The highest SIR was obsersved among physicians, identically in both genders, which might indicate that there is some diagnostic bias which overrules the possible weaker effects of occupational carcinogens.

Skin cancer in the upper limbs was studied separately to reveal the possible effects of dermal exposure at work. One might speculate that the excess risk in health care personnel, seamen or military personnel might be related, e.g., to products they handle in their work, including disinfection liquids.

Eye cancer

The incidence of cancer of the eye has remained fairly stable around 1 per 100 000 in men, and a bit lower in women in all Nordic countries (Figure 40).

Only a modest risk variation across occupational categories was found (Table 58). For men, the only significantly elevated SIR (1.35, 95% CI 1.09–1.66) was found for transport workers, and the only significantly low SIR (0.81, 0.70–0.95) was found for economically inactive men. No occupational

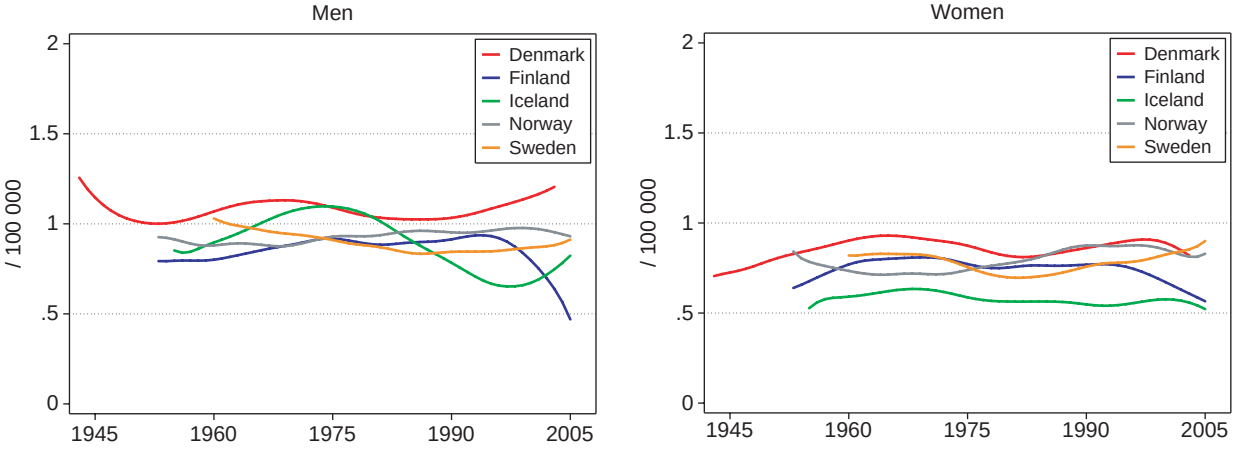


Figure 40. Age standardised (World) incidence rates for eye cancer 1943–2005, by country and gender. Modified from NORDCAN [49].

category came up with an increased or a decreased risk in women (Table 59).

Eye melanoma constitutes by far the majority of the eye cancer cases in the study series, and therefore the SIRs for eye melanoma resembled those given for eye cancer (http://astra.cancer.fi/NOCCA/Incidence/eye-melanoma). Transport work was still the only elevated occupation with an elevated SIR (1.35, 1.06–1.68). On the other end of the scale, forestry workers and gardeners showed lower SIRs (0.75, 0.56–0.99; and 0.79, 0.62–0.99, respectively) than for all eye cancers combined, because their SIR for the non-melanoma type of eye cancer was above 1.0.

Comment. Solar UV radiation might be the main cause of ocular melanoma, although this association is still disputed [124]. UV radiation from manmade sources, such as sunlamps, sun beds, tanning booths, and electrical arc welding have also been reported as possibly associated with risk. Radio-frequency electromagnetic fields were associated with risk in a few studies, but the association cannot be considered as established. Occupations such as dentists, physicians, military personnel, transport workers, engine operators, mechanics, and welders have the highest SIRs in the present study which may imply exposure to some of the above factors. Farmers have an excess risk that is close to significance in both genders; this could be interpreted as a sign of an effect of solar UV exposure.

Some previous occupational studies indicated an increased risk of ocular melanoma in chemical industry employees, employees in administration and management, cooks and kitchen assistants [124]. Although the number of eye cancers in our study is as high as 7 733 cases, we were not able to confirm any of the suggested excesses.

Brain cancer

The incidence of cancer of the brain and central nervous system is similar in all Nordic countries and in both genders (Figure 41). There was an increase in all countries until about the mid 1990s, and later the slopes have varied from increase to slight decrease, depending on country and gender.

The variation of the SIRs between the occupations was relatively small. In men, the highest SIRs were observed among physicians (SIR 1.32, 95% CI 1.16–1.49) and "other health and medical workers" (Table 60). The SIR was lowest among forestry workers (0.84, 0.78–0.91). In women, the highest significant SIR was in public safety and protection work (1.39, 1.02–1.85) and lowest for "other health and medical workers" (0.89, 0.82–0.98; Table 61).

In cases classified as gliomas (http://astra.cancer.fi/NOCCA/Incidence/brain-glioma) in the present data set (35% of all cases), the SIRs in males were highest among "other health workers" (1.30, 1.02–1.64), and military personnel (1.24, 1.06–1.44). Low SIRs were among forestry workers (0.78, 0.70–0.88), fishermen (0.81, 0.68–0.96) and seamen (0.82, 0.71–0.96). In women, the highest SIR was among physicians (1.55, 1.02–2.25), while there were no occupations with an SIR significantly below unity.

In meningeoma (29% of all cases: http://astra.cancer.fi/NOCCA/Incidence/brain-meningeoma), the highest SIRs based on at least 15 observed cases among men were in assistant nurses (1.67, 0.93–2.75), physicians (1.53, 1.13–2.01) and "other health workers" (1.50, 1.05–2.06). The lowest SIRs were in "other construction workers" (0.80, 0.69–0.93), and forestry workers (0.82, 0.69–0.98). In women, the only occupations that came up with somewhat elevated SIRs were technical, chemical, physical and

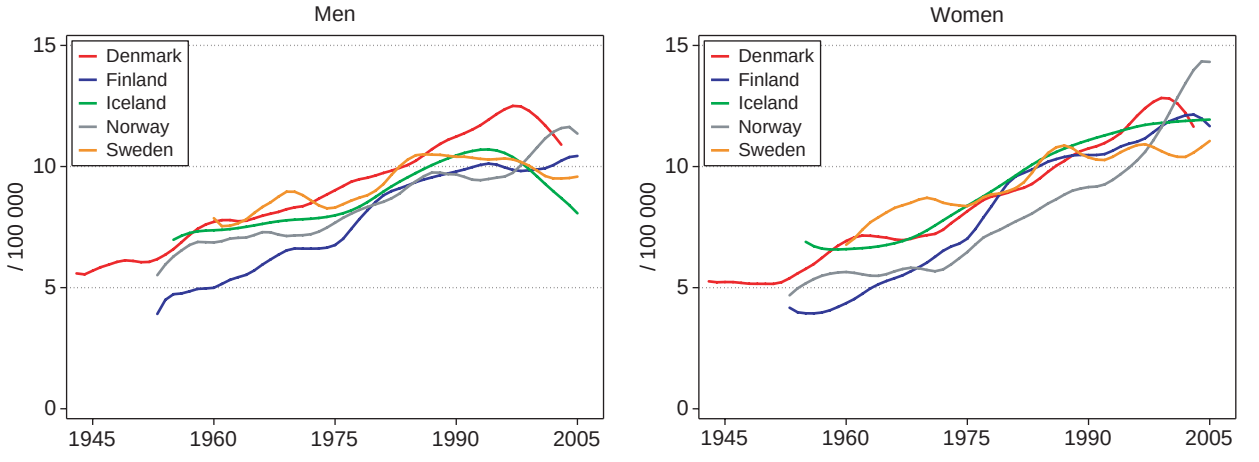


Figure 41. Age standardised (World) incidence rates for brain cancer 1943–2005, by country and gender. Modified from NORDCAN [49].

Table 58. Observed number of eye cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	46	1.03	39	0.96	1	2.58	39	1.24	172	1.02	297	1.04	0.93—1.17
2	Laboratory assistants	[0.87]	0.00	1	0.97	[0.07]	0.00	4	2.72	1	0.99	6	1.35	0.49—2.93
3	Physicians	3	0.82	5	2.13	[0.13]	0.00	4	1.01	10	1.25	22	1.22	0.76—1.84
4	Dentists	2	1.83	[0.49]	0.00	[0.04]	0.00	3	1.73	6	1.60	11	1.55	0.77—2.77
5	Nurses	[0.05]	0.00	[0.16]	0.00	[0.00]	0.00	[0.22]	0.00	[0.67]	0.00	[1.10]	0.00	0.00—3.35
6	Assistant nurses	[1.07]	0.00	[0.15]	0.00	[0.02]	0.00	1	1.51	4	1.33	5	1.02	0.33—2.38
7	"Other health workers"	3	0.96	6	2.71	[0.04]	0.00	[1.55]	0.00	6	0.90	15	1.11	0.62—1.82
8	Teachers	26	1.30	16	0.96	1	1.91	21	0.93	44	0.99	108	1.04	0.86—1.25
9	Religious workers etc	6	0.74	8	0.85	[0.36]	0.00	13	1.14	32	0.89	59	0.91	0.69—1.17
10	Artistic workers	2	0.80	[3.26]	0.00	[0.09]	0.00	4	1.21	12	1.16	18	0.92	0.55—1.46
11	Journalists	4	3.38	2	1.28	[0.06]	0.00	2	1.35	5	1.02	13	1.41	0.75—2.42
12	Administrators	47	0.96	28	1.15	1	1.17	51	1.30	57	0.92	184	1.05	0.91—1.21
13	Clerical workers	27	1.23	17	1.07	[1.01]	0.00	34	1.15	67	0.99	145	1.06	0.90—1.25
14	Sales agents	12	1.04	21	0.90	1	2.02	37	1.09	103	1.03	174	1.02	0.88—1.19
15	Shop workers	53	1.08	10	0.97	[0.36]	0.00	12	0.88	30	0.94	105	1.00	0.82—1.21
16	Farmers	88	0.94	105	1.02	2	1.41	98	1.10	175	1.13	468	1.06	0.97—1.16
17	Gardeners	7	0.53	18	1.14	[0.05]	0.00	22	0.98	49	0.83	96	0.87	0.70—1.06
18	Fishermen	2	0.44	3	2.18	[0.90]	0.00	25	0.86	8	1.28	38	0.90	0.64—1.24
19	Forestry workers	5	2.61	14	0.75	[0.01]	0.00	12	0.73	35	0.81	66	0.82	0.64—1.05
20	Miners and quarry workers	1	1.70	1	0.33	[0.01]	0.00	5	1.03	9	0.81	16	0.82	0.47—1.33
21	Seamen	6	1.20	3	0.74	[0.24]	0.00	27	1.09	8	0.81	44	1.00	0.73—1.34
22	Transport workers	15	1.44	12	1.07	[0.46]	0.00	17	1.32	47	**1.45**	91	**1.35**	1.09—1.66
23	Drivers	26	0.75	38	0.98	3	4.48	27	0.75	90	1.07	184	0.95	0.82—1.10
24	Postal workers	3	0.44	6	1.04	[0.09]	0.00	7	1.02	14	0.76	30	0.79	0.53—1.13
25	Textile workers	6	0.99	1	0.27	[0.15]	0.00	5	0.70	18	0.94	30	0.83	0.56—1.19
26	Shoe and leather workers	1	0.68	[1.61]	0.00	[0.03]	0.00	5	1.66	11	1.48	17	1.25	0.73—2.01
27	Smelting workers	17	1.22	3	0.53	[0.20]	0.00	9	0.90	19	**0.61**	48	0.79	0.58—1.05
28	Mechanics	36	0.96	41	1.07	[0.68]	0.00	46	0.92	173	1.15	296	1.07	0.95—1.20
29	Plumbers	3	0.89	11	1.68	[0.11]	0.00	5	0.85	16	0.92	35	1.05	0.73—1.46
30	Welders	–	–	9	1.39	[0.04]	0.00	4	0.59	23	1.13	36	1.07	0.75—1.48
31	Electrical workers	3	**0.33**	16	0.96	[0.41]	0.00	18	0.81	61	1.15	98	0.97	0.78—1.18
32	Wood workers	23	0.90	41	1.07	1	2.64	54	0.98	111	1.15	230	1.07	0.94—1.21
33	Painters	9	1.07	10	1.18	[0.15]	0.00	6	0.64	30	1.06	55	1.00	0.76—1.31
34	"Other construction workers"	33	1.06	28	1.10	1	1.26	12	1.05	44	0.84	118	0.97	0.81—1.17
35	Bricklayers	10	1.07	4	1.00	–	–	5	0.90	11	0.88	30	0.96	0.65—1.37
36	Printers	3	0.50	2	0.49	[0.13]	0.00	5	0.85	18	1.13	28	0.87	0.58—1.26
37	Chemical process workers	5	0.94	5	0.78	[0.07]	0.00	11	0.89	25	1.07	46	0.97	0.71—1.29
38	Food workers	15	0.86	5	1.06	1	1.63	13	0.92	21	0.89	55	0.91	0.68—1.18
39	Beverage workers	[2.08]	0.00	1	3.37	[0.01]	0.00	[0.18]	0.00	1	0.75	2	0.51	0.06—1.85
40	Tobacco workers	[0.34]	0.00	[0.06]	0.00	[0.00]	0.00	[0.22]	0.00	[0.11]	0.00	[0.72]	0.00	0.00—5.11
41	Glass makers etc	11	1.08	8	1.18	[0.11]	0.00	8	1.13	17	0.65	44	0.88	0.64—1.18
42	Packers	10	1.12	15	1.09	[0.35]	0.00	24	1.12	36	0.77	85	0.93	0.74—1.15
43	Engine operators	11	1.17	24	1.24	2	4.22	15	1.17	46	1.13	98	1.18	0.96—1.44
44	Public safety workers	15	1.73	12	1.13	[0.33]	0.00	6	0.65	19	0.78	52	0.98	0.73—1.28
45	Cooks and stewards	1	1.43	2	2.72	[0.16]	0.00	3	0.70	1	0.21	7	0.66	0.27—1.37
46	Domestic assistants	[0.01]	0.00	[0.04]	0.00	[0.00]	0.00	[0.04]	0.00	[0.52]	0.00	[0.61]	0.00	0.00—6.06
47	Waiters	1	0.71	[0.72]	0.00	[0.02]	0.00	[1.81]	0.00	1	0.42	2	0.32	0.04—1.14
48	Building caretakers	10	1.11	7	0.79	[0.15]	0.00	6	1.26	16	0.85	39	0.94	0.67—1.28
49	Chimney sweeps	[0.24]	0.00	[0.66]	0.00	–	–	1	2.06	1	0.73	2	0.72	0.09—2.62
50	Hairdressers	3	1.16	[0.19]	0.00	[0.02]	0.00	2	1.47	4	0.87	9	1.03	0.47—1.95
51	Launderers	1	0.80	[0.19]	0.00	[0.01]	0.00	1	1.23	2	0.61	4	0.72	0.20—1.85
52	Military personnel	2	0.43	5	1.33	–	–	10	1.28	21	1.50	38	1.26	0.89—1.72
53	"Other workers"	32	1.15	9	0.84	2	1.53	39	0.98	59	1.04	141	1.03	0.88—1.22
54	Economically inactive	33	1.23	46	0.80	[1.02]	0.00	14	0.65	69	**0.75**	162	**0.81**	0.70—0.95
1–54	All categories	678	1.00	658	1.00	16	1.00	792	1.00	1 858	1.00	4 002	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 59. Observed number of eye cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	2	1.05	5	1.21	[0.04]	0.00	2	1.72	9	1.11	18	1.18	0.70—1.86
2	Laboratory assistants	1	0.70	3	1.29	[0.06]	0.00	2	1.45	2	0.77	8	1.03	0.44—2.02
3	Physicians	1	1.59	1	0.98	[0.01]	0.00	1	1.77	1	0.52	4	0.97	0.26—2.47
4	Dentists	[0.55]	0.00	[1.00]	0.00	[0.00]	0.00	[0.46]	0.00	2	1.45	2	0.59	0.07—2.13
5	Nurses	6	0.54	19	1.60	[0.23]	0.00	15	1.41	17	0.72	57	0.99	0.75—1.29
6	Assistant nurses	9	1.09	14	1.18	[0.27]	0.00	12	1.14	45	1.06	80	1.09	0.86—1.36
7	"Other health workers"	5	0.79	10	1.06	[0.07]	0.00	12	1.15	20	1.38	47	1.15	0.85—1.54
8	Teachers	11	0.77	17	0.81	[0.46]	0.00	20	0.98	63	1.18	111	1.01	0.84—1.22
9	Religious workers etc	1	0.53	9	0.84	[0.07]	0.00	5	0.99	15	0.81	30	0.83	0.56—1.18
10	Artistic workers	1	1.07	3	1.74	[0.04]	0.00	3	2.01	2	0.57	9	1.17	0.54—2.23
11	Journalists	1	4.75	[1.11]	0.00	[0.01]	0.00	2	4.86	[1.64]	0.00	3	0.89	0.18—2.60
12	Administrators	4	0.71	7	1.90	[0.03]	0.00	2	0.41	10	1.28	23	1.05	0.66—1.57
13	Clerical workers	47	0.81	73	1.05	1	0.92	70	1.10	133	1.01	324	1.00	0.90—1.12
14	Sales agents	[0.51]	0.00	10	1.04	[0.11]	0.00	7	0.85	15	0.85	32	0.88	0.60—1.25
15	Shop workers	38	1.01	33	0.91	1	1.67	57	1.13	89	1.17	218	1.08	0.95—1.24
16	Farmers	37	1.37	22	1.10	[0.42]	0.00	32	1.00	9	1.27	100	1.15	0.95—1.40
17	Gardeners	3	0.87	46	0.75	[0.01]	0.00	24	1.25	20	1.03	93	0.90	0.72—1.10
18	Fishermen	[0.14]	0.00	[0.14]	0.00	[0.02]	0.00	[0.26]	0.00	[0.06]	0.00	[0.62]	0.00	0.00—5.94
19	Forestry workers	[0.04]	0.00	[0.26]	0.00	[0.00]	0.00	[0.37]	0.00	[0.44]	0.00	[1.11]	0.00	0.00—3.33
20	Miners and quarry workers	[0.00]	0.00	[0.11]	0.00	[0.00]	0.00	[0.02]	0.00	[0.11]	0.00	[0.24]	0.00	0.00—15.20
21	Seamen	–	–	[0.04]	0.00	–	–	[0.06]	0.00	[0.02]	0.00	[0.11]	0.00	0.00—32.75
22	Transport workers	[0.04]	0.00	2	1.15	[0.01]	0.00	[0.30]	0.00	1	0.76	3	0.88	0.18—2.58
23	Drivers	1	1.02	1	1.18	[0.01]	0.00	2	1.93	4	1.23	8	1.30	0.56—2.57
24	Postal workers	2	1.00	14	1.30	[0.17]	0.00	8	0.66	23	1.03	47	0.99	0.73—1.32
25	Textile workers	7	0.55	25	1.05	1	2.97	11	0.60	43	1.01	87	0.89	0.71—1.10
26	Shoe and leather workers	[0.95]	0.00	1	0.33	[0.02]	0.00	1	0.75	2	0.61	4	0.47	0.13—1.19
27	Smelting workers	[0.23]	0.00	1	1.43	[0.00]	0.00	1	6.23	[0.98]	0.00	2	0.96	0.12—3.48
28	Mechanics	5	2.11	3	0.94	[0.00]	0.00	1	0.60	7	0.72	16	0.94	0.54—1.53
29	Plumbers	[0.02]	0.00	[0.01]	0.00	–	–	[0.01]	0.00	[0.02]	0.00	[0.06]	0.00	0.00—66.53
30	Welders	–	–	1	3.82	[0.00]	0.00	[0.13]	0.00	[0.40]	0.00	1	1.25	0.03—6.99
31	Electrical workers	8	**2.43**	5	2.33	[0.00]	0.00	1	0.54	1	0.18	15	1.17	0.66—1.94
32	Wood workers	[1.08]	0.00	3	0.49	[0.01]	0.00	[0.60]	0.00	2	1.21	5	0.53	0.17—1.24
33	Painters	[0.04]	0.00	[0.73]	0.00	[0.00]	0.00	[0.14]	0.00	[0.44]	0.00	[1.35]	0.00	0.00—2.74
34	"Other construction workers"	[0.03]	0.00	3	1.28	[0.00]	0.00	[0.05]	0.00	[0.06]	0.00	3	1.20	0.25—3.51
35	Bricklayers	[0.01]	0.00	[0.08]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.09]	0.00	0.00—41.74
36	Printers	1	0.83	1	0.32	[0.03]	0.00	1	0.62	2	0.50	5	0.50	0.16—1.17
37	Chemical process workers	1	0.54	2	1.27	[0.01]	0.00	[1.44]	0.00	4	1.28	7	0.87	0.35—1.80
38	Food workers	10	1.08	5	0.62	[0.76]	0.00	5	0.56	6	0.67	26	0.72	0.47—1.06
39	Beverage workers	[0.85]	0.00	[0.45]	0.00	[0.00]	0.00	[0.08]	0.00	2	3.57	2	1.03	0.13—3.73
40	Tobacco workers	3	2.53	[0.25]	0.00	–	–	[0.32]	0.00	1	2.68	4	1.88	0.51—4.81
41	Glass makers etc	4	1.74	8	1.40	[0.02]	0.00	3	0.97	10	1.19	25	1.28	0.83—1.89
42	Packers	1	1.53	8	0.79	[0.06]	0.00	11	1.52	4	**0.32**	24	0.79	0.51—1.17
43	Engine operators	[0.02]	0.00	3	1.80	[0.00]	0.00	[0.11]	0.00	[0.87]	0.00	3	1.12	0.23—3.27
44	Public safety workers	[0.06]	0.00	1	2.61	[0.02]	0.00	[0.85]	0.00	[1.19]	0.00	1	0.40	0.01—2.23
45	Cooks and stewards	[0.02]	0.00	14	1.24	1	3.61	9	0.92	7	**0.41**	31	0.80	0.55—1.14
46	Domestic assistants	14	0.98	7	0.58	[0.08]	0.00	30	1.16	54	1.09	105	1.03	0.85—1.25
47	Waiters	1	0.41	10	1.02	[0.03]	0.00	6	0.54	19	1.05	36	0.87	0.61—1.20
48	Building caretakers	53	1.30	42	1.10	[0.58]	0.00	47	1.01	49	1.01	191	1.10	0.95—1.26
49	Chimney sweeps	[0.00]	0.00	[0.02]	0.00	–	–	[0.01]	0.00	[0.00]	0.00	[0.03]	0.00	0.00—117.52
50	Hairdressers	2	0.80	9	**2.41**	[0.05]	0.00	2	0.67	6	0.73	19	1.09	0.66—1.70
51	Launderers	4	0.87	2	0.66	[0.08]	0.00	3	0.76	16	1.74	25	1.20	0.78—1.77
52	Military personnel	[0.02]	0.00	[0.04]	0.00	–	–	[0.02]	0.00	[0.04]	0.00	[0.12]	0.00	0.00—30.20
53	"Other workers"	17	1.46	12	1.00	1	1.80	20	0.81	20	0.91	70	0.99	0.77—1.25
54	Economically inactive	293	0.99	245	1.00	4	1.70	309	1.00	956	1.00	1 807	1.00	0.95—1.05
1–54	All categories	594	1.00	700	1.00	9	1.00	737	1.00	1 691	1.00	3 731	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 60. Observed number of brain cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	447	1.02	476	1.05	3	0.49	322	1.03	1 830	**1.10**	3 078	**1.07**	1.03—1.11
2	Laboratory assistants	7	0.81	13	1.09	2	1.82	15	1.07	13	1.06	50	1.04	0.78—1.38
3	Physicians	57	**1.66**	38	**1.44**	3	1.46	48	1.31	93	1.13	239	**1.32**	1.16—1.49
4	Dentists	12	1.13	6	1.13	[0.61]	0.00	16	1.01	49	1.32	83	1.19	0.95—1.48
5	Nurses	[0.54]	0.00	3	1.31	[0.03]	0.00	1	0.38	12	1.36	16	1.12	0.64—1.81
6	Assistant nurses	6	0.56	3	1.32	[0.34]	0.00	3	0.51	35	1.07	47	0.90	0.66—1.20
7	"Other health workers"	35	1.16	34	1.41	[0.59]	0.00	23	**1.60**	84	**1.26**	176	**1.30**	1.12—1.50
8	Teachers	193	1.00	175	0.99	7	0.87	242	1.11	475	1.04	1 092	1.04	0.98—1.10
9	Religious workers etc	59	0.80	137	**1.25**	9	1.70	106	1.00	417	**1.11**	728	**1.08**	1.01—1.17
10	Artistic workers	27	1.14	31	0.88	5	**3.62**	32	1.06	89	0.86	184	0.95	0.82—1.09
11	Journalists	11	0.95	20	1.19	1	1.19	19	1.37	46	0.93	97	1.05	0.85—1.28
12	Administrators	535	**1.15**	276	1.08	15	1.31	404	**1.15**	640	**1.10**	1 870	**1.12**	1.07—1.18
13	Clerical workers	206	0.98	175	1.10	15	1.11	261	0.97	677	1.04	1 334	1.02	0.97—1.08
14	Sales agents	116	1.03	268	1.10	6	0.88	333	**1.12**	1 020	1.05	1 743	**1.07**	1.02—1.12
15	Shop workers	479	1.04	119	1.05	6	1.17	140	1.08	321	1.03	1 065	1.04	0.98—1.11
16	Farmers	794	0.95	820	0.93	18	0.96	647	0.96	1 299	0.98	3 578	**0.96**	0.93—0.99
17	Gardeners	108	0.90	146	0.96	[0.63]	0.00	150	**0.82**	516	0.97	920	**0.93**	0.87—0.99
18	Fishermen	45	1.01	12	0.97	11	0.73	212	0.89	47	0.84	327	0.89	0.80—1.00
19	Forestry workers	13	0.76	160	0.88	[0.11]	0.00	119	0.93	311	**0.80**	603	**0.84**	0.78—0.91
20	Miners and quarry workers	8	1.46	30	1.00	1	4.26	35	0.83	93	0.90	167	0.92	0.79—1.07
21	Seamen	66	1.29	44	1.07	3	0.84	212	0.93	82	0.86	407	0.97	0.88—1.07
22	Transport workers	112	1.09	112	1.01	6	0.98	117	1.06	314	1.03	661	1.04	0.96—1.12
23	Drivers	322	0.93	393	0.98	11	1.10	327	0.98	769	0.93	1 822	0.95	0.91—1.00
24	Postal workers	71	1.02	55	0.92	2	1.74	55	0.93	192	1.08	375	1.02	0.92—1.13
25	Textile workers	57	1.01	40	1.15	1	0.53	63	1.07	162	0.95	323	1.00	0.90—1.12
26	Shoe and leather workers	13	0.96	22	1.48	1	2.55	22	0.93	54	0.85	112	0.96	0.80—1.16
27	Smelting workers	125	0.91	53	0.95	3	1.05	82	0.95	275	0.96	538	0.95	0.87—1.03
28	Mechanics	354	0.97	428	1.05	8	0.75	446	0.97	1 550	1.05	2 786	1.02	0.99—1.06
29	Plumbers	31	0.93	65	0.94	2	1.24	52	0.93	167	0.99	317	0.96	0.86—1.07
30	Welders	–	–	71	0.95	[0.64]	0.00	72	1.09	203	0.98	346	0.99	0.90—1.11
31	Electrical workers	101	1.12	168	0.91	5	0.76	221	1.08	516	0.97	1 011	0.99	0.93—1.05
32	Wood workers	240	0.99	368	1.00	7	1.30	472	1.01	807	**0.91**	1 894	0.96	0.92—1.01
33	Painters	89	1.08	84	1.01	2	0.92	75	0.94	274	1.03	524	1.02	0.94—1.11
34	"Other construction workers"	273	0.94	233	0.96	11	0.92	90	0.88	437	**0.90**	1 044	**0.92**	0.87—0.98
35	Bricklayers	88	0.99	31	0.80	–	–	58	1.23	113	1.00	290	1.01	0.90—1.13
36	Printers	64	1.08	41	0.92	[1.96]	0.00	56	1.04	156	0.99	317	1.00	0.90—1.12
37	Chemical process workers	58	1.15	80	1.20	2	2.16	88	0.85	190	0.88	418	0.96	0.87—1.05
38	Food workers	171	1.01	39	0.82	8	0.98	122	1.01	211	0.96	551	0.97	0.90—1.06
39	Beverage workers	17	0.82	3	1.04	[0.13]	0.00	2	0.94	12	0.99	34	0.89	0.62—1.25
40	Tobacco workers	3	0.98	1	1.83	[0.01]	0.00	2	1.15	2	1.86	8	1.24	0.54—2.45
41	Glass makers etc	79	0.81	71	1.00	1	0.66	59	0.92	247	1.00	457	0.95	0.87—1.04
42	Packers	81	0.96	136	1.00	5	1.09	185	1.02	435	1.01	842	1.01	0.94—1.08
43	Engine operators	81	0.89	197	0.97	10	1.40	120	0.98	396	0.99	804	0.98	0.91—1.05
44	Public safety workers	68	0.83	107	0.97	3	0.64	84	1.04	244	1.01	506	0.97	0.89—1.06
45	Cooks and stewards	1	**0.14**	8	0.88	3	1.19	41	1.01	49	0.99	102	0.94	0.77—1.14
46	Domestic assistants	1	12.18	[0.36]	0.00	[0.01]	0.00	1	2.46	7	1.05	9	1.20	0.55—2.27
47	Waiters	16	1.09	15	1.64	[0.31]	0.00	10	0.60	31	1.24	72	1.09	0.86—1.38
48	Building caretakers	105	**1.23**	86	0.99	4	2.39	39	0.93	152	0.85	386	0.98	0.88—1.08
49	Chimney sweeps	5	2.05	3	0.46	–	–	4	0.94	9	0.66	21	0.78	0.49—1.20
50	Hairdressers	27	1.12	[1.97]	0.00	1	2.81	9	0.77	38	0.91	75	0.94	0.74—1.18
51	Launderers	13	1.10	[2.00]	0.00	[0.15]	0.00	6	0.87	27	0.90	46	0.91	0.66—1.21
52	Military personnel	61	1.27	50	1.17	–	–	78	1.05	150	1.09	339	**1.12**	1.01—1.25
53	"Other workers"	247	0.90	77	**0.73**	17	0.95	334	1.03	485	0.94	1 160	**0.94**	0.88—0.99
54	Economically inactive	236	1.01	488	1.00	11	0.78	159	0.92	883	0.98	1 777	0.98	0.94—1.03
1–54	All categories	6 434	1.00	6 511	1.00	229	1.00	6 891	1.00	17 706	1.00	37 771	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 61. Observed number of brain cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	32	1.36	80	1.15	1	1.06	11	0.78	130	1.18	254	**1.16**	1.03—1.32
2	Laboratory assistants	17	0.95	37	1.02	2	1.48	27	**1.69**	42	0.99	125	1.10	0.92—1.31
3	Physicians	13	1.68	23	1.30	[0.21]	0.00	9	1.38	22	0.78	67	1.11	0.86—1.41
4	Dentists	3	0.44	7	0.48	[0.09]	0.00	7	1.38	17	0.93	34	0.76	0.53—1.06
5	Nurses	156	1.16	219	**1.18**	7	1.19	125	0.99	321	1.02	828	**1.08**	1.01—1.16
6	Assistant nurses	110	1.08	174	1.02	4	0.47	112	0.90	619	1.05	1 019	1.03	0.96—1.09
7	"Other health workers"	76	0.99	121	0.85	1	0.55	110	0.92	178	0.87	486	**0.89**	0.82—0.98
8	Teachers	191	1.09	341	1.09	16	1.50	251	1.07	786	**1.08**	1 585	**1.09**	1.03—1.14
9	Religious workers etc	32	1.37	223	**1.18**	2	1.27	52	0.90	285	1.05	594	**1.09**	1.01—1.19
10	Artistic workers	7	0.62	23	0.83	3	2.33	18	1.09	49	1.03	100	0.96	0.79—1.16
11	Journalists	2	0.76	19	1.12	[0.34]	0.00	5	1.04	23	1.01	49	1.03	0.76—1.36
12	Administrators	66	0.97	60	1.02	1	1.05	56	1.06	123	1.14	306	1.06	0.95—1.19
13	Clerical workers	758	1.07	1 107	1.05	27	0.83	705	0.99	1 769	1.02	4 366	1.03	1.00—1.06
14	Sales agents	3	0.48	130	0.95	4	1.23	80	0.98	206	0.93	423	0.94	0.86—1.03
15	Shop workers	440	0.95	487	0.98	15	0.75	566	1.05	922	1.02	2 430	1.00	0.96—1.04
16	Farmers	292	0.90	220	0.88	16	1.15	330	1.05	80	0.89	938	0.94	0.88—1.01
17	Gardeners	35	0.83	702	0.93	[0.48]	0.00	174	0.91	196	**0.86**	1 107	**0.91**	0.86—0.97
18	Fishermen	2	1.18	1	0.52	2	3.66	2	0.70	3	3.72	10	1.28	0.61—2.35
19	Forestry workers	1	2.24	2	0.54	[0.07]	0.00	4	1.01	5	0.91	12	0.88	0.45—1.54
20	Miners and quarry workers	[0.03]	0.00	1	0.73	[0.01]	0.00	1	4.00	[1.43]	0.00	2	0.65	0.08—2.33
21	Seamen	–	–	[0.62]	0.00	[0.00]	0.00	1	1.45	1	4.00	2	1.28	0.16—4.63
22	Transport workers	[0.46]	0.00	19	0.86	1	1.92	5	1.44	15	0.88	40	0.92	0.66—1.25
23	Drivers	18	1.51	5	**0.39**	[0.26]	0.00	10	0.86	58	1.29	91	1.12	0.90—1.37
24	Postal workers	18	0.74	139	0.96	7	1.08	117	0.90	285	1.04	566	0.97	0.90—1.06
25	Textile workers	161	1.03	316	1.00	12	1.07	176	0.98	500	1.05	1 165	1.02	0.96—1.08
26	Shoe and leather workers	14	1.19	34	0.86	1	1.61	7	0.53	35	0.94	91	0.89	0.72—1.09
27	Smelting workers	3	1.04	11	1.20	[0.03]	0.00	[1.94]	0.00	15	1.15	29	1.08	0.72—1.54
28	Mechanics	37	1.26	44	0.98	[0.12]	0.00	12	0.67	130	1.03	223	1.02	0.89—1.16
29	Plumbers	[0.22]	0.00	[0.13]	0.00	–	–	[0.15]	0.00	[0.26]	0.00	[0.75]	0.00	0.00—4.90
30	Welders	–	–	6	1.51	[0.01]	0.00	4	2.43	6	1.03	16	1.39	0.80—2.26
31	Electrical workers	41	0.99	36	1.06	[0.11]	0.00	18	0.88	76	1.06	171	1.02	0.88—1.19
32	Wood workers	17	1.27	68	0.88	[0.21]	0.00	10	1.46	20	0.90	115	0.96	0.80—1.15
33	Painters	[0.50]	0.00	11	1.12	[0.06]	0.00	3	1.99	6	1.06	20	1.14	0.70—1.76
34	"Other construction workers"	[0.38]	0.00	31	1.09	[0.04]	0.00	1	1.71	1	1.08	33	1.09	0.75—1.53
35	Bricklayers	[0.08]	0.00	[1.07]	0.00	–	–	[0.03]	0.00	[0.03]	0.00	[1.22]	0.00	0.00—3.03
36	Printers	21	1.40	50	1.16	2	1.94	11	0.65	42	0.83	126	1.00	0.84—1.18
37	Chemical process workers	26	1.12	20	0.97	[0.43]	0.00	19	1.26	36	0.95	101	1.04	0.85—1.26
38	Food workers	117	1.02	99	0.95	28	1.12	75	0.84	104	0.99	423	0.96	0.88—1.06
39	Beverage workers	11	1.03	2	0.36	[0.06]	0.00	[0.89]	0.00	4	0.62	17	0.72	0.42—1.15
40	Tobacco workers	14	0.94	10	**3.14**	–	–	2	0.65	4	0.90	30	1.17	0.79—1.67
41	Glass makers etc	27	0.94	76	0.99	[0.69]	0.00	23	0.70	108	1.06	234	0.97	0.85—1.10
42	Packers	12	1.49	143	1.06	2	0.87	76	1.00	151	1.01	384	1.04	0.94—1.15
43	Engine operators	[0.28]	0.00	21	0.92	[0.04]	0.00	4	2.93	19	1.53	44	1.19	0.86—1.60
44	Public safety workers	[0.81]	0.00	9	1.55	1	2.16	15	1.72	22	1.23	47	**1.39**	1.02—1.85
45	Cooks and stewards	[0.29]	0.00	164	1.06	5	0.58	93	0.98	219	1.09	481	1.05	0.96—1.15
46	Domestic assistants	178	1.02	164	0.91	5	2.06	231	0.90	585	**0.90**	1 163	**0.92**	0.87—0.97
47	Waiters	30	0.98	131	0.94	[1.05]	0.00	113	0.98	221	1.05	495	1.00	0.91—1.09
48	Building caretakers	471	0.94	471	0.94	23	1.32	460	0.94	607	1.01	2 032	0.96	0.92—1.00
49	Chimney sweeps	[0.04]	0.00	[0.26]	0.00	–	–	[0.06]	0.00	[0.03]	0.00	[0.39]	0.00	0.00—9.54
50	Hairdressers	31	0.99	58	1.08	1	0.87	23	0.72	108	1.04	221	1.00	0.87—1.14
51	Launderers	63	1.12	31	0.83	3	1.13	47	1.20	109	1.06	253	1.06	0.94—1.20
52	Military personnel	[0.29]	0.00	1	1.37	–	–	[0.19]	0.00	[0.67]	0.00	1	0.53	0.01—2.96
53	"Other workers"	144	1.00	159	0.95	21	1.12	241	0.92	275	1.00	840	0.97	0.91—1.04
54	Economically inactive	3 579	0.99	3 022	1.01	58	0.90	3 009	1.04	10 676	0.99	20 344	1.00	0.98—1.01
1–54	All categories	7 269	1.00	9 328	1.00	271	1.00	7 451	1.00	20 214	1.00	44 533	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

biological workers (1.21, 1.01–1.46) and teachers (1.12, 1.03–1.20), while none of the significant SIRs were below 0.85.

Comment. To date, no lifestyle or environmental risk factors for brain cancer have been identified, except for ionising radiation [131]. Exposure to electromagnetic fields and to mobile cell phones have been hypothesised as possibly increasing brain cancer risk, but results from large studies have not confirmed any associations. Chemicals suspected to be associated with risk in animal models are epichlorohydrin and non-arsenical insecticides [118]. In this study we did not find evidence of an association with occupational exposures.

In the present data set, only about one-third of the cases were classified as gliomas and one-fourth as meningiomas. These low proportions indicate problems in finding comparable code definitions over the Nordic countries; e.g. only 9% of the Danish cases were included in the category of gliomas. If this type of classification problem is not related to occupation it does not bias SIR estimates. The other potential source of bias may be the diverging degree of diagnostic precision; this may well explain clustering of medical work occupations on the top of the list of the highest SIRs for meningeoma.

Thyroid cancer

The incidence of thyroid cancer in the Nordic countries is twofold higher in women than in men (Figure 42). The two most common histological types are papillary (70%) and follicular carcinoma (10–20%). The incidence of thyroid cancer is by far the highest in Iceland. There was a rapid increase in Finland until the mid 1990s but the rates in Finland are still only about one half of the rates in Iceland.

We found quite modest and inconsistent variation in risk of thyroid cancer between occupations (Tables 62, 63). Male fishermen in Iceland and Norway had elevated SIRs, but not fishermen in the other countries, resulting in an overall SIR of 1.32 (95% CI 1.07–1.62). The other significant elevated SIRs among men were in public safety work and clerical work. Female farmers had an SIR of 1.18 (1.07–1.30).

There was an elevated risk of the papillary type of thyroid cancer in fishermen (1.70, 1.27–2.23; http://astra.cancer.fi/NOCCA/Incidence/thyroid-papillary) and seamen (1.43, 1.04–1.91) while the SIRs for the follicular type were below unity, for the seaman even significantly so (http://astra.cancer.fi/NOCCA/Incidence/thyroid-follicular). Significant excess risks for follicular thyroid cancer were observed among male "other health workers (3.24, 1.19–7.04), public safety workers (1.95, 1.14–3.12) and mechanics (1.47, 1.11–1.91), and among female glass etc. workers (2.11, 1.29–3.26).

Comment. Childhood exposure to ionising radiation is one of the few risk factors that are clearly associated with thyroid cancer, while radiation in adulthood has not been linked convincingly to thyroid cancer [132]. Several studies have indicated that an increased intake of iodine is associated with a larger risk, especially for the papillary type, but a reverse association with iodine intake for the follicular type. Fishermen and seamen are assumed to consume more oceanic fish rich of iodine than others, and thus the increased risk of papillary thyroid cancer and decreased risk of follicular thyroid cancer among them are in line with the iodine theory. Wood processing has been suggested as a risk factor; in the present study the SIR among the wood workers was about 1.0.

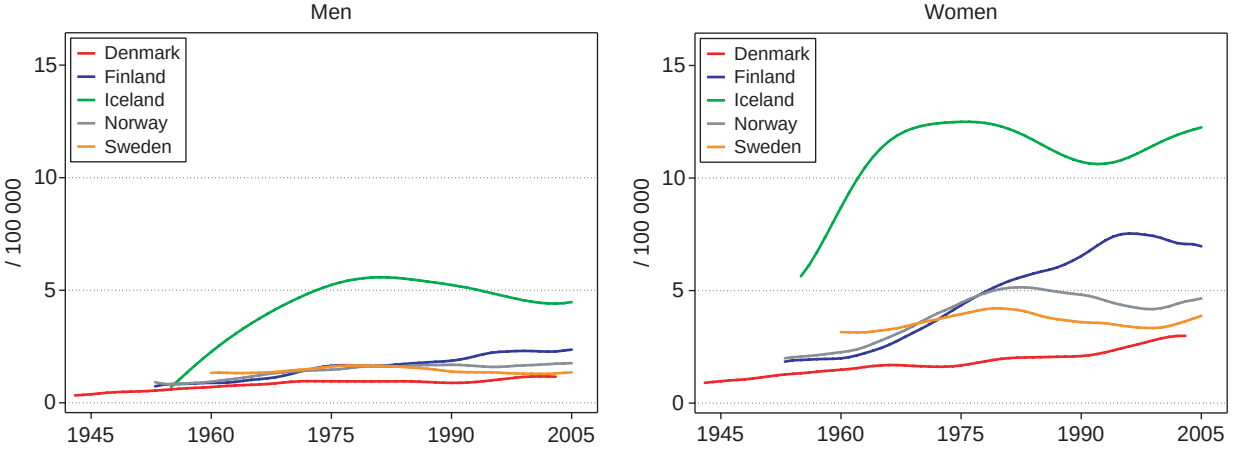


Figure 42. Age standardised (World) incidence rates for thyroid cancer 1943–2005, by country and gender. Modified from NORDCAN [49].

Table 62. Observed number of thyroid cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	43	1.14	125	1.16	2	0.61	36	**0.66**	278	1.04	484	1.03	0.94—1.12
2	Laboratory assistants	1	1.34	2	0.70	2	3.31	1	0.40	2	1.17	8	0.95	0.41—1.88
3	Physicians	1	0.33	5	0.80	2	1.69	5	0.73	12	0.92	25	0.82	0.53—1.22
4	Dentists	1	1.10	1	0.78	[0.34]	0.00	4	1.36	6	1.01	12	1.05	0.54—1.83
5	Nurses	[0.04]	0.00	1	1.70	[0.01]	0.00	[0.48]	0.00	[1.27]	0.00	1	0.42	0.01—2.33
6	Assistant nurses	[0.91]	0.00	1	1.69	[0.17]	0.00	[1.10]	0.00	7	1.37	8	1.01	0.44—2.00
7	"Other health workers"	4	1.51	5	0.88	[0.32]	0.00	4	1.49	14	1.30	27	1.22	0.80—1.77
8	Teachers	20	1.21	45	1.11	4	0.89	48	1.20	82	1.15	199	1.15	1.00—1.32
9	Religious workers etc	7	1.03	24	0.90	5	1.70	22	1.11	58	0.98	116	1.00	0.84—1.20
10	Artistic workers	1	0.47	12	1.45	1	1.29	5	0.91	12	0.72	31	0.93	0.63—1.32
11	Journalists	[1.01]	0.00	2	0.51	[0.47]	0.00	2	0.79	10	1.25	14	0.88	0.48—1.48
12	Administrators	46	1.11	75	1.26	7	1.02	64	0.97	104	1.05	296	1.09	0.97—1.22
13	Clerical workers	25	1.35	58	**1.56**	10	1.27	49	1.01	122	1.13	264	**1.20**	1.06—1.35
14	Sales agents	6	0.61	57	1.01	4	1.01	55	0.98	160	1.00	282	0.99	0.88—1.11
15	Shop workers	40	0.96	19	0.72	2	0.69	22	0.95	42	0.83	125	0.86	0.73—1.03
16	Farmers	57	**0.73**	190	0.95	9	0.81	143	1.02	240	0.98	639	0.95	0.88—1.02
17	Gardeners	9	0.81	32	0.93	[0.38]	0.00	33	0.95	62	**0.66**	136	**0.78**	0.66—0.92
18	Fishermen	1	0.26	[2.88]	0.00	12	1.49	73	**1.60**	7	0.70	93	**1.32**	1.07—1.62
19	Forestry workers	2	1.23	24	**0.59**	[0.07]	0.00	19	0.75	75	1.09	120	0.88	0.73—1.05
20	Miners and quarry workers	[0.51]	0.00	5	0.74	1	7.85	7	0.90	14	0.79	27	0.82	0.54—1.19
21	Seamen	2	0.47	9	0.95	2	1.01	49	1.20	18	1.14	80	1.10	0.88—1.38
22	Transport workers	9	0.99	26	1.03	7	1.93	18	0.90	52	1.02	112	1.03	0.85—1.24
23	Drivers	24	0.81	99	1.08	2	0.35	49	0.82	156	1.17	330	1.03	0.92—1.15
24	Postal workers	8	1.37	11	0.79	[0.68]	0.00	12	1.06	25	0.84	56	0.91	0.69—1.18
25	Textile workers	2	0.39	7	0.88	1	0.89	11	0.99	32	1.07	53	0.96	0.72—1.25
26	Shoe and leather workers	1	0.79	6	1.75	[0.23]	0.00	4	0.86	11	0.94	22	1.03	0.65—1.56
27	Smelting workers	10	0.84	13	1.01	[1.66]	0.00	20	1.24	43	0.87	86	0.94	0.75—1.16
28	Mechanics	26	0.82	110	1.15	8	1.37	82	0.99	234	0.97	460	1.01	0.92—1.10
29	Plumbers	3	1.04	13	0.81	1	1.12	8	0.81	23	0.83	48	0.84	0.62—1.11
30	Welders	–	–	16	0.91	1	2.84	9	0.79	38	1.17	64	1.03	0.80—1.32
31	Electrical workers	5	0.65	42	0.97	6	1.71	38	1.03	89	1.04	180	1.02	0.88—1.18
32	Wood workers	24	1.11	86	1.02	2	0.66	80	0.91	140	0.91	332	0.95	0.85—1.05
33	Painters	9	1.25	19	0.99	1	0.82	14	0.93	49	1.08	92	1.05	0.84—1.28
34	"Other construction workers"	37	1.38	40	**0.73**	4	0.61	17	0.89	64	**0.76**	162	**0.85**	0.73—0.99
35	Bricklayers	12	1.52	5	0.57	–	–	7	0.80	22	1.12	46	1.02	0.75—1.36
36	Printers	9	1.76	9	0.86	[1.07]	0.00	5	0.50	20	0.79	43	0.83	0.60—1.11
37	Chemical process workers	5	1.09	16	1.04	1	1.83	18	0.91	36	0.96	76	0.98	0.77—1.23
38	Food workers	17	1.13	12	1.10	2	0.42	31	1.36	34	0.91	96	1.06	0.86—1.29
39	Beverage workers	7	**3.80**	[0.67]	0.00	[0.08]	0.00	[0.37]	0.00	1	0.47	8	1.57	0.68—3.09
40	Tobacco workers	1	3.41	[0.13]	0.00	[0.00]	0.00	[0.34]	0.00	[0.18]	0.00	1	1.06	0.03—5.92
41	Glass makers etc	6	0.69	9	0.55	1	1.15	9	0.77	36	0.86	61	**0.77**	0.59—0.99
42	Packers	4	0.52	31	0.99	2	0.75	29	0.84	79	1.06	145	0.96	0.82—1.13
43	Engine operators	8	1.00	42	0.89	3	0.76	28	1.27	70	1.07	151	1.03	0.88—1.21
44	Public safety workers	10	1.38	31	1.20	5	1.87	15	1.00	51	1.31	112	**1.25**	1.04—1.50
45	Cooks and stewards	[0.60]	0.00	3	1.34	[1.37]	0.00	8	1.09	7	0.90	18	0.93	0.55—1.48
46	Domestic assistants	[0.01]	0.00	[0.09]	0.00	[0.00]	0.00	[0.07]	0.00	2	2.05	2	1.74	0.21—6.27
47	Waiters	2	1.59	2	0.88	[0.16]	0.00	2	0.66	6	1.53	12	1.13	0.58—1.97
48	Building caretakers	9	1.15	21	1.04	2	1.95	13	1.61	30	0.98	75	1.10	0.87—1.38
49	Chimney sweeps	[0.21]	0.00	1	0.68	–	–	2	2.53	3	1.36	6	1.28	0.47—2.79
50	Hairdressers	3	1.35	[0.47]	0.00	[0.20]	0.00	4	1.81	12	1.67	19	1.55	0.93—2.41
51	Launderers	2	1.85	1	2.16	[0.10]	0.00	1	0.78	3	0.58	7	0.87	0.35—1.79
52	Military personnel	7	1.79	20	**2.01**	–	–	15	1.19	21	0.95	63	1.29	0.99—1.66
53	"Other workers"	22	0.91	21	0.86	9	0.87	55	0.86	84	0.93	191	0.90	0.78—1.03
54	Economically inactive	29	1.20	108	0.91	9	1.14	50	1.34	175	1.14	371	1.08	0.98—1.20
1–54	All categories	577	1.00	1 512	1.00	130	1.00	1 295	1.00	2 973	1.00	6 487	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 63. Observed number of thyroid cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	3	0.82	46	0.97	2	1.76	10	1.59	42	1.11	103	1.07	0.88—1.30
2	Laboratory assistants	6	2.19	20	0.88	1	0.70	5	0.73	20	1.37	52	1.08	0.80—1.41
3	Physicians	[1.21]	0.00	18	1.47	1	4.99	2	0.70	2	0.21	23	0.88	0.56—1.32
4	Dentists	[1.07]	0.00	7	0.83	[0.08]	0.00	[2.18]	0.00	10	1.57	17	0.94	0.55—1.51
5	Nurses	25	1.16	138	1.19	8	1.39	57	1.08	101	0.93	329	1.08	0.97—1.20
6	Assistant nurses	11	0.71	119	1.21	12	1.43	49	0.96	202	1.00	393	1.05	0.95—1.16
7	"Other health workers"	10	0.82	104	1.20	[1.90]	0.00	47	0.95	67	0.96	228	1.04	0.91—1.18
8	Teachers	29	1.05	184	0.99	14	1.29	100	0.99	239	0.96	566	0.99	0.91—1.07
9	Religious workers etc	2	0.55	134	1.01	3	1.93	35	1.42	83	0.88	257	1.00	0.89—1.13
10	Artistic workers	2	1.05	16	0.89	[1.18]	0.00	9	1.28	21	1.27	48	1.08	0.79—1.43
11	Journalists	[0.41]	0.00	6	0.57	[0.32]	0.00	1	0.49	9	1.14	16	0.76	0.43—1.23
12	Administrators	4	0.36	31	0.81	1	1.39	22	0.95	28	0.75	86	0.78	0.62—0.96
13	Clerical workers	97	0.89	585	0.90	36	1.12	274	0.94	546	0.93	1 538	0.92	0.88—0.97
14	Sales agents	[0.97]	0.00	74	0.94	1	0.38	23	0.65	63	0.80	161	0.82	0.70—0.96
15	Shop workers	60	0.82	244	0.90	15	0.84	195	0.91	287	0.92	801	0.90	0.84—0.97
16	Farmers	63	1.22	138	1.05	8	0.74	171	1.30	40	1.26	420	1.18	1.07—1.30
17	Gardeners	2	0.30	382	1.06	[0.40]	0.00	84	1.08	76	0.97	544	1.04	0.95—1.13
18	Fishermen	[0.26]	0.00	1	0.93	[0.51]	0.00	3	2.59	[0.28]	0.00	4	1.22	0.33—3.12
19	Forestry workers	[0.07]	0.00	1	0.49	[0.07]	0.00	1	0.67	1	0.53	3	0.54	0.11—1.58
20	Miners and quarry workers	[0.01]	0.00	1	1.47	[0.01]	0.00	[0.11]	0.00	[0.48]	0.00	1	0.78	0.02—4.34
21	Seamen	–	–	[0.41]	0.00	[0.01]	0.00	1	3.56	[0.09]	0.00	1	1.27	0.03—7.06
22	Transport workers	[0.07]	0.00	9	0.82	[0.40]	0.00	[1.48]	0.00	7	1.15	16	0.84	0.48—1.37
23	Drivers	1	0.55	8	1.02	1	3.97	4	0.82	17	1.12	31	1.03	0.70—1.47
24	Postal workers	1	0.26	81	1.03	7	1.34	54	1.00	99	1.05	242	1.03	0.91—1.17
25	Textile workers	22	0.90	171	1.02	9	1.10	69	0.93	173	1.03	444	1.00	0.91—1.10
26	Shoe and leather workers	2	1.12	21	1.01	[0.47]	0.00	5	0.93	14	1.07	42	1.01	0.73—1.37
27	Smelting workers	1	2.27	6	1.27	[0.02]	0.00	[0.80]	0.00	4	0.91	11	1.06	0.53—1.90
28	Mechanics	9	2.08	24	0.95	[0.11]	0.00	3	0.41	49	1.13	85	1.06	0.85—1.31
29	Plumbers	[0.04]	0.00	[0.08]	0.00	–	–	[0.06]	0.00	[0.09]	0.00	[0.27]	0.00	0.00—13.45
30	Welders	–	–	5	2.04	[0.02]	0.00	[0.70]	0.00	3	1.51	8	1.55	0.67—3.06
31	Electrical workers	13	2.13	27	1.26	[0.09]	0.00	11	1.36	24	0.98	75	1.24	0.98—1.56
32	Wood workers	6	3.00	32	0.82	[0.18]	0.00	4	1.47	11	1.44	53	1.03	0.77—1.34
33	Painters	[0.08]	0.00	5	0.96	[0.06]	0.00	1	1.71	[1.96]	0.00	6	0.76	0.28—1.66
34	"Other construction workers"	[0.06]	0.00	13	0.97	[0.04]	0.00	[0.25]	0.00	1	3.12	14	1.00	0.54—1.67
35	Bricklayers	[0.01]	0.00	[0.53]	0.00	–	–	[0.01]	0.00	[0.01]	0.00	[0.57]	0.00	0.00—6.46
36	Printers	3	1.30	20	0.82	[0.92]	0.00	4	0.56	12	0.68	39	0.75	0.53—1.02
37	Chemical process workers	3	0.84	5	0.46	[0.32]	0.00	6	0.98	12	0.91	26	0.77	0.50—1.12
38	Food workers	21	1.20	49	0.92	15	0.71	39	1.07	40	1.09	164	0.99	0.85—1.16
39	Beverage workers	1	0.60	3	1.08	[0.04]	0.00	[0.35]	0.00	1	0.44	5	0.70	0.23—1.64
40	Tobacco workers	2	0.86	3	1.92	–	–	[1.33]	0.00	1	0.66	6	0.89	0.33—1.94
41	Glass makers etc	4	0.93	37	0.90	1	1.69	19	1.44	39	1.11	100	1.06	0.87—1.29
42	Packers	1	0.82	69	0.98	1	0.56	21	0.70	58	1.12	150	0.96	0.82—1.13
43	Engine operators	[0.04]	0.00	13	1.04	[0.04]	0.00	[0.57]	0.00	2	0.48	15	0.87	0.48—1.43
44	Public safety workers	[0.14]	0.00	4	1.11	[0.38]	0.00	3	0.84	3	0.47	10	0.71	0.34—1.30
45	Cooks and stewards	[0.05]	0.00	103	1.19	5	0.77	38	0.96	63	0.88	209	1.02	0.89—1.17
46	Domestic assistants	28	1.02	108	0.97	3	1.80	97	0.92	219	0.96	455	0.96	0.87—1.05
47	Waiters	3	0.64	68	0.87	[0.92]	0.00	39	0.83	78	1.06	188	0.92	0.80—1.06
48	Building caretakers	71	0.89	291	1.08	12	0.90	218	1.11	235	1.13	827	1.08	1.01—1.15
49	Chimney sweeps	[0.01]	0.00	[0.13]	0.00	–	–	[0.02]	0.00	[0.01]	0.00	[0.17]	0.00	0.00—22.00
50	Hairdressers	4	0.79	26	0.82	2	1.54	7	0.53	21	0.59	60	0.69	0.53—0.89
51	Launderers	9	1.01	19	1.03	[1.81]	0.00	8	0.50	26	0.71	62	0.76	0.58—0.97
52	Military personnel	[0.05]	0.00	[0.51]	0.00	–	–	[0.08]	0.00	[0.23]	0.00	[0.86]	0.00	0.00—4.28
53	"Other workers"	29	1.28	83	0.89	23	1.46	93	0.88	96	1.01	324	0.97	0.87—1.08
54	Economically inactive	646	1.04	1 530	1.02	51	0.97	1 357	1.03	3 919	1.03	7 503	1.02	1.00—1.05
1–54	All categories	1 194	1.00	5 082	1.00	232	1.00	3 189	1.00	7 064	1.00	16 761	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Changes in diagnostic activity may at least partly explain the observed changes in the incidence of thyroid cancer in Iceland.

Cancers of other endocrine glands

Cancers of endocrine glands other than the thyroid gland are so rare that they have hardly ever been included in epidemiological studies or even routine tabulations as separate entities. Therefore, there is no published information about the time trends of these cancers in the Nordic countries. We do not publish tables on SIRs for each combination of gender, country and occupation as we do for more common cancers, because the majority of the strata would show zero number of cases. Those who want to check the exact numbers of cancer related to a given occupational category are advised to have a look at the appendix tables on the internet (http://astra.cancer.fi/NOCCA/Incidence/endocrine-glands)

Glandula suprarenalis. There were 1 764 incident cases of cancer of the suprarenal gland included in the study. Among men, the incidence was significantly elevated among smelting workers (SIR 1.85, 95% CI 1.18–2.75), packers (1.72, 1.20–2.39), engine operators (1.55, 1.05–2.19) and woodworkers (1.33, 1.03–1.69). Male farmers had a deficit risk (0.77, 0.61–0.95). Shoe and leather workers had an excess risk among women (3.38, 1.36–6.96) based on seven cases, and building caretakers had an SIR of 1.42 (1.07–1.83), based on 58 cases. Female sales agents had a low risk (0.23, 0.03–0.84).

Glandula parathyrioeda. Only 159 incident cases of parathyroid cancer were included in the study, 41 in men and 118 in women. There were no statistically significant excess or deficit risks.

Thymus. In total, 680 incident cases of thymus cancer were included in the study. Men in the occupational category including glass makers and several other similar occupations, had an excess risk (SIR 2.23, 95% CI 1.07–4.10), and mechanics had a deficit risk, SIR 0.60 (95%CI 0.34–0.99). No significant variation in risk was found across the occupational categories of women.

Hypophysis. There were 216 cases of cancer of the hypophysis. Beverage workers had an SIR of 16.60 (95% CI 2.01–59.95), however based on only two cases, and sales agents an SIR of 2.31 (1.11–4.25), based on ten cases. There were no significant SIRs among women.

Corpus pineale. Only a total of 48 incident cases of corpus pineale were included in the present study. Swedish and Danish observations were missing, and there were no cases diagnosed in Finland. The only significant excess risk, SIR of 5.48 (1.13-16-01) among "other construction workers" is based on three cases and must be interpreted as a chance find.

Comment. We could not identify studies indicating environmental or occupational causes of any of these rare tumours in the literature. Hence, all observations made in our data set should be interpreted as suggestive or chance findings to be confirmed or rejected on the basis of cumulative information from other parts of the world.

Bone cancer

Bone cancer is rare, and the disease has been on the decrease for both men and women in the Nordic countries (Figure 43), possibly due to improving means of separating bone metastases from primary bone cancers. It is now between about 1 per 100 000 in men and one-third less in women.

"Other health workers" had an excess risk of bone cancer in men (SIR 2.25, 95%CI 1.29–3.66). Seamen, military personnel and public safety workers were also at excess risk (Table 64). The only category with a significantly decreased SIR was "other workers" (SIR 0.75, 0.56–0.99). There were no significant SIRs in women, except the one based on zero observed cases among woodworkers (95% CI 0.00–0.90; Table 65).

About every second one of the bone cancers in the present study series was of chondrosarcoma type (http://astra.cancer.fi/NOCCA/Incidence/bone-chondrosarcoma). Men in "other health work" had an an excess SIR of chondrosarcoma (2.97, 1.28–5.85), and the SIR was also elevated among military workers (2.88, 1.68–4.61), seamen (1.92, 1.05–3.22) and drivers (1.45, 1.09–1.88). In women, the only significant finding was among technical etc. workers (2.60, 1.12–5.12); this finding was dominated by the high SIR in Sweden.

Comment. Previous studies have indicated that the main environmental factors for bone cancer are ionising radiation and chemotherapy. Radium dial painters exposed to radium 226, 228, and occupational and environmental exposure to plutonium in and around nuclear weapons factories had an

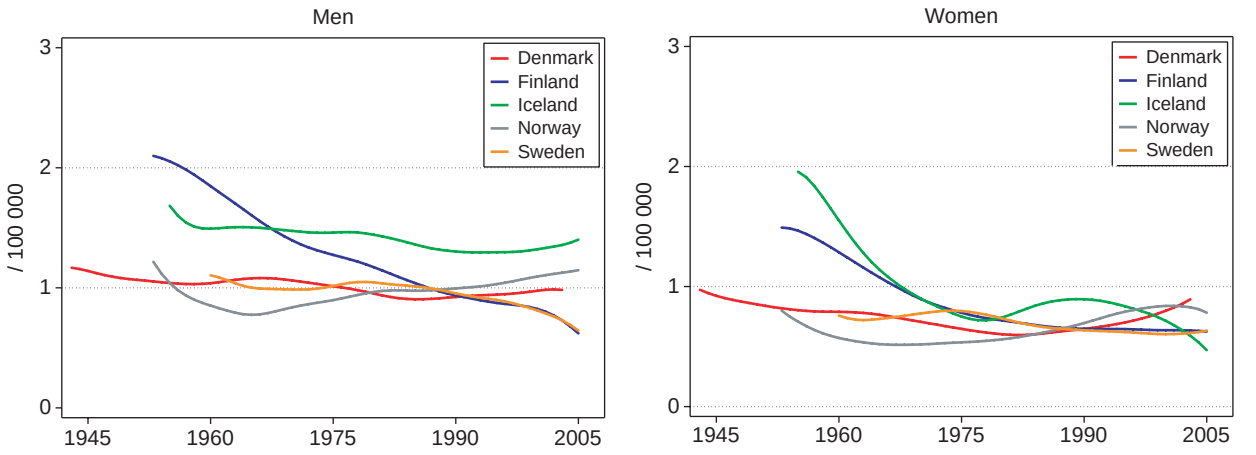


Figure 43. Age standardised (World) incidence rates for bone cancer 1943–2005, by country and gender. Modified from NORDCAN [49].

increased risk [133]. Exposure to ionising radiation and other physical agents such as gamma rays, neutrons and radon gas can be observed in radiologists, technologists, nuclear workers, underground miners, plutonium workers, clean-up workers following nuclear accidents and aircraft crew. In the present study we found an excess risk of osteosarcoma among health care workers, military workers and seamen. It would deserve further investigation to establish if these are associated with radiation exposure.

Soft tissue cancer

There has been a slight increase in the incidence of cancer of the soft tissue during the latest decades, but rates are still very low and similar (incidence around 2 per 100 000) in both genders and all Nordic countries (Figure 44).

Among men, the only occupational categories with significantly elevated SIRs in the combined Nordic data were building caretakers (SIR 1.30, 95% CI 1.08–1.56) and military personnel (1.27, 1,01–1.59), but there were significant single-country excesses among Norwegian welders, Danish men in the category of "religious workers etc.", Finnish gardeners and Swedish public safety workers (Table 66). Fishermen and packers had SIRs significantly below 1.0. No occupational category was either at an excess risk or a deficit risk among women (Table 67).

The data set included 1328 cases in the subgroup of fibrosarcoma (http://astra.cancer.fi/NOCCA/Incidence/soft-tissue-fibrosarcoma) in men and 1 174 in women from Finland, Iceland, Norway and Sweden. The only significant excess in men was among building caretakers (1.71, 1.12–2.50) and in women among sales agents (1.62, 1.01–2.45).

The only significant four-country SIR based on the 1 326 cases of liposarcoma (http://astra.cancer.fi/NOCCA/Incidence/soft-tissue-liposarcoma) in men

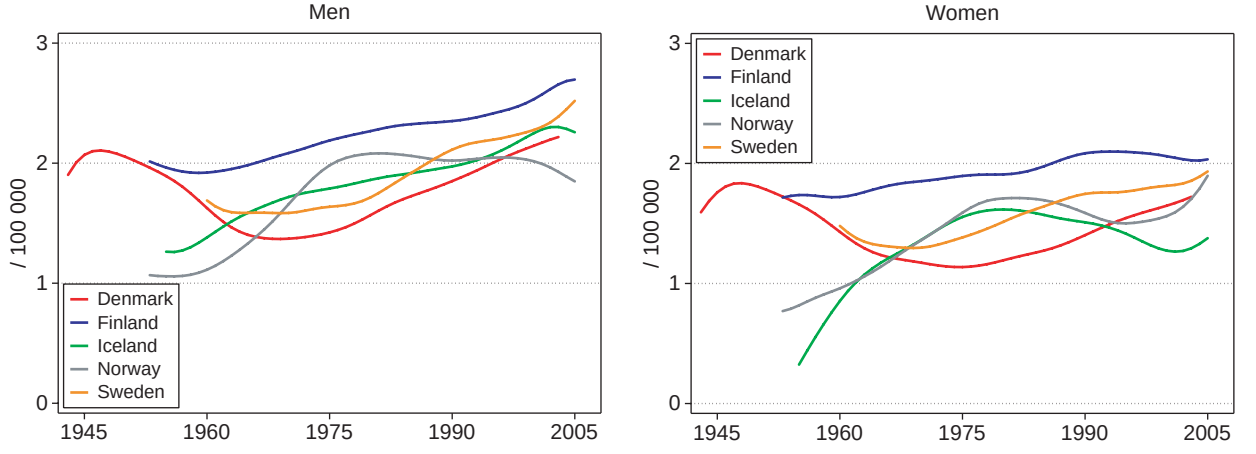


Figure 44. Age standardised (World) incidence rates for soft tissue cancer 1943–2005, by country and gender. Modified from NORDCAN [49].

Table 64. Observed number of bone cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	16	0.99	24	0.86	1	1.83	9	0.55	109	1.20	159	1.05	0.90—1.22
2	Laboratory assistants	[0.32]	0.00	[0.73]	0.00	[0.10]	0.00	3	4.02	[0.63]	0.00	3	1.19	0.24—3.47
3	Physicians	1	0.77	1	0.61	[0.18]	0.00	2	1.02	8	1.80	12	1.26	0.65—2.21
4	Dentists	[0.39]	0.00	[0.33]	0.00	[0.05]	0.00	1	1.14	[1.99]	0.00	1	0.27	0.01—1.53
5	Nurses	[0.02]	0.00	[0.13]	0.00	[0.00]	0.00	[0.13]	0.00	[0.48]	0.00	[0.76]	0.00	0.00—4.88
6	Assistant nurses	1	2.55	[0.13]	0.00	[0.04]	0.00	[0.32]	0.00	2	1.11	3	1.12	0.23—3.27
7	"Other health workers"	2	1.78	6	**4.02**	[0.05]	0.00	4	**5.17**	4	1.09	16	**2.25**	1.29—3.66
8	Teachers	5	0.70	11	1.02	[0.71]	0.00	13	1.12	22	0.91	51	0.94	0.70—1.23
9	Religious workers etc	1	0.35	7	1.05	[0.45]	0.00	8	1.41	23	1.13	39	1.08	0.77—1.48
10	Artistic workers	[0.91]	0.00	2	0.91	1	8.36	1	0.61	3	0.53	7	0.67	0.27—1.37
11	Journalists	1	2.34	3	2.86	[0.07]	0.00	1	1.35	2	0.74	7	1.40	0.56—2.88
12	Administrators	17	0.98	19	1.19	3	3.36	15	0.78	34	1.06	88	1.03	0.83—1.27
13	Clerical workers	11	1.39	11	1.07	3	2.82	15	1.02	37	1.03	77	1.10	0.87—1.38
14	Sales agents	4	0.95	14	0.91	[0.54]	0.00	13	0.78	45	0.84	76	0.84	0.66—1.06
15	Shop workers	18	1.04	7	0.99	[0.43]	0.00	9	1.30	16	0.94	50	1.03	0.76—1.35
16	Farmers	27	0.85	53	0.90	[1.40]	0.00	35	0.85	76	1.01	191	0.91	0.79—1.05
17	Gardeners	4	0.87	11	1.12	[0.04]	0.00	12	1.13	29	0.97	56	1.02	0.77—1.32
18	Fishermen	[1.64]	0.00	1	1.22	[1.39]	0.00	19	1.37	5	1.59	25	1.20	0.78—1.77
19	Forestry workers	[0.66]	0.00	4	**0.34**	[0.01]	0.00	7	0.91	25	1.14	36	0.85	0.60—1.18
20	Miners and quarry workers	1	4.81	1	0.51	[0.02]	0.00	4	1.69	5	0.86	11	1.06	0.53—1.90
21	Seamen	5	2.67	4	1.53	[0.32]	0.00	18	1.44	10	1.90	37	**1.64**	1.15—2.26
22	Transport workers	3	0.81	3	0.43	[0.48]	0.00	3	0.49	22	1.28	31	0.90	0.61—1.27
23	Drivers	18	1.42	33	1.31	2	2.37	17	0.94	57	1.26	127	**1.24**	1.05—1.48
24	Postal workers	3	1.20	5	1.33	[0.09]	0.00	1	0.29	3	**0.30**	12	0.61	0.32—1.07
25	Textile workers	5	2.34	[2.27]	0.00	1	7.20	5	1.49	9	0.94	20	1.14	0.70—1.77
26	Shoe and leather workers	[0.51]	0.00	[0.99]	0.00	[0.03]	0.00	[1.41]	0.00	5	1.38	5	0.76	0.25—1.78
27	Smelting workers	6	1.17	4	1.10	[0.23]	0.00	6	1.23	13	0.81	29	0.97	0.65—1.39
28	Mechanics	6	**0.44**	24	0.94	[0.93]	0.00	25	1.00	86	1.05	141	0.96	0.81—1.13
29	Plumbers	2	1.58	[4.35]	**0.00**	1	7.26	2	0.67	9	0.97	14	0.78	0.42—1.30
30	Welders	–	–	8	1.74	[0.06]	0.00	2	0.58	15	1.33	25	1.29	0.83—1.90
31	Electrical workers	6	1.78	11	0.97	1	1.63	11	0.98	16	**0.55**	45	0.81	0.59—1.08
32	Wood workers	9	0.98	23	0.96	[0.45]	0.00	25	0.94	46	0.93	103	0.94	0.78—1.14
33	Painters	1	0.33	9	1.66	[0.19]	0.00	9	1.98	19	1.28	38	1.36	0.96—1.86
34	"Other construction workers"	16	1.45	15	0.94	2	1.89	7	1.23	29	1.07	69	1.13	0.88—1.43
35	Bricklayers	1	0.29	2	0.80	–	–	1	0.38	4	0.63	8	0.54	0.23—1.06
36	Printers	1	0.45	3	1.08	[0.18]	0.00	5	1.68	5	0.58	14	0.84	0.46—1.40
37	Chemical process workers	2	1.05	3	0.71	[0.07]	0.00	5	0.84	8	0.67	18	0.74	0.44—1.18
38	Food workers	6	0.95	1	0.33	[0.59]	0.00	5	0.73	11	0.90	23	0.79	0.50—1.19
39	Beverage workers	1	1.30	[0.18]	0.00	[0.01]	0.00	[0.11]	0.00	[0.68]	0.00	1	0.57	0.01—3.18
40	Tobacco workers	[0.12]	0.00	[0.03]	0.00	[0.00]	0.00	[0.10]	0.00	[0.06]	0.00	[0.31]	0.00	0.00—11.74
41	Glass makers etc	4	1.10	4	0.89	1	8.58	2	0.56	11	0.80	22	0.86	0.54—1.31
42	Packers	2	0.63	10	1.14	1	2.89	8	0.77	29	1.20	50	1.07	0.79—1.41
43	Engine operators	5	1.48	14	1.10	1	1.61	2	0.30	19	0.87	41	0.91	0.65—1.23
44	Public safety workers	3	0.95	9	1.27	1	2.74	9	2.02	20	1.52	42	**1.49**	1.07—2.01
45	Cooks and stewards	[0.27]	0.00	[0.54]	0.00	[0.23]	0.00	2	0.91	[2.69]	0.00	2	0.34	0.04—1.22
46	Domestic assistants	[0.00]	0.00	[0.02]	0.00	[0.00]	0.00	[0.02]	0.00	[0.36]	0.00	[0.41]	0.00	0.00—8.97
47	Waiters	[0.55]	0.00	[0.54]	0.00	[0.03]	0.00	[0.91]	0.00	[1.39]	0.00	[3.41]	0.00	0.00—1.08
48	Building caretakers	1	0.31	7	1.25	[0.11]	0.00	3	1.27	10	1.01	21	0.99	0.61—1.51
49	Chimney sweeps	[0.09]	0.00	1	2.36	–	–	[0.24]	0.00	[0.74]	0.00	1	0.67	0.02—3.74
50	Hairdressers	4	**4.28**	[0.13]	0.00	[0.03]	0.00	2	3.02	1	0.42	7	1.70	0.68—3.50
51	Launderers	[0.44]	0.00	[0.13]	0.00	[0.01]	0.00	[0.39]	0.00	1	0.59	1	0.38	0.01—2.10
52	Military personnel	2	1.18	4	1.53	–	–	6	1.50	13	1.70	25	**1.57**	1.02—2.32
53	"Other workers"	11	1.07	4	0.58	[1.43]	0.00	23	1.21	12	**0.41**	50	**0.75**	0.56—0.99
54	Economically inactive	10	1.05	45	1.23	[1.16]	0.00	13	1.15	53	1.04	121	1.10	0.92—1.32
1–54	All categories	242	1.00	421	1.00	19	1.00	388	1.00	981	1.00	2 051	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 65. Observed number of bone cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	1	1.64	2	0.97	[0.07]	0.00	[0.48]	0.00	7	1.78	10	1.40	0.67—2.57
2	Laboratory assistants	[0.47]	0.00	1	0.92	[0.09]	0.00	[0.55]	0.00	[1.38]	0.00	1	0.28	0.01—1.55
3	Physicians	1	4.97	1	1.90	[0.01]	0.00	[0.23]	0.00	[0.97]	0.00	2	1.03	0.12—3.72
4	Dentists	[0.18]	0.00	[0.46]	0.00	[0.01]	0.00	[0.19]	0.00	1	1.48	1	0.66	0.02—3.69
5	Nurses	5	1.42	7	1.27	[0.38]	0.00	7	1.59	14	1.21	33	1.30	0.89—1.82
6	Assistant nurses	4	1.52	6	1.13	[0.54]	0.00	2	0.47	15	0.71	27	0.79	0.52—1.16
7	"Other health workers"	[2.00]	0.00	1	0.23	[0.12]	0.00	4	0.95	8	1.10	13	0.72	0.39—1.24
8	Teachers	5	1.09	7	0.73	2	2.81	6	0.72	40	**1.49**	60	1.20	0.91—1.54
9	Religious workers etc	[0.60]	0.00	6	1.09	[0.10]	0.00	3	1.49	5	0.53	14	0.79	0.43—1.33
10	Artistic workers	[0.30]	0.00	[0.83]	0.00	[0.08]	0.00	[0.60]	0.00	2	1.16	2	0.57	0.07—2.04
11	Journalists	[0.07]	0.00	[0.52]	0.00	[0.02]	0.00	[0.17]	0.00	[0.82]	0.00	[1.59]	0.00	0.00—2.31
12	Administrators	1	0.56	1	0.55	[0.05]	0.00	3	1.54	1	0.26	6	0.63	0.23—1.37
13	Clerical workers	20	1.08	36	1.11	3	1.42	31	1.22	48	0.76	138	0.97	0.82—1.15
14	Sales agents	[0.16]	0.00	5	1.11	1	5.16	3	0.93	8	0.92	17	1.02	0.59—1.63
15	Shop workers	7	0.58	18	1.12	1	0.81	16	0.81	29	0.82	71	0.84	0.66—1.06
16	Farmers	7	0.83	8	0.83	1	1.28	19	1.55	3	0.84	38	1.10	0.78—1.50
17	Gardeners	[1.09]	0.00	18	0.66	[0.03]	0.00	7	0.96	8	0.87	33	0.74	0.51—1.04
18	Fishermen	[0.04]	0.00	[0.06]	0.00	1	28.44	[0.10]	0.00	[0.03]	0.00	1	3.60	0.09—20.06
19	Forestry workers	[0.01]	0.00	1	8.18	[0.00]	0.00	[0.14]	0.00	[0.21]	0.00	1	2.04	0.05—11.37
20	Miners and quarry workers	[0.00]	0.00	[0.05]	0.00	[0.00]	0.00	[0.01]	0.00	[0.05]	0.00	[0.11]	0.00	0.00—33.55
21	Seamen	–	–	[0.02]	0.00	[0.00]	0.00	[0.02]	0.00	[0.01]	0.00	[0.05]	0.00	0.00—73.39
22	Transport workers	[0.01]	0.00	1	1.32	[0.03]	0.00	[0.12]	0.00	[0.62]	0.00	1	0.65	0.02—3.61
23	Drivers	[0.31]	0.00	[0.40]	0.00	[0.02]	0.00	[0.42]	0.00	[1.64]	0.00	[2.78]	0.00	0.00—1.33
24	Postal workers	3	4.80	5	1.04	1	2.68	7	1.45	9	0.86	25	1.18	0.77—1.75
25	Textile workers	8	1.95	10	0.93	[0.59]	0.00	10	1.44	21	1.07	49	1.16	0.86—1.54
26	Shoe and leather workers	[0.31]	0.00	[1.32]	0.00	[0.03]	0.00	[0.50]	0.00	1	0.66	1	0.27	0.01—1.52
27	Smelting workers	[0.08]	0.00	[0.31]	0.00	[0.00]	0.00	[0.07]	0.00	1	2.10	1	1.08	0.03—6.00
28	Mechanics	[0.76]	0.00	[1.47]	0.00	[0.01]	0.00	1	1.54	7	1.48	8	1.05	0.45—2.08
29	Plumbers	[0.01]	0.00	[0.00]	0.00	–	–	[0.01]	0.00	[0.01]	0.00	[0.02]	0.00	0.00—155.56
30	Welders	–	–	[0.12]	0.00	[0.00]	0.00	[0.06]	0.00	[0.20]	0.00	[0.38]	0.00	0.00—9.65
31	Electrical workers	3	2.81	[1.03]	0.00	[0.01]	0.00	[0.72]	0.00	3	1.14	6	1.10	0.40—2.39
32	Wood workers	[0.35]	0.00	[2.67]	0.00	[0.01]	0.00	[0.24]	0.00	[0.81]	0.00	[4.09]	**0.00**	0.00—0.90
33	Painters	[0.01]	0.00	[0.32]	0.00	[0.00]	0.00	[0.05]	0.00	[0.21]	0.00	[0.60]	0.00	0.00—6.11
34	"Other construction workers"	[0.01]	0.00	2	1.92	[0.00]	0.00	[0.02]	0.00	[0.03]	0.00	2	1.81	0.22—6.53
35	Bricklayers	[0.00]	0.00	[0.03]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.04]	0.00	0.00—98.27
36	Printers	[0.39]	0.00	1	0.71	[0.06]	0.00	1	1.57	1	0.52	3	0.68	0.14—1.98
37	Chemical process workers	[0.61]	0.00	[0.70]	0.00	[0.02]	0.00	[0.55]	0.00	[1.47]	0.00	[3.36]	0.00	0.00—1.10
38	Food workers	5	1.68	5	1.41	1	0.68	4	1.18	4	0.94	19	1.22	0.73—1.90
39	Beverage workers	1	3.56	[0.20]	0.00	[0.00]	0.00	[0.03]	0.00	[0.27]	0.00	1	1.28	0.03—7.14
40	Tobacco workers	1	2.56	[0.11]	0.00	–	–	[0.12]	0.00	[0.17]	0.00	1	1.25	0.03—6.99
41	Glass makers etc	[0.74]	0.00	3	1.18	[0.04]	0.00	2	1.66	3	0.76	8	0.94	0.41—1.86
42	Packers	[0.21]	0.00	10	**2.24**	[0.12]	0.00	2	0.72	2	0.34	14	1.04	0.57—1.75
43	Engine operators	[0.01]	0.00	[0.74]	0.00	[0.00]	0.00	[0.05]	0.00	[0.44]	0.00	[1.24]	0.00	0.00—2.97
44	Public safety workers	[0.02]	0.00	[0.19]	0.00	[0.03]	0.00	[0.33]	0.00	[0.61]	0.00	[1.17]	0.00	0.00—3.15
45	Cooks and stewards	[0.01]	0.00	6	1.15	1	2.14	1	0.27	9	1.09	17	0.96	0.56—1.54
46	Domestic assistants	3	0.66	8	1.35	1	8.17	6	0.60	24	0.97	42	0.93	0.67—1.25
47	Waiters	[0.81]	0.00	4	0.90	[0.06]	0.00	4	0.93	9	1.07	17	0.94	0.55—1.51
48	Building caretakers	10	0.76	14	0.80	2	2.11	22	1.21	23	0.97	71	0.97	0.76—1.22
49	Chimney sweeps	[0.00]	0.00	[0.01]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.01]	0.00	0.00—295.10
50	Hairdressers	[0.83]	0.00	2	1.15	[0.08]	0.00	[1.15]	0.00	7	1.81	9	1.17	0.54—2.23
51	Launderers	2	1.36	2	1.49	[0.13]	0.00	3	2.00	4	0.93	11	1.26	0.63—2.25
52	Military personnel	[0.01]	0.00	[0.02]	0.00	–	–	[0.01]	0.00	[0.02]	0.00	[0.06]	0.00	0.00—64.94
53	"Other workers"	4	1.06	9	1.62	1	0.90	9	0.94	16	1.51	39	1.27	0.91—1.74
54	Economically inactive	101	1.04	119	1.07	[3.67]	0.00	114	0.96	471	1.05	805	1.03	0.96—1.11
1–54	All categories	192	1.00	319	1.00	16	1.00	287	1.00	804	1.00	1 618	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 66. Observed number of soft tissue cancer among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	60	1.04	94	0.97	[0.99]	0.00	45	1.04	436	1.04	635	1.03	0.95—1.11
2	Laboratory assistants	2	1.78	3	1.22	1	4.52	1	0.48	1	0.42	8	0.97	0.42—1.90
3	Physicians	4	0.85	4	0.71	[0.38]	0.00	6	1.05	21	1.06	35	0.97	0.67—1.35
4	Dentists	[1.40]	0.00	2	1.72	[0.09]	0.00	2	0.79	13	1.39	17	1.17	0.68—1.88
5	Nurses	[0.07]	0.00	2	4.79	[0.01]	0.00	[0.29]	0.00	2	1.22	4	1.65	0.45—4.23
6	Assistant nurses	1	0.73	[0.40]	0.00	[0.10]	0.00	2	2.05	5	0.67	8	0.77	0.33—1.52
7	"Other health workers"	5	1.24	4	0.76	[0.11]	0.00	1	0.44	17	1.03	27	0.96	0.63—1.40
8	Teachers	25	0.98	45	1.16	2	1.38	37	1.16	111	1.01	220	1.06	0.93—1.21
9	Religious workers etc	18	**1.73**	27	1.19	1	1.12	22	1.34	84	0.95	152	1.09	0.93—1.28
10	Artistic workers	2	0.62	3	0.39	[0.26]	0.00	7	1.48	30	1.17	42	1.01	0.73—1.37
11	Journalists	2	1.31	2	0.54	[0.15]	0.00	1	0.48	18	1.49	23	1.18	0.75—1.77
12	Administrators	66	1.04	70	1.23	1	0.52	59	1.04	164	1.06	360	1.08	0.97—1.19
13	Clerical workers	27	0.97	28	0.76	1	0.41	47	1.10	182	1.08	285	1.02	0.91—1.15
14	Sales agents	16	1.09	56	1.03	[1.18]	0.00	56	1.12	244	0.98	372	1.01	0.91—1.12
15	Shop workers	62	0.98	26	1.07	[1.01]	0.00	14	0.72	85	1.07	187	1.00	0.87—1.15
16	Farmers	111	0.91	208	0.90	5	1.52	127	0.92	385	0.98	836	0.94	0.88—1.01
17	Gardeners	21	1.23	49	**1.36**	[0.11]	0.00	28	0.83	138	0.93	236	1.00	0.88—1.14
18	Fishermen	4	0.69	3	0.96	2	0.65	32	0.73	11	0.70	52	**0.72**	0.54—0.95
19	Forestry workers	3	1.21	29	**0.69**	[0.03]	0.00	24	0.95	97	0.90	153	0.86	0.73—1.01
20	Miners and quarry workers	1	1.33	4	0.58	[0.05]	0.00	8	1.11	26	0.96	39	0.93	0.66—1.27
21	Seamen	8	1.26	14	1.50	1	1.45	27	0.75	28	1.15	78	1.02	0.80—1.27
22	Transport workers	18	1.33	21	0.81	2	1.88	26	1.41	72	0.87	139	0.98	0.83—1.15
23	Drivers	36	0.81	81	0.91	3	1.60	49	0.93	213	1.03	382	0.97	0.88—1.07
24	Postal workers	14	1.58	12	0.89	[0.20]	0.00	7	0.69	54	1.18	87	1.11	0.89—1.37
25	Textile workers	7	0.91	8	0.95	1	2.82	11	1.03	49	1.03	76	1.02	0.80—1.27
26	Shoe and leather workers	[1.88]	0.00	1	0.27	[0.07]	0.00	3	0.65	21	1.14	25	0.87	0.57—1.29
27	Smelting workers	16	0.91	9	0.69	[0.56]	0.00	17	1.14	91	1.19	133	1.08	0.91—1.29
28	Mechanics	45	0.95	87	0.97	[2.12]	0.00	69	0.96	367	0.98	568	0.97	0.89—1.05
29	Plumbers	8	1.88	16	1.06	[0.30]	0.00	7	0.83	48	1.12	79	1.11	0.88—1.39
30	Welders	–	–	16	1.04	[0.15]	0.00	19	**2.03**	43	0.86	78	1.04	0.82—1.30
31	Electrical workers	10	0.88	45	1.14	2	1.49	36	1.13	138	1.05	231	1.07	0.94—1.22
32	Wood workers	31	0.95	94	1.07	1	0.94	90	1.10	187	**0.78**	403	0.91	0.82—1.00
33	Painters	6	0.56	19	0.98	1	2.32	12	0.85	78	1.11	116	1.01	0.84—1.21
34	"Other construction workers"	30	0.75	69	1.20	3	1.29	12	0.72	121	0.94	235	0.96	0.84—1.09
35	Bricklayers	13	1.10	11	1.20	–	–	13	1.57	34	1.10	71	1.18	0.92—1.49
36	Printers	9	1.18	8	0.84	[0.36]	0.00	6	0.70	50	1.28	73	1.12	0.88—1.41
37	Chemical process workers	6	0.88	11	0.74	[0.18]	0.00	24	1.28	49	0.85	90	0.92	0.74—1.13
38	Food workers	20	0.89	10	0.92	1	0.62	23	1.08	64	1.08	118	1.03	0.86—1.23
39	Beverage workers	3	1.14	2	2.94	[0.03]	0.00	[0.24]	0.00	3	0.92	8	1.17	0.51—2.31
40	Tobacco workers	2	4.68	[0.12]	0.00	[0.00]	0.00	[0.33]	0.00	[0.27]	0.00	2	1.73	0.21—6.23
41	Glass makers etc	15	1.15	16	1.02	[0.30]	0.00	8	0.77	55	0.85	94	0.90	0.73—1.11
42	Packers	8	0.70	31	0.99	4	**4.26**	26	0.81	88	**0.77**	157	**0.82**	0.70—0.96
43	Engine operators	12	1.00	46	1.03	2	1.45	14	0.76	103	1.03	177	1.00	0.87—1.16
44	Public safety workers	12	1.08	27	1.08	1	1.24	11	0.81	79	**1.32**	130	1.18	0.99—1.40
45	Cooks and stewards	1	1.14	1	0.55	[0.49]	0.00	9	1.47	11	0.96	22	1.06	0.66—1.60
46	Domestic assistants	[0.01]	0.00	[0.10]	0.00	[0.00]	0.00	[0.05]	0.00	2	1.47	2	1.32	0.16—4.76
47	Waiters	3	1.69	1	0.55	[0.06]	0.00	3	1.13	8	1.38	15	1.24	0.69—2.04
48	Building caretakers	19	1.64	22	1.08	[0.29]	0.00	7	0.99	63	**1.36**	111	**1.30**	1.08—1.56
49	Chimney sweeps	[0.31]	0.00	3	2.00	–	–	[0.72]	0.00	1	0.30	4	0.68	0.19—1.74
50	Hairdressers	3	0.90	[0.44]	0.00	[0.06]	0.00	1	0.49	15	1.31	19	1.10	0.66—1.72
51	Launderers	2	1.23	1	2.20	1	35.63	[1.22]	0.00	8	0.98	12	1.04	0.54—1.82
52	Military personnel	9	1.48	11	1.23	–	–	16	1.46	42	1.19	78	**1.27**	1.01—1.59
53	"Other workers"	39	1.10	30	1.23	2	0.59	73	1.20	138	0.99	282	1.07	0.95—1.20
54	Economically inactive	32	1.00	130	1.04	5	1.82	30	0.90	214	0.96	411	0.99	0.90—1.09
1–54	All categories	867	1.00	1 512	1.00	43	1.00	1 168	1.00	4 607	1.00	8 197	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 67. Observed number of soft tissue cancer among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	4	1.71	7	0.71	[0.11]	0.00	2	1.40	13	0.66	26	0.78	0.51—1.14
2	Laboratory assistants	1	0.57	7	1.31	1	6.20	1	0.58	8	1.28	18	1.18	0.70—1.86
3	Physicians	1	1.29	4	1.61	[0.02]	0.00	[0.74]	0.00	6	1.28	11	1.26	0.63—2.26
4	Dentists	2	2.92	3	1.27	[0.01]	0.00	1	1.62	3	0.88	9	1.27	0.58—2.42
5	Nurses	11	0.81	26	0.95	[0.69]	0.00	9	0.68	52	0.90	98	0.87	0.71—1.06
6	Assistant nurses	10	0.99	22	0.83	1	1.11	11	0.87	97	0.94	141	0.92	0.78—1.08
7	"Other health workers"	6	0.77	29	1.35	[0.21]	0.00	12	0.92	33	0.94	80	1.03	0.81—1.28
8	Teachers	15	0.85	57	1.19	2	1.57	23	0.89	129	1.00	226	1.02	0.89—1.16
9	Religious workers etc	4	1.71	24	0.92	[0.18]	0.00	6	0.95	52	1.13	86	1.06	0.85—1.31
10	Artistic workers	[1.17]	0.00	3	0.74	[0.14]	0.00	3	1.55	7	0.82	13	0.82	0.44—1.41
11	Journalists	1	3.84	3	1.18	[0.04]	0.00	1	1.95	4	1.00	9	1.23	0.56—2.33
12	Administrators	6	0.86	5	0.58	[0.10]	0.00	9	1.42	21	1.09	41	0.99	0.71—1.35
13	Clerical workers	87	1.23	146	0.92	1	0.28	91	1.14	311	0.99	636	1.01	0.94—1.10
14	Sales agents	[0.63]	0.00	30	1.36	[0.37]	0.00	15	1.30	48	1.10	93	1.18	0.96—1.45
15	Shop workers	42	0.90	70	0.87	1	0.45	61	0.95	168	0.91	342	0.91	0.81—1.01
16	Farmers	27	0.81	60	1.30	[1.49]	0.00	33	0.74	16	0.92	136	0.95	0.81—1.13
17	Gardeners	9	2.12	145	1.08	[0.05]	0.00	16	**0.61**	52	1.10	222	1.05	0.92—1.19
18	Fishermen	[0.17]	0.00	[0.31]	0.00	[0.06]	0.00	1	3.09	[0.16]	0.00	1	0.97	0.02—5.42
19	Forestry workers	[0.04]	0.00	[0.61]	0.00	[0.01]	0.00	1	2.18	1	0.94	2	0.92	0.11—3.31
20	Miners and quarry workers	[0.00]	0.00	[0.24]	0.00	[0.00]	0.00	[0.03]	0.00	[0.26]	0.00	[0.53]	0.00	0.00—6.96
21	Seamen	–	–	[0.09]	0.00	[0.00]	0.00	[0.08]	0.00	[0.04]	0.00	[0.20]	0.00	0.00—18.31
22	Transport workers	[0.05]	0.00	2	0.54	[0.06]	0.00	[0.38]	0.00	5	1.55	7	0.94	0.38—1.94
23	Drivers	[1.19]	0.00	3	1.54	[0.03]	0.00	[1.32]	0.00	7	0.90	10	0.81	0.39—1.50
24	Postal workers	2	0.81	27	1.14	1	1.41	12	0.77	65	1.22	107	1.12	0.92—1.35
25	Textile workers	12	0.77	57	1.08	2	1.74	27	1.07	120	1.14	218	1.09	0.96—1.25
26	Shoe and leather workers	[1.17]	0.00	5	0.77	1	15.67	2	1.11	11	1.36	19	1.08	0.65—1.68
27	Smelting workers	[0.28]	0.00	3	1.97	[0.00]	0.00	[0.19]	0.00	1	0.43	4	0.92	0.25—2.36
28	Mechanics	1	0.35	6	0.84	[0.02]	0.00	4	1.86	25	1.06	36	1.01	0.71—1.40
29	Plumbers	[0.02]	0.00	[0.02]	0.00	–	–	[0.01]	0.00	[0.04]	0.00	[0.10]	0.00	0.00—37.88
30	Welders	–	–	1	1.71	[0.00]	0.00	[0.16]	0.00	1	1.04	2	1.17	0.14—4.24
31	Electrical workers	2	0.50	8	1.61	[0.01]	0.00	2	0.87	16	1.21	28	1.14	0.76—1.65
32	Wood workers	[1.32]	0.00	16	1.21	[0.02]	0.00	1	1.37	1	0.25	18	0.94	0.55—1.48
33	Painters	[0.05]	0.00	4	2.49	[0.01]	0.00	1	6.02	2	1.89	7	2.42	0.97—4.99
34	"Other construction workers"	[0.04]	0.00	4	0.78	[0.00]	0.00	[0.07]	0.00	[0.15]	0.00	4	0.74	0.20—1.91
35	Bricklayers	[0.01]	0.00	[0.18]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.20]	0.00	0.00—18.83
36	Printers	1	0.68	6	0.87	[0.11]	0.00	[2.16]	0.00	10	1.03	17	0.83	0.49—1.33
37	Chemical process workers	3	1.31	8	**2.34**	[0.04]	0.00	4	2.11	7	0.92	22	1.44	0.90—2.18
38	Food workers	6	0.53	13	0.73	6	2.28	9	0.76	21	0.95	55	0.84	0.63—1.09
39	Beverage workers	1	0.95	3	3.07	[0.01]	0.00	[0.10]	0.00	2	1.44	6	1.71	0.63—3.71
40	Tobacco workers	[1.46]	0.00	[0.55]	0.00	–	–	[0.45]	0.00	1	1.13	1	0.30	0.01—1.66
41	Glass makers etc	2	0.71	11	0.87	[0.08]	0.00	2	0.50	28	1.38	43	1.08	0.78—1.45
42	Packers	[0.80]	0.00	22	0.99	[0.23]	0.00	7	0.74	32	1.06	61	0.97	0.74—1.25
43	Engine operators	[0.03]	0.00	6	1.64	[0.00]	0.00	[0.13]	0.00	1	0.48	7	1.19	0.48—2.45
44	Public safety workers	[0.08]	0.00	2	2.21	[0.05]	0.00	2	1.81	5	1.68	9	1.76	0.80—3.34
45	Cooks and stewards	[0.03]	0.00	33	1.30	[0.89]	0.00	10	0.73	38	0.88	81	0.97	0.77—1.21
46	Domestic assistants	16	0.91	19	0.68	[0.24]	0.00	38	1.09	110	0.90	183	0.90	0.78—1.04
47	Waiters	2	0.66	12	**0.55**	[0.11]	0.00	15	1.04	56	1.25	85	1.01	0.81—1.25
48	Building caretakers	46	0.91	80	0.94	2	1.10	64	1.07	107	0.90	299	0.95	0.85—1.06
49	Chimney sweeps	[0.00]	0.00	[0.04]	0.00	–	–	[0.01]	0.00	[0.00]	0.00	[0.06]	0.00	0.00—62.81
50	Hairdressers	2	0.64	11	1.31	[0.13]	0.00	2	0.51	25	1.26	40	1.13	0.81—1.54
51	Launderers	4	0.71	3	0.45	1	3.92	3	0.56	23	1.00	34	0.83	0.58—1.16
52	Military personnel	[0.03]	0.00	[0.10]	0.00	–	–	[0.02]	0.00	[0.10]	0.00	[0.24]	0.00	0.00—15.24
53	"Other workers"	16	1.11	17	0.63	2	1.02	28	0.90	54	1.01	117	0.91	0.76—1.09
54	Economically inactive	397	1.06	550	1.00	8	1.19	485	1.06	2 330	1.00	3 770	1.01	0.98—1.05
1–54	All categories	739	1.00	1 573	1.00	29	1.00	1 014	1.00	4 125	1.00	7 480	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

was among the public safety workers (1.64, 1.10–2.34), but Swedish artistic workers and building caretakers also had a significant, about twofold, excess of liposarcoma. In women (1 076 cases) there were no significant SIRs for liposarcoma in any occupational category in any country.

Comment. Soft tissue sarcoma is a rare disease of the mesenchymal tissue other than bone and cartilage [134]. Epidemiological studies have suffered from problems of misclassification of histology, since the histopathological classification of this cancer in cancer registries is often inconsistent and pathologists frequently disagree on histologic subtypes.

Previous studies have indicated that exposure to phenoxy herbicides, dioxins, and pesticides may be associated with an increased risk, but these studies are rather inconsistent [134]. Exposure to vinyl chloride has been suggested as being associated with the development of soft tissue sarcoma. Exposure to radiation as therapy is a well-established cause of secondary soft tissue sarcoma, while tobacco use, exogenous hormonal factors and diet have only been inconsistently associated with risk.

Non-Hodgkin lymphoma

Up to the 1990s, the incidence of non-Hodgkin lymphoma increased in all Nordic countries more rapidly than that of any other form of cancer (Figure 45). After that the increase has stopped [135]. Incidence in men is higher than in women in all countries, and Finland has the highest level.

Variation in the incidence of non-Hodgkin lymphoma over occupational categories was small (Tables 68, 69). Male physicians had the highest significant SIR (1.22, 95% CI 1.08–1.39) and forestry workers the lowest one (0.86, 0.80–0.93). Among women, plumbers had the highest risk of Non-Hodgkin lymphoma (5.39, 1.11–15.76), however based on three cases only. Postal workers had the lowest significant SIR (0.89, 0.81–0.98).

Comment. Known risk factors for non-Hodgkin lymphoma include immunosuppression, autoimmunity, HIV infection, and some specific viruses, but they explain only a small fraction of the cases [136]. Other possible risk associations with food products, medications, pesticides and hair dyes have been investigated, but the results are inconsistent [137]. Some carcinogenic substances found in working places may be associated with the development of non-Hodgkin lymphoma. These include 2,3, 7,8-Tetrachlorodibenzopara-dioxin (TCDD), non-arsenical insecticides, Tetrachloroethylene, and Trichloroethylene. These exposures are not easily identified in the occupational categories used here. Occupations such as hairdressers or barbers have also been associated with the development on non-Hodgkin lymphoma in some studies [87,103]. In the present study, the SIR among female hairdressers was 1.00, and among male hair dressers 0.99.

An about 20% excess among both male and female physicians might indicate that accurate diagnostics of non-Hodgkin lymphoma is sometimes challenging. The rapidly changing classifications also made it difficult to find subcategories of non-Hodgkin lymphoma that would have been comparable over decades and countries, although there may well be work-related factors that are only relevant in some of the numerous sub-types of non-Hodgkin lymphoma.

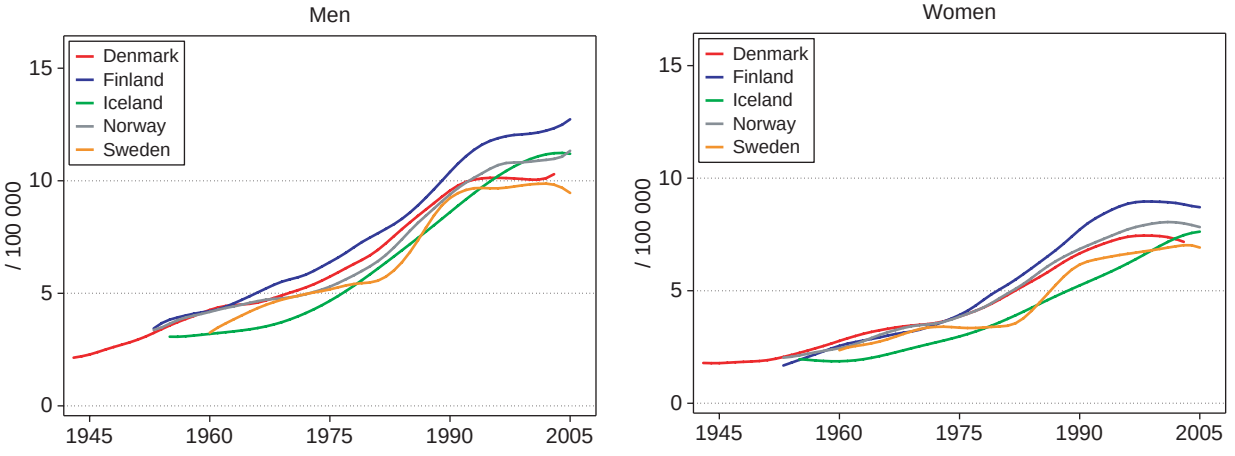


Figure 45. Age standardised (World) incidence rates for non-Hodgkin lymphoma 1943–2005, by country and gender. Modified from NORDCAN [49].

Table 68. Observed number of non-Hodgkin lymphoma among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	422	1.04	598	1.08	10	1.61	332	1.11	1 958	1.04	3 320	**1.05**	1.02—1.09
2	Laboratory assistants	5	0.63	12	0.86	1	0.84	12	0.92	6	0.54	36	0.76	0.53—1.05
3	Physicians	40	1.21	36	1.12	4	1.78	47	1.32	107	1.21	234	**1.22**	1.08—1.39
4	Dentists	11	1.12	7	1.07	1	1.67	15	0.99	36	0.86	70	0.94	0.74—1.19
5	Nurses	[0.47]	0.00	3	1.35	[0.03]	0.00	4	1.61	9	1.38	16	1.36	0.78—2.21
6	Assistant nurses	5	0.51	4	1.87	[0.37]	0.00	4	0.72	29	0.92	42	0.85	0.61—1.15
7	"Other health workers"	31	1.09	32	1.07	[0.64]	0.00	13	0.97	62	0.86	138	0.95	0.81—1.13
8	Teachers	187	1.05	248	1.11	17	**1.98**	207	0.99	518	1.03	1 177	1.05	0.99—1.11
9	Religious workers etc	75	1.03	108	0.84	7	1.24	106	1.05	398	1.02	694	0.99	0.92—1.07
10	Artistic workers	19	0.84	46	1.06	2	1.32	23	0.81	125	1.09	215	1.02	0.89—1.16
11	Journalists	10	0.93	19	0.91	1	1.11	22	**1.69**	45	0.84	97	0.98	0.79—1.19
12	Administrators	451	1.01	370	**1.12**	17	1.30	367	1.09	704	1.02	1 909	**1.05**	1.01—1.10
13	Clerical workers	189	0.96	223	1.06	13	0.85	252	1.01	755	1.00	1 432	1.00	0.95—1.06
14	Sales agents	93	0.89	318	1.03	10	1.31	296	1.07	1 118	1.02	1 835	1.02	0.98—1.07
15	Shop workers	448	1.01	135	0.98	5	0.88	129	1.08	368	1.03	1 085	1.02	0.96—1.08
16	Farmers	770	**0.91**	1 298	0.98	24	1.11	689	1.06	1 712	1.01	4 493	0.99	0.96—1.02
17	Gardeners	113	0.94	200	0.98	[0.72]	0.00	142	**0.83**	595	**0.92**	1 050	**0.92**	0.86—0.97
18	Fishermen	45	1.09	18	1.02	14	0.89	206	0.95	65	0.95	348	0.97	0.87—1.07
19	Forestry workers	19	1.09	179	**0.75**	[0.14]	0.00	110	0.92	422	**0.90**	730	**0.86**	0.80—0.93
20	Miners and quarry workers	4	0.75	52	1.34	[0.25]	0.00	34	0.89	133	1.12	223	1.11	0.97—1.26
21	Seamen	38	0.84	46	0.87	8	2.06	170	**0.82**	105	0.98	367	**0.88**	0.80—0.98
22	Transport workers	85	0.88	169	1.11	4	0.58	99	0.97	354	0.95	711	0.98	0.91—1.05
23	Drivers	323	1.02	507	0.99	10	0.91	317	1.05	993	**1.08**	2 150	1.04	1.00—1.09
24	Postal workers	62	0.99	92	1.20	1	0.77	66	1.22	229	**1.15**	450	**1.14**	1.04—1.25
25	Textile workers	45	0.82	48	1.00	2	0.89	60	1.09	212	1.02	367	1.00	0.90—1.11
26	Shoe and leather workers	9	0.67	21	1.02	[0.47]	0.00	17	0.80	74	0.94	121	0.90	0.75—1.08
27	Smelting workers	123	0.98	79	1.06	3	0.90	68	0.87	300	0.89	573	0.93	0.86—1.01
28	Mechanics	349	1.04	498	0.98	12	1.06	398	0.94	1 628	0.97	2 885	0.98	0.94—1.01
29	Plumbers	37	1.21	88	1.03	[1.76]	0.00	41	0.81	193	1.01	359	1.00	0.90—1.11
30	Welders	–	–	74	0.85	[0.72]	0.00	45	**0.74**	222	0.98	341	0.91	0.82—1.01
31	Electrical workers	79	0.97	217	0.97	6	0.85	180	0.95	599	1.02	1 081	0.99	0.93—1.05
32	Wood workers	235	1.02	450	**0.90**	3	0.50	425	0.96	1 057	1.01	2 170	0.97	0.93—1.02
33	Painters	77	1.01	85	**0.78**	4	1.63	77	1.06	318	1.03	561	0.99	0.91—1.07
34	"Other construction workers"	272	0.96	295	0.91	11	0.85	84	0.91	527	0.94	1 189	**0.93**	0.88—0.99
35	Bricklayers	84	1.00	51	0.97	–	–	33	0.77	143	1.05	311	0.99	0.88—1.10
36	Printers	55	1.02	50	0.93	3	1.44	46	0.94	172	0.98	326	0.98	0.88—1.09
37	Chemical process workers	45	0.93	90	1.06	[1.07]	0.00	101	1.09	239	0.96	475	0.99	0.91—1.09
38	Food workers	163	1.03	50	0.82	12	1.30	99	0.90	268	1.03	592	0.99	0.91—1.07
39	Beverage workers	20	1.05	4	1.03	[0.15]	0.00	4	2.00	11	0.79	39	1.00	0.71—1.36
40	Tobacco workers	4	1.31	1	1.39	[0.01]	0.00	3	2.01	2	1.65	10	1.54	0.74—2.83
41	Glass makers etc	74	0.80	90	1.01	2	1.20	56	0.96	243	**0.85**	465	**0.88**	0.81—0.97
42	Packers	79	0.97	187	1.05	8	1.50	183	1.13	502	1.01	959	1.04	0.98—1.11
43	Engine operators	84	0.99	275	1.08	4	0.52	124	1.11	435	0.98	922	1.02	0.96—1.09
44	Public safety workers	86	1.09	154	1.08	5	1.00	84	1.13	268	1.01	597	1.05	0.97—1.14
45	Cooks and stewards	4	0.64	7	0.69	1	0.38	30	0.81	46	0.92	88	0.83	0.67—1.03
46	Domestic assistants	[0.07]	0.00	[0.55]	0.00	[0.01]	0.00	1	2.45	3	0.58	4	0.65	0.18—1.65
47	Waiters	14	1.09	13	1.31	[0.31]	0.00	17	1.15	25	0.98	69	1.09	0.84—1.37
48	Building caretakers	101	**1.23**	112	0.96	4	2.02	53	**1.37**	198	1.00	468	1.07	0.98—1.17
49	Chimney sweeps	2	0.91	7	0.83	–	–	2	0.52	11	0.73	22	0.75	0.47—1.13
50	Hairdressers	28	1.19	4	1.64	[0.37]	0.00	14	1.33	49	0.98	95	1.09	0.88—1.33
51	Launderers	15	1.30	[2.52]	0.00	[0.19]	0.00	5	0.81	34	0.94	54	0.96	0.72—1.25
52	Military personnel	46	1.09	55	1.08	–	–	78	1.12	164	1.03	343	1.06	0.96—1.18
53	"Other workers"	269	1.06	112	**0.82**	15	0.74	290	0.99	606	1.01	1 292	0.99	0.94—1.04
54	Economically inactive	285	**1.22**	721	**1.08**	9	0.60	111	**0.73**	935	1.00	2 061	1.03	0.99—1.08
1–54	All categories	6 129	1.00	8 558	1.00	253	1.00	6 391	1.00	20 330	1.00	41 661	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 69. Observed number of non-Hodgkin lymphoma among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	22	1.24	57	1.12	[0.57]	0.00	11	1.08	62	0.81	152	0.98	0.83—1.15
2	Laboratory assistants	20	1.54	26	0.92	5	**6.19**	10	0.83	27	1.24	88	1.16	0.93—1.43
3	Physicians	7	1.18	12	0.96	1	7.18	7	1.47	21	1.19	48	1.17	0.86—1.56
4	Dentists	5	0.95	19	1.46	[0.05]	0.00	3	0.79	14	1.04	41	1.15	0.83—1.57
5	Nurses	106	1.02	149	1.04	4	1.08	97	1.00	246	1.07	602	1.04	0.96—1.13
6	Assistant nurses	67	0.89	149	1.03	6	1.13	100	1.02	449	**1.12**	771	1.06	0.99—1.14
7	"Other health workers"	70	1.17	124	1.08	[1.11]	0.00	87	0.94	140	1.03	421	1.04	0.95—1.15
8	Teachers	124	0.94	259	1.00	7	1.06	184	1.06	505	0.98	1 079	0.99	0.94—1.05
9	Religious workers etc	24	1.35	150	1.14	1	1.01	46	1.04	162	0.95	383	1.05	0.95—1.16
10	Artistic workers	9	0.98	17	0.80	1	1.29	12	0.94	35	1.06	74	0.96	0.76—1.21
11	Journalists	2	1.02	9	0.66	[0.19]	0.00	4	1.11	19	1.24	34	0.98	0.68—1.37
12	Administrators	58	1.07	43	0.94	2	3.27	32	0.78	59	0.79	194	0.90	0.78—1.03
13	Clerical workers	563	1.05	902	1.06	25	1.24	564	1.03	1 269	1.00	3 323	1.03	1.00—1.07
14	Sales agents	5	1.03	126	1.03	1	0.48	89	**1.35**	183	1.04	404	1.09	0.99—1.20
15	Shop workers	349	0.96	431	0.96	5	**0.39**	449	1.01	800	1.03	2 034	1.00	0.95—1.04
16	Farmers	202	**0.79**	269	1.00	8	0.88	271	0.97	63	0.92	813	**0.92**	0.86—0.99
17	Gardeners	32	0.97	763	0.97	2	6.41	151	0.88	204	1.02	1 152	0.97	0.91—1.02
18	Fishermen	[1.30]	0.00	3	1.71	[0.33]	0.00	4	1.67	[0.66]	0.00	7	1.09	0.44—2.24
19	Forestry workers	[0.34]	0.00	4	1.16	[0.04]	0.00	5	1.44	4	0.91	13	1.11	0.59—1.90
20	Miners and quarry workers	[0.02]	0.00	[1.40]	0.00	[0.01]	0.00	[0.19]	0.00	1	0.94	1	0.37	0.01—2.07
21	Seamen	–	–	[0.42]	0.00	[0.00]	0.00	[0.55]	0.00	[0.13]	0.00	[1.10]	0.00	0.00—3.35
22	Transport workers	[0.36]	0.00	21	0.97	1	3.04	5	1.95	14	1.13	41	1.10	0.79—1.49
23	Drivers	8	0.88	11	1.05	[0.15]	0.00	6	0.65	39	1.27	64	1.07	0.82—1.37
24	Postal workers	21	1.10	109	**0.81**	3	0.73	95	0.93	200	0.91	428	**0.89**	0.81—0.98
25	Textile workers	114	0.94	284	0.94	8	1.05	147	1.01	428	0.97	981	0.96	0.91—1.03
26	Shoe and leather workers	9	1.01	27	0.73	1	2.45	8	0.75	39	1.15	84	0.92	0.73—1.14
27	Smelting workers	2	0.92	8	0.92	1	**58.16**	5	**3.36**	10	1.05	26	1.19	0.78—1.74
28	Mechanics	25	1.17	36	0.91	1	13.62	7	0.50	101	1.07	170	1.00	0.86—1.16
29	Plumbers	1	4.83	[0.10]	0.00	–	–	1	8.92	1	7.05	3	**5.39**	1.11—15.76
30	Welders	–	–	2	0.63	[0.01]	0.00	2	1.65	5	1.37	9	1.12	0.51—2.13
31	Electrical workers	38	1.26	36	1.38	[0.06]	0.00	16	1.02	49	0.92	139	1.11	0.94—1.32
32	Wood workers	15	1.50	73	0.96	[0.13]	0.00	6	1.09	16	1.01	110	1.03	0.85—1.24
33	Painters	[0.39]	0.00	10	1.11	[0.04]	0.00	1	0.82	3	0.71	14	0.94	0.51—1.58
34	"Other construction workers"	1	3.37	34	1.14	[0.02]	0.00	[0.49]	0.00	[0.54]	0.00	35	1.12	0.78—1.56
35	Bricklayers	[0.06]	0.00	2	1.93	–	–	[0.03]	0.00	[0.02]	0.00	2	1.75	0.21—6.34
36	Printers	11	0.97	36	0.94	[0.68]	0.00	12	0.92	37	0.94	96	0.93	0.76—1.14
37	Chemical process workers	16	0.90	14	0.72	2	6.97	11	0.93	30	0.96	73	0.91	0.71—1.14
38	Food workers	88	1.01	92	0.91	10	0.63	77	1.03	84	0.91	351	0.95	0.85—1.05
39	Beverage workers	6	0.73	2	0.35	[0.04]	0.00	2	2.71	2	0.35	12	0.59	0.30—1.03
40	Tobacco workers	16	1.42	3	0.93	–	–	[2.28]	0.00	4	1.08	23	1.12	0.71—1.68
41	Glass makers etc	22	1.03	79	1.10	[0.43]	0.00	27	1.04	87	1.04	215	1.06	0.93—1.21
42	Packers	4	0.65	142	1.12	1	0.65	60	0.97	132	1.06	339	1.06	0.95—1.18
43	Engine operators	[0.18]	0.00	17	0.83	[0.02]	0.00	[1.02]	0.00	8	0.98	25	0.84	0.54—1.23
44	Public safety workers	[0.68]	0.00	6	1.21	[0.31]	0.00	8	1.00	17	1.63	31	1.27	0.86—1.80
45	Cooks and stewards	[0.23]	0.00	123	0.86	7	1.20	80	1.00	169	0.95	379	0.93	0.84—1.03
46	Domestic assistants	157	1.15	131	0.85	1	0.60	223	1.04	447	0.94	959	0.98	0.92—1.04
47	Waiters	32	1.39	122	1.01	[0.68]	0.00	86	0.91	166	0.89	406	0.95	0.86—1.05
48	Building caretakers	404	1.03	481	0.99	12	1.03	431	1.04	506	1.05	1 834	1.03	0.98—1.07
49	Chimney sweeps	[0.04]	0.00	1	4.24	–	–	[0.06]	0.00	[0.01]	0.00	1	2.88	0.07—16.04
50	Hairdressers	32	1.34	47	1.02	[0.72]	0.00	23	0.94	73	0.90	175	0.99	0.86—1.15
51	Launderers	47	1.06	43	1.12	4	2.16	31	0.95	85	0.88	210	0.98	0.86—1.13
52	Military personnel	[0.23]	0.00	[0.50]	0.00	–	–	[0.14]	0.00	1	3.05	1	0.83	0.02—4.65
53	"Other workers"	108	0.97	158	1.04	11	0.91	201	0.93	231	1.06	709	1.00	0.93—1.08
54	Economically inactive	2 937	0.99	3 206	1.01	43	1.03	2 208	1.00	9 786	1.00	18 180	1.00	0.98—1.01
1–54	All categories	5 779	1.00	8 868	1.00	174	1.00	5 905	1.00	17 033	1.00	37 759	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

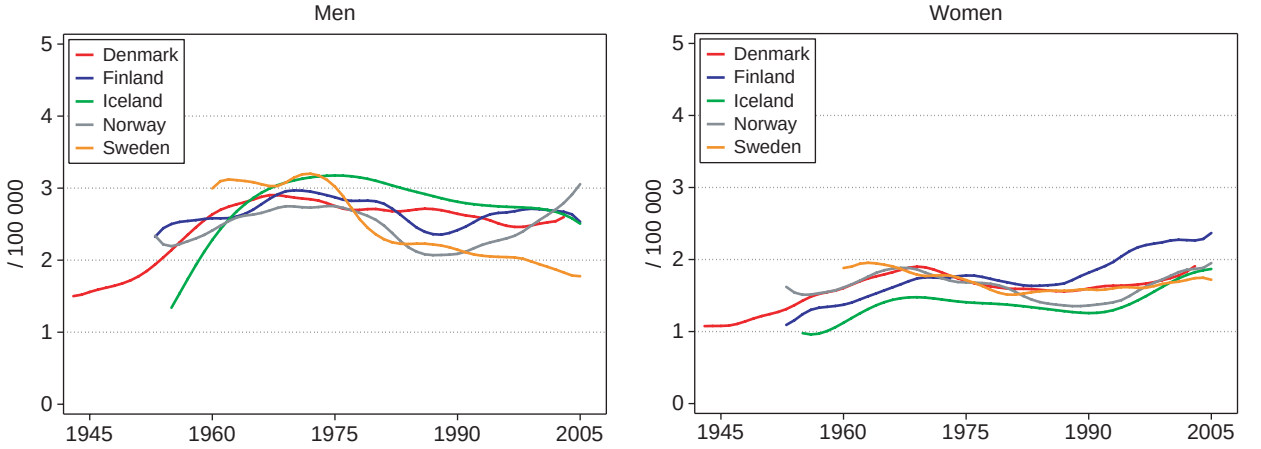


Figure 46. Age standardised (World) incidence rates for Hodgkin lymphoma 1943–2005, by country and gender. Modified from NORDCAN [49].

Hodgkin lymphoma

The incidence of Hodgkin lymphoma in the Nordic countries is slightly higher in males than in females, and rates have been rather stable over time (Figure 46).

Male bricklayers had the highest risk of Hodgkin lymphoma, SIR 1.33 (95% CI 1.04–1.68; Table 70), while electrical workers represent the group with a significant decreased risk (0.83, 0.71–0.98).

Among women (Table 71), the only findings worth mentioning are the borderline significant excess risk among farmers (1.21, CI 1.00–1.45) and the decreased risk among drivers (0.14, 0.00–0.80).

Comment. Epstein Barr virus, immunodeficiency conditions and infectious mononucleosis have been implicated in the aetiology of Hodgkin lymphoma [138]. Occupational studies have suggested that occupations related to woodworking industries and certain chemical exposures are related to risk [139]. We found no clear evidence of variation in risk according to occupation.

Multiple myeloma

For multiple myeloma, incidence rates are rather similar between genders and in all Nordic countries (Figure 47). There was an increase in rates until the late 1980s, which then levelled off or even turned into a decrease, especially in Finland.

The variation between occupational categories in the incidence of multiple myeloma was small (Tables 72, 73). A weak increase in the risk of multiple myeloma was observed among male farmers, SIR 1.07 (95% CI 1.03–1.11) and a lowered risk among male printers (0.80, 0.68–0.95).

Female farmers also had a somewhat increased risk (1.14, 1.05–1.24), while no occupation showed a decreased risk among women.

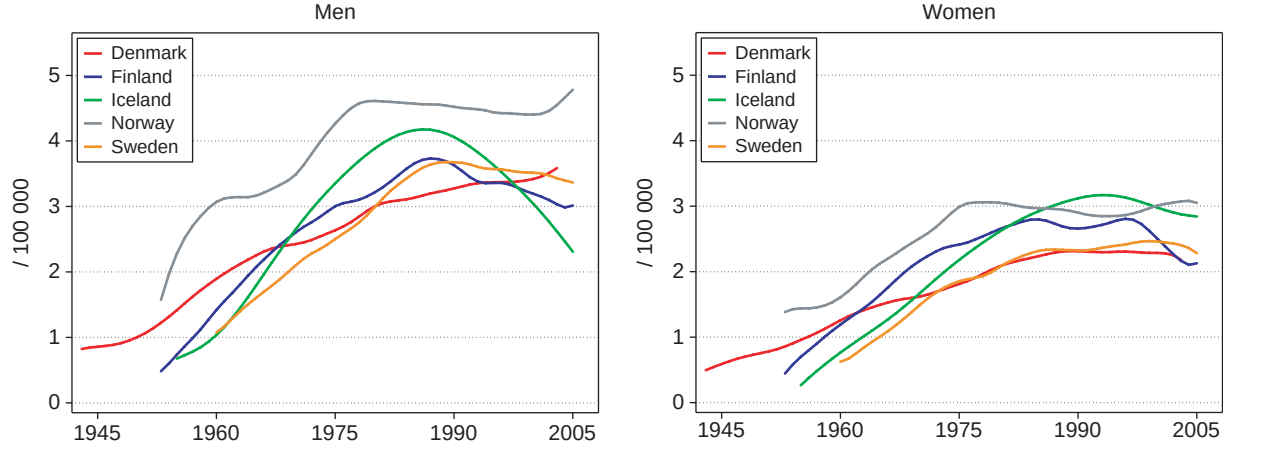


Figure 47. Age standardised (World) incidence rates for multiple myeloma 1943–2005, by country and gender. Modified from NORDCAN [49].

Table 70. Observed number of Hodgkin lymphoma among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	64	0.96	89	0.99	2	2.30	42	0.86	291	1.02	488	0.99	0.91—1.08
2	Laboratory assistants	4	3.08	3	1.25	[0.18]	0.00	1	0.43	2	1.10	10	1.25	0.60—2.30
3	Physicians	7	1.34	6	1.16	[0.30]	0.00	6	0.96	14	1.01	33	1.07	0.74—1.51
4	Dentists	2	1.22	1	0.93	[0.08]	0.00	3	1.09	7	1.08	13	1.08	0.57—1.85
5	Nurses	[0.08]	0.00	1	1.95	[0.01]	0.00	[0.42]	0.00	2	1.52	3	1.29	0.27—3.76
6	Assistant nurses	1	0.62	[0.51]	0.00	[0.07]	0.00	[1.04]	0.00	7	1.24	8	0.90	0.39—1.78
7	"Other health workers"	4	0.88	7	1.46	[0.09]	0.00	4	1.60	8	0.68	23	0.97	0.62—1.46
8	Teachers	28	0.95	39	1.17	1	0.84	31	0.86	64	0.85	163	0.93	0.80—1.08
9	Religious workers etc	10	0.89	26	1.16	[0.75]	0.00	14	0.78	54	0.85	104	0.90	0.74—1.09
10	Artistic workers	[3.63]	0.00	8	1.15	[0.20]	0.00	2	0.39	22	1.22	32	0.94	0.65—1.33
11	Journalists	[1.73]	0.00	2	0.60	[0.11]	0.00	2	0.86	11	1.27	15	0.93	0.52—1.53
12	Administrators	57	0.82	41	0.83	2	1.43	59	0.97	107	0.99	266	0.92	0.82—1.04
13	Clerical workers	29	0.90	31	0.99	1	0.57	44	0.96	120	1.01	225	0.98	0.86—1.12
14	Sales agents	12	0.70	39	0.82	1	1.17	54	1.01	178	1.02	284	0.97	0.86—1.09
15	Shop workers	71	1.02	12	**0.54**	2	2.84	16	0.74	55	1.01	156	0.92	0.79—1.08
16	Farmers	106	0.85	199	**1.17**	4	1.74	146	1.07	278	0.99	733	1.03	0.96—1.11
17	Gardeners	13	0.72	29	0.99	[0.08]	0.00	32	0.94	106	1.01	180	0.96	0.83—1.12
18	Fishermen	6	0.89	2	0.81	1	0.44	41	0.91	9	0.80	59	0.87	0.66—1.12
19	Forestry workers	3	1.17	34	0.98	[0.02]	0.00	27	1.07	87	1.12	151	1.08	0.92—1.26
20	Miners and quarry workers	[0.82]	0.00	4	0.68	[0.04]	0.00	8	1.04	25	1.25	37	1.08	0.76—1.48
21	Seamen	5	0.64	9	1.12	2	3.94	38	0.96	16	0.90	70	0.95	0.74—1.20
22	Transport workers	16	1.07	22	1.05	[0.75]	0.00	24	1.27	47	0.87	109	1.00	0.83—1.20
23	Drivers	55	1.05	85	1.11	1	0.74	61	1.05	142	0.97	344	1.03	0.93—1.14
24	Postal workers	12	1.15	7	0.60	[0.14]	0.00	9	0.82	36	1.11	64	0.97	0.75—1.24
25	Textile workers	9	1.06	7	1.04	[0.23]	0.00	14	1.30	37	1.09	67	1.11	0.86—1.41
26	Shoe and leather workers	1	0.49	4	1.36	[0.05]	0.00	6	1.28	14	1.02	25	1.07	0.69—1.58
27	Smelting workers	21	0.99	13	1.19	1	2.69	20	1.27	51	0.92	106	1.02	0.84—1.24
28	Mechanics	70	1.25	71	0.88	2	1.32	96	1.22	265	1.01	504	1.05	0.96—1.15
29	Plumbers	8	1.55	12	0.89	1	4.47	10	1.06	34	1.13	65	1.11	0.86—1.42
30	Welders	–	–	10	0.67	[0.11]	0.00	18	1.69	31	0.89	59	0.98	0.74—1.26
31	Electrical workers	14	1.00	36	0.99	1	1.00	31	0.89	66	**0.72**	148	**0.83**	0.71—0.98
32	Wood workers	46	1.24	79	1.11	1	1.36	77	0.91	179	1.04	382	1.04	0.94—1.15
33	Painters	18	1.45	12	0.74	[0.30]	0.00	14	0.95	48	0.95	92	0.97	0.79—1.19
34	"Other construction workers"	39	0.88	41	0.86	2	1.17	24	1.31	104	1.09	210	1.01	0.89—1.16
35	Bricklayers	13	0.95	13	1.75	–	–	12	1.40	31	1.39	69	**1.33**	1.04—1.68
36	Printers	10	1.09	10	1.12	[0.29]	0.00	7	0.73	23	0.82	50	0.89	0.66—1.18
37	Chemical process workers	13	1.72	13	1.00	[0.12]	0.00	16	0.82	39	0.92	81	0.98	0.78—1.22
38	Food workers	26	1.02	8	0.87	2	1.98	26	1.16	50	1.20	112	1.12	0.93—1.35
39	Beverage workers	3	0.96	[0.57]	0.00	[0.02]	0.00	[0.32]	0.00	1	0.40	4	0.61	0.17—1.57
40	Tobacco workers	1	2.18	[0.11]	0.00	[0.00]	0.00	[0.34]	0.00	[0.19]	0.00	1	0.90	0.02—5.04
41	Glass makers etc	17	1.17	17	1.21	[0.20]	0.00	14	1.24	39	0.83	87	1.00	0.80—1.24
42	Packers	13	1.02	25	0.93	[0.58]	0.00	29	0.85	97	1.13	164	1.03	0.88—1.20
43	Engine operators	16	1.16	44	1.12	1	1.00	21	1.00	73	1.01	155	1.05	0.90—1.23
44	Public safety workers	21	**1.70**	20	0.92	[0.60]	0.00	18	1.26	41	0.97	100	1.10	0.90—1.33
45	Cooks and stewards	1	0.90	3	1.55	1	2.70	4	0.57	3	0.35	12	0.64	0.33—1.11
46	Domestic assistants	[0.01]	0.00	[0.08]	0.00	[0.00]	0.00	[0.06]	0.00	1	0.94	1	0.82	0.02—4.58
47	Waiters	1	0.44	1	0.51	[0.05]	0.00	2	0.68	3	0.69	7	0.61	0.24—1.25
48	Building caretakers	15	1.17	15	0.88	[0.18]	0.00	6	0.78	34	0.98	70	0.96	0.75—1.22
49	Chimney sweeps	[0.37]	0.00	1	0.78	–	–	[0.76]	0.00	3	1.23	4	0.82	0.22—2.11
50	Hairdressers	5	1.37	[0.41]	0.00	[0.05]	0.00	1	0.46	9	1.12	15	1.05	0.59—1.73
51	Launderers	[1.75]	0.00	[0.40]	0.00	[0.02]	0.00	1	0.79	6	1.05	7	0.77	0.31—1.58
52	Military personnel	9	1.24	6	0.73	–	–	19	1.59	20	0.86	54	1.07	0.80—1.39
53	"Other workers"	51	1.22	29	1.37	[2.28]	0.00	59	0.94	117	1.13	256	1.11	0.98—1.25
54	Economically inactive	31	0.81	102	0.90	2	0.99	31	0.83	184	1.01	350	0.94	0.85—1.04
1–54	All categories	977	1.00	1 288	1.00	31	1.00	1 240	1.00	3 291	1.00	6 827	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 71. Observed number of Hodgkin lymphoma among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	1	0.54	9	1.38	[0.08]	0.00	1	0.94	7	0.70	18	0.92	0.55—1.46
2	Laboratory assistants	[1.39]	0.00	4	1.23	[0.09]	0.00	2	1.58	5	1.56	11	1.20	0.60—2.14
3	Physicians	1	1.64	[1.68]	0.00	[0.02]	0.00	[0.57]	0.00	[2.35]	0.00	1	0.19	0.00—1.07
4	Dentists	1	1.85	2	1.44	[0.00]	0.00	3	**6.23**	1	0.58	7	1.68	0.68—3.47
5	Nurses	14	1.30	11	0.67	[0.35]	0.00	10	1.08	28	0.95	63	0.95	0.73—1.22
6	Assistant nurses	4	0.50	14	0.92	1	1.29	10	1.18	50	0.95	79	0.93	0.74—1.16
7	"Other health workers"	9	1.47	16	1.23	[0.14]	0.00	10	1.06	23	1.28	58	1.24	0.94—1.61
8	Teachers	13	0.94	29	1.03	[0.69]	0.00	16	0.82	52	0.78	110	0.85	0.71—1.03
9	Religious workers etc	[1.84]	0.00	11	0.63	[0.10]	0.00	2	0.44	22	0.92	35	0.73	0.51—1.02
10	Artistic workers	2	2.15	1	0.39	[0.07]	0.00	[1.46]	0.00	4	0.91	7	0.74	0.30—1.53
11	Journalists	[0.21]	0.00	2	1.29	[0.02]	0.00	[0.38]	0.00	1	0.49	3	0.71	0.15—2.09
12	Administrators	3	0.54	2	0.37	1	22.44	8	1.69	14	1.39	28	1.09	0.72—1.57
13	Clerical workers	66	1.18	80	0.85	3	1.19	46	0.78	177	1.12	372	1.01	0.91—1.11
14	Sales agents	[0.49]	0.00	9	0.70	[0.19]	0.00	7	0.78	25	1.03	41	0.88	0.63—1.19
15	Shop workers	36	0.97	32	0.73	1	0.68	34	0.74	100	1.06	203	0.91	0.79—1.04
16	Farmers	27	1.04	29	1.11	2	2.46	40	1.27	16	1.56	114	1.21	1.00—1.45
17	Gardeners	5	1.50	81	1.17	[0.04]	0.00	15	0.82	30	1.21	131	1.13	0.95—1.34
18	Fishermen	[0.13]	0.00	[0.17]	0.00	[0.03]	0.00	[0.22]	0.00	1	11.49	1	1.56	0.04—8.71
19	Forestry workers	[0.03]	0.00	[0.33]	0.00	[0.01]	0.00	[0.31]	0.00	[0.54]	0.00	[1.22]	0.00	0.00—3.02
20	Miners and quarry workers	[0.00]	0.00	[0.13]	0.00	[0.00]	0.00	[0.02]	0.00	[0.13]	0.00	[0.28]	0.00	0.00—12.97
21	Seamen	–	–	[0.06]	0.00	[0.00]	0.00	[0.05]	0.00	[0.02]	0.00	[0.14]	0.00	0.00—27.01
22	Transport workers	[0.04]	0.00	[1.95]	0.00	1	32.00	[0.28]	0.00	2	1.18	3	0.75	0.16—2.20
23	Drivers	[0.95]	0.00	1	0.89	[0.01]	0.00	[0.94]	0.00	[3.95]	**0.00**	1	**0.14**	0.00—0.80
24	Postal workers	2	1.03	21	1.62	1	2.64	14	1.19	23	0.85	61	1.13	0.86—1.45
25	Textile workers	11	0.88	31	1.08	[0.76]	0.00	16	0.81	45	0.79	103	0.87	0.72—1.05
26	Shoe and leather workers	[0.93]	0.00	2	0.57	[0.04]	0.00	3	2.12	6	1.40	11	1.08	0.54—1.93
27	Smelting workers	1	4.37	1	1.24	[0.00]	0.00	[0.12]	0.00	2	1.75	4	1.74	0.47—4.45
28	Mechanics	5	2.19	2	0.51	[0.00]	0.00	1	0.62	12	1.01	20	1.01	0.62—1.56
29	Plumbers	[0.02]	0.00	[0.01]	0.00	–	–	[0.01]	0.00	[0.02]	0.00	[0.06]	0.00	0.00—61.00
30	Welders	–	–	1	2.98	[0.00]	0.00	[0.11]	0.00	1	2.10	2	2.17	0.26—7.85
31	Electrical workers	2	0.62	2	0.66	[0.01]	0.00	2	1.15	3	0.45	9	0.61	0.28—1.16
32	Wood workers	1	0.95	3	0.43	[0.02]	0.00	1	2.00	[2.02]	0.00	5	0.47	0.15—1.11
33	Painters	[0.04]	0.00	[0.87]	0.00	[0.01]	0.00	[0.12]	0.00	[0.55]	0.00	[1.59]	0.00	0.00—2.33
34	"Other construction workers"	[0.03]	0.00	3	1.14	[0.00]	0.00	[0.04]	0.00	[0.08]	0.00	3	1.07	0.22—3.14
35	Bricklayers	[0.01]	0.00	[0.10]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.11]	0.00	0.00—34.61
36	Printers	[1.19]	0.00	5	1.26	[0.08]	0.00	[1.69]	0.00	4	0.78	9	0.75	0.34—1.42
37	Chemical process workers	1	0.54	[1.85]	0.00	[0.03]	0.00	1	0.69	3	0.76	5	0.55	0.18—1.27
38	Food workers	10	1.10	8	0.84	[1.89]	0.00	8	0.90	8	0.66	34	0.82	0.57—1.15
39	Beverage workers	2	2.29	3	**5.72**	[0.00]	0.00	[0.07]	0.00	1	1.28	6	2.67	0.98—5.81
40	Tobacco workers	2	1.65	[0.28]	0.00	–	–	2	5.18	[0.44]	0.00	4	1.72	0.47—4.41
41	Glass makers etc	2	0.89	11	1.59	[0.05]	0.00	2	0.65	8	0.77	23	1.01	0.64—1.52
42	Packers	1	1.57	12	1.00	[0.17]	0.00	5	0.72	15	0.95	33	0.93	0.64—1.30
43	Engine operators	[0.02]	0.00	3	1.50	[0.01]	0.00	[0.09]	0.00	1	1.01	4	1.29	0.35—3.30
44	Public safety workers	[0.07]	0.00	2	3.66	[0.03]	0.00	[0.73]	0.00	2	1.25	4	1.34	0.37—3.43
45	Cooks and stewards	[0.02]	0.00	17	1.18	[0.61]	0.00	18	**1.73**	23	0.94	58	1.16	0.88—1.50
46	Domestic assistants	13	0.93	16	0.94	[0.17]	0.00	19	0.72	60	0.88	108	0.86	0.71—1.04
47	Waiters	2	0.82	15	1.20	[0.09]	0.00	9	0.84	26	1.10	52	1.06	0.79—1.38
48	Building caretakers	55	**1.35**	44	0.94	[1.09]	0.00	40	0.95	70	1.08	209	1.07	0.94—1.23
49	Chimney sweeps	[0.00]	0.00	[0.02]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.03]	0.00	0.00—113.90
50	Hairdressers	2	0.80	5	1.01	[0.13]	0.00	2	0.66	7	0.70	16	0.78	0.44—1.26
51	Launderers	8	1.76	1	0.29	[0.19]	0.00	2	0.49	15	1.18	26	1.04	0.68—1.53
52	Military personnel	[0.02]	0.00	[0.06]	0.00	–	–	[0.01]	0.00	[0.05]	0.00	[0.14]	0.00	0.00—25.50
53	"Other workers"	16	1.38	21	1.36	[1.49]	0.00	22	0.97	35	1.22	94	1.18	0.95—1.44
54	Economically inactive	280	0.91	331	1.05	9	2.12	424	1.09	1 302	1.01	2 346	1.02	0.98—1.06
1–54	All categories	598	1.00	893	1.00	19	1.00	795	1.00	2 230	1.00	4 535	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 72. Observed number of multiple myeloma among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	220	0.97	175	1.00	[2.39]	0.00	192	1.13	904	1.01	1 491	1.02	0.97—1.07
2	Laboratory assistants	6	1.33	4	0.95	[0.48]	0.00	4	0.47	3	0.77	17	0.79	0.46—1.26
3	Physicians	17	0.91	13	1.30	[1.02]	0.00	25	1.04	33	0.82	88	0.94	0.75—1.16
4	Dentists	4	0.74	2	0.93	[0.25]	0.00	6	0.56	22	1.10	34	0.88	0.61—1.23
5	Nurses	[0.25]	0.00	1	2.06	[0.01]	0.00	1	1.19	3	1.58	5	1.43	0.46—3.34
6	Assistant nurses	7	1.30	[0.42]	0.00	[0.11]	0.00	4	0.95	14	1.01	25	1.04	0.67—1.54
7	"Other health workers"	18	1.11	8	0.80	[0.26]	0.00	8	0.87	46	1.34	80	1.14	0.91—1.42
8	Teachers	102	1.03	73	0.99	4	1.10	143	1.12	215	0.95	537	1.01	0.93—1.10
9	Religious workers etc	54	1.29	46	1.17	1	0.43	66	0.97	186	1.07	353	1.09	0.98—1.21
10	Artistic workers	16	1.23	16	1.12	1	1.55	15	0.76	45	0.83	93	0.91	0.74—1.12
11	Journalists	6	0.98	5	0.72	[0.36]	0.00	7	0.82	26	1.04	44	0.93	0.68—1.25
12	Administrators	270	1.06	117	1.02	3	0.49	217	0.89	350	0.99	957	0.99	0.93—1.05
13	Clerical workers	99	0.89	66	0.87	10	1.48	170	0.95	377	1.00	722	0.96	0.90—1.04
14	Sales agents	46	0.78	110	1.03	3	0.85	211	0.98	572	1.06	942	1.02	0.95—1.08
15	Shop workers	274	1.06	45	1.02	1	0.42	78	0.99	172	0.99	570	1.02	0.94—1.11
16	Farmers	498	1.00	581	1.04	11	1.11	689	1.07	1 091	**1.12**	2 870	**1.07**	1.03—1.11
17	Gardeners	72	1.02	77	1.01	[0.31]	0.00	151	0.99	401	**1.13**	701	1.07	1.00—1.16
18	Fishermen	18	0.76	7	0.97	4	0.68	185	0.95	44	1.16	258	0.96	0.85—1.08
19	Forestry workers	7	0.67	75	0.85	[0.05]	0.00	116	1.00	250	0.97	448	0.95	0.87—1.04
20	Miners and quarry workers	4	1.25	13	0.93	[0.10]	0.00	33	1.08	75	1.20	125	1.13	0.95—1.35
21	Seamen	22	0.87	17	0.91	2	1.23	123	**0.83**	53	0.97	217	0.88	0.77—1.00
22	Transport workers	53	0.96	65	1.15	7	2.16	88	1.10	186	1.00	399	1.05	0.95—1.15
23	Drivers	156	0.86	181	1.04	7	1.48	204	0.95	445	1.00	993	0.97	0.91—1.04
24	Postal workers	29	0.83	33	1.23	[0.59]	0.00	45	1.05	83	0.84	190	0.93	0.81—1.07
25	Textile workers	27	0.84	20	1.09	[0.99]	0.00	44	0.91	101	0.89	192	0.90	0.78—1.04
26	Shoe and leather workers	5	0.63	8	0.99	[0.22]	0.00	16	0.77	51	1.12	80	0.97	0.77—1.21
27	Smelting workers	99	**1.38**	29	1.05	[1.44]	0.00	64	1.01	150	**0.84**	342	1.00	0.90—1.11
28	Mechanics	206	1.07	147	0.85	4	0.89	285	0.96	727	**0.90**	1 369	**0.93**	0.88—0.98
29	Plumbers	15	0.87	35	1.23	[0.73]	0.00	41	1.22	99	1.06	190	1.09	0.95—1.26
30	Welders	–	–	30	1.15	1	3.61	33	0.90	96	0.92	160	0.95	0.82—1.11
31	Electrical workers	44	0.97	72	1.00	3	1.13	128	0.98	280	1.01	527	1.00	0.92—1.09
32	Wood workers	120	0.90	169	0.88	2	0.77	399	1.10	573	1.03	1 263	1.01	0.96—1.07
33	Painters	40	0.92	45	1.13	[1.08]	0.00	44	**0.73**	151	0.94	280	0.92	0.82—1.03
34	"Other construction workers"	200	**1.19**	116	0.94	8	1.55	75	1.08	292	0.97	691	1.04	0.96—1.12
35	Bricklayers	47	0.97	22	1.10	–	–	55	**1.53**	62	0.85	186	1.05	0.91—1.21
36	Printers	28	0.92	17	0.99	[0.86]	0.00	27	0.77	63	**0.74**	135	**0.80**	0.68—0.95
37	Chemical process workers	24	0.84	32	1.09	[0.48]	0.00	98	1.20	129	0.96	283	1.03	0.92—1.16
38	Food workers	99	1.07	16	0.75	5	1.25	92	1.00	148	1.09	360	1.05	0.94—1.16
39	Beverage workers	8	0.71	3	2.05	[0.07]	0.00	[0.79]	0.00	7	0.91	18	0.85	0.50—1.34
40	Tobacco workers	1	0.54	1	4.00	[0.01]	0.00	1	0.70	[0.59]	0.00	3	0.73	0.15—2.13
41	Glass makers etc	45	0.83	35	1.14	1	1.39	57	**1.33**	147	1.00	285	1.03	0.92—1.16
42	Packers	39	0.81	67	1.03	3	1.31	121	0.88	268	1.00	498	0.96	0.88—1.04
43	Engine operators	47	0.96	88	1.04	4	1.29	72	0.98	212	0.97	423	0.99	0.90—1.09
44	Public safety workers	45	0.98	56	1.12	5	2.25	68	1.16	143	1.13	317	1.12	1.00—1.25
45	Cooks and stewards	5	1.41	7	2.39	[1.05]	0.00	21	0.86	21	0.94	54	0.99	0.75—1.30
46	Domestic assistants	[0.04]	0.00	[0.22]	0.00	[0.00]	0.00	[0.19]	0.00	[1.77]	0.00	[2.23]	0.00	0.00—1.66
47	Waiters	8	1.06	4	1.44	1	9.01	13	1.20	11	0.95	37	1.13	0.79—1.55
48	Building caretakers	54	1.11	37	0.85	3	3.09	26	0.87	117	1.13	237	1.05	0.92—1.19
49	Chimney sweeps	4	3.22	2	0.63	–	–	3	0.99	8	1.10	17	1.15	0.67—1.85
50	Hairdressers	7	0.50	2	2.28	[0.16]	0.00	6	0.68	31	1.17	46	0.91	0.67—1.22
51	Launderers	13	**1.92**	1	1.11	[0.09]	0.00	6	1.14	22	1.16	42	1.31	0.95—1.78
52	Military personnel	22	0.95	19	1.24	–	–	35	0.77	75	1.00	151	0.95	0.81—1.11
53	"Other workers"	150	1.01	49	0.96	6	0.66	281	1.05	317	0.98	803	1.00	0.93—1.07
54	Economically inactive	143	0.96	280	0.97	8	1.24	118	0.85	409	**0.84**	958	**0.90**	0.84—0.96
1–54	All categories	3 543	1.00	3 139	1.00	108	1.00	5 010	1.00	10 306	1.00	22 106	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 73. Observed number of multiple myeloma among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	8	0.92	16	1.05	[0.23]	0.00	5	1.11	33	1.02	62	1.02	0.78—1.30
2	Laboratory assistants	6	1.00	11	1.22	[0.36]	0.00	3	0.48	4	0.59	24	0.84	0.54—1.26
3	Physicians	3	1.04	[3.60]	0.00	1	14.61	1	0.39	11	1.61	16	1.00	0.57—1.63
4	Dentists	[2.59]	0.00	5	1.03	[0.03]	0.00	1	0.43	8	1.35	14	0.89	0.49—1.49
5	Nurses	49	0.95	49	1.08	[1.86]	0.00	56	1.16	96	0.95	250	1.01	0.89—1.14
6	Assistant nurses	37	1.01	53	1.04	3	1.20	44	0.90	164	0.97	301	0.98	0.87—1.09
7	"Other health workers"	33	1.12	39	1.00	[0.51]	0.00	44	0.87	51	0.92	167	0.95	0.82—1.11
8	Teachers	67	1.06	98	1.09	1	0.32	104	1.11	226	1.02	496	1.05	0.97—1.15
9	Religious workers etc	4	0.46	40	1.11	[0.47]	0.00	24	1.02	65	0.95	133	0.97	0.82—1.15
10	Artistic workers	8	1.72	[6.74]	0.00	[0.39]	0.00	6	0.80	14	1.00	28	0.84	0.56—1.22
11	Journalists	1	1.04	5	1.10	[0.10]	0.00	2	1.08	10	1.57	18	1.30	0.77—2.06
12	Administrators	35	1.26	12	0.81	[0.35]	0.00	24	0.96	30	0.92	101	1.00	0.83—1.22
13	Clerical workers	231	0.89	269	0.95	18	1.85	287	0.92	569	1.03	1 374	0.97	0.92—1.02
14	Sales agents	2	0.83	44	0.95	1	0.89	48	0.94	74	0.86	169	0.90	0.78—1.05
15	Shop workers	175	0.96	154	0.93	4	0.61	269	0.96	379	0.99	981	0.96	0.91—1.03
16	Farmers	126	0.99	142	1.17	7	1.41	258	1.22	37	1.07	570	1.14	1.05—1.24
17	Gardeners	18	1.09	356	1.06	1	6.07	143	1.14	90	0.89	608	1.05	0.97—1.13
18	Fishermen	[0.64]	0.00	1	1.47	[0.16]	0.00	2	1.45	1	3.06	4	1.26	0.34—3.22
19	Forestry workers	[0.17]	0.00	[1.28]	0.00	[0.02]	0.00	1	0.46	4	1.93	5	0.87	0.28—2.04
20	Miners and quarry workers	[0.01]	0.00	1	1.68	[0.00]	0.00	[0.09]	0.00	[0.46]	0.00	1	0.86	0.02—4.76
21	Seamen	–	–	[0.12]	0.00	[0.00]	0.00	[0.31]	0.00	[0.04]	0.00	[0.48]	0.00	0.00—7.73
22	Transport workers	[0.18]	0.00	4	0.45	[0.17]	0.00	[1.35]	0.00	5	0.88	9	0.55	0.25—1.05
23	Drivers	5	1.10	3	0.86	[0.07]	0.00	6	1.13	9	0.70	23	0.87	0.55—1.31
24	Postal workers	7	0.72	62	1.20	1	0.43	71	1.12	100	0.97	241	1.05	0.92—1.19
25	Textile workers	63	1.03	103	0.87	6	1.42	134	1.19	226	0.96	532	1.00	0.92—1.09
26	Shoe and leather workers	8	1.79	16	1.10	[0.21]	0.00	5	0.63	15	0.84	44	0.98	0.71—1.31
27	Smelting workers	2	1.83	1	0.29	[0.01]	0.00	1	1.45	6	1.47	10	1.07	0.51—1.97
28	Mechanics	11	1.04	18	1.24	[0.04]	0.00	6	0.67	40	0.94	75	0.98	0.77—1.22
29	Plumbers	[0.11]	0.00	[0.03]	0.00	–	–	[0.06]	0.00	[0.05]	0.00	[0.24]	0.00	0.00—15.33
30	Welders	–	–	[1.01]	0.00	[0.00]	0.00	1	1.93	[1.39]	0.00	1	0.34	0.01—1.91
31	Electrical workers	5	0.34	7	0.85	[0.03]	0.00	13	1.39	26	1.10	51	0.91	0.68—1.20
32	Wood workers	5	1.01	28	0.91	[0.06]	0.00	4	1.33	10	1.46	47	1.03	0.76—1.37
33	Painters	[0.19]	0.00	4	1.14	[0.02]	0.00	[0.71]	0.00	3	1.56	7	1.10	0.44—2.27
34	"Other construction workers"	[0.15]	0.00	13	1.00	[0.01]	0.00	[0.27]	0.00	[0.20]	0.00	13	0.95	0.51—1.62
35	Bricklayers	[0.03]	0.00	1	2.51	–	–	[0.01]	0.00	[0.01]	0.00	1	2.23	0.06—12.44
36	Printers	12	2.12	13	0.90	1	2.87	5	0.56	16	0.86	47	0.98	0.72—1.30
37	Chemical process workers	7	0.77	10	1.29	[0.16]	0.00	5	0.62	20	1.31	42	1.04	0.75—1.41
38	Food workers	44	1.00	30	0.73	8	0.97	52	0.96	59	1.23	193	0.99	0.86—1.14
39	Beverage workers	6	1.41	1	0.42	[0.02]	0.00	2	4.66	2	0.65	11	1.08	0.54—1.93
40	Tobacco workers	5	0.86	3	2.26	–	–	3	1.54	1	0.57	12	1.11	0.57—1.94
41	Glass makers etc	11	1.04	23	0.83	1	4.76	19	1.11	41	1.02	95	0.99	0.80—1.21
42	Packers	3	0.98	54	1.09	[0.84]	0.00	42	1.00	63	1.03	162	1.04	0.89—1.21
43	Engine operators	[0.08]	0.00	4	0.52	[0.01]	0.00	[0.45]	0.00	1	0.32	5	0.44	0.14—1.03
44	Public safety workers	[0.38]	0.00	1	0.57	[0.16]	0.00	7	1.33	5	1.24	13	1.12	0.60—1.92
45	Cooks and stewards	[0.12]	0.00	63	1.13	4	1.27	73	1.16	104	1.09	244	1.12	0.99—1.27
46	Domestic assistants	58	0.84	61	1.10	3	3.17	168	1.05	224	0.99	514	1.01	0.92—1.10
47	Waiters	11	0.94	47	1.06	1	2.86	59	0.93	89	0.92	207	0.96	0.84—1.10
48	Building caretakers	209	1.04	207	1.06	4	0.62	272	1.01	234	0.97	926	1.01	0.95—1.08
49	Chimney sweeps	[0.02]	0.00	[0.09]	0.00	–	–	[0.04]	0.00	[0.00]	0.00	[0.15]	0.00	0.00—23.93
50	Hairdressers	10	0.87	12	0.72	[0.29]	0.00	14	0.89	28	0.76	64	0.79	0.61—1.01
51	Launderers	14	0.62	16	0.98	[1.06]	0.00	27	1.08	53	1.02	110	0.94	0.78—1.13
52	Military personnel	[0.12]	0.00	[0.11]	0.00	–	–	[0.06]	0.00	[0.10]	0.00	[0.39]	0.00	0.00—9.56
53	"Other workers"	54	0.95	69	1.19	9	1.43	122	0.90	120	1.13	374	1.03	0.93—1.14
54	Economically inactive	1 602	1.03	1 383	0.98	16	0.74	1 926	0.98	5 186	1.00	10 113	1.00	0.98—1.02
1–54	All categories	2 955	1.00	3 552	1.00	90	1.00	4 359	1.00	8 552	1.00	19 508	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Comment. Previous studies have found associations between multiple myeloma and work in the production of non-arsenical insecticides, pest control, agricultural work and flour and grain mill work [87]. In our study, we found a modest but consistent excess risk among farmers in both genders and in all countries except Denmark.

Leukaemia

Incidence rates for leukaemia are higher among men than among women in all Nordic countries and have been quite stable over the latest decades (Figure 48).

Generally, there was only minor variation in the incidence of leukaemia between the occupations (Tables 74, 75). Significantly elevated SIRs for leukaemia were seen among male public safety workers (1.11, 95% CI 1.02–1.21), sales agents and clerical workers. The SIR was decreased among launderers (0.71, 0.50–0.99), fishermen and forestry workers. The risk of 0.28 (0.03–0.99) among male nurses was derived from two cases only. There were no elevated leukaemia risks according to occupation among women. A slightly decreased SIR (0.91, 0.84–0.98) was observed in textile workers.

A somewhat elevated SIR of chronic lymphocytic leukaemia (CLL) was observed among male farmers (1.09, 1.03–1.14), while reduced risks were observed among "other health workers" (0.59, 0.37–0.89) and seamen (0.80, 0.66–0.96). No female occupation showed any significantly elevated or reduced risk of CLL (http://astra.cancer.fi/NOCCA/Incidence/CLL).

The risk of acute myeloid leukaemia (AML) in men was highest among drivers (1.16, 1.07–1.27), and sales agents (1.11, 1.01–1.22) also had a somewhat elevated risk. The lowest risks were observed among seamen, (0.79, 0.64–0.96) and forestry workers (0.85, 0.73–0.99). None of the female occupations had a significantly elevated risk, while textile workers were observed to have a lowered risk (0.83, 0.72–0.96; http://astra.cancer.fi/NOCCA/Incidence/AML).

Comment. Leukaemia comprises a heterogeneous group of acute and chronic myelogenous and lymphocytic malignancies originating in different cells of the haematopoietic system. Exposure to ionising radiation is a common aetiological factor for all types of leukaemia. Several chemical and physical exposures occurring in occupational settings have been previously reported as associated with an increased risk of leukaemia. Such exposures with substantial evidence include benzene, ethylene oxide, ionising radiation (including x-rays, gamma rays, neutrons, and radon gas and its decay products) 1,3-butadiene, non-arsenical insecticides [87], work in boot and shoe manufacturing and repair, the rubber industry and petroleum refining In this study there was very little variation in SIRs between occupational categories, and for instance, the incidence of leukaemia in shoe and leather work was 6–7% below the average in both genders.

There was a small (about 10%) excess risk of CLL among farmers and clerical workers in both genders which is similar to the effect found in some previous studies [140,141].

Environmental and occupational risk factors for AML include exposure to toxic chemicals present in tobacco smoke, emissions from industrial operations and petroleum refinery waste dumps [142], as well as high dose radiation exposure, exposure to high dose benzene and prior treatment with chemotherapeutic agents [143]. Occupational activities such as wood processing and agricultural work and jobs with high levels of exposure to electromagnetic fields, in particular the extremely low range (0–300 Hz), have

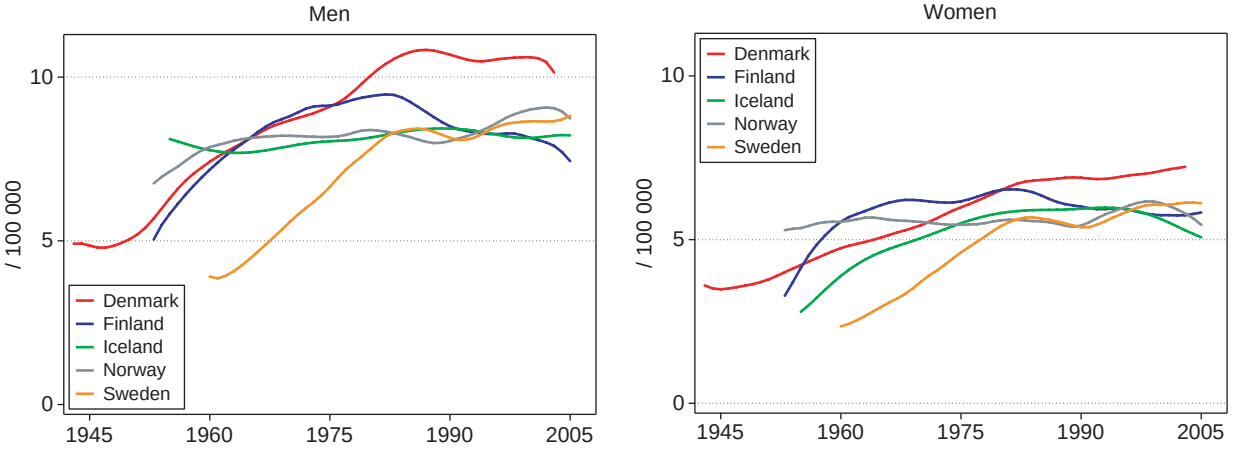


Figure 48. Age standardised (World) incidence rates for leukaemia 1943–2005, by country and gender. Modified from NORDCAN [49].

Table 74. Observed number of leukaemia among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	449	0.95	317	0.98	4	0.87	243	0.98	1 397	0.99	2 410	0.98	0.94—1.02
2	Laboratory assistants	14	1.47	6	0.75	[0.83]	0.00	12	0.98	3	0.40	35	0.92	0.64—1.28
3	Physicians	27	**0.68**	16	0.86	3	1.73	41	1.20	61	0.94	148	0.93	0.79—1.09
4	Dentists	14	1.23	6	1.49	[0.46]	0.00	23	1.50	31	0.98	74	1.18	0.92—1.48
5	Nurses	[0.52]	0.00	[1.07]	0.00	[0.01]	0.00	1	0.71	1	0.23	2	**0.28**	0.03—0.99
6	Assistant nurses	6	0.53	2	2.10	[0.22]	0.00	8	1.36	18	0.77	34	0.82	0.57—1.14
7	"Other health workers"	36	1.05	13	0.71	[0.46]	0.00	15	1.14	54	0.99	118	0.98	0.82—1.17
8	Teachers	233	1.13	122	0.92	7	1.08	179	0.96	374	1.02	915	1.02	0.95—1.08
9	Religious workers etc	95	1.06	90	1.21	6	1.42	99	1.01	300	1.05	590	1.07	0.99—1.16
10	Artistic workers	28	1.01	30	1.14	[1.14]	0.00	34	1.21	83	0.97	175	1.04	0.89—1.20
11	Journalists	14	1.08	15	1.18	[0.64]	0.00	13	1.06	39	0.98	81	1.03	0.82—1.28
12	Administrators	564	1.04	220	1.06	15	1.45	366	1.06	523	0.98	1 688	1.03	0.98—1.08
13	Clerical workers	237	1.00	160	1.16	15	1.28	299	**1.18**	592	1.03	1 303	**1.07**	1.01—1.13
14	Sales agents	140	1.13	215	1.11	6	1.02	347	**1.15**	899	1.07	1 607	**1.10**	1.05—1.15
15	Shop workers	559	1.02	77	0.95	6	1.41	107	0.95	239	0.89	988	0.97	0.91—1.04
16	Farmers	1 005	0.94	1 021	1.03	15	0.88	910	1.03	1 419	1.01	4 370	1.00	0.97—1.03
17	Gardeners	157	1.04	126	0.93	[0.56]	0.00	204	0.97	505	0.97	992	0.97	0.91—1.04
18	Fishermen	35	**0.70**	15	1.16	8	0.76	215	**0.80**	39	**0.70**	312	**0.78**	0.70—0.88
19	Forestry workers	19	0.85	149	0.95	[0.09]	0.00	157	0.99	324	**0.86**	649	**0.91**	0.84—0.98
20	Miners and quarry workers	5	0.73	36	1.43	[0.17]	0.00	33	0.77	97	1.04	171	1.02	0.87—1.18
21	Seamen	39	0.74	38	1.13	2	0.71	176	**0.84**	88	1.07	343	0.90	0.81—1.00
22	Transport workers	119	1.01	112	1.12	7	1.29	121	1.09	274	0.97	633	1.03	0.95—1.11
23	Drivers	394	1.03	321	1.02	9	1.12	314	1.03	743	1.07	1 781	1.05	1.00—1.10
24	Postal workers	76	1.04	43	0.88	[1.00]	0.00	55	0.91	146	0.95	320	0.95	0.85—1.06
25	Textile workers	72	1.05	33	1.00	2	1.14	58	0.87	162	0.97	327	0.97	0.87—1.08
26	Shoe and leather workers	13	0.76	9	0.62	[0.37]	0.00	27	0.94	68	1.04	117	0.93	0.78—1.11
27	Smelting workers	147	0.98	50	1.01	2	0.82	83	0.94	256	0.97	538	0.97	0.89—1.05
28	Mechanics	383	0.94	300	0.95	5	0.62	401	0.95	1 261	1.00	2 350	0.97	0.94—1.02
29	Plumbers	38	1.05	49	0.94	[1.29]	0.00	49	1.02	131	0.90	267	0.95	0.84—1.07
30	Welders	–	–	59	1.21	[0.49]	0.00	49	0.93	186	1.11	294	1.09	0.97—1.23
31	Electrical workers	104	1.10	131	0.99	5	1.04	197	1.06	439	1.00	876	1.02	0.96—1.09
32	Wood workers	258	0.91	337	0.98	4	0.89	466	0.93	833	1.00	1 898	0.96	0.92—1.01
33	Painters	83	0.90	78	1.09	1	0.57	85	1.01	228	0.94	475	0.97	0.88—1.06
34	"Other construction workers"	367	1.02	205	0.92	7	0.76	96	0.98	451	1.01	1 126	0.99	0.93—1.05
35	Bricklayers	106	1.04	35	0.98	–	–	49	0.99	103	0.95	293	0.99	0.88—1.11
36	Printers	57	0.89	20	**0.63**	1	0.67	50	1.00	139	1.05	267	0.96	0.85—1.08
37	Chemical process workers	48	0.79	49	0.92	1	1.23	130	1.15	219	1.10	447	1.05	0.95—1.15
38	Food workers	210	1.08	40	1.03	9	1.30	137	1.08	204	1.00	600	1.05	0.97—1.14
39	Beverage workers	28	1.16	2	0.76	1	8.09	1	0.80	12	1.07	44	1.12	0.81—1.50
40	Tobacco workers	5	1.25	[0.46]	0.00	[0.01]	0.00	4	2.02	[0.91]	0.00	9	1.22	0.56—2.32
41	Glass makers etc	115	0.99	31	**0.55**	2	1.58	59	0.97	233	1.05	440	0.97	0.88—1.06
42	Packers	101	0.97	107	0.91	6	1.52	182	0.95	383	0.97	779	0.96	0.89—1.03
43	Engine operators	108	1.05	146	0.95	8	1.44	114	1.08	356	1.05	732	1.04	0.96—1.11
44	Public safety workers	101	1.05	107	1.18	5	1.28	101	**1.24**	209	1.04	523	**1.11**	1.02—1.21
45	Cooks and stewards	6	0.80	5	0.88	3	1.61	28	0.79	39	1.07	81	0.93	0.74—1.16
46	Domestic assistants	[0.08]	0.00	[0.42]	0.00	[0.01]	0.00	[0.29]	0.00	4	1.12	4	0.91	0.25—2.34
47	Waiters	18	1.12	6	1.10	[0.20]	0.00	21	1.37	21	1.13	66	1.19	0.92—1.51
48	Building caretakers	111	1.07	85	1.08	1	0.61	40	0.94	166	1.06	403	1.05	0.95—1.16
49	Chimney sweeps	1	0.38	7	1.24	–	–	5	1.19	11	0.97	24	1.01	0.65—1.50
50	Hairdressers	25	0.84	1	0.61	[0.27]	0.00	13	1.06	33	0.84	72	0.86	0.68—1.09
51	Launderers	7	0.48	1	0.61	1	6.38	6	0.82	22	0.78	37	**0.71**	0.50—0.99
52	Military personnel	51	1.06	35	1.25	–	–	63	0.97	131	1.10	280	1.08	0.96—1.21
53	"Other workers"	360	**1.14**	89	0.96	10	0.65	364	0.98	465	0.97	1 288	1.01	0.96—1.07
54	Economically inactive	349	1.07	522	0.96	11	0.99	183	0.90	721	0.98	1 786	0.98	0.94—1.03
1–54	All categories	7 537	1.00	5 689	1.00	188	1.00	7 033	1.00	15 735	1.00	36 182	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 75. Observed number of leukaemia among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	12	0.71	24	0.99	[0.45]	0.00	5	0.79	53	1.04	94	0.95	0.77—1.16
2	Laboratory assistants	9	0.77	26	**1.89**	1	1.52	6	0.73	12	0.84	54	1.11	0.83—1.45
3	Physicians	4	0.71	3	0.51	[0.12]	0.00	6	1.72	16	1.37	29	1.08	0.72—1.55
4	Dentists	4	0.80	6	0.86	[0.04]	0.00	2	0.65	7	0.77	19	0.79	0.47—1.23
5	Nurses	105	1.05	53	0.76	4	1.33	59	0.94	156	1.02	377	0.97	0.88—1.07
6	Assistant nurses	79	1.12	73	0.99	3	0.71	58	0.94	283	1.05	496	1.04	0.95—1.13
7	"Other health workers"	64	1.12	72	1.24	1	1.10	51	0.79	94	1.04	282	1.04	0.93—1.17
8	Teachers	128	1.04	153	1.16	5	0.89	125	1.00	331	0.96	742	1.02	0.95—1.09
9	Religious workers etc	25	1.49	57	0.94	2	2.36	29	0.95	126	1.09	239	1.07	0.94—1.21
10	Artistic workers	7	0.78	10	0.95	[0.65]	0.00	7	0.72	26	1.18	50	0.96	0.72—1.27
11	Journalists	[1.86]	0.00	12	1.76	[0.16]	0.00	[2.44]	0.00	10	0.98	22	1.02	0.64—1.55
12	Administrators	51	0.96	25	1.09	1	2.07	25	0.78	48	0.95	150	0.94	0.80—1.11
13	Clerical workers	492	0.98	422	1.00	19	1.18	389	0.98	913	**1.08**	2 235	1.03	0.98—1.07
14	Sales agents	3	0.64	60	0.90	3	1.74	74	1.18	121	1.01	261	1.02	0.90—1.15
15	Shop workers	347	0.99	240	1.02	11	1.09	323	0.95	535	1.03	1 456	1.00	0.95—1.05
16	Farmers	238	0.98	170	1.03	5	0.66	251	1.01	40	0.84	704	0.99	0.92—1.06
17	Gardeners	46	**1.45**	447	0.99	1	3.70	155	1.06	141	1.04	790	1.03	0.96—1.11
18	Fishermen	3	2.44	[0.95]	0.00	[0.27]	0.00	2	1.19	1	2.23	6	1.31	0.48—2.85
19	Forestry workers	1	3.11	2	1.10	[0.03]	0.00	1	0.40	2	0.68	6	0.79	0.29—1.71
20	Miners and quarry workers	[0.02]	0.00	1	1.22	[0.01]	0.00	[0.12]	0.00	[0.70]	0.00	1	0.60	0.02—3.32
21	Seamen	–	–	[0.21]	0.00	[0.00]	0.00	1	2.56	[0.09]	0.00	1	1.46	0.04—8.11
22	Transport workers	[0.35]	0.00	14	1.16	1	3.39	2	1.13	4	0.47	21	0.92	0.57—1.40
23	Drivers	12	1.39	3	0.58	[0.12]	0.00	5	0.75	27	1.33	47	1.15	0.84—1.53
24	Postal workers	18	0.98	62	0.86	2	0.62	67	0.84	160	1.08	309	0.96	0.86—1.08
25	Textile workers	120	1.03	146	0.89	8	1.21	114	0.83	273	0.90	661	**0.91**	0.84—0.98
26	Shoe and leather workers	8	0.94	20	0.99	[0.38]	0.00	13	1.34	17	0.73	58	0.94	0.71—1.21
27	Smelting workers	[2.09]	0.00	3	0.63	[0.01]	0.00	1	1.12	4	0.64	8	0.57	0.25—1.13
28	Mechanics	20	0.99	16	0.77	[0.05]	0.00	11	1.00	63	1.00	110	0.96	0.79—1.15
29	Plumbers	2	**9.22**	[0.04]	0.00	–	–	[0.07]	0.00	[0.09]	0.00	2	4.71	0.57—17.02
30	Welders	–	–	[1.53]	0.00	[0.01]	0.00	1	1.43	4	1.66	5	1.08	0.35—2.52
31	Electrical workers	33	1.17	15	1.18	1	17.04	11	0.95	39	1.10	99	1.13	0.92—1.37
32	Wood workers	9	0.95	38	0.91	[0.11]	0.00	2	0.54	12	1.14	61	0.93	0.71—1.19
33	Painters	[0.37]	0.00	4	0.82	[0.03]	0.00	[0.86]	0.00	2	0.70	6	0.67	0.25—1.46
34	"Other construction workers"	[0.29]	0.00	15	0.86	[0.02]	0.00	[0.34]	0.00	[0.36]	0.00	15	0.81	0.45—1.34
35	Bricklayers	[0.06]	0.00	[0.56]	0.00	–	–	[0.02]	0.00	[0.01]	0.00	[0.65]	0.00	0.00—5.71
36	Printers	4	**0.37**	17	0.83	[0.55]	0.00	12	1.08	28	1.06	61	0.88	0.67—1.13
37	Chemical process workers	19	1.10	15	1.40	[0.23]	0.00	8	0.81	25	1.19	67	1.13	0.88—1.44
38	Food workers	81	0.97	62	1.11	17	1.28	52	0.80	58	0.92	270	0.96	0.85—1.08
39	Beverage workers	9	1.11	2	0.62	[0.03]	0.00	[0.51]	0.00	6	1.51	17	1.08	0.63—1.72
40	Tobacco workers	18	1.63	1	0.56	–	–	2	0.84	2	0.81	23	1.30	0.82—1.95
41	Glass makers etc	18	0.89	39	1.01	[0.38]	0.00	21	1.01	57	1.02	135	0.99	0.84—1.17
42	Packers	4	0.68	88	**1.29**	3	2.32	49	0.98	89	1.06	233	1.11	0.98—1.26
43	Engine operators	[0.15]	0.00	9	0.83	[0.02]	0.00	1	1.67	5	0.95	15	0.89	0.50—1.46
44	Public safety workers	[0.71]	0.00	4	1.55	[0.28]	0.00	8	1.27	3	0.42	15	0.88	0.49—1.45
45	Cooks and stewards	[0.23]	0.00	85	1.08	7	1.37	76	1.00	128	1.04	296	1.05	0.93—1.17
46	Domestic assistants	121	0.92	70	0.86	1	0.66	203	1.04	326	1.00	721	0.98	0.91—1.06
47	Waiters	22	0.99	59	0.93	[0.53]	0.00	72	0.94	109	0.86	262	0.90	0.80—1.02
48	Building caretakers	369	0.96	266	0.98	7	0.69	347	1.08	342	1.04	1 331	1.01	0.96—1.07
49	Chimney sweeps	[0.04]	0.00	[0.13]	0.00	–	–	[0.04]	0.00	[0.01]	0.00	[0.22]	0.00	0.00—16.88
50	Hairdressers	19	0.84	18	0.74	[0.60]	0.00	19	0.96	48	0.89	104	0.86	0.71—1.04
51	Launderers	48	1.11	16	0.73	[1.65]	0.00	23	0.77	80	1.21	167	1.03	0.88—1.19
52	Military personnel	[0.22]	0.00	[0.20]	0.00	–	–	[0.08]	0.00	[0.22]	0.00	[0.72]	0.00	0.00—5.12
53	"Other workers"	107	0.99	82	1.00	7	0.69	159	0.96	156	1.06	511	0.99	0.91—1.08
54	Economically inactive	2 992	1.00	1 957	1.01	37	1.00	2 572	1.03	6 614	0.98	14 172	1.00	0.98—1.02
1–54	All categories	5 671	1.00	4 982	1.00	147	1.00	5 420	1.00	11 596	1.00	27 816	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

also been associated with AML in earlier studies [144], but it is hard to observe any effects of these factors from the present results. Drivers and sales agents, who had significantly elevated SIRs for AML in the present study have also been previously reported to have a somewhat elevated risk of AML [143,145].

Mycosis fungoides

Mycosis fungoides is a cutaneous T-cell lymphoma which represents a spectrum of lymphoproliferative disorders that affect the skin. It is a rare cancer with a total of 3 634 cases included in the present study.

Cooks and stewards represented a high risk group among men with an SIR of 2.65 (95% CI 1.37–4.63). Gardeners (0.67, 0.49–0.89) were at the bottom together with "other construction workers" and farmers (Table 76). In women, farmers were at a deficit risk (0.36, 0.15–0.75; Table 77).

Comment. The aetiology of mycosis fungoides is poorly understood, and infectious agents may be involved. Previous occupational studies have indicated a possible association with men working in the industries of non-metallic mineral products, wholesale trade, glass formers, potters, and ceramics workers and technical salesmen. A high risk was found for female employees in the sector of pulp paper manufacture, government executives and railway and road vehicles loaders [146].

An earlier study also indicated an increased risk among women in Sweden working in agriculture and textile industries, housekeepers, and post office employees [147]. The present study did not pick up any of the occupational categories reported to have had excess risk in the earlier studies.

Other and unknown cancer sites

The category of "other and unknown cancers" (199 in ICD–7) includes few cancers of other specific organs not included in any other ICD category, but mainly cancers with an unspecified primary site. Incidence of cancers classified to this category has been quite stable over several decades and similar in both genders, e.g. in Finland about 5 and in Sweden about 7 per 100 000 person-years [148,149]. The proportion of an unknown primary site was 2–4% in all Nordic countries in 1998–2002 [150].

Tobacco workers had the highest non-significant SIR (1.73, 95% CI 0.86–3.09) and waiters the highest significant SIR (1.49, 1.19–1.84) of unspecified cancer among the men, followed by cooks and stewards, hairdressers, seamen and assistant nurses. The SIR was low among the physicians (0.68, 0.57–0.82), teachers and farmers (Table 78).

In women (Table 79), significantly high SIRs were observed among "other construction workers" (1.45, 1.02–2.00; dominated by the finding in Finland), chemical process workers, and waiters. The SIR was low among physicians (0.66, 0.43–0.97), artistic workers, teachers, and nurses.

Comment. In a previous study in Finland covering the 1970s and early 1980s, there appeared to be two types of persons with an excess of unspecified cancers: persons with a low level of awareness about cancer who may have gone to the doctor with an already advanced stage of disease, consequently receiving less specialised medical care and a delayed diagnosis, and persons with a predominantly high living standard who purposely did not want to have their cancer diagnosed [6]. It was also reported that the socioeconomic differences in the incidence of unspecified cancer were decreasing over time.

In the present study series this is not as evident, apart from the finding related to physicians who had the lowest SIR in both genders. Otherwise, most of the categories with the highest and lowest incidence of unspecified cancers also have similar rates for all cancers combined (see next chapter). Hence, the likelihood of getting a proper cancer diagnosis, or having the cancer diagnosed before it is so spread in the body that the origin cannot be defined any more, seems not to vary markedly between most occupations.

All cancer sites combined

The age-adjusted incidence of all cancers combined (excluding non-melanoma skin cancer) has been slowly increasing for several decades in all Nordic countries (Figure 49). The speed of growth has been highest in Norway and lowest in Finland. The rates for men in Finland have been markedly higher than for women, while in the other Nordic countries there is no large difference between the gender-specific rates.

In men, high SIRs were observed among waiters (1.48, 95% CI 1.43–1.54), beverage manufacture workers, tobacco manufacture workers, seamen, chimney sweeps and cooks and stewards. The SIRs were lowest among domestic assistants (0.79, 0.66–0.95), farmers, forestry workers and gardeners. The variation in incidence between Danish men was larger and among Finnish men smaller than in the other Nordic countries (Table 80).

Table 76. Observed number of mycosis fungoides among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	12	0.90	13	0.98	[0.30]	0.00	13	1.78	96	0.88	134	0.93	0.79—1.11
2	Laboratory assistants	[0.26]	0.00	[0.33]	0.00	[0.05]	0.00	[0.35]	0.00	[0.33]	0.00	[1.32]	0.00	0.00—2.78
3	Physicians	1	0.88	[0.77]	0.00	[0.10]	0.00	2	2.13	9	1.85	12	1.54	0.80—2.69
4	Dentists	1	3.23	[0.16]	0.00	[0.03]	0.00	[0.41]	0.00	2	0.77	3	0.86	0.18—2.51
5	Nurses	[0.01]	0.00	[0.04]	0.00	[0.00]	0.00	[0.04]	0.00	[0.17]	0.00	[0.27]	0.00	0.00—13.49
6	Assistant nurses	[0.31]	0.00	[0.04]	0.00	[0.01]	0.00	[0.16]	0.00	2	1.08	2	0.84	0.10—3.05
7	"Other health workers"	[0.97]	0.00	1	1.36	[0.02]	0.00	1	2.74	2	0.45	4	0.61	0.17—1.57
8	Teachers	9	1.57	4	0.72	[0.39]	0.00	3	0.58	29	1.09	45	1.03	0.75—1.38
9	Religious workers etc	5	1.95	5	1.67	[0.24]	0.00	4	1.48	27	1.25	41	1.36	0.98—1.85
10	Artistic workers	1	1.28	1	0.95	1	15.32	1	1.27	5	0.73	9	0.94	0.43—1.78
11	Journalists	[0.36]	0.00	2	3.82	[0.04]	0.00	[0.35]	0.00	2	0.59	4	0.86	0.23—2.20
12	Administrators	14	0.90	11	1.30	[0.56]	0.00	8	0.86	60	1.22	93	1.12	0.91—1.37
13	Clerical workers	5	0.77	5	0.92	1	1.73	9	1.27	44	0.85	64	0.90	0.69—1.15
14	Sales agents	4	1.18	6	0.77	[0.32]	0.00	7	0.86	86	1.16	103	1.10	0.91—1.33
15	Shop workers	15	0.97	7	2.06	[0.22]	0.00	2	0.62	21	0.93	45	1.00	0.73—1.34
16	Farmers	16	**0.51**	32	0.88	[0.82]	0.00	17	0.78	147	0.94	212	**0.86**	0.75—0.98
17	Gardeners	1	0.23	1	0.19	[0.03]	0.00	2	0.35	43	0.79	47	**0.67**	0.49—0.89
18	Fishermen	2	1.47	1	2.13	[0.64]	0.00	7	0.99	3	0.50	13	0.84	0.45—1.43
19	Forestry workers	[0.65]	0.00	12	1.88	[0.00]	0.00	1	0.25	33	0.83	46	0.90	0.66—1.20
20	Miners and quarry workers	[0.19]	0.00	1	0.97	[0.01]	0.00	4	3.43	14	1.46	19	1.58	0.95—2.47
21	Seamen	3	2.13	[1.36]	0.00	1	6.33	5	0.84	11	1.37	20	1.18	0.72—1.83
22	Transport workers	1	0.29	4	0.98	[0.29]	0.00	3	0.97	19	0.81	27	0.79	0.52—1.15
23	Drivers	14	1.35	12	0.92	[0.48]	0.00	6	0.70	63	1.05	95	1.03	0.83—1.26
24	Postal workers	3	1.50	1	0.52	[0.05]	0.00	2	1.25	17	1.20	23	1.16	0.74—1.75
25	Textile workers	4	2.06	1	0.79	[0.07]	0.00	1	0.57	22	1.26	28	1.24	0.83—1.80
26	Shoe and leather workers	2	4.16	[0.55]	0.00	[0.01]	0.00	[0.73]	0.00	9	1.14	11	1.14	0.57—2.04
27	Smelting workers	5	1.24	2	1.02	[0.12]	0.00	4	1.67	22	0.81	33	0.93	0.64—1.30
28	Mechanics	15	1.36	7	0.55	[0.46]	0.00	14	1.18	119	1.10	155	1.08	0.92—1.26
29	Plumbers	1	1.02	1	0.46	[0.07]	0.00	1	0.73	7	0.56	10	0.58	0.28—1.07
30	Welders	–	–	2	0.96	[0.03]	0.00	1	0.63	16	1.27	19	1.17	0.70—1.83
31	Electrical workers	3	1.19	6	1.10	2	7.23	2	0.38	31	0.89	44	0.91	0.66—1.22
32	Wood workers	4	0.51	15	1.12	[0.23]	0.00	12	0.89	92	1.09	123	1.03	0.86—1.23
33	Painters	4	1.56	5	1.77	[0.10]	0.00	2	0.89	22	0.94	33	1.06	0.73—1.49
34	"Other construction workers"	5	0.50	6	0.69	1	1.97	1	0.37	37	0.79	50	**0.73**	0.54—0.96
35	Bricklayers	2	0.71	1	0.72	–	–	1	0.74	12	1.10	16	0.97	0.55—1.57
36	Printers	[1.72]	0.00	1	0.77	[0.09]	0.00	4	2.93	15	1.29	20	1.24	0.76—1.92
37	Chemical process workers	3	1.75	2	0.92	[0.04]	0.00	8	**2.68**	25	1.18	38	1.35	0.96—1.85
38	Food workers	6	1.11	2	1.28	[0.31]	0.00	5	1.46	18	0.92	31	1.02	0.69—1.45
39	Beverage workers	2	3.10	[0.10]	0.00	[0.01]	0.00	[0.04]	0.00	3	2.23	5	2.34	0.76—5.46
40	Tobacco workers	[0.11]	0.00	[0.02]	0.00	[0.00]	0.00	[0.05]	0.00	[0.08]	0.00	[0.27]	0.00	0.00—13.79
41	Glass makers etc	5	1.54	[2.27]	0.00	[0.06]	0.00	4	2.39	18	0.84	27	0.94	0.62—1.36
42	Packers	3	1.04	7	1.51	[0.17]	0.00	7	1.37	50	1.15	67	1.19	0.92—1.51
43	Engine operators	2	0.71	9	1.40	1	3.21	5	1.69	30	0.98	47	1.09	0.80—1.45
44	Public safety workers	6	2.07	2	0.55	[0.21]	0.00	3	1.35	14	0.84	25	0.97	0.63—1.43
45	Cooks and stewards	[0.20]	0.00	[0.23]	0.00	[0.11]	0.00	3	3.00	9	**3.00**	12	**2.65**	1.37—4.63
46	Domestic assistants	[0.00]	0.00	[0.01]	0.00	[0.00]	0.00	[0.01]	0.00	[0.22]	0.00	[0.24]	0.00	0.00—15.06
47	Waiters	[0.41]	0.00	[0.21]	0.00	[0.01]	0.00	1	2.34	2	1.26	3	1.13	0.23—3.30
48	Building caretakers	5	1.72	4	1.32	[0.06]	0.00	1	0.90	19	1.14	29	1.22	0.82—1.75
49	Chimney sweeps	[0.07]	0.00	[0.23]	0.00	–	–	[0.12]	0.00	3	2.96	3	2.10	0.43—6.14
50	Hairdressers	1	1.17	[0.06]	0.00	[0.02]	0.00	[0.33]	0.00	4	1.05	5	0.98	0.32—2.29
51	Launderers	[0.41]	0.00	[0.06]	0.00	[0.01]	0.00	[0.20]	0.00	3	1.11	3	0.88	0.18—2.59
52	Military personnel	[1.30]	0.00	3	2.42	–	–	4	2.11	7	0.81	14	1.07	0.59—1.80
53	"Other workers"	13	1.53	6	1.67	2	2.58	4	0.42	48	0.92	73	0.98	0.76—1.23
54	Economically inactive	12	1.51	20	1.17	1	1.81	4	0.90	94	1.01	131	1.07	0.90—1.26
1–54	All categories	210	1.00	221	1.00	10	1.00	189	1.00	1 486	1.00	2 116	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 77. Observed number of mycosis fungoides among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	1	2.72	[0.90]	0.00	[0.03]	0.00	[0.16]	0.00	[3.43]	0.00	1	0.20	0.01—1.14
2	Laboratory assistants	[0.27]	0.00	[0.44]	0.00	[0.03]	0.00	1	5.19	1	2.80	2	1.54	0.19—5.57
3	Physicians	[0.12]	0.00	1	4.34	[0.00]	0.00	[0.08]	0.00	1	1.63	2	1.91	0.23—6.89
4	Dentists	1	9.28	[0.20]	0.00	[0.00]	0.00	[0.06]	0.00	[0.66]	0.00	1	0.98	0.02—5.44
5	Nurses	3	1.41	1	0.43	[0.11]	0.00	1	0.66	10	0.91	15	0.88	0.49—1.45
6	Assistant nurses	2	1.28	2	0.93	1	5.56	3	1.96	22	1.26	30	1.31	0.89—1.88
7	"Other health workers"	2	1.63	2	1.10	[0.04]	0.00	4	2.71	8	1.44	16	1.58	0.90—2.56
8	Teachers	4	1.46	5	1.26	[0.21]	0.00	3	1.05	17	0.70	29	0.85	0.57—1.23
9	Religious workers etc	1	2.72	2	0.84	[0.03]	0.00	[0.72]	0.00	6	0.89	9	0.88	0.40—1.66
10	Artistic workers	[0.18]	0.00	[0.35]	0.00	[0.02]	0.00	1	4.69	3	1.95	4	1.73	0.47—4.43
11	Journalists	[0.04]	0.00	[0.21]	0.00	[0.01]	0.00	[0.06]	0.00	1	1.51	1	1.02	0.03—5.68
12	Administrators	[1.10]	0.00	1	1.30	[0.01]	0.00	1	1.43	3	0.82	5	0.80	0.26—1.87
13	Clerical workers	13	1.18	24	**1.82**	[0.64]	0.00	7	0.79	48	0.80	92	0.98	0.79—1.21
14	Sales agents	[0.10]	0.00	3	1.63	[0.04]	0.00	1	0.86	14	1.20	18	1.21	0.72—1.92
15	Shop workers	6	0.81	12	1.91	[0.31]	0.00	10	1.37	49	1.03	77	1.12	0.88—1.40
16	Farmers	2	0.38	3	0.78	[0.16]	0.00	2	0.41	[5.25]	**0.00**	7	**0.36**	0.15—0.75
17	Gardeners	1	1.48	11	1.06	[0.01]	0.00	1	0.34	14	1.06	27	0.99	0.65—1.44
18	Fishermen	[0.03]	0.00	[0.03]	0.00	[0.01]	0.00	[0.04]	0.00	[0.04]	0.00	[0.14]	0.00	0.00—26.15
19	Forestry workers	[0.01]	0.00	[0.05]	0.00	[0.00]	0.00	[0.06]	0.00	[0.25]	0.00	[0.36]	0.00	0.00—10.37
20	Miners and quarry workers	[0.00]	0.00	[0.02]	0.00	[0.00]	0.00	[0.00]	0.00	[0.05]	0.00	[0.07]	0.00	0.00—53.66
21	Seamen	–	–	[0.01]	0.00	[0.00]	0.00	[0.01]	0.00	[0.00]	0.00	[0.02]	0.00	0.00—183.02
22	Transport workers	[0.01]	0.00	[0.29]	0.00	[0.00]	0.00	[0.04]	0.00	[0.69]	0.00	[1.04]	0.00	0.00—3.54
23	Drivers	[0.18]	0.00	[0.16]	0.00	[0.00]	0.00	1	6.58	[1.35]	0.00	1	0.54	0.01—3.00
24	Postal workers	1	2.59	2	1.06	2	**26.22**	3	1.80	9	0.73	17	1.04	0.60—1.66
25	Textile workers	2	0.81	6	1.44	[0.12]	0.00	2	0.79	35	1.07	45	1.07	0.78—1.43
26	Shoe and leather workers	1	5.46	[0.51]	0.00	[0.01]	0.00	1	5.41	2	0.81	4	1.19	0.32—3.05
27	Smelting workers	[0.04]	0.00	[0.12]	0.00	[0.00]	0.00	[0.02]	0.00	1	2.41	1	1.67	0.04—9.28
28	Mechanics	1	2.25	[0.57]	0.00	[0.00]	0.00	[0.24]	0.00	1	0.20	2	0.32	0.04—1.17
29	Plumbers	[0.00]	0.00	[0.00]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.01]	0.00	0.00—363.67
30	Welders	–	–	[0.05]	0.00	[0.00]	0.00	[0.02]	0.00	1	8.54	1	5.48	0.14—30.51
31	Electrical workers	[0.62]	0.00	1	2.41	[0.00]	0.00	[0.26]	0.00	2	0.75	3	0.76	0.16—2.22
32	Wood workers	[0.21]	0.00	2	1.96	[0.00]	0.00	[0.09]	0.00	[0.73]	0.00	2	0.98	0.12—3.53
33	Painters	[0.01]	0.00	[0.13]	0.00	[0.00]	0.00	[0.02]	0.00	[0.23]	0.00	[0.38]	0.00	0.00—9.66
34	"Other construction workers"	[0.01]	0.00	1	2.54	[0.00]	0.00	[0.01]	0.00	[0.02]	0.00	1	2.36	0.06—13.13
35	Bricklayers	[0.00]	0.00	[0.01]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.02]	0.00	0.00—230.45
36	Printers	[0.23]	0.00	[0.56]	0.00	[0.02]	0.00	1	4.54	1	0.42	2	0.58	0.07—2.11
37	Chemical process workers	[0.36]	0.00	[0.27]	0.00	[0.00]	0.00	[0.20]	0.00	4	2.04	4	1.43	0.39—3.66
38	Food workers	2	1.11	1	0.72	[0.36]	0.00	[1.27]	0.00	3	0.45	6	0.52	0.19—1.14
39	Beverage workers	1	6.04	[0.08]	0.00	[0.00]	0.00	[0.01]	0.00	1	2.18	2	2.80	0.34—10.13
40	Tobacco workers	[0.23]	0.00	[0.04]	0.00	–	–	[0.04]	0.00	[0.21]	0.00	[0.53]	0.00	0.00—7.02
41	Glass makers etc	1	2.28	[1.00]	0.00	[0.01]	0.00	1	2.33	7	1.40	9	1.31	0.60—2.48
42	Packers	[0.13]	0.00	5	2.86	[0.03]	0.00	[1.04]	0.00	4	0.51	9	0.83	0.38—1.57
43	Engine operators	[0.00]	0.00	[0.29]	0.00	[0.00]	0.00	[0.02]	0.00	1	3.89	1	1.77	0.04—9.86
44	Public safety workers	[0.01]	0.00	[0.08]	0.00	[0.01]	0.00	[0.13]	0.00	1	2.46	1	1.57	0.04—8.76
45	Cooks and stewards	[0.00]	0.00	[2.08]	0.00	[0.10]	0.00	1	0.72	11	0.79	12	0.68	0.35—1.19
46	Domestic assistants	1	0.36	2	0.84	[0.02]	0.00	3	0.83	35	1.13	41	1.03	0.74—1.40
47	Waiters	[0.47]	0.00	3	1.70	[0.02]	0.00	[1.57]	0.00	9	0.70	12	0.72	0.37—1.26
48	Building caretakers	6	0.75	4	0.59	[0.19]	0.00	8	1.19	34	1.05	52	0.96	0.72—1.26
49	Chimney sweeps	[0.00]	0.00	[0.00]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.01]	0.00	0.00—673.62
50	Hairdressers	[0.49]	0.00	1	1.44	[0.03]	0.00	[0.42]	0.00	5	1.18	6	1.02	0.37—2.22
51	Launderers	2	2.22	1	1.96	[0.03]	0.00	[0.56]	0.00	5	0.66	8	0.84	0.36—1.65
52	Military personnel	[0.00]	0.00	[0.01]	0.00	–	–	[0.00]	0.00	[0.00]	0.00	[0.02]	0.00	0.00—191.22
53	"Other workers"	4	1.76	[2.22]	0.00	[0.27]	0.00	3	0.85	11	0.80	18	0.82	0.48—1.29
54	Economically inactive	58	0.99	31	0.70	1	1.15	43	1.05	789	1.04	922	1.02	0.96—1.09
1–54	All categories	116	1.00	127	1.00	4	1.00	102	1.00	1 169	1.00	1 518	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 78. Observed number of other/unknown site among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	166	0.79	203	0.74	3	0.92	215	0.64	1 770	0.97	2 357	0.89	0.86—0.93
2	Laboratory assistants	4	0.96	8	1.21	1	1.62	11	0.64	8	0.90	32	0.85	0.58—1.20
3	Physicians	14	0.81	5	0.31	[1.35]	0.00	39	0.78	56	0.68	114	0.68	0.57—0.82
4	Dentists	[4.98]	0.00	1	0.29	[0.31]	0.00	15	0.67	40	0.98	56	0.78	0.59—1.01
5	Nurses	[0.23]	0.00	1	1.31	[0.01]	0.00	[1.40]	0.00	5	1.18	6	0.90	0.33—1.96
6	Assistant nurses	5	1.00	[0.62]	0.00	[0.15]	0.00	12	1.34	35	1.25	52	1.22	0.91—1.60
7	"Other health workers"	14	0.93	12	0.76	1	2.66	10	0.52	79	1.15	116	0.97	0.81—1.17
8	Teachers	75	0.82	87	0.74	6	1.24	171	0.66	387	0.82	726	0.77	0.72—0.83
9	Religious workers etc	26	0.67	44	0.71	2	0.62	109	0.77	318	0.89	499	0.83	0.76—0.91
10	Artistic workers	8	0.67	16	0.71	[0.88]	0.00	34	0.83	99	0.90	157	0.84	0.72—0.99
11	Journalists	7	1.25	8	0.73	[0.49]	0.00	12	0.68	75	1.48	102	1.20	0.98—1.45
12	Administrators	243	1.03	156	0.85	7	0.84	435	0.85	673	0.97	1 514	0.93	0.88—0.97
13	Clerical workers	96	0.94	98	0.80	8	0.84	320	0.86	707	0.95	1 229	0.91	0.86—0.96
14	Sales agents	59	1.09	162	0.96	5	1.04	426	0.94	1 197	1.11	1 849	1.05	1.00—1.10
15	Shop workers	224	0.95	68	0.98	2	0.60	156	0.98	374	1.07	824	1.01	0.94—1.08
16	Farmers	316	0.69	882	0.96	9	0.64	1 168	0.81	1 414	0.77	3 789	0.81	0.79—0.84
17	Gardeners	56	0.86	111	0.91	[0.43]	0.00	275	0.83	611	0.90	1 053	0.88	0.83—0.93
18	Fishermen	27	1.25	8	0.68	6	0.78	502	1.19	79	1.09	622	1.16	1.07—1.25
19	Forestry workers	9	0.94	165	1.19	[0.07]	0.00	231	0.90	401	0.81	806	0.90	0.84—0.96
20	Miners and quarry workers	7	2.42	25	1.14	[0.13]	0.00	75	1.16	116	0.96	223	1.06	0.93—1.21
21	Seamen	22	0.95	36	1.21	3	1.37	389	1.28	137	1.28	587	1.26	1.16—1.36
22	Transport workers	64	1.24	79	0.88	5	1.12	157	0.94	364	0.98	669	0.97	0.90—1.05
23	Drivers	177	1.07	282	1.03	11	1.76	526	1.19	992	1.11	1 988	1.12	1.07—1.17
24	Postal workers	32	0.98	40	0.93	3	3.54	92	1.01	186	0.95	353	0.97	0.87—1.08
25	Textile workers	35	1.20	34	1.14	3	2.06	91	0.87	225	1.03	388	1.01	0.92—1.12
26	Shoe and leather workers	8	1.11	12	0.92	[0.32]	0.00	57	1.24	77	0.90	154	1.01	0.87—1.19
27	Smelting workers	68	1.04	54	1.22	3	1.52	179	1.33	365	1.06	669	1.13	1.05—1.22
28	Mechanics	188	1.07	279	1.03	8	1.33	717	1.18	1 729	1.06	2 921	1.09	1.05—1.13
29	Plumbers	14	0.89	53	1.19	2	2.01	80	1.18	207	1.11	356	1.13	1.01—1.25
30	Welders	–	–	51	1.26	1	2.85	94	1.31	230	1.07	376	1.15	1.04—1.27
31	Electrical workers	46	1.11	113	1.01	5	1.39	261	0.98	555	0.99	980	0.99	0.93—1.06
32	Wood workers	137	1.13	259	0.84	4	1.12	716	0.92	947	0.88	2 063	0.90	0.86—0.94
33	Painters	52	1.30	78	1.24	1	0.68	161	1.24	326	1.04	618	1.13	1.05—1.22
34	"Other construction workers"	164	1.07	238	1.22	5	0.71	167	1.15	618	1.07	1 192	1.10	1.04—1.17
35	Bricklayers	51	1.16	35	1.09	–	–	90	1.17	163	1.16	339	1.16	1.04—1.29
36	Printers	32	1.15	27	1.00	[1.16]	0.00	62	0.85	176	1.04	297	0.99	0.89—1.11
37	Chemical process workers	33	1.27	42	0.91	[0.65]	0.00	212	1.20	316	1.23	603	1.19	1.10—1.29
38	Food workers	101	1.20	31	0.91	8	1.42	239	1.22	269	1.02	648	1.11	1.03—1.20
39	Beverage workers	12	1.18	2	0.85	[0.10]	0.00	[1.35]	0.00	16	1.10	30	1.05	0.71—1.50
40	Tobacco workers	2	1.21	1	2.45	[0.01]	0.00	6	1.93	2	1.68	11	1.73	0.86—3.09
41	Glass makers etc	51	1.03	51	1.05	1	1.04	111	1.25	338	1.18	552	1.16	1.07—1.26
42	Packers	57	1.30	130	1.26	2	0.62	374	1.26	525	1.02	1 088	1.13	1.07—1.20
43	Engine operators	40	0.89	115	0.86	2	0.48	170	1.15	474	1.09	801	1.05	0.98—1.12
44	Public safety workers	47	1.12	67	0.85	4	1.31	118	0.95	267	1.04	503	1.00	0.91—1.09
45	Cooks and stewards	4	1.25	6	1.30	[1.39]	0.00	65	1.30	61	1.35	136	1.30	1.10—1.54
46	Domestic assistants	[0.04]	0.00	[0.42]	0.00	[0.00]	0.00	[0.37]	0.00	3	0.80	3	0.66	0.14—1.92
47	Waiters	12	1.78	5	1.15	[0.15]	0.00	26	1.16	42	1.79	85	1.49	1.19—1.84
48	Building caretakers	51	1.15	76	1.10	3	2.10	69	1.08	198	1.00	397	1.05	0.95—1.16
49	Chimney sweeps	[1.14]	0.00	5	1.02	–	–	5	0.79	19	1.31	29	1.08	0.72—1.55
50	Hairdressers	9	0.71	[1.34]	0.00	[0.20]	0.00	23	1.23	76	1.47	108	1.28	1.06—1.54
51	Launderers	8	1.30	1	0.70	[0.13]	0.00	11	0.97	36	0.97	56	1.00	0.76—1.30
52	Military personnel	26	1.20	17	0.72	–	–	87	0.96	155	1.01	285	0.98	0.88—1.10
53	"Other workers"	161	1.20	99	1.22	8	0.64	641	1.09	672	1.08	1 581	1.10	1.05—1.15
54	Economically inactive	177	1.45	629	1.36	16	1.83	412	1.33	1 107	1.20	2 341	1.28	1.23—1.33
1–54	All categories	3 237	1.00	5 007	1.00	148	1.00	10 624	1.00	20 317	1.00	39 333	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 79. Observed number of other/unknown site among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	9	0.74	25	0.89	[0.52]	0.00	8	0.77	93	0.93	135	0.89	0.75—1.05
2	Laboratory assistants	7	0.83	15	0.92	[0.79]	0.00	13	0.88	21	0.86	56	0.86	0.65—1.12
3	Physicians	3	0.75	3	0.46	[0.14]	0.00	2	0.31	18	0.81	26	0.66	0.43—0.97
4	Dentists	2	0.56	10	1.07	[0.05]	0.00	4	0.67	14	0.77	30	0.81	0.54—1.15
5	Nurses	51	0.71	63	0.76	3	0.80	87	0.77	263	0.85	467	0.81	0.74—0.88
6	Assistant nurses	52	1.02	76	0.82	2	0.39	90	0.81	492	0.94	712	0.91	0.84—0.98
7	"Other health workers"	42	1.03	73	1.03	3	2.75	106	0.87	162	0.92	386	0.94	0.85—1.04
8	Teachers	66	0.75	122	0.74	6	0.89	198	0.86	518	0.75	910	0.77	0.72—0.82
9	Religious workers etc	16	1.33	59	0.89	1	0.97	60	1.07	181	0.83	317	0.90	0.81—1.00
10	Artistic workers	4	0.62	10	0.80	[0.83]	0.00	14	0.75	30	0.69	58	0.71	0.54—0.92
11	Journalists	4	3.01	6	0.71	[0.20]	0.00	3	0.68	13	0.65	26	0.76	0.50—1.11
12	Administrators	40	1.05	17	0.62	2	3.03	62	0.97	82	0.83	203	0.89	0.77—1.02
13	Clerical workers	321	0.89	478	0.93	21	1.05	624	0.83	1 613	0.94	3 057	0.91	0.88—0.94
14	Sales agents	4	1.20	93	1.08	4	1.78	119	0.88	234	0.94	454	0.95	0.87—1.04
15	Shop workers	242	0.96	270	0.89	11	0.84	645	0.94	1 091	0.98	2 259	0.96	0.92—1.00
16	Farmers	145	0.83	258	1.12	16	1.58	515	0.95	83	0.84	1 017	0.96	0.90—1.02
17	Gardeners	21	0.92	591	0.95	[0.34]	0.00	313	0.99	285	0.98	1 210	0.97	0.91—1.02
18	Fishermen	2	2.24	1	0.78	[0.34]	0.00	4	1.22	[0.94]	0.00	7	1.04	0.42—2.15
19	Forestry workers	[0.23]	0.00	1	0.40	[0.04]	0.00	6	1.16	4	0.65	11	0.78	0.39—1.40
20	Miners and quarry workers	[0.02]	0.00	2	1.81	[0.02]	0.00	[0.21]	0.00	[1.43]	0.00	2	0.72	0.09—2.60
21	Seamen	–	–	[0.22]	0.00	[0.00]	0.00	1	1.32	[0.15]	0.00	1	0.89	0.02—4.94
22	Transport workers	[0.26]	0.00	13	0.81	[0.39]	0.00	4	1.26	15	0.89	32	0.87	0.60—1.23
23	Drivers	4	0.64	4	0.62	[0.16]	0.00	14	1.09	45	1.12	67	1.02	0.79—1.29
24	Postal workers	17	1.27	99	1.06	2	0.46	132	0.84	339	1.09	589	1.02	0.94—1.10
25	Textile workers	102	1.22	204	0.93	8	0.92	272	0.93	650	0.99	1 236	0.98	0.92—1.03
26	Shoe and leather workers	3	0.49	31	1.17	[0.49]	0.00	18	0.88	56	1.12	108	1.04	0.86—1.26
27	Smelting workers	1	0.67	7	1.12	[0.02]	0.00	2	1.30	10	0.79	20	0.91	0.56—1.41
28	Mechanics	12	0.83	23	0.87	[0.07]	0.00	25	1.15	156	1.22	216	1.13	0.99—1.29
29	Plumbers	[0.16]	0.00	[0.05]	0.00	–	–	[0.12]	0.00	1	6.14	1	2.02	0.05—11.28
30	Welders	–	–	1	0.54	[0.01]	0.00	3	2.66	4	0.88	8	1.07	0.46—2.10
31	Electrical workers	24	1.18	17	1.14	[0.07]	0.00	28	1.26	82	1.15	151	1.17	1.00—1.37
32	Wood workers	8	1.18	58	1.04	[0.13]	0.00	6	0.86	19	0.90	91	1.00	0.81—1.23
33	Painters	2	7.39	5	0.80	[0.04]	0.00	[1.66]	0.00	7	1.22	14	1.00	0.55—1.68
34	"Other construction workers"	[0.21]	0.00	35	1.46	1	49.46	1	1.48	[0.66]	0.00	37	1.45	1.02—2.00
35	Bricklayers	[0.04]	0.00	[0.80]	0.00	–	–	[0.03]	0.00	[0.02]	0.00	[0.89]	0.00	0.00—4.15
36	Printers	6	0.77	22	0.84	[0.68]	0.00	28	1.25	60	1.09	116	1.04	0.86—1.24
37	Chemical process workers	17	1.38	10	0.72	1	3.23	21	1.05	64	1.45	113	1.24	1.04—1.50
38	Food workers	55	0.92	72	0.96	23	1.35	148	1.08	168	1.25	466	1.10	1.00—1.20
39	Beverage workers	12	2.09	2	0.46	[0.04]	0.00	3	3.01	8	0.93	25	1.27	0.82—1.88
40	Tobacco workers	15	1.91	3	1.21	–	–	6	1.18	5	0.95	29	1.40	0.94—2.01
41	Glass makers etc	20	1.38	49	0.96	1	2.09	41	0.98	113	0.96	224	0.99	0.87—1.13
42	Packers	2	0.48	88	0.97	3	1.75	107	1.05	177	1.00	377	1.00	0.91—1.11
43	Engine operators	1	8.88	19	1.36	[0.03]	0.00	3	3.03	11	1.08	34	1.34	0.93—1.87
44	Public safety workers	[0.50]	0.00	6	1.81	[0.36]	0.00	8	0.59	10	0.78	24	0.79	0.50—1.17
45	Cooks and stewards	[0.17]	0.00	82	0.79	6	0.90	154	0.92	299	1.14	541	1.00	0.92—1.09
46	Domestic assistants	96	1.02	95	0.91	2	1.01	413	1.00	734	1.11	1 340	1.05	1.00—1.11
47	Waiters	23	1.44	97	1.20	[0.68]	0.00	186	1.18	293	1.08	599	1.14	1.05—1.23
48	Building caretakers	324	1.18	361	1.00	11	0.83	663	1.01	735	1.07	2 094	1.05	1.01—1.10
49	Chimney sweeps	[0.03]	0.00	[0.16]	0.00	–	–	[0.09]	0.00	[0.01]	0.00	[0.29]	0.00	0.00—12.73
50	Hairdressers	14	0.87	32	1.04	[0.68]	0.00	40	1.03	94	0.85	180	0.91	0.79—1.05
51	Launderers	28	0.90	32	1.07	[2.17]	0.00	50	0.78	146	1.02	256	0.95	0.84—1.07
52	Military personnel	2	12.53	1	4.94	–	–	[0.13]	0.00	[0.35]	0.00	3	3.56	0.73—10.40
53	"Other workers"	83	1.07	101	0.94	18	1.40	324	0.97	288	0.94	814	0.97	0.91—1.04
54	Economically inactive	2 149	1.01	2 875	1.08	43	0.91	5 810	1.06	14 918	1.02	25 795	1.03	1.02—1.05
1–54	All categories	4 051	1.00	6 617	1.00	188	1.00	11 384	1.00	24 704	1.00	46 944	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

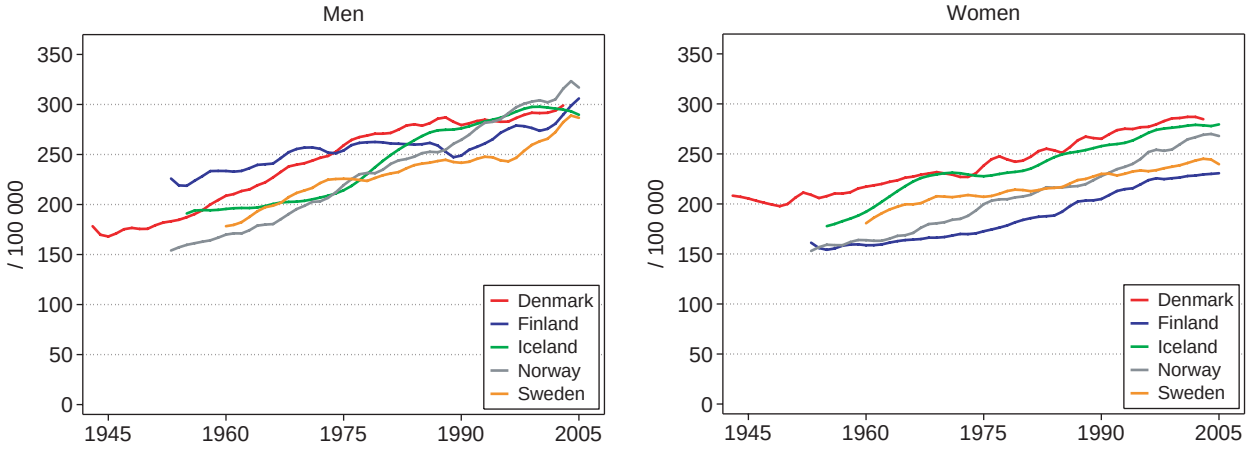


Figure 49. Age standardised (World) incidence rates for all malignant neoplasms 1943–2005, by country and gender. Modified from NORDCAN [49].

In women, tobacco manufacture workers had the highest SIR (1.27, 1.19–1.35); all other significant SIRs were below 1.15 (Table 81). The rates were lowest among female seafarers (0.58, 0.37–0.87) and bricklayers. From the more common occupations among the women, farming and gardening were associated with the lowest rates.

Comment. The group of all cancer combined includes numerous cancer diseases with different aetiologies. The relative large variation in occupation-specific incidence rates indicates that risk-increasing factors may cumulate in some occupational categories. Among occupations with the highest SIRs in men were occupations such as waiters, beverage workers and tobacco workers that have also been seen at the top of the list of SIRs for alcohol and tobacco related cancers. On the other hand, there were also many occupations with known or strongly suspected direct occupational exposures such as chimney sweeps, plumbers, hairdressers and printers. At the bottom of the list there are occupations related to farming and forestry which have a low exposure to industrial agents.

In women, the top of the list is more mixed. There were industrial occupations with relatively high SIRs, e.g., tobacco workers, printers and plumbers, but many occupations in administration and technical work also showed high SIRs. The collection of occupations with a low overall cancer risk is also quite a mixture, with a likely under representation of occupations with a high degree of education. All of the lowest-risk occupations among the women are "male occupations" with quite heavy physical demands.

Discussion

Validity of census occupation

Correct classification of exposure categories is crucial in any study on work-related cancer. In the present study, the information on occupations was based on national censuses from 1960–1990. The current population register systems allow tabulation of the entire population by sex, age, and several other demographic variables and have therefore diminished the incentive to undertake traditional censuses. Unfortunately, the detailed information on occupation and industry for each citizen may be difficult to obtain from registers with similar precision as they were collected from census questionnaires. We have therefore restricted the present study to the census populations for whom high quality data on occupation are available.

Denmark became the first country in the world to abolish traditional censuses. In the first register-based census in Denmark from 1981 the information on occupation came primarily from tax-forms, and 5% of the work force ended up being registered only as wage-earners without further information [2]. The Danish part of the present study is therefore based solely on the 1970 census. Finland was the second country to skip traditional censuses, but according to internal quality controls by Statistics Finland a sufficiently high quality of the occupational information was ensured when the transition took place in 1990. The present study therefore includes data from the 1970, the 1980, and the 1990 censuses in Finland. Iceland has a long census tradition, but the only census available with computerised data is from 1981. Sweden kept the traditional censuses throughout the 20th century, and the present study includes data from the 1960, 1970,

Table 80. Observed number of all malignant neoplasms among men in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	14 472	0.98	13 197	0.95	156	0.93	9 201	0.90	57 315	1.03	94 341	0.99	0.99—1.00
2	Laboratory assistants	293	0.99	313	0.93	37	1.16	498	1.00	254	0.95	1 395	0.98	0.93—1.03
3	Physicians	1 094	0.89	733	0.92	70	1.03	1 278	0.93	2 484	0.98	5 659	0.94	0.92—0.97
4	Dentists	341	0.96	132	0.78	6	0.36	612	1.00	1 264	1.00	2 355	0.97	0.94—1.01
5	Nurses	9	0.55	36	0.92	1	2.55	43	0.79	119	0.94	208	0.87	0.76—1.00
6	Assistant nurses	320	0.91	38	1.12	4	0.50	240	1.02	884	1.02	1 486	0.99	0.94—1.04
7	"Other health workers"	1 026	0.96	730	0.93	13	0.70	527	1.01	2 131	1.00	4 427	0.98	0.95—1.01
8	Teachers	5 393	0.83	4 914	0.84	250	1.01	6 453	0.86	13 521	0.94	30 531	0.88	0.87—0.89
9	Religious workers etc	2 519	0.91	2 994	0.96	188	1.15	3 572	0.92	11 046	1.01	20 319	0.97	0.96—0.99
10	Artistic workers	858	1.00	1 119	0.99	60	1.34	1 191	1.05	3 636	1.08	6 864	1.05	1.02—1.07
11	Journalists	416	1.03	525	0.96	28	1.10	474	0.96	1 740	1.11	3 183	1.05	1.01—1.09
12	Administrators	17 050	1.01	9 072	1.01	436	1.03	14 314	1.04	23 185	1.07	64 057	1.04	1.03—1.05
13	Clerical workers	7 123	0.97	5 910	0.99	536	1.12	10 114	0.99	24 553	1.06	48 236	1.02	1.01—1.03
14	Sales agents	4 141	1.07	8 354	0.99	259	1.07	12 899	1.08	36 697	1.10	62 350	1.08	1.07—1.08
15	Shop workers	17 514	1.03	3 364	0.96	168	0.99	4 610	1.01	11 203	1.04	36 859	1.02	1.01—1.03
16	Farmers	23 400	0.71	38 820	0.90	508	0.72	28 709	0.83	49 126	0.84	140 563	0.83	0.82—0.83
17	Gardeners	3 872	0.83	5 174	0.87	18	0.81	6 787	0.81	18 408	0.86	34 259	0.85	0.84—0.85
18	Fishermen	1 736	1.12	524	0.94	429	1.07	10 869	1.02	2 210	0.97	15 768	1.02	1.00—1.04
19	Forestry workers	564	0.82	6 639	0.96	[3.69]	0.00	5 023	0.80	12 567	0.81	24 793	0.84	0.83—0.85
20	Miners and quarry workers	205	0.97	1 398	1.28	6	0.91	1 774	1.04	3 855	1.01	7 238	1.06	1.04—1.08
21	Seamen	2 143	1.30	1 742	1.19	138	1.24	10 124	1.20	4 119	1.23	18 266	1.22	1.20—1.23
22	Transport workers	3 713	1.01	4 250	0.97	228	1.01	4 654	1.03	11 584	1.01	24 429	1.01	1.00—1.02
23	Drivers	13 551	1.14	14 290	1.04	329	1.02	13 842	1.13	29 686	1.07	71 698	1.09	1.08—1.10
24	Postal workers	2 237	0.98	2 021	0.96	49	1.16	2 426	1.02	6 302	1.03	13 035	1.01	0.99—1.03
25	Textile workers	2 184	1.03	1 469	1.02	59	0.81	2 651	1.00	6 749	0.98	13 112	1.00	0.98—1.01
26	Shoe and leather workers	528	1.00	592	0.94	15	0.95	1 184	1.05	2 900	1.07	5 219	1.04	1.01—1.07
27	Smelting workers	5 382	1.15	2 240	1.04	89	0.88	3 991	1.13	10 713	0.99	22 415	1.05	1.04—1.07
28	Mechanics	13 654	1.08	13 773	1.02	286	0.92	18 230	1.07	51 641	1.03	97 584	1.04	1.03—1.05
29	Plumbers	1 382	1.23	2 488	1.11	50	0.98	2 208	1.14	6 372	1.10	12 500	1.12	1.10—1.14
30	Welders	–	–	2 256	1.09	18	0.96	2 323	1.06	6 903	1.05	11 500	1.06	1.04—1.08
31	Electrical workers	3 264	1.11	5 601	0.99	188	1.01	7 763	1.03	17 406	1.01	34 222	1.02	1.01—1.03
32	Wood workers	8 632	0.99	15 088	1.01	170	0.94	19 253	0.96	31 210	0.92	74 353	0.95	0.95—0.96
33	Painters	3 192	1.12	3 279	1.06	69	0.94	3 567	1.07	10 020	1.02	20 127	1.05	1.04—1.06
34	"Other construction workers"	11 543	1.04	10 939	1.14	360	1.00	4 235	1.08	18 733	1.03	45 810	1.06	1.05—1.07
35	Bricklayers	3 503	1.10	1 680	1.08	–	–	2 120	1.07	4 519	1.02	11 822	1.06	1.04—1.08
36	Printers	2 236	1.12	1 383	1.02	53	0.90	2 172	1.09	5 725	1.09	11 569	1.08	1.06—1.10
37	Chemical process workers	2 035	1.08	2 306	1.00	32	0.97	4 608	1.03	8 087	0.99	17 068	1.01	1.00—1.03
38	Food workers	6 389	1.05	1 697	1.01	288	1.01	5 450	1.08	8 611	1.04	22 435	1.05	1.04—1.06
39	Beverage workers	1 049	1.41	104	0.91	4	0.85	54	1.04	538	1.16	1 749	1.27	1.21—1.33
40	Tobacco workers	154	1.25	26	1.30	[0.35]	0.00	96	1.24	40	1.09	316	1.23	1.10—1.37
41	Glass makers etc	3 664	1.02	2 454	1.01	62	1.24	2 684	1.10	8 908	0.99	17 772	1.02	1.00—1.03
42	Packers	3 491	1.09	5 670	1.11	179	1.09	8 722	1.15	17 283	1.07	35 345	1.10	1.08—1.11
43	Engine operators	3 343	1.04	7 058	1.05	218	1.01	4 703	1.11	14 018	1.03	29 340	1.05	1.04—1.06
44	Public safety workers	3 176	1.06	4 015	1.02	158	1.02	3 555	1.09	8 532	1.08	19 436	1.07	1.05—1.08
45	Cooks and stewards	331	1.42	252	1.10	78	1.08	1 655	1.17	1 675	1.20	3 991	1.19	1.16—1.23
46	Domestic assistants	4	1.57	4	0.24	[0.23]	0.00	14	1.20	93	0.81	115	0.79	0.66—0.95
47	Waiters	913	1.84	251	1.15	8	1.05	832	1.36	1 046	1.45	3 050	1.48	1.43—1.54
48	Building caretakers	3 643	1.13	3 376	1.00	87	1.25	1 922	1.15	6 622	1.05	15 650	1.07	1.05—1.09
49	Chimney sweeps	114	1.40	261	1.06	–	–	203	1.20	557	1.23	1 135	1.20	1.13—1.27
50	Hairdressers	950	1.04	54	0.78	10	0.97	539	1.11	1 823	1.13	3 376	1.09	1.06—1.13
51	Launderers	454	1.01	75	1.08	10	1.50	339	1.17	1 188	1.03	2 066	1.05	1.01—1.10
52	Military personnel	1 557	1.03	1 175	0.96	–	–	2 807	1.04	4 996	1.07	10 535	1.04	1.02—1.06
53	"Other workers"	11 351	1.16	4 090	1.03	668	1.06	14 839	1.02	19 863	1.01	50 811	1.05	1.04—1.05
54	Economically inactive	11 625	1.17	25 506	1.14	456	1.04	6 968	0.94	29 385	0.99	73 940	1.06	1.05—1.07
1–54	All categories	233 733	1.00	245 451	1.00	7 532	1.00	279 921	1.00	634 045	1.00	1 400 682	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

Table 81. Observed number of all malignant neoplasms among women in the Nordic countries and standardised incidence ratios 1961–2005, by country and occupational category.

		Denmark		Finland		Iceland		Norway		Sweden		Total		
No	Occupational category	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	Obs	SIR	95% CI
1	Technical workers, etc	796	1.09	1 651	1.11	17	0.72	441	1.14	3 039	1.05	5 944	1.08	1.05—1.10
2	Laboratory assistants	551	1.02	894	1.10	40	1.17	479	1.03	954	1.02	2 918	1.05	1.01—1.08
3	Physicians	266	1.10	438	1.19	6	1.06	186	0.97	704	1.01	1 600	1.06	1.01—1.12
4	Dentists	225	1.05	440	1.22	2	0.87	163	1.03	519	1.04	1 349	1.09	1.03—1.15
5	Nurses	4 157	0.97	4 543	1.10	154	0.99	3 491	0.96	8 553	1.00	20 898	1.01	0.99—1.02
6	Assistant nurses	3 127	1.00	3 810	0.94	191	0.88	3 412	0.95	15 098	0.98	25 638	0.97	0.96—0.98
7	"Other health workers"	2 449	1.00	3 476	1.07	37	0.80	3 521	0.99	5 354	1.02	14 837	1.02	1.00—1.04
8	Teachers	5 435	1.00	8 093	1.11	267	0.95	6 808	0.99	19 518	1.00	40 121	1.02	1.01—1.03
9	Religious workers etc	700	0.96	4 233	1.09	51	1.22	1 763	1.03	6 925	1.02	13 672	1.04	1.02—1.06
10	Artistic workers	378	1.02	666	1.09	31	0.92	523	1.02	1 383	1.10	2 981	1.07	1.03—1.11
11	Journalists	95	1.17	434	1.12	8	0.90	158	1.14	657	1.11	1 352	1.12	1.06—1.18
12	Administrators	2 481	1.12	1 507	1.14	32	1.25	1 816	1.08	3 057	1.07	8 893	1.10	1.08—1.12
13	Clerical workers	23 863	1.08	26 565	1.10	900	1.06	23 079	1.07	51 572	1.09	125 979	1.09	1.08—1.09
14	Sales agents	206	1.04	3 552	1.04	96	1.10	3 110	1.07	6 850	1.06	13 814	1.06	1.04—1.07
15	Shop workers	14 979	1.02	12 250	0.99	524	0.99	17 582	1.00	28 353	1.03	73 688	1.02	1.01—1.02
16	Farmers	7 757	0.75	6 526	0.90	303	0.81	10 020	0.87	2 321	0.89	26 927	0.84	0.83—0.85
17	Gardeners	1 132	0.85	18 024	0.86	18	1.41	5 812	0.84	6 386	0.90	31 372	0.86	0.85—0.87
18	Fishermen	41	0.77	42	0.88	17	1.21	80	0.89	26	1.09	206	0.90	0.78—1.03
19	Forestry workers	16	1.14	50	0.53	1	0.54	118	0.91	144	0.90	329	0.82	0.74—0.92
20	Miners and quarry workers	[0.89]	0.00	31	0.81	[0.34]	0.00	7	0.97	19	0.48	57	0.66	0.50—0.86
21	Seamen	–	–	9	0.71	[0.06]	0.00	9	0.42	5	0.90	23	0.58	0.37—0.87
22	Transport workers	15	1.02	677	1.17	17	1.23	121	1.20	502	1.08	1 332	1.14	1.08—1.20
23	Drivers	374	1.00	262	0.89	6	0.89	325	0.91	1 214	1.03	2 181	0.98	0.94—1.03
24	Postal workers	792	1.02	3 712	1.01	161	0.93	4 188	1.01	8 455	1.06	17 308	1.03	1.02—1.05
25	Textile workers	5 233	1.06	8 236	1.01	284	0.93	6 727	1.05	15 701	1.02	36 181	1.03	1.01—1.04
26	Shoe and leather workers	379	1.03	972	0.96	21	1.28	450	0.97	1 296	1.09	3 118	1.02	0.99—1.06
27	Smelting workers	95	1.06	218	0.92	2	2.58	54	0.99	352	1.00	721	0.98	0.91—1.06
28	Mechanics	1 034	1.15	1 027	0.94	4	1.26	593	1.03	3 675	1.05	6 333	1.04	1.02—1.07
29	Plumbers	6	0.75	1	0.38	–	–	6	1.43	10	1.67	23	1.11	0.70—1.66
30	Welders	–	–	78	0.87	[0.30]	0.00	53	1.19	153	1.06	284	1.02	0.91—1.15
31	Electrical workers	1 483	1.18	765	1.02	4	1.46	707	1.13	2 006	1.02	4 965	1.08	1.05—1.11
32	Wood workers	450	1.09	1 803	0.88	3	0.56	205	0.99	543	0.91	3 004	0.92	0.89—0.95
33	Painters	13	0.83	263	1.07	[1.51]	0.00	66	1.42	141	0.90	483	1.03	0.94—1.13
34	"Other construction workers"	12	0.98	897	1.12	1	1.08	15	0.82	17	0.77	942	1.11	1.04—1.18
35	Bricklayers	2	0.81	17	0.60	–	–	1	1.00	1	1.36	21	0.65	0.40—0.99
36	Printers	542	1.16	1 148	1.08	26	0.96	666	1.19	1 658	1.15	4 040	1.13	1.10—1.17
37	Chemical process workers	842	1.15	508	0.96	11	0.95	534	1.08	1 171	1.04	3 066	1.06	1.02—1.10
38	Food workers	3 629	1.01	2 560	0.93	653	1.00	3 029	0.97	3 346	1.02	13 217	0.99	0.97—1.00
39	Beverage workers	430	1.28	120	0.79	2	1.28	34	1.23	199	0.97	785	1.09	1.01—1.16
40	Tobacco workers	624	1.33	95	1.10	–	–	139	1.26	150	1.13	1 008	1.27	1.19—1.35
41	Glass makers etc	962	1.09	1 883	0.96	20	1.13	1 172	1.10	3 125	1.04	7 162	1.03	1.01—1.06
42	Packers	281	1.11	3 592	1.04	71	1.15	2 694	1.07	4 701	1.05	11 339	1.06	1.04—1.08
43	Engine operators	14	1.78	578	1.02	1	1.06	44	1.18	290	0.92	927	1.00	0.94—1.07
44	Public safety workers	24	0.89	175	1.27	11	0.90	324	1.06	464	1.09	998	1.10	1.03—1.17
45	Cooks and stewards	10	1.06	3 944	1.01	246	1.06	3 647	1.05	6 531	1.03	14 378	1.03	1.01—1.04
46	Domestic assistants	5 459	0.98	4 046	0.94	74	1.11	8 745	0.96	17 860	0.99	36 184	0.97	0.96—0.98
47	Waiters	1 321	1.38	3 560	1.06	30	1.10	4 204	1.10	7 020	1.07	16 135	1.09	1.08—1.11
48	Building caretakers	16 237	1.01	12 891	0.97	464	0.97	16 124	0.99	18 027	1.02	63 743	1.00	0.99—1.01
49	Chimney sweeps	[1.43]	0.00	6	0.93	–	–	3	1.36	[0.54]	0.00	9	0.85	0.39—1.60
50	Hairdressers	1 026	1.05	1 367	1.06	17	0.58	1 050	1.03	3 171	1.08	6 631	1.06	1.03—1.09
51	Launderers	1 850	1.03	955	0.93	66	0.90	1 331	0.95	3 424	1.02	7 626	1.00	0.97—1.02
52	Military personnel	16	1.71	20	1.36	–	–	5	1.00	13	0.90	54	1.24	0.93—1.62
53	"Other workers"	5 010	1.10	4 051	0.97	514	1.04	8 244	0.97	8 295	1.04	26 114	1.02	1.00—1.03
54	Economically inactive	117 999	0.99	86 283	1.00	1 767	1.03	109 954	1.01	338 703	0.98	654 706	0.99	0.98—0.99
1–54	All categories	234 818	1.00	243 944	1.00	7 171	1.00	258 032	1.00	613 651	1.00	1 357 616	1.00	Ref.

Obs = observed number of cases; SIR = standardised incidence ratio; 95% CI = 95% confidence interval.

1980 and 1990 censuses. For Norway the censuses of 1960, 1970, and 1980 have been included, as the 1990 census included only a sample of the Norwegian population.

In Norway control surveys based on personal interviews with random samples of the census population were undertaken both in 1970 and in 1980. Compared with the census, the interview data gave similar occupational codes on the two digit level of the NYK-code. Compared with the census, overall 2.1% more men and 13.8% more women in the survey reported to have more than 500 hours of income producing work and should have been classified as economically active. The main deficits in the census data came from agriculture and public and private services [151].The validity was considered to be equally good for the 1960 census [41].

In Sweden, a control study of the 1970 census data showed an underreporting of economic activity in the census data for persons with 20 or less hours of work per week coming especially from women in agriculture [152]. The distributions by the main occupational categories for those recorded economically active were fairly similar in the census and control surveys. The accuracy of the occupational codes used in Finland has also been proven to be high [153].

In Denmark, no coding errors were detected in a sample of 1970 census questionnaires retrieved for a nested case-control study [154]. In general, the validity studies indicate that the classification by occupation in the Nordic censuses has been reasonably accurate, but that economic activity has been somewhat underestimated, especially among the women.

We grouped the economically active population into relatively specific categories that are large enough to get stable numbers of observed cases and that can be defined similarly in different coding systems in the countries. From the point of view of work place exposures, some of the occupational categories are heterogeneous and may therefore hide occupational risks. For example, nickel smelting workers, who are known to have about a 30-fold excess risk of nasal cancer [80], are here grouped together with other occupations in the category of smelters and metal foundry workers, and the SIR for nasal cancer in this broad group was only 1.20 (95% CI 0.93–1.53; Table 30). Still, a major part of the known associations between occupations and specific cancer diseases was seen in the present study.

Occupational mobility

Occupational classification in this study is based on the occupation recorded in the first census the person participated in the age range of 30–64 years. The extent to which the first census occupation reflects the lifetime experience varies considerably across occupational categories. We estimated the occupational stability proportion of individuals who had the same occupational category (of the 53 categories defined for the present study) in the first and second census available to us, i.e., 1960 and 1970 censuses in Norway and Sweden, and 1970 and 1980 censuses in Finland (Table 82). In general, stability was higher among men than women and highest in occupational categories where a long education is required such as physicians, dentists and teachers. Nurses were more likely to keep their occupation than assistant nurses, except in Sweden, where female assistant nurses also had a high rate of staying in the occupation. Hairdressers in all countries and of both genders tended to remain in the occupation. Among men, the category of domestic assistants was the least stable. Among women, the least stable categories were occupations with male dominancy, and occupations requiring little specific education.

There are several reasons for low occupational stability rates:

(1) The number of employed persons in an occupational category may have decreased in the society as a whole. This applies, for instance, to agricultural work (farmers) or industrial plants which were closed down, such as asbestos mines in Finland [155];
(2) Individual career development may have moved workers to leading positions. To avoid the occupational misclassification related to the beginning of the work career, the follow-up in our study started with the occupation held at the age of 30 or older;
(3) The changes in coding practises between subsequent censuses could have influenced classifications. This is believed to have only a minor impact, except for some new occupations. In terms of traditional occupational exposures, it is assumed that the movement has been from the more to the less exposed categories.

An earlier study from Finland analysed occupational mobility between the censuses from 1975, 1980, and 1985 [153]. In both genders, 85% of persons worked

Table 82. Number of persons and proportion who stayed in their occupation between censuses, Finland 1970–1980 census, Norway and Sweden 1960–1970 census, by gender and occupational category. Only occupations N > 10 are included.

		Men						Women					
		Finland		Norway		Sweden		Finland		Norway		Sweden	
No	Occupational category	N	%	N	%	N	%	N	%	N	%	N	%
1	Technical workers, etc.	32 190	64.1	15 823	66.9	97 410	70.2	2 595	65.9	264	65.2	3 479	37.6
2	Laboratory assistants	760	55.3	964	50.9	–	–	1 875	65.1	299	43.8	–	–
3	Physicians	1 930	90.2	2 077	91.5	3 664	95.0	665	97.0	220	92.7	605	96.2
4	Dentists	310	85.5	854	93.3	2 062	93.6	845	94.1	209	91.9	707	94.3
5	Nurses	70	50.0	18	61.1	–	–	9 335	89.8	774	88.4	10 223	75.3
6	Assistant nurses	65	15.4	445	34.2	1 133	53.7	11 460	43.7	223	33.6	14 902	74.6
7	"Other health workers"	1 545	72.8	839	53.9	3 487	71.5	8 125	68.7	2 425	31.8	4 934	77.6
8	Teachers	15 130	86.1	9 602	90.6	20 677	83.0	18 270	89.8	5 013	90.7	18 860	92.5
9	Religious workers etc.	5 695	59.0	6 010	64.3	14 684	66.8	5 060	66.0	1 125	50.8	5 243	64.2
10	Artistic workers	2 570	70.6	1 968	53.9	5 706	66.0	1 120	55.8	385	60.8	1 265	66.1
11	Journalists	1 260	65.1	864	71.1	2 768	69.9	935	42.8	93	68.8	574	65.9
12	Administrators	18 215	68.6	23 412	53.2	38 193	50.9	2 110	49.8	1 187	30.8	2 637	40.2
13	Clerical workers	12 445	42.9	19 922	54.2	42 817	48.8	55 810	78.9	17 651	82.0	60 234	79.4
14	Sales agents	19 185	52.2	22 599	55.5	60 874	57.1	7 135	47.1	2 527	51.4	7 726	44.0
15	Shop workers	8 900	48.4	8 603	49.3	21 826	45.0	34 585	64.1	8 906	68.7	44 687	62.0
16	Farmers	72 600	77.8	57 683	72.8	97 276	70.3	8 075	44.8	1 353	64.3	1 649	50.0
17	Gardeners	13 260	41.4	17 494	21.1	39 581	44.4	48 250	67.6	790	34.9	7 855	55.7
18	Fishermen	845	60.9	21 857	50.1	4 009	63.7	90	72.2	17	5.9	21	66.7
19	Forestry workers	14 820	45.8	12 056	35.2	26 533	48.7	195	10.3	–	–	134	14.2
20	Miners and quarry workers	2 440	40.4	3 490	44.3	7 602	44.0	90	50.0	–	–	30	0.0
21	Seamen	3 085	68.1	16 765	50.0	6 290	57.2	40	0.0	–	–	–	–
22	Transport workers	8 520	76.5	9 537	76.8	25 728	70.7	1 355	42.4	87	33.3	719	41.3
23	Drivers	35 755	73.6	25 905	64.8	54 010	60.2	610	54.1	43	18.6	922	37.0
24	Postal workers	4 675	77.9	4 204	70.1	10 596	70.2	9 760	73.5	3 619	71.5	12 557	68.9
25	Textile workers	2 950	50.3	5 600	55.2	13 194	57.5	18 900	59.4	6 572	59.3	27 369	57.2
26	Shoe and leather workers	1 240	51.6	2 278	45.4	4 826	51.2	2 560	58.2	489	41.7	2 249	39.8
27	Smelting workers	4 265	42.8	7 157	50.8	21 270	51.5	570	17.5	–	–	348	34.5
28	Mechanics	29 755	58.6	33 571	55.8	96 054	61.4	2 345	43.9	500	38.4	4 422	44.3
29	Plumbers	5 455	65.8	3 881	72.2	11 441	66.6	–	–	–	–	–	–
30	Welders	5 120	52.4	4 102	52.3	12 707	52.8	180	36.1	–	–	78	16.7
31	Electrical workers	13 135	70.2	14 279	64.3	31 654	65.2	1 645	46.8	602	46.3	2 615	42.3
32	Wood workers	27 735	65.8	38 736	69.1	56 689	71.4	4 885	53.7	60	23.3	579	44.0
33	Painters	6 980	72.6	6 489	69.6	17 940	80.8	680	26.5	15	20.0	170	29.4
34	"Other construction workers"	17 630	45.4	6 664	22.9	31 696	56.7	1 660	22.0	–	–	–	–
35	Bricklayers	3 060	74.3	4 091	63.9	8 075	75.8	75	0.0	–	–	–	–
36	Printers	3 475	71.5	3 665	76.0	9 560	75.8	2 675	62.1	525	65.3	2 186	54.5
37	Chemical process workers	5 340	53.4	8 993	46.1	14 740	44.4	1 210	44.6	467	28.5	1 819	45.4
38	Food workers	4 185	53.4	10 242	55.4	16 291	59.4	7 080	57.0	1 922	42.1	5 231	43.3
39	Beverage workers	195	48.7	–	–	767	43.2	365	34.2	–	–	298	49.0
40	Tobacco workers	45	22.2	148	44.6	72	50.0	230	54.3	171	43.3	222	41.4
41	Glass makers etc.	5 380	34.3	4 429	44.8	15 663	46.7	4 750	41.5	876	39.5	4 683	40.8
42	Packers	10 500	41.4	15 069	42.6	29 180	44.2	9 010	43.5	1 508	44.3	6 960	32.4
43	Engine operators	16 655	45.9	7 388	38.6	23 880	42.2	1 340	44.0	–	–	199	52.3
44	Public safety workers	7 225	80.3	6 545	75.0	13 277	74.4	175	48.6	68	36.8	246	35.8
45	Cooks and stewards	425	35.3	2 560	48.3	2 111	54.2	8 620	63.1	2 830	45.5	9 994	60.4
46	Home helpers	15	0.0	–	–	46	8.7	5 410	44.8	6 749	30.7	14 210	47.8
47	Waiters	320	28.1	1 254	43.5	1 412	55.5	8 350	44.1	2 507	46.7	12 154	46.7
48	Building caretakers	6 310	65.9	2 385	69.6	8 835	59.5	27 275	65.3	4 242	70.1	20 890	56.3
49	Chimney sweeps	520	63.5	348	78.2	914	79.8	25	0.0	–	–	–	–
50	Hairdressers	115	78.3	1 078	89.2	3 452	88.3	2 745	78.0	1 188	84.5	4 336	78.4
51	Launderers	155	58.1	611	39.4	2 422	52.8	2 440	48.8	1 146	40.2	5 878	40.9
52	Military personnel	2 940	62.6	5 847	72.3	9 200	68.0	–	–	–	–	–	–
53	"Other workers"	7 140	38.6	28 164	6.6	33 457	38.8	9 170	42.6	7 104	9.1	10 311	41.4
1–53	All categories	464 535	62.8	508 573	55.5	1 077 756	60.4	352 770	64.3	86 774	57.9	337 420	62.5

in the same main occupational category in 1975 and 1980. The percentage among men varied from 91% in transport to 82% in administration and manufacture, and among women from 89% in communication to 77% in administration. The comparison between 1980 and 1985 also indicated a very stable labour market in Finland at that time [153]. In Denmark, a comparison of subsequent birth cohorts in one census indicate that at least one fourth of men working in manufacture, construction and transport in 1970 had a background in agriculture [156]. A background in agriculture is expected to affect the cancer pattern of such occupational categories, as the cancer risk of farmers is in general low and as farmers normally had lower tobacco consumption than other occupational categories.

Even for those who remained in the same occupation, job conditions may have changed considerably. Although in some occupations where the physical demands are still high, for instance mining, forestry, fishing, agriculture, construction, cleaning and some health care work, the physical work load has generally diminished with the automatisation of industrial processes. Physical activity during leisure time has to be considered in addition to physical activity at work when it comes to interpreting the occupational differences in, e.g., the incidence of breast and colon cancers.

In Finland, occupation specific SMRs were calculated in two ways: first based on one single census (1980) and then restricted to persons who had stayed in the same occupation in subsequent censuses. The SMR estimates were practically identical [157]. We believe that the present results based on occupation in one census give, in most instances, similar results that we would have gotten from categorisations based on occupational titles kept in several censuses. This phenomenon will be studied in detail in specific NOCCA studies in restricted data sets for which we have data on several censuses available.

Validity of cancer incidence data

Nordic countries are well known of their long tradition of high-quality population-based cancer registration [158]. In Denmark, several independent studies indicate a good coverage of the cancer registration from the very beginning in 1943. Comparison between 1977 data from the newly established hospital discharge register and the cancer register showed that 95% of the cancer cases in the hospital discharge register were also known in the cancer register, with the deficits seen for cancers of the digestive organs, breast, female genital organs and lymphatic and haematopoietic tissue [159]. In 1997, the registration of cancer in Denmark was moved from the Danish Cancer Society to the National Board of Health to be part of other national registration activities and based on electronic data capture. The change caused severe delays both in the cancer registration process and the mortality reporting, and in May 2008 the newest statistics were from 2003. The effects of the system change on the coverage and accuracy are not yet known.

Cancer registration in Norway has been compulsory from 1953, and was from the beginning based on a combination of reporting from clinical and pathology departments [160]. A comparative study was undertaken for two counties in 1976 between the cancer register data and data retrieved from the Economic and Medical Information System. The study showed an overall completeness of the cancer register of 98%, with the deficit coming in particular from leukaemia and multiple myeloma [192]. For all cancers registered since 1953, 86.5% are histologically verified, and 1.3% of the diagnoses are based on death certificates alone [161].

Cancer registration in Finland is, like in Norway, based on a combination of reporting from clinical and pathological departments, and the registration has been compulsory since 1961. A linkage was made between the data from the cancer register and from the national hospital discharge register for 1985–1988. The agreement was good (about 99%) for most diagnostic groups, but showed about a 10% underreporting in the cancer register for benign neoplasms of the central nervous system, mainly among elderly people, chronic lymphatic leukaemia and multiple myeloma [162]. The main problem was slowness of reporting of these diseases; most of them were later reported via the normal registration procedure. The same phenomenon has been reported from other Nordic countries, e.g. Denmark [163] and Iceland [164].

The Icelandic Cancer Registry, which was founded in 1954, receives electronic notifications from the pathology and haematology laboratories on all cancers and other reportable neoplasms in the country that are diagnosed at those laboratories. This information is supplemented by reports from hospital departments, healthcare facilities, private-practicing consultants and information on death certificates. Recent results from record linkage with the Hospital Discharge Registry indicate 99% completeness of the registry [164].

The registration procedure in Sweden has been somewhat different, as death certificates have not been used as a data source. Validation studies have been made by linking the cause of death registry with the cancer registry [165,166]. The studies showed a drop out in completeness of a maximum of 4.5%,

with the deficits seen for prostate cancer, stomach cancer, myeloma and leukaemia.

The small inaccuracies in cancer registration are not likely to affect the SIR estimates of the present study because they are not related to occupation. The accuracy of the diagnostic procedure, instead, may vary over educational and socio-economic strata, and there may even be occupation-specific special features such as annual health controls that directly affect the likelihood of a non-symptomatic cancer diagnosis of the employee. Most of the categories with the highest and lowest incidence of unspecified cancers in the present study (Tables 78, 79) were also among the top and bottom risk occupations of all cancers combined (Tables 80, 81). Hence, the likelihood of getting a proper diagnosis for the cancer seems not to vary markedly between occupations.

Accuracy of linkage and person-year calculation

The linkage between the census data, the mortality and emigration data and the cancer incidence data was based on the unique personal identity codes used in all five countries. Apart from errors in the identifiers, which are extremely rare, the method thus by definition ensured a complete ascertainment of relevant events [158].

If the follow-up for vital status would be incomplete, there would be a risk of bias related to the occupational variation in general mortality. Fortunately the Nordic population register systems offer very accurate data on the vital status of all residents, and therefore the person-year calculations in the present study are precise.

Statistical significance

We present in this study SIRs for men and women, five countries, 54 occupational categories and close to 80 diagnostic groups, i.e., about 40 000 SIRs. Inevitably, many of these combinations will by chance come out with significantly high or low SIRs. In the interpretation of the findings, it is therefore important to pay attention not only to the size of the SIRs or the confidence intervals, but also to the consistency across countries and the biological plausibility.

The present study covers up to 45 years of cancer incidence in the population born between 1896 and 1960 and living in the five Nordic countries; Denmark, Finland, Iceland, Norway and Sweden. Almost 15 million persons were included in the study, and close to 385 million person years at risk were accumulated. Approximately 3 million incident cancer cases occurred during the follow-up period. The present study is thus the largest study ever reported on occupational cancer incidence.

Due to the huge size of the study, many of the observations that are statistically significant correspond to such a small deviation from unity that it has no practical implication. For instance, a great majority of the 54 occupation-specific SIRs for all sites combined were statistically significant (42 SIRs among the men and 40 among the women), although the relative risk difference in some instances was not more than some 2% as compared with the reference rate.

Selection of reference rates

Selection of the reference population has an effect on the SIR values. In the present paper, the expected numbers of cancer cases were based on national incidence rates. The other easily available option as to the reference rates would have been to use the rates calculated for the entire Nordic population. SIRs based on national rates and on Nordic incidence are dissimilar for cancers with large variation in incidence levels between the countries. In testicular cancer the incidence rate in Denmark during the follow-up period of the present study was about twofold, in Finland only one-half of the Nordic average (Figure 34). The SIR for testicular cancer among Finnish seamen based on the national reference rate was 2.29 (95%CI 1.18–4.00, 12 cases), but only 1.06 (0.55–1.86) if based on the combined Nordic rate (Table 83). In turn, the SIR for Danish farmers increases from 0.84 (0.71–0.98, 155 cases) to 1.75 (1.49–2.04) if Nordic rates are used instead of Danish rates. In comparison to the Nordic reference rates, virtually all occupation-specific SIRs in Denmark are statistically significantly increased and most SIRs in Finland are statistically significantly decreased.

There are several factors affecting the general national incidence rates, including differences in the prevalence of aetiological factors, diagnostic procedures and even registration practices. These factors are hardly related to direct occupational hazards, and therefore we decided that in a study aiming at describing relative risks related to occupation, it is best justified to compare the incidence of cancer in a given occupation in a given country with the general population in the same country.

There is also variation in the background cancer incidence within countries (Figure 50, [167]). If a given occupation is concentrated in specific regions, then the national reference rate may not be fully appropriate. Previous studies (e.g., Pukkala et al., 1997 [168]), however indicate that the use of

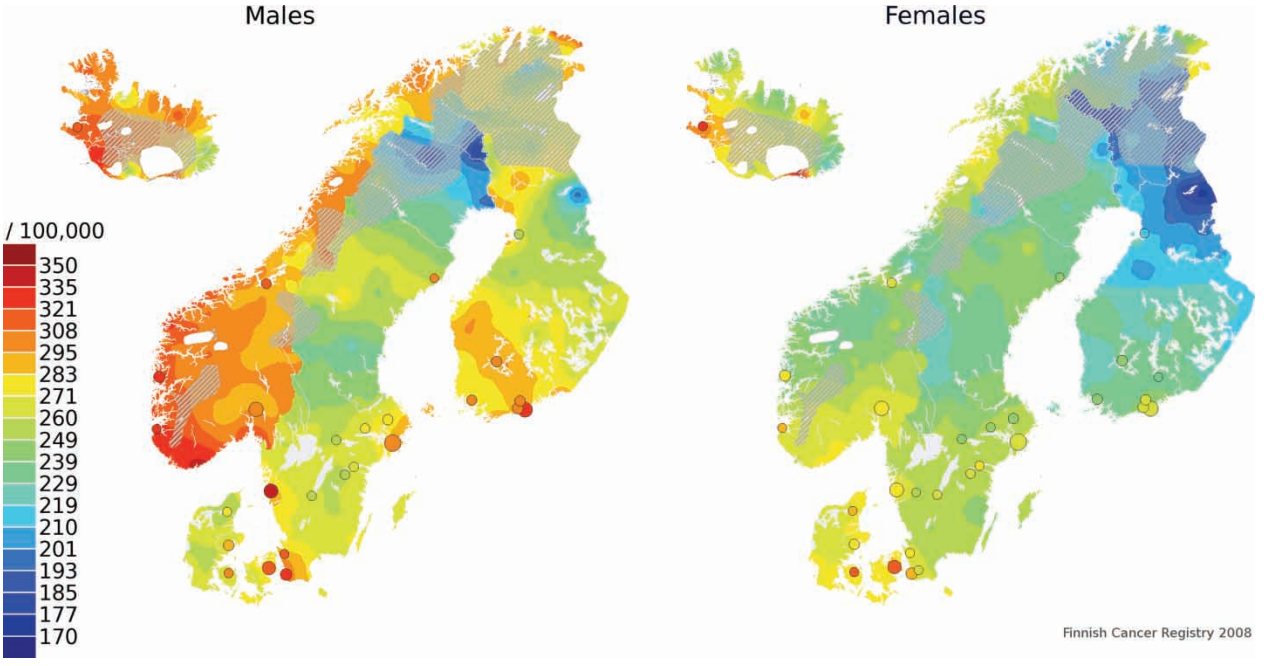


Figure 50. Age adjusted (World) incidence rates of cancer (all sites) in the Nordic countries in 1998–2003, by gender, based on municipality specific observations [167].

regional reference rates instead of whole-nation rates does not markedly affect the SIR estimates.

General lifestyle factors

Not all associations between occupations and specific cancer diseases found in the present study reflect risks caused by exposures at the work place. Besides work place exposures, the occupational categories also vary in their exposures to other risk factors. Such major risk factors include tobacco smoking, alcohol consumption, dietary habits and reproductive patterns.

Occupation and tobacco smoking. The prevalence of smoking in the Nordic countries has varied over decades and been different in men and women as described in the Introduction. Smoking has also been differentially distributed across socio-economic strata and occupations.

Four stages of the so-called smoking epidemic have been described based on empirical data, also including the Nordic countries [169–171]:

(1) The prevalence of smoking is low and mainly a habit of higher socio-economic groups;
(2) Smoking becomes more common, rates among men are at their peak, and may be equal among the socio-economic groups or higher among higher socio-economic groups. Women follow the smoking patterns of men with a lag of 10–20 years, with the higher socio-economic groups taking up the smoking habit;
(3) Prevalence rates among men decrease, as many quit smoking, especially those in the higher social strata. Among women, the smoking prevalence peaks before a decline sets in by the end of this stage;
(4) Prevalence rates keep declining slowly for both men and women, and smoking becomes progressively more a habit of the lower socio-economic groups.

Although the actual smoking prevalence and the pace of passing through the different stages have differed between the countries, the Nordic countries presently can be considered to be in late-stage 3 or stage 4.

Many of the occupational differences may be ascribed to socio-economic differences in smoking. Farmers have been consistently seen to have a lower smoking prevalence than those employed in manufacture. Some occupations have characteristics that influence the probability of being a smoker. For example, for a person working in the health care sector, or as a teacher, it was not possible to smoke during the active working hours, while in tobacco workers, the former tradition of quotas of free cigarettes increased the smoking probability.

The smoking prevalence by occupation for Norwegian men and women has been estimated in a series of health surveys in 1965–1981 linked to the 1970 census (Table 84; [83]). Among men

Table 83. Standardized incidence ratios for testis cancer based on country specific incidence rates (SIR_c) and Nordic incidence rates (SIR_n), by occupational category. Only occupations where sum of observed cases ≥20 in Denmark and Finland are included.

		Denmark			Finland			All Nordic countries				
No	Occupational category	Obs	SIR_c	SIR_n	Obs	SIR_c	SIR_n	Obs	SIR_c	95% CI	SIR_n	95% CI
1	Technical workers, etc.	128	1.01	**2.05**	79	1.14	**0.54**	680	1.06	0.99—1.15	1.02	0.95—1.10
3	Physicians	16	1.72	**3.52**	4	1.00	0.47	67	**1.48**	1.15—1.88	**1.56**	1.21—1.98
8	Teachers	68	1.15	**2.37**	32	1.35	**0.62**	277	1.06	0.94—1.19	1.12	0.99—1.26
9	Religious workers etc.	17	0.92	**1.85**	26	1.42	0.70	228	**1.30**	1.15—1.49	**1.29**	1.13—1.47
12	Administrators	121	1.04	**2.09**	46	**1.39**	**0.65**	407	**1.18**	1.07—1.30	**1.31**	1.19—1.45
13	Clerical workers	81	**1.37**	**2.74**	25	1.24	**0.58**	314	**1.14**	1.02—1.27	**1.19**	1.06—1.32
14	Sales agents	35	1.10	**2.19**	29	0.89	**0.42**	344	1.05	0.94—1.17	0.98	0.88—1.09
15	Shop workers	134	1.19	**2.36**	11	0.66	**0.31**	246	1.07	0.95—1.22	**1.31**	1.15—1.48
16	Farmers	155	**0.84**	**1.75**	81	1.10	**0.50**	521	0.97	0.89—1.06	0.99	0.91—1.08
17	Gardeners	21	0.80	**1.62**	15	0.86	**0.39**	157	1.03	0.88—1.20	0.94	0.81—1.10
19	Forestry workers	2	0.58	1.16	18	0.86	**0.39**	70	**0.70**	0.54—0.88	**0.54**	0.42—0.68
21	Seamen	14	0.93	1.76	12	**2.29**	1.06	90	0.86	0.69—1.06	1.05	0.84—1.29
22	Transport workers	22	0.92	**1.83**	16	1.30	**0.59**	120	1.07	0.89—1.28	1.03	0.86—1.23
23	Drivers	85	0.93	**1.80**	42	0.81	**0.37**	379	0.94	0.85—1.04	0.92	0.83—1.02
24	Postal workers	20	0.98	**1.99**	10	1.23	0.58	87	1.06	0.85—1.31	1.11	0.89—1.36
25	Textile workers	16	1.25	**2.45**	7	1.83	0.83	60	1.17	0.89—1.50	1.17	0.89—1.50
27	Smelting workers	31	0.80	**1.55**	2	0.30	**0.14**	90	0.81	0.65—1.00	0.89	0.72—1.10
28	Mechanics	99	1.00	**1.95**	51	0.89	**0.42**	501	**0.87**	0.79—0.94	**0.85**	0.78—0.92
31	Electrical workers	30	1.08	**2.13**	21	0.76	**0.36**	216	0.92	0.81—1.06	0.88	0.77—1.01
32	Wood workers	65	1.03	**2.05**	33	0.80	**0.37**	364	1.02	0.92—1.13	1.00	0.91—1.11
33	Painters	25	1.15	**2.25**	11	1.06	**0.49**	87	0.91	0.73—1.12	0.89	0.71—1.09
34	"Other construction workers"	54	0.85	**1.62**	18	0.66	**0.31**	158	**0.79**	0.67—0.92	**0.78**	0.66—0.91
35	Bricklayers	26	1.10	**2.15**	3	0.69	**0.32**	58	1.06	0.80—1.37	1.19	0.91—1.54
36	Printers	23	1.31	**2.58**	7	1.03	0.49	90	**1.25**	1.01—1.54	**1.28**	1.03—1.58
37	Chemical process workers	13	1.16	**2.23**	9	1.04	**0.48**	64	0.82	0.63—1.05	0.79	0.61—1.01
38	Food workers	39	0.92	**1.80**	6	0.97	**0.45**	107	0.92	0.76—1.11	1.07	0.89—1.30
41	Glass makers etc.	14	0.62	1.21	12	1.24	0.59	76	0.82	0.65—1.03	0.81	0.64—1.02
42	Packers	12	0.67	1.25	15	0.89	**0.42**	144	0.96	0.82—1.13	0.92	0.78—1.08
43	Engine operators	15	0.63	1.23	17	**0.61**	**0.28**	126	**0.74**	0.62—0.88	**0.67**	0.56—0.80
44	Public safety workers	14	0.69	1.38	10	0.68	**0.32**	110	1.02	0.84—1.23	0.97	0.80—1.17
48	Building caretakers	27	1.45	**2.79**	13	1.22	**0.58**	96	1.22	0.99—1.50	1.21	0.98—1.48
52	Military personnel	14	0.94	**1.89**	12	1.83	0.85	81	1.16	0.92—1.44	1.20	0.95—1.49
53	"Other workers"	63	0.94	**1.75**	10	0.75	**0.36**	211	0.89	0.78—1.02	1.00	0.87—1.14
54	Economically inactive	44	1.12	**1.84**	78	**1.33**	**0.70**	409	**1.12**	1.02—1.24	1.04	0.94—1.15

over 16 years of age, the proportion of current smokers was highest among painters (69.1%) and smelting workers (68.4%). Most of the groups consisting of manual workers had a smoking prevalence above 60%. The lowest proportion was seen among teachers (33.2%). Among women, mechanics, plumbers and welders had the highest prevalence of smokers (65.9%), while the prevalence rate among farmers and gardeners was only 12.4%.

In Finland in 1968, 46% of men working in agriculture smoked compared with 61% of men working in manufacture [32]. These percentages had decreased to 34% and 49%, respectively in 1978 [172], and to 33% and 44% in 1990 [172]. Occupation-specific rates of current smokers based on surveys of health habits of the Finnish adult population in 1978–1991 have been created as part of FINJEM [173]. The prevalence in males varies from 9% among architects, and 13% among primary school teachers and clergy to 56% among cooks and building hands, 58% among dockers, 59% among miners and 62% among service station attendants. In women, smoking was very rare among farmers (2%), deacons (3%), primary school teachers (5%) and dentists (6%) while 46% of female marketing workers and 42% of waiters in restaurants were regular smokers.

In Sweden, 19% of male farmers and 40% of male industrial workers were daily smokers in 1982–1983 [31]. In Denmark, the prevalence of male smokers in 1990 varied from 29% of male higher educated salaried employees to 58% among unskilled workers [29].

In Iceland, surveys from 1985–1988 showed a different pattern of smoking habits among those in various industries. Among men 18–69 years old, 50% of those in the fishing and fishing industry were daily smokers versus 37% of those in sales and service work, 39% of industrial workers, 34% of those in farming, 30% of those in civil service and 28% of those in the group "others". Among women of the same age 51% in the fishing and fishing industry were daily smokers versus 40% in sales and service work, 34% in industry, 27% in farming, 29% in civil service and 30% of those in the group "others" [174].

Table 84. Estimated proportion of current smokers in the Norwegian study populaton (1965–1981), by occupational category. Only groups >10 are included [83].

No	Occupational category	Men		Women	
		Number	%	Number	%
1, 2	Technical workers, etc./Laboratory assistants	498	45.8	13	18.3
3,4	Physicians/Dentists	81	46.0	–	–
5, 6, 7	Nurses/Assistant nurses/"Other health workers"	54	57.4	268	34.0
8	Teachers	248	33.2	115	22.1
9	Religious workers etc.	137	37.8	34	29.1
10, 11	Artistic workers/Journalists	92	54.8	15	28.8
12	Administrators	542	46.2	62	45.6
13	Clerical workers	663	55.3	555	40.3
14, 15	Sales agents/Shop workers	839	57.8	415	40.4
16, 17	Farmers/Gardeners	1 685	42.6	83	12.4
18	Fishermen	475	63.3	–	–
19	Forestry workers	176	53.0	–	–
20	Miners and quarry workers	92	58.6	–	–
21	Seamen	531	64.7	–	–
22	Transport workers	232	58.0	–	–
23	Drivers	740	62.1	–	–
24	Postal workers	121	53.1	70	35.2
25, 26	Textile workers/Shoe and leather workers	191	57.0	94	37.8
27	Smelting workers	143	68.4	–	–
28, 29, 30	Mechanics/Plumbers/Welders	1 194	62.7	27	65.9
31	Electrical workers	397	57.8	13	41.9
32	Wood workers	1 028	55.2	–	–
33	Painters	181	69.1	–	–
34, 35	"Other construction workers"/Bricklayers	394	62.7	–	–
36	Printers	126	62.4	11	42.3
37	Chemical process workers	154	67.0	13	59.1
38, 39, 40	Food workers/Beverage workers/Tobacco workers	307	63.8	24	26.1
41	Glass makers etc.	136	63.3	26	47.3
42	Packers	275	60.4	72	51.1
43	Engine operators	300	63.0	–	–
44	Public safety workers	182	60.7	–	–
45, 46, 47	Cooks and stewards/Domestic assistants/Waiters	138	63.9	328	35.7
48, 49	Building caretakers/Chimney sweeps	125	56.3	382	39.6
52	Military personnel	49	47.1	–	–
50, 51, 53	Hairdressers/Launderers/"Other workers"	664	57.5	67	38.7
54	Economically inactive	1 480	48.3	5 237	23.2
1–54	All categories	14 670	53.7	7 961	26.2

Haldorsen and co-workers [83] used data on occupational smoking habits to control for confounding by smoking on the occupational lung cancer risk seen in the Norwegian part of the previous census-based follow-up study [1] (Table 85; adapted from Haldorsen et al. 2004 [83]). The relationship between smoking habits and lung cancer risk was estimated for 12 groups considered not to be occupationally exposed to lung carcinogens, and this relationship was used to control for smoking in the remaining groups possibly exposed to lung carcinogens through their work. In most of the probably exposed groups (such as welders, plumbers, painters, bricklayers, smelters, glass workers, beverage workers, launderers, and tobacco workers), initial SIRs were above 1.00, and adjustment led to further elevation of the risk estimate, indicating an effect of occupational exposure. On the other hand, the initially significantly elevated SIRs for waiters and cooks were lowered to unity after smoking adjustment, indicating smoking habits to be the main explanation for the elevated risk. For physicians and dentists, the smoking adjustment further decreased the already low SIRs, indicating a lower smoking prevalence as compared to other occupations. The risk estimate for gardeners changed from being significantly low to being significantly high, which might be an indication of exposure to lung carcinogens (or of imprecise smoking data). The results summarised

Table 85. Original SIR and smoking adjusted lung cancer SIR by occupation among 893 264 Norwegian men followed-up 1971–1991 [83].

		Unadjusted		Adjusted	
No	Occupational category	Obs	SIR	SIR	95% CI
	Potentially exposed				
1	Technical workers, etc.	321	0.64	0.91	0.8—1.0
2	Laboratory assistants	28	0.93	1.25	0.8—1.8
3	Physicians	32	0.49	0.37	0.3—0.5
4	Dentists	20	0.73	0.60	0.4—0.9
5	Nurses	3	0.68	1.13	0.2—3.3
6	Assistant nurses	10	0.76	1.22	0.6—2.2
7	"Other health workers"	23	0.65	1.05	0.7—1.6
18	Fishermen	436	1.16	1.21	1.1—1.3
20	Miners and quarry workers	162	1.39	1.65	1.4—1.9
21	Seamen	585	1.69	1.25	1.2—1.4
22	Transport workers	275	0.90	1.21	1.1—1.4
23	Drivers	940	1.38	1.58	1.5—1.7
25	Textile workers	103	0.74	1.07	0.9—1.3
26	Shoe and leather workers	36	0.89	1.27	0.9—1.8
27	Smelting workers	326	1.39	1.63	1.5—1.8
28	Mechanics	1 254	1.31	1.44	1.4—1.5
29	Plumbers	153	1.34	1.49	1.3—1.8
30	Welders	211	1.31	1.48	1.3—1.7
31	Electrical workers	429	1.06	1.34	1.2—1.5
32	Wood workers	1 118	0.83	1.25	1.2—1.3
33	Painters	260	1.38	1.52	1.3—1.7
34	"Other construction workers"	596	1.05	1.28	1.2—1.4
35	Bricklayers	162	1.26	1.57	1.3—1.8
36	Printers	122	1.18	1.44	1.2—1.7
37	Chemical process workers	367	1.26	1.37	1.2—1.5
38	Food workers	342	1.20	1.29	1.2—1.4
39	Beverage workers	30	1.92	2.07	1.4—3.0
40	Tobacco workers	8	2.12	2.28	1.0—4.5
41	Glass makers etc.	286	1.30	1.73	1.5—1.9
42	Packers	701	1.36	1.44	1.3—1.6
43	Engine operators	369	1.29	1.34	1.2—1.5
44	Public safety workers	200	1.02	1.10	1.0—1.3
45	Cooks and stewards	92	1.48	1.00	0.8—1.2
46	Domestic assistants	3	3.93	2.25	0.5—6.6
47	Waiters	45	1.66	1.08	0.8—1.4
48	Building caretakers	253	1.27	1.30	1.1—1.5
49	Chimney sweeps	14	1.09	1.19	0.7—2.0
50	Hairdressers	35	1.27	1.64	1.1—2.3
51	Launderers	27	1.72	2.22	1.5—3.2
52	Military personnel	130	0.99	1.14	1.0—1.4
53	"Other workers"	194	1.34	1.74	1.5—2.0
54	Economically inactive	1 549	1.41	1.75	1.7—1.8
	Potentially unexposed				
8	Teachers	168	0.46	1.06	0.9—1.2
9	Religious workers etc.	126	0.59	0.90	0.8—1.1
10	Artistic workers	41	0.83	0.87	0.6—1.2
11	Journalists	21	0.76	0.79	0.5—1.2
12	Administrators	713	0.81	1.01	0.9—1.1
13	Clerical workers	579	0.86	1.01	0.9—1.1
14	Sales agents	605	0.95	1.01	0.9—1.1
15	Shop workers	296	0.98	1.05	0.9—1.1
16	Farmers	755	0.42	0.93	0.9—1.0
17	Gardeners	127	0.69	1.54	1.3—1.8
19	Forestry workers	88	0.47	0.94	0.8—1.2
24	Postal workers	107	0.79	1.02	0.8—1.2

above are largely supportive of the interpretation that the varying smoking habits do not explain all the occupational variation in risk.

Occupation and alcohol consumption. Alcohol consumption is, like tobacco smoking, unevenly distributed across the occupational categories. The sparse data indicate that the higher social classes and some categories within the lowest social classes have had the highest and farmers the lowest average alcohol consumption. Alcohol consumption was throughout the study period higher in Denmark than in the other Nordic countries (Figure 4). In Denmark, 23% of men in 1976 reported consumption of 11 alcoholic drinks or more per week. The proportion was 30% in university graduates and office workers, but only 7% among farmers. Five percent of women reported consumption of at least 11 alcoholic drinks per week. Consumption of wine increased after Denmark joined the European Union in 1972, and wine consumption in 1985 showed a marked social class gradient from 41% in university graduate workers to 4% in blue-collar workers. Beer consumption showed the opposite trend with 38% in academic occupations and 75% in blue-collar workers [175].

Beverage manufacture workers in Denmark [176], and male waiters and cooks in Norway [177] have reported higher consumption of alcoholic beverages than the general population. In Finland, the highest indices for alcohol-related utilisation of health care resources in the early 1970s were obtained among labourers, painters, seamen, construction workers, forestry workers, artists and journalists [178]. FINJEM includes estimates of average alcohol consumption in each occupation based on surveys of health habits of the Finnish adult population 1978–1991 [173]. In males, the consumption was lowest among clergymen (10 g of alcohol per week, agricultural workers (36 g) and bench carpenters (39 g). The consumption was highest among waiters in restaurants (219 g), dockers (197 g) and engineers in ships (197 g). In women the consumption was highest (78–98 g of alcohol per week) among journalists, commercial managers and musicians) and lowest (7 g) among farmers.

In Sweden, a high consumption of alcohol is more common among men than among women, and highest among men with a low level of education. Swedish women with a high level of education have had higher alcohol consumption than women in manual occupations [89].

In the present study, it was seen that occupations with easy access to alcohol and with cultural traditions of alcohol consumption also have a high risk of cancers associated with alcohol consumption. Table 86 shows the mortality from alcohol related liver disease and the incidence of alcohol related cancer by occupation in the Nordic countries combined in the cohort of the present study. "Alcohol related cancer" has been defined here as cancer of the mouth, tongue, pharynx, larynx, oesophagus, and liver. There are other cancer sites with an established association with alcohol, such as colorectal cancer and breast cancer, but these were not included due to the weaker associations with alcohol and presumed lower attributable fractions. In the group'alcohol related liver disease', alcoholic liver cirrhosis, fatty liver, hepatitis, fibrosis, and hepatic failure have been included (ICD-7 581.1, ICD-8 571.0, ICD-9 571.0-3, ICD-10 K70).

High-risk groups are, to a large extent, the same for both diagnostic groups, supporting the interpretation that alcohol consumption is the main factor explaining the high risk of cancer of the upper aerodigestive tract and liver among, for instance, waiters and waitresses, male beverage workers, female journalists and seamen. Farmers and teachers are among the low risk groups for both genders. It should be noted, that all cancer sites included in the group' alcohol related cancer', except liver cancer, are also related to tobacco smoking. This may explain why some occupational categories, for instance male drivers, shoe and leather workers, and engine operators, and female smelting workers and launderers, have an elevated risk for the' alcohol related cancers' but not for the' alcohol related liver diseases'. In these groups, smoking may play a relatively stronger role than alcohol consumption in the elevating risk of upper aerodigestive tract cancer, but this finding may also point to possible carcinogenic occupational exposures.

Occupation and dietary habits. Foods rich in fibre probably decrease the risk of colorectal cancer, while diets rich in fruits and vegetables probably decrease the risk of cancer in several sites such as mouth, pharynx, larynx, oesophagus, stomach, colorectum, lung, pancreas, and prostate. Red meat and processed meat have been convincingly shown to increase the risk of colorectal cancer, and diets rich in milk may also increase the risk. There is limited evidence for an association between the consumption of fat, in particular saturated fat, and cancers of the lung, breast and prostate [179].

There is very little systematic information on dietary habits according to occupational category. More information is available on diet according to the socio-economic status or education. Several

Table 86. Observed number (Obs) of incident cases of alcohol related cancer (alcohol cancers) and number of deaths from alcohol related non-malignant liver disease (liver disease) and standardised incidence/mortality ratio (SIR/SMR) for the Nordic countries, 1961–2005, by gender and occupational category.

		Men				Women			
		Alcohol cancers		Liver disease		Alcohol cancers		Liver disease	
No	Occupational category	Obs	SIR	Obs	SMR	Obs	SIR	Obs	SMR
1	Technical workers, etc.	4 375	0,79	1 167	0.58	97	0,78	30	0.62
2	Laboratory assistants	78	0,92	22	0.54	48	0,80	29	1.08
3	Physicians	246	0,71	75	0.60	27	0,83	18	1.34
4	Dentists	116	0,84	33	0.80	34	1,09	4	0.45
5	Nurses	8	0,51	8	0.80	37	0,76	70	0.45
6	Assistant nurses	83	0,91	32	1.07	532	0,89	126	0.72
7	"Other health workers"	219	0,81	64	0.67	284	0,86	75	0.68
8	Teachers	1 229	0,61	338	0.45	721	0,79	147	0.53
9	Religious workers etc.	977	0,81	288	0.63	223	0,82	75	0.61
10	Artistic workers	547	1,47	231	1.72	90	1,42	32	1.55
11	Journalists	268	1,53	80	1.25	35	1,29	30	3.02
12	Administrators	3 736	1,04	1 093	0.96	196	1,00	77	1.35
13	Clerical workers	2 618	0,98	800	1.00	2 888	1,06	1 091	1.25
14	Sales agents	3 838	1,20	1 214	1.21	334	1,03	119	1.62
15	Shop workers	2 495	1,11	864	1.18	1 772	0,97	521	1.23
16	Farmers	4 848	0,52	694	0.31	665	0,74	22	0.12
17	Gardeners	1 443	0,65	366	0.64	887	0,85	65	0.31
18	Fishermen	774	0,96	93	0.55	7	1,23	0	0.00
19	Forestry workers	1 122	0,72	294	0.63	6	0,63	2	0.85
20	Miners and quarry workers	366	0,99	147	1.36	0	0,00	0	0.00
21	Seamen	1 520	1,83	414	1.64	3	3,91	0	0.00
22	Transport workers	1 265	0,93	342	0.85	31	1,01	4	0.54
23	Drivers	4 628	1,21	1 344	0.96	67	1,31	14	0.94
24	Postal workers	742	0,98	241	0.98	394	0,98	93	0.97
25	Textile workers	701	0,96	181	1.02	939	0,99	124	0.67
26	Shoe and leather workers	336	1,23	55	0.91	83	1,02	15	0.82
27	Smelting workers	1 329	1,07	384	1.10	30	1,63	4	0.80
28	Mechanics	5 591	1,04	1 765	0.99	180	1,22	45	1.17
29	Plumbers	716	1,12	344	1.44	0	0,00	1	7.12
30	Welders	617	1,02	237	0.93	9	1,57	5	2.06
31	Electrical workers	1 938	1,02	759	1.07	127	1,14	43	1.22
32	Wood workers	3 475	0,81	906	0.75	75	0,82	29	1.13
33	Painters	1 295	1,19	481	1.48	14	1,17	6	1.66
34	"Other construction workers"	2 964	1,17	1 124	1.45	40	1,46	11	1.87
35	Bricklayers	770	1,18	219	1.18	0	0,00	0	0.00
36	Printers	813	1,30	301	1.39	115	1,28	51	2.11
37	Chemical process workers	937	1,01	227	0.86	75	0,99	25	1.46
38	Food workers	1 416	1,13	392	1.13	400	1,12	96	1.23
39	Beverage workers	235	2,63	90	3.40	31	1,45	10	2.18
40	Tobacco workers	21	1,38	8	1.99	40	1,76	8	1.47
41	Glass makers etc.	1 069	1,06	253	0.81	217	1,23	83	1.88
42	Packers	2 353	1,32	682	1.37	314	1,17	91	1.44
43	Engine operators	1 717	1,07	508	0.81	31	1,36	12	1.43
44	Public safety workers	974	0,94	253	0.69	15	0,76	11	2.04
45	Cooks and stewards	463	2,46	159	2.53	400	1,10	85	1.19
46	Domestic assistants	13	1,48	5	1.55	805	0,88	186	0.93
47	Waiters	521	4,23	166	3.48	561	1,53	213	2.50
48	Building caretakers	939	1,11	312	1.16	1 949	1,16	416	1.09
49	Chimney sweeps	89	1,66	27	1.44	0	0,00	0	0.00
50	Hairdressers	259	1,44	84	1.99	180	1,18	48	1.15
51	Launderers	111	0,99	20	0.75	255	1,21	32	0.93
52	Military personnel	554	0,95	168	0.80	4	4,59	0	0.00
53	"Other workers"	3 540	1,29	1 166	1.67	700	1,10	210	1.39
54	Economically inactive	6 195	1,56	3 051	2.59	18 239	1,00	2 651	0.98
1–54	All categories	79 492	1.00	24 571	1.00	35 539	1.00	7 155	1.00

studies indicate that persons with a high socio-economic status practice more healthy behaviours than in low socio-economic status groups [180].

The intake of potatoes was higher among men in the lowest social class in Denmark in 1985 than in the highest social class, but the intake of vegetables and fruit varied in the opposite direction [119]. Consumption of milk and milk products among men was higher in the highest social class. The food consumption among women varied less by social class than among men but showed the same tendencies. Food consumption by educational groups among Swedish men in 1989 resembled that reported for Danish men: there was a higher consumption of potatoes among the low educated men compensated by a higher consumption of fruit and vegetables among high educated men [120]. The same pattern was observed among Norwegian men in 1986–1988 [181].

In Finland, the intake of milk and butter in 1992 was significantly higher in men with low education, whereas the intake of vitamin C and carotenoids was significantly lower than in the highest educational category [182]. FINJEM includes estimates of average consumption of food items in each occupation based on surveys on health habits of the Finnish adult population 1978–1991 [173]. Regular use of butter is considered to be a proxy of a less healthy diet. In men, the proportion was low among university teachers (16%) and architects (17%) and highest among farmers (70%), miners (63%) and forestry workers (60%). In women, the variation was from 11–12% among university teachers and commercial managers to 52% among butchers and dairy workers and 67% among farmers and agricultural workers.

In Iceland, male unskilled workers, lower service workers, employers, fishermen and farmers consumed more fat and less carbohydrates and fibres than men with higher education. Dietary habits among women varied less by occupation than among men but showed the same tendencies [183].

We cannot rule out that some of the associations we found in our study may be – at least partially – explained by socio-economic and occupational differences in dietary habits. The strongest indication of the potential effect of dietary factors was in stomach cancer, where all low risk occupations represented high socio-economic status with a diet presumably rich in fruit and vegetable.

Occupation, body fatness and physical activity. There is convincing evidence that body fatness is associated with an increased risk of oesophageal adenocarcinoma, colorectal cancer, pancreatic cancer, endometrial cancer, kidney cancer, and postmenopausal breast cancer [184]. Body fatness is probably associated with cancer of the gallbladder directly and indirectly, through the formation of gallstones. Abdominal fatness has linked with cancers of the pancreas, breast, and endometrium but is specifically associated with an increased risk of colorectal cancer. There is limited evidence that body fatness may be associated with an increased risk for liver cancer and that low body fatness is associated with lung cancer risk [184]. The latter finding may be explained by residual confounding due to smoking. Highly educated persons in the Nordic countries tend to be leaner than persons with limited education.

Physical activity at work, household, commuting and leisure probably reduces the risk of at least colon cancer, postmenopausal breast cancer and endometrial cancer [185]. In the Nordic countries, as elsewhere, occupations with high physical activity tend to be those with short education, such as miners, forestry workers, fishermen, farmers, construction workers, cleaning workers or assistant nurses. On the other hand, highly educated persons who work mainly in sedentary occupations, tend to do more leisure time exercise.

FINJEM includes estimates of average body mass index (BMI) in each occupation based on surveys on the health habits of the Finnish adult population 1978–1991 [173]. Men working as university teachers, physicians, computer operators or programmers were leanest (BMI 23.5–24.0), and the BMI was highest (27.7–27.8) in several occupations on ships. In women, the BMI was lowest among physiotherapists (22.1), university teachers (22.3) and highest among typographers (27.8) and farmers (26.5). Part of the variation may be attributable to age distribution (the youngest men tend to be leanest) and physical demands of the work (strong muscles increase the weight).

In this first phase of the NOCCA study we did not yet have means to adjust risk estimates according to information on body size or physical activity. Thus, we cannot give numerical estimates on how much of the occupational variation in cancer risk is attributable to body fatness and physical activity. Such cofactor data will be available in the later phases of the NOCCA study. On the other hand, lack of physical activity at work can be considered as one of the most serious occupational health hazards in the modern work life, and thus it is also important to show risk estimates without adjustment for work-related physical activity.

Occupation and reproductive pattern. Reproductive factors are associated with the risk of cancer of the

reproductive organs in women. The risk of breast cancer decreases with increasing parity, in particular if the first birth is below the age of 20 [186]. The risk of endometrial cancer decreases with increasing parity, in particular if the age of the last birth is above 35 years [100]. The risk of ovarian cancer [187] is also decreased with increasing parity without connection to ages at deliveries [188].

In general, women in higher socio-economic classes have lower fertility rates. In Norway, for example, the average age at first birth in occupations that require high education, such as dentists, physicians, and teachers, is about 5 years higher than in occupations with short education (Table 87). The average number of children was highest among farmers, gardeners, and fishermen, while otherwise the variation was not very large. The percentage of nulliparous women was highest among seamen and journalists and also the parous women in these categories had few children on average.

There are similar data in Finland from 1985, including women in ages 40–49 [6], showing similar fertility patterns as the Norwegians. For instance the proportion of nulliparous journalists in Finland was 23% (Norway 27%) and average number of children among the parous was 2.0 (Norway 1.5). For farmers, the proportion of nullipara was 7%, and the average number of children was 3.0 in both countries.

In Iceland, record linkage was done between the Census and the population-based Cohort Study of the Cancer Detection Clinic, where information on reproductive factors has been collected since 1964 [189]. This was done as a preparatory phase of the future analyses of the NOCCA project, where parity data are required as cofactors in multivariate analysis on occupational risk factors of hormone-related cancer sites. The average age at first birth among Icelandic women born in 1935–1950 was 21.8 years, i.e., about two years younger than in Norway, but the differences between the occupations with the oldest age at first birth (physicians, 26.2 years) and the youngest age at first birth (<21 years, e.g., among shop workers, gardeners, fishermen, shoe and leather workers, printers, food workers and launderers) was similar as in Norway. The average number of children was 2.5 among physicians, but between 3.1 and 3.7 for the other occupations mentioned above.

In a sample of Danish married women aged 15–49 years and interviewed in 1970, 23% of women with 7–9 years of education reported birth of the first child before age 20, whereas this was the case for only 2% of women with 12 or more years of education [190]. The fertility differences were relatively small among Swedish women born in 1940–1949, with women with only basic education having on average 2.1 children and women with university education having on average 1.9 children [191].

Occupations with high age at first birth systematically had elevated SIRs for breast cancer in the current study. In occupations where women had a high number of children, the risk of breast cancer was low. For cancer of the corpus uteri and for ovarian cancer, the occupational variation in risk was small and not clearly associated with the fertility pattern.

Socially discriminating cancers

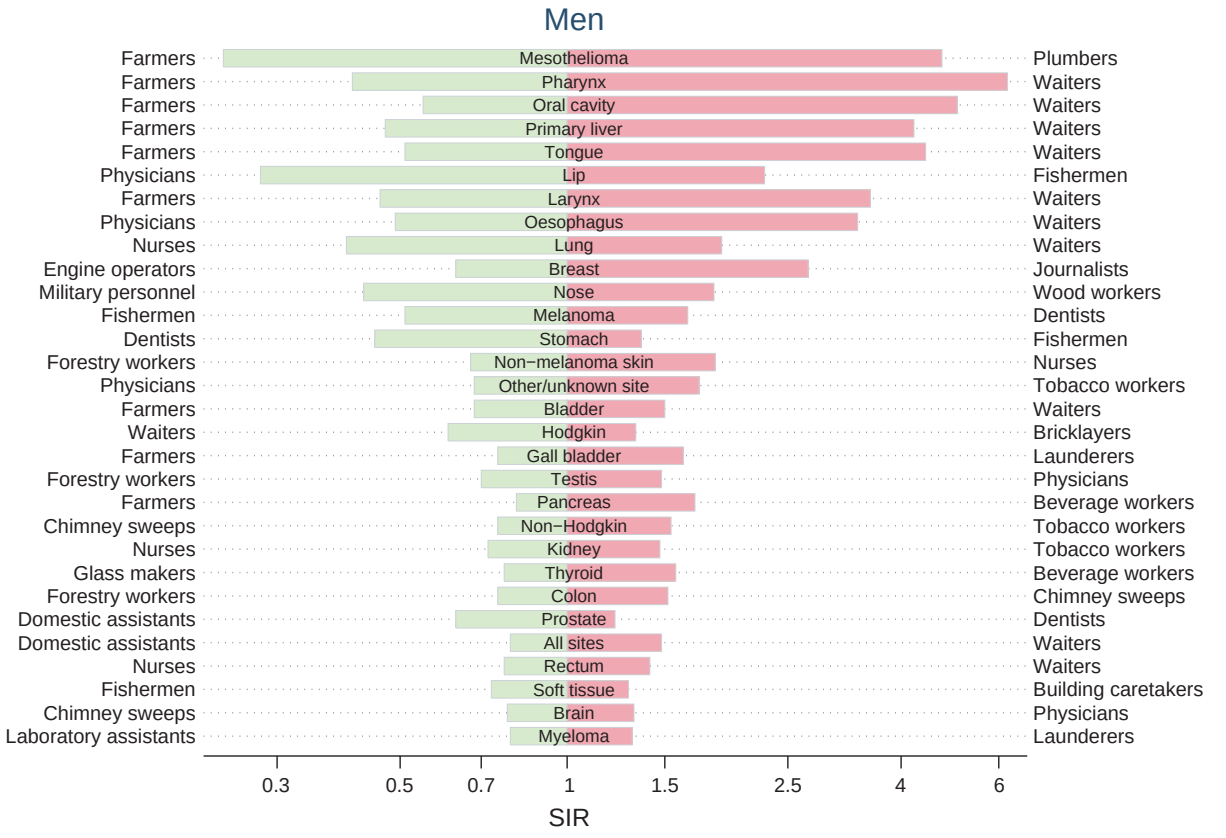
The variation in relative risk across occupational categories varied considerably between cancer types. The cancer sites thus formed a hierarchy from cancer sites with large variations to cancer sites with small variations (Figure 51). For men, mesothelioma topped the list with a 20-fold risk variation between the lowest risk group of farmers with an SIR of 0.24 (95% CI 0.21–0.28) and the high risk group of plumbers with an SIR of 4.74 (4.18–5.38). In contrast, only a 1.5-fold risk variation was found for multiple myeloma, where the SIR varied from 0.79 (0.46–1.26) for laboratory assistants to 1.31 (0.95–1.78) for launderers.

The risk variation was large for cancer sites where work-related exposures play a marked role. This was the case for mesothelioma, where the asbestos exposed plumbers came out with the highest risk for; lip cancer; where the sunlight exposed fishermen had the highest risk; and for cancer of the nose, where the wood dust exposed woodworkers topped the list. In addition, large risk variations were found for alcohol and tobacco related cancers. Risk variations were 5-15-fold for cancers of the pharynx, oral cavity, liver, tongue, larynx, oesophagus and lung. Waiters topped the list on all of these seven cancer sites, and farmers were at the bottom for six of them. The SIRs for these occupational categories differ for most cancer sites (Figure 52). Waiters had higher incidence in most cancer sites than farmers, suggesting that cancer-causing factors tend to cluster in same population categories. The only exception where farmers had a significantly higher incidence was lip cancer among men. The risk variation between the female waiters and farmers was smaller than between male ones.

The cancer sites with less risk variation were primarily those less attributable to specific established aetiological factors related to occupational exposures or social status. The variation among men was about twofold for cancers of the testis, pancreas, kidney, thyroid, colon and prostate and non-Hodgkin lymphoma, and only about 1.5-fold for cancers of the rectum, soft tissue, and brain, as

Table 87. Parity for the Norwegian women in the study. Only women born 1935–1950 are included.

No	Occupational category	Persons	Nulliparous (%)	Age at first birth	Age at last birth	Number of children
1	Technical workers, etc.	1 984	18.2	26	30.3	1.7
2	Laboratory assistants	1 754	16.2	25.5	29.6	1.8
3	Physicians	741	16.6	28.1	33.2	2.1
4	Dentists	417	11.5	27.3	31.9	2.0
5	Nurses	14 150	14.4	26.1	31.2	2.1
6	Assistant nurses	13 270	11.8	23.2	28.6	2.2
7	"Other health workers"	11 388	12.4	24.3	29.3	2.1
8	Teachers	25 621	12.9	26.3	31.3	2.1
9	Religious workers etc.	6 294	20.8	26.1	30.8	1.8
10	Artistic workers	1 473	20.8	26.6	30.7	1.6
11	Journalists	533	26.6	26.6	30.4	1.5
12	Administrators	5 322	21.6	25.1	29.2	1.6
13	Clerical workers	57 594	14.8	24.2	28.6	1.9
14	Sales agents	4 105	12.8	23.2	28.2	2.0
15	Shop workers	29 468	9.9	22.3	27.5	2.2
16	Farmers	9 153	6.5	23.3	30.5	3.0
17	Gardeners	4 211	7.5	23.0	30.2	2.9
18	Fishermen	218	14.2	21.3	28.8	2.7
19	Forestry workers	138	8.7	22.0	28.0	2.5
20	Miners and quarry workers	32	15.6	21.0	26.3	2.3
21	Seamen	57	28.1	24.0	29.3	1.8
22	Transport workers	362	24.0	24.1	28.5	1.7
23	Drivers	1 092	9.2	21.9	28.1	2.5
24	Postal workers	8 667	11.5	23.4	28.6	2.1
25	Textile workers	5 083	17.2	22.6	27.8	2.1
26	Shoe and leather workers	349	18.3	22.3	27.3	2.0
27	Smelting workers	232	9.1	21.4	27.1	2.5
28	Mechanics	1 020	14.3	21.5	26.7	2.2
29	Plumbers	14	14.3	24.0	29.7	2.1
30	Welders	221	12.2	21.5	26.5	2.2
31	Electrical workers	1 276	18.1	22.4	27.2	1.9
32	Wood workers	581	12.0	21.8	27.6	2.4
33	Painters	90	6.7	21.8	27.5	2.5
34	"Other construction workers"	56	12.5	22.4	27.8	2.5
36	Printers	1 026	17.1	23.1	27.7	1.8
37	Chemical process workers	710	12.7	21.5	26.5	2.1
38	Food workers	3 055	11.8	21.7	27.9	2.5
39	Beverage workers	56	16.1	21.8	25.8	2.0
40	Tobacco workers	67	23.9	22.3	27.0	1.7
41	Glass makers etc.	1 495	13.4	22.0	27.2	2.1
42	Packers	3 101	13.4	21.8	27.2	2.2
43	Engine operators	181	14.9	21.2	26.3	2.1
44	Public safety workers	475	14.5	23.3	28.6	2.1
45	Cooks and stewards	2 888	19.0	23.2	28.7	2.1
46	Domestic assistants	9 526	9.4	22.5	28.5	2.4
47	Waiters	5 737	14.3	22.1	27.7	2.2
48	Building caretakers	25 537	6.2	21.9	28.3	2.6
50	Hairdressers	2 179	12.8	23.7	28.2	1.8
51	Launderers	1 086	12.9	22.0	27.4	2.3
52	Military personnel	28	3.6	24.5	30.2	2.3
53	"Other workers"	16 622	11.2	23.0	28.9	2.4
54	Economically inactive	110 947	8.0	23.7	30.0	2.5
1–54	All categories	391 685	11.2	23.7	29.3	2.3



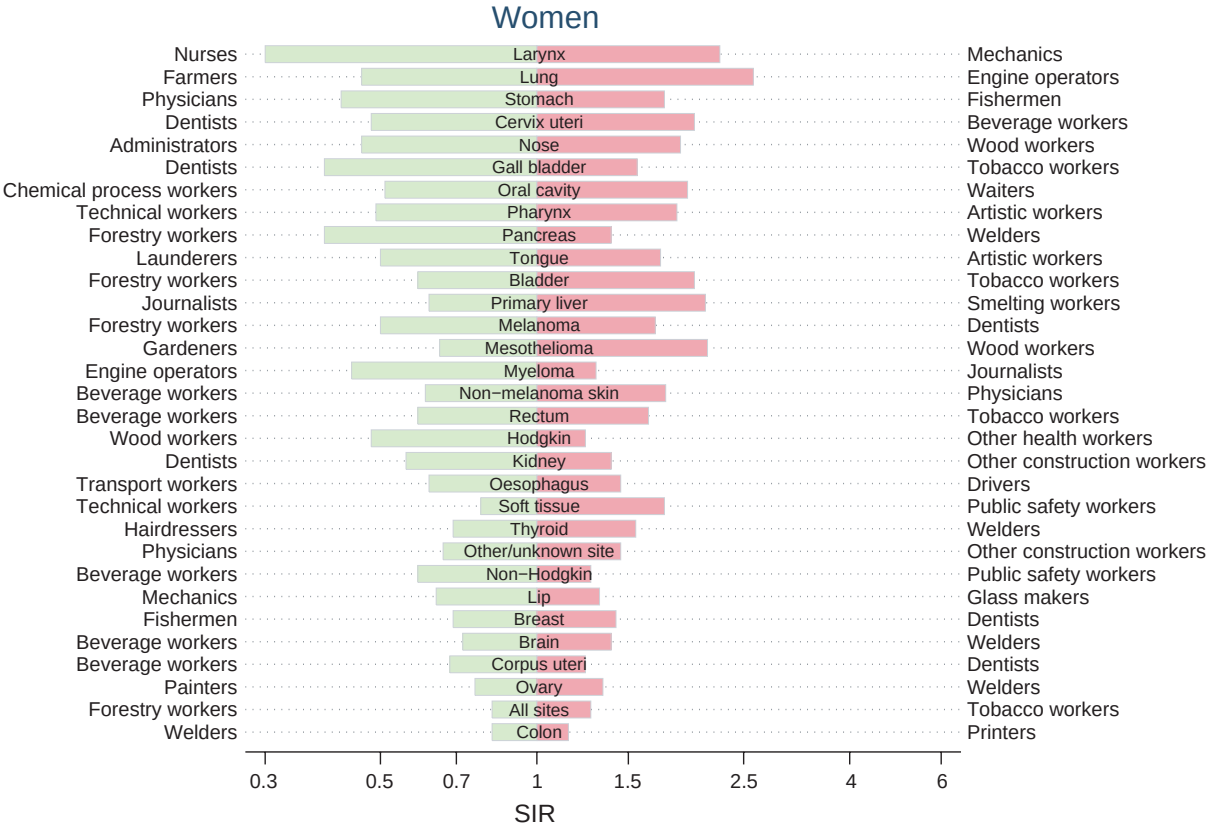


Figure 51. Risk of cancer in occupations with the highest and lowest standardised incidence ratios (SIR), by gender. Only occupations with ≥1 000 workers, ≥5 observed cases and ≥5 expected cases have been included.

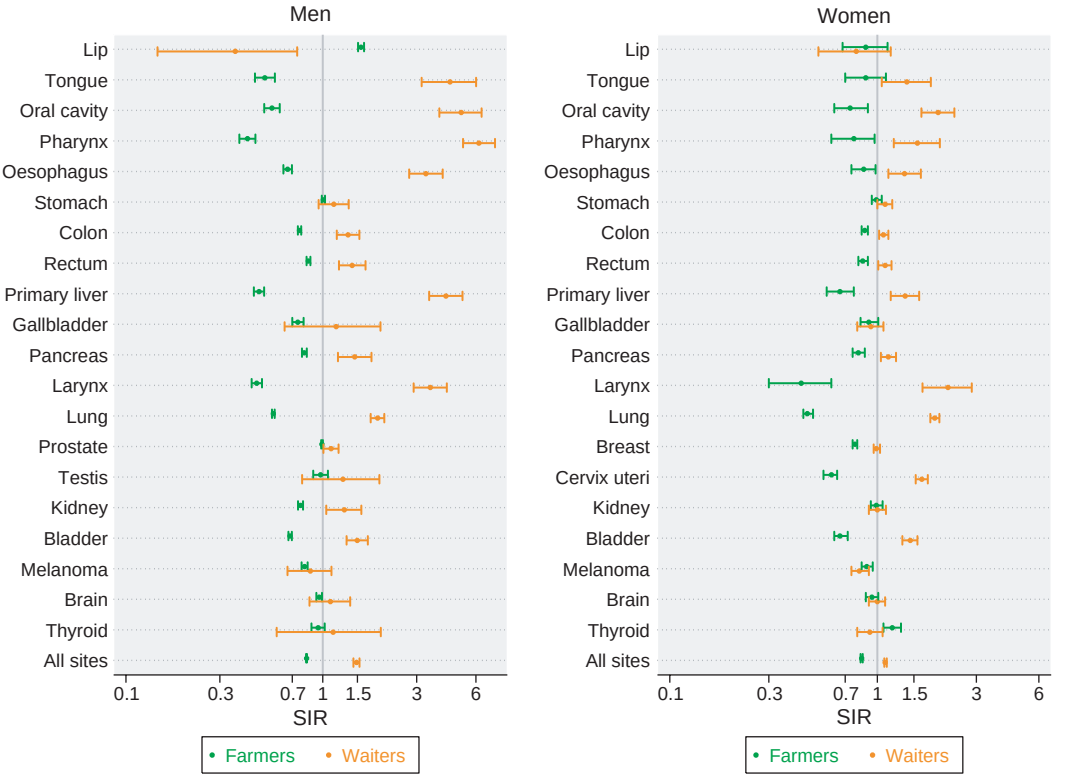


Figure 52. Standardised incidence ratios (SIR) and 95% confidence interval for selected cancers among farmers and waiters, by gender.

well as for multiple myeloma (Figure 51). Beverage workers, tobacco workers or waiters came out with the highest risk on cancer of the pancreas, non-Hodgkin lymphoma, kidney, thyroid and rectum. Tobacco smoking could be a risk factor behind the observed increase in cancers of the pancreas and kidney. Hence, even the high risks for less discriminating cancers aggregated in certain occupations.

The fact that a given occupational category can be at the highest risk for one cancer site and at the lowest risk for another reflects the differences in aetiology across cancer sites. Male dentists, for instance, had the highest risk for skin melanoma and the lowest risk for stomach cancer. Exactly the opposite pattern was found for fishermen, who had the lowest risk for melanoma and the highest risk for stomach cancer. Such differences were balanced out when all cancer sites were considered together, resulting in similar overall cancer incidence for dentists (SIR 0.97, 95% CI 0.94–1.01) and fishermen (1.02, 1.00–1.04).

For women, less difference in the risk variations across cancer sites was found (Figure 50). A more than fivefold risk variation was found only for cancers of the larynx and lung. A risk variation of less than two was found for cancer of the brain, corpus uteri, ovary and colon. Diverging aetiologies of cancers were also shown in the data for women. Dentists, for instance, had the highest risk for cancer of the corpus uteri with an SIR of 1.24 (1.00–1.51) versus an SIR of 0.68 (0.47–0.96) for beverage workers. The pattern was exactly opposite for cervical cancer, with beverage workers having an SIR of 2.01 (1.51–2.61) and dentists having an SIR of 0.48 (0.30–0.74).

There was a much more varied pattern for women than for men in the occupational categories coming up as either high or low risk groups. While either beverage workers, tobacco workers or waiters came out as the high risk group for 15 of 29 cancer sites for men, these occupational categories came out as the high risk group for only six of 30 cancer sites for women. This might be related to the lower occupational stability for women in these categories.

Economic inactive persons

The SIRs for the category of economic inactive persons were given for every cancer site but not commented upon in the Result chapter because this category was not considered as a real occupational category. The definition also varies over the Nordic countries. While the Danish, Icelandic, Norwegian and Swedish definitions include jobs held for a relatively short period and part-time jobs with few working hours, the Finnish definition sets a threshold for inclusion as occupationally active of approximately 20 working hours a week at the

time of the census. These differences will probably not have affected the classification of men, but part-time working women could have been classified differently across the countries. There are differences across the countries in the way a distinction was made between economically inactive housewives and economically active housewives at the family farm or in the family shop.

The proportion of economically inactive men of the total 30–64-year-old male population at the time of the first available population census of the current study was 7.3%, including a great proportion of men unable to work, for instance due to a disease. The large category of economically inactive women (42.4% of the total 30–64-year-old female population) included housewives and farmers' spouses not taking part in farm work and was thus less selected in terms of health status than that of males.

The total cancer incidence among economically inactive men was 6% (95% CI 5%–7%) larger than the incidence among economically active men, whereas there was a slightly decreased cancer incidence among the economically inactive women (SIR 0.99, 95% CI 0.98–0.99). (http://astra.cancer.fi/NOCCA/Incidence/economically-inactive). The highest site-specific SIRs among economically inactive men were obtained for alcohol-related cancers of the pharynx other than nasopharynx (2.08, 1.94–2.23), oral cavity (1.73, 1.60–1.87), tongue (1.59, 1.44–1.75), liver (1.54, 1.46–1.62), oesophagus (1.50, 1.43–1.58), and larynx (1.42, 1.35–1.50). The SIR for lung cancer was 1.33 (1.31–1.35), indicating that economically active men also smoked more than men on average. Besides the common cancer sites illustrated in Figure 53, penile cancer also showed a significant excess (SIR 1.40, 1.25–1.56) quite consistently across the Nordic countries (Table 49). There is no obvious explanation for this finding. The SIRs were lowest for skin melanoma (0.70, 0.67–0.74) and prostate cancer (0.80, 0.79–0.82), suggesting that economically inactive men do not get sunburns and do not go to PSA tests as frequently as other men.

The elevated SIR of 1.34 (1.24–1.45) for cancer of the gallbladder among economically inactive men might be related to obesity, which is likely to be more common among economically inactive men than among economically active ones. Cancer of the gallbladder was the only cancer to show a significant more than 5% excess risk among economically inactive women, but the SIR was not higher than 1.07 (1.05–1.09). The SIR was lowest in cancer of the Fallopian tube (0.88, 0.82–0.94).

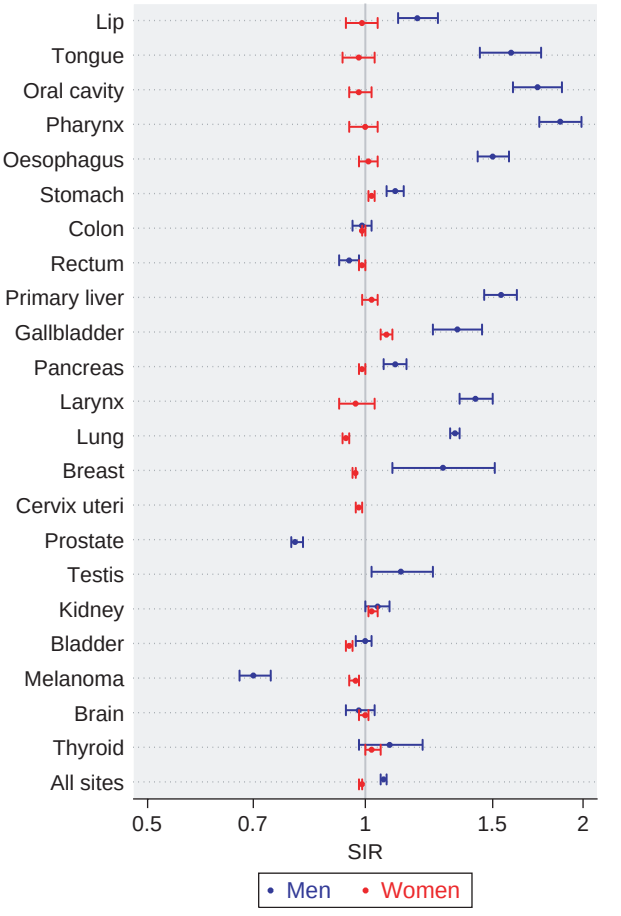


Figure 53. Standardised incidence ratios (SIR) and 95% confidence intervals for selected cancers among economically inactive men and women.

Conclusions

The surveillance system described in this publication systematically produced standardised incidence ratios (SIRs) among men and women in all five Nordic countries for all main cancer sites by occupation. It was based on the computerised record linkage of the nationwide population-based cancer Registries and population census files including occupational data from a time-point 0–45 years prior to the cancer diagnosis. Because of the high coverage, precision and validity of the linked files, the cancer risk estimates can be considered very reliable, and the large numbers of cases downplay the role of chance variation even in the case of relatively rare cancer forms. For the many small occupational categories and cancer sites, the possibility to combine data from several countries made it possible to get meaningful risk evaluations, and the possibility for five independent country-specific observations to have a tool to estimate consistency of the findings.

The occupation at one point in time may not always correspond to the lifelong occupational history of a person. However, comparison with

results of special occupational cancer studies indicates that the risk diluting effect of misclassification is small. The study was able to find well-known, confirmed occupational risks such as a high lip cancer incidence in farmers and fishermen. Comparisons made earlier have indicated that even the numerical relative risk estimates derived from register-based analyses like the present one have repeatedly been seen to be similar to those obtained in studies investigating more specific hypotheses [6,173]. Because the present survey was based on incident cancer cases and exact person-years, there was no bias caused by occupational variation in cancer survival and in mortality from competing causes of death that may be a serious problem in analyses based on cancer deaths and cross-sectional proportionate analyses.

Known or suspected associations, such as a high risk of nasal adenocarcinoma among woodworkers, mesothelioma among asbestos exposed workers, and lung cancer among asbestos and silica dust exposed workers, can be picked up from the numerous site and occupation-specific risk ratios. Sedentary workers tend to have an increased risk of breast cancer, while the association with colon cancer was not so evident. Skin melanoma was most common among indoor workers who are not used to sun radiation and thus easily burn due to intensive sunbathing during the holidays.

Thousands of new significant associations came up, and these should be confirmed in other studies before they can be believed to be true causal associations. For instance in ovarian cancer, especially borderline tumours, there was a cluster of chemical-exposed occupations with a high risk. Even in such a rare disease as male breast cancer there were enough cases (2 336) to reveal a hint of an increase in risk in occupations characterised by shift work. The rare occupational category of chimney sweeps, who are exposed to known carcinogens, showed a significant excess risk of cancers of the pharynx, oesophagus, lung, colon, pancreas and bladder.

Occupation-related social factors seem to be more important determinants of some cancer risks than the real occupational ones. There were high risks of alcohol-related cancers among workers having easy access to alcoholic beverages in their work. Occupations can also create a protective environment against cancer: it is not suitable for a primary school teacher, dentist or priest to smoke at work (or elsewhere), which is reflected in a low incidence of smoking-related cancers.

Cancer is socially discriminating, more so for men than for women. The highly discriminating cancers were found to be those aetiologically related to asbestos, sunlight, and tobacco and/or alcohol exposures. Occupational categories of high risk for one cancer may be of low risk for another cancer, and this resulted in the present study in a 1.9-fold variation in the overall cancer risk for men and in a 1.5-fold variation for women. It was estimated from a similar results pattern in Finland from 1971–1985 that some 5% of all cancers both in males and in females would be related to work, and about 35% of cancer incidence in males and 16% in females would be attributable to socio-economic position [6]. The current risk estimates indicate that the population attributable fractions for the Nordic region would still be of similar magnitude.

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Appendix 1. Abbreviations of the occupational categories defined by NYK-codes and ISCO-1958 codes.

No	Occupational category	Abbreviation	NYK	ISCO
1	Technical, chemical, physical and biological workers	Technical workers, etc.	00, 01, 02(except 013)	00, 01, 02, 0X1
2	Laboratory assistants	Laboratory assistants	013	0X9
3	Physicians	Physicians	030, 031	031
4	Dentists	Dentists	032	032
5	Nurses	Nurses	040, 041, 042	041, 042
6	Assistant nurses	Assistant nurses	045	04920
7	Other health and medical workers	"Other health workers"	043, 046, 047, 049, 05	04990, 05
8	Teachers	Teachers	06	06
9	Religious, juridical and other social science related workers	Religious workers etc.	07, 08, 0x	07, 08, 0Y
10	Artistic workers	Artistic workers	09 (except 095)	091, 093
11	Journalists	Journalists	095	092
12	Administrators and managers	Administrators	10, 11	10, 11
13	Clerical workers	Clerical workers	20, 21, 29	20, 21, 29
14	Sale and agents	Sales agents	30, 31, 32, 33 (except 332, 333)	30, 31, 32., 332, 339
15	Shop managers and assistants	Shop workers	332, 333	331
16	Farmers	Farmers	401, 404, 411	40110–40166, 40190, 41110–41150, 41175–41190
17	Gardeners and related workers	Gardeners	40, 41, 42 (except 401, 404, 411)	40169–40184, 41155–41170, 42
18	Fishermen, whalers and sealers	Fishermen	43	43
19	Forestry workers	Forestry workers	44	44
20	Miners and quarriers	Miners and quarry workers	50, 51, 52, 59	50, 51, 52, 59
21	Seamen	Seamen	60, 61	60, 61
22	Transport workers	Transport workers	62, 63, 65, 66, 69	62, 63, 65, 66, 69
23	Drivers	Drivers	64	64
24	Postal and communication workers	Postal workers	67, 68	67, 68
25	Textile workers	Textile workers	70, 71	70, 71
26	Shoe and leather workers	Shoe and leather workers	72	72
27	Smelters and metal foundry workers	Smelting workers	73	73
28	Mechanics, iron and metalware workers	Mechanics	75 (except 755, 756)	75010–75490, 75705–75990
29	Plumbers	Plumbers	755	755
30	Welders	Welders	756	756
31	Electrical workers	Electrical workers	76	76
32	Wood workers	Wood workers	77	77
33	Painter and wall paperhangers	Painters	78	78
34	Other construction workers	"Other construction workers"	79 (except 791)	79210–79990
35	Bricklayers	Bricklayers	791	791
36	Printers and related workers	Printers	80	80
37	Chemical process workers	Chemical process workers	83	83
38	Food manufacture workers	Food workers	82 (except 824)	82120–82390, 82510–82990
39	Beverage manufacture workers	Beverage workers	824	824
40	Tobacco manufacture workers	Tobacco workers	84	84
41	Glass, ceramic and tile workers and others	Glass makers etc.	81, 85	81, 85
42	Packers, loaders and warehouse workers	Packers	86, 88	86, 88
43	Engine and motor operator workers	Engine operators	87	87
44	Public safety and protection workers	Public safety workers	90	90
45	Cooks and stewards	Cooks and stewards	911, 912	911, 912
46	Domestic assistants	Domestic assistants	914, 915	91920, 91930, 91940
47	Waiters	Waiters	92	92
48	Building caretakers and cleaners	Building caretakers	93 (except 933)	93120, 93230, 93290
49	Chimney sweeps	Chimney sweeps	933	93240
50	Hairdressers	Hairdressers	941	94140, 94150, 941, 90
51	Launderers and dry-cleaners	Launderers	95	95
52	Military personnel	Military personnel	X1	Armed forces
53	Other economically active persons	"Other workers"	74, 89, 96, 97, 99, 913, 916, 917, 919, 942, 98, X2	Remaining codes
54	Economically inactive persons	Economically inactive		

Appendix 2. Description of the occupational categories.

No	Occupational category	Description
1	Technical, chemical, physical and biological workers	Includes engineers, physicists, architects, chemists, geologists, biologists, meteorologists and related professionals. Their main tasks require a high level of professional knowledge and experience.
2	Laboratory assistants	Includes life science technicians, pharmaceutical assistants, laboratory technicians, and other health professional assistants. Their main tasks involve preparing materials and equipment for experiments, tests and analyses. They collect and prepare specimens such as plant, animal, or human cells and tissues. They assist with and perform experiments and analyses. The pharmaceutical assistants handle medicaments.
3	Physicians	Includes medical doctors.
4	Dentists	Includes all types of specialists and researchers in the field of odontology.
5	Nurses	Includes nurses in somatic and psychiatric hospitals, and in the field of health prevention. They give first aid treatment and dispense medications to patients.
6	Assistant nurses	Includes workers assisting physicians, nurses and midwives in their practical application of preventive and curative measures. They provide caring services for the sick and injured.
7	Other health and medical workers	Includes veterinarians, pharmacists, physiotherapists, and other types of health professionals not included in the occupational categories 05 or 06. Some of them perform technical tasks related to research and practical application and operational methods in the field of medicine, veterinary medicine, dentistry, pharmacy, sanitation. Pharmacists prepare and handle medicaments.
8	Teachers	Includes teachers at pre-school, primary and secondary schools, college, university, and special education professionals. The majority works at primary schools.
9	Religious, juridical and other social science related workers	Includes religious and legal professionals, archivists, librarians, economists, sociologists, psychologists and social work professionals. The tasks of religious professionals include ritual services, various administrative and social duties. Legal professionals advise clients on legal problems and plead cases or conduct prosecutions in courts of justice. Social science and related professionals conduct research, or apply knowledge relating to philosophy, politics and economics.
10	Artistic workers	Includes authors (excluding journalists, cf. occupational category 11), sculptors, painters and related artists, painting restorers, composers, singers, musicians, dancers and other types of artists.
11	Journalists	Includes all types of journalistic work. The tasks include collecting, reporting and commenting on news and current affairs for publication in newspapers and periodicals, or for broadcasting by radio or television.
12	Administrators and managers	Includes senior officials, managers and legislators working on behalf of governments, regional or local administrators, political parties, trade unions, and other organisations and enterprises.
13	Clerical workers	Includes secretaries and clerical workers in banks and insurance companies, accounting and bookkeeping clerks, keyboard-operating clerks, and other types of office workers.
14	Sale and agents	Includes finance and sales associate professionals and business service agents and trade brokers. They sell insurances, real estate, travel services and other business services, and they act as wholesale representatives.
15	Shop managers and assistants	Includes shop managers and shop sale persons, who sell goods in retail establishments and explain functions of these goods.
16	Farmers	Includes field crop and vegetable growers, market oriented animal producers and related workers. Tasks performed include purchasing seeds, fertiliser and other supplies; buildings and machinery; performing farm operation, sowing, cultivating and harvesting crops; breeding, raising and tending animals; maintaining farm buildings, machinery and equipment.
17	Gardeners and related workers	Includes gardeners, horticultural and nursery growers. They plan and carry out the necessary operations to grow vegetables, cultivate trees, shrubs, flowers and other plants, and they produce saplings, bulbs and seeds for sale.
18	Fishermen, whalers and sealers	Includes fishermen, whale and seal hunters. They catch fish and gather other forms of aquatic life for sale or delivery to wholesale buyers or at markets. Whale and seal hunters are present only in Iceland and in Norway. They catch animals for meat, skin and other products for sale.
19	Forestry workers	Includes forestry workers and loggers. Forestry workers cultivate, conserve and exploit forest for delivery of forestry products to wholesale buyers.
20	Miners and quarriers	Includes miners and quarry workers who extract coal and solid minerals from underground or surface mines and granite, limestone and other kinds of rocks from quarries. They set up and operate machines which cut channels or drill blasting holes into the open face of mines and quarries.
21	Seamen	Includes all types of seamen, both sailors working on deck and in engine rooms. Ship deck crews and related workers carry out deck duties on board ships. The ship deck officers command and navigate ships. Ship engineers control and participate in the operation, maintenance and repair of the mechanical and electrical machinery on board.
22	Transport workers	Includes railway staff, buss and train staff, except drivers, and aircraft pilots, traffic supervisors and other transport and communication workers.
23	Drivers	Includes car, taxi, van, bus, motor-cycle, tram, heavy truck and lorry drivers. Their tasks include driving and tending their vehicles in order to transport materials, goods, and passengers.
24	Post and communication workers	Includes postal workers such as mail carriers, sorting clerks and telephone switchboard operators. Communication workers include telegraph operators and other types of communication workers.
25	Textile workers	Includes textile work such as operators of fibre preparing, spinning, winding, weaving, knitting, sewing, bleaching, dyeing, and fur preparing machines.
26	Shoe and leather workers	Includes shoe and leather workers who produce and repair footwear, handbags, etc. Leather workers treat hides and skins in solutions and apply finishing product to convert them into leather.
27	Smelters and metal foundry workers	Includes ore and metal furnace operators, metal smelters, casters and rolling mill operators, metal heat treating plant operators and metal drawers and extruders. Their tasks include operating and monitoring furnaces for ore smelting, refining, converting or reheating metal.
28	Mechanics, iron and metal ware workers	Includes workers who make products of metal, and assemble and repair machines and motors. The Danish data also include welders in this category, cf occupational category 30.

Appendix 2 (*Continued*)

No	Occupational category	Description
29	Plumbers	Workers in this category assemble, fit, install and repair pipes and pipeline systems for drainage, heating, water supply, and sanitary systems.
30	Welders	Workers in this category join and cut metal parts using flame, electric arc and other sources of heat to melt and cut or fuse metal. The Danish welders are included in the mechanic workers (occupational category 28).
31	Electrical workers	Workers in this category fit, assemble, install, maintain and repair electrical and electronic equipment such as electrical motors, generators, instruments, signal transmitters and receivers, domestic appliances, switchgear, and control apparatus. They install and service electrical wiring systems in homes, industrial plants, ships, motor vehicles, and aircrafts, and install and service electrical power transmission cables, telephone and telegraph lines and related equipment.
32	Wood workers	Workers in this category prepare and treat wood, and make, assemble and repair constructions and products of wood.
33	Painters and wall paperhangers	Painters prepare structural surfaces for painting and apply decorative and protective coatings to buildings, ships, motor vehicles and articles of wood, metal, textile and other materials. Wall paperhangers cover interior walls and ceilings.
34	Other construction workers	Includes workers in the building and construction industry who do not constitute separate occupational categories in this study. Included here are reinforced concreters, cement finishers, terrazzo workers, insulators, glaziers, underwater workers, and other unspecified building and construction workers.
35	Bricklayers	Workers in this category erect and repair foundations, walls and complete structures of brick, stone and similar materials and cover and decorate walls, ceilings and floors of buildings with tiles and mosaic panels.
36	Printers and related workers	Workers in this category compose type, cast and engrave printing plates and operate printing presses to print text and illustrations. Includes type setters, printers (not textile printers) and book binders.
37	Chemical process workers	Workers in this category distil, refine, cook, roast and grind chemicals, prepare pulp for paper production, and make paper.
38	Food manufacture workers	Workers in this category prepare food products of all kind for human and animal consumption. Includes occupations such as grain millers, butchers and meat preparers, food preservers, dairy product processors, fish plant workers, bakers, pastry cooks and confectionery makers.
39	Beverage manufacture workers	Workers in this category produce liquor, wine, beer, soft drinks and mineral water.
40	Tobacco manufacture workers	Workers in this category prepare and treat tobacco leaves and make cigarettes, cigars, and other tobacco products.
41	Glass, ceramic, and tile workers and others	Includes glass formers and cutters, potters, glass and ceramics kiln men, glass engravers and etchers, glass painters and decorators, rubber and plastic product makers, tanners, fellmongers and pelt dressers, musical instrument makers and tuners, stonecutters and carvers, paper and paperboard products makers, and other small categories.
42	Packers, loaders and warehouse workers	Workers in this category perform freight handling tasks, such as loading and unloading ship, aircraft and train cargoes and other freight, wrapping objects, packing liquids, materials and objects in containers, affixing labels on containers, rigging cables, wires and ropes for lifting, hauling and other purposes, and operating specialised vehicles to lift, move, dump and stack materials in warehouses.
43	Engine and motor operator workers	Includes stationary engine operators, crane and hoist operators, earth moving and related operators, truck drivers and motor vehicle operators.
44	Public safety and protection workers	Workers in this category protect individuals and property against hazards and enforce law and order. Fire-fighters, policemen and detectives, customs officers, guards, and watchmen are included.
45	Cooks and stewards	Workers in this category prepare and cook in hotels, restaurants, other public eating places, aboard ships, aeroplanes and on railway trains.
46	Domestic assistants	Domestic assistants clean rooms, wash dishes, do laundry and ironing, and perform additional domestic duties in private homes. They may also prepare food and serve meals.
47	Waiters	Includes waiters, bartenders and related workers who serve food and beverages in dining and drinking places, clubs, institutions and canteens, on board on ships and on railway trains.
48	Building caretakers and cleaners	Workers in this category take care of apartment houses, office buildings and other buildings and maintain them in an orderly and clean condition. Tasks may include operating furnaces or boilers to provide heat and hot water for tenants.
49	Chimney sweeps	Chimney sweeps remove soot from flues, chimneys and connecting pipes, and may also clean furnaces and boilers.
50	Hairdressers	Includes hairdressers, barbers, beauticians and others. Workers holding these occupations typically shampoo, cut and style hair and apply hair colorants, waving and straightening preparations and conditioners, or they give various beauty treatments to customers, apply make up to actors and other performers, and make wigs.
51	Launders and dry-cleaners	Workers in this category launder, dry clean and press clothing, textile fabrics and similar products.
52	Military personnel	Includes professional military personnel who lead, plan, organise and execute military work.
53	Other economically active persons	This category consists of all occupational titles not included in previous occupational categories (1–52) such as precision mechanic workers, athletes and sportsmen, photographers, bath attendants, and several subcategories of service workers.
54	Economically inactive persons	Includes housewives, early pensioners, students and persons on social support and was defined somewhat differently in the respective countries.

Appendix 3. Number of persons under follow-up by gender, country and occupational category.

		Men						Women					
No	Occupational category	Denmark	Finland	Iceland	Norway	Sweden	Total	Denmark	Finland	Iceland	Norway	Sweden	Total
1	Technical workers, etc	63 923	125 200	1 602	58 282	323 859	572 866	3 252	17 865	320	2 743	24 778	48 958
2	Laboratory assistants	1 277	3 330	337	2 562	3 146	10 652	2 632	7 930	381	2 923	12 182	26 048
3	Physicians	5 019	7 250	515	7 037	19 428	39 249	1 084	4 770	64	1 177	7 281	14 376
4	Dentists	1 579	1 500	136	2 931	7 393	13 539	913	2 950	20	832	3 987	8 702
5	Nurses	84	925	17	673	3 558	5 257	18 066	40 280	1 464	22 894	66 368	149 072
6	Assistant nurses	1 564	990	203	1 101	9 527	13 385	13 965	32 880	2 351	22 749	131 030	202 975
7	Other health workers	4 501	6 915	157	2 948	14 700	29 221	10 150	30 715	511	21 069	46 887	109 332
8	Teachers	27 323	42 280	2 139	42 318	91 959	206 019	23 891	63 650	2 822	41 909	151 696	283 968
9	Religious workers etc.	10 804	33 060	1 377	20 742	93 148	159 131	3 115	50 105	408	10 572	70 633	134 833
10	Artistic workers	3 863	9 620	376	5 627	21 830	41 316	1 583	6 630	297	2 910	11 072	22 492
11	Journalists	1 809	4 550	232	2 719	10 817	20 127	401	3 730	87	878	5 333	10 429
12	Administrators	68 398	63 430	2 299	66 253	106 335	306 715	9 150	14 280	171	9 883	24 798	58 282
13	Clerical workers	32 234	39 780	3 314	47 957	120 972	244 257	96 861	223 550	8 526	119 471	331 834	780 242
14	Sales agents	17 294	62 545	1 499	55 942	191 288	328 568	819	28 075	656	14 171	43 817	87 538
15	Shop workers	69 840	30 040	1 467	24 155	56 321	181 823	60 582	86 295	4 602	86 880	138 259	376 618
16	Farmers	110 708	183 300	3 977	118 336	206 119	622 440	39 960	47 405	2 544	50 983	17 623	158 515
17	Gardeners	16 927	34 885	153	30 359	87 080	169 404	5 214	110 620	104	29 805	32 178	177 921
18	Fishermen	7 053	2 970	4 907	42 711	9 285	66 926	212	370	129	528	144	1 383
19	Forestry workers	2 411	43 125	37	21 758	65 171	132 502	57	630	21	595	943	2 246
20	Miners and quarry workers	866	7 560	75	7 761	18 830	35 092	5	220	2	50	265	542
21	Seamen	8 936	10 230	1 001	42 936	18 637	81 740	–	175	2	117	93	387
22	Transport workers	14 669	25 480	1 318	18 669	51 230	111 366	60	3 565	94	636	3 962	8 317
23	Drivers	54 493	98 520	2 561	62 662	158 482	376 718	1 637	2 685	62	2 156	9 415	15 955
24	Postal workers	9 871	15 835	287	11 671	36 898	74 562	3 159	25 840	1 277	21 634	46 214	98 124
25	Textile workers	8 679	7 840	462	9 893	28 828	55 702	21 262	53 985	1 969	28 049	67 243	172 508
26	Shoe and leather workers	2 177	3 435	94	4 365	10 822	20 893	1 617	6 590	112	2 018	5 182	15 519
27	Smelting workers	22 510	13 370	738	15 974	51 794	104 386	413	1 505	7	372	2 603	4 900
28	Mechanics	57 488	108 325	3 227	85 784	286 407	541 231	4 193	8 285	25	2 956	25 246	40 705
29	Plumbers	5 379	17 990	446	10 624	31 593	66 032	26	30	–	27	77	160
30	Welders	–	21 045	216	12 289	41 307	74 857	–	815	4	322	1 465	2 606
31	Electrical workers	14 402	50 815	2 082	38 002	106 533	211 834	6 027	7 585	28	3 299	14 589	31 528
32	Wood workers	36 525	88 585	1 485	81 152	161 084	368 831	1 819	12 435	53	1 208	4 747	20 262
33	Painters	12 840	21 020	576	14 940	49 367	98 743	74	1 700	16	244	1 181	3 215
34	Other construction workers	45 564	60 260	3 529	19 883	89 224	218 460	60	4 375	13	113	253	4 814
35	Bricklayers	13 939	9 560	–	8 344	19 242	51 085	10	160	–	7	12	189
36	Printers	9 422	12 065	528	10 551	30 730	63 296	2 129	8 395	246	2 921	9 513	23 204
37	Chemical process workers	7 912	16 580	240	19 353	40 457	84 542	3 315	3 435	81	2 437	6 510	15 778
38	Food workers	26 395	11 830	2 389	22 426	39 349	102 389	15 544	17 060	5 514	14 427	16 357	68 902
39	Beverage workers	3 685	690	39	483	2 369	7 266	1 645	890	12	146	981	3 674
40	Tobacco workers	515	125	1	349	219	1 209	2 228	490	–	527	681	3 926
41	Glass makers etc	15 129	18 575	449	12 109	47 264	93 526	4 088	13 225	157	5 191	17 866	40 527
42	Packers	13 702	34 510	1 312	34 542	82 644	166 710	1 104	22 555	447	12 056	25 559	61 721
43	Engine operators	13 794	51 680	2 054	24 073	77 091	168 692	55	4 080	11	264	2 776	7 186
44	Public safety workers	11 840	28 390	1 153	14 890	49 131	105 404	116	1 290	100	1 571	5 301	8 378
45	Cooks and stewards	1 402	3 255	762	8 251	12 995	26 665	47	29 580	1 612	15 572	32 944	79 755
46	Domestic assistants	21	105	3	101	2 817	3 047	23 058	39 600	410	43 499	141 608	248 175
47	Waiters	3 109	3 385	105	3 382	6 153	16 134	4 685	26 355	252	18 911	31 635	81 838
48	Building caretakers	13 531	22 215	357	8 656	41 670	86 429	68 253	90 070	3 151	82 850	107 640	351 964
49	Chimney sweeps	402	1 635	–	798	2 663	5 498	3	40	–	9	7	59
50	Hairdressers	3 756	575	89	2 236	7 070	13 726	4 422	10 950	359	5 202	18 946	39 879
51	Launderers	1 765	525	35	1 275	5 144	8 744	7 434	5 910	416	6 254	14 738	34 752
52	Military personnel	7 114	11 330	–	12 164	25 295	55 903	37	160	–	39	204	440
53	Other workers	48 633	28 740	4 519	62 534	95 970	240 396	20 467	32 380	4 140	44 568	51 691	153 246
54	Economically inactive	58 500	169 040	4 563	48 728	262 390	543 221	526 871	524 840	13 506	513 789	1 578 776	3 157 782
1–54	All categories	995 576	1 670 815	61 439	1 286 261	3 433 635	7 447 726	1 017 770	1 733 985	59 556	1 276 413	3 367 123	7 454 847

Appendix 4. Number of persons-years under follow-up by gender, country and occupational category.

		Men						Women					
No	Occupational category	Denmark	Finland	Iceland	Norway	Sweden	Total	Denmark	Finland	Iceland	Norway	Sweden	Total
1	Technical workers, etc	1 663 926	2 799 854	33 438	1 649 937	8 623 953	14 771 108	89 989	372 034	6 098	70 847	587 599	1 126 567
2	Laboratory assistants	32 649	75 314	6 577	72 724	76 088	263 352	75 277	183 900	7 660	76 156	253 033	596 026
3	Physicians	126 160	162 581	10 153	190 548	451 235	940 677	29 220	96 460	1 079	32 107	156 523	315 389
4	Dentists	41 424	32 745	2 928	82 288	191 711	351 096	25 359	69 478	408	24 513	95 588	215 346
5	Nurses	2 227	17 426	273	16 266	65 233	101 425	506 142	939 978	30 031	586 421	1 634 590	3 697 162
6	Assistant nurses	41 585	17 680	3 143	30 017	198 190	290 615	394 624	825 747	44 403	556 157	3 141 692	4 962 623
7	Other health workers	112 266	146 714	3 152	76 412	358 743	697 287	284 500	711 985	10 140	546 370	1 104 254	2 657 249
8	Teachers	736 534	1 032 453	42 626	1 159 719	2 431 830	5 403 162	688 370	1 527 302	57 138	1 127 220	3 768 901	7 168 931
9	Religious workers etc.	268 220	701 707	27 933	554 313	2 147 538	3 699 711	87 720	1 022 158	8 154	273 265	1 523 172	2 914 469
10	Artistic workers	89 878	213 900	7 323	154 342	548 749	1 014 192	41 705	143 247	6 113	78 007	255 811	524 883
11	Journalists	43 909	100 836	4 509	73 435	265 940	488 629	10 654	85 487	1 688	22 801	123 512	244 142
12	Administrators	1 684 513	1 468 028	46 847	1 783 590	2 796 834	7 779 812	246 049	300 554	3 602	250 639	566 971	1 367 815
13	Clerical workers	806 624	910 310	64 602	1 364 682	3 249 702	6 395 920	2 735 026	5 253 298	168 140	3 249 608	8 795 690	20 201 762
14	Sales agents	433 719	1 419 569	29 721	1 506 381	4 915 784	8 305 174	22 319	649 464	13 535	374 164	1 081 182	2 140 664
15	Shop workers	1 682 959	693 310	27 707	675 880	1 561 773	4 641 629	1 672 882	2 303 414	91 977	2 321 296	4 178 833	10 568 402
16	Farmers	2 803 855	4 285 694	80 628	3 248 218	5 670 523	16 088 918	1 150 794	1 081 805	53 644	1 335 746	428 524	4 050 513
17	Gardeners	411 413	839 790	2 944	887 573	2 425 675	4 567 395	147 391	3 161 766	2 006	797 358	1 016 036	5 124 557
18	Fishermen	170 809	65 437	94 090	1 170 043	251 330	1 751 709	6 098	8 852	2 675	12 397	3 824	33 846
19	Forestry workers	58 022	1 012 022	702	616 252	1 782 062	3 469 060	1 585	16 970	368	15 793	26 233	60 949
20	Miners and quarry workers	19 595	171 230	1 396	212 147	496 253	900 621	132	5 862	38	1 190	7 130	14 352
21	Seamen	209 956	237 934	19 024	1 182 959	470 783	2 120 656	–	3 422	33	3 066	1 574	8 095
22	Transport workers	364 831	600 801	25 921	542 046	1 470 917	3 004 516	1 706	95 132	1 998	16 582	90 447	205 865
23	Drivers	1 331 245	2 325 417	50 595	1 718 031	4 223 821	9 649 109	45 120	63 297	1 304	52 862	234 619	397 202
24	Postal workers	265 932	350 794	5 305	307 643	916 029	1 845 703	86 381	664 664	26 132	594 429	1 330 388	2 701 994
25	Textile workers	203 247	187 807	8 917	282 178	773 107	1 455 256	581 940	1 429 164	40 352	803 882	2 078 758	4 934 096
26	Shoe and leather workers	47 764	79 813	1 758	114 419	276 043	519 797	44 162	177 196	2 351	59 168	163 332	446 209
27	Smelting workers	546 418	311 992	14 220	433 504	1 352 019	2 658 153	11 068	40 505	116	8 772	65 722	126 183
28	Mechanics	1 408 520	2 443 311	61 463	2 377 508	7 532 862	13 823 664	115 394	209 040	534	80 511	634 412	1 039 891
29	Plumbers	133 998	413 640	8 761	291 864	853 787	1 702 050	681	650	–	634	1 547	3 512
30	Welders	–	473 825	4 140	347 752	1 088 629	1 914 346	–	19 619	88	7 819	32 238	59 764
31	Electrical workers	365 336	1 128 116	40 601	1 065 532	2 817 110	5 416 695	164 107	173 099	476	90 967	366 090	794 739
32	Wood workers	903 946	1 998 181	28 168	2 302 125	4 204 345	9 436 765	50 474	339 752	960	29 688	115 278	536 152
33	Painters	314 621	475 904	10 998	399 519	1 283 477	2 484 519	2 072	44 522	297	6 448	28 685	82 024
34	Other construction workers	1 055 827	1 333 336	68 419	526 046	2 309 207	5 292 835	1 523	119 258	221	2 602	5 285	128 889
35	Bricklayers	339 984	210 204	–	232 123	525 089	1 307 400	272	4 700	–	142	205	5 319
36	Printers	236 307	275 698	10 495	282 002	805 745	1 610 247	57 703	204 060	4 800	78 730	248 536	593 829
37	Chemical process workers	183 233	386 649	4 494	512 664	1 024 040	2 111 080	88 202	91 651	1 609	67 536	179 345	428 343
38	Food workers	633 652	276 424	42 914	605 654	1 052 983	2 611 627	427 167	462 184	108 187	387 797	469 086	1 854 421
39	Beverage workers	80 452	16 084	706	12 075	57 477	166 794	41 554	24 171	215	3 753	27 918	97 611
40	Tobacco workers	10 785	3 107	23	8 614	5 521	28 050	58 263	13 738	–	14 698	21 078	107 777
41	Glass makers etc	355 624	418 341	8 142	328 662	1 205 626	2 316 395	112 144	347 919	3 071	145 652	487 998	1 096 784
42	Packers	307 393	774 051	23 791	907 527	2 062 599	4 075 361	30 286	604 822	8 871	327 070	700 503	1 671 552
43	Engine operators	343 842	1 207 674	39 870	649 479	2 026 586	4 267 451	1 413	104 999	203	6 352	67 174	180 141
44	Public safety workers	297 658	643 632	22 362	402 482	1 265 497	2 631 631	2 917	28 690	1 923	36 407	106 389	176 326
45	Cooks and stewards	30 469	62 241	14 623	215 813	281 309	604 455	1 149	715 813	32 181	416 345	894 354	2 059 842
46	Domestic assistants	383	2 126	45	2 248	48 690	53 492	637 574	886 118	8 104	1 123 678	3 304 447	5 959 921
47	Waiters	62 189	63 542	1 955	86 340	140 283	354 309	121 783	659 908	4 722	506 116	941 957	2 234 486
48	Building caretakers	307 602	487 667	6 483	214 505	913 865	1 930 122	1 846 118	2 262 749	65 238	2 083 749	2 806 552	9 064 406
49	Chimney sweeps	9 641	36 454	–	21 370	70 121	137 586	96	1 133	–	243	165	1 637
50	Hairdressers	87 135	11 692	1 804	59 221	192 801	352 653	125 197	261 140	6 989	148 581	517 679	1 059 586
51	Launderers	41 028	11 835	576	33 953	139 678	227 070	202 008	159 350	8 608	169 320	443 427	982 713
52	Military personnel	187 460	266 456	–	377 966	706 458	1 538 340	987	3 860	–	858	4 088	9 793
53	Other workers	1 066 918	604 369	85 766	1 611 030	2 437 681	5 805 764	543 215	780 566	80 720	1 146 544	1 322 516	3 873 561
54	Economically inactive	897 264	2 741 222	80 084	959 903	4 881 084	9 559 557	13 430 302	12 964 766	266 457	14 276 412	47 657 779	88 595 716
1–54	All categories	23 860 947	37 026 939	1 183 115	34 939 524	87 924 415	184 934 940	27 048 814	42 721 418	1 185 657	34 449 468	94 098 669	199 504 026

Appendix 5. Number of new cancer cases during the follow-up period, by country. Men.

ICD-7	Site	Denmark	Finland	Iceland	Norway	Sweden	Total
140	Lip	2 645	3 231	45	2 996	5 560	14 477
141	Tongue	873	1 001	23	1 201	2 329	5 427
142	Salivary glands	542	597	18	553	1 642	3 352
143–144	Oral cavity	1 740	1 011	31	1 712	3 395	7 889
145–148	Pharynx	2 073	1 281	35	1 993	4 999	10 381
145	-oropharynx	1 148	506	10	760	1 956	4 380
146	-nasopharynx	312	263	10	358	1 037	1 980
150	Oesophagus	4 283	3 121	141	3 388	8 644	19 577
	-adenocarcinoma[1]	1 705	705	54	691	2 309	5 464
151	Stomach	9 637	14 687	424	19 346	35 291	79 385
151.1	-cardia	2 872	2 505	79	3 246	4 319	13 021
152	Small intestine	744	888	45	976	3 570	6 223
153	Colon	21 627	12 158	590	25 584	48 497	108 456
154	Rectum, rectosigma	15 156	10 067	216	15 629	33 586	74 654
155	Primary liver	3 206	3 613	68	1 951	8 892	17 730
	-hemangiosarcoma[1]	–	15	–	3	41	59
155.1	Gall bladder	1 753	1 935	35	1 441	3 397	8 561
157	Pancreas	7 993	8 962	219	9 672	20 099	46 945
160	Nose	747	520	21	770	1 465	3 523
	-adenocarcinoma[1]	–	35	2	103	246	386
161	Larynx	4 787	3 462	85	3 529	6 625	18 488
162,163	Lung	53 401	52 189	996	37 334	64 377	208 297
	-adenocarcinoma[1]	10 390	6 855	283	6 933	12 168	36 629
	-small cell[1]	–	8 050	198	6 246	5 705	20 199
	-squamous cell[1]	18 324	16 355	238	11 603	23 634	70 154
	-other[1]	–	20 929	254	8 792	22 870	52 845
158, 162.2	Mesothelioma[1]	1 365	1 046	23	1 062	2 521	6 017
170	Breast	486	294	27	402	1 127	2 336
177	Prostate	34 794	57 652	2 050	64 778	180 699	339 973
178	Testis	1 618	814	81	1 851	3 155	7 519
	-seminoma[1]	672	560	59	1 289	2 255	4 835
	-non-seminoma[1]	953	242	22	410	900	2 527
179	Penis	966	432	28	990	2 252	4 668
180	Kidney	6 375	9 716	373	9 491	24 389	50 344
	-renal pelvis[1]	2 491	608	21	1 089	2 526	6 735
181	Bladder	27 063	13 716	565	22 272	47 885	111 501
190	Melanoma	5 516	6 585	157	9 471	19 529	41 258
190.6	-upper limbs	658	839	23	862	2 872	5 254
192	Eye	678	658	16	792	1 858	4 002
	-melanoma[1]	595	593	13	697	1 509	3 407
193	Brain	6 434	6 511	229	6 891	17 706	37 771
	-glioma[1]	685	2 965	136	3 524	8 923	16 233
	-meningeoma[1]	817	1 344	56	1 117	3 775	7 109
194	Thyroid	577	1 512	130	1 295	2 973	6 487
	-follicular[1]	–	262	20	153	142	577
	-papillary[1]	–	902	95	670	403	2 070
195	Other endocrine organs	244	377	48	248	528	1 445
195	-glandula suprarenalis	147	280	6	159	327	919
195.1	-parathyreioeda	8	4	1	5	23	41
195.2	-thymus	69	74	4	68	139	354
195.3	-hypophysis	20	6	37	13	39	115
195.4	-corpus pineale	–	13	–	3	–	16
196	Bone	242	421	19	388	981	2 051
	-chondrosarcoma[1]	–	214	17	105	433	769
197	Connective tissue	867	1 512	43	1 168	4 607	8 197
	-fibrosarcoma[1]	–	526	–	111	691	1 328
	-liposarcoma[1]	–	328	14	190	794	1 326
200,202	Non-Hodgkin lymphoma	6 129	8 558	253	6 391	20 330	41 661
201	Hodgkin's lymphoma	977	1 288	31	1 240	3 291	6 827
203	Multiple myeloma	3 543	3 139	108	5 010	10 306	22 106
204	Leukaemia	7 537	5 689	188	7 033	15 735	36 182
	-chronic lymphatic[1]	–	2 466	64	2 563	7 224	12 317
	-acute myeloid[1]	2 150	1 567	61	2 516	3 403	9 697
191 or 205	Mycosis fungoides[1]	210	221	10	189	1 486	2 116
199	Other/Unknown	3 237	5 007	148	10 624	20 317	39 333
191	Non melanoma skin	–	7 122	223	12 547	30 398	50 290
191.6	-upper limbs	–	546	20	1 092	3 250	4 908

[1]Based on both primary site and codes for histology/morphology and/or behavioural code.

Appendix 6. Number of new cancer cases during the follow-up period, by country. Women.

ICD-7	Site	Denmark	Finland	Iceland	Norway	Sweden	Total
93 140	Lip	394	868	7	454	1 285	3 008
141	Tongue	530	839	17	668	1 539	3 593
142	Salivary glands	442	596	11	465	1 571	3 085
143–144	Oral cavity	1 230	863	38	1 098	2 330	5 559
145–148	Pharynx	841	548	15	675	1 934	4 013
145	-oropharynx	485	194	7	277	812	1 775
146	-nasopharynx	137	147	8	139	487	918
150	Oesophagus	1 703	2 355	49	1 245	3 369	8 721
	-adenocarcinoma[1]	418	199	14	198	552	1 381
151	Stomach	5 391	11 160	209	11 851	21 201	49 812
151.1	-cardia	861	1 056	18	1 364	1 337	4 636
152	Small intestine	666	800	28	980	2 933	5 407
153	Colon	24 822	15 390	460	29 285	52 355	122 312
154	Rectum, rectosigma	10 969	9 229	179	12 487	26 721	59 585
155	Primary liver	1 921	2 486	33	1 200	5 335	10 975
	-hemangiosarcoma[1]	–	16	2	4	35	57
155.1	Gall bladder	2 967	4 471	44	2 336	9 219	19037
157	Pancreas	7 943	9 498	170	8 855	18 902	45 368
160	Nose	469	396	19	483	909	2 276
	-adenocarcinoma[1]	–	25	–	47	69	141
161	Larynx	1 022	337	16	429	874	2 678
162,163	Lung	26 248	11 299	867	14 017	29 412	81 843
	-adenocarcinoma[1]	8 056	2 987	306	4 197	9 807	25 353
	-small cell[1]	–	1 826	141	2 747	3 662	8 376
	-squamous cell[1]	4 961	1 802	138	2 202	5 564	14 667
	-other[1]	–	4 684	280	3 861	10 379	19 204
158, 162.2	Mesothelioma[1]	393	425	2	180	548	1 548
170	Breast	62 191	73 754	2 162	62 999	172 255	373 361
	-ductual[1]	–	52 353	1 688	40 518	40 346	134 905
	-lobular[1]	–	8 515	181	3 611	9 189	21 496
171	Cervix uteri	11 008	4 816	202	10 712	21 510	48 248
172	Corpus uteri	15 623	16 741	387	14 533	40 333	87 617
173	Choriocarcinoma	10	28	1	25	63	127
175	Ovary	13 159	11 538	314	14 814	39 839	79 664
175.1	Fallopian tubes	384	571	9	358	884	2 206
176	Vulva	1 324	1 570	31	2 453	4 375	9 753
176.1	Vagina	547	411	9	463	1 295	2 725
180	Kidney	4 820	7 474	216	6 151	16 957	35 618
	-renal pelvis[1]	1 743	387	19	654	1 703	4 506
181	Bladder	8 605	4 282	183	7 532	16 622	37 224
190	Melanoma	6 758	6 464	199	9 916	19 303	42 640
190.6	-upper limbs	1 226	1 140	32	1 655	3 794	7 847
192	Eye	594	700	9	737	1 691	3 731
	-melanoma[1]	536	648	7	642	1 369	3 202
193	Brain	7 269	9 328	271	7 451	20 214	44 533
	-glioma[1]	590	2 478	99	2 513	6 789	12 469
	-meningeoma[1]	1 737	3 942	140	2 604	8 484	16 907
194	Thyroid	1 194	5 082	232	3 189	7 064	16 761
	-follicular[1]	–	726	28	447	294	1 495
	-papillary[1]	–	3 618	188	1 746	1 087	6 639
	Other endocrine organs	222	361	31	213	595	1 422
195	-glandula suprarenalis	135	234	5	134	337	845
195.1	-parathyreioeda	11	7	–	15	85	118
195.2	-thymus	61	88	–	44	133	326
195.3	-hypophysis	15	8	26	12	40	101
195.4	-corpus pineale	–	24	–	8	–	32
196	Bone	192	319	16	287	804	1 618
	-chondrosarcoma[1]	–	144	10	83	348	585
197	Connective tissue	739	1 573	29	1 014	4 125	7 480
	-fibrosarcoma[1]	–	483	2	82	607	1 174
	-liposarcoma[1]	–	327	7	129	613	1 076
200,202	Non-Hodgkin lymphoma	5 779	8 868	174	5 905	17 033	37 759
201	Hodgkin's lymphoma	598	893	19	795	2 230	4 535
203	Multiple myeloma	2 955	3 552	90	4 359	8 552	19 508
204	Leukaemia	5 671	4 982	147	5 420	11 596	27 816
	-chronic lymphatic[1]	–	1 798	48	1 771	4 528	8 145
	-acute myeloid[1]	1 903	1 665	59	2 130	3 357	9 114
191 or 205	Mycosis fungoides[1]	116	127	4	102	1 169	1 518
199	Other/ Unknown	4 051	6 617	188	11 384	24 704	46 944
	Ovary, borderline[1]	–	2 121	117	1 860	4 987	9 085
191	Non-melanoma skin	–	7 359	189	9 266	20 515	37 329
191.6	-upper limbs	–	547	24	938	2 375	3 884

[1]Based on both primary site and codes for histology/morphology and/or behavioural code.

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