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# Social Inequality in Mortality in the Nordic Countries

- The impact of smoking and alcohol



NOMESCO Nordic  
Medico Statistical  
Committee 105:2017



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**Symbols used in the tables:**

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# Preface

The Nordic countries are seen as a prototype of a welfare state in which the public sector has a responsibility for social protection and health care services. The Nordic welfare states are distinguished by their emphasis on universal social policies instead of targeted, selective and means-tested policies. The Nordic countries have been successful in reducing poverty and fostering equality of opportunity as well as equality of outcomes, both with regard to socioeconomic status, income and gender. By providing many citizens with welfare resources through welfare state institutions, universal social policies are also likely to affect public health<sup>1</sup>.

The target to increase health equity and to reduce health inequalities is stated in all national health policies. With the decreasing mortality, however, increasing social inequality in mortality has been reported. Therefore, after a proposal from Denmark, NOMESCO decided in 2012 to start a project on health inequalities. The aim of this project was subsequently focused in exploring the potential differences in preventable mortality due to smoking- and alcohol-related deaths in the Nordic countries.

The work was led by Professor Knud Juel from the National Institute of Public Health at the University of Southern Denmark with representatives from Finland, Norway and Sweden. The participants did a substantial work to provide harmonised national data for the project. We warmly thank the project leader and the collaborating partners from the participating Nordic countries for their interest, commitment, and help during the process of writing the report.

Nordic Medico-Statistical Committee (NOMESCO), May 2017

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<sup>1</sup> Olle Lundberg, Monica Åberg Yngwe, Maria Kölegård Stjärne, Lisa Björk and Johan Fritzell: The Nordic Experience: Welfare States and Public Health (NEWS). Health Equity Studies No 12. Centre for Health Equity Studies (CHESS). Stockholm University/Karolinska Institutet. August 2008. Available at: [http://www.chess.su.se/polopoly\\_fs/1.54170.1321266667!/menu/standard/file/NEWS\\_Rapport\\_080819.pdf](http://www.chess.su.se/polopoly_fs/1.54170.1321266667!/menu/standard/file/NEWS_Rapport_080819.pdf).

# Introduction

The high level of inequality in mortality and life expectancy in the Nordic countries compared to other countries in Western Europe has been well documented<sup>1</sup>. Since the 1990s, it has been observed that the mortality rate in the Nordic countries is generally decreasing<sup>2</sup>. As recently as 2014, however, there were still differences in life expectancy: Finnish men (78.2 years) and Danish men (78.5 years) and women (82.7 years) lag behind Sweden (80.4 and 84.1 years for men and women, respectively) and Norway (80.0 and 84.1 years for men and women, respectively), while the life expectancy for Finnish women (83.9 years) is comparable to that of Norwegian and Swedish women. Previously, it has been shown that a large proportion of the excess mortality in Denmark can be attributed to smoking- and alcohol-related diseases<sup>3</sup>.

Along with the decreasing mortality, increasing social inequality in mortality has been observed<sup>4-9</sup>. A Norwegian study has shown that a large proportion of this increase is attributable to lung cancer and chronic obstructive pulmonary disease (COPD), both of which are primarily caused by smoking<sup>9</sup>. The prevalence of daily smokers varies between the Nordic countries. In 2013, Finnish men had the highest proportion of daily smokers among adult males (19 per cent; aged 15-64), whereas the lowest share of daily smokers among adult males was found in Sweden (10 per cent; aged 16-84)<sup>2</sup>. For women, the highest share of daily smokers was found in Denmark (17 per cent; aged 16 or above), and the lowest in Sweden (12 per cent; aged 16-84)<sup>2</sup>. Furthermore, in 2013 Denmark also took the lead in alcohol sales, with 9.4 liters of pure alcohol sold for every adult Dane (age 15 or above)<sup>2</sup>. By contrast, the average sale per adult Norwegian (age 15 or above) in the same year was 6.2 liters.

Differences in smoking habits and alcohol consumption in the Nordic countries are likely to explain some of the variance in mortality between the countries. Moreover, these differences may also have had an influence on the documented development in social inequality in the Nordic countries.

The purpose of this report is to explore the potential differences in mortality due to smoking- and alcohol-related deaths in the Nordic countries. The report also aims to explore the proportion of social inequality attributable to smoking- and alcohol-related deaths.

# Method

## Introduction

The analyses presented in this report use the European standard population developed by Eurostat for age-standardization<sup>10</sup>. In general, all analyses were performed using 5-year age groups (20-24, 25-29, ..., 80-84, 85+). In order to calculate the total number of deaths excluding, e.g. smoking-related deaths, we subtracted the number of smoking-related deaths from the total number of deaths in each sex- and age-group. These figures were then used to calculate, e.g. age-standardized mortality rates excluding smoking. Results are presented for age 20+, as deaths attributable to alcohol or smoking very rarely occur at an earlier age. However, it should be noted that the Peto-Lopez method (described in detail below), which was used to calculate the number of deaths due to smoking, assumes that there are no deaths attributable to smoking among the under-35s. The Appendix presents the data, figures, and analyses on which the results in this paper are based. The breakdown of age groups in the Appendix deviates from that in the results section, but this does not affect the scale of the variance in the results for the Nordic countries.

## 2.1 Calculation of smoking-related mortality

Smoking-related mortality is difficult to calculate, as it is necessary to take into account the cumulative effect of smoking over many years. Death certificates do not specify smoking as a cause of death. Many studies have used an indirect method for estimating the number of smoking-related deaths<sup>11</sup>. This method exploits the fact that the large sample size (over 1 million persons) of the American Cancer Society's Second Prospective Cancer Prevention Study (CPS-II) facilitates estimates of mortality due to lung cancer for people who have never smoked. The proportion of smoking-related deaths due to lung cancer is calculated based on national lung cancer death rates and the CPS-II estimates for lung cancer death rates among never-smokers. The CPS-II lung cancer death rates for smokers were also used to estimate each country's sex- and age-specific "synthetic smoking prevalence", i.e. the prevalence that would be needed to achieve the observed mortality from lung cancer in the population. Indirectly, this prevalence also includes the proportion of smokers, the amount smoked, how long the person has smoked, the age at which they began smoking, and the extent of inhalation.

Based on this "synthetic smoking prevalence" (P), and the relative risk (RR) derived from CPS-II, we calculated the aetiological fractions for other smoking-related causes of death. Table 2.1.1 below shows the diseases used in the present study to estimate smoking-related mortality.

**Table 2.1.1 ICD-10 codes for diseases used to estimate smoking-related mortality**

Disease	ICD 10 Codes
<i>Medical causes</i>	A00-R99
Cancer	C00-C96
Lung cancer	C33-C34
Upper respiratory cancer	C00-C15, C32
Cardiovascular diseases	I00-199
Respiratory diseases	J00-J99
Chronic obstructive pulmonary disease (COPD)	J20-J22, J40-J44, J47
<i>Non-medical causes</i>	V00-Y99

It was assumed that no smoking-related deaths occur before the age of 35, and that no deaths due to liver cirrhosis or accidents, suicides or murders are smoking-related. In order to control for confounding, and to ensure that the effect of smoking is not overestimated, the aetiological fraction:

- a.  $P(RR-1)/(1+P(RR-1))$ , was replaced by:
- b.  $P(RR-1)/(2+P(RR-1))$

This corresponds to reducing the excess risk by 50 per cent, and makes it possible to calculate the number of deaths due to smoking and the number of deaths not due to smoking. In particular, it makes it possible to construct a life table and estimate life expectancy for never-smokers. New analyses indicate that the original Peto-Lopez model (b) for calculating smoking-related mortality was too conservative, and underestimated the number of tobacco-related deaths.

Originally, unmeasured confounding was taken into account by reducing the calculated excess mortality for certain causes of death by 50 per cent<sup>11</sup>. However, the unmeasured confounding proved not to be as high as originally assumed<sup>12-16</sup>. As a result, the reduction was changed to 30 per cent, and the formula therefore became:

- c.  $P(RR-1)/(10/7+P(RR-1))$

In this report, we have used formula c.

## 2.2 Calculation of alcohol-related mortality

Alcohol-related deaths are estimated in two fundamentally different ways:

1. directly from the Cause of Death Register, based on death certificates that specify alcohol-related diagnoses, and
2. based on follow-up on studies involving self-reported information on alcohol consumption

The present study uses the first method, in which alcohol-related deaths are identified directly from death certificates. There are two distinct categories of alcohol-related deaths: those due to illness, and acute deaths caused by accidents or suicide.

The diseases listed in Table 2.2.1 below are those considered directly alcohol-related.

**Table 2.2.1 ICD-10 codes for alcohol-related diseases**

Alcohol-related disease	ICD-10 codes
Alcoholism	F10
Cirrhosis of the liver	K70, K74
Pancreatitis	K85-K86
Alcohol poisoning	X45, X65, Y15

Deaths were included in the calculations if one of the diseases listed above was given as the underlying cause of death or a contributory cause of death.

## 2.3 Educational data

In Denmark, register data from Statistics Denmark were used to define educational groups, based on the number of years needed to obtain the highest educational qualification. The groups were defined as follows:

**Table 2.3.1 Educational groups in Denmark**

Code	Group
<10 years	Short
10-12 years	Medium
≥13 years	Long

In Finland, educational groups were defined as follows:

**Table 2.3.2 Educational groups in Finland**

Code	Group
Missing/basic	Short
Upper secondary	Medium
Tertiary	Long

In Sweden, educational groups were defined as follows:

**Table 2.3.3 Educational groups in Sweden**

Code	Group
Primary and lower secondary education	Short
Lower secondary education	Medium
Upper secondary education less than 3 years (<12 years)	
Upper secondary education 3 years	
Post-secondary education less than 3 years	Long
Post-secondary education 3 years or more	

The analyses that incorporate educational data use the age groups 35-39, 40-44..., 80-84. The minimum age was specified as 35, to ensure that all those in the dataset had completed their education. The maximum age was specified as 84, due to the very high number of people aged 85+ in Denmark and Sweden for whom educational data was missing.



# Results

## 3.1 All-cause mortality

Figure 3.1.1 shows a generally similar all-cause mortality rate among men in the four countries, although the rates in Denmark and Finland exceed those in Norway and Sweden. In all countries, the rate has been constantly decreasing between 1995 and 2013.

**Figure 3.1.1** All-cause mortality per 100 000 persons, according to country. Men. Age-standardized rates. 1995-2013. Age 20+

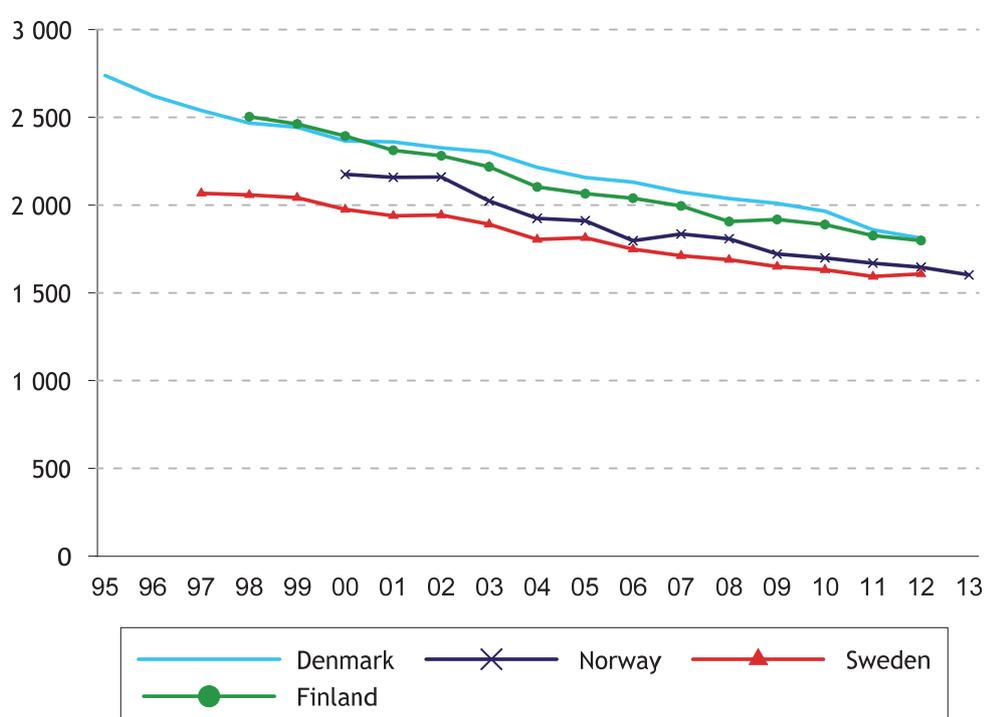
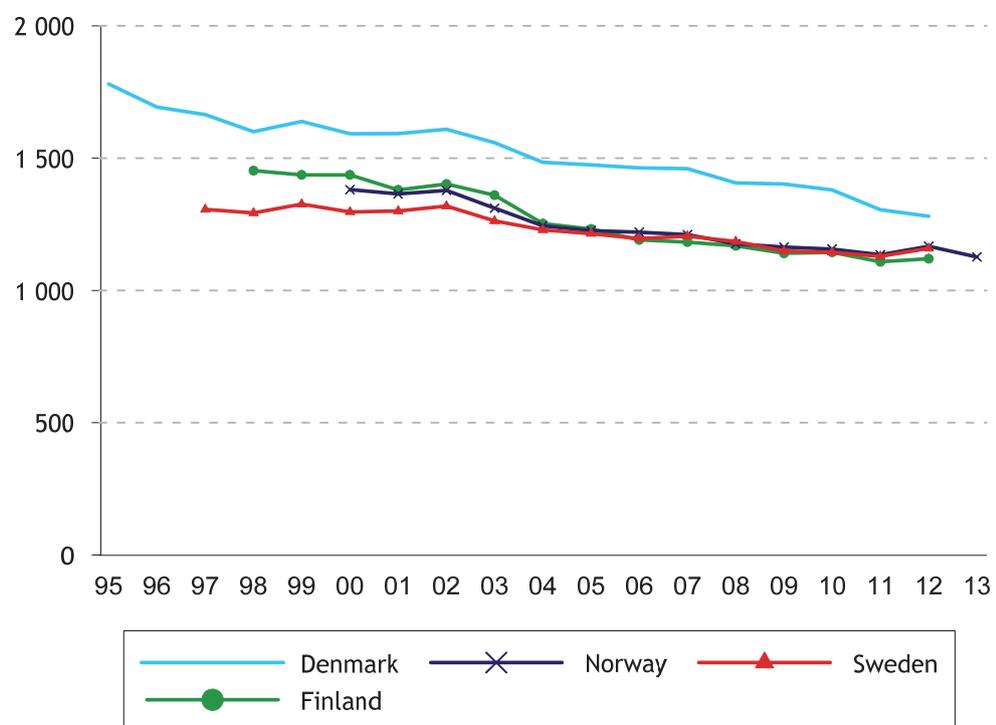


Figure 3.1.2 shows that the all-cause mortality rate among women is similar in Finland, Norway, and Sweden, but is consistently exceeded by the rate in Denmark. In all countries, the rates have been constantly decreasing between 1995 and 2013.

Figure 3.1.2 All-cause mortality per 100 000 persons, according to country. Women. Age-standardized rates. 1995-2013. Age 20+



## 3.2 Smoking-related mortality

Figure 3.2.1 shows that the smoking-related mortality rate among men is highest in Denmark and lowest in Sweden. Finland and Norway fall in between the two, and exhibit largely similar rates. The rates have been decreasing in all four countries between 1995 and 2013, most markedly among Danish and Finnish men.

**Figure 3.2.1** Smoking-related mortality per 100 000 persons, according to country. Men. Age-standardized rates. 1995-2013. Age 20+

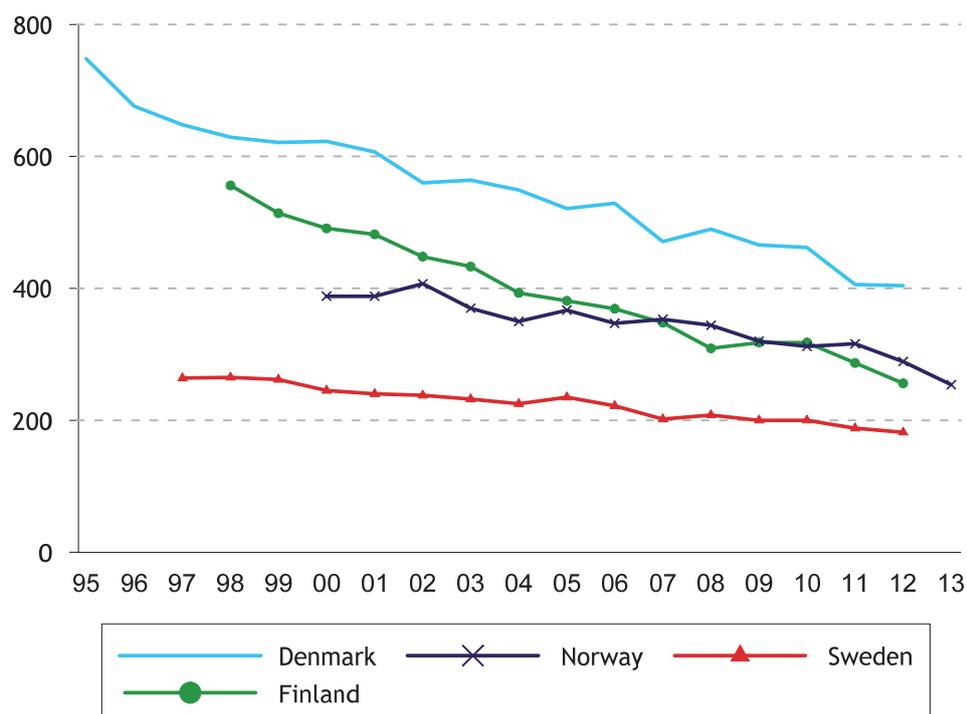
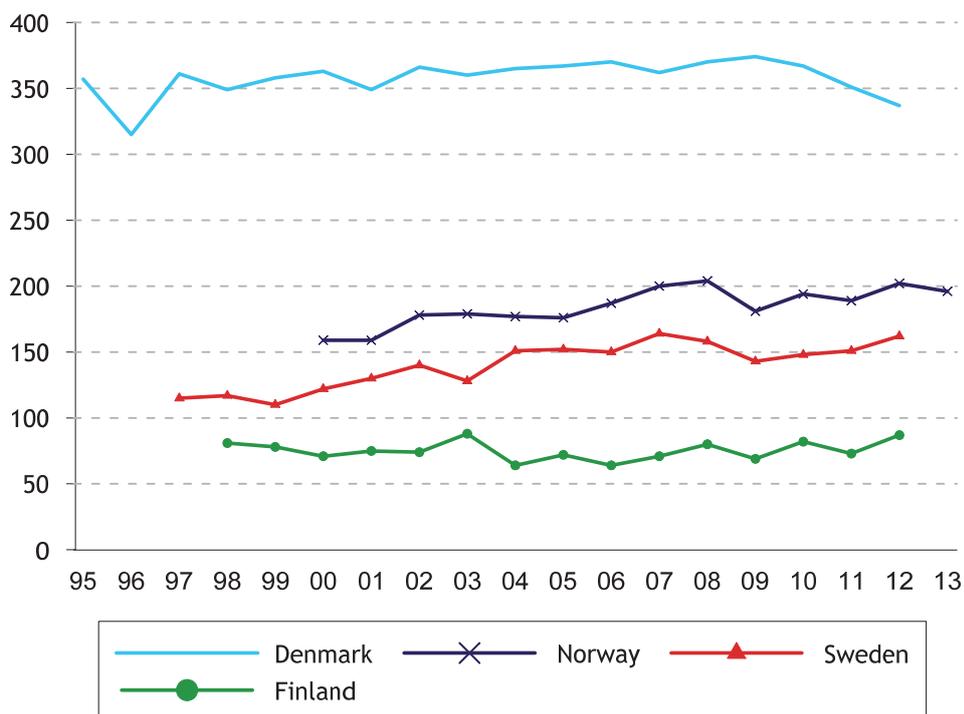


Figure 3.2.2 shows that the smoking-related mortality rate for Danish women is notably higher than for women from other Nordic countries. The lowest rate is found among Finnish women. In recent years, the smoking-related mortality rate has been modestly decreasing in Denmark. By contrast, the rate has been consistently but slowly increasing in Norway and Sweden. In Finland, the smoking-related mortality rate has remained stable.

**Figure 3.2.2** Smoking-related mortality per 100 000 persons, according to country. Women. Age-standardized rates. 1995-2013. Age 20+



### 3.3 Alcohol-related mortality

Figure 3.3.1 shows the alcohol-related mortality rate among men according to country between 1995 and 2013. The highest rate is found among Finnish men, while the lowest rates are found among Swedish and Norwegian men. In all four countries, the rates have remained more or less stable over time, with only a weak overall decrease.

**Figure 3.3.1** Alcohol-related mortality per 100 000 persons, according to country and year. Men. Age-standardized rates. 1995-2013. Age 20+

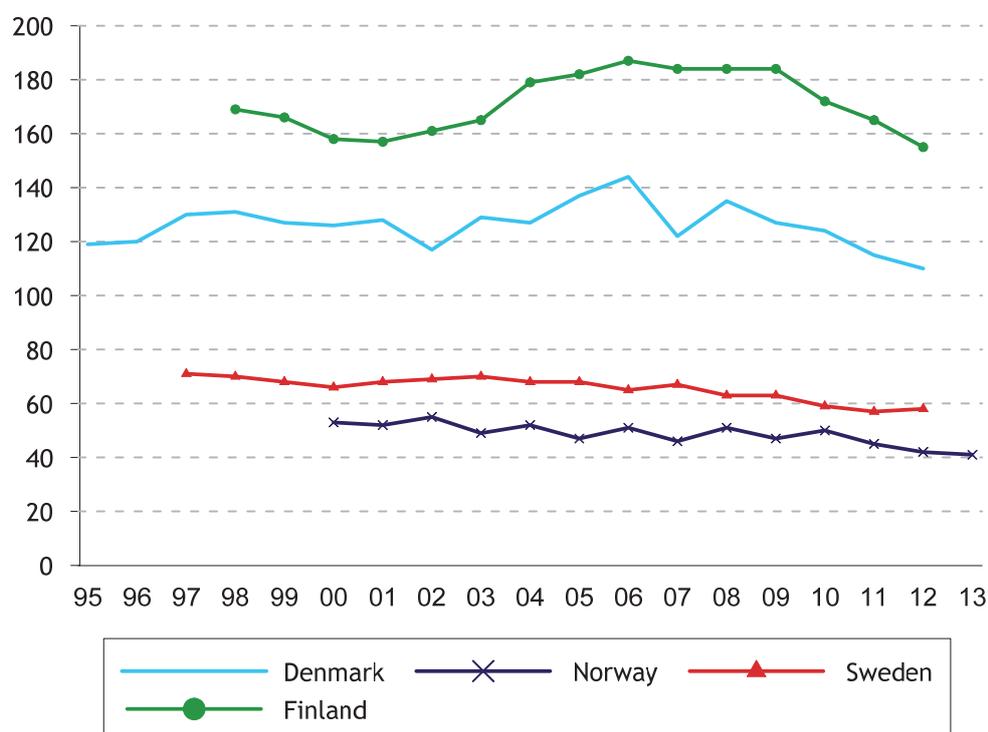
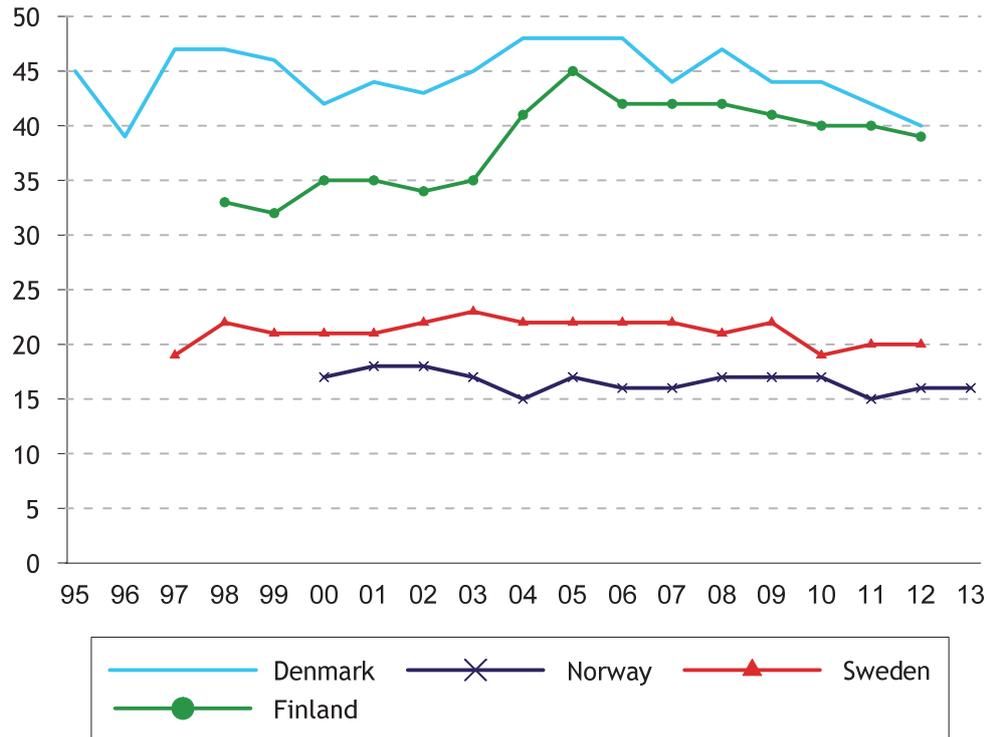


Figure 3.3.2 shows unequivocally that the highest alcohol-related mortality rates among women were found in Finland and Denmark. In Finland, the rate has been weakly increasing over time, while the rates in Denmark, Norway, and Sweden have remained relatively stable.

**Figure 3.3.2** Alcohol-related mortality per 100 000 persons, according to country. Women. Age-standardized rates. 1995-2013. Age 20+



### 3.4 All-cause mortality excluding smoking-related deaths

Figure 3.4.1 shows that the all-cause mortality rate excluding smoking-related deaths among men is largely similar in Denmark, Finland, Norway, and Sweden. In all four countries, the rates have been constantly decreasing between 1995 and 2013.

**Figure 3.4.1** All-cause mortality excluding smoking-related deaths per 100 000 persons, according to country. Men. Age-standardized rates. 1995-2013. Age 20+

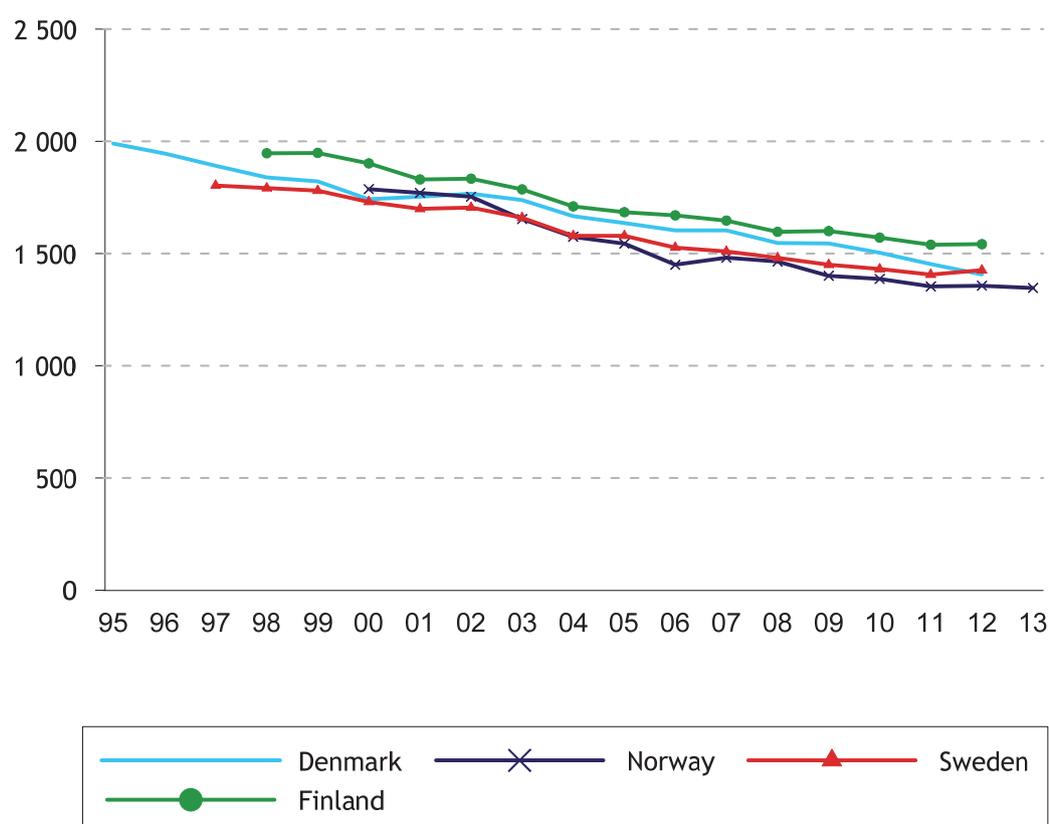
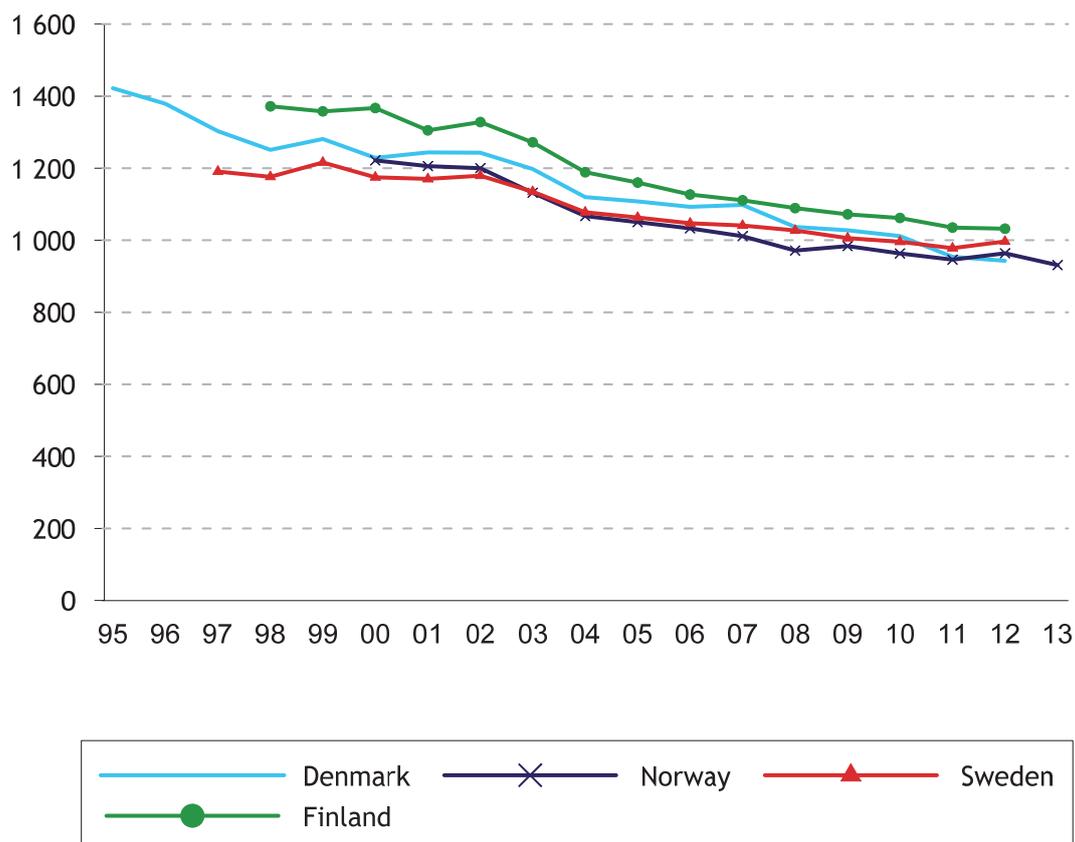


Figure 3.4.2 shows that the all-cause mortality rate excluding smoking-related deaths among women is largely similar in Denmark, Finland, Norway, and Sweden. In all four countries, the rates have been constantly decreasing between 1995 and 2013.

**Figure 3.4.2** All-cause mortality excluding smoking-related deaths per 100 000 persons, according to country. Women. Age-standardized rates. 1995-2013. Age 20+



### 3.5 All-cause mortality excluding alcohol-related deaths

According to Figure 3.5.1, the all-cause mortality rate excluding alcohol-related deaths among men is largely similar in Denmark, Finland, Norway, and Sweden. In all four countries, the rates have been constantly decreasing between 1995 and 2013.

**Figure 3.5.1** All-cause mortality excluding alcohol-related deaths per 100 000 persons, according to country. Men. Age-standardized rates. 1995-2013. Age 20+

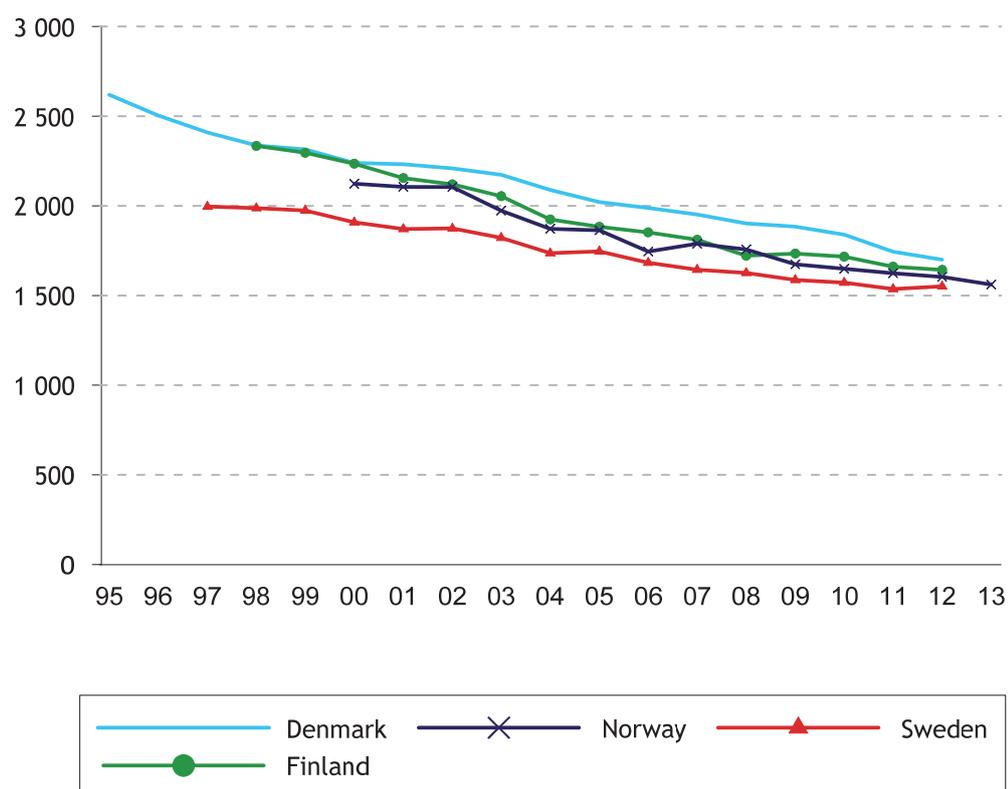
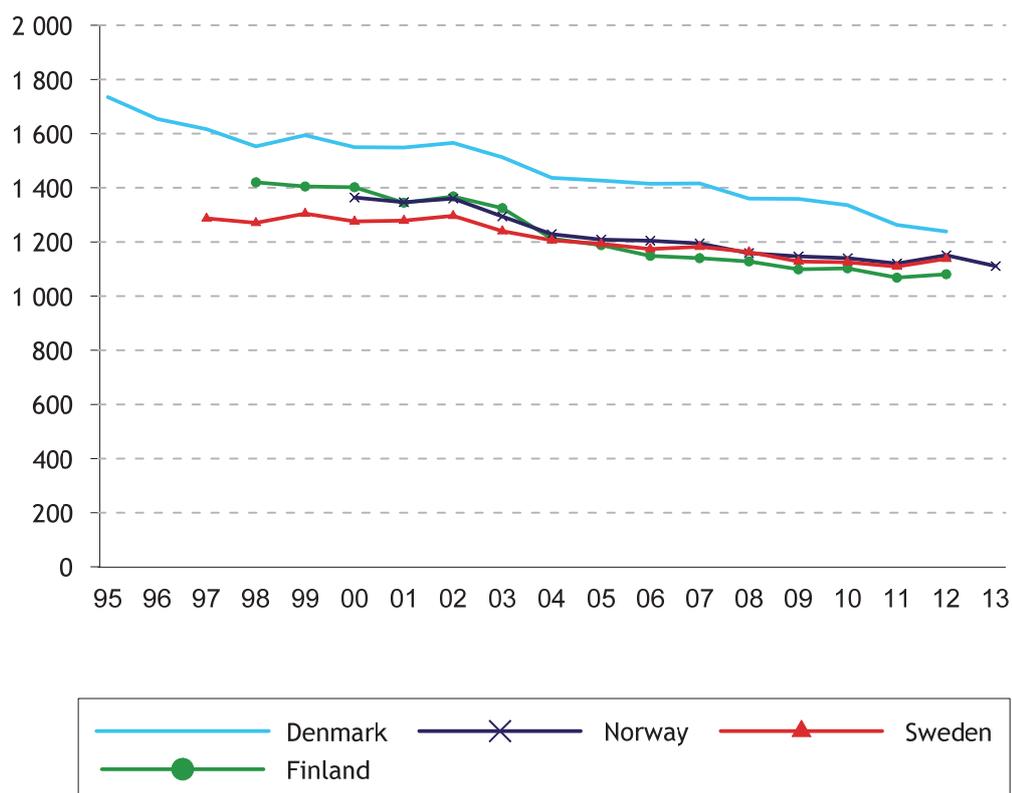


Figure 3.5.2 shows that the all-cause mortality rate excluding alcohol-related deaths among women is highest in Denmark, with similar rates among Finnish, Norwegian, and Swedish women. In all four countries, the rates have been constantly decreasing between 1995 and 2013.

**Figure 3.5.2** All-cause mortality excluding alcohol-related deaths per 100 000 persons, according to country. Women. Age-standardized rates. 1995-2013. Age 20+



## 3.6 Social inequality in mortality

### *Relative risk*

Figure 3.6.1 shows that the relative risk for all causes of death among persons with a short vs. a long education is similar among Finnish and Swedish men and lowest among Danish men. This indicates a higher level of social inequality in all-cause mortality among the former two compared to the latter. A similar increase in social inequality in all-cause mortality is observed between 2000 and 2012 in all three countries. The same picture emerges with regard to all-cause mortality excluding smoking- and alcohol-related deaths. The relative risk is higher among Finnish and Swedish men than among Danish men, which indicates lower social inequality among the latter. In all three countries, a decrease in social inequality is observed when smoking- and alcohol-related deaths are excluded from all-cause mortality. This tendency is especially pronounced when smoking-related deaths are excluded from all-cause mortality.

**Figure 3.6.1** Relative risk of death among persons with a short vs. a long education, according to cause of death and year. Men. Age-standardized. Age 35-84

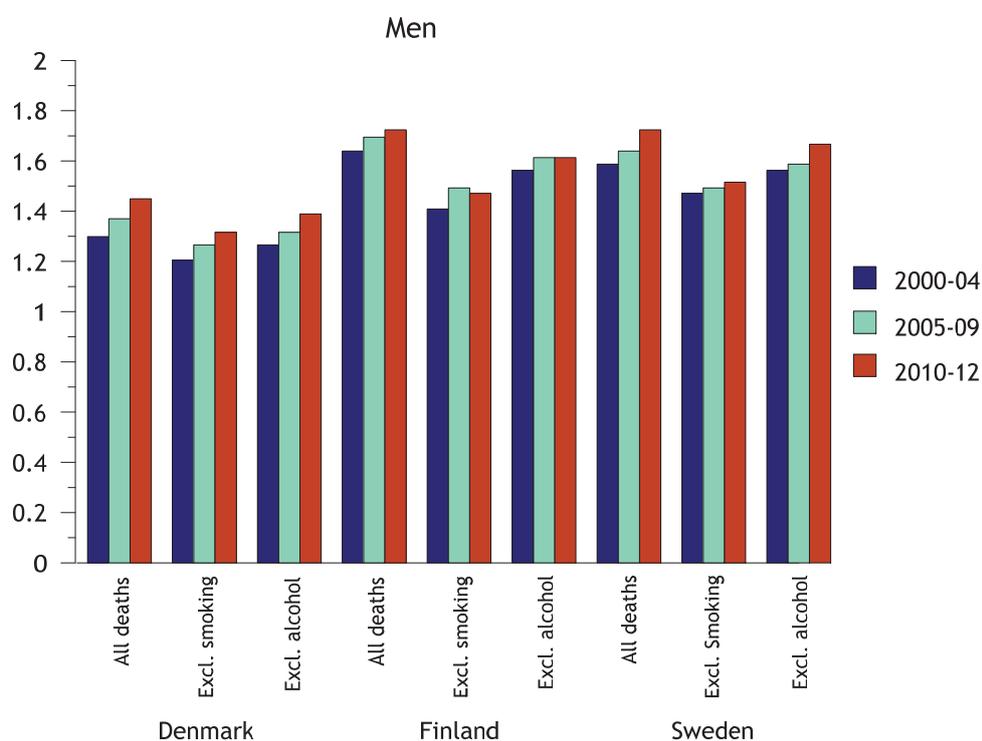
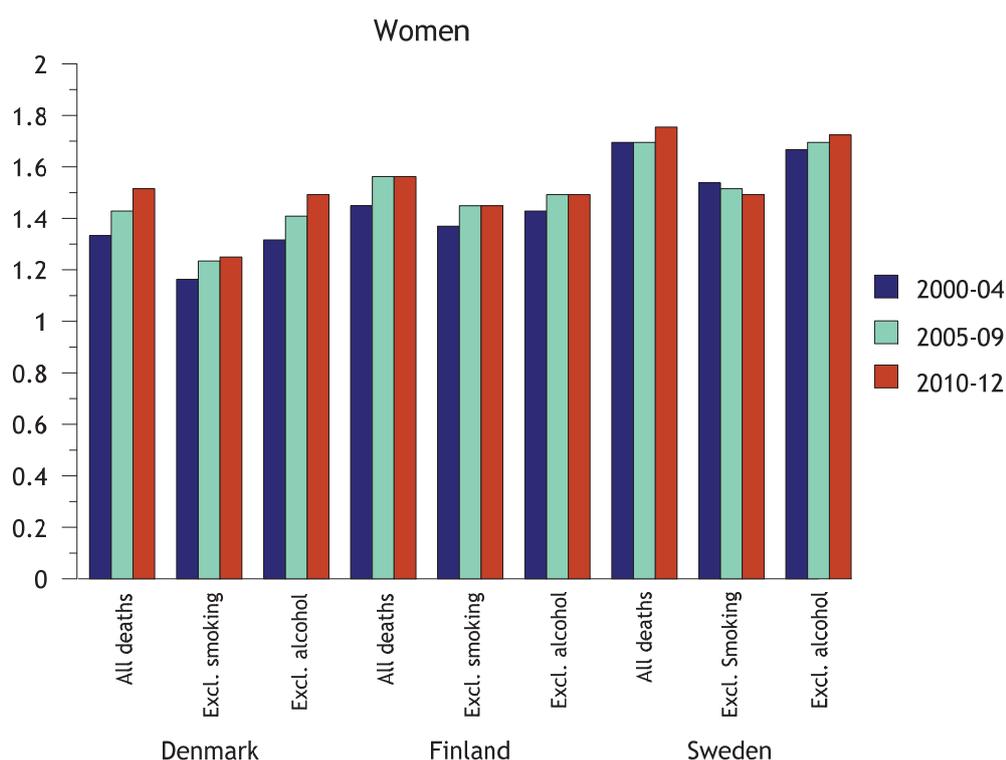


Figure 3.6.2 shows that the relative risk of all causes of death among those with a short vs. a long education is higher among Swedish women than among Danish and Finnish women. This indicates a higher level of social inequality in all-cause mortality in the former compared to the latter two. Between 2000 and 2012, a number of different tendencies in social inequality in mortality are observed among women in the Nordic countries. When smoking-related deaths are excluded from all-cause mortality, the largest decrease in social inequality in mortality is found among Danish women, with no major difference between Finnish and Swedish women. When alcohol-related deaths are excluded from all-cause mortality, the largest decrease in social inequality in mortality is found in Denmark and Finland, with higher social inequality in Sweden. In all three countries, the largest reduction in social inequality in mortality is found when smoking-related deaths are excluded from all-cause mortality.

**Figure 3.6.2** Relative risk of death among persons with a short vs. a long education, according to cause of death and year. Women. Age-standardized. Age 35-84



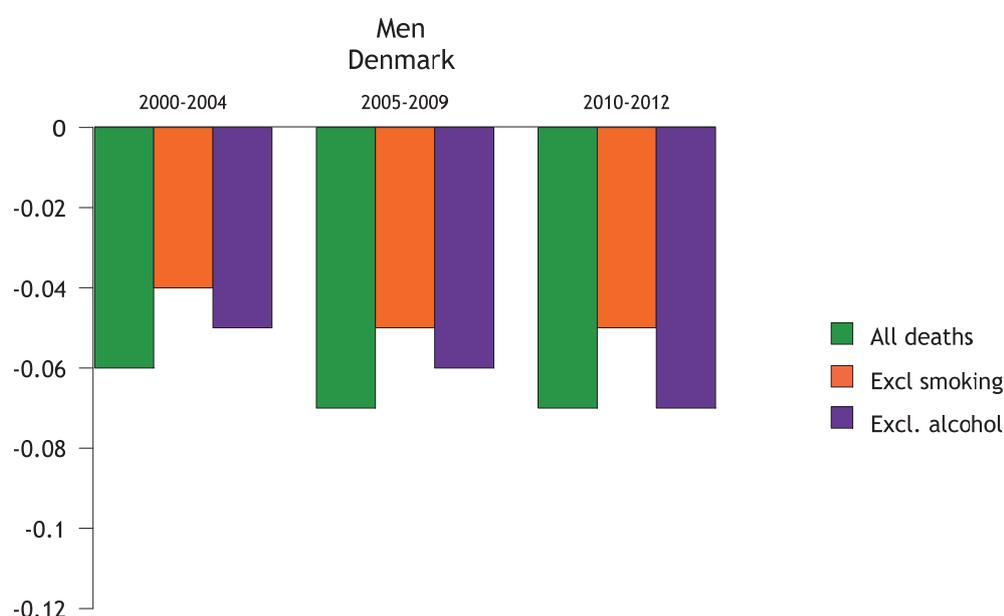
### ***Relative concentration index***

The relative concentration index is a method used to measure social inequality between educational groups in certain years, and thereby monitor its development over time. The index exhibits values between -1 and 1. If the concentration index equals zero, no social inequality is observed for the given indicator. A negative value indicates a higher prevalence among those with a shorter education compared to those with a longer education, and therefore reflects greater social inequality. Accordingly, positive values indicate a lower prevalence among those with a shorter education

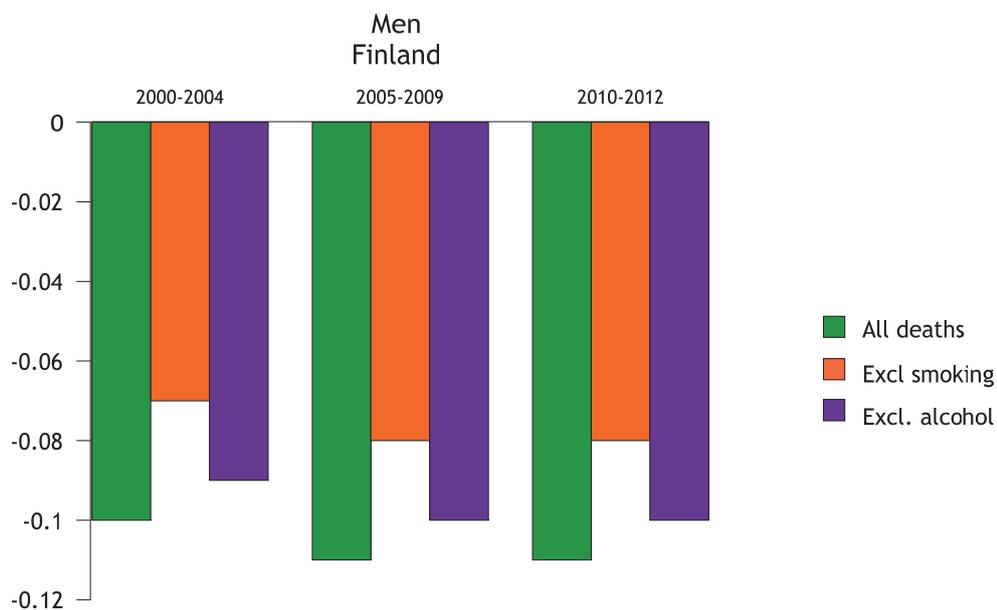
compared to those with a longer education, and therefore reflect inverse social inequality. The advantage of the relative concentration index is that it takes into account the fact that the distribution of educational groups may vary both between countries and within countries over time.

Figures 3.6.3-3.6.5 show that the lowest social inequality in all-cause mortality among men is seen in Denmark, followed in ascending order by Sweden and Finland. A similar pattern is observed when considering all-cause mortality excluding smoking- and alcohol-related deaths, respectively. Overall, social inequality in mortality has increased between 2000 and 2012, despite stable rates for all-cause mortality in Denmark and Finland between 2005-2009 and 2010-2012. Furthermore, among Finnish and Danish men, social inequality in all-cause mortality excluding smoking-related deaths has remained stable between 2005-2009 and 2010-2012, and has remained stable among Swedish men throughout the whole period. In all three countries, the largest reduction in social inequality in mortality is found when smoking-related deaths are excluded from all-cause mortality.

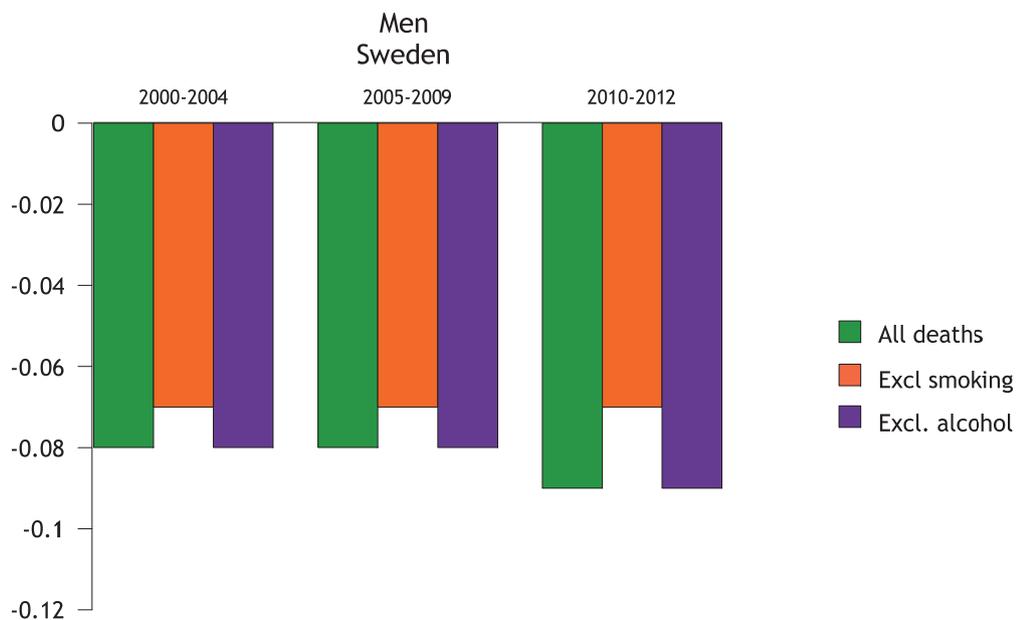
**Figure 3.6.3** Relative concentration index for mortality risk among persons with a shorter education vs. a longer education, according to cause of death and year. Men. Age-standardized. Age 35-84



**Figure 3.6.4** Relative concentration index for mortality risk among persons with a shorter education vs. a longer education, according to cause of death and year. Men. Age-standardized. Age 35-84

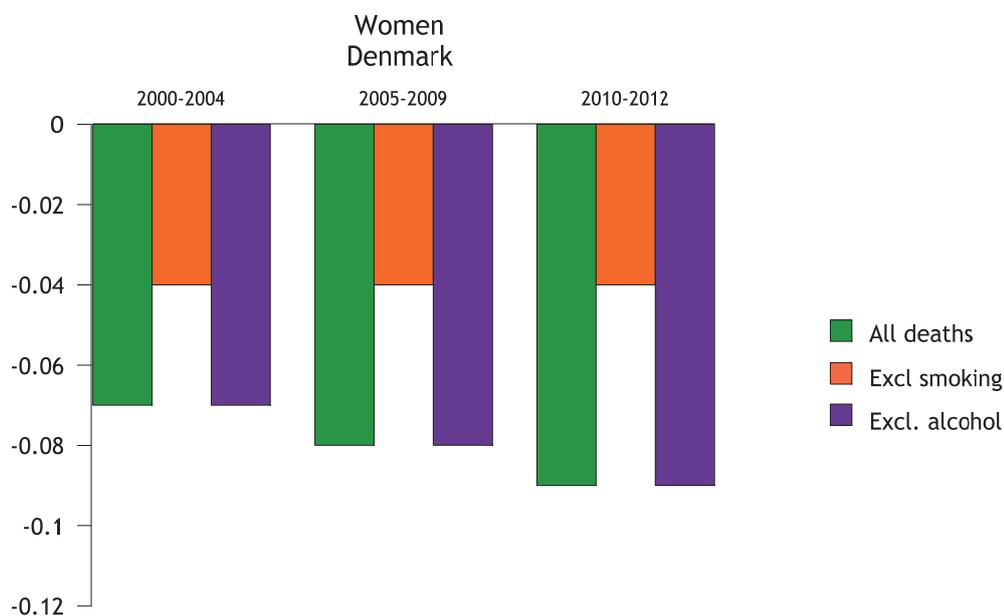


**Figure 3.6.5** Relative concentration index for mortality risk among persons with a shorter vs. a longer education, according to cause of death and year. Men. Age-standardized. Age 35-84

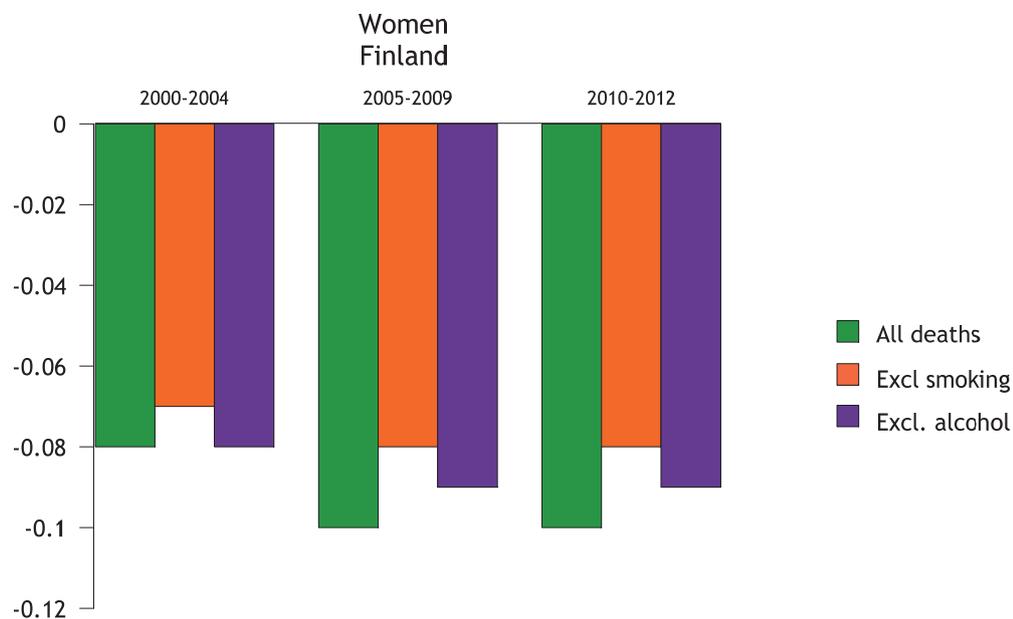


Figures 3.6.6-3.6.8 show that, among women, the lowest social inequality in all-cause mortality in 2010-2012 is found in Denmark, with similar levels in Finland and Sweden. Generally, the same picture emerges when smoking-related deaths are excluded from all-cause mortality. When alcohol-related deaths are excluded from all-cause mortality, a slightly higher level of social inequality in mortality is observed among Swedish women compared to Danish and Finnish women. Overall, social inequality in mortality (both all-cause and excluding alcohol-related deaths) has been steadily increasing among Danish women between 2000 and 2012, while remaining largely stable among Finnish and Swedish women during 2005-2009 and 2010-2012. When smoking-related deaths are excluded from all-cause mortality, different tendencies emerge between 2000 and 2012. While social inequality remained stable among Danish women, it decreased throughout the period among Swedish women. Among Finnish women, social inequality increased after 2000 but then remained stable after 2005. In all three countries, the largest reduction in social inequality in mortality in 2010-2012 is found when smoking-related deaths are excluded from all-cause mortality, with the largest reduction among Danish women.

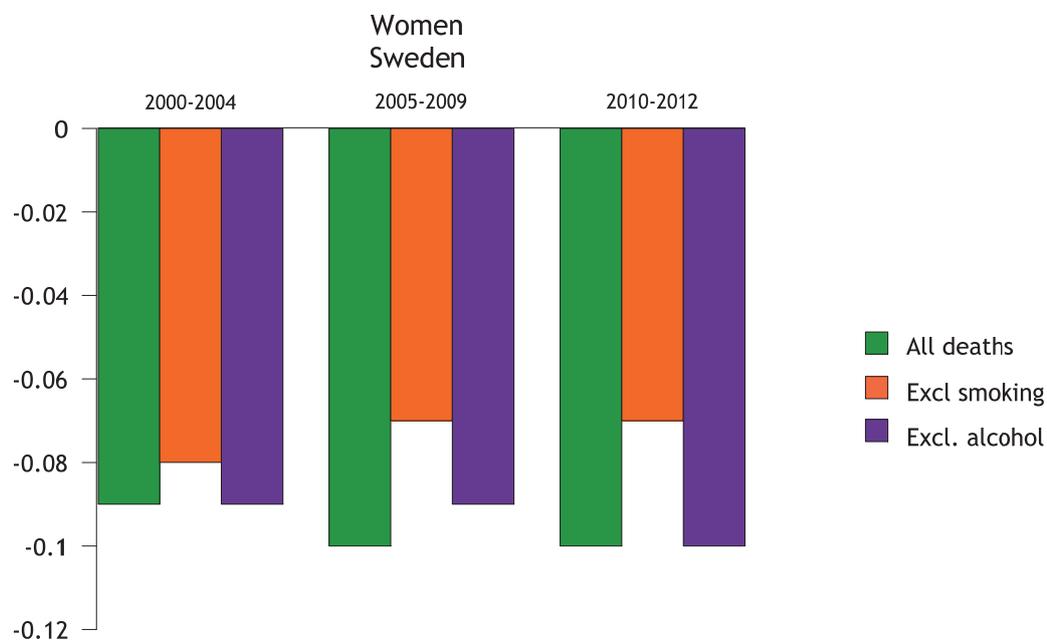
**Figure 3.6.6** Relative concentration index for mortality risk among persons with a shorter vs. a longer education, according to cause of death and year. Women. Age-standardized. Age 35-84



**Figure 3.6.7** Relative concentration index for mortality risk among persons with a shorter vs. a longer education, according to cause of death and year. Women. Age-standardized rates. Age 35-84



**Figure 3.6.8** Relative concentration index for mortality risk among persons with a shorter vs. a longer education, according to cause of death and year. Women. Age-standardized. Age 35-84



# Discussion

Social inequality in health is associated with unequal exposure to various environmental risk factors, and often means that less advantaged groups have a significantly higher risk of morbidity and mortality<sup>17</sup>. This report has documented differences between the Nordic countries in terms of social inequality in all-cause mortality and all-cause mortality excluding smoking- and alcohol-related deaths, respectively. Despite exhibiting a high all-cause mortality rate and high smoking- and alcohol-related mortality rates, Denmark has the lowest level of social inequality in mortality. However, in Denmark, Finland, and Sweden, social inequality in mortality increased between 2000 and 2012. Among both men and women, the largest reduction in social inequality in mortality is found when smoking-related deaths are excluded from all-cause mortality.

Despite the documented differences between the Nordic countries in terms of social inequality in mortality, there are several factors that may have influenced the results in this report. Firstly, different national coding practices with regard to causes of death may compromise comparability. A potential lack of comparability between countries may arise in cases in which two or more causes of death are recorded on the death certificate. In such cases, the choice of underlying cause of death may differ from country to country, as the WHO guidelines in this area are subject to interpretation<sup>2</sup>. Furthermore, changes in coding practice for different causes of death in Sweden and Finland may have affected the distribution of diagnoses. In Sweden, coding practice in relation to alcohol poisoning and alcoholism changed in 2000. Prior to this, the underlying cause of death was coded as alcoholism (F10), but from 2001 such cases were instead coded as alcohol poisoning (X45, X65, or Y15). Since all causes of death related to alcohol were pooled into one category (“Alcohol-related diseases”), this change did not affect the results in this report. In Finland, coding practice in relation to respiratory diseases gradually changed during 2004-2006, following the application of the new WHO definition of pneumonia as the underlying cause of death. This adjustment reduced the number of deaths attributed to pneumonia in Finland by around one third. These cases were mostly attributed instead to dementia and cerebrovascular diseases. To our knowledge, other Nordic countries did not simultaneously adopt the new definition. Accordingly, comparisons between countries of mortality rates for respiratory diseases are compromised. Secondly, national differences between the Nordic countries in autopsy rates<sup>2</sup> are also likely to influence the distribution of diagnoses across countries. Autopsy rates in the Nordic countries have more than halved in recent decades. It has been shown that in approximately 30 per cent of cases, an autopsy led to a revision of the underlying cause of death<sup>2</sup>. Thirdly, national educational data were originally calculated differently in Denmark, Sweden, and Finland, and then subsequently recoded to facilitate comparisons between countries. This procedure may have affected the analyses

based on educational data. For example, in the data from Finland, missing values were coded as if the persons in question had a "short education". Moreover, data on educations completed outside Finland were excluded, which e.g. means that educational data on immigrants were excluded, too. Accordingly, the Finnish data on educational level may not reflect the actual distribution.

When the results from the present report are compared with data from other sources, e.g. on smoking and alcohol habits in the Nordic countries<sup>2</sup>, it appears very likely that such health behaviors extensively affect mortality. In particular, the life expectancies for Finnish men and Danish men and women are markedly lower than those in other Nordic countries. However, as our results make clear, the lowest social inequality in both all-cause mortality and all-cause mortality excluding smoking- and alcohol-related deaths, respectively, were found in Denmark. Another study also demonstrated high levels of social inequality in morbidity in Finland and in mortality in Norway and Sweden<sup>1</sup>, but that social inequality in mortality depended on the specific category of social inequality employed. For example, Sweden was in a favourable position with regard to income-related inequalities in health, but this was more than counteracted by unfavourable positions for inequalities related to education and occupation. This suggests that welfare policies may affect one category of social inequality in health (e.g. income-related inequality) while leaving others untouched. Accordingly, therefore, differences in inequality in health between countries may not appear as generalized differences across all socioeconomic categories, but as differences in the chosen category of social inequality.

Several aspects of the Peto-Lopez method, which plays a key role in this report's analyses of mortality, need to be discussed. The use of lung cancer - which has a longer latent period than heart disease and some other smoking-related diseases - as a marker for the cumulative risk of smoking can result in an overestimation of the risk in cases where smoking frequency has fallen markedly, and underestimation of the risk in cases where smoking frequency has increased markedly. Smoking has generally been on the decline in the Nordic countries, albeit mainly among moderate smokers. Furthermore, the confounder effect may still be overestimated. Peto and his colleagues originally applied a correction factor of 50 per cent of the excess risk, but attracted considerable criticism for the lack of an empirical basis for this correction<sup>18-19</sup>. In response, the CPS-II data has been re-analyzed, this time adjusting for potential confounders<sup>13,20</sup>. Based on this new knowledge about the robustness of CPS-II's relative risks in relation to confounder control, the correction factor was revised to 30 per cent to reduce the excess mortality of all cause-specific deaths excluding lung cancer. The 30 per cent correction corresponds to the greatest reduction in excess mortality in the new analyses of CPS-II, and is therefore still considered a conservative estimate<sup>13</sup>. For the group "other medical diseases", for which the degree of confounding was unknown, the correction factor was kept at 50 per cent, as per Peto et al.'s original model<sup>10</sup>. A direct estimate of cardiovascular deaths related to smoking yielded the same result as the new Peto-Lopez model, with only a 30 per cent reduction due to confounding<sup>14</sup>. A direct estimate of cancer deaths related to smok-

ing yielded the same result as the new Peto-Lopez model, with only a 30 per cent reduction due to confounding<sup>12</sup>.

There is also some uncertainty with regard to mortality rates calculated directly from death certificates. For example, a physician may lack information on the deceased's drinking habits and autopsy results, and - perhaps in an effort to spare the feelings of relatives - there may be some reluctance to give an alcohol-related diagnosis on the death certificate. Other studies that utilize this method have also included both underlying and contributory causes of death<sup>21</sup>, but attempts have also been made to use the aetiological fractions for the various diseases or all deaths combined in order to calculate alcohol-related deaths<sup>22</sup>. Death from cirrhosis of the liver is a classic indicator of the health impact of high alcohol consumption. Alcoholism and pancreatitis are now also used<sup>23</sup>. Alcohol poisoning is often used as a measure of the acute effects of alcohol consumption. The use of cirrhosis of the liver in general, as opposed to exclusively alcohol-induced cirrhosis, can result in an overestimation of the effects of alcohol consumption. Nevertheless, it is a commonly used method. Leon states that even though hepatitis C and obesity can also cause cirrhosis of the liver, this is probably of limited significance<sup>24</sup>. Other studies have shown that alcohol also has a significant effect on death from non-alcohol-induced cirrhosis, which could indicate considerable misclassification of alcohol-related deaths<sup>23</sup>.

Our definition of alcohol-related death requires that the death certificate specifies a cause such as alcoholism, cirrhosis of the liver or alcohol poisoning, i.e. relatively certain indications that the death is alcohol-related. However, there are acknowledged problems with the quality and completeness of the death certificates used to quantify alcohol-related deaths, and underreporting is well known. Three studies from Sweden and USA have found that the use of all available information increases the number of alcohol-related deaths among men six-fold relative to only considering the underlying causes of death<sup>25-27</sup>. The difference is smaller for women<sup>26</sup>. Among other reasons, these registration problems can be due to difficulties in obtaining precise information about the role played by alcohol in the death. In some cases, there may be a stigma associated with stating alcohol on the death certificate. It is probable that alcohol is rarely recorded as a contributory cause of death in certain types of cancer. Of 3 307 deaths from cancer of the oral cavity, throat, and oesophagus in Denmark during 1997-2001, alcohol was only recorded as a contributory cause in 6 per cent of the cases. By contrast, the aetiological fraction for alcohol in these forms of cancer is reported to be 25-40 per cent or more<sup>28-31</sup>. This indicates an underestimation of the number of alcohol-related deaths.

The present study possesses several strengths that should be emphasized. For example, the many similarities between the Nordic countries mean that national comparisons are less likely to be confounded by fundamental societal and cultural factors. Furthermore, when using data on substantial contributory causes of death, e.g. smoking-related and alcohol-related deaths, minor differences in coding practice between countries for some diseases are not likely to affect the results presented. The large amount of data used in this report also minimizes the risk of presenting results that are due to chance alone. National comparisons of social inequality in

mortality were carried out in two different ways (relative risk and relative concentration index). By applying a measure on the relative concentration index, the differences in the size of educational groups - both between countries and over time - were taken into account. Finally, the availability of national registry data on various health outcomes in the Nordic countries represents a unique opportunity to carry out analyses at national level using officially registered data. This means that selection biases are eliminated, and ensures that the data truly reflects the population's morbidity and mortality. However, considering the reservations regarding the comparability of data between countries, as well as the methods used to estimate smoking- and alcohol-related mortality, respectively, the results presented in this report should still be interpreted with caution.

# Conclusion

An overall comparison of life expectancy in the Nordic countries shows that Finnish men and Danish men and women lag behind men and women in the other Nordic countries. However, the present report demonstrates that when smoking-related deaths and alcohol-related deaths are excluded from all-cause mortality, mortality differences between the Nordic countries are almost equalized.

The report also documents that the lowest levels of social inequality in all-cause mortality, in all-cause mortality excluding smoking-related deaths, and in all-cause mortality excluding alcohol-related deaths were found in Denmark. The largest reduction in social inequality in mortality is observed when smoking-related deaths are excluded from all-cause mortality. Since 2000, social inequality in mortality has been increasing in the Nordic countries. Accordingly, in order to reduce social inequality in mortality in the Nordic countries, the results from the present report underscore the importance of reducing smoking prevalence, thereby reducing a considerable proportion of the social inequality in mortality.

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# Appendices

## 6.1 All-cause mortality

Table 6.1.1 shows that the highest number of deaths per year of all causes among both men and women is found in Sweden (41 154 and 43 731, respectively), followed in descending order by Denmark, Finland, and Norway. The lowest number of deaths per year for both men and women is found in Norway (18 996 and 20 117, respectively). In all four countries, more women than men die each year.

**Table 6.1.1 All-cause mortality among men and women. Yearly number according to country. 2000-2012 (yearly average). Age 0+**

	Denmark	Finland	Norway	Sweden
Men	25 181	22 552	18 995	41 154
Women	26 329	22 788	20 117	43 731

When age-standardized, rates of all-cause mortality are the highest for both men and women in Denmark, with 1 596 and 1 112 deaths per 100 000 persons, respectively (Table 6.1.2). The lowest mortality rate for both men and women is found in Sweden, with 1 325 and 918 deaths per 100 000 persons, respectively.

**Table 6.1.2 All-cause mortality among men and women. Age-standardized rate per 100 000 persons according to country. 2000-2012 (yearly average). Age 0+**

	Denmark	Finland	Norway	Sweden
Men	1 596	1 541	1 414	1 325
Women	1 112	935	938	918

## 6.2 Smoking-related mortality

Table 6.2.1 shows that the highest number of all-cause deaths (due to medical and non-medical causes) per year among men is found among Sweden, followed in descending order by Denmark, Finland, and Norway. For smoking-related deaths among men, the highest number is found in Denmark, followed in descending order by Sweden, Finland, and Norway. There are by definition no smoking-related deaths due to non-medical causes. In all four countries, the largest proportion of smoking-related deaths relative to the number of all deaths due to the same disease is observed for lung cancer and COPD.

**Table 6.2.1<sup>1</sup> Deaths among men for diseases used in estimating smoking-related mortality. Yearly average according to diagnosis and country. 2000-2012. Age 35+**

Disease	Denmark		Finland		Norway		Sweden	
	All	Smoking-related	All	Smoking-related	All	Smoking-related	All	Smoking-related
<b>Medical causes</b>	23 219	6 140	21 355	4 411	18 392	3 844	41 162	5 519
<i>Cancer</i>	7 110	2 758	5 612	1 906	5 572	1 729	11 164	2 487
Lung cancer	1 785	1 626	1 426	1 259	1 208	1 067	1 847	1 531
Upper respiratory cancer	534	346	273	154	252	146	508	233
<i>Cardiovascular diseases</i>	7 688	1 396	9 674	1 447	7 038	940	18 413	1 572
<i>Respiratory diseases</i>	2 396	1 286	1 561	688	1 986	819	2 915	958
COPD	1 419	1 122	791	582	954	697	1 321	831
<b>Non-medical causes</b>	1 132	-	2 347	-	1 101	-	2 412	-
<b>All deaths</b>	24 351	6 140	23 702	4 413	19 493	3 844	43 574	5 520

1 Because of roundings of numbers, slight deviations can occur when summing results

Table 6.2.2 shows that the highest number of all-cause deaths (medical and non-medical causes) per year among women is found in Sweden, followed in descending order by Denmark, Finland, and Norway. For smoking-related deaths, the highest number is found among Danish women, followed in descending order by Swedish, Norwegian, and Finnish women. There are by definition no smoking-related deaths due to non-medical causes. In all four countries, the largest proportion of smoking-related deaths relative to the number of all deaths due to the same disease is observed for lung cancer and COPD.

**Table 6.2.2<sup>1</sup> Deaths among women for diseases used in estimating smoking-related mortality. Yearly average according to diagnosis and country. 2000-2012. Age 35+**

Disease	Denmark		Finland		Norway		Sweden	
	All	Smoking-related	All	Smoking-related	All	Smoking-related	All	Smoking-related
<b>Medical causes</b>	25 022	6 318	23 316	1 483	20 377	3 041	45 299	5 426
<i>Cancer</i>	6 805	1 752	5 118	401	4 912	891	10 274	1 618
Lung cancer	1 489	1 314	565	349	801	644	1 532	1 180
Upper respiratory cancer	210	152	139	50	106	62	227	121
<i>Cardiovascular diseases</i>	8 314	1 723	10 719	554	8 086	923	20 210	1 875
<i>Respiratory diseases</i>	2 760	1 602	1 172	223	2 126	777	3 016	1 125
COPD	1 581	1 363	316	179	827	635	1 349	975
<b>Non-medical causes</b>	861	-	1 135	-	871	-	1 587	-
<b>All deaths</b>	25 883	6 318	24 451	1 484	21 248	3 042	46 886	5 426

1 Because of roundings of numbers, slight deviations can occur when summing results

Table 6.2.3 shows that the mortality rate among men for diseases used to estimate smoking-related deaths is highest in Denmark, followed in descending order by Finland, Norway, and Sweden.

**Table 6.2.3<sup>1</sup> Deaths among men for diseases used to estimate smoking-related mortality. Age-standardized rate per 100 000 persons according to diagnosis and country. 2000-2012 (yearly average). Age 35+**

Disease	Denmark	Finland	Norway	Sweden
		2 500	2 301	2 142
<b>Medical causes</b>	704	549	611	527
<i>Cancer</i>	169	132	126	84
Lung cancer	47	23	26	23
Upper respiratory cancer	876	1 074	841	936
<i>Cardiovascular diseases</i>	281	186	246	151
<i>Respiratory diseases</i>	159	88	112	66
COPD	105	189	110	109
<b>Non-medical causes</b>	633	446	429	265
<b>All deaths</b>	2 500	2 301	2 142	2 049

1 The presented rates do not reflect the specific mortality rate of smoking-attributable deaths, but instead the mortality rates within each group of diseases/disease groups, which have been used to estimate smoking-related mortality

Table 6.2.4 shows that the highest mortality rate among women for diseases used to estimate smoking-related deaths is found in Denmark, followed by Norway, Sweden, and Finland.

**Table 6.2.4<sup>1</sup>** Deaths among women for diseases used to estimate smoking-related mortality. Age-standardized rate per 100 000 persons according to diagnosis and country. 2000-2012 (yearly average). Age 35+

	Denmark	Finland	Norway	Sweden
Disease	1 765	1 454	1 458	1 453
<b>Medical causes</b>	491	320	381	361
<i>Cancer</i>	109	35	66	56
Lung cancer	15	9	8	8
Upper respiratory cancer	580	667	559	626
<i>Cardiovascular diseases</i>	197	73	151	97
<i>Respiratory diseases</i>	116	20	63	46
COPD	60	71	61	52
<b>Non-medical causes</b>	454	93	230	184
<b>All deaths</b>	1 765	1 454	1 458	1 453

1 The presented rates do not reflect the specific mortality rate of smoking-attributable deaths, but instead the mortality rates within each group of diseases/disease groups, which have been used to estimate smoking-related mortality

### Medical causes

Figure 6.2.1 shows that the mortality rate among men due to medical causes is largely similar in the four countries. The highest rate is found in Denmark, followed in descending order by Finland, Norway, and Sweden. In all four countries, the rates have been constantly decreasing between 1995 and 2013.

**Figure 6.2.1 Medical-cause mortality per 100 000 persons according to country. Men. Age-standardized rates. 1995-2013. Age 35+**

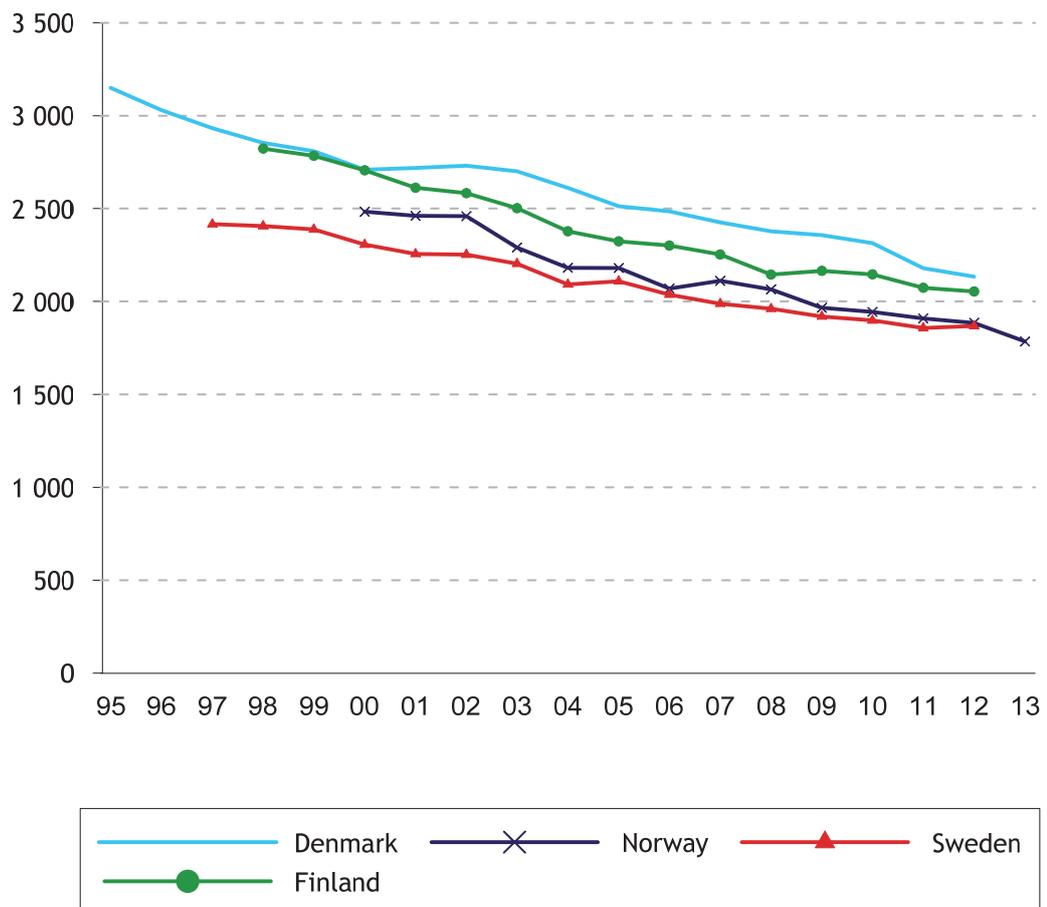
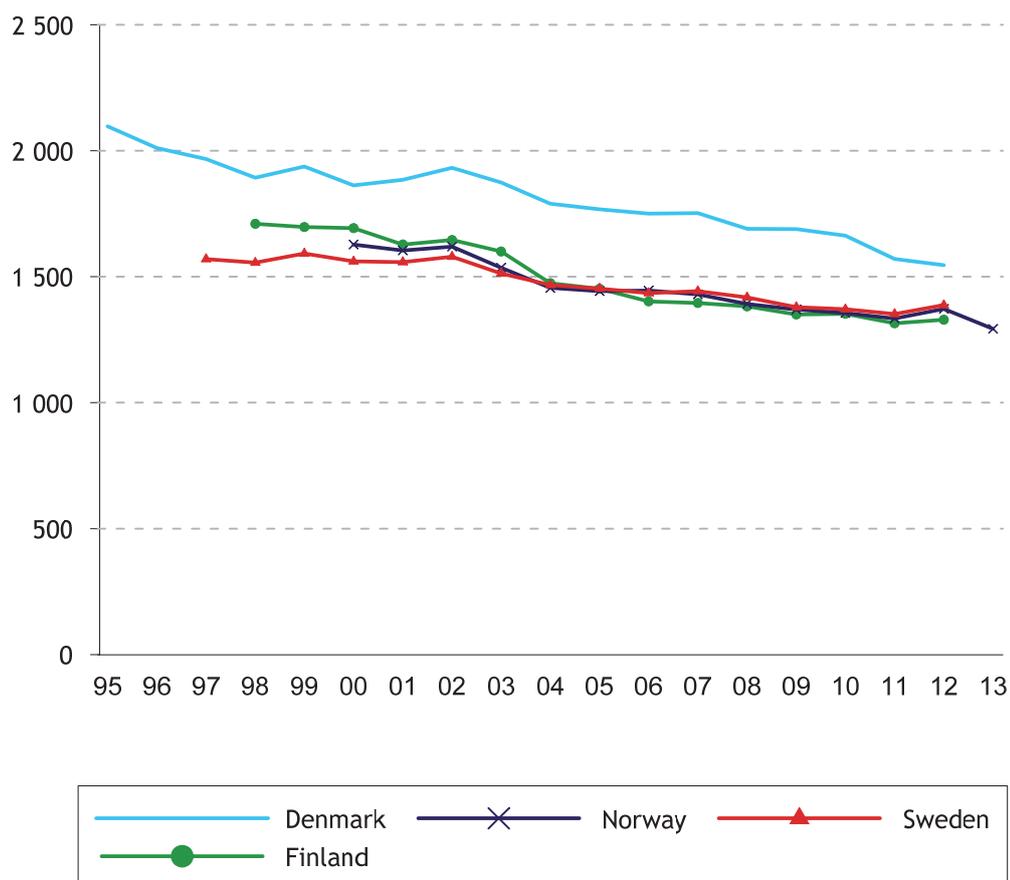


Figure 6.2.2 shows that the mortality rate among women due to medical causes is similar in Finland, Norway, and Sweden, but in each year a higher rate is observed among Danish women. In all four countries, the rates have been constantly decreasing between 1995 and 2013.

**Figure 6.2.2** Medical-cause mortality per 100 000 persons according to country. Women. Age-standardized rates. 1995-2013. Age 35+



## Cancer

Figure 6.2.3 shows that the cancer mortality rate among men is highest in Denmark, followed in descending order by Norway, Finland, and Sweden, the latter two rates being largely similar. In all four countries, the rates have been constantly decreasing between 1995 and 2013.

**Figure 6.2.3 Cancer mortality per 100 000 persons according to country. Men. Age-standardized rates. 1995-2013. Age 35+**

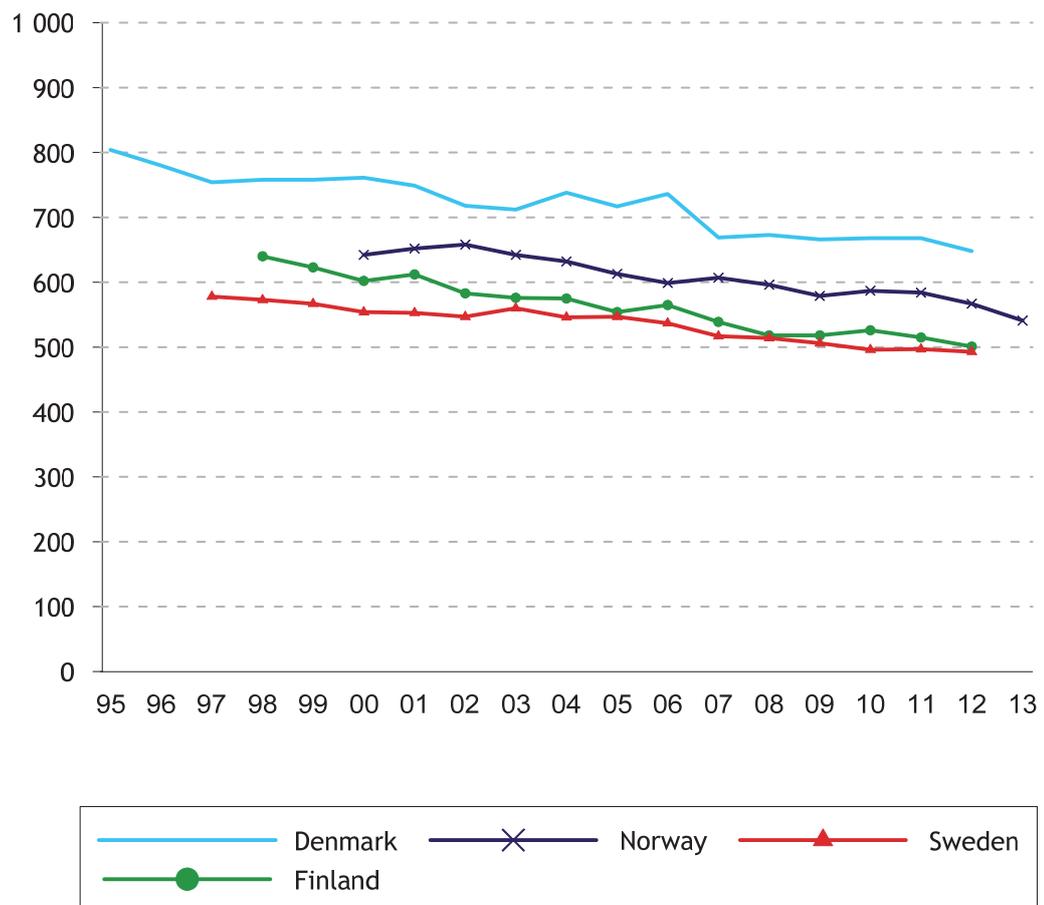
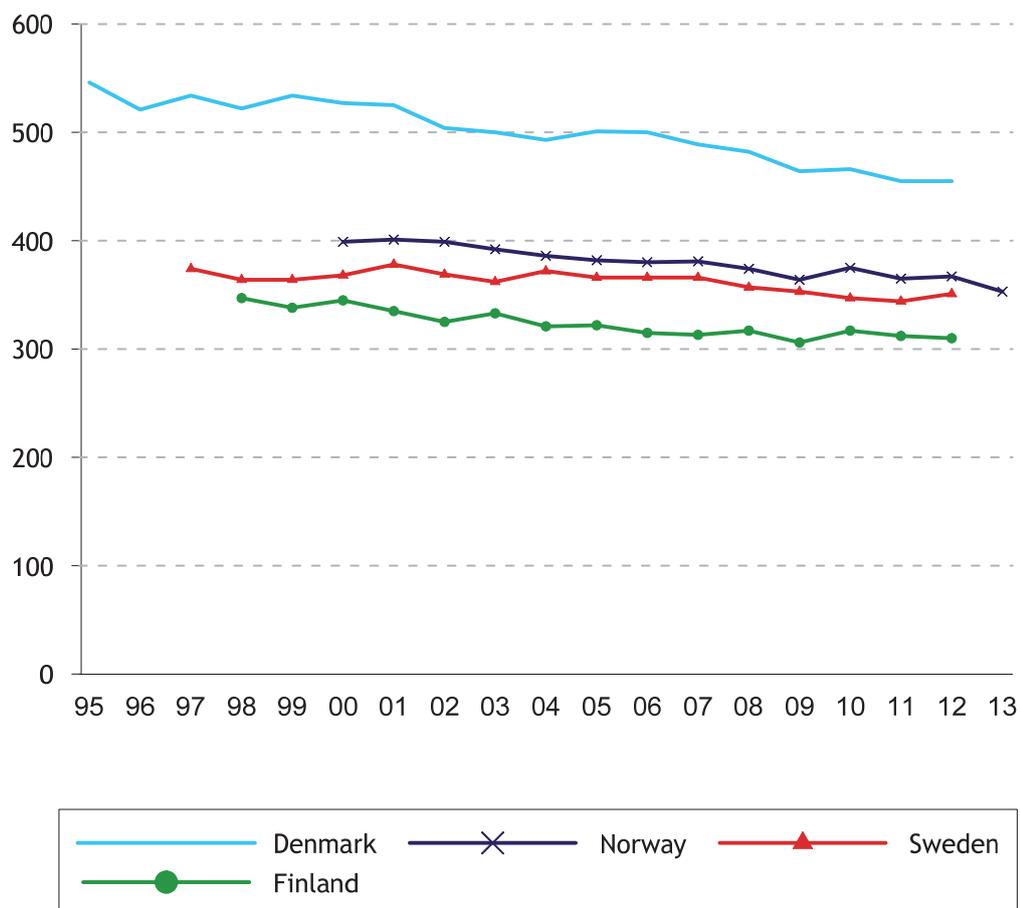


Figure 6.2.4 shows that the cancer mortality rate among women is highest in Denmark, followed in descending order by Norway, Sweden, and Finland. In all four countries, the rates have been constantly decreasing between 1995 and 2013.

**Figure 6.2.4 Cancer mortality per 100 000 persons according to country. Women. Age-standardized rates. 1995-2013. Age 35+**



### Lung cancer

Figure 6.2.5 shows that the lung cancer mortality rate among men is highest in Denmark and lowest in Sweden. Between the two are Finland and Norway, which exhibit largely similar rates. Between 1995 and 2013, the rates have been decreasing among Danish and Finnish men, with a weak decrease also observed for Swedish men. No clear development is seen among Norwegian men.

**Figure 6.2.5 Lung cancer mortality per 100 000 persons according to country. Men. Age-standardized rates. 1995-2013. Age 35+**

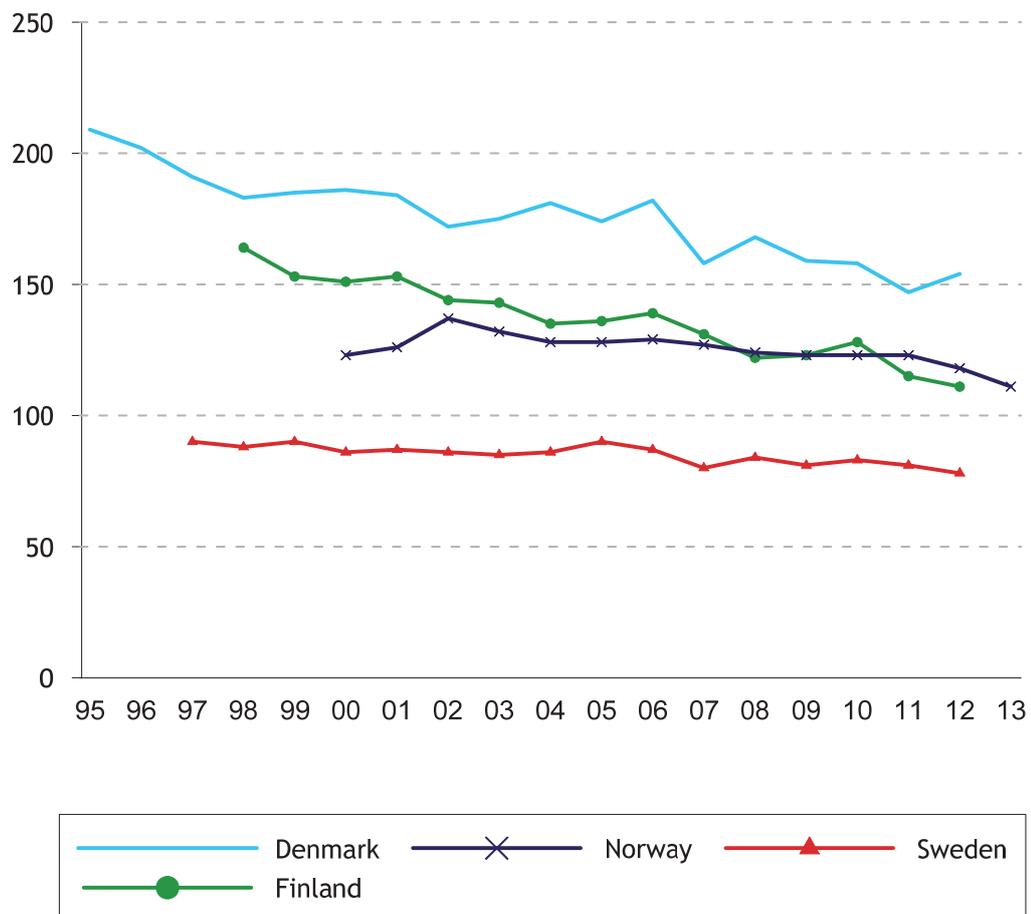
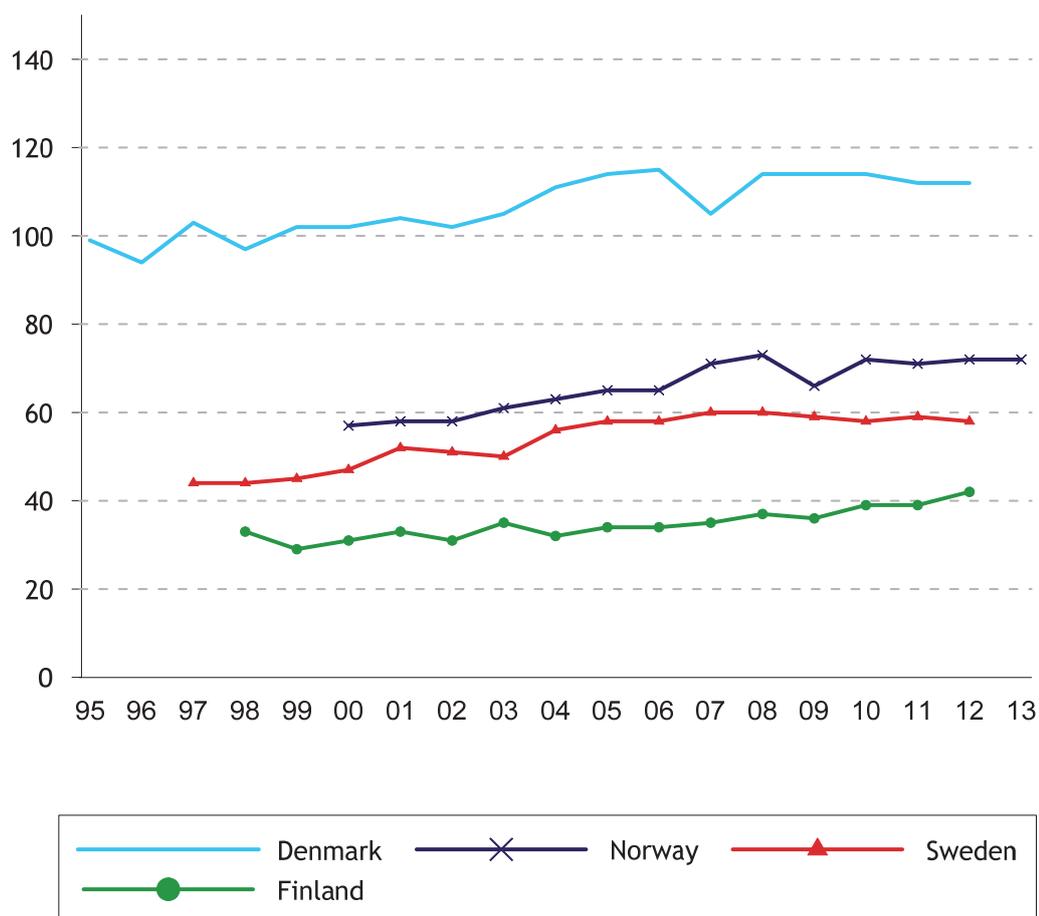


Figure 6.2.6 shows that the lung cancer mortality rate among women is markedly highest in Denmark, followed in descending order by Norway, Sweden, and Finland. In all four countries, the rates have been increasing between 1995 and 2013.

**Figure 6.2.6 Lung cancer mortality per 100 000 persons according to country. Women. Age-standardized rates. 1995-2013. Age 35+**



### *Cancer in the upper respiratory tract*

Figure 6.2.7 shows that the mortality rate due to upper respiratory tract cancer among men is markedly highest in Denmark, with largely similar rates in Finland, Norway, and Sweden. In all four countries, the mortality rates do not change significantly between 1995 and 2013, although a decreasing tendency can be observed among Danish men since 2005.

**Figure 6.2.7** Upper respiratory tract cancer mortality per 100 000 persons according to country. Men. Age-standardized rates. 1995-2013. Age 35+

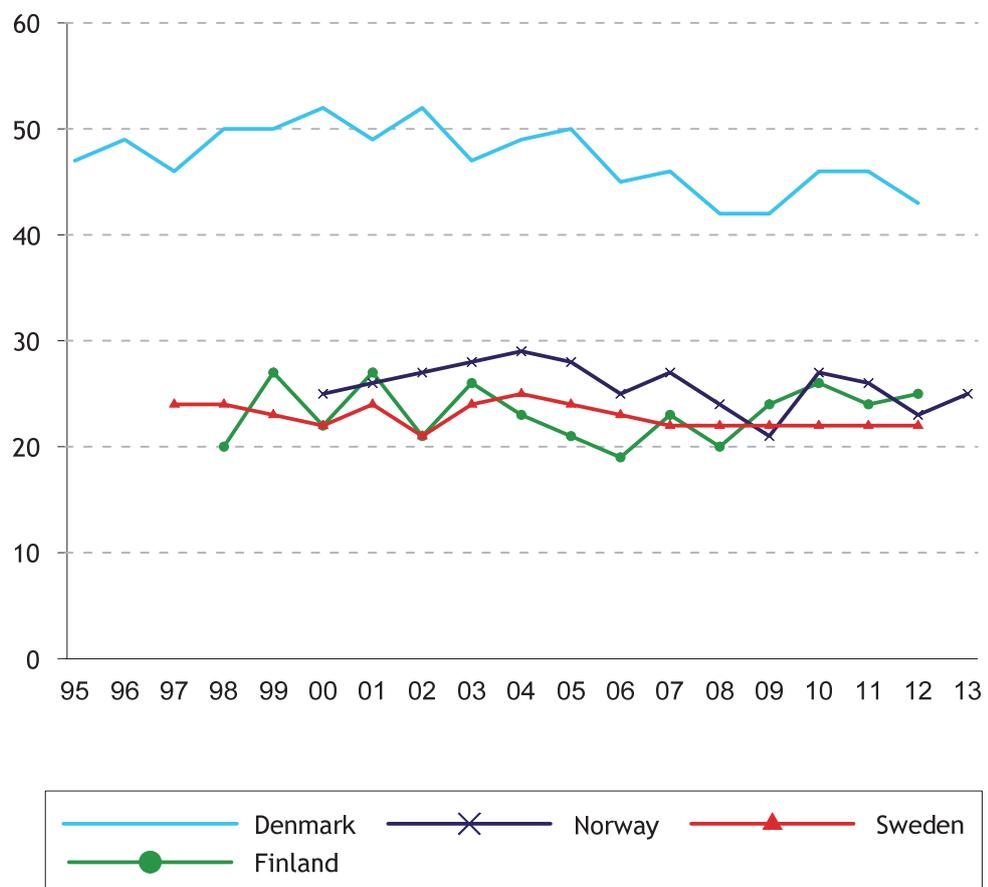
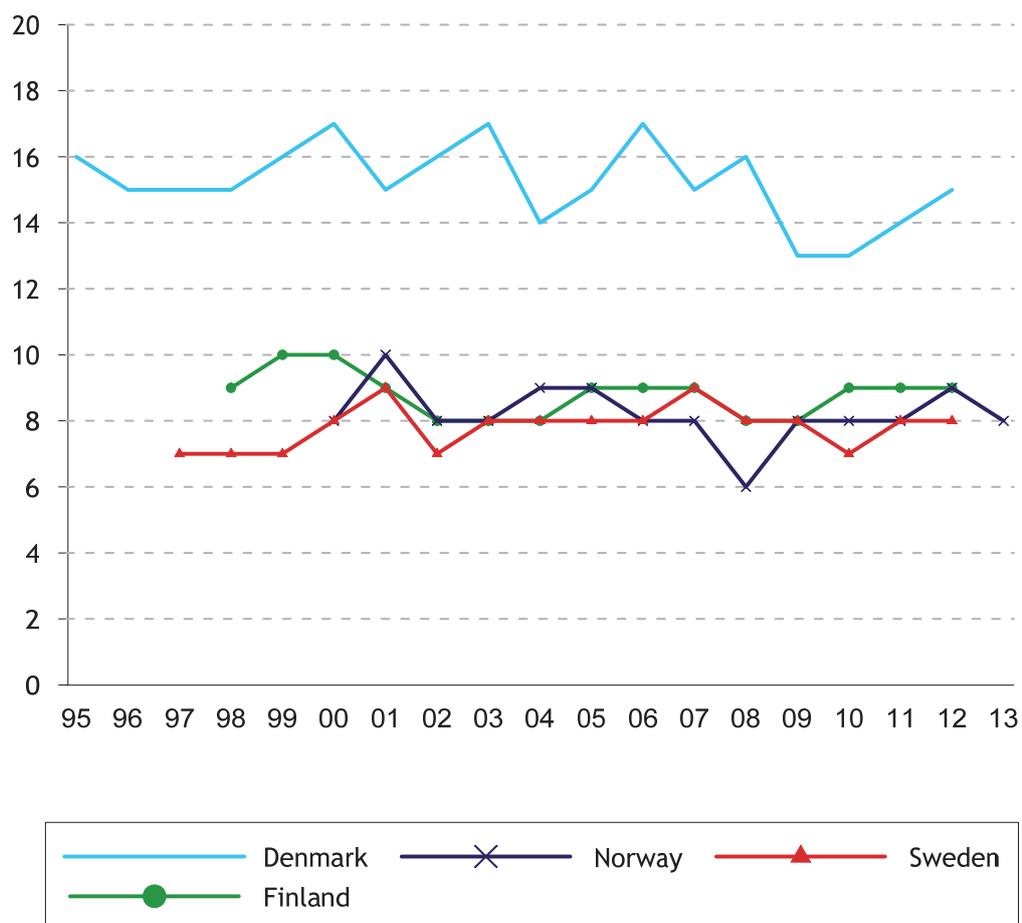


Figure 6.2.8 shows that the mortality rate due to upper respiratory tract cancer among women is pronouncedly highest in Denmark, with largely similar rates in Finland, Norway, and Sweden. Overall, the rates do not change significantly between 1995 and 2013 in any of the four countries.

**Figure 6.2.8** Upper respiratory tract cancer mortality per 100 000 persons according to country. Women. Age-standardized rates. 1995-2013. Age 35+



### Cardiovascular diseases

Figure 6.2.9 shows that the mortality rate due to cardiovascular diseases among men is highest in Finland, followed by Sweden. The lowest rates are found among Norwegian and Danish men, who exhibit largely similar rates. In all four countries, the rates have been constantly decreasing between 1995 and 2013.

**Figure 6.2.9 Cardiovascular mortality per 100 000 persons according to country. Men. Age-standardized rates. 1995-2013. Age 35+**

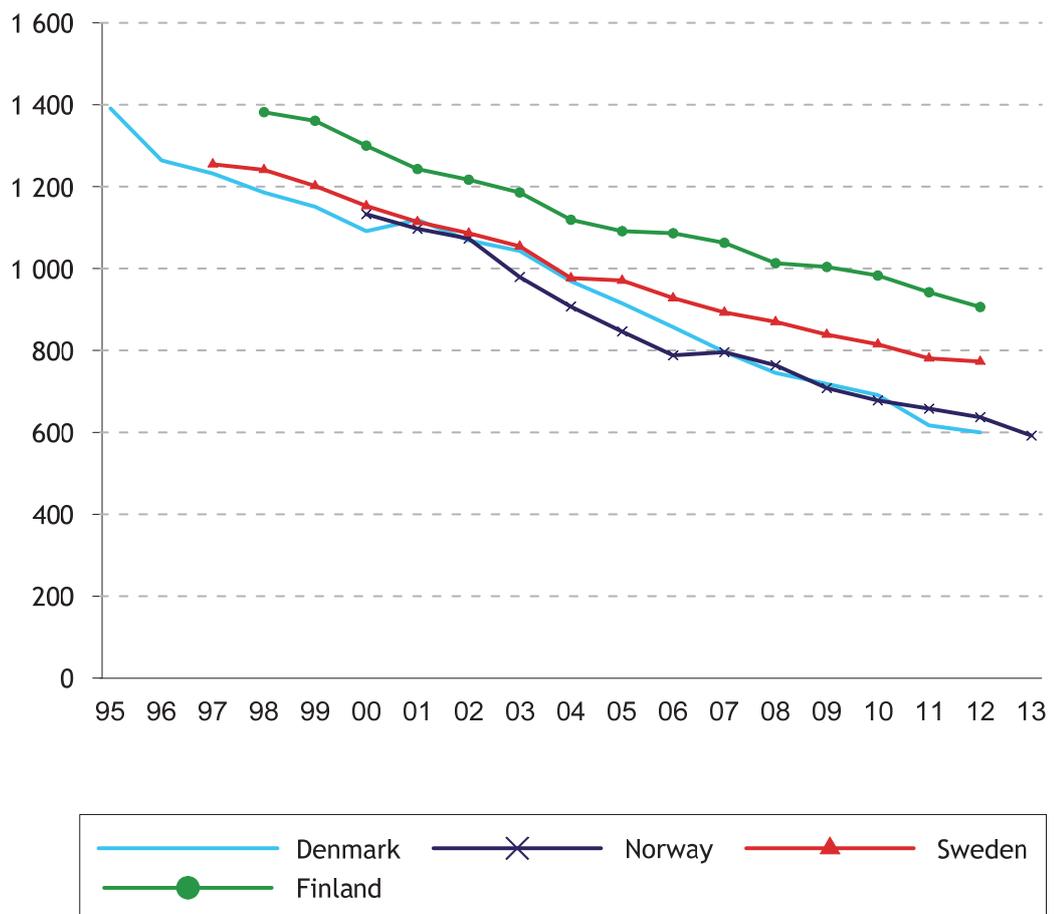
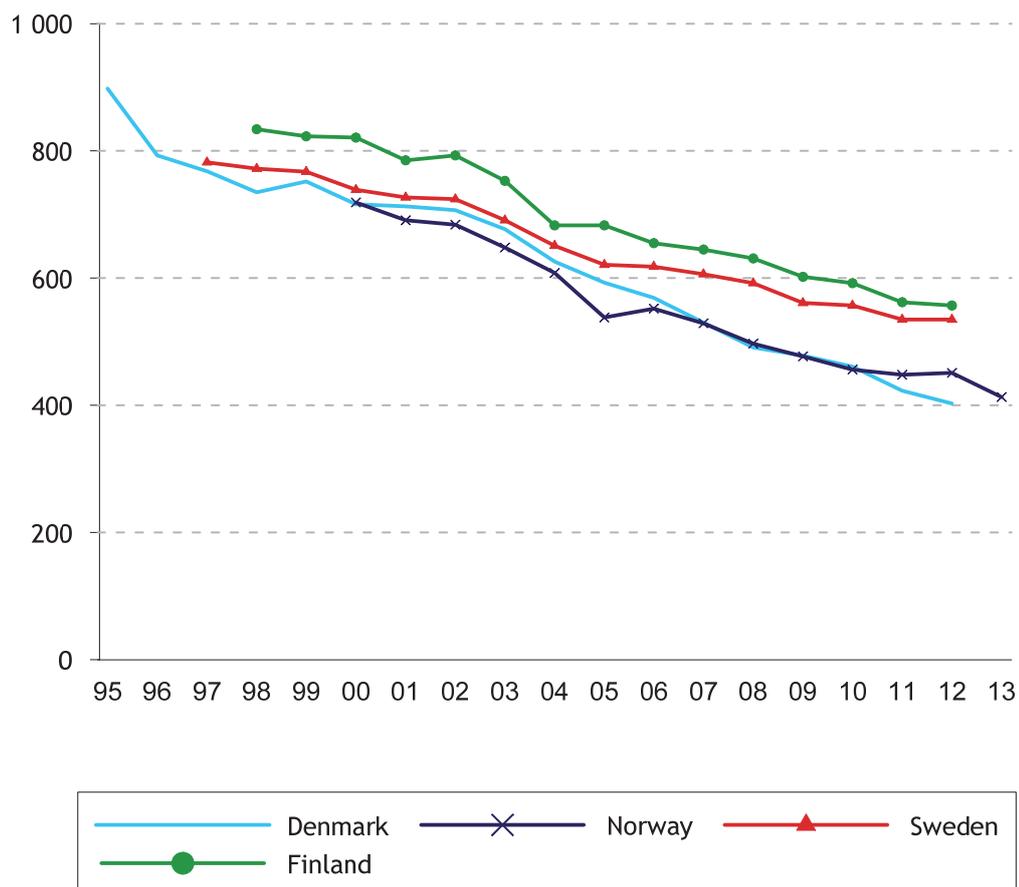


Figure 6.2.10 shows that the mortality rate due to cardiovascular diseases among women is highest in Finland and Sweden and lowest in Norway and Denmark. In all four countries, the rates have been constantly decreasing between 1995 and 2013.

**Figure 6.2.10** Cardiovascular mortality per 100 000 persons according to country. Women. Age-standardized rates. 1995-2013. Age 35+



### Respiratory diseases

Figure 6.2.11 shows that the mortality rate due to respiratory diseases among men is highest in Denmark, followed in descending order by Norway, Sweden, and Finland. Before 2000, the highest rate was found among Finnish men. However, after 2000 there is a relatively steep decrease in mortality among Finnish men, resulting in the lowest rate among the four countries.

Figure 6.2.11 Respiratory diseases mortality per 100 000 persons according to country. Men. Age-standardized rates. 1995-2013. Age 35+

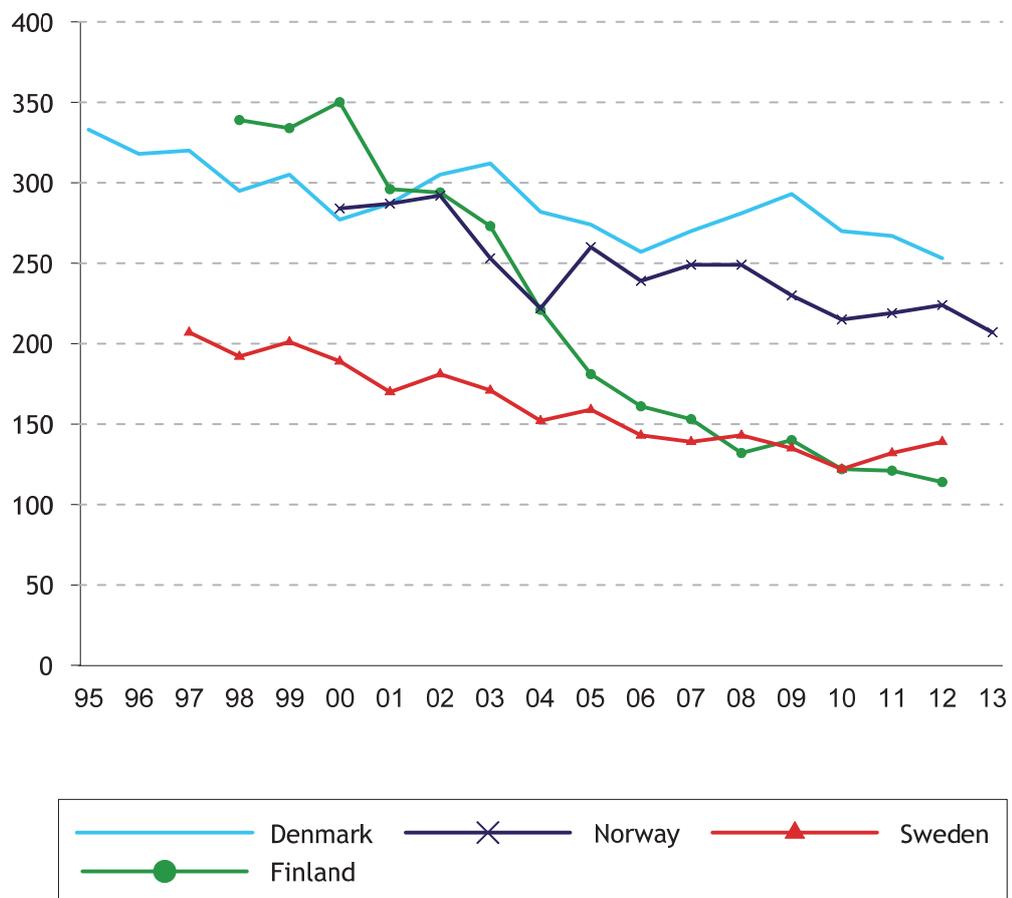
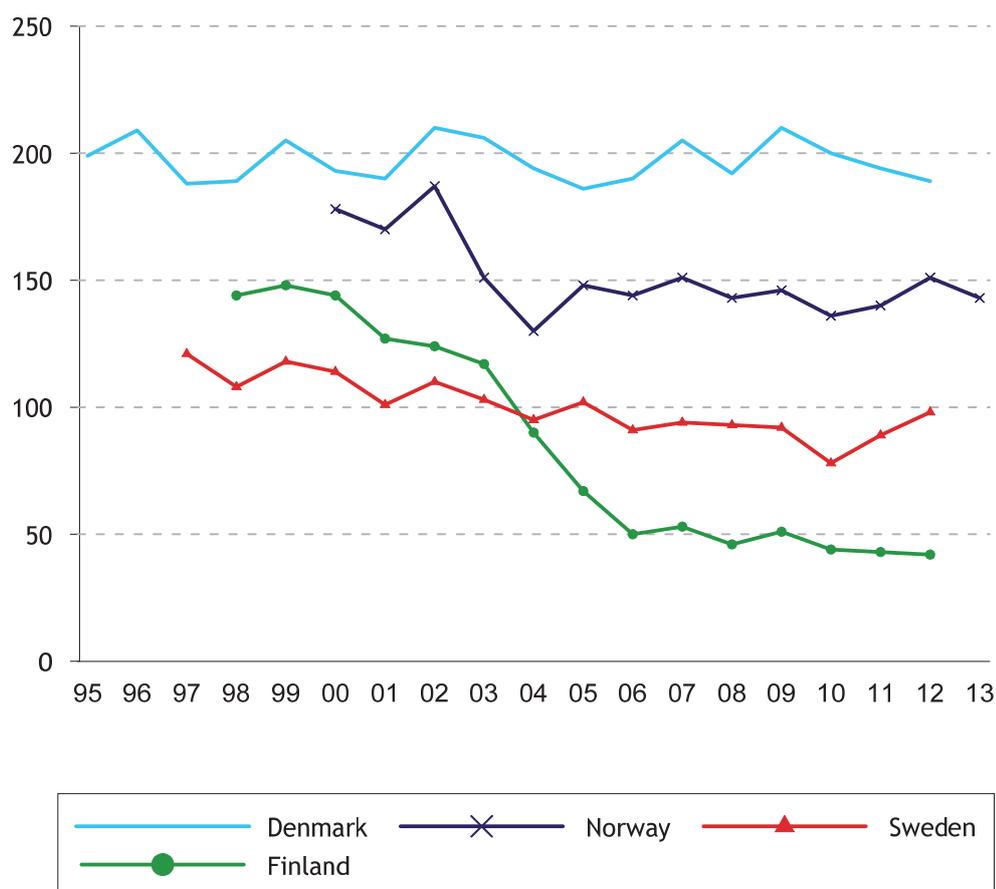


Figure 6.2.12 shows that the mortality rate due to respiratory diseases among women is highest in Denmark, followed in descending order by Norway, Sweden, and Finland. Between 1995 and 2013, the rate remains largely stable in Denmark, Norway, and Sweden. The mortality rate among Finnish women falls sharply between 2000 and 2006, after which it stabilizes.

**Figure 6.2.12 Respiratory diseases mortality per 100 000 persons according to country. Women. Age-standardized rates. 1995-2013. Age 35+**



### Chronic obstructive pulmonary disease (COPD)

Figure 6.2.13 shows that the COPD mortality rate among men is highest in Denmark, followed in descending order by Norway, Finland, and Sweden. The rate has remained largely stable in Norway and Sweden, but has been decreasing in Denmark and Finland.

**Figure 6.2.13 COPD mortality per 100 000 persons according to country. Men. Age-standardized rates. 1995-2013. Age 35+**

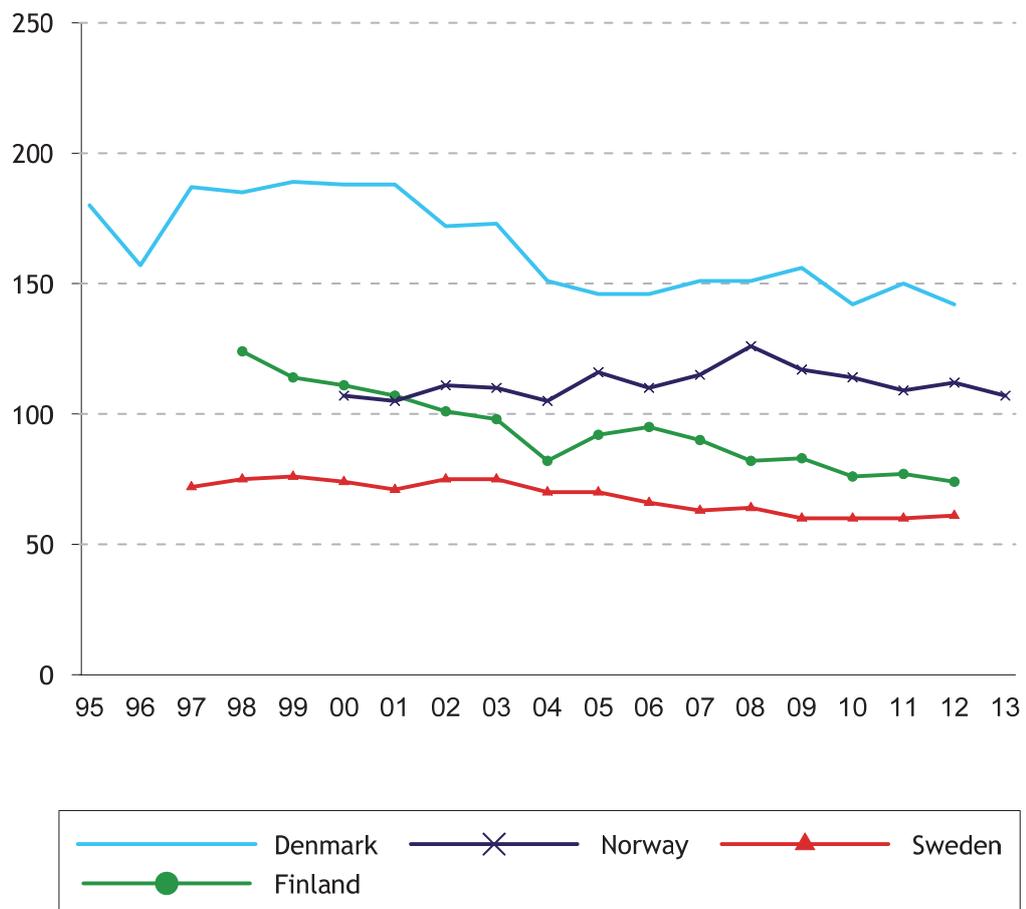
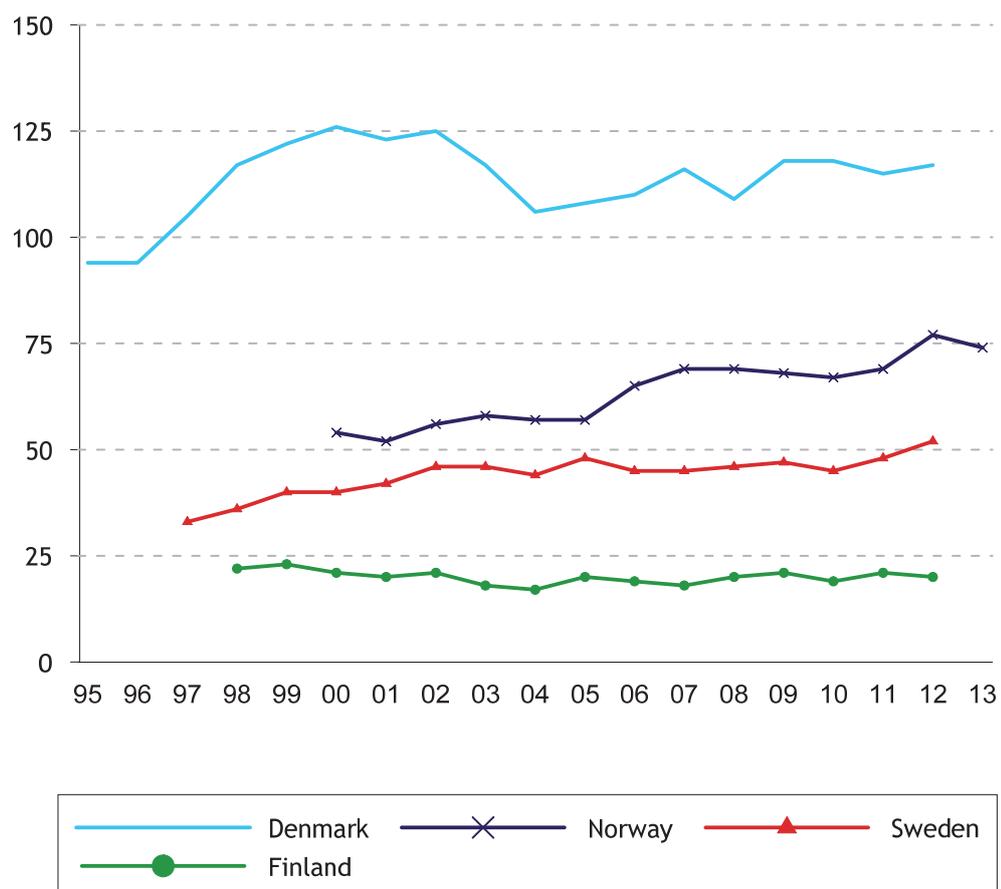


Figure 6.2.14 shows that the COPD mortality rate among women is highest in Denmark, followed in descending order by Norway, Sweden, and Finland. Between 1995 and 2013, the rates have been increasing among Danish, Norwegian, and Swedish women. Among Finnish women, the rate has remained stable.

**Figure 6.2.14 COPD mortality per 100 000 persons according to country. Women. Age-standardized rates. 1995-2013. Age 35+**



### 6.3 Alcohol-related mortality

Table 6.3.1 shows that, when considered an underlying cause of death, alcohol-related diseases cause the highest number of deaths per year among Finnish men, followed in descending order by Danish, Swedish, and Norwegian men. For alcohol-related diseases that are considered a contributory cause of death among men, the highest number of deaths per year is found in Finland, followed in descending order by Sweden, Denmark, and Norway. Consequently, when summarizing the numbers of deaths per year in which alcohol-related diseases were either the underlying or a contributory cause of death, the highest number is found among Finnish men, followed in descending order by Danish, Swedish, and Norwegian men.

When looking at the numbers of deaths caused by specific alcohol-related diseases among men in the Nordic countries, slightly different patterns emerge. In Denmark, Sweden, and Norway, the two alcohol-related diseases attributable to the highest numbers of deaths per year are alcoholism and cirrhosis of the liver. Cirrhosis also of the liver yields the most alcohol-related deaths per year in Finland, but here alcohol poisoning is the second most frequently specified cause of death attributable to alcohol.

**Table 6.3.1 Alcohol-related deaths among men. Yearly average according to diagnosis and country. 2000-2012. Age 20+**

	Denmark	Finland	Norway	Sweden
<b>Alcohol-related disease</b>				
<i>Alcoholism</i>	488	167	148	258
<i>Cirrhosis of the liver</i>	521	739	132	403
<i>Pancreatitis</i>	78	120	30	78
<i>Alcohol poisoning</i>	15	358	28	0
All underlying causes	1 102	1 384	338	740
All contributory causes	1 043	1 863	345	1 285
All underlying and contributory causes	2 145	3 247	683	2 025

Table 6.3.2 shows that, among women, the pattern for deaths per year in which alcohol is an underlying cause follows that of men. In other words, the highest number of deaths per year is found among Finnish women, followed in descending order by Danish, Swedish, and Norwegian women. When alcohol is considered a contributory cause of death, the highest number of deaths per year is found in Denmark, followed in descending order by Finland, Sweden, and Norway. When summarizing the number of deaths per year caused by alcohol-related diseases as underlying or contributory causes of death, the highest number is found among Finnish and Danish women, followed in descending order by Swedish and Norwegian women. The most prevalent alcohol-related disease cited as a cause of death among

women in all four countries is cirrhosis of the liver. The second most frequent cause is alcohol poisoning in Finland, and alcoholism in Denmark.

**Table 6.3.2 Alcohol-related deaths among women. Yearly average according to diagnosis and country. 2000-2012. Age 20+**

	Denmark	Finland	Norway	Sweden
<b>Alcohol-related disease</b>				
<i>Alcoholism</i>	145	36	31	58
<i>Cirrhosis of the liver</i>	243	280	70	198
<i>Pancreatitis</i>	48	46	29	58
<i>Alcohol poisoning</i>	8	98	10	0
All underlying causes	444	461	141	314
All contributory causes	378	364	126	440
All underlying and contributory causes	822	825	267	754

Table 6.3.3 shows that, among men, the highest age-standardized mortality rate due to alcohol-related diseases, as an underlying or a contributory cause of death, and the two rates combined, is found in Finland, followed in descending order by Denmark, Sweden, and Norway. For specific alcohol-related diseases, the two highest mortality rates are found for cirrhosis of the liver and alcoholism among Danish, Swedish, and Norwegian men. In Finland, the highest mortality rate is found for cirrhosis of the liver and alcohol poisoning.

**Table 6.3.3 Alcohol-related deaths among men. Age-standardized rate per 100 000 persons according to diagnosis and country. 2000-2012 (yearly average). Age 20+**

	Denmark	Finland	Norway	Sweden
<b>Alcohol-related disease</b>				
<i>Alcoholism</i>	28	9	10	8
<i>Cirrhosis of the liver</i>	30	38	9	13
<i>Pancreatitis</i>	5	7	2	3
<i>Alcohol poisoning</i>	1	17	2	0
All underlying causes	63	71	23	23
All contributory causes	62	99	25	40
All underlying and contributory causes	125	170	48	63

Table 6.3.4 shows that for Nordic women, as for men, when considering alcohol-related diseases as an underlying or a contributory cause of death, and the two rates combined, the rate is highest among Danish women, followed by Finnish and Swedish women, and lowest among Norwegian women. For mortality caused by specific alcohol-related diseases, the highest rates are found for cirrhosis of the liver in Denmark and Finland.

**Table 6.3.4 Alcohol-related deaths among women. Age-standardized rate per 100 000 persons according to diagnosis and country. 2000-2012 (yearly average). Age 20+**

	Denmark	Finland	Norway	Sweden
<b>Alcohol-related disease</b>				
<i>Alcoholism</i>	8	2	2	2
<i>Cirrhosis of the liver</i>	13	13	4	6
<i>Pancreatitis</i>	3	2	2	1
<i>Alcohol poisoning</i>	0	5	1	0
All underlying causes	24	22	9	9
All contributory causes	21	17	8	12
All underlying and contributory causes	45	39	17	21

Figure 6.3.1 shows the alcohol-related mortality rate (underlying causes) among men according to country between 1995 and 2013. It shows unequivocally that the highest rates are among Finnish and Danish men. For both countries, the rates peak in 2007 and then begin to fall. The alcohol-related mortality rates (underlying causes) for Norwegian and Swedish men remain relatively similar and largely stable during the period, albeit with a weak decrease over time.

**Figure 6.3.1 Alcohol-related mortality (underlying causes) per 100 000 persons according to country. Men. Age-standardized rates. 1995-2013. Age 20+**

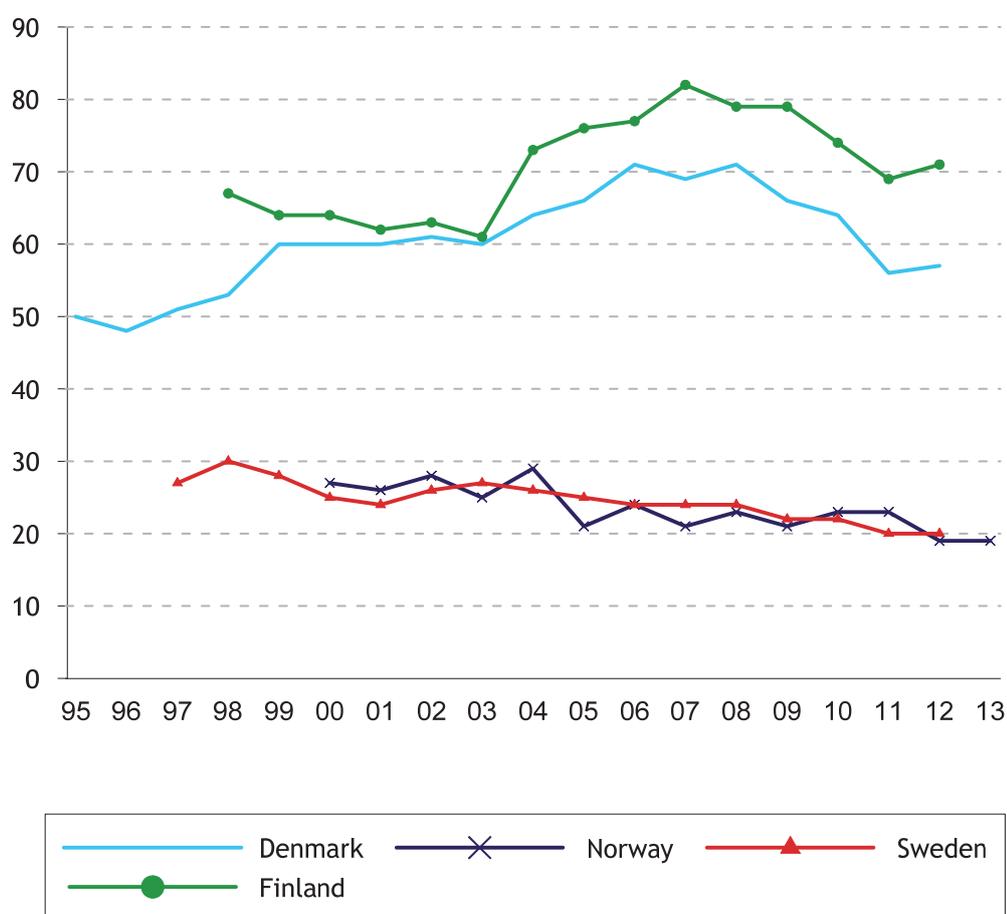


Figure 6.3.2 shows unequivocally that the highest alcohol-related mortality rates (underlying causes) among women are found in Finland and Denmark. Between 1995 and 2012, the rates in Finland and Denmark have been weakly increasing and relatively similar, with Danish women taking a minor lead. However, from 2011, the highest rate is among Finnish women. For Norway and Sweden, the alcohol-related mortality rates (underlying causes) among women are both similar and stable during the period.

**Figure 6.3.2 Alcohol-related mortality (underlying causes) per 100 000 persons according to country. Women. Age-standardized rates. 1995-2013. Age 20+**

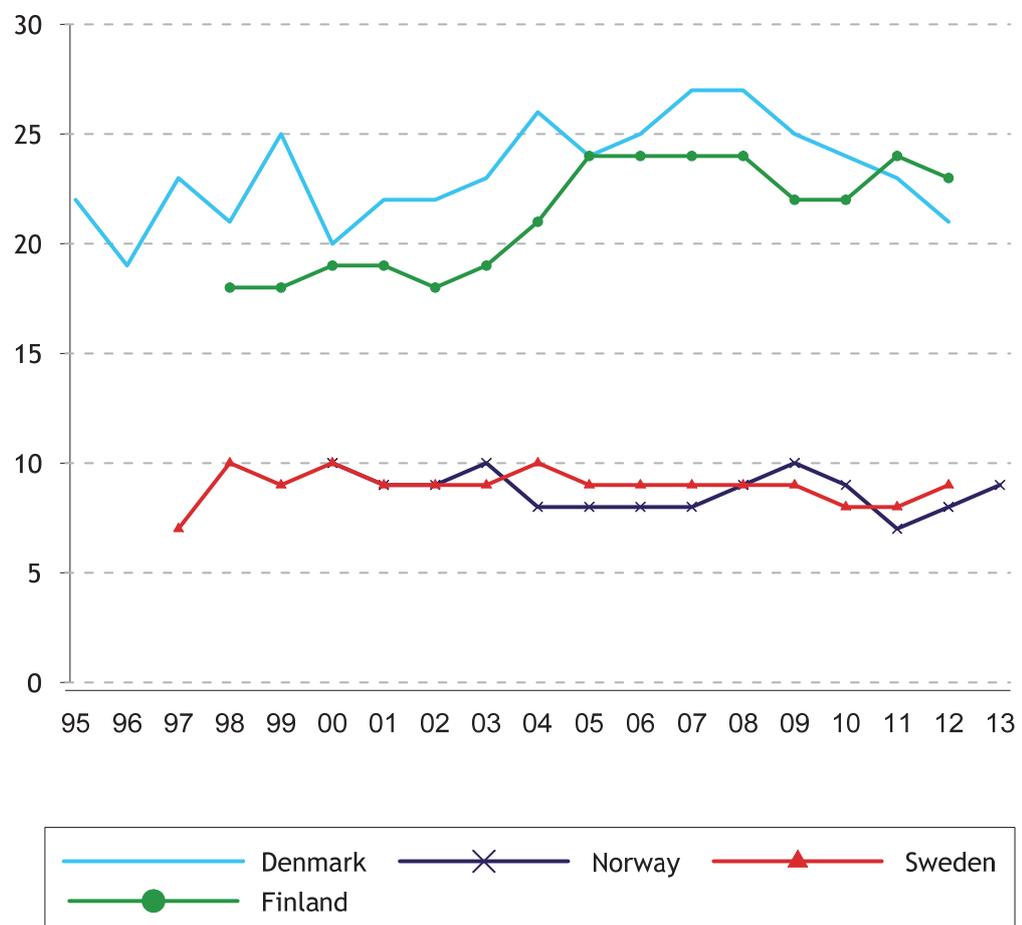


Figure 6.3.3 shows that, for each year, the highest alcohol-related mortality rate (contributory causes) is found among Finnish men. However, since 2006, the rate has been decreasing. After Finland, in descending order, the highest alcohol-related mortality rates among men (contributory causes) are in Denmark, Sweden, and Norway. These three countries all exhibit a weak decrease over time, most markedly among Danish men.

**Figure 6.3.3 Alcohol-related mortality (contributory causes) per 100 000 persons according to country. Men. Age-standardized rates. 1995-2013. Age 20+**

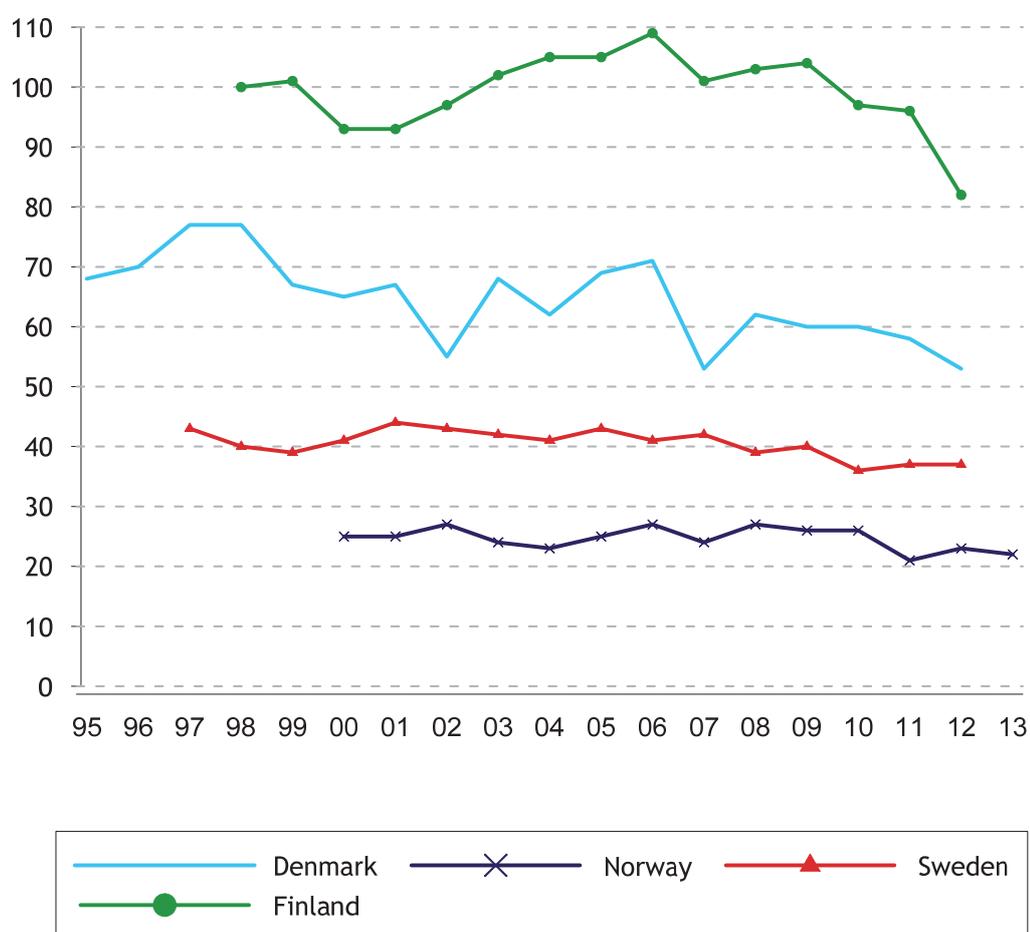
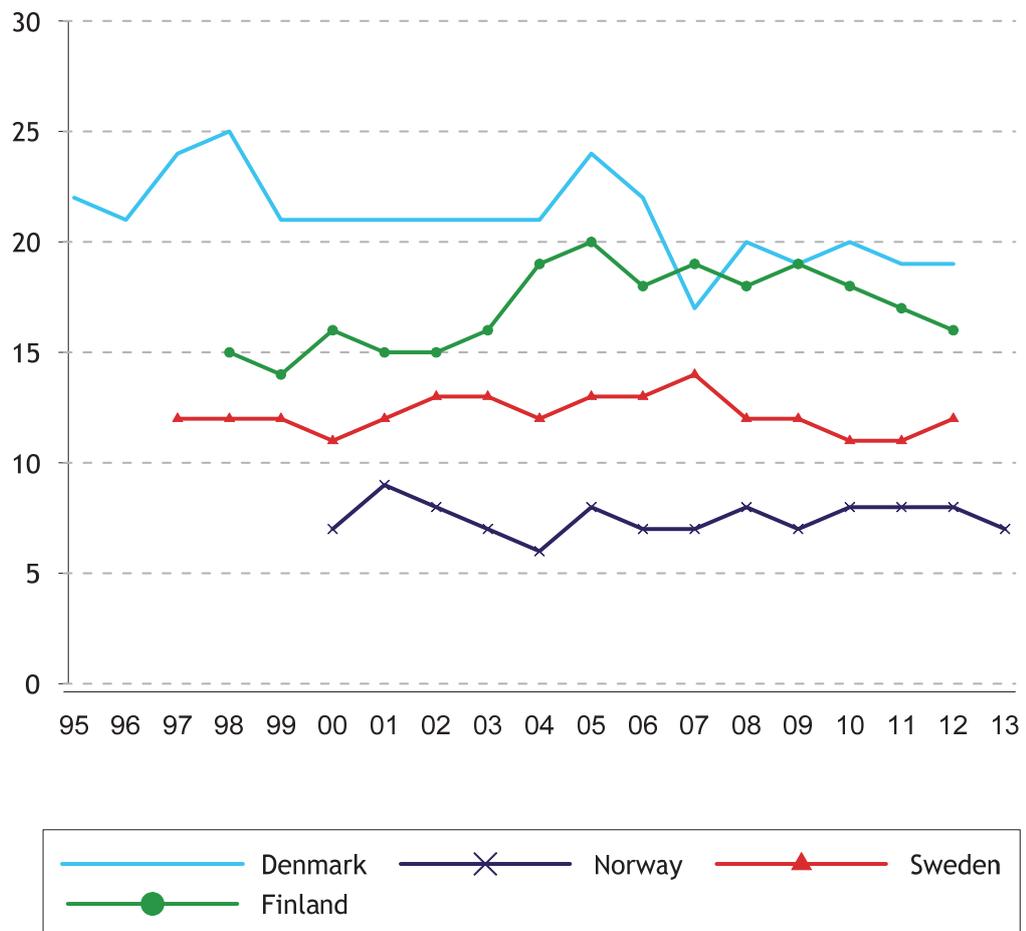


Figure 6.3.4 shows the alcohol-related mortality rate among women (contributory causes). The rate is highest among Danish women, followed in descending order by Finnish, Swedish, and Norwegian women. Although minor changes can be observed for each country between 1995 and 2013, no clear change in the alcohol-related mortality rate (underlying causes) is found.

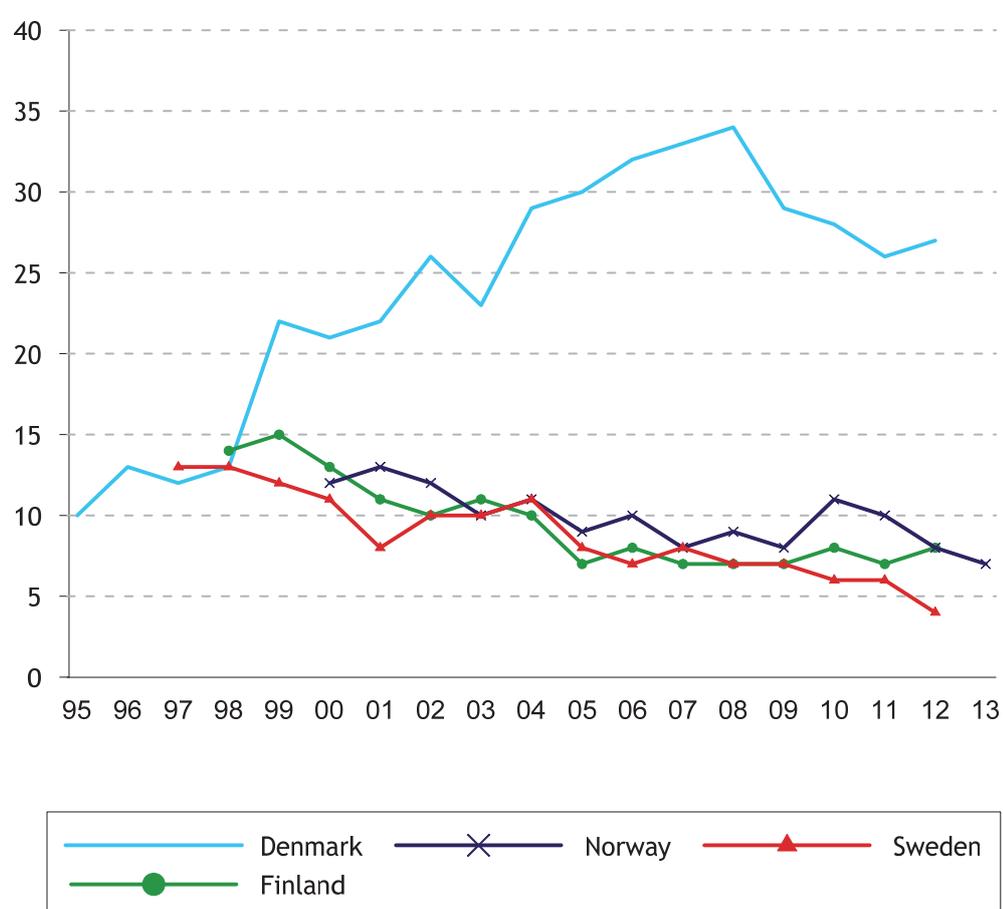
**Figure 6.3.4 Alcohol-related mortality (contributory causes) per 100 000 persons according to country. Women. Age-standardized rates. 1995-2013. Age 20+**



### Alcoholism

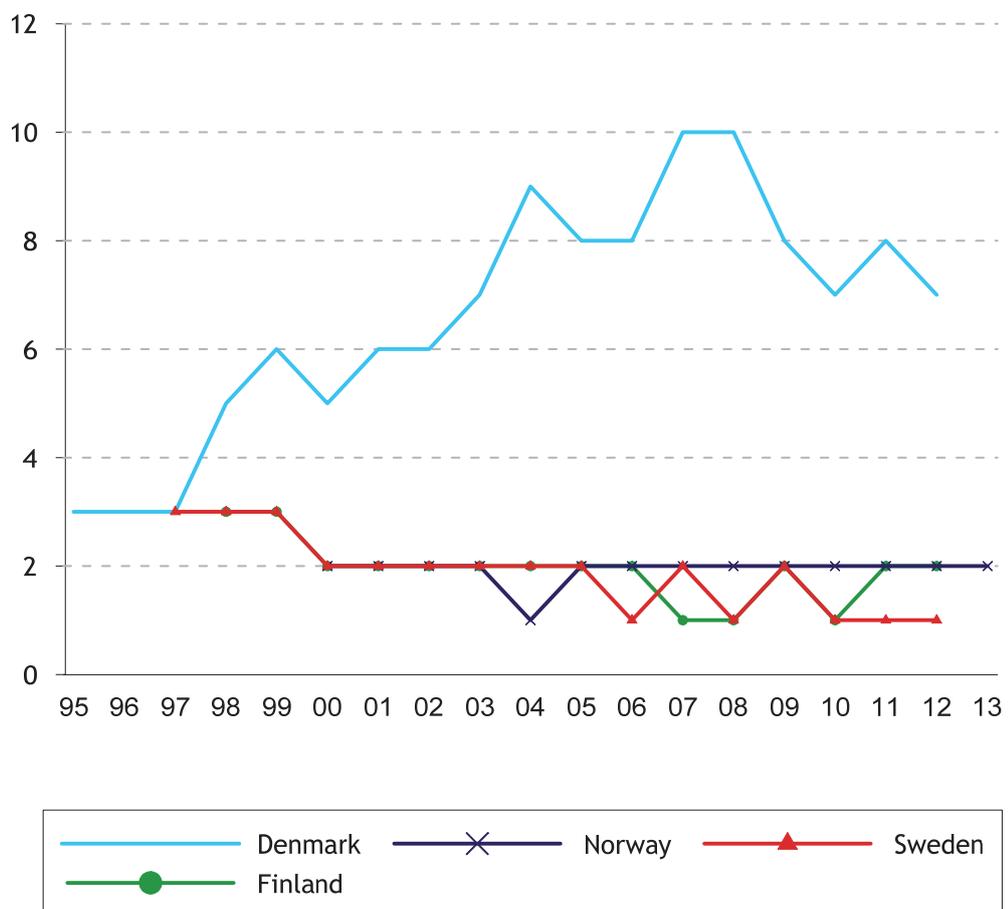
Figure 6.3.5 shows that the alcoholism-caused mortality rate among men is markedly highest in Denmark, followed by largely similar rates in Norway, Finland, and Sweden. The rates remain relatively stable among Finnish, Swedish, and Norwegian men between 1997 and 2013. By contrast, there is a sharp increase in the mortality rate due to alcoholism among Danish men between 1997 and 2007, followed by a decrease.

**Figure 6.3.5 Alcoholism-caused mortality per 100 000 persons according to country. Men. Age-standardized rates. 1995-2013. Age 20+**



According to Figure 6.3.6, the alcoholism-caused mortality rate among women is pronouncedly highest in Denmark, followed by largely similar rates in Norway, Finland, and Sweden. The rates remain relatively stable among Finnish, Swedish, and Norwegian women between 1997 and 2013. By contrast, there is a sharp increase in the alcoholism-caused mortality rate among Danish women between 1997 and 2007, followed by a decrease.

**Figure 6.3.6** Alcoholism-caused mortality per 100 000 persons according to country. Women. Age-standardized rates. 1995-2013. Age 20+



### *Cirrhosis of the liver*

Figure 6.3.7 shows that, among men, the mortality rate caused by cirrhosis of the liver is highest in Finland, followed in descending order by Denmark, Sweden, and Norway, the latter two at rather similar rates. Between 1995 and 2013, the rate has been generally stable in Sweden and Norway. It has been similarly stable in Denmark, but with a decreasing tendency in recent years. From 2003, an increase can be observed in the mortality rate among Finnish men.

**Figure 6.3.7 Cirrhosis of the liver-caused mortality per 100 000 persons according to country. Men. Age-standardized rates. 1995-2013. Age 20+**

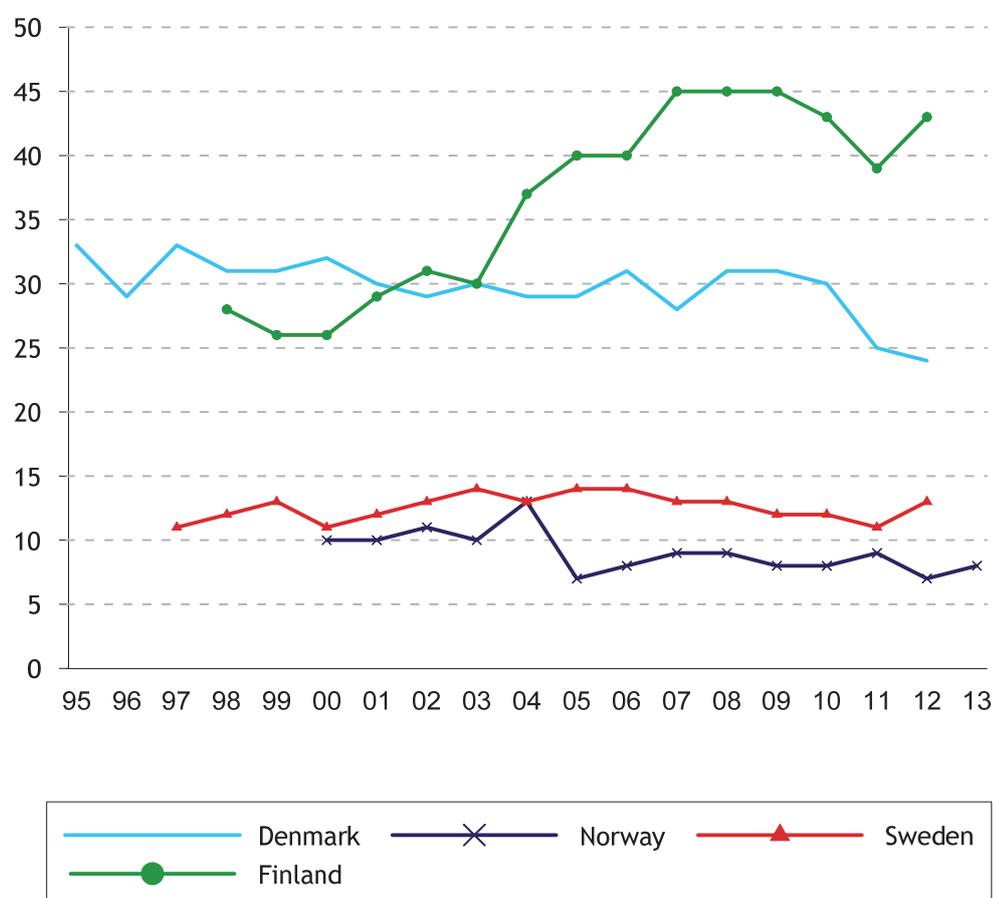
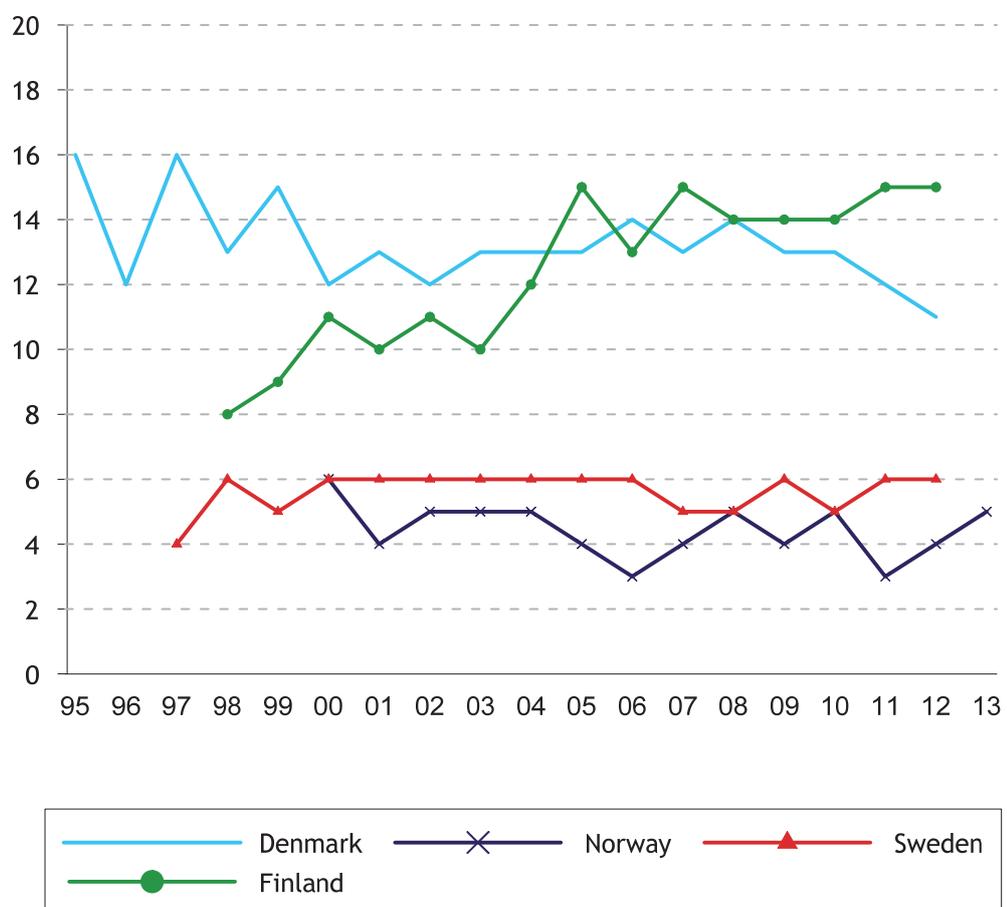


Figure 6.3.8 shows that, among women, the mortality rate caused by cirrhosis of the liver is highest in Finland, followed in descending order by Denmark, Sweden, and Norway, the latter two at rather similar rates. While remaining generally stable among Swedish and Norwegian women since 1997, the rate among Finnish women exceeds that of Danish women around 2008. Since 2008, the mortality rate has been decreasing in Denmark, but an increasing tendency can be observed in Finland.

**Figure 6.3.8 Cirrhosis of the liver-caused mortality per 100 000 persons according to country. Women. Age-standardized rates. 1995-2013. Age 20+**



### Pancreatitis

Figure 6.3.9 shows that pancreatitis-caused mortality is generally low among men in the Nordic countries. The rate is highest in Finland, followed in descending order by Denmark, Sweden, and Norway, with no major differences between the countries. The mortality rate in all four countries remains generally stable between 1995 and 2013.

**Figure 6.3.9 Pancreatitis-caused mortality per 100 000 persons according to country. Men. Age-standardized rates. 1995-2013. Age 20+**

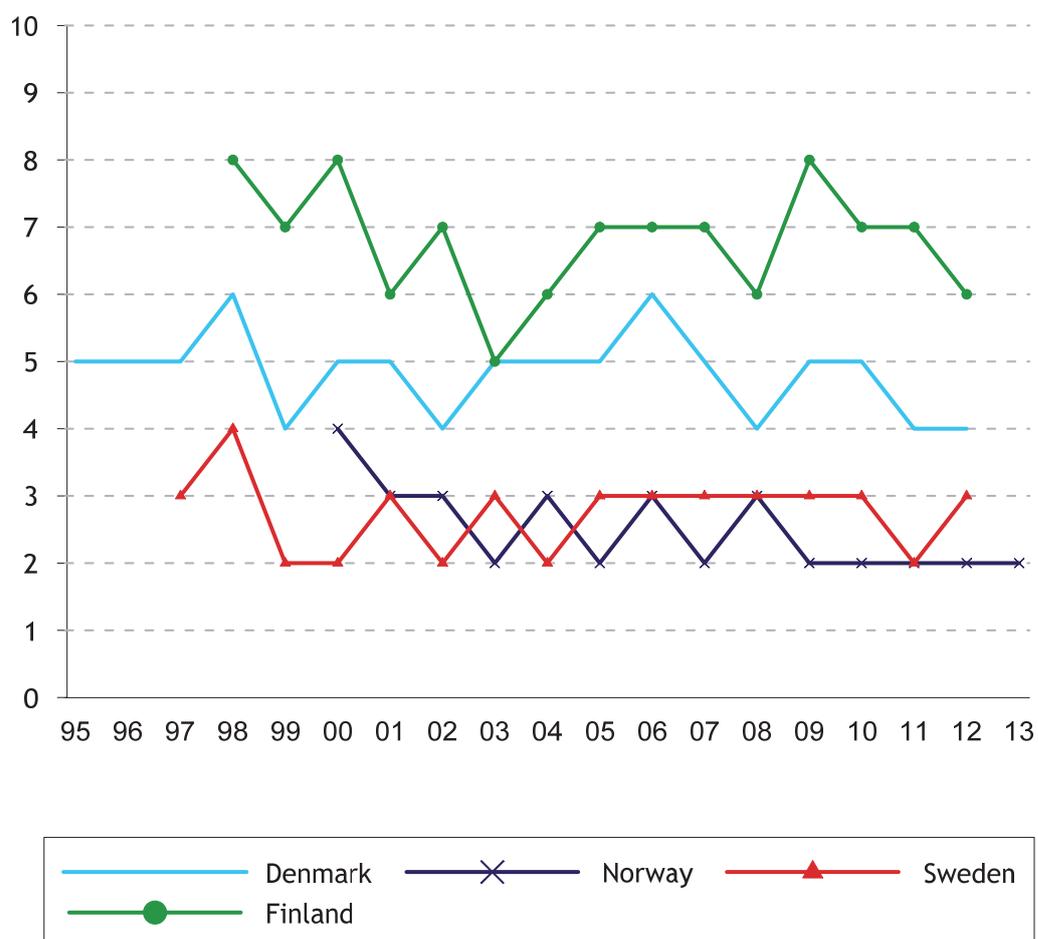
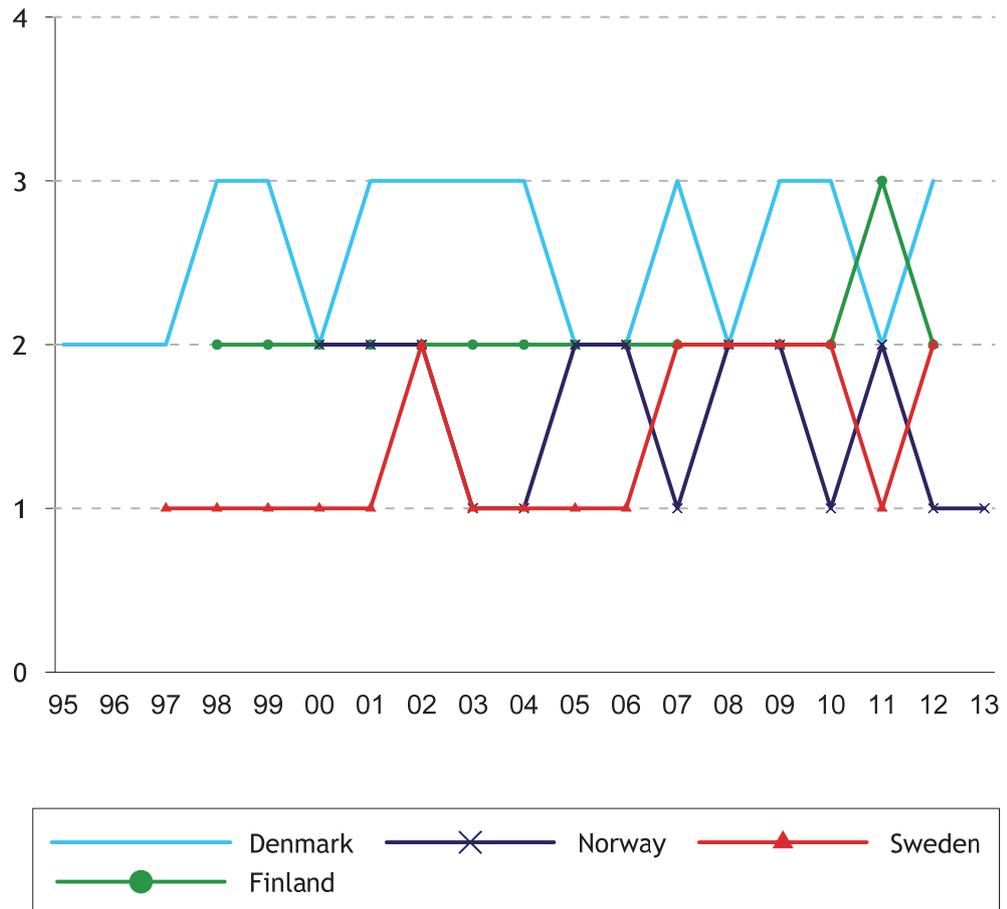


Figure 6.3.10 shows that the pancreatitis-caused mortality rate among women has been low, similar, and relatively stable in all four countries between 1995 and 2013. Overall, however, the rate among Danish women is slightly higher.

**Figure 6.3.10 Pancreatitis-caused mortality per 100 000 persons according to country. Women. Age-standardized rates. 1995-2013. Age 20+**



### Alcohol poisoning

Figure 6.3.11 shows that the mortality rate caused by alcohol poisoning among men is pronouncedly highest in Finland. In Norway and Denmark, the rates remain largely similar and stable between 1995 and 2013. Among Finnish men, a significant increase in the mortality rate can be observed between 2003 and 2007, followed by a significant decrease.

Figure 6.3.11 Alcohol poisoning-caused mortality per 100 000 persons according to country. Men. Age-standardized rates. 1995-2013. Age 20+

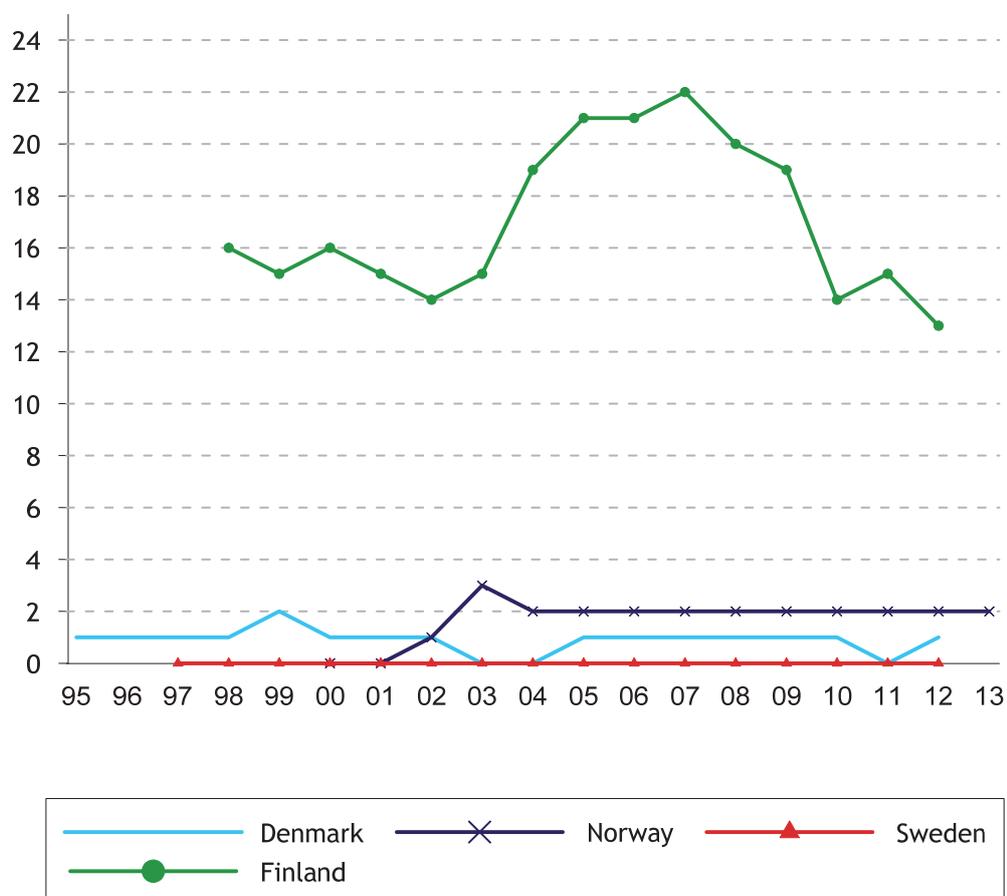
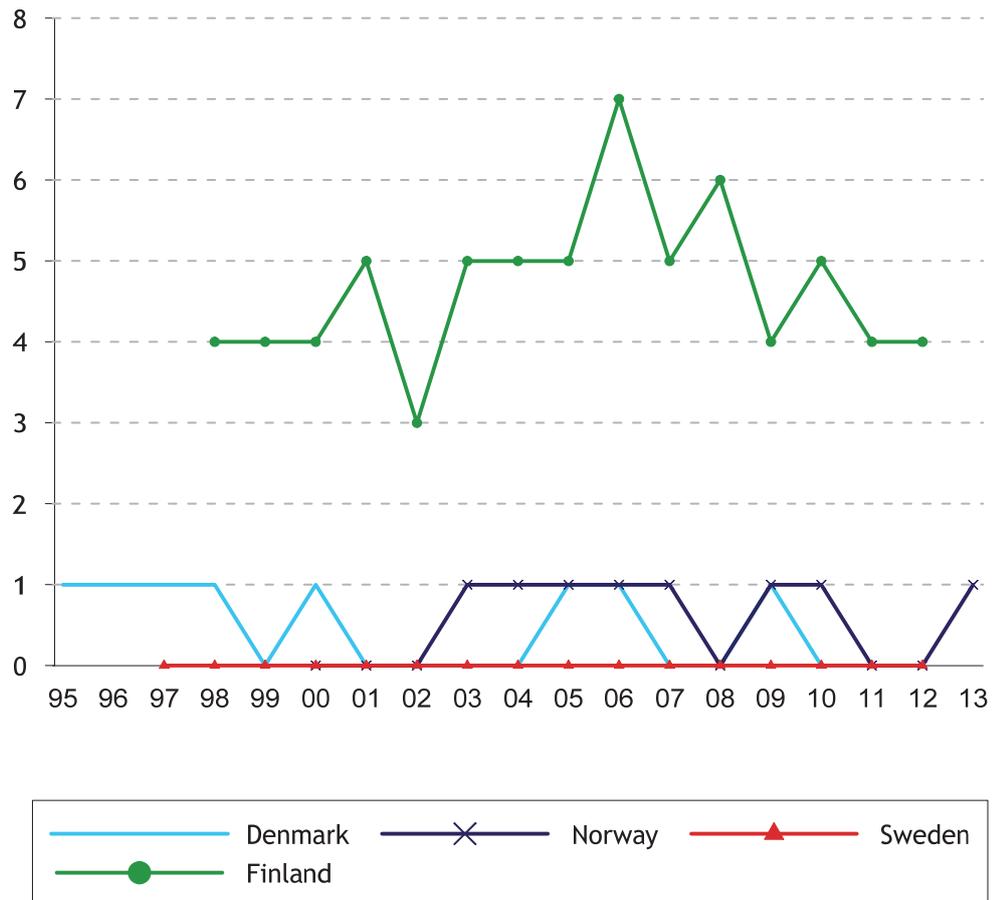


Figure 6.3.12 shows that the mortality rate caused by alcohol poisoning among women is highest in Finland. In Denmark and Norway, the rates remain largely similar and stable between 1995 and 2013. Among Finnish women, there is a modest increase in mortality due to alcohol poisoning prior to 2006, followed by a decrease.

**Figure 6.3.12 Alcohol poisoning-caused mortality per 100 000 persons according to country. Women. Age-standardized rates. 1995-2013. Age 20+**



## 6.4 Educational level

Figure 6.4.1 shows that the proportion of Danish men who have completed fewer than 10 years of education increases with age. By contrast, the proportion with 10-12 years of education decreases with age. Finally, the proportion with an education of 13 years or more remains relatively stable until age 55, after which it begins to decrease.

**Figure 6.4.1 Educational level among Danish men. Relative distribution stratified according to age groups. 2000-2004. Age 25-75**

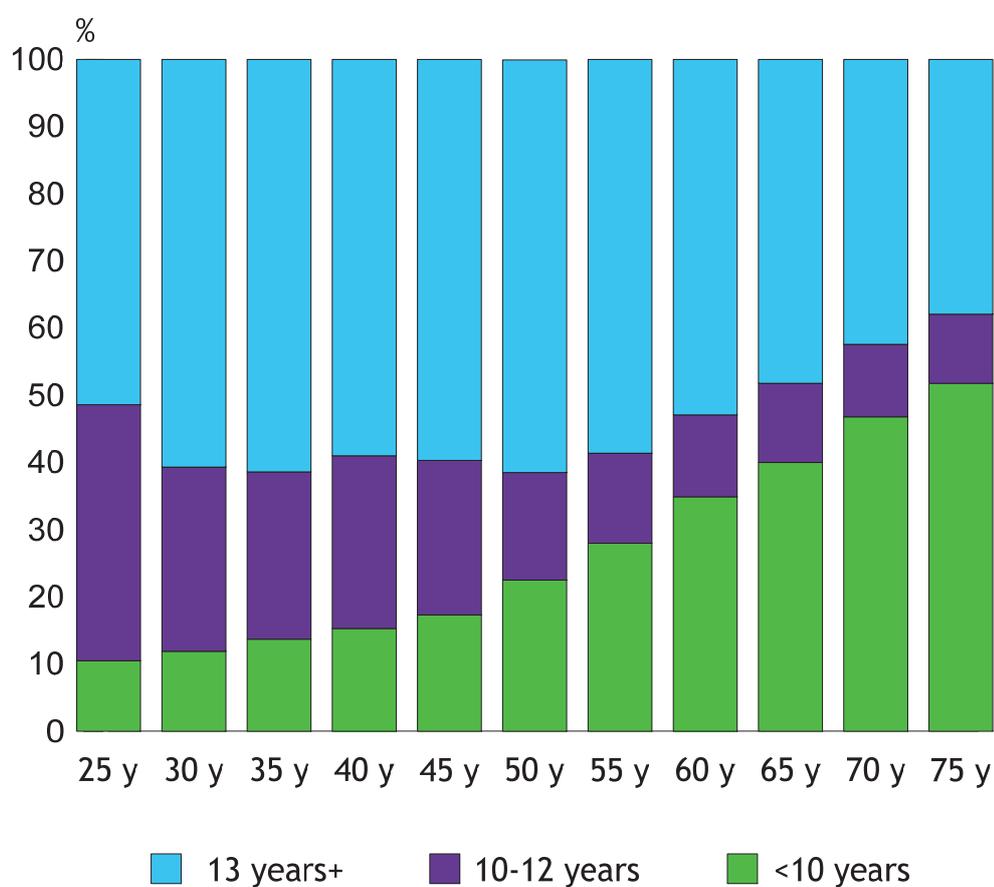


Figure 6.4.2 shows that the proportion of Danish women who have completed fewer than 10 years of education increases with age. By contrast, the proportion with 10-12 years of education decreases with age. Finally, the proportion with an education of 13 years or more remains relatively stable until age 55, after which it begins to decrease.

**Figure 6.4.2 Educational level among Danish women. Relative distribution stratified according to age groups. 2000-2004. Age 25-75**

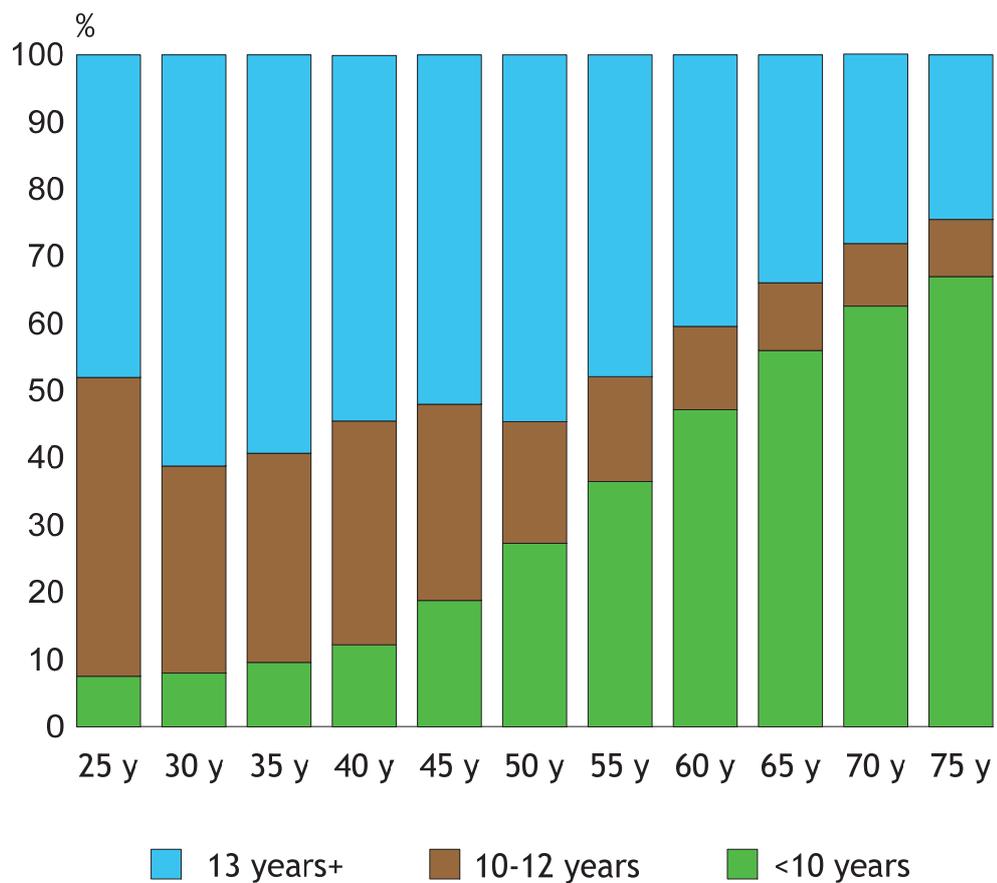


Figure 6.4.3 shows that the proportion of Finnish men who have completed fewer than 10 years of education increases with age. In contrast, the proportion with an education of 10-12 years decreases with age. For educations lasting 13 years or more, the proportion decreases with age.

**Figure 6.4.3** Educational level among Finnish men. Relative distribution stratified according to age groups. 2000-2004. Age 25-85

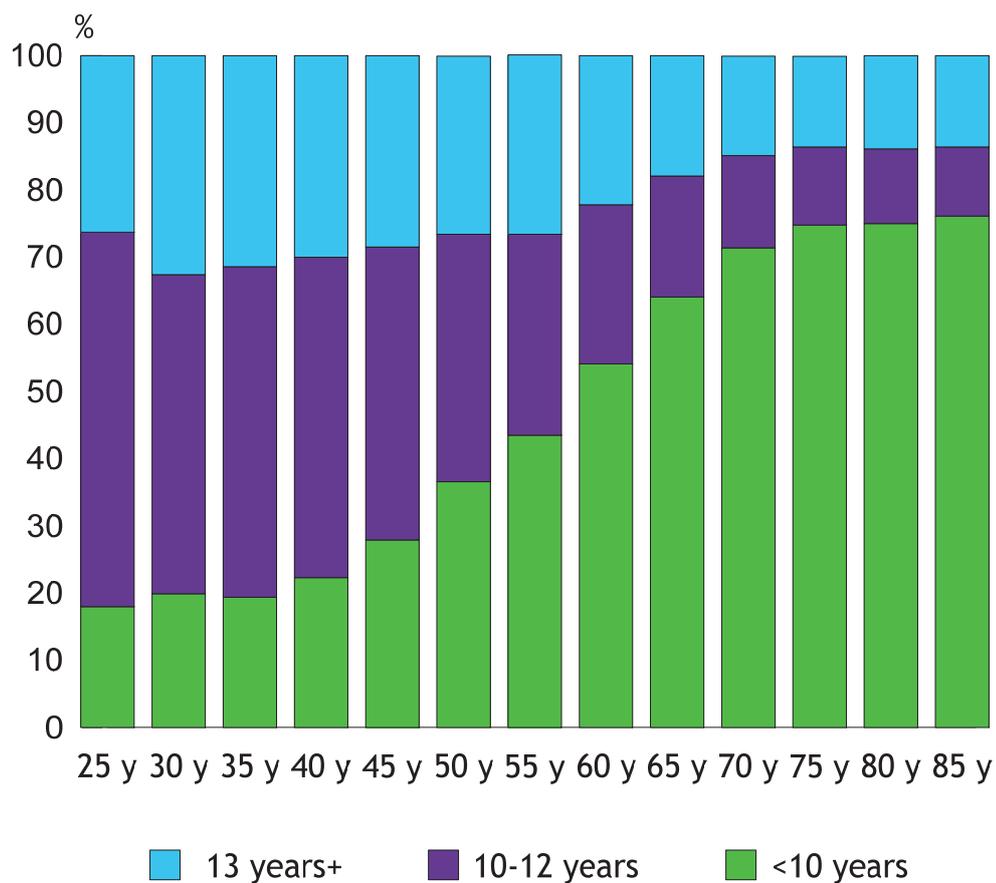


Figure 6.4.4 shows that the proportion of Finnish women who have completed fewer than 10 years of education increases with age. In contrast, the proportion with an education of 10-12 years decreases with age. For educations lasting 13 years or more, the proportion decreases with age.

**Figure 6.4.4 Educational level among Finnish women. Relative distribution stratified according to age groups. 2000-2004. Age 25-85**

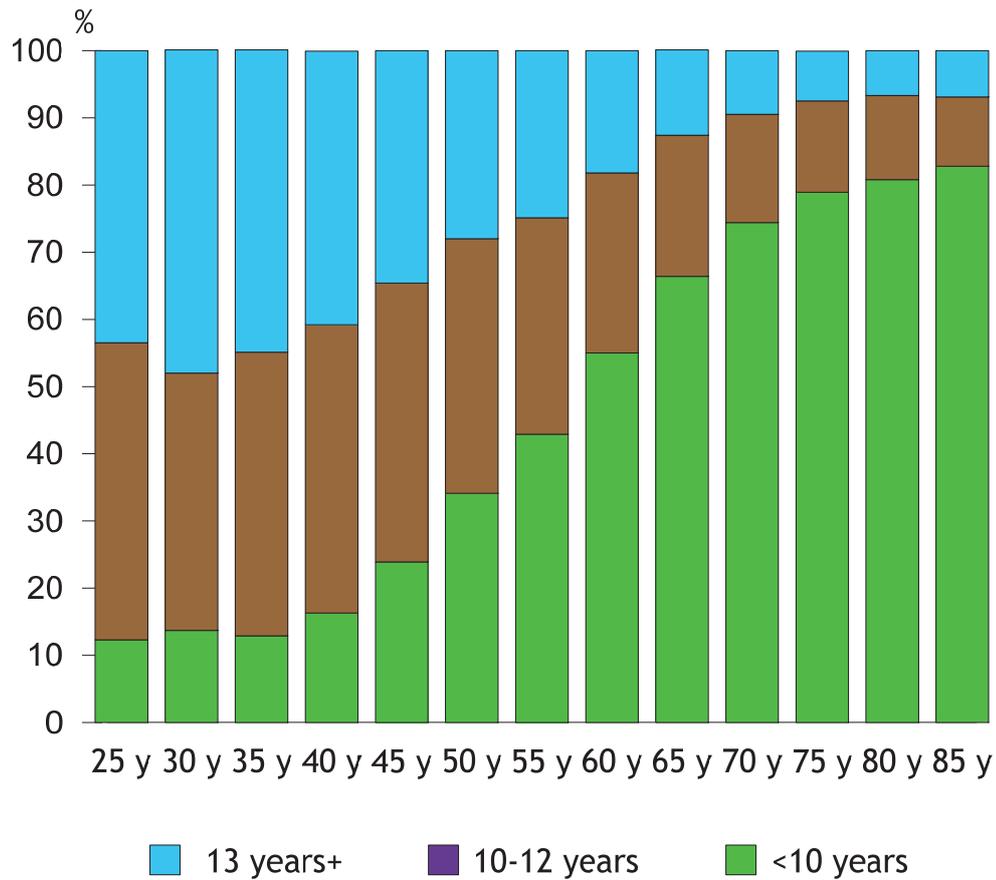


Figure 6.4.5 shows that the proportion of Swedish men who have completed fewer than 10 years of education remains very low until age 45. From 45, this proportion increases pronouncedly with age. The proportion with an education of 10-12 years remains relatively stable between the ages of 25 and 45, after which it begins to decrease with age. For educations of 13 or more years, the proportion decreases with age.

**Figure 6.4.5 Educational level among Swedish men. Relative distribution stratified according to age groups. 2000-2004. Age 25-80**

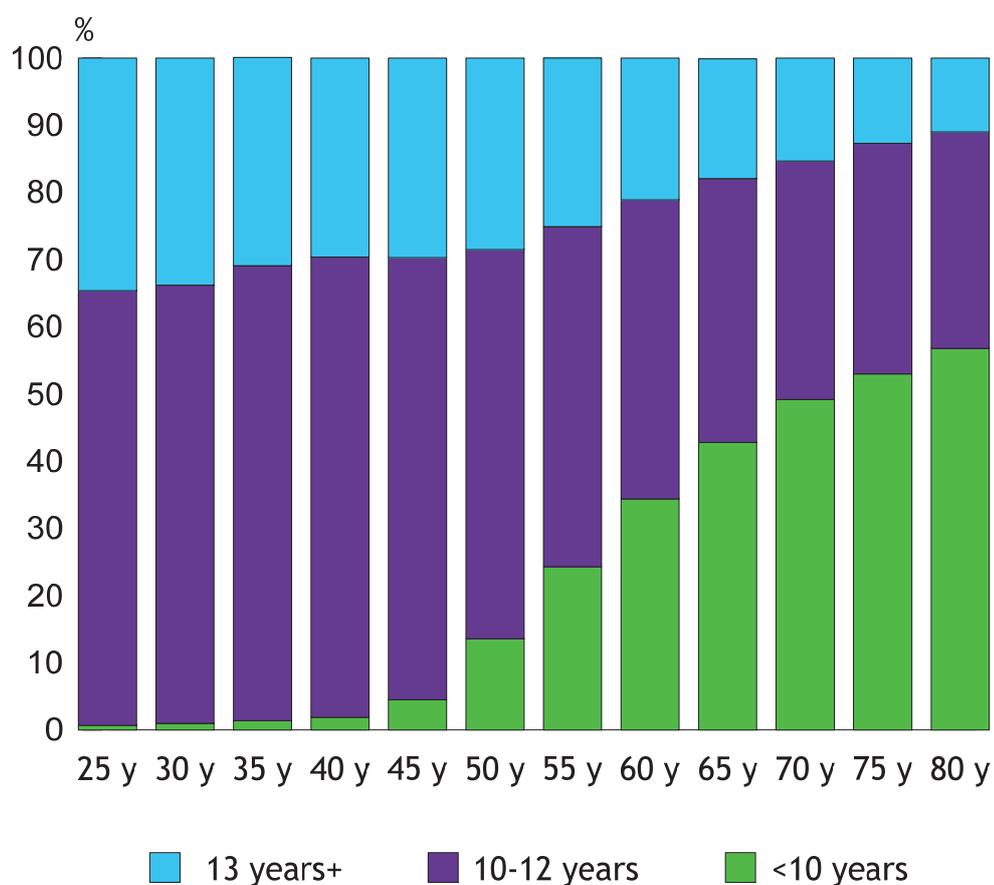
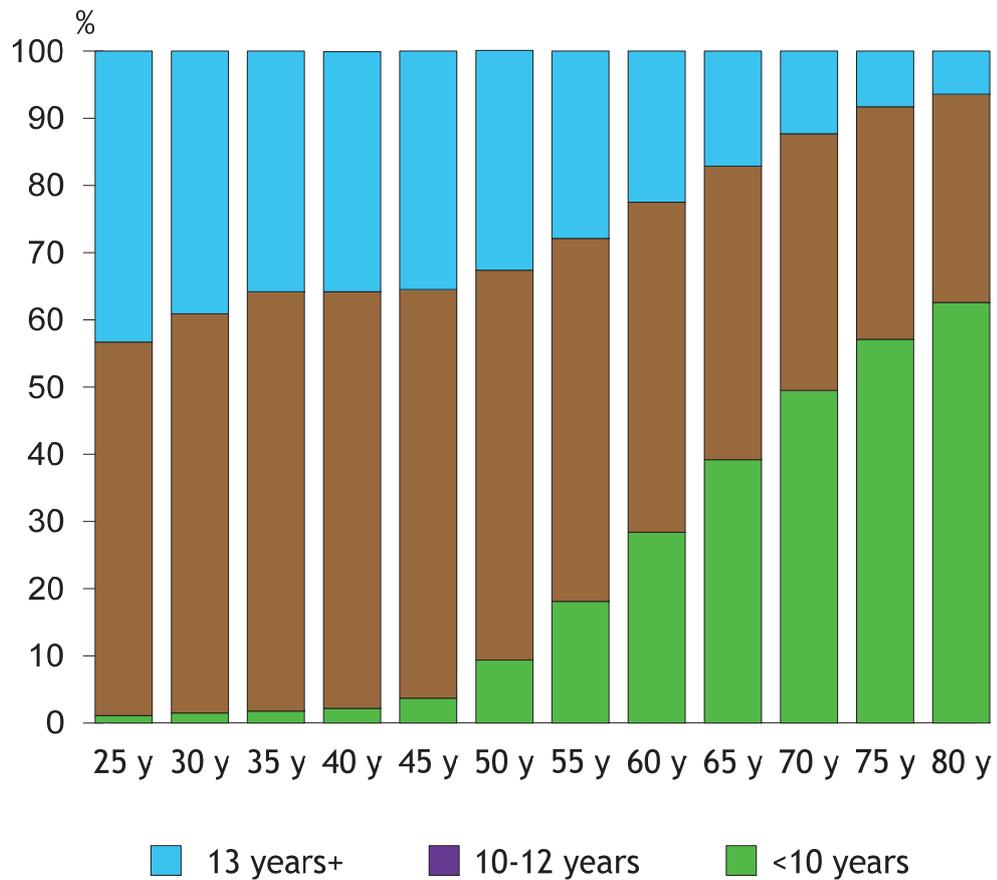


Figure 6.4.6 shows that the proportion of Swedish women who have completed fewer than 10 years of education remains very low until age 45. From 45, this proportion increases pronouncedly with age. The proportion with an education of 10-12 years remains relatively stable between the ages of 25 and 45, after which it decreases with age. For those with an education of 13 or more years, the proportion decreases with age.

**Figure 6.4.6 Educational level among Swedish women. Relative distribution stratified according to age groups. 2000-2004. Age 25-80**



### All-cause mortality according to educational level

Figure 6.4.7 shows a steady decrease in all-cause mortality rates among men in all three Nordic countries and in all educational groups between 2000 and 2012. However, in each year, the rates in each educational group are highest among Danish men, followed in descending order by Finnish men and Swedish men. In all three countries, a clear social gradient in all-cause mortality can be observed, with a higher all-cause mortality rate among those with a short education, compared to those with a long education.

**Figure 6.4.7** All-cause mortality according to country, educational level, and year. Age-standardized rate per 100 000 persons. Men. Age 35-84

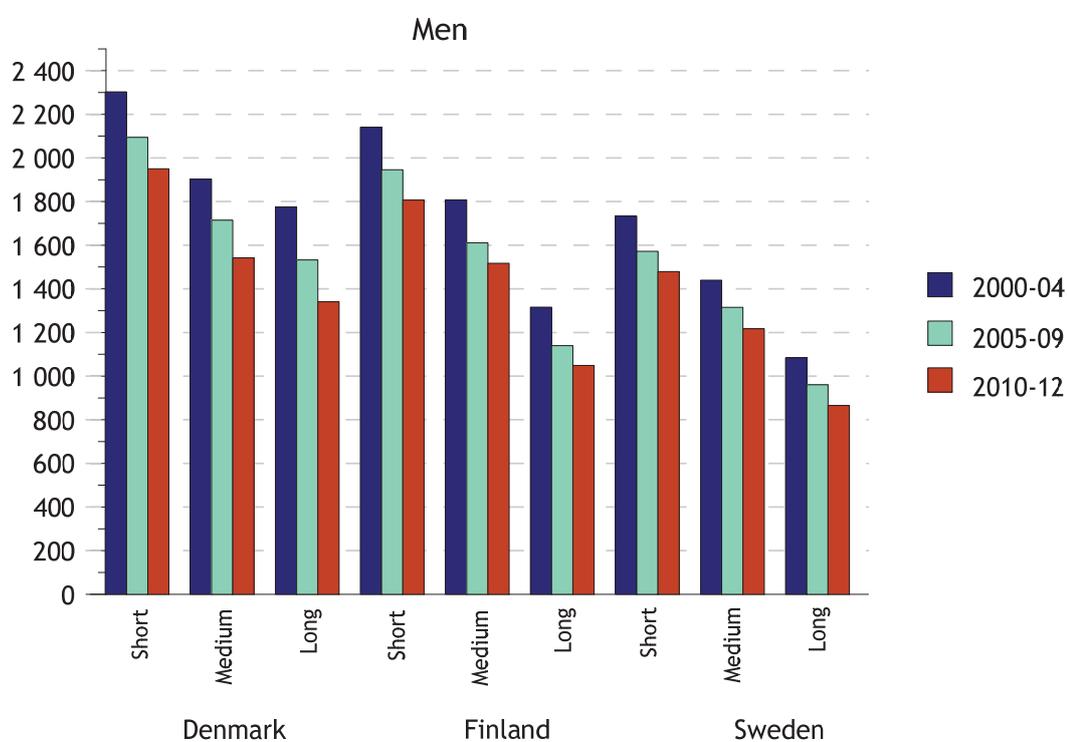
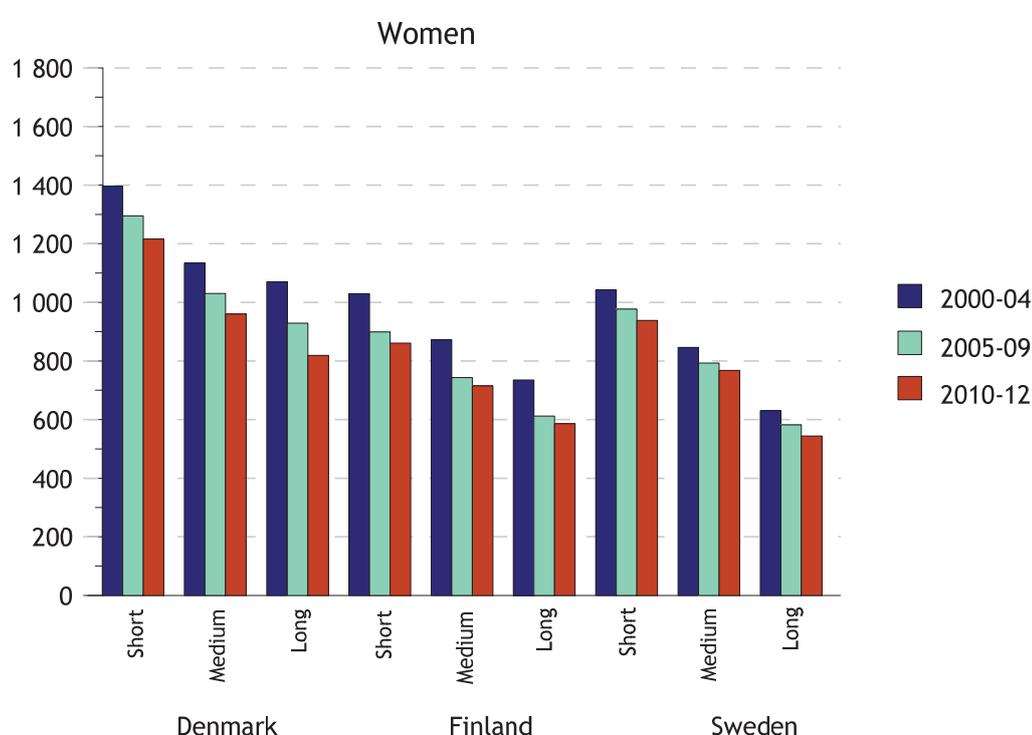


Figure 6.4.8 shows a steady decrease in all-cause mortality rates among women in all three Nordic countries and in all educational groups between 2000 and 2012. For each year, the rates in each educational group are highest among Danish women, with Finnish and Swedish women exhibiting largely similar rates. In all three countries, a clear social gradient in the all-cause mortality can be observed, with a higher all-cause mortality rate among those with a short education compared to those with a long education.

**Figure 6.4.8 All-cause mortality according to country, educational level, and year. Age-standardized rate per 100 000 persons. Women. Age 35-84**



### ***All-cause mortality excluding smoking-related deaths, according to educational level***

Figure 6.4.9 shows the all-cause mortality excluding smoking-related deaths among Danish, Finnish, and Swedish men, according to year and educational level. A steady decrease in mortality rates can be observed for all three countries and all educational groups between 2000 and 2012. In each year, the lowest mortality rate is found among Swedish men. In Denmark and Finland, similar mortality rates can be observed among men with a short or medium-long education. For those with a long education, a lower mortality rate is seen among Finnish men compared to Danish men. In all three countries, a clear social gradient in the all-cause mortality

excluding smoking-related deaths can be observed, with a higher mortality rate among those with a short education compared to those with a long education.

**Figure 6.4.9 All-cause mortality excluding smoking-related deaths, according to country, educational level, and year. Age-standardized rate per 100 000 persons. Men. Age 35-84**

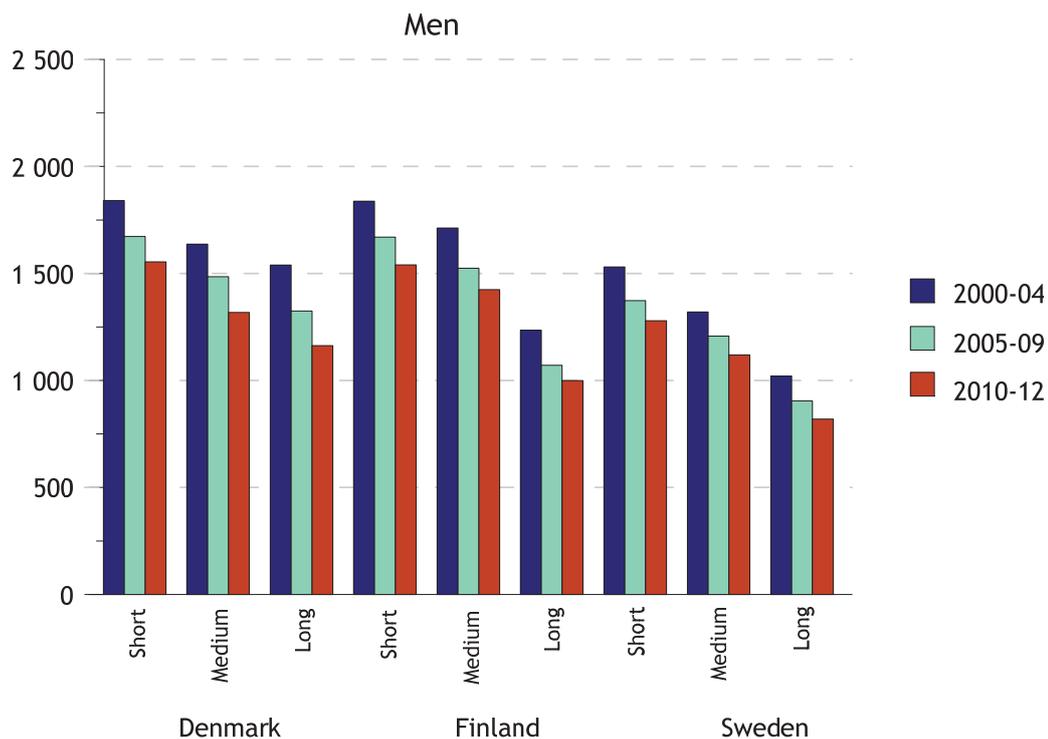
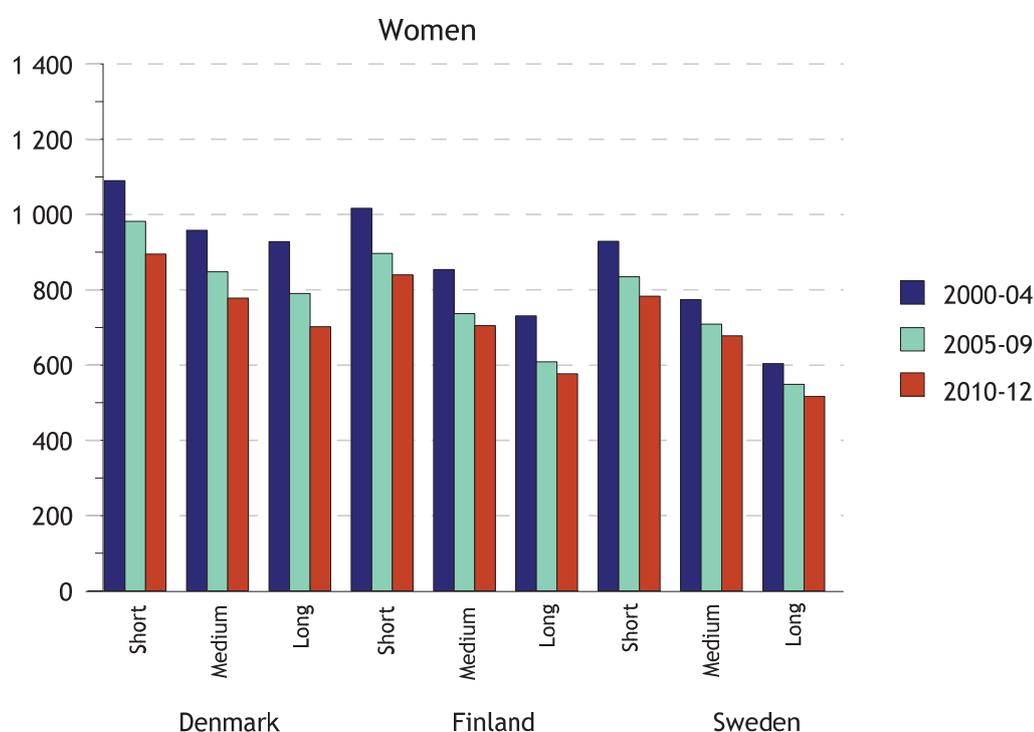


Figure 6.4.10 shows a steady decrease in the all-cause mortality rate excluding smoking-related deaths among Danish, Finnish, and Swedish women in all educational groups between 2000 and 2012. No major differences can be observed between the three countries. However, slightly higher rates can be seen in Denmark, followed in descending order by Finland and Sweden. In all three countries, a social gradient in the all-cause mortality excluding smoking-related deaths can be observed, with a higher mortality rate among those with a short education compared to those with a long education.

**Figure 6.4.10 All-cause mortality excluding smoking-related deaths, according to country, educational level, and year. Age-standardized rate per 100 000 persons. Women. Age 35-84**



***All-cause mortality excluding alcohol-related deaths (underlying and contributory causes), according to educational level***

Figure 6.4.11 shows a steady decrease in all-cause mortality excluding alcohol-related deaths (underlying and contributory causes) among men in all three Nordic countries and in all educational groups between 2000 and 2012. However, the largest decrease is observed among Danish men in all educational groups. In each year, the rates in each educational group are highest among Danish men, followed in descending order by Finnish and Swedish men. In all three countries, a clear social gradient in the all-cause mortality excluding alcohol-related deaths (underlying and

contributory causes) can be observed, with a higher mortality rate among those with a short education compared to those with a long education.

**Figure 6.4.11 All-cause mortality excluding alcohol-related deaths (underlying and contributory causes) according to country, educational level, and year. Age-standardized rate per 100,000 persons. Men. Age 35-84**

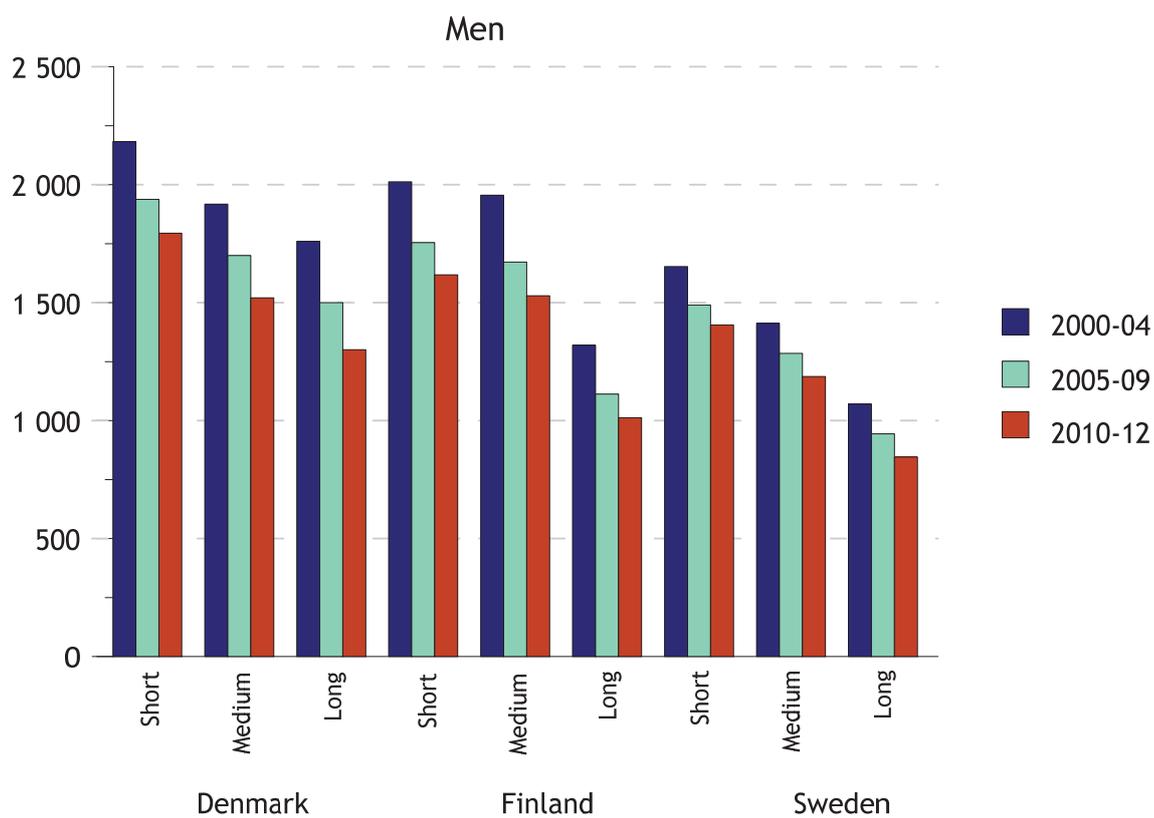
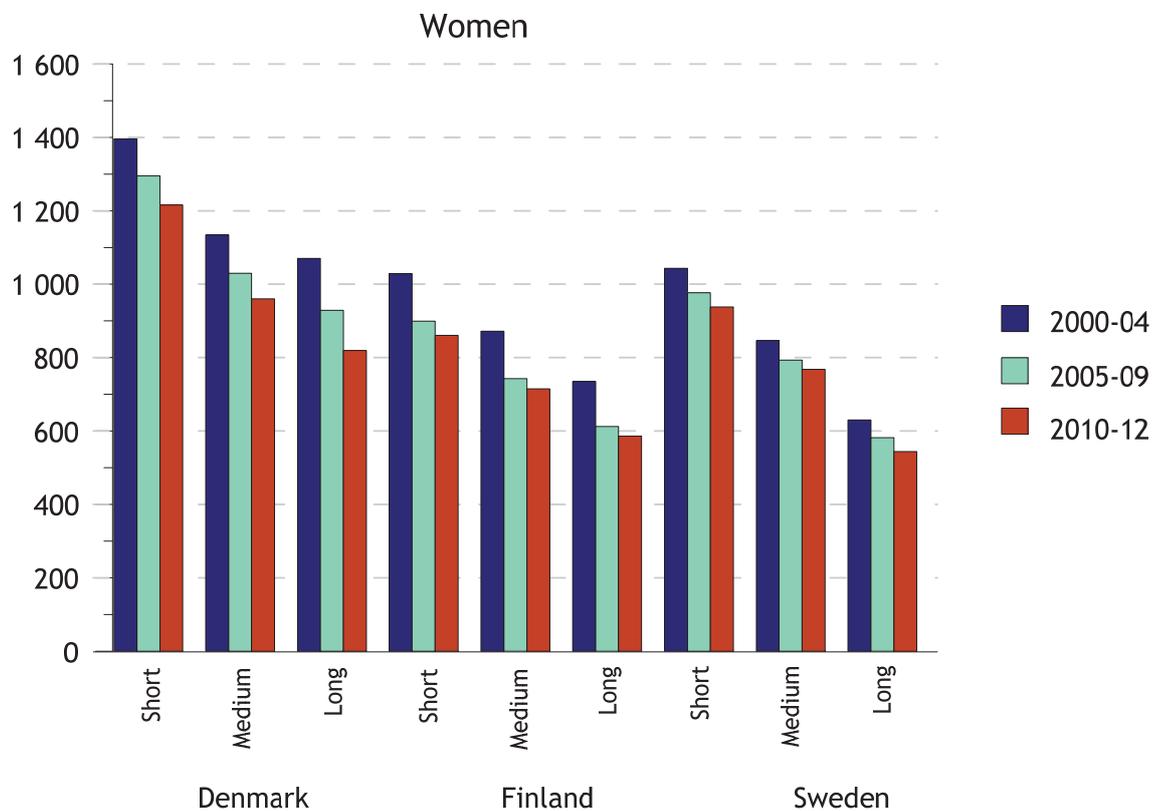


Figure 6.4.12 shows a steady decrease in all-cause mortality excluding alcohol-related deaths (underlying and contributory causes) among women in all three Nordic countries and in all educational groups between 2000 and 2012. In each year, the rates in each educational group are highest among Danish women, with Finnish and Swedish women exhibiting largely similar rates. In all three countries, a clear social gradient in the all-cause mortality excluding alcohol-related deaths (underlying and contributory causes) can be observed, with a higher mortality rate among those with a short education compared to those with a long education.

**Figure 6.4.12 All-cause mortality excluding alcohol-related deaths (underlying and contributory causes) according to country, educational level, and year. Age-standardized rate per 100,000 persons. Women. Age 35-84**





## NOMESCO's Publications since 2000

### Recurring Publications

Each year NOMESCO publishes *Health Statistics in the Nordic Countries*. Up until and including 2011 this was a bi-lingual publication in Danish (Nordic languages) and English.

In cooperation with the Nordic Centre for Classification of Health Services (Nordclass) NOMESCO publishes NOMESCO Classification of Surgical Procedures. The publication has been updated annually for a number of years and is now available in version 1.16.

In cooperation with the Baltic countries the publication *Nordic/Baltic Health Statistics* has been published four times the latest version with data from 2006.

Moreover a number of theme publications have been published. These are shown below with their number in NOMESCO's publication list.

- 99. Financing of Health Care in the Nordic Countries 2013
- 92. NOMESCO Report on Mortality Statistics - Theme section 2010 NOMESCO Copenhagen 2010
- 90. Temasektion vedrørende kvalitetsindikatorer NOMESCO's Health Statistics in the Nordic Countries 2009 NOMESCO Copenhagen 2010
- 88. Medicines Consumption in the Nordic Countries 2004-2008. NOMESCO Copenhagen 2010
- 82. Ældres Helse Temasektion Health Statistics in the Nordic Countries 2006
- 80. Mental Helse Temasektion Health Statistics in the Nordic Countries 2005
- 79. NOMESCO Classification of External Causes of Injuries. Fourth revised edition. NOMESCO Copenhagen 2007
- 78. Sustainable Social and Health Development in the Nordic Countries. Seminar 6th April 2006 Oslo. Seminar Report. NOMESCO Copenhagen 2006
- 76. Smedby Björn and Schiøler Gunner: Health Classifications in the Nordic Countries. Historic development in a national and international perspective 2006. NOMESCO Copenhagen 2006
- 72. Medicines Consumption in the Nordic Countries 1999-2003. NOMESCO Copenhagen 2004
- 75. Patienter I Öppen Vård Temasektion Health Statistics in the Nordic Countries 2004
- 73. Barns Helse Temasektion Health Statistics in the Nordic Countries 2003
- 69. Vård på lika villkor Temasektion Health Statistics in the Nordic Countries 2002

66. Validitet och jämförbarhet i NOMESKO:s dagkirurgistatistik Section B Health Statistics in the Nordic countries 2001
67. Sustainable Social and Health Development in the Nordic Countries. Seminar 27th May 2003 Stockholm. NOMESCO Copenhagen 2003
64. Validitet og sammenlignbarhet av statistikk over kirurgiske inngrep ved nordiske sykehus Temasektion Health Statistics in the Nordic countries 2000
58. Nordiske læger og sygeplejersker med autorisation i et andet nordisk land. Copenhagen 2000