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Development of alcohol-related harms in the Nordic countries: descriptions of and explanations for a mixed picture

THE IMPORTANCE OF MONITORING CHANGES in alcohol consumption and related harms has been underlined by the considerable changes in the past 10–15 years that have taken place in Nordic alcohol policies in connection with ongoing globalization. The European Comparative Alcohol Study (ECAS), which studied alcohol consumption, drinking patterns, consequences and policy responses in post-war Europe can be seen as one response to this need. The ECAS project (Norström et al. 2002) covered the period up to 1995, but since then no comparative Nordic studies on alcohol-related harms have been carried out.

In their report published in 2005, Holder et al. (later published as Andreasson et al. 2006) raised to the fore the observation that many actors in the alcohol policy field had also paid attention to, namely that alcohol-related mortality was stable in Sweden despite a longer-term increase in alcohol consumption that had started in the latter part of the 1990s. This observation raised many questions. Did the same discrepancy between alcohol consumption and related harms apply to a wider set of harm indicators as well? Did the discrepancy only apply to Sweden or also to other Nordic countries? What caused this discrepancy? Is the link between consumption and harms, which has been the cornerstone of Nordic alcohol policies for the past few decades, eroding?

These questions were raised also in the board of NAD, the Nordic Council for Alcohol and Drug Research. As a result, a group of researchers gathered to form the project Development of Alcohol-related Damage (DAD). The participants were Louise Eriksen and Morten Grønbæk from Denmark, Pia Mäkelä and Esa Österberg from Finland, Hildigunnur Ólafsdóttir from Iceland, Ingeborg Rossow from Norway, and Mats Ramstedt from Sweden. The current thematic issue of NAT is devoted to publishing the results of this project.

The project set out with two aims. The first was to compare the Nordic countries with respect to types and levels of alcohol-related harm. The second was to take a closer look at the recent development of different types of alcohol-related harm in each of the five Nordic countries and to analyse and discuss possible reasons behind the development, particularly with respect to how these relate to the development in alcohol consumption. As the ECAS project covered the time period up to 1995, the choice to limit the project to the period of the 1990s and 2000s avoided too much overlap and yet stretched to a time period before the EU memberships of Finland and Sweden, which resulted in a significant erosion in the use of alcohol policy as a natural extension of health policy.

The approach in the analyses of this issue is mostly descriptive. As the data readily available on most harms is annual, it would not be possible to carry out formal time series analysis on recent data. Instead, we aim to provide the reader with five “full figure portraits”. We do
this by describing the development of trends and by trying to see to what extent per capita consumption may have contributed to this development and by trying to identify factors other than per capita alcohol consumption that may have driven the trends. Most of the data presented may have previously appeared elsewhere, e.g., in statistical yearbooks. However, the data has been scattered and only reaches its full potential usefulness when collated and interpreted coherently. In this way, we believe that we produce important new information both at the national level and for the Nordic region as a whole.

The issue starts with a comparative analysis by Mats Ramstedt, where he sheds light on the question of how the different countries compare with each other in regard to the level of different types of alcohol-related mortality and whether the relative positions of the countries have been stable over time. The main conclusion is that alcohol-related mortality is significantly higher in Finland and Denmark than in the other three Nordic countries and that little change has occurred in this respect. Overall, differences in per capita alcohol consumption seem to be an important factor underlying these national variations in alcohol-related mortality, particularly for liver cirrhosis and alcohol-specific mortality.

The national portraits from Denmark, Finland, Iceland, Norway and Sweden follow this comparison, with a mixed picture emerging. Both stable and increasing trends in consumption have been observed. The development of harms does not follow the development of consumption in all countries. Discrepancies between consumption and related harms are observed particularly in Iceland and to some extent also in Norway and Sweden. However, the picture of the situation as described by Holder et al. (2005) for Sweden is modified in important respects by Ramstedt in this issue.

The somewhat mixed picture of the country reports is summarized and discussed by Rossow, Mäkelä and Österberg. They first discuss explanations that relate to methodological and measurement issues, before continuing to discuss four substantive pathways for how the discrepancy in the consumption–harm association could theoretically arise, along with an assessment of how likely these different pathways are in explaining the observed discrepancies. According to their evaluation, the basic underlying connection between total alcohol consumption and related harms still exists: even if in some cases alcohol consumption has increased without a corresponding increase in harms, we cannot let alcohol consumption increase without a fear of simultaneously causing an increase in alcohol-related harms.

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ABSTRACT

M. Ramstedt: Variations in alcohol-related mortality in the Nordic countries after 1995—continuity or change?

■ AIMS

The main aim of the present paper was to describe and analyse the recent development regarding differences in alcohol-related mortality between the Nordic countries. To what extent do various forms of alcohol-related mortality differ between the Nordic countries, and is a similar cross-national pattern found for men and women? Do differences in mortality rates correspond to variations in levels of alcohol consumption, and have any changes occurred with respect to these variations?

■ DATA

Age-adjusted mortality from alcohol-specific causes, liver cirrhosis, alcohol poisonings and fatal accidents were compared between countries and in relation to recorded per capita alcohol consumption for two approximate time periods, 1995–1999 and 2000–2004. R$^2$ was used to evaluate the extent to which differences in per capita consumption accounted for the mortality differences.

■ RESULTS

Finland and Denmark had typically 2–5 times higher chronic alcohol-related mortality, e.g., cirrhosis, than Sweden. Norway and Iceland, whereas for acute mortality only Finland, and particularly Finnish men, stood out with high mortality rates, e.g., alcohol poisonings. Danish women tended to have higher

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Background

There are surprisingly few studies on Nordic differences in alcohol-related mortality, if we exclude broader European comparisons in which the Nordic countries are included (e.g., Ramstedt 2002; Munoz-Perez & Nizard 1999; Ramstedt 1999). These comparisons suggest that deaths from liver cirrhosis have been consistently more common in Denmark than in Finland, Sweden and Norway, in accordance with differences in per capita alcohol consumption. However, when comparing deaths explicitly defined as alcohol-related, Finland reaches the highest position, mainly as a result of its high death rate due to alcohol poisoning. Alcohol poisoning mortality is also the subject of the only explicit Nordic comparative study on alcohol-related mortality. In his pioneering study, Poikolainen (1977) clearly demonstrated that the high figure for alcohol poisoning mortality in Finland was actually related to a high frequency of uncontrolled drinking and not only a matter of recording practices.

No comparative study has yet included all Nordic countries, as Iceland is consistently left out. In addition, no study has focused on
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or more similar mortality in relation to Finnish women in cases when this is not true for men. Differences in per capita consumption accounted for a significant part of variations in chronic alcohol mortality but to a lesser extent for variations in alcohol poisonings and fatal accidents. No marked changes in country differences occurred during the study period.

CONCLUSION
The results agree with the main prediction of the total consumption model, namely that the level of drinking is an important determinant of alcohol-related harm in society, in particular for long-term negative consequences. The findings also suggest that comparisons of alcohol mortality should be gender-specific since the country differences may be different for men and women. The extent to which differences in alcohol policy may influence these national differences is also discussed.

KEYWORDS

the period after 1995, the year when Finland and Sweden joined the EU and after which all Nordic countries except Denmark have experienced rising alcohol consumption (see Rossow et al. this issue). The main aim of the present paper is to describe and analyse the development regarding differences in alcohol-related mortality between the Nordic countries, including Iceland, from 1995 up to 2004 or when the most recent mortality data are available. Three main questions will be addressed:

1. To what extent do various forms of alcohol-related mortality differ between the Nordic countries and is a similar cross-national pattern found for men and women?
2. Do differences in mortality rates correspond to variations in levels of alcohol consumption?
3. Have any changes occurred with respect to these variations?

It should be mentioned that changes in trends and how these relate to changes in consumption are outside the scope of this paper, as they are covered elsewhere (Rossow et al. this issue).

Data and method
The selection of alcohol-related deaths was founded on three criteria. The first was to only include causes of death with a substantial and well-established association with alcohol. The second was to include mortality indicators representing both acute and chronic alcohol-related harm and, finally, to only select deaths in which an alcohol diagnosis is defined as the underlying cause of death; this is suggested to be more reliable (Romelsjö et al. 1993) and avoids potential problems with different national traditions of recording contributory causes of death. The annual number of deaths by gender and 5-year age groups for each country was retrieved from the detailed WHO mortality database, and age-adjusted mortality rates were calculated using a common standard European population from 1995.

A mortality index consisting of all deaths with explicit mention of alcohol was initially constructed to obtain an overall picture. This index is dominated by alcoholic cirrhosis, mental and behavioural disorders due to alcohol, and alcohol poisoning, and these will be denoted as alcohol-specific mortality. Second, mortality from liver cirrhosis
Variations in alcohol-related mortality in the Nordic countries after 1995, the classical indicator of chronic alcohol-related harm in a population, was analysed. There are two conceivable ways of presenting this measure: either as all deaths in this category or as those specifically defined as alcohol-related. As there is no agreement in the literature concerning which measure is the most comparable across countries, both are presented here. As indicators of acute harm, i.e., harm related to single drinking occasions, we selected fatal alcohol poisonings and accident mortality. Even though many fatal accidents are not caused by alcohol, a substantial fraction of e.g. fatal car crashes, falls, burns and drownings has a link to heavy drinking (e.g. Brismar & Bergman 1998). In Sweden for instance, the alcohol-related fractions in the age group 30–64 have been estimated to be about 50% among men and 30% among women (Sjögren et al. 2000). In addition, fatal accidents have been found to have a close relationship with per capita alcohol consumption in all Nordic countries (Skog 2001).

To examine whether any changes in cross-national differences have occurred after 1995, the comparison will be made between two parts of the study period, namely the period 1995–1999 and 2000–2003/2004, depending on when the most recent mortality data were published. The use of two fairly broad time periods was chosen in order to obtain more stable figures on national differences in mortality. With shorter time periods the picture would be less clear due to random fluctuations in the yearly figures.

ICD-10 codes for the alcohol-related causes of death and the years covered in the different countries are presented in Table 1. The observation periods for alcohol-specific causes of death start with the introduction of ICD-10 and vary subsequently somewhat between countries according to what year ICD-10 was introduced. Further, mortality data is published with varying degrees of rapidity; with Denmark being slower to report than the other countries and Finland being faster.

### Table 1. ICD-10 codes for alcohol-related causes of death and years included in the analyses

<table>
<thead>
<tr>
<th>Causes of death</th>
<th>ICD-10</th>
<th>Finland</th>
<th>Denmark</th>
<th>Norway</th>
<th>Sweden</th>
<th>Iceland</th>
</tr>
</thead>
</table>

* + the following diagnoses: I426, G621, G312, G721, K292, K860, O354.
Variations in alcohol-related mortality in the Nordic countries after 1995

The data analyses consist of a graphical description of variations in the different forms of alcohol-related mortality in relation to per capita alcohol consumption. This enables an illustration of the extent to which per capita alcohol consumption accounts for the different mortality rates and whether any changes have occurred in this respect. Because measures of unrecorded alcohol are not available on an annual basis for all Nordic countries, the analysis will be based on recorded alcohol consumption. However, as illustrated in Figure 1, the rank order of Nordic countries with respect to alcohol consumption would not change significantly if estimates of unrecorded alcohol were added, at least not for the year 2002.

Results

Alcohol-specific mortality

Figure 2 presents national variations in male alcohol-specific mortality for the two time periods in relation to recorded alcohol consumption. During 1995–99, Finland stands out with a much higher male mortality rate than the other countries: 20–30% higher than Denmark, about three times the rates in Sweden and Norway, and ten times the rate of Icelandic males. In the later period, the mortality rate in Denmark increased, whereas it remained fairly stable in the other countries. Per capita alcohol consumption corresponds fairly well to these mortality differences, with explained variation, estimated using $R^2$, of 48% in the first period and 72% in the recent period. A somewhat different cross-national pattern is observed for women (Figure 3). In the first period, Denmark has higher rates than Finland and about 2–3 times the rates in Sweden, Norway and Iceland. During the latter part, however, Finland and Denmark have similar mortality due to increasing mortality in Finland, whereas no change took place in the other countries. These female mortality differences match differences in population drinking during both periods, with $R^2$ estimated to be 86% and 88%, respectively.
Liver cirrhosis mortality

Comparing male mortality from liver cirrhosis gives a similar picture with two basic groupings: Finland and Denmark with 2–3 times higher cirrhosis mortality rates than Sweden and Norway, and Iceland with the lowest mortality rate (Figure 4). For the recent period, Finland and Denmark have practically similar mortality rates and Sweden has somewhat higher rates than Norway. The cross-national pattern for women is similar, the only difference being that Danish women have higher rates than Finnish women (Figure 5). Swedish women have somewhat higher rates than Norwegian women. The $R^2$ for men amounts to about 90% in both time periods, and the corresponding estimates for women were 98% and 95% in the respective periods, implying that cirrhosis mortality differences agree well with variations in per capita consumption.

Not all deaths in the overall cirrhosis mortality category are alcohol-related, and this proportion may vary across countries. It is therefore worth noting that using only alcohol-specific cirrhosis deaths gives a roughly similar cross-national pattern (Figure 6). A relatively higher death rate among Finnish men is observed with even somewhat higher rates than for Denmark in the period after 2000. Further, alcohol-specific cirrhosis rates tend to be somewhat higher in Norway than in Sweden, which was not the case for total cirrhosis rates. According to both measures, Iceland has the lowest Nordic mortality rate for liver cirrhosis.

The cross-national pattern for female alcohol-specific cirrhosis is also similar compared with total cirrhosis; the only
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**Figure 4.** Cross-national relationship between recorded per capita consumption and male cirrhosis mortality in the Nordic countries for two time periods

**Figure 5.** Cross-national relationship between recorded per capita consumption and female cirrhosis mortality in the Nordic countries for two time periods

**Figure 6.** Cross-national relationship between recorded per capita consumption and male alcohol-specific cirrhosis mortality in the Nordic countries for two time periods

**Figure 7.** Cross-national relationship between recorded per capita consumption and female alcohol-specific cirrhosis mortality in the Nordic countries for two time periods
notable change is that Norway has higher alcohol-specific rates than Sweden (Figure 7).

Variations in per capita consumption also account for a substantial part of differences in alcohol-specific cirrhosis mortality; for men $R^2$ amounted to 82% in the first period and 84% in the latest. For women the corresponding estimates were 94% and 92% respectively.

**Alcohol poisoning mortality**

Alcohol poisoning mortality is considerably higher in Finland than in the other countries. While the mortality rate is rather low in most Nordic countries, Finland stands out with rates at least seven times higher than those in any other Nordic countries (Figure 8). Thus, while the mortality rate among Finnish men reaches around 14 deaths per 100 000, the corresponding figures for the other countries are between 0.2 and 2 deaths per 100 000. The same cross-national pattern is seen for women, with at least 5 times higher rates in Finland compared with the other countries, or 3–4 deaths per 100 000 in Finland compared with at most 0.6 deaths in the remaining countries (Figure 9). No striking changes have occurred with respect to these cross-national differences since 1995. In contrast to previous forms of alcohol-related mortality, differences in per capita consumption do not explain to any extent these cross-national differences. For men $R^2$ is estimated to 5% in the first period and 15% in the recent. Corresponding figures for women are 5% and 14%.

**Accident mortality**

A similar cross-national pattern is uncovered regarding overall male accident mortality, in which Finland is far above the
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other Nordic countries, with deaths rates of 80–85 deaths per 100,000 in contrast to around 50 in Denmark, 45 in Norway, 40 in Iceland and 35 in Sweden (Figure 10). As to female accident mortality, Denmark and Finland have the highest mortality rates (around 25 per 100,000), followed by Norway, Iceland and Sweden with the lowest rates (Figure 11). These national differences appear to be fairly stable. Per capita consumption accounts for a higher share of the female variation with an $R^2$ estimated of 75% in the earlier period and 65% in the later. Corresponding figures for men were 21% and 25%.

Discussion

This comparative analysis has demonstrated that Nordic variations in alcohol-related mortality after 1995 differ depending on what causes of death are used for the comparison and also on whether male or female mortality is considered. Still, some consistent findings were revealed that allow us to draw some general conclusions. First, alcohol-related mortality is higher in Finland and Denmark than in the other three Nordic countries. In fact, for each indicator examined here, either Finland or Denmark had the highest death rates and in several cases substantially higher numbers of alcohol-related deaths, e.g., as regards liver cirrhosis mortality.

Differences in per capita consumption seem to be an important factor underlying at least the more pronounced national variations in alcohol-related mortality observed here, particularly for liver cirrhosis and alcohol-specific mortality. Thus, the most likely explanation for the higher mortality in Finland and Denmark is simply a higher level of drinking, which typi-
cally signifies a higher proportion of heavy drinkers (Skog 1985). In this respect, these findings agree with the main prediction of the total consumption model, namely that the level of drinking is an important determinant of alcohol-related harm in society. It is worth noting that there were no indications of any decline in the extent to which total consumption accounted for these Nordic differences in alcohol-related mortality during the study period, in contrast to the mismatch found in some analyses of national developments during a similar period (see Rossow et al. this issue).

Differences in total alcohol consumption explain less of the national differences in harm resulting from intoxication-oriented drinking according to the comparison of alcohol poisonings and fatal accidents. There were much higher rates of acute alcohol-related mortality in Finland (but not in Denmark) than in the other countries, which were clearly illustrated in the comparison of fatal alcohol poisonings. Although this may partly be related to a greater tendency to code a death as an alcohol poisoning (Poikolainen 1977), the difference most likely also reflects a more intoxication-oriented drinking pattern in Finland. This conclusion is also substantiated by the comparison of another indicator of acute harm, fatal accidents, which also were much higher in Finland particularly among men.

This leads us to another main conclusion, namely that the Nordic comparison gives slightly different results depending on whether male or female mortality is considered. The main modification relates to the comparison between Finland and Denmark, where Danish women tend to have higher or more similar mortality in relation to Finnish women in cases when this is not true for men, e.g. regarding liver cirrhosis (not alcohol-specific), alcohol-specific deaths and fatal accidents. In other words, while an analysis pertaining to men would conclude that Finland ranks the highest in alcohol-related mortality, Denmark would have that position if female mortality rates were compared. This is in accordance with previous findings showing that Danish women drink more than Finnish women and also have a high level of alcohol consumption in a Nordic perspective (Mäkelä et al. 2001). No substantial changes appear in the rank order of Sweden, Norway and Iceland irrespective of whether male or female mortality is taken into account.

The main idea underlying the present comparative analysis of alcohol-related mortality was that variations in the number of alcohol-related deaths at least roughly reflect variations in the prevalence of alcohol-related harms. The empirical base for this idea is formed by the numerous studies showing that various forms of alcohol-related mortality generally are associated with changes in per capita alcohol consumption (Norström & Ramstedt 2005). However, it is also obvious that national differences in alcohol-related mortality may have a wide range of causes other than the level of population drinking and the prevalence of alcohol harm, e.g., different treatment facilities, recording practices, etc. This limitation must be kept in mind, although a comparison of mortality data is probably less prone to such errors than is a comparison with other data, such as hospitalisations and crime statistics, which after some consideration were left out in this comparison. Taking arrests for
In conclusion, these national variations in alcohol-related deaths have shown that Nordic differences in alcohol harm are substantial, with Finland and Denmark belonging to one category with high rates of harm and the other three countries being in a better position. It is worth noting in this context that the alcohol policy in Denmark in particular, but also in Finland, has been less comprehensive and strict than in Sweden and Norway, at least in the year 2000 (Österberg & Karlsson 2002).

This indicates that differences in alcohol policies may explain some of the Nordic differences in alcohol-related harm. A current example of the importance of alcohol policy was the recent tax-cut in Finland (2004), which gave rise to a significant increase in acute alcohol-related deaths (Koski et al. 2007). In fact, one of the few changes that were noticeable in the present data was the tendency for Finland to show relatively higher mortality rates during the period after 2000. A closer look revealed that this was basically related to the sharp increase in 2004, the same year as alcohol prices were reduced by on average 22% as a result of the tax reduction.

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Development in alcohol-related harm in Denmark 1990–2005

Introduction
High alcohol consumption has been associated with increased risk of long-term health consequences such as morbidity and mortality, but also with more acute consequences in the shape of both unintentional and intentional injuries (WHO 2004; Doll et al. 1994). The chronic consequences mainly related to long-term alcohol use are, in most cases, associated with the volume of drinking and assumed to be cross-culturally stable (Doll et al. 1994). On the other hand, acute consequences may be influenced more by drinking pattern (such as heavy episode drinking) and cultural factors (Tolstrup et al. 2004; Paljärvi et al. 2005; Mäkelä et al. 2005). A cross-sectional study of alcohol consumption at one point in time, related to prevalence of different alcohol-related diseases, may give an indication of the association, while a time trend analysis of the development in alcohol consumption and the development in alcohol-related harm may give a much more precise picture of the associations.
instance coronary heart disease. There is also a need for better measures of social consequences of drinking.

■ KEY WORDS
Alcohol consumption, alcohol-related harms, Denmark.

The aim of this study is to focus on the development in alcohol consumption and alcohol-related harm in Denmark during 1990–2005. As will be shown, the total consumption has changed very little during the period, while there have been dramatic changes in the distribution between different types of alcohol. This may have had effects on alcohol-related harm, since some studies have suggested that there are type-specific differences in the effect of wine, beer and spirits (Becker et al. 2002; Grønbæk et al. 2000). The alcohol-related damages to be described are mortality and hospitalisation due to alcohol-related diagnoses, alcohol-related traffic accidents, drink-driving convictions, violent assaults and homicides, and detentions in custody due to drunkenness. The paper is one of several country reports investigating any similarities or differences in these relations between the Nordic countries.

Materials
Data on alcohol consumption were obtained through Statistics Denmark. The consumption is taxable alcohol and is measured in 100% pure alcohol. The consumption is compiled on the basis of information on the tax revenue from the fiscal authorities. In the present paper data has been included back to 1910 for alcohol consumption figures, since the development from 1990 and onwards is more expressive when including this longer-term perspective.

Data on alcohol-related mortality rates and hospitalisation rates were obtained from the National Board of Health. Data stems from the Causes of Death Registry and from the National Patient Registry. Data on alcohol-related mortality rates are only available up to 2001. Furthermore, it should be noted that the classification of diagnosis changed in 1994 from ICD 8 (291, 303, 591, 577, e860, n979–n980) to ICD 10 (F10, K70, K74, K85, K86, X45, X65, Y15, Y51) and the interpretation of the actual development should therefore be treated with caution.

Data for drink driving, alcohol-related traffic accidents, violent assaults and homicides are from Statistics Denmark and “Politiets Årstabel 2004”. These data originate from the Central Criminal Register administered by the National Commissioner of the Danish Police (Rigspolitiet 2004).
Alcohol consumption

Among the Nordic countries Denmark has by far the highest level of alcohol consumption. Denmark has undergone significant changes in respect of alcohol consumption throughout the last hundred years. Before 1917 the level of annual alcohol consumption per person in Denmark was almost equal to the level of today, but due to a drastic increase in taxation in 1917, within a few months consumption had decreased from 9.6 to 2.2 litres. After 1950 consumption increased steadily and peaked in 1983 with 12.8 litres. After 1983 consumption decreased modestly until 1991. Between 1991 and 2005 the total annual alcohol consumption per person in Denmark has maintained a somewhat constant level between 11.3 and 12.2 litres (Figure 1). Due to cross-frontier trade total consumption is estimated to be a bit higher than the consumption reflected by sales statistics. Thus, in 2003 total consumption was estimated to be 9–13% higher than the figures from sales statistics (Sundhedsstyrelsen 2004).

The association between alcohol consumption and its consequences is not only dependent on the average volume of consumption but also on drinking patterns (Tolstrup et al. 2004; Paljärvi et al. 2005; Mäkelä et al. 2005). The development in alcohol consumption from sales statistics does not reveal the development in the underlying drinking patterns among the Danish population. Consequently, in spite of the fact that the total alcohol consumption in Denmark, as reflected by sales statistics, has remained somewhat unchanged for a long period, underlying changes may have occurred in subgroups of the population in this period. It is a generally accepted view that the risk for alcohol-related damages is increased in people who are binge drinkers compared to people who are steady drinkers — even though the same total amount is consumed (Mäkelä et al. 2005).

National data from more specific population surveys reveal that men drink more than women and that alcohol consumption seems to be higher in the age group 16–24 years compared to any other age group. Furthermore, more alcohol is consumed in the cities than in the provinces (Ekholm et al. 2007).

The Danish National Board of Health recommends that the alcohol intake should not exceed 21 drinks per week for men and 14 drinks per week for women. The development in the proportion of women and men who have exceeded these limits (when asked to give their consumption for the last week) has increased from 13.6% in 1994 to 17.9% in 2005 for men and from 8.0% to 10.8% for women (Ekholm et al. 2007), which means that approximately 500 000 Danes consume more than the recommended amount of alcohol.

Figure 1. Alcohol consumption in Denmark 1910–2005. Sales statistics.

Litres of alcohol (100%) per person aged 15+
It has been shown that those who state they drink more than the recommended amount have a higher mortality than those who consume a moderate amount. This applies to both men and women (Ekholm et al. 2007).

In terms of mortality the risk may depend on the type of alcohol consumed. It has been found in Denmark that those who drink beer may have a higher mortality than those drinking wine and spirits (Johansen et al. 2005). A stratification of alcohol into types of alcohol discloses a considerable change in the development of preferred type of alcohol during the last two decades in Denmark. Beer used to be the predominant type of alcohol consumed; now wine seems to have surpassed it. The increase in total alcohol consumption until 1983 was a result of an increase in all three types of alcohol (Figure 2). However, with the peak of total alcohol consumption in 1983 a shift began. The consumption of beer decreased considerably from 1983 to 2005 whereas the consumption of wine continued to increase in this period. During the nineties the level of beer and wine consumption strongly converged. In 2005 the consumption of wine reached 4.4 litres annually and the consumption of beer was 5.1 litres. No considerable change in respect of consumption of spirits was seen from 1990 to 2002, whereas consumption increased from 1.4 litres in 2002 to 1.6 in 2003 and there was a 35% increase to 1.9 litres in 2004. In 2004 the consumption of beer decreased markedly by 0.4 litres. In order to prevent an increase in the cross-frontier trade due to the abolishment of the so-called 24-hours rule in January 2004, the taxes on spirits were reduced from DKK 275 to DKK 150 per litre pure alcohol, i.e., by DKK 125 per litre, in October 2003. The before-mentioned changes may very well be consequences of this 45% reduction of taxes on spirits.

Alcohol-related mortality rates and hospitalisation rates
A significant relationship between per capita consumption and mortality from liver cirrhosis and other alcohol-related diseases has been found to exist in the EU countries including Denmark (Norström & Ramstedt 2005). The development in annual alcohol consumption and alcohol-related mortality rate is depicted in Figure 3. As previously described, total alcohol consumption has remained at a somewhat constant level from 1990 to 2005. The same stability applies to the development in alcohol-related mortality rates. No significant changes have happened from 1990 to 2001 (Juel et al. 2006).

In the period 1990–2001 deaths attributed to alcohol-related diagnoses ranged from 2 571 to 2 726, corresponding to
Figure 3. Alcohol-related mortality rates per 100 000 and alcohol consumption per person aged 15+. Denmark 1990–2004.

Figure 4. Alcohol-related mortality rates per 100 000 in Denmark 1990–2001

Figure 5. Gender-specific alcohol-related mortality rates per 100 000 in Denmark 1990–2001

4–5% of the total mortality in Denmark. The mortality rates due to cirrhosis and alcoholism, alcohol psychosis, and alcohol poisoning show a slightly volatile pattern in this period, but no overall changes are observed. With respect to pancreatitis the mortality rate has increased by 20% from 4.4 per 100 000 in 1990 to 5.3 in 2001 (Figure 4). Pancreatitis is by far the lowest of the three alcohol-related mortality rates, and it is the cause of death for which the alcohol-attributable proportion is the smallest.

Men had an almost three-fold higher alcohol-related death rate than women in 1990–2001. The gender differences in alcohol-related mortality rates were most pronounced in alcoholism, alcohol psychosis and alcohol poisoning where men had a three- to five-fold higher mortality rate than women. The above-mentioned increase in total pancreatitis mortality rates is due to an increase in the male mortality rate (Figure 5).
The National Patient Registry records all somatic hospitalisations. However, treatments in outpatients’ alcohol clinics and alcohol-related treatments in primary health care are not registered. The hospitalisation rates are therefore an approximation of the total load that alcohol consumption is putting on the health care system (WHO 2004). The hospitalisation rates for alcohol-related diagnosis for pancreatitis and cirrhosis of the liver have been fairly unchanged in the period 1990–2004. However, the hospitalisation rate for alcoholism, alcohol psychosis and alcohol poisoning has increased by 36% in this period (Figure 6). This increase may partly be explained by a general higher awareness of these conditions among medical personnel. During the same period parts of psychiatric treatment in Denmark have been decentralised, which has actually “decreased” the number of psychiatric admissions for other causes during that period. The number of Danes who suffer from dependence on alcohol is estimated to be 200 000 (Sundhedsstyrelsen 2004).

**Drink driving and alcohol-related traffic accidents**

The effects of changes in aggregate alcohol consumption on fatal motor vehicle traffic accidents, accidental falls and other accidents have been investigated in 14 Western European countries. An association between aggregate alcohol consumption and fatal motor vehicle traffic accidents was only found in central and southern Europe—not in northern Europe (Skog 2001). The number of convictions for excess blood-alcohol levels in those involved in traffic accidents decreased in Denmark from 2 720 to 1 944 (29%) in the period 1990–2004 (Figure 7). If police charges are included in the figures, they would add approximately another 1 000 alcohol-related traffic accidents (Rigspolitiet 2004).

The BAC limit for drink driving is 0.05% in Denmark. As per September 2005 the sentencing for drink driving was made more stringent. In addition to a fine the license is withheld depending upon the alcohol concentration (Rådet for større færdsels sikkerhed 2006). Approximately
1% of all drivers have been found to be under the influence of alcohol whereas 29% of those who were killed in traffic accidents in 2002 were under the influence of alcohol (Bjerre et al. 2006). The number of drink-driving convictions decreased by 34% in the period 1990–1997 (Figure 8). However, by the year 2004 the number of convictions had returned to almost the same level as in 1990. If charges for drink driving were included, this would increase the numbers in Figure 8 by about 5 000 (Ekholm et al. 2007).

It should be noted that the number of convictions and charges of drink driving is indeed dependent on the extent of the control activities of the police. Unfortunately we have no data on control activities of the police, such as the number of random breath tests etc. Furthermore, it is plausible that the development in the number of drunken drivers is dependent on the development in the population’s attitude to abstaining from drinking (or driving) in risky situations rather than on the mean alcohol consumption in the population.

**Violent assaults, homicides and detentions in custody due to drunkenness**

At an individual level there is a causal relationship between alcohol intoxication or alcohol abuse and almost all types of accidents or violence (Brismar & Bergman 1998). In a Swedish study the relationship has been investigated in more detail (Norström 1998). In respect to homicide rates, the findings of a Norwegian study support the hypothesis that homicide rates are influenced by alcohol sales—especially in the Northern European countries (Rossow 2001). A Danish survey from 1990 has shown that on average 50% of all inmates in low and high security prisons were under the influence of alcohol when committing the crime (Kramp et al. 1990). Figure 9 shows the overall violent assault rates in Denmark.

Violent assault rates have increased considerably in the period 1990–2005 (Figure 9). Since total alcohol consumption has remained unchanged in this period the increase in violent assault rates cannot be

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**Figure 8.** Drink-driving convictions in Denmark 1990–2004

**Figure 9.** Violent assault rates per 100 000 in Denmark 1990–2005
explained by this factor, or it may be due to differences in drinking patterns in the society and therefore may be due to an increase in drinking in excess. Moreover, the consumption of beer has decreased markedly in this period, and the consumption of spirits did not start to increase until 2003. Rather, the explanation is a tendency in the society to report more assaults or more assaults are simply taking place due to reasons other than alcohol consumption. The overall development in homicide and homicide attempt rates has remained fairly constant during this period although some fluctuations are seen from year to year (Figure 10).

According to the police act, individuals who are a danger to themselves, to others or to public order may be detained. Instead of detaining a drunk person the police may decide to take the person home, to the hospital or to a detoxification centre or the like. The police can also consign a person to the care of other persons. Detentions due to drunkenness have decreased by more than 50% from 1990 to 2004 (Figure 11). As is the case for drink driving the number of detentions due to drunkenness is dependent on the activities of the police in this area. The marked decrease in detentions might therefore be a reflection of changed approaches from the police.

**Conclusion**

This paper serves as one country contribution to the broad picture of the association between the development in alcohol consumption and alcohol-related harm in the Nordic countries. Compared with the other Nordic countries, the development in total alcohol consumption and alcohol-related mortality in Denmark from 1990 onwards is characterised by stability, and the conclusions drawn with regard to any strong association is weak. The preferred type of alcohol among the Danes during this period was beer—although the consumption of beer is now decreasing, “compensated” for by an increase in wine. The total alcohol-related mortality rate in
the period 1990–2001 has remained at the same (high) level, and there seem to be no differences in the overall effect on these somatic consequences in spite of the differences in consumption of the different types of alcohol. Only the mortality rate due to pancreatitis has increased in this period and only among men. Hospitalisation rates have remained somewhat constant for cirrhosis of the liver and pancreatitis, whereas a considerable increase of 36% in the hospitalisation rate due to alcoholism, alcohol psychosis and alcohol poisoning can be seen. The number of alcohol-related traffic accidents and detentions due to drunkenness has decreased considerably, whereas drink-driving convictions in 2004 were at almost the same level as in 1990 but with a decline of 35% between these two years. Violent assault rates (not specifically alcohol-related) have increased during the period, whereas homicide and attempted homicide rates have remained stable.

With regard to the shown extent in the development in e.g. hospitalisation, drink driving, accidents and assaults, we assume that these are fair reflections of the actual number of people with alcohol-related problems in a Danish context. The development is also influenced by the activity of the authorities in the respective areas and may hence be a reflection of changes in these activities. In an ongoing work for the National Board of Health by the National Institute of Public Health in Denmark, new and direct as well as indirect measures of alcohol-related harm are being developed. Hence, it is quite evident that alcoholic cirrhosis and pancreatitis are only a few of the many somatic consequences from high alcohol consumption. A problem to be solved is that many of the others (breast cancer, colon cancer, upper digestive tract cancer, etc.) have other component causes, which makes it difficult to measure the unique “effects” of alcohol. For instance, a report on the etiologic fraction of alcohol on coronary heart disease and all-cause mortality seemed to “increase” the number of deaths attributable to heavy alcohol consumption in Denmark from 3 000 to 7 000 per year (Osler et al. 2000). Further, there are a vast number of social consequences that may constitute an even larger problem, both with regard to the individual and societal economic scale—which are also not measured sufficiently, and therefore not mentioned in this report.

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NOTES

1) The 24-hour rule restricted the amount of spirits and tobacco that could be imported/introduced to Denmark when entering the country from other EU-countries without paying Danish taxes and VAT.

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Upward trends in alcohol consumption and related harm in Finland

Harms and benefits from consumers’ point of view
If the use of alcoholic beverages is looked at from the perspective of alcohol consumers, it should be seen as an activity that increases individual welfare, at least as regards alcohol consumers’ own expectations. Otherwise it would be difficult to understand why consumers voluntarily buy alcoholic beverages with their scarce resources. Finns seem to regard the immediate effects experienced during drinking as the most important benefits of their alcohol use. In the 2000 Drinking Habits Survey conducted by the National Research and Development Centre for Welfare and Health, the most typical positive effect of drinking reported by the respondents was that alcohol had helped them to have fun. Other frequently experienced positive effects included that drinking had helped the respondents to say more amusing things than usual, feel less timid in the company of others, express their feelings better, learn to know another person better, and approach the opposite sex more easily.

Regular, moderate use of alcohol has been shown to have a protective effect against cardiovascular diseases at least in some subgroups of the population (Rehm et al. 2003; World Health Organization 2006, 15). At least

ABSTRACT
P. Mäkelä & E. Österberg:
Upward trends in alcohol consumption and related harm in Finland

AIM
Our aim was to study whether the development in the rates of harm still follows the development in per capita alcohol consumption, and to clarify the relationship between alcohol consumption and related harms by paying attention to third factors affecting this relationship.

DATA
Statistics on alcohol consumption and alcohol-related harm associated with the maintenance of public order and safety, alcohol-related deaths and hospitalizations, and treatment for alcohol problems in the period 1990-2004.

ANALYSIS
In the last 15 years, alcohol consumption in Finland first decreased during the economic recession of the early 1990s, and then increased almost constantly. Some harm series roughly followed these consumption trends, and for some others the connection with alcohol consumption became obvious when the effect of some third factor was taken into account. Harm rates also increased in 2004 when alcohol consumption increased by 10% after a decrease of alcohol excise duty rates of 33% on average.

CONCLUSIONS
In Finland changes in alcohol consumption are still today followed
by changes in rates of alcohol-related harm.

**KEYWORDS**
Alcohol consumption,
alcohol-related harm,
Finland, indicators,
statistics.

in Finland, however, the protective effect of alcohol use is not a particularly common motive for drinking, as suggested by the 2000 Drinking Habit Survey. In this study, only slightly more than 3% of Finns reported using alcoholic beverages in order to prevent cardiovascular diseases. Nor would the intoxication-oriented drinking habit common among Finns be likely to produce such a protective effect (Rehm et al. 2003; Metso et al. 2002).

Consumers may fail to achieve the benefits they expect from using the commodities they buy, and the use of many commodities may have undesired side effects or harmful consequences. In this respect, alcoholic beverages are particularly problematic.

Firstly, heavy, regular use of alcohol puts a strain on the body and makes life management more difficult, which in the long run may lead to social, financial and health-related harms that people are unable to take into account when making the decision to consume alcohol. In the 2000 Drinking Habits Survey, for instance, 5% of the respondents reported that they had, due to drinking, had health problems during the preceding year, 5% had got into financial difficulties, and 12% had neglected their duties.

Secondly, alcohol is a substance that affects the central nervous system and impairs judgement. Therefore, it may cause people to behave in the drinking situation in ways that they would not when sober and that they regret later on. In the 2000 Drinking Habits Survey, one third of the respondents reported having regretted something they had said or done because of their drinking during the preceding year.

Thirdly, drinking has a negative effect on motor functions and physical performance, and the risk of various accidents increases with the degree of drunkenness. Furthermore, alcohol use causes dependence in some users, so that the decision to consume alcoholic beverages may become compulsive instead of being based on one’s own free will and on the pursuit of one’s chosen needs. In the 2000 Drinking Habits Survey just over a quarter of the respondents reported having problems in controlling their drinking during the preceding year.

In addition to the effects on drinkers themselves, the use of alcohol may cause adverse consequences to third parties, such as being subjected to violence or disturbance. For in-
stance, nearly half of the respondents in the 2000 Drinking Habits Survey reported having suffered at least once during the preceding year from various disturbances associated with drinking, ranging from noise to harassment. Third parties also include the children and spouses suffering from one family member’s heavy drinking or drunken behaviour, as well as unborn children who are harmed by the mother’s drinking during pregnancy. Negative consequences of drinking for the public sector include also financial costs that follow from, for instance, guaranteeing public order and safety, hospital care, social benefits or disability pensions and losses of tax income because of absences from work due to illness or premature death.

The scope of this paper
Time series analyses on the connection between per capita alcohol consumption and various harmful effects of alcohol use have shown that the development of consumption and harm series are typically connected, and that they are more closely connected in countries in which the drinking pattern is not particularly moderate, such as Finland, than in, e.g., southern European countries (Edwards et al. 1994; Norström et al. 2002). Consequently, as per capita alcohol consumption is relatively easy to measure, it has long been used—in the Nordic countries in particular—as an indicator to describe developments in the alcohol situation and to predict alcohol-related harms. However, ultimately it is the development of alcohol-related harms that matters, and therefore it is important to closely monitor the development of harm rates when possible. Additionally, as the society changes, also the connection between alcohol consumption and related harm can potentially change.

In addition to describing trends in alcohol-related harm, this paper looks at changes in alcohol-related harm in relation to alcohol consumption in the period 1990–2004. Besides alcohol use, alcohol-related harm is usually a result of several other factors as well. Therefore, one should not expect to find a one-to-one relation between total alcohol consumption and different kinds of alcohol-related harm. The aim here is to study whether the development in the rates of harm still follows the development in per capita alcohol consumption, and to clarify the relationship between alcohol consumption and related harms by paying attention to third factors affecting this relationship.

This paper draws on time-series data on alcohol-related harm broken down as follows: harm associated with the maintenance of public order and safety, alcohol-related deaths and hospitalizations, and treatment for alcohol problems. Some of the time series, such as those on assaults, make no distinction between alcohol-related and other cases. However, as alcohol is known to be involved in a large proportion of such cases, they are included in the analysis. Not all alcohol-related harms are included here, but the analysis nevertheless covers the most important measurable types of harm. The series provide detailed information about the short- and long-term side effects and harmful consequences of alcohol use for drinkers themselves, third parties and society at large.

The sources of the data are mainly the authorities responsible for making official statistics in Finland: the National Product Control Agency for Welfare and Health...
(recorded and unrecorded alcohol consumption), Statistics Finland (drunkenness arrests, assaults, manslaughter and murder, drink driving, number of people injured in traffic accidents, alcohol-related deaths) and the National Research and Development Centre for Welfare and Health (hospital care, treatment for alcohol abuse).

In temporal analyses, the level of alcohol-related harm is often given in per capita terms in order to avoid the confounding effect of population changes on comparisons between different periods of time. However, the period covered here is so short that the effects of changes in population size are almost non-existent, and therefore the analysis of alcohol-related harm in this paper will focus on the nationwide absolute numbers of cases. The interested reader can relate the numbers of harm to the average population size of Finland in the period: 2.5 million men, 2.6 million women and 5.1 million Finns altogether.

Long-term trends in alcohol consumption

In the early 1950s, Finland’s total per capita alcohol consumption, including both registered and estimated unregistered alcohol consumption, was around two litres per year. In 1975, it was about seven litres, and in 1990 nine litres. Total alcohol consumption then decreased during the economic recession to eight litres by 1994, after which it started to grow again (Figure 1). In 2004, total alcohol consumption increased 10% on the preceding year, amounting to some 10.3 litres per capita, which was an all-time peak. In 2005 alcohol consumption reached a new all-time peak of around 10.5 litres.

The sudden increase in alcohol consumption in March 2004 was the outcome of the decrease in alcohol excise duties (Österberg 2005, 287). This decrease was particularly strong with regard to the excise duty rate for distilled spirits, 44% when the corresponding decrease was 40% for intermediate products, 32% for beer and 10% for wine. The aim of the tax decrease was to combat the anticipated increase in alcohol imports after the abolishment of travellers’ duty-free alcohol import quotas from other European Union (EU) member states in January 2004 and after Estonia became a member of the EU in May 2004 (Österberg 2005).

In the 1950s, some 80% of alcohol was consumed in the form of distilled spirits in Finland. During the past five decades, the proportion of other alcoholic beverages has increased. In spite of the increase in spirits consumption in 2004, distilled spirits accounted for only 30% of total
alcohol consumption in that year (Figure 1). Beer accounted for nearly half of total alcohol consumption in 1990 and its share has been decreasing slightly since then. The consumption of wines has increased during the last three decades, particularly after 1990. Similarly, the consumption of ciders has grown considerably after 1995 when they were allowed to be sold in ordinary grocery stores.

Estimated changes in unrecorded alcohol consumption have seldom been large enough to change our view on the development of total alcohol consumption as compared to the development based on recorded consumption only. There are, however, two such cases in our observation period. In 1995, when Finland joined the EU, travellers’ duty-free quotas for alcohol imports were extended, which increased travellers’ alcohol imports by 0.8 litres per capita on a yearly basis and led to a 10% increase in total alcohol consumption (Pehkonen & Österberg 1996). In 2004, with the abolishment of the quotas restricting travellers’ duty-free alcohol import from other EU countries, alcohol imports by Finnish travellers increased especially after Estonia’s accession to the EU despite the major reduction in alcohol taxes in Finland (Österberg 2005). The share of unrecorded alcohol consumption has increased from some 10% of the total alcohol consumption in the mid-1970s to some 21% in 2005. Then, nearly 80% of unrecorded consumption consisted of travellers’ imports and about half consisted of strong alcoholic beverages.

There does not seem to have been any great changes in drinking habits among Finns between 1992 and 2000 (Mustonen et al. 2001; Metso et al. 2002). The frequency of drinking decreased slightly, but the frequency of subjective intoxication and of drinking 6 or more drinks at a time did not change significantly.

Police statistics on alcohol-related harm

As late as in the mid-1960s, alcohol-related harm was monitored in Finland mainly by analysing developments in the number of drunkenness arrests by the police and the number of violent offences that had come to the police’s attention.

- **Arrests for drunkenness**

In 1975, nearly 300 000 arrests for drunkenness were made in Finland. By 1990, the number had decreased by one half, and the decrease continued during the first half of the 1990s, with the lowest level reached in 1997. The number increased in the late 1990s and in the 2000s (Figure 2 top left). In 2004, the number of arrests for drunkenness increased by 11%.

The police are not particularly keen on drunkenness arrests because of the strain they put on their resources. Furthermore, the police consider that drunken people should be taken care of by social and health authorities. The conscious decision by the police to raise the threshold of arrest is, in fact, the main reason for the decrease in the number of arrests. On the other hand, the police must act in cases where people are so intoxicated that they are unable to take care of themselves. An interesting observation from this point of view is that when related to the consumption of alcohol, arrests for drunkenness decreased up to the mid-1990s and have ever since remained roughly unchanged. The downward trend in drunkenness arrests coming
to an end has been explained by the fact that the 1995 Alcohol Act for the first time allowed drinking in public, and the resulting disturbances made the press, among others, demand a stricter approach from the police (Törrönen 2004). On the other hand, the arrest threshold may already be so high that the people who get arrested are mostly so drunk that they have passed out or cannot take care of themselves, and the number of such cases may well follow trends in per capita alcohol consumption.
Assaults

A majority of those suspected of assault offences have been under the influence of alcohol. In 2000–2004, for example, such cases accounted for some 70% (Lehti & Sirén 2006). In addition, in many assault cases, the victim has also been under the influence of alcohol.

The number of assaults decreased in the early 1990s but has been on the increase after 1994 (Figure 2 top right). The number of petty assaults has increased most, which might suggest a lowering of the police’s threshold of intervention. However, this is not very likely as the number of ordinary assaults has also increased. Furthermore, the proportions of petty and aggravated assaults have also changed due to a legislative amendment effective in 1995 that redefined the essential elements of these offences (Sirén et al. 2005). When related to the amount of alcohol consumption, the number of assaults has increased during the observation period.

In 2004, the number of assaults reported to the police increased by 3%. A time series analysis on the impact of the tax changes on different types of crime showed no significant increase in non-lethal violent crime in private or public places or in police calls for service and patrol tasks (Sirén & Lehti 2006).

Manslaughters and murders

The number of manslaughters and murders was the same in 2004 as in 1990, which represents a decrease in relation to the level of alcohol consumption (Figure 2 bottom left). In the past few decades, the numbers of manslaughters and murders have been regarded as an objective indicator of the occurrence of violence, unaffected by the threshold of intervention by the police. However, the number of attempted manslaughters and murders increased by more than one third from 1990 to 2004. This could be interpreted as meaning that an increasing number of the victims of attempted manslaughters or murders have survived because of the improved effectiveness of health care and improved communication systems.

While the number of manslaughters and murders increased significantly in 2004 as compared with 2003, their number was still below the long-term average, and the numbers decreased to the pre-2004 level already in 2005 (Sirén & Lehti 2006). Overall, over one-half of all manslaughters and murders in Finland can be classified as being committed within groups of marginalized men (Lehti & Kivivuori 2006), and the increase in manslaughters and murders in the spring of 2004 has been found to be completely attributable to middle-aged marginalized and alcoholic men (Lehti & Sirén 2006).

Drink driving

The number of instances of drink driving that have come to the police’s attention has often been seen to primarily reflect the level of the police’s control activities, in the same way as the number of arrests for drunkenness. This is, in fact, true with the number of drunken drivers caught by the police at checks points. However, drunken drivers are mostly caught in the context of various traffic accidents and violations or because they drive unsteadily and thus attract the attention of the police or other road users. Changes in police and citizen activity certainly have an effect on the number of drunken drivers caught by the
police, but the figures no doubt also reflect actual changes in the number of drunken drivers.

The number of instances of drink driving that has come to the police’s attention decreased in the early 1990s, reaching the lowest level in 1994. Since that year, increases have occurred both in aggravated drink driving and in instances involving a blood alcohol content of over 0.05% (Figure 2 bottom right). The lowering of the blood alcohol content limit of aggravated drink driving from 0.15% to 0.12% in September 1994 slightly changed the shares of drink driving and aggravated drink driving in 1995.

In 2004, an increase of 10% took place on the preceding year in the recorded cases of both drink driving and aggravated drink driving. The increase can only partly be explained by the fact that the number of breath tests conducted by the police increased by nearly 20% between 2003 and 2004 (Niemi 2005). The number of people injured in traffic accidents involving drink driving also increased 9% from 2003 to 2004 (Figure 3).

Of all drivers breath-tested in the roadside screening tests by the police in the region of Uusimaa in 2004, 0.01% were found guilty of aggravated drink driving and 0.2% of drink driving, while another 1.0% had consumed some alcohol but were found to have a blood alcohol level of less than 0.05% (Niemi 2005). No major changes have occurred in the percentage of drunken drivers discovered by the roadside tests since the early 1990s, not even in 2004. However, in the last few years, the proportion of those who have consumed some alcohol, but not enough to exceed the legal limit, has doubled from the first years of the 2000s, and is nearly threefold compared with the late 1990s.

When the number of instances of drink driving recorded by the police is compared with that of drunken drivers caught in roadside tests, two things become apparent. The number of instances of drink driving recorded by the police has clearly more often involved blood alcohol contents in excess of 0.12% than have the cases revealed in roadside testing. In other words, the higher the drivers’ blood alcohol content is, the more often they get caught through their own actions. Additionally, roadside tests suggest that one out of every five hundred vehicles on the roads is driven by a person with a blood alcohol level of more than 0.05%. This means that drunken drivers very rarely get caught.
Alcohol-related deaths

Although alcohol-related deaths account for only a very small part of all adverse effects of alcohol consumption, they are an important type of harm for two reasons. First, death is the most serious type of harm. Second, deaths in Finland are examined and diagnosed relatively accurately, which means that there is more reliable statistical information available on alcohol-related deaths than on other types of harm caused by alcohol.

Alcohol-related deaths here include two kinds of deaths. The first kind includes deaths in which the underlying cause is alcohol-related disease or (fatal) alcohol poisoning. Another category of alcohol-related deaths discussed here consists of accidental and violent deaths where alcohol intoxication has been a contributory cause, e.g. traffic accidents or drownings. This category will be referred to below as ‘intoxication deaths’. Due to technical reasons, we could not distinguish alcohol poisonings and alcohol dependence, and we also had to make some modifications on the numbers in official statistics on different types of poisonings in order to improve comparability between the 9th and 10th revisions of the international classification of diseases (ICD9 and ICD10).

Deaths from alcoholic diseases and poisonings

Deaths from alcoholic diseases and poisonings in women increased nearly 80% from 1990 to 2004 (Figure 4 top right). In men, the increase was markedly smaller but nevertheless clear (Figure 4 top left). Despite the challenge that the 1996 change in cause-of-death categorization poses on interpretation, it is clear that in the early 1990s deaths from alcoholic diseases and poisonings in men decreased slightly with decreasing alcohol consumption, and that the increase in alcohol consumption after the mid-1990s and early 2000s was associated with an increase in alcoholic deaths in both women and men.

The increase in total alcohol consumption in 2004 resulted in a clear increase in deaths from alcoholic diseases and poisonings. The increase was 20% for men and 17% for women, in total 19%. In absolute numbers the increase was greatest in the age-group 45–64, which accounted for about two thirds of all the deaths from alcoholic diseases and poisonings in both years. A larger proportional growth was seen in the younger age groups (25–44 years), where the absolute number of deaths and increases in them were smaller.

Intoxication deaths

No systematic increases or decreases have occurred in intoxication deaths in women between 1990 and 2003, while intoxication deaths in men have actually decreased (Figure 4 top right and top left). Thus, accidental and violent intoxication-related deaths have not followed the upward trend in alcohol consumption in the observation period. One possible reason for this is the increasingly rapid reactions by society in cases of accidents and the improved level of services. A case with a fatal outcome in 1990 is today more likely to be saved. Alternatively, the long-term downward trend in cases of intoxication deaths in men could reflect some kind of moderation in the extreme forms of the Finnish drinking culture, either with regard to intoxication orientation or in that people have increasingly learnt to avoid risky actions when under the influence of alcohol.
Figure 4. Alcohol-related deaths, 1990–2004
In 2004, intoxication deaths increased 3% in men and nearly 40% in women, in total 8%. Proportionally, the greatest increase in intoxication deaths occurred in the youngest and the oldest age group: 27% for 15–24-year-olds and 20% for over 65-year-olds.

**Individual alcohol-related causes**

An analysis of individual causes of alcohol-related deaths reveals that the number of deaths from both alcoholic liver diseases and from poisonings and disorders caused by alcohol use (alcohol dependence, alcohol psychoses, etc.) has roughly followed changes in alcohol consumption: There was some decline (or at least no growth) in the early 1990s, after which the trend has been upwards (Figure 4 bottom right). The similarity between the time series is even a little closer when taking into account that in 1996 and 1997 the number of alcohol poisonings has been found to be an underestimate (Lahti & Vuori 2002). However, despite similar directions in the trends, the size of the changes in alcohol consumption and deaths from alcoholic liver diseases has been different. Deaths from alcoholic liver diseases increased nearly twofold from 1990 to 2004 while the increase in alcohol consumption was 17%. The increase in liver transplantations in the past two decades has not prevented the increase in alcoholic liver cirrhosis, possibly partly due to the fact that only a few of the liver transplantations undertaken in Finland are performed to treat alcoholic liver cirrhosis (Finnish Association for Organ-Transplant and Kidney Patients 2007). Deaths from cardiomyopathy caused by alcohol and alcoholic diseases of the pancreas remained rather steady in 1990–2004 (Figure 4 bottom right).

In 2004, proportionally the greatest increase took place in deaths from liver diseases caused by alcohol: 29% among men, 35% among women and 30% in total. Deaths from alcohol poisoning increased 25% for men, 4% for women and 20% for all. The increase in deaths from other alcoholic diseases was 4% in 2004. In 2005, alcohol-related deaths increased again, by 7%, and the increase for liver diseases caused by alcohol was again large, at 17% (Yearbook of Alcohol and Drug Statistics 2006).

**Hospital care and treatment for alcohol abuse**

Statistics on services for alcohol abuse and alcohol-specific health care reflect the number of people who have ended up seeking help for social or health-related problems with alcohol, and can hence be included among indicators of alcohol-related harm. It is important to simultaneously look at both the specialised services provided by substance abuse units and hospital discharges with alcohol-related diagnoses. This is because in most municipalities, particularly in the small ones, the local authorities provide hardly any specialised services, and instead substance abuse problems may be mostly treated within the health service system (Ruuth 2005). Some of the changes over time may be due to transfers between the different service providers.

**Hospital care and treatment for alcohol abuse in 1990–2004**

A-clinics are community-based service units for problem users of alcohol and
other substances, whilst youth clinics are community-based service units that help young people and their families with their problems, including alcohol- and drug-related problems. When total alcohol consumption decreased in the early 1990s, there was also a decrease in patient numbers in A-clinics and youth clinics and also in care days provided by detoxification centres (Figure 5, top left; see also Kaukonen 2000). By contrast, the number of visits to A-clinics and youth clinics increased even in the beginning of the 1990s, suggesting that the remaining, smaller number of clients needed a greater number of visits than before. An increase also took place in the number of hospital discharges with alcohol-related primary diagnoses in the early 1990s in both men and women (Figure 5 top right). The concurrent increase in the number of hospital discharges and the decrease in the number of care periods in services for alcohol abusers may be interrelated. The development suggests that during the recession local authorities made fewer commitments to pay for treatment in substance abuse units, so that people with alcohol problems have been referred to health-care facilities instead. After the early 1990s, care days in detoxification centres and patient numbers and visits in A-clinics have increased. Visits to youth clinics have almost doubled since 1997 (Yearbook of Alcohol and Drug Statistics 1999 and 2005).

For men, the number of hospital discharges that have an alcohol-related primary diagnosis reached the highest level in 1996–1998, and in 2004 the figures were again very close to the 1996–1998 figures (Figure 5 top right). For women, the trends have been similar except that the dip in the number of discharges for alcoholic diseases in the early 2000s was less pronounced.

In 2004, the number of people visiting A-clinics increased by 3% and the number visiting detoxification centres increased by 9%. No increases occurred in patient numbers in rehabilitation centres for alcohol abusers, while lengths of stay clearly increased (Ruuth & Hein 2005). According to professionals working in service centres for alcohol abusers, their clients have been in a poorer condition after the tax cut in March 2004 than previously (see e.g. A-Clinic Foundation 2004).

In 2004, the number of alcohol-related discharges increased by 9%. Proportionally the increase was approximately equal for men and women. The increase in discharges very clearly varied with age. No increases were observed in the 15–44 age group. In the age group under 15 years the increase was 32%, in the 45–54 age group 9%, in the 55–64 age group 25% and in the age group over 65 years 11%.

## Hospital discharges by cause
The number of hospital discharges with an alcohol dependence diagnosis decreased steadily during the observation period (Figure 5 bottom left). As for 1996, this can be explained by the fact that the new classification of diseases, ICD10, was brought into use. Other reasons behind these developments may include the general tendency to give preference to community-based services and social services with regard to patients in need of long-term care. The development in psychiatric care units is not substantially different from the development in other health care units (Figure 5 bottom right).
Figure 5. Treatment of alcohol-related diseases in hospitals and services for alcohol abusers, 1990–2004
The number of discharges with an intoxication diagnosis increased most during the observation period (Figure 5 bottom left). Obviously the decrease of 60,000 cases in arrests for drunkenness by the police in the 1990s was realized by taking some of the cases to health care centres instead. It is also possible that in borderline cases there is some variation in the practice of recording a diagnosis with regard to alcohol dependence, alcohol intoxication and alcohol psychoses, and that these practices have changed gradually during the years after the introduction of ICD10.

The number of hospital discharges with diseases of the liver as well as those with alcohol psychoses have increased considerably whereas the total number of discharges with other alcohol-related primary diagnoses—mainly poisonings, gastritis and diseases of the pancreas—has remained about the same. Among the different alcoholic diseases, it was thus the number of liver cirrhoses that most clearly followed developments in the mean consumption of alcohol.

The increase in alcohol-related hospital discharges in 2004 was largely attributable to three diagnoses. The increase in discharges was 16% for alcohol psychoses, 12% for alcohol intoxication and 16% for diseases of the liver caused by alcohol.

Harm to families
No particularly useful statistics exist on the alcohol-related harms to the drinker’s family. Information on the occurrence of foetal defects is available only from individual studies; child neglect cannot be measured; and time series on domestic violence are not available. Although statistical information is available on the number of children placed outside the home and taken into care, cases involving alcohol are not distinguished from other cases. Specific studies have shown that substance abuse of parents is among the most important factors contributing to the need for child welfare interventions (Kivinen & Heinonen 1990; Heino et al. 2002; Mellin et al. 2006).

In our observation period, child welfare interventions have increased constantly. The number of children taken into care increased by a third, and the number of other children placed outside the home increased one-and-a-half fold from 1990 to 2004. Trends in the number of children placed outside the home do not follow trends in alcohol consumption, particularly not in the first half of the 1990s. During this period, a more significant contributory factor to the number of children placed outside the home was certainly the economic recession with its consequences. Nevertheless, the number of children taken into care is increasing more rapidly in the 2000s than in the first half of the 1990s, coinciding with the development of per capita alcohol consumption.

Summary and discussion
In the last 15 years, alcohol consumption in Finland first decreased during the economic recession of the early 1990s and has then increased almost constantly. Some types of harm associated with alcohol consumption have roughly followed these consumption trends, such as drink driving, assaults, visits to detoxification centres and the number of customers in community-based services for alcohol abusers, hospital care for diseases of the liver, and deaths from alcohol diseases and poisonings.
For some other types of harm, the connection with alcohol consumption becomes obvious when the effect of some third factor is taken into account. This is the case especially with arrests for drunkenness where the police’s arrest threshold has already long been rising, which has resulted in a steep decline in arrests for drunkenness and probably also in an increase in hospital discharges with an intoxication diagnosis. The decrease in discharges with alcohol dependence, in turn, is likely to be associated with efforts to reduce inpatient hospital care in cases where patients can be referred to outpatient services or services of the social sector. In some other types of harm, such contributory factors cannot be equally clearly identified. One example of such harms would be intoxication-related accidental and violent deaths.

The biggest single change in alcohol consumption for a long time was experienced in Finland in 2004 when alcohol consumption increased by approximately one tenth during one year. This change offers an opportunity to use a natural experimental design where the effects of the decrease in alcohol taxation and of an increase in alcohol consumption can be observed directly. An increase occurred in a majority of the different types of alcohol-related harm in 2004, including hospital care and deaths caused by alcohol. On the basis of these observations for both the whole observation period 1990–2004 and for 2004, it can be concluded that in Finland changes in alcohol consumption are still today followed by changes in alcohol-related harm rates. This conclusion is justified despite the fact that not all time series for alcohol-related harm have followed the same pattern as those of alcohol consumption. Hence, the notion that in the Nordic countries the association between alcohol consumption and harms might perhaps be getting weaker (Holder et al. 2005; see also the introduction to this special issue of NAT) does not seem to apply in Finland.

In 2004, the number of deaths from alcoholic diseases of the liver increased 30%, and in 2005 by a further 17%, although cirrhosis of the liver only develops as a result of long-term heavy drinking. An explanation for this is that there already existed a large number of drinkers with liver damage, and as these people increased their consumption, it did not take a long time before it was reflected in the death statistics. Similar observations of rapid changes in deaths from cirrhosis of the liver resulting from abrupt changes in consumption have also been made previously (Bruun et al. 1975). It is also noteworthy that the increase in deaths from liver diseases and from alcohol poisoning in 2004 was considerably greater than the increase in alcohol consumption. One likely reason for this is the empirical finding that when alcohol consumption is increasing, the number of heavy drinkers grows proportionally more rapidly. An increase of 10% in alcohol consumption can be expected to increase the number of heavy drinkers by just over 20% (Bruun et al. 1975). Still, the fact that the increase in liver cirrhosis mortality after 2003 was so large suggests that consumption may have increased more among heavy drinkers (see also Mustonen et al. 2005).

One way in which harm rates could grow less than per capita consumption would be that the distribution of alcohol consumption would become more even.
However, the evidence of the growth of serious alcohol-related harm in 2004 seems to suggest that rather than being more evenly distributed, alcohol consumption may after the tax cut be even more concentrated than before.

Alcohol-related harm could also increase less than expected if drinking habits became less harmful and less intoxication-oriented. Such developments have been awaited and desired by politicians and the media alike, but so far no convincing evidence exists in Finland of such changes. While drinking wine at meals and other light drinking occasions have increased somewhat, occasions of intoxication have also increased. In other words, new drinking habits have been adopted in addition to the traditional ones, rather than replacing them (Metso et al. 2002).

In 2004, the abolishment of the quotas restricting duty-free passenger imports from other EU countries, the reduction of alcohol taxes, and the accession of Estonia to the EU increased the consumption of alcohol by some 10%, and alcohol consumption has since remained at that level. The increase in alcohol consumption in 2004 thus does not seem to be a temporary phenomenon, which implies that alcohol-related harm will not decrease in the near future.

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NOTES

1) According to the ninth revision of the international classification of diseases, ICD9, alcohol-related diseases included: alcoholic psychoses, alcohol dependence syndrome, alcoholic epilepsy, alcoholic cardiomyopathy, alcoholic gastritis and duodenitis, chronic liver disease and cirrhosis caused by alcohol, and diseases of the pancreas caused by alcohol. According to ICD10 alcohol-related diseases included in addition to the above mentioned diseases: degenerative diseases of the nervous system caused by alcohol and alcoholic polyneuropathy, both of which are categories with a very low number of cases in Finland.

2) ICD10 was introduced in Finland in 1996.

Then, the rules were changed on whether a death was classified as alcohol dependence or alcohol intoxication when both were present.

3) In the years when ICD9 was in use (1990–1995), all cases of accidental alcohol poisoning have been included in the analysis. The category of “combined effect of medicines and alcohol” no longer existed in ICD10. Half of these cases have been included in the analysis in years when ICD9 was in use, because about half of such cases were counted as alcohol poisonings according to ICD10 and the rest as other poisonings. Alcohol poisonings classified as suicide have been excluded from the analysis in all years. Cases of “injury undetermined whether accidentally or purposely inflicted” have not been included as they have mostly involved the combined effect
of alcohol and medicines, and have largely been recorded as poisonings by medicines according to ICD10.

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Trends in alcohol consumption and alcohol-related harms in Iceland

Introduction

The aim of this article is to present an overview of the development of alcohol consumption and alcohol-related problems in Iceland from 1990 to 2004.

The relationship between the total consumption of alcohol and alcohol-related problems has been widely documented, but the causality varies by the nature of the harms (Edwards et al. 1994). In general, it has been easier to demonstrate how alcohol affects health rather than social life. Such methodological problems matter to countries such as Iceland where the drinking habits have been characterized by infrequent drinking at special occasions where drinking as well as intoxication is acceptable. This pattern generates more risk factors for acute alcohol problems as well as social problems than caused by longstanding and frequent daily drinking. The paradox in the position of alcohol in Iceland has been that alcohol problems have to a great extent been viewed as health problems where treatment has been considered the appropriate reaction (Ólafsdóttir 2000). Due to this approach, the documentation of the diverse social problems...
likely explanation is that an extensive treatment service available for people with alcohol problems along with a high level of AA membership have decreased the rates of alcohol-related harms on the population level.  

**KEYWORDS**  
Alcohol consumption, alcohol-related harms, AA, Iceland.

attributable to alcohol is not well developed. How alcohol consumption and harms are perceived may have reflected how alcohol-related problems are documented. The available data on alcohol-related harms will be presented so as to study how the relationship between alcohol consumption trends and harms has developed.

Alcohol sales figures are recorded by Statistics Iceland, but information on alcohol-related harms is not centrally registered. Therefore, in collaboration with the Public Health Institute of Iceland information on alcohol-related harms has been collected from Statistics Iceland, the Police in Reykjavik, the National Commissioner of Police, the Road Traffic Directorate, the Directorate for Health, and the Government Agency for Child Protection. As the data have been collected from different authorities with various traditions for recording information, the length of the time-series varies and the data are usually not gender-specific. All data from Statistics Iceland and other government agencies include statistics on the whole population, which increased from 256 000 to 293 000 between 1990 and 2004. In the same period the population of the Reykjavik area increased from 98 000 to 114 000.

**Trends in alcohol consumption**

In 1989 a milestone in the development of the position of alcohol in Iceland was reached. When prohibition of beer ended on 1st March of that year, beer was available for sale for the first time since 1915, in a similar way to wines and stronger beverages on sale in the monopoly stores and licensed restaurants.

In only a few years, beer became the most popular type of alcoholic beverage, changing the structure of the alcohol sales, and shaping drinking habits. The symbolic factor of the entrance of beer into the market is also important because to some extent it marked the end of the temperance-driven alcohol policy, which had been in force for most of the twentieth century. From 1988 (the final year before legalized beer sales) to 2004, the total annual sales of alcohol increased from 4.6 to 6.7 litres of alcohol per inhabitant, an increase of 46% in 16 years (see Figure 1).

Even though it was not legal to sell beer before 1989, respondents in alcohol surveys reported beer consumption
Figure 1. Alcohol sales in litres of pure alcohol per inhabitant aged 15 and over 1985–2004
Source: Hagstofa Íslands 2006 (Statistics Iceland)

(Hauge & Irgens-Jensen 1987). Duty-free beer could be legally imported by seamen, fishermen and air flight crews. As a reaction to such discrimination, Icelandic tourists travelling from abroad started to import duty-free beer, and it became the practice from 1980 to 1989 even if it was not legal. It is not known how many litres of beer were imported as duty-free, or how much beer was smuggled, or how widespread home brewing was. In the late 1980s, an attempt was made to measure the unrecorded alcohol consumption, the estimate being about 1 litre of pure alcohol (Guðmundsdóttir 1990). In this study, strong beverages were estimated to account for most of the unrecorded alcohol consumption. In the first year that beer was sold, the total sale of alcohol increased by 1 litre. How much this influenced the unrecorded alcohol sales is unknown.

In the years following beer’s entrance, its novelty faded away, though disposable income also decreased, causing a decline in the sale of all alcoholic beverages (Ólafsdóttir & Leifman 2002). As soon as beer was introduced, sales of strong beverages and wines decreased somewhat. Since then, the sale of strong beverages has continuously declined, from 3.49 litres to 1.31 litres, between 1988 and 2004. Wine sales also initially declined after the entrance of beer, but have been growing since 1994. In 1988, the sale of wines was 1.05 litres but had risen to 1.92 litres in 2004. After the economic recession in the early 1990s, the sale of beer increased and was 3.49 litres in 2004.

Before the entrance of beer, strong beverages accounted for 77% and wines for 23% of the alcohol sales. Iceland rapidly changed from being a spirits country to becoming a beer-drinking country. In 2004, the proportion of strong beverages was as low as 20%, the proportion of wine was 28%, and beer had become the prevailing beverage, constituting 52% of alcohol sales.

The shift from stronger to milder beverages seems to some extent to have changed drinking habits. The frequency of drinking has increased with more frequent use of beer and wine, but drinking to intoxication is still part of the drinking habits, as found in the most recent drinking habits survey carried out by the Public Health Institute of Iceland in 2004. The same survey indicates that differences in total consumption are highly related to age as young adults (aged 18–35) were found to drink most, people aged 35–60 drink less, while those aged 60+ drink much less with an increasing age. The proportion of alcohol drunk
by women was found to be 28% and the proportion drunk by men 72% (Lýðheilsustöð 2005a).

Ever since it was legalized, beer has added to the total alcohol sales, which were 5.52 litres per inhabitant (aged 15 and over) in 1989, decreased in the following years, but have increased rapidly in the last decade and were 6.71 litres in 2004. This increase reveals that recorded alcohol sales per inhabitants aged 15 and over have become higher than in Norway (6.22 litres) and even higher than the recorded alcohol sales in Sweden, 6.5 litres (Nordic alcohol statistics 1993–2004). When the unrecorded alcohol consumption has been added to these figures, the total alcohol consumption is estimated to be 10.4 litres in Sweden and 7.5 litres in Norway. A considerable increase in foreign travels among Icelanders, in the last decade and a half, has very likely increased the amount of duty-free alcohol brought into the country. Therefore, it seems reasonable to reckon that an increase in duty-free alcohol from the end of the 1980s to 2004 may have contributed to a rise in unrecorded alcohol. As there is no evidence of changes in smuggling or homemade alcoholic beverages in this period, a qualified guess of the amount of unrecorded alcohol consumption could be one to one and a half litres. If this is a valid estimate, the total alcohol consumption on the per capita level is on the same level as in Norway, or even a little higher for 2004.

**Crime Statistics**

Crime statistics were not available for the whole country until the National Commissioner of Police began publishing annual reports in 1999. Limited data for offences reported to the Police in Reykjavik are available for the period 1990 to 2004, but in 1998, the police changed their recording system, using wider criteria for recording crime. Therefore, information recorded before and after 1998 is not comparable for violent offences.

### Violent offences

In an extensive study of penal sanctions for homicide, robbery and assault from 1951 to 2000, it was found that 57% of the offenders sentenced for these violent offences had been under the influence of alcohol and in a few cases of other drugs (Magnússon & Ólafsdóttir 2003).

Figure 2 shows that according to the crime statistics there is an increase in violent offences from 1999 to 2000, followed by a decrease.

The crime statistics for 1999 to 2003 show no changes in the most serious violent offences such as homicides and major...
assaults, but the increase in 2000 is due to an increase in assaults. A majority of the violent incidents are committed in the city centre of Reykjavik where most of the nightlife takes place. From mid-1999 to mid-2001 an experiment in free opening hours for restaurants was carried out, and most of the pubs in the city centre were open all night. The only complete year with 24 hour opening was 2000. When this experiment was over, the opening hours were restricted again to 5.30 a.m. on Fridays and Saturdays (before 1999 it was 3 a.m. and 1 a.m. on weekdays). The increase in violent offences in 2000 can therefore very probably be explained by more drinking causing confrontations and fights when the pubs and bars had unrestricted serving-hours.

Unpublished data from the Department of Emergency Services at the Landspítali University Hospital further support this explanation because the number of injured persons seeking medical help peaked in 2000. Around one third of the visits to the clinic took place late on Saturday nights and early on Monday mornings, so a considerable part of the injuries were related to weekend drinking and partying. The data showed an increase from 1 201 to 1 377 persons seeking medical help in the period from 1999 to 2004, which is in contrast with the decline in violent offences registered by the police in the same period.

■ Drink driving

According to Icelandic legislation the maximum level of BAC (blood alcohol concentration) for drivers is set at 0.05%. The crime statistics include persons that the police suspected of drink driving, but data are not available on how many were sentenced for drink driving. Erratic driving, speeding, driving through red lights, and traffic accidents are the main circumstances where the police detect drink driving. In Reykjavik, drink-driving offences decreased from 1990 to 1995, followed by an increase that peaked in 2000, and then decreased again. Available data on drink driving for the entire country (Figure 3) follow the same pattern, and the peak in 2000 is very likely a consequence of the unrestricted serving-hours in Reykjavik.

Information has been gathered from the Road Traffic Directorate on injuries and

![Figure 3. Number of drink-driving incidents](image-url)

**Figure 3.** Number of drink-driving incidents

*Sources: 1) Ríkislögreglustjórin (National Commissioner of Police); 2) Árskýrslur Lögreglunnar í Reykjavík 1990-2005 (Annual reports of the Police in Reykjavík 1990-2005)*
Iceland

Figure 4. Number of injuries caused by drink driving per 100 000 inhabitants aged 15 and over
Source: Umferðarstofa (the Road Traffic Directorate)

Deaths caused by intoxicated drivers in road traffic (Figure 4). In the period from 1993 to 2003 a downward trend can be observed, but a new peak appears in 2004. Gender-specific data on intoxicated drivers who have caused injuries and deaths are available for 1993 to 1999. In this seven-year period, the number of intoxicated men who have caused casualties is stable, but there is a slight increase in the number of women.

Public intoxication
Public intoxication may be both an indicator of self-inflicted harm and of harm to others. Intoxicated behaviour in public spaces mainly relates to two groups, one of them being young adults who are on their way to a bar or on their way home after leaving a pub or bar. This behaviour may cause conflicts between drunken people leading to violence and casualties, but as nightlife in Reykjavik ends very late, intoxicated people may also disturb other citizens and keep them awake at night due to noise. The other group is people with lifelong alcohol problems that are either homeless or live in poor housing and who may disturb or challenge the public.

Public intoxication is not prohibited by law, but a person may be held responsible if he or she, while intoxicated, causes disturbance, danger, or outrage in public places, in motor vehicles, or on vessels. The level of tolerance appropriate to the surroundings is therefore decisive in whether the police decide to arrest a person for public disturbances due to drinking. For a long time, arrests for public intoxication in Reykjavik have been high compared with other cities. Control of intoxicated persons in public was more similar to the practice in Helsinki than in Copenhagen (Ólafsdóttir 2003; Ahlström-Laakso 1979). As a result of the increased treatment availability in Iceland in the late 1970s and the 1980s, arrests for public intoxication declined because the police was active in referring to treatment those persons who were repeatedly being arrested.

The police try to avoid arresting intoxicated people and prefer not to take them to custody, and police practice is to encourage drunken people to go home. However, the police have to take into custody those who are either boisterous or helpless after extensive drinking, and homeless people. Those persons who are arrested because of intoxication in the city centre are usually leaving or entering different bars and pubs.

Crime statistics from the Police in Reykjavik show a decrease in arrests and a
particularly rapid decrease from 1990 to 1994 (Figure 5). An exception to the general trend is seen in the year 2000, as there is an increase in arrests for public intoxication in Reykjavik. This peak is very likely related to the extended serving-hours in restaurants, leading to more intoxicated people going on pub crawls and moving around the city centre throughout the night.

**Experience of alcohol-related harm due to own drinking or someone else’s drinking**

In the alcohol surveys carried out in 1992, 2001 and 2004 questions have been asked about alcohol-related harms, but the questions have varied, which limits a comparison between surveys. The size of the samples was 999 in 1992, 3 836 in 2001 and 1 944 in 2004. In the survey collected in 1992, the sample was of people aged 20–69, whereas the age range was 18–75 in the surveys carried out in 2001 and 2004. The response rate was highest in 1992, 75%, but dropped to 64% in 2001 and 61% in 2004. Eight questions on alcohol-related harm were asked in the survey carried out in 2001, with the same questions repeated in 2004. Questions covered the consequences of intoxication, casualties, social pressure and seeking support. All but one of the questions refer to the year prior to

![Arrests for public intoxication](chart.png)

**Figure 5.** Arrests for public intoxication  
*Sources: 1) Ríkislögreglustjörinn (National Commissioner of Police); 2) Ársskýrslur Lögreglunnar í Reykjavík 1990–2005 (Annual reports of the Police in Reykjavik 1990–2005)*

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<tbody>
<tr>
<td>Continued drinking because of hangover</td>
<td>10.7</td>
<td>2.2</td>
<td>9.5</td>
<td>3.3</td>
</tr>
<tr>
<td>Not been able to stop drinking</td>
<td>15.8</td>
<td>7.0</td>
<td>13.1</td>
<td>6.2</td>
</tr>
<tr>
<td>Regretted something</td>
<td>32.3</td>
<td>24.0</td>
<td>21.6</td>
<td>17.0</td>
</tr>
<tr>
<td>Black-out</td>
<td>26.3</td>
<td>14.2</td>
<td>23.7</td>
<td>10.9</td>
</tr>
<tr>
<td>Not been able to do usual things</td>
<td>15.4</td>
<td>8.8</td>
<td>12.6</td>
<td>5.3</td>
</tr>
<tr>
<td>Injuries</td>
<td>3.0</td>
<td>1.7</td>
<td>6.2</td>
<td>3.1</td>
</tr>
<tr>
<td>Pressure from spouse to drink less or stop drinking</td>
<td>13.0</td>
<td>2.0</td>
<td>10.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Sought support</td>
<td>9.0</td>
<td>4.0</td>
<td>8.8</td>
<td>1.7</td>
</tr>
</tbody>
</table>

*Sources: 1) Data from a survey of Icelanders’ alcohol and drug use (Áfengis- og vímuvarnaráð 2001); 2) Data from a survey of Icelanders’ alcohol and drug use 2004 (Lýðheilsustöð 2005b)*
the survey, while the question on seeking support requested respondents to indicate their life-time prevalence.

In Table 1, it can be seen that the alcohol-related harms men experience are decreasing except for injuries, which are on the increase. The trend is similar for women but not as clear. As could be expected, about the same proportions of men have sought treatment in both years, whereas the proportion of women reporting that they have sought help is much lower in 2004 than in 2001. This may indicate a sample error or may be explained by a more skewed sample of respondents. In 2001, the response rate was 71%, but as low as 62% in 2004. In the table, seeking support from one’s family or seeking treatment is combined.

These results are in harmony with the decreasing proportion of the respondents who consider they have alcohol problems. In the surveys carried out in 1992 and 2001, the respondents were asked the following question: Do you have an alcohol problem? The proportion of men who answered positively decreased by half, but the proportion of women reporting they had an alcohol problem was twice as high (Table 2).

Table 2. Self-reported alcohol problem (%)

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<thead>
<tr>
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<th>1992&lt;sup&gt;1)&lt;/sup&gt;</th>
<th>2001&lt;sup&gt;1)&lt;/sup&gt;</th>
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<tbody>
<tr>
<td>Men</td>
<td>9.6</td>
<td>4.8</td>
</tr>
<tr>
<td>Women</td>
<td>1.1</td>
<td>2.8</td>
</tr>
</tbody>
</table>

Sources: 1) Data from a survey of Icelanders’ alcohol use in 1992 (Landspítali University Hospital); 2) Data from a survey of Icelanders’ alcohol and drug use (Áfengis- og vímuvarnarð 2001)

### Alcohol-related harms due to someone else’s drinking

Only one measurement is available on alcohol-related harms due to someone else’s drinking. In a survey carried out in 2001 a few questions were asked about whether the respondents had been disturbed by intoxicated persons or had been disturbed by noise and fear because of someone else’s drinking (Table 3). The responses refer to the year before the survey was carried out. Noise and trouble seem to accompany drinking, along with a tendency to disturb other people, but very few people reported they were injured. Women more often than men have been afraid of intoxicated persons, they have also more often been kept awake at night due to noise from intoxicated persons, but are more seldom injured than men are. In the survey report, it was described that younger people more often than older people had experienced alcohol-related harms from someone else’s drinking. A majority of those who reported

<table>
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<th>Men</th>
<th>Women</th>
</tr>
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<tbody>
<tr>
<td>Been disturbed by intoxicated persons in public places</td>
<td>26.5</td>
<td>24.6</td>
</tr>
<tr>
<td>Been disturbed by intoxicated persons in private homes</td>
<td>13.0</td>
<td>13.7</td>
</tr>
<tr>
<td>Been physically hurt by an intoxicated person</td>
<td>5.1</td>
<td>2.6</td>
</tr>
<tr>
<td>Been afraid of intoxicated persons on the street</td>
<td>9.6</td>
<td>21.2</td>
</tr>
<tr>
<td>Been kept awake at night due to noise from intoxicated persons</td>
<td>28.2</td>
<td>31.6</td>
</tr>
</tbody>
</table>

Source: Data from a survey of Icelanders’ alcohol and drug use (Áfengis- og vímuvarnarð 2001)
having been disturbed by intoxicated people in private homes had been disturbed by an acquaintance. More than half of those who had been injured reported that the perpetrator was someone they did not know.

**Child welfare**

Indicators for social harms caused by drinking on drinkers’ families are not recorded in statistics. This kind of indicators are not well developed and therefore the recording of social harms is very limited.

Child welfare statistics on reasons for interventions by child welfare authorities are available from 1996 to 2001. An increase in interventions because of substance abuse among parents may be observed in Figure 6 and was either a main or a contributory cause in 8–14% of all child welfare interventions in this period.

**Morbidity and mortality**

The disease classification system ICD-9 was replaced by ICD-10 in 1996. How this affected the statistics is not known.

- **Morbidity**

Data on hospital admissions are based on discharges from somatic hospitals and are only available for a five-year period (1999–2003), and for the following main diagnoses: alcoholic liver cirrhosis, alcoholic cardiomyopathy and alcoholic pancreatitis. Because the number of hospital admissions for each diagnosis is very low they have been combined in Figure 7. The figure shows a decline in the numbers of somatic hospital admissions that have an underlying alcohol-related diagnosis. This is due to a decrease in admissions for liver cirrhosis and alcoholic pancreatitis, whereas admissions for alcoholic cardiomyography are stable.

**Figure 6.** Number of interventions by child welfare authorities because of parents’ substance abuse


**Figure 7.** Number of somatic hospital admissions with underlying alcohol-related diagnoses per 100 000 inhabitants aged 15 and over

*Source: Landlæknisambættið (The Directorate for Health)*
**Mortality**

Numbers of deaths due to alcohol-related diseases are very small because of the small size of the Icelandic population (2–16 deaths per year). Therefore, changes in figures between years should be interpreted very carefully. However, the trend for alcohol-related deaths shows a downward trend from 1992 to 2003 (Figure 8). Deaths due to alcohol poisoning and alcohol dependence have decreased continuously whereas the number of deaths from liver cirrhosis has remained stable, but alcohol-related liver cirrhosis mortality was slightly higher in the latter part of the period.

Mortality due to liver cirrhosis has always been very low and has not followed the increase in the total consumption of alcohol. This has been explained by both nutritional and social factors as well as by drinking habits. As a fishing nation, Icelanders have a high consumption of fish, and the high intake of protein in food has been suggested to have a preventive effect. Furthermore, binge drinking rather than daily drinking has also characterized the drinking habits, causing more social than health-related harms. Social factors such as strong family ties, developed welfare, and a large alcoholism treatment system may have protected heavy drinkers from developing the most severe alcohol-related harms.

An even more possible explanatory factor for the low cirrhosis mortality is the large membership of Alcoholics Anonymous (AA).

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**Figure 8.** Alcohol-related deaths per 100,000 inhabitants aged 15 and over

*Source: Hagstofa Islands 2007 (Statistics Iceland)*

**Figure 9.** Alcohol consumption, liver cirrhosis mortality and AA membership

*Sources: 1) Hagstofa Islands 2007 (Statistics Iceland); Ólafsdóttir 2000; 2) AA-samtökín á Íslandi 2007 (AA Iceland)*
In a recent study, Mann et al. (2005) examined alcohol consumption levels, AA membership rates, and cirrhosis mortality rates in Ontario, Canada, from 1968 to 1989. Their results were consistent with previous research that cirrhosis mortality rates are positively associated with per capita alcohol consumption and negatively associated with AA membership rates (Mann et al. 1988; Holder & Parker 1992).

In the period under observation, 1992 to 2003, the increase in the number of AA meetings in Iceland corresponds to the rise in the total consumption of alcohol, whereas cirrhosis mortality remains stable (Figure 9). Treatment and AA activities are so large in scope that they very likely have an impact on alcohol-related harm in the population, particularly morbidity and mortality rates.

**Suicides and self-inflicted harms**

The figures for suicides and self-inflicted harms fluctuate among men, but are stable for women for the period 1990 to 2003, as can be seen in Figure 10. In general, there is a decline in suicide rates in the period with the exception of 2000, when an unusually high number of suicides was recorded. Out of 42 suicides among men, 20 were committed by young men aged 15–29 years. Because they are of the same age as those who frequently visit pubs and bars it cannot be completely ruled out that this sudden rise in suicides is a consequence of the extended opening hours of the pubs and bars in Reykjavík. However, because the numbers for suicides are low, an increase in suicide in one particular year could possibly be a random fluctuation.

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**Admissions for alcoholism treatment**

Even though treatment facilities keep records of their own activities, the numbers of individuals admitted for treatment (treatment admissions) are not centrally recorded. All treatment facilities offer treatment for both misuse of alcohol and for misuse of other substances. Available data do not show which are the main diagnoses, alcohol disorders or other substance disorders. Treatment in Iceland is structured in three categories: detoxication and treatment, rehabilitation, and other services. In 2002, there were 204 beds per 100 000 inhabitants for detoxication, rehabilitation, and after-care homes (with a total of 93 actual hospital beds for detoxication, 233 beds for rehabilitation, and 126 beds in after-care homes) (Heilbrigðisráðuneytið 2005). In the same year, there were 2 589 admissions per 100 000 inhabitants. Even if the same person were counted more than
Iceland

once, the specialised services provided for substance abuse have been quite large in the period under investigation. Incidence rates as registered at the SÁÁ National Center of Addiction Medicine (the main and largest specialised treatment service for alcohol and substance disorders) have been relatively stable since they were established in 1977. At the end of 1985, 10% of men aged 40–49 and 3.6% of the adult population had been admitted for inpatient alcoholism treatment (Ólafsdóttir 2000). Twenty years later, in 2004, as many as 6.8% of the adult population had been admitted to the treatment facilities of the SÁÁ National Center of Addiction Medicine, 9.8% of men and 3.9% of women (SÁÁ National Center of Addiction Medicine 2005).

Summary and discussion

In the observed period (1990 to 2004) alcohol has become more available because of an increased number of alcohol outlets, an increase in the hours of sale, the possibility of credit card payments, and an increased number of licensed pubs and restaurants. Changed attitudes to alcohol and an increased interest in drinking along with a high purchasing power in the population have seen alcohol consumption increase substantially. Such a big increase in alcohol consumption could have been expected to lead to an increase in alcohol-related problems, but such a hypothesis cannot be confirmed.

This study has shown how selected indicators of social problems and health hazards have not developed in times of continuously increasing alcohol consumption. As very few data series on alcohol-related harms contain data for all of the last 15 years but only include information for a few years, or only contain data for Reykjavik, the picture of trends in alcohol-related harms is rather imperfect. Based upon the accessible data, the increase in alcohol consumption has not been followed by a similar rise in alcohol-related harms. Regarding alcohol-related offences the trend is downward, with the exception of the year 2000, when violent offences, drink driving and public intoxication peaked. This sudden increase can very probably be explained by the experiment in the licensing policy in Reykjavik, when pubs and bars in the city centre had unrestricted serving-hours. Therefore, this particular alcohol policy action disrupted an otherwise downward trend in alcohol-related offences. Possible reasons for the general trend of decreasing violence, alcohol-related traffic offences and injuries, as well as public intoxication are not obvious. It is well known that crime statistics are very sensitive to changes in police priority, but policing does not change suddenly, which may counteract such fluctuations. An increase in the number of injured persons seeking medical help late at night in the weekends may indicate an increase in violence, but also that people report less incidents to the police.

A comparison of survey data from 1992 and 2001 showed that fewer men but more women reported they had an alcohol problem. More recent data from surveys carried out in 2001 and 2004 indicate a decrease in self-reported alcohol-related harms. Less self-reported harm may be partly explained by methodological weaknesses, because the response rates of surveys have declined. Low response rates may affect the results because people
with alcohol-related problems may refrain from responding to surveys on drinking. An increase in women’s alcohol-related harms may, however, reflect substantial problems. This notion is supported by an increase in interventions by child welfare authorities due to the substance abuse of a parent. Even if these are vague indicators they both point in the same direction, that is towards increasing alcohol problems among women.

Morbidity and mortality measured as somatic hospital admissions and alcohol-related deaths display a clear downward trend. In general, morbidity and mortality data are based upon very low numbers in such a small population as the Icelandic, so random fluctuations may affect data series and give a false impression of changes. However, all indicators point in the same downward direction. A general decline in suicide rates was also found, but there was an unexpected rise in the year 2000. Trends in suicide rates seem to follow the same pattern as the other indicators of alcohol-related harms.

Progress in medical treatment for somatic alcohol-related harms can only partly explain the declining rates for alcohol-related morbidity and mortality. Another and probably a stronger impact factor is the fact that a relatively large proportion of the population has been admitted for treatment and regularly attends AA meetings. An extensive treatment of heavy-drinking middle-aged men followed by active AA membership may have protected them from developing liver cirrhosis and other alcohol-related diseases in older age. Because a high proportion of those who are at risk of developing alcohol-related diseases such as cirrhosis of the liver have decreased their drinking, it has very probably had an impact on the rates of alcohol-related harms at the population level.

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UNPUBLISHED SOURCES


Landlæknisembættið: Óbirt gögn (unpublished data from the Directorate for Health)

Trends in alcohol consumption and alcohol-related harms in Norway around the turn of the millennium

Introduction
Alcohol-related harms constitute the main concern and basis for alcohol policy. Alcohol-related harms cover a wide range of harmful consequences both in the health and in the social domain and are due to both the acute and chronic effects of drinking (Babor et al. 2003). At the population level we expect that the number of heavy-drinking episodes as well as the number of chronic heavy-drinking individuals are closely associated with the amount of alcohol-related harm in that population. Thus, if alcohol consumption in a population increases, we assume that the amount of risky drinking occasions and the number of high-risk drinkers also increases, and consequently that the amount of alcohol-related harms also increases. Such associations between changes in alcohol consumption and alcohol-related harms have been shown for some harm indicators (e.g., cirrhosis mortality (Ramstedt 2001; violent assaults (Skog & Bjørk 1988, Lenke 1990); and homicides

ABSTRACT
1. Rossow: Trends in alcohol consumption and alcohol-related harms in Norway around the turn of the millennium

AIMS
This study aims to examine whether the significant increase in alcohol consumption in Norway since 1993 is reflected in various alcohol-related harms over the same period.

DATA
The study draws on various register statistics and population sample surveys that provide mostly annual time series data on alcohol-related mortality, morbidity, crimes and other social harms.

RESULTS AND DISCUSSION
When examining a wide range of alcohol-related harms some—but not all—harm trends were found to follow the same increasing trend as alcohol consumption. The results are discussed with respect to data accuracy as well as more substantive possible explanations for a mismatch in trends in consumption and harms.

KEYWORDS
Alcohol, harms, population, trends.
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Norway (Rossow 2001). It is, however, not clear whether—or to what extent—a wide range of indicators of alcohol-related harms display a consistent picture in mirroring trends in alcohol consumption. In the present study a significant increase in alcohol consumption over a 12-year period was the point of departure for examining all obtainable indicators of alcohol-related harm over the same period so as to assess whether there are consistencies or discrepancies in these trends. Such an exercise has probably not been done previously in Norway, though Thorkild Thorsen’s monograph (1990) on alcohol consumption and alcohol-related harms in Denmark over a 100-year period provides a comprehensive example.

The present study is based on a collection of various types of data: registered alcohol sales; survey data on unregistered consumption and self-reported consumption among young people; death statistics; somatic hospital statistics; crime statistics; child welfare statistics and surveys in the adult population and among young people covering self-reported alcohol-related harms. Most of these data are annual series for the period 1994 to 2005/2006; however, survey data in the adult population cover only three data points: 1994, 1999 and 2004. The data have been collected from various sources; mortality statistics from Statistics Norway (2006); morbidity statistics were ordered for the purpose of this study from the Norwegian Patient Registry (2006); social harm statistics were collected from Statistics Norway (2006) and the survey data are part of series of surveys conducted by the Norwegian Institute for Alcohol and Drug Research (SI-RUS) annually (youth surveys) or every five years (adult population). Hence, several of the data series and survey data results presented in this study have not been presented previously.

**Trends in alcohol consumption**

In Norway statistics on registered sales of alcohol have been recorded since 1851, and over this one and a half centuries there have been huge variations in recorded sales (Statistics Norway 2007). We will in the following only consider the more recent period from the early 1990s and onwards. Registered sales of alcohol in Norway increased steadily during the period 1993–2005 (see Figure 1). In 1993 the total sales were 4.55 litres of pure alcohol per inhabitant (aged over 15), whereas in 2004 the sales were 6.22 litres, which implies a 37% increase in registered sales over the 12-year period. The sales statistics further show that the increase in alcohol sales is mainly due to the doubling in sales of wine (from 0.9 to 1.9 litres) and particularly so table wines, which constitute the vast majority of all wine sales in Norway. It is noteworthy that the increase in wine sales reflects a significant increase in sales of “bag-in-box” wine, which now constitutes half of the wine sales in Norway. The beer sales have been fairly stable during this period (increasing only from 2.8 to 3.0 litres), as have spirits sales (mostly around 1.0 litre per year, except for the past couple of years when the sales have increased to around 1.2 litres).

The unregistered consumption of alcohol (due to tax free and other travellers’ imports, smuggled alcohol and home production of wine and spirits) has been estimated on the basis of surveys in national samples of the adult population in 1994, 1999 and 2004 (Horverak et al. 2001;
The trends in unregistered consumption appear to differ from that of registered sales. In 1994 the estimated unregistered consumption was 1.8 litres of pure alcohol per adult inhabitant, and the corresponding figure was 1.9 litres for 1999 and 1.3 litres for 2004. Thus, when taking into account the unregistered consumption the estimated total consumption of alcohol was approximately 6.4 litres in 1994, whereas in 2004 the estimated total consumption was 7.5 litres of pure alcohol per adult inhabitant, which implies an increase of 17% in total consumption over the 12-year period from 1993 to 2004.

Analyses of the data from national surveys in the adult population in 1994, 1999 and 2004 for the purpose of this study indicate that the proportion of alcohol drunk by women has been fairly stable over this period, i.e. the proportion being 28%, 29% and 31% in the three survey years, respectively. Self-reported consumption has increased in all age groups, and no huge differences in trends across age groups have been noted. The survey data further indicate that the mean number of times per year of events of subjective intoxication has been quite stable from 1994 to 2004.

Data from annual surveys among 15–20-year-olds show an even more dramatic increase in alcohol consumption among young people than what is seen in the general population surveys. Figure 2 shows the trends in self-reported annual consumption in litres of pure alcohol per year.

As can be seen from Figure 2 the increase in consumption among young people is not at all due to an increase in wine consumption, as is the case with the general population, but rather among young people it is due to an increase in beer and

Figure 1. Trends in alcohol sales by beverage type and in total sales. Annual sales in litres of pure alcohol per inhabitant aged 15 and over.
Note: Data on alcohol sales were not recorded by the Central Bureau of Statistics in 1998.
Source: Statistics Norway, 2006a
spirits consumption as well as the introduction of alcopops on the Norwegian market in 1998.²

**Trends in mortality**

Although it typically takes many years of heavy drinking before death from alcoholic liver cirrhosis or alcohol dependence is likely to occur, the trends in mortality rates due to chronic heavy drinking do often reflect those of alcohol consumption. Most striking are probably historic examples of significant changes in alcohol consumption over relatively short periods during which there have also been significant changes in alcohol-related mortality. For instance, in Denmark alcohol consumption decreased by 77% from 1916 to 1918, and over the same 2-year period liver cirrhosis mortality decreased by 50% (Thorsen 1990). Correspondingly, we see that the significant reduction in alcohol consumption (28%) in Russia from 1984 to 1987 was accompanied by a reduction in liver cirrhosis mortality rates of the same magnitude (30%) (Nemtsov 1998).

Norwegian data on cause-specific mortality (based on underlying diagnoses) between 1993 and 2003 generally show rather stable or slightly decreasing trends in mortality rates for those causes of death that are often or mostly due to alcohol consumption. We can see that liver cirrhosis mortality rates as well as mortality rates for alcohol psychosis and alcohol dependence (combined) appear to be slightly decreasing for men and rather stable for women (see Figures 3 and 4). Thus, in sum we find that despite a rather significant increase in total alcohol consumption in Norway over the period from 1993 to 2004, similar trends were not found for cause-specific...
mortality rates, where an association with alcohol consumption might be expected.

**Trends in morbidity**

Data on in-patient hospital admissions in somatic hospitals for the period 1993 to 2004 were based on the following alcohol-related underlying diagnoses: alcohol psychosis, alcohol dependence, liver cirrhosis and alcohol intoxication (ICD-9 291, 303, 571, E860; ICD-10 F10, K70–73, X45, X65). These data were combined, as it was assumed that the shift from ICD-9 to ICD-10 in 1999 could have some impact on the comparability over time. A somewhat similar approach was taken by Hjern & Allebeck (2004) when assessing alcohol-related disorders based on both ICD-9 and
ICD-10 diagnoses. The Norwegian morbidity data show an increase in the number of somatic hospital admissions per 100 000 in the population over the second half of the period for both men and women (Figure 5).

Whereas Figure 5 shows that the rates of somatic hospital admissions with a broad range of underlying alcohol-related diagnoses increased by 29% from 1993 to 2004, Figure 6 shows that the rates of somatic hospital admissions with alcohol intoxication as underlying diagnosis increased by 52% over this 12-year period.

A more detailed description of the trends in alcohol-related morbidity (both from somatic and psychiatric hospitals) for the period 1999–2003 can be found in Pedersen (2004). Over this five-year period the number of somatic hospital admissions with underlying alcohol-related diagnoses increased by 17% (from 4 001 to 4 699), whereas the number of somatic
hospital admissions with both underlying and contributing alcohol-related diagnoses increased by 41% (from 8,015 to 11,307).

**Trends in social harms**

In the following description of trends in social harms a number of indicators have been chosen. These indicators are in part directly alcohol-related, such as public drunkenness offences and drink driving, whereas other indicators are social harms where alcohol is known to be an important factor, such as violent assaults, vagrancy and child abuse. The latter two indicators are particularly sensitive to resources, activities and priorities in the police and the child welfare system and therefore not presented here.

Figures 7 and 8 show increasing trends in the number of public drunkenness offences and the number of violent assaults, whereas the trend in drink driving appears

![Figure 7. Number of arrests for public drunkenness and number of violent assaults reported to the police per 100,000 inhabitants aged 15 and over, per year. Source: Statistics Norway 2006c](image_url)

![Figure 8. Drink-driving incidents reported by the police per 100,000 inhabitants aged 15 and over, per year. Source: Statistics Norway 2006d](image_url)
to display a slight increasing trend when disregarding the final year in the series.

**Trends in self-reported harms**

The Norwegian Institute for Alcohol and Drug Research (SIRUS) has provided survey data from national population samples for the years 1994, 1999 and 2004 that may provide some further evidence for trends in certain (mostly minor) alcohol-related harms. These comprise harms due to intoxicated behaviour, hangover symptoms and harms due to other people’s drinking. Table 1 presents the figures on these types of harm from these three surveys. As can be seen, there are no significant or unidirectional trends in these data. A few types of harm (having been in a scuffle or fight while intoxicated, having been away from work the day after drinking and having been kept awake because of other people’s drinking) appear to be more frequently reported over the period, whereas other self-reported harms (for instance regretting something you said at or did while intoxicated and having been scolded at or insulted by an intoxicated person) displayed a decreasing trend over the period, yet most of these harms displayed no unidirectional trend. It should be noted that the response rates in these surveys are around 50% (they have not been accurately assessed), which implies that heavy drinkers most probably are severely underrepresented in the surveys, and furthermore that the levels of harms may well be underestimates. There is, however, no reason to assume that the response rates may have affected the trends in self-reported harms to any significant extent.

| Table 1. Proportion of respondents reporting various alcohol-related harms (whether due to own drinking or someone else’s drinking). % |
|-------------------------------------------------|---|---|---|
| INTOXICATED BEHAVIOUR                           | 1994 | 1999 | 2004 |
| Regretted smth you said or did                  | 22.4 | 21.1 | 20.8 |
| Quarrelled with someone                         | 9.7  | 8.1  | 9.4  |
| Been in scuffle or fight                       | 2.5  | 3.0  | 3.3  |
| HANGOVER SYMPTOMS                              |   |   |   |
| Nervous or tense                               | 13.4 | 12.9 | 22.3 |
| Headache, nausea, etc.                         | 36.3 | 39.1 | 35.7 |
| Not been able to get up at usual time           | 22.6 | 19.3 | 19.5 |
| Been away from work the day after drinking     | n.a. | 1.8  | 2.3  |
| HARMs DUE TO OTHER PEOPLE’S DRINKING            |   |   |   |
| Been bothered by intoxicated persons in public places | 13.9 | 15.2 | 12.7 |
| Been bothered by intoxicated persons in private parties etc. | 5.5  | 7.5  | 5.5  |
| Been physically hurt by an intoxicated person  | 2.4  | 3.1  | 2.6  |
| Had clothes/other belongings destroyed by an intoxicated person | 4.2  | 4.8  | 4.6  |
| Been scolded at or insulted by an intoxicated person | 15.9 | 14.3 | 13.5 |
| Been afraid of intoxicated persons on the street | 14.4 | 12.2 | 10.2 |
| Been kept awake at night due to noise from intoxicated persons | 18.8 | 21.3 | 22.6 |

*Source: Norwegian Institute for Alcohol and Drug Research 2006b*
Data from SIRUS’ annual youth surveys among 15–20-year-olds show a tendency of increasing trends in the proportion of adolescents reporting having experienced alcohol-related fights and having experienced alcohol-related injuries during the previous 6 months in the latter part of the 12-year period from 1993 to 2004 (Figure 9).

**Summary and discussion**

There has been a significant increase in alcohol sales in Norway over the past 12 years. This has implied a significant increase also in estimated total consumption of alcohol, although the relative increase in total consumption has been less than that of alcohol sales, as unregistered consumption seems to have decreased in the latter part of the period. It is possible that the increase in alcohol sales to some extent may reflect an increase in the availability of alcohol (in terms of an increase in wine and liquor monopoly outlets; an increase in on-premise licences and use of ‘bag-in-box’ wine), yet it is also likely that the increase in sales reflects an increase in purchase power in the Norwegian population during this period.

As it is generally shown that an increase in total consumption tends to be followed by an increase in alcohol-related mortality and morbidity, it might be somewhat surprising that liver cirrhosis mortality as well as total alcohol-specific mortality appear to be slightly decreasing during a decade when total consumption was increasing. However, similar observations were made in Sweden for the same period by Holder et al. (2005), and they suggested that improvements in treatment of alcohol dependence, liver cirrhosis and other alcohol-related diseases could have compensated for or countered the impact of increased consumption on mortality risk.

![Figure 9. Trends in self-reported harms among 15–20-year-olds. Proportion of respondents who reported to have been in a fight due to own alcohol consumption during the past 6 months and proportion of respondents who reported to have been injured due to own alcohol consumption in the past 6 months. Source: Norwegian Institute for Alcohol and Drug Research 2006a](image-url)
among the heavy drinkers. It is not known whether the shift from ICD-9 to ICD-10 in 1999 as well as a decreasing trend in the use of autopsy may have any impact on the trends in alcohol-related mortality data.

The observed increase in alcohol-related morbidity (in terms of number of somatic hospital admissions) fits more neatly with an increase in total consumption. The shift from ICD-9 to ICD-10 in 1999 could be a possible explanation for the higher number of days in hospital in the latter part of the period; however, the increase in hospitalisation days with alcohol-related causes was most prominent from 2002 and onwards. It may, however, also be noted that during this period the total number of somatic hospital admissions in Norway increased by 26%, whereas the average duration of days in hospital per stay decreased by 25%.

Moreover, the trends in social harms that are often alcohol-related—such as arrests for public drunkenness and violent assaults—also displayed increasing trends, as would be expected in line with the increase in total consumption. Nevertheless, these trends should be interpreted with some caution; arrests for public drunkenness also depend on police activity and priorities, and trends in recorded violent assaults may be affected by various factors that are not alcohol-related, and hence the observed increase in these types of social harms is not necessarily entirely attributable to the increase in alcohol consumption.

Data on self-reported social harms—whether due to one’s own or someone else’s drinking—displayed a rather mixed picture in terms of both increasing and decreasing trends, depending on the type of harm. It may, however, be argued that these kinds of indicators of alcohol-related harms may be problematic when attempting to assess trends in alcohol-related damages. It is possible—or even likely—that when a society becomes wetter, the meaning of various alcohol-related consequences is somewhat altered, for instance that regretting something or quarrelling with someone while drinking is viewed differently in wetter times than in dryer times, and furthermore that social acceptance of other people’s behaviour while intoxicated increases when these behaviours are observed more frequently.

Finally, it is also possible that the observed recent increase in total consumption to a lesser extent than previously has been accompanied by an increase in various alcohol-related harms. The increase in total alcohol consumption in Norway over the past 12 years is mainly due to an increase in wine consumption. If this has implied that the increase in consumption is distributed over larger consumer groups and to a larger extent among people without drinking problems, and/or that the increase in consumption is mainly related to drinking with meals and in social contexts where the risk of social harms is low, it is probable that the increase in consumption is being accompanied to a lesser extent by health and social harms than has previously been found in the Norwegian population.

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NOTES

1) The drop in unregistered consumption in recent years is mostly due to a fall in consumption of smuggled spirits after a number of fatal poisonings attributed to methanol in smuggled spirits.

2) Until January 1st 2003 alcopops were only sold in wine monopoly outlets. After this date alcopops were also sold in grocery shops and thus became as available as beer.

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UNPUBLISHED SOURCES

Norwegian Institute for Alcohol and Drug Research (2006a): Unpublished data
Norwegian Institute for Alcohol and Drug Research (2006b): Partly unpublished data

Has the impact of population drinking on harm become weaker in Sweden?

An analysis of the development in alcohol consumption and alcohol-related harm in Sweden 1990–2005

Introduction
There is substantial evidence that per capita alcohol consumption and alcohol-related harm have been positively connected in Sweden during the post-war period. One illuminating example was the introduction of medium strength beer in grocery stores in 1965; per capita consumption increased by 25% in five years and alcohol-related mortality increased by 40% during the same period (CAN 2005). Perhaps the most convincing evidence comes from a wide range of studies based on time series analysis estimating how changes in per capita consumption have affected various forms of harms, e.g., liver cirrhosis mortality (Ramstedt 2001a; Norström 1987), fatal accidents (Skog 2001), suicide (Ramstedt 2001b; Norström 1995), homicide (Rossow 2001) and alcohol-specific mortality (Norström 2002). The findings reveal that a one-litre increase in per capita consumption has been associated with at least 10% higher mortality rates for these causes of deaths, and that the magnitude of the association is stronger in Sweden than in most other Western European countries.
Further, alcohol-related hospitalisations in somatic care and hospitalisations for liver cirrhosis and alcohol poisonings have increased among both men and women and a recent upward trend was found regarding reported drink-driving offences, alcohol-related traffic accidents and violent crimes.

**CONCLUSION**

Taking all indicators together suggests that alcohol-related harm in Sweden today has become higher compared with the situation before population drinking started to rise in the late 1990s, though not at the expected extent for all harms. A lower level of drinking in Sweden would most likely give rise to less alcohol-related problems among men and women.

**KEYWORDS**


(Norström 2002). Although most research has used alcohol-related mortality as a measure of alcohol-related harm, a similar analysis based on liver cirrhosis hospitalisations (Leifman & Romelsjö 1997) and police-reported assaults (Norström 1998) have also found a positive association.

There is some evidence suggesting that the association between overall alcohol consumption and harm may have become weaker in Sweden during the last ten years. Mainly due to a gradual increase in travellers’ allowances and extended availability at Systembolaget, alcohol consumption has increased by roughly two litres per capita since 1995 without leaving expected traces in some alcohol-related harms (Norström & Ramstedt 2006). In fact, when the actual development in several forms of alcohol-related mortality during 1994–2002 was compared with predictions from this consumption increase, the observed mortality rates were lower than predicted in several cases (Andreasson et al. 2006).

The aim of this paper is to follow up on the findings of Andreasson et al. (2006) in two respects. First, to analyse the development in alcohol-related mortality after 2002 to see whether the rise in alcohol consumption that took place up to 2004 had any clear effect on the mortality development. Second, it seems important to broaden the analysis by considering the development also in other harm indicators than mortality, e.g., morbidity and adverse social consequences related to alcohol. An account will thus also be given for trends in alcohol-related hospitalisations, alcohol-related traffic injuries and arrests for drunkenness. Since there have been signs of a different and mostly worse development in alcohol-related harm for women (Andreasson et al. 2006), the data will as far as possible be separated by gender. Further, in order to be able to evaluate the recent development within a somewhat longer perspective, the study period will cover 1990–2005.

The structure of the paper is as follows. A brief description of the development in alcohol consumption and the various sources of consumption is first presented. The second part deals with developments in alcohol-related mortality, or more specifically, liver cirrhosis, suicide, accidents and homicide as well as an index consisting of all deaths with an alcohol diagnosis as the underlying or contributory cause.
The next section includes a description of various forms of alcohol-related hospitalisations, police-reported violent crimes, drink driving, alcohol-related traffic injuries and arrests for drunkenness. The paper ends with a discussion of how to interpret the development in alcohol-related harm on the basis of this data.

**Development in alcohol consumption**

Between 1990 and 1995, alcohol consumption per capita did not change much in Sweden (Figure 1). This is true for **recorded consumption**, i.e., sales at Systembolaget, in restaurants and in grocery stores, as well as for **estimated total consumption** including estimates of **unrecorded alcohol** (travellers’ imports, smuggling and homemade alcohol). In 1995, recorded consumption amounted to fully 6 litres per capita (aged 15 and over) and estimated total consumption to around 8 litres.

After 1995, however, alcohol consumption tended to increase somewhat and a particularly steep increase started around the year 2000. Estimated total alcohol consumption subsequently rose from 8 litres per capita in 1996 to 10.5 litres in 2004 and then declined slightly to 10.2 litres in 2005. Recorded consumption has also increased but not to the same extent, from 6 to 6.6 litres during the same period.

Table 1 shows the development for different beverages and the various sources from which alcohol is purchased in Sweden, according to estimations for 1996, 2000 and the more recent years 2003, 2004 and 2005. It appears that strong beer and wine account for practically all of the increase in alcohol consumption, whereas spirits actually declined somewhat. Travellers’ imports more than doubled (+1.2 litres) and smuggling was five times higher in 2005 than in 1996 (+0.8 litres). Thus, legally and illegally bought alcohol from...
Sweden

Table 1. Alcohol consumption in Sweden 1996–2005 expressed as litres of alcohol (100%) per inhabitant aged 15 and over by beverage type and divided into recorded and unrecorded sources

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<td>10,3</td>
<td>10,4</td>
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<td>3,9</td>
<td>1,6</td>
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</tr>
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<td>1,0</td>
<td>0,8</td>
</tr>
<tr>
<td>Homemade</td>
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<td>0,4</td>
<td>0,4</td>
<td>0,4</td>
<td>0,3</td>
<td>-0,4</td>
</tr>
</tbody>
</table>

Source: Boman & Ramstedt 2006

abroad is an important factor behind increasing alcohol consumption in Sweden. However, sales at Systembolaget and in restaurants have also contributed to the rise in consumption, with increases of about 25% each or in absolute terms 1.2 litres. Only two sources of alcohol show a decline, namely sales of beer in grocery stores and various forms of homemade alcohol, mainly homemade spirits.

Development in alcohol-related harm
  ■ Mortality and morbidity
  ■ Alcohol-related mortality 1990–2004
The development in fatal accidents, suicide, homicide and liver cirrhosis between 1990 and 2004 are presented for women in Figure 2 and for men in Figure 3. Most of these categories for alcohol-related deaths decreased between 1990 and 2000 in spite of the fairly stable level of alcohol consumption. Particularly for accidents but also for liver cirrhosis deaths this decline came to an end in the latter part of the 1990s when consumption started to increase and there are signs of increasing mortality. For instance, a comparison of cirrhosis mortality rates during 1997–98, i.e., just before the increase in population drinking and when the new mortality classification (ICD-10) had been implemented, and the two most recent years (2003–04) reveals a 10% increase for men and a 20% increase for women. A more detailed examination of this data shows that cirrhosis deaths with explicit mention of alcohol (K70 in ICD-10) increased even more: 20% for men and 50% for women during the same period (data not shown).

For fatal accidents the corresponding increase amounts to 10% for women and 15% for men, using 2003 as the most re-
Sweden

cent observation (there is a peak in 2004 due to the tsunami). However, suicide rates continue to decline despite rising population drinking while homicide rates remain fairly stable.

A broader mortality index based on all deaths with an alcohol-specific diagnosis as an underlying or contributory cause (e.g., alcohol dependence, alcohol psychosis, alcohol poisoning and alcohol abuse in ICD-9) show a more stable development (Figure 4). For men, the weak long-term decreasing trend has halted around 2000, but there is no indication of higher mortality during recent years. For women there is a weak increase of on average 26% during the study period, but the rate in 2003–04 is only 7% higher than in 1997–98.

Although a regional analysis is beyond the scope of this paper, the development in southern Sweden is worth mentioning since this region has been especially

Figure 2. Female mortality in accidents, suicide, homicide and liver cirrhosis (age-standardised per 100 000), 1990–2004

Figure 3. Male mortality in accidents, suicide, homicide and liver cirrhosis (age-standardised per 100 000), 1990–2004

Figure 4. Alcohol-specific mortality 1990–2004 per 100 000 inhabitants aged 15 and over. Alcohol-specific diagnosis as underlying or contributory cause of death.
influenced by increasing travellers’ allowances and cross-border trade. It has previously been noted that alcohol-related mortality showed an upward trend up to 2002 among men and women in southern Sweden in contrast to other parts of Sweden (Ramstedt 2005a). This finding still holds although alcohol-related mortality as well as estimated total consumption in southern Sweden decreased somewhat in 2004 (Figure 5). Nevertheless, both alcohol-related mortality and estimated total consumption has become higher in southern Sweden than in Sweden on average since the late 1990s, and a more expected match between per capita consumption in Sweden and alcohol-related mortality is found in southern Sweden. (Figures on per capita consumption in southern Sweden are only available since 2001).

Alcohol-related hospitalisations 1990–2005

The development in various forms of alcohol-related mortality showed thus a mixed pattern for causes of death, gender and region. We now turn to the question of how trends in alcohol-related hospitalisations compare with these results. In other words we will present data on the number of patients being treated in hospital with an alcohol-related diagnosis, data that are recorded in the Swedish Hospital Discharge Register, which covers all public, inpatient care in Sweden. The overall trend in alcohol-related hospitalisations, however, is very much affected by a substantial decline in the number of alcohol patients in psychiatric hospitals (Ramstedt 2005b). A reduction in the number of beds from 18 000 in 1987 to 5 000 in 2002 and a general increase in out-patient treatment are mentioned as important factors underlying this development. It may therefore be more accurate to focus on somatic hospitals and somatic diagnoses, where corresponding reductions have not taken place and where the possibility to receive out-patient treatment is likely to be lower.

The development in patients hospitalised with any alcohol-specific diagnosis as an underlying or contributory cause in a somatic hospital during 1990–2005 is presented in Figure 6. For both men and women, there is a clear upward trend since the year 2000, reaching the highest level of the whole study period in 2005. Increasing numbers of hospitalisations are also found for liver cirrhosis and alcohol poisonings (Figure 7). The number of patients who were hospitalised for cirrhosis increased between 1997/98 and 2004/05 by 10% for men and by 20% for women with corresponding increases for alcohol poisonings of 20% and 35%.
Adverse behavioural consequences of drinking

Drink driving

A change in police-reported drink-driving offences is often used as an indicator of the development in drink driving in Sweden (CAN 2005). However, since the changes are influenced by other factors than actual changes in drink driving, like drink-driving legislation and intensity of police monitoring, the trends must be interpreted with caution. For instance, the major reforms of the drink driving law in 1990 and 1994 are believed to have reduced actual drink driving (Norström & Andersson 1996; BRÅ 1998) and may explain the decline occurring between 1990 and 1998 (Figure 8), a period when alcohol consumption was stable. Further, the sharp increase in drink-driving offences...
in 1999–2000 is related to the inclusion of drugs in the drink-driving legislation in July 1999 and the fact that drug cases were not reported separately in the statistics until 2001 (Figure 8 excludes drug cases from 2001). However, several reports have suggested that the general increase after 1998 is most likely also related to an actual increase in drink driving and the increasing alcohol consumption (BRÅ 2004; SOU 2005). This conclusion is also supported by the development in police-reported traffic accidents in which someone is injured and the driver is suspected of having consumed alcohol (Figure 8). Thus, both indicators suggest that an increase in drink driving has taken place since 1997–98, although the magnitude of the rise cannot be established.

Criminal violence

That alcohol plays a significant role in violent behaviour has been shown in a large number of empirical studies, employing various perspectives and methods (e.g. Room & Rossow 2001).

For instance, a time series analysis on Swedish data suggests that alcohol accounts for about 50% of criminal violence in Sweden (Norström 1998). With the exception of the period 1993 to 1996, the development in criminal violence shows a relatively consistent increase between 1990 and 2005, i.e., both in times of stable and increasing per capita consumption (Figure 9). This reflects the fact that other factors are also important for explaining this development, e.g., police resources and the tendency to report violent crimes. Still, considering that the number of cases has increased by about 40% since the mid-nineties, it seems likely that alcohol-related violence actually has increased to some extent in association with the increase in alcohol consumption.

Arrests for drunkenness

The number of persons taken care of by the police because of drunkenness declined from 75 000 cases in 1990 to 45 000 in 2004. Figure 10 specifies the development for men and women and reveals that the reduction is only valid for men, whereas no change occurred for women. In effect, the fraction of cases accounted for by women increased from 7% to 11%. It is not likely that these data reflect a similar reduction in intoxication drinking among Swedish men but rather that the police were not giving priority to this kind of intervention.
Discussion

The starting point for this study was the thought-provoking observation in Sweden that an expected rise in alcohol-related mortality was not found during 1994–2002 despite a significant rise in per capita consumption (Andreasson et al. 2006). The present study has shown that adding two additional years did not change this conclusion; cirrhosis mortality, alcohol-specific mortality, suicide and homicide rates have not increased in accordance with predictions from previous experiences. In principal, the attempts to explain this divergence have focused on either plausible factors making changes in per capita consumption less harmful, or other factors (than alcohol) that may have dampened an increase in alcohol mortality (Andreasson et al. 2006; Norström & Ramstedt 2006). The increasing share of wine and beer, a higher fraction of female consumption and that travellers’ imports account for a high proportion of the increase in consumption are examples of the former. If a large fraction of the increase in per capita consumption is consumed by groups not belonging to high-risk groups in the sense of alcohol-related deaths, then this may explain some of the absent rise in mortality. Whether beer and wine drinkers and people bringing in alcohol from abroad actually have less adverse drinking patterns is not well substantiated and would thus be an important question for future studies.

Improvements in treatment of liver disease and new medicines that reduce the craving for alcohol among heavy drinkers are examples of factors that may have prevented some alcohol-related deaths. Another idea is that an increase in treatment may explain the unexpected mortality trend, an idea partly based on the recent development in Stockholm County (Romelsjö 2007). Further, the Swedish Government has invested large resources in local policies and prevention (e.g. 550 million SEK 2001–2005), and it cannot be excluded that this has counteracted an increase in alcohol-related harm. However, also these attempts to explain the absent mortality increase need more study in order to gain credibility (for a further discussion of this issue, see Rossow et al. in this issue).

An important finding in the present paper, however, is that several indicators of alcohol-related harm actually suggest a more expected development, i.e., a more negative picture. For instance, alcohol-related mortality in southern Sweden, the region that has been most exposed to increasing possibilities to buy cheap alcohol in Germany and Denmark, showed

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**Figure 10.** Number of men and women taken charge of by the police for drunkenness (LOB) per 100 000 inhabitants, 1990–2004
an increasing trend during the study period. Moreover, there were several signs of increasing alcohol mortality such as the weak increase in alcohol-specific mortality among women as well as a recent upward trend in fatal accidents and cirrhosis that concerned men as well. In fact, looking at the recent development in the subcategory alcohol-specific cirrhosis, quite substantial increases were revealed among both men and women, despite reports suggesting improvements in treating cirrhosis (Stokkeland et al. 2006).

Going beyond mortality data has revealed increasing alcohol-related harm both in the form of morbidity and adverse behavioural consequences of drinking. Alcohol-related hospitalisations in somatic care and hospitalisations due to liver cirrhosis and alcohol poisonings have increased after 2000 among both men and women, in correspondence with the most pronounced rise in per capita consumption. There were also recent upward trends in reported drink-driving offences, alcohol-related traffic accidents and reported violent crimes. Indeed, other factors than increasing population drinking may affect all these upward trends, which was illustrated by significant changes in the 1990s even though alcohol consumption was stable. However, taking all indicators together suggests that alcohol-related harm is higher in Sweden today compared with the situation before population drinking started to rise, though not to an expected extent for all harms. Thus, even if the impact of population drinking on harm would have become weaker, a main conclusion is that the higher level of drinking in Sweden has given rise to more alcohol-related problems among men and women.

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Explanations and implications of concurrent and diverging trends

Alcohol consumption and alcohol-related harm in the Nordic countries in 1990–2005

Introduction
It is generally found that the level of various alcohol-related harms tends to vary in accordance with population drinking over time, so that when total alcohol consumption goes up so does the harm level, and vice versa. This has been reported in numerous studies with respect to, for instance, chronic alcohol-related diseases, homicide and other violent crimes, suicide and fatal accidents (e.g. Norström 2002; Babor et al. 2003). However, it has been reported that in Sweden around the turn of the millennium, alcohol-related mortality did not increase despite a clear increase in alcohol consumption (Andreasson et al. 2006). This observation lead to a Nordic research project initiated and supported by NAD that examined if the connection between alcohol consumption and alcohol-related harm at the population level is changing in the Nordic countries. These analyses have been conducted by Erik sen and Grønbæk (2007) for Denmark, Mäkelä and Österberg (2007) for Finland, Ólafsdóttir (2007) for Iceland, Rossow (2007) for Norway,
and Ramstedt (2007a) for Sweden. On the basis of these studies the present article aims to explain and draw out the implications of the observed interrelationships between alcohol consumption and alcohol-related harm in the Nordic countries.

Over the past 10 to 15 years, per capita alcohol consumption has increased significantly in Finland (first a decrease, then an increase), Iceland (continuous increase since 1993) and Norway (steady increase). It has been stable in Sweden in the first half of the 1990s and has started to increase at some point in the latter half of the 1990s. Per capita alcohol consumption has been fairly stable in Denmark with a slight increase until the mid-1990s, after which it decreased to the same level as in 1990. It should be noted that the trends are pretty much the same whether we apply to sales figures of alcoholic beverages or estimates of total alcohol consumption, i.e. if unrecorded alcohol consumption is included. The most important exceptions in this respect are Sweden in the most recent years and Finland in 1995 and 2004. The level of alcohol consumption is, of course, significantly higher when total alcohol consumption estimates are based on both recorded and unrecorded alcohol consumption (see Ramstedt 2007b for a summary).

When we consider the trends in various harms that are closely associated with alcohol consumption, we find in the above-mentioned studies from the five Nordic countries that these harm trends in some instances follow trends in alcohol consumption whereas in others they do not (see Table 1 for a brief summary). We have seen over the past 15 years in Finland that the expected association between trends in consumption and harms has, for the most part, applied; i.e., most types of alcohol-related harm roughly followed the first decreasing and then increasing trend of per capita alcohol consumption (Mäkelä & Österberg 2007). Also the Danish data in the 1990s can be interpreted to show concurrence, as both consumption and harm were fairly stable. However, in the 2000s, there was an increase in hospitalisations in Denmark for alcohol dependence, alcohol psychosis and alcohol intoxication.

<table>
<thead>
<tr>
<th></th>
<th>Denmark</th>
<th>Finland</th>
<th>Iceland</th>
<th>Norway</th>
<th>Sweden</th>
</tr>
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<tr>
<td>Overall consumption</td>
<td>Stable</td>
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<td>Increasing</td>
<td>Increasing</td>
<td>Stable, increasing in recent years especially in the south</td>
</tr>
<tr>
<td>Mortality</td>
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<td>Increasing</td>
<td>Stable</td>
<td>Decreasing</td>
<td>Stable, increase in the south</td>
</tr>
<tr>
<td>Morbidity</td>
<td>Slightly increasing</td>
<td>Increasing</td>
<td>Decreasing</td>
<td>Increasing</td>
<td>Stable, increasing in recent years</td>
</tr>
<tr>
<td>Police data</td>
<td>Mixed</td>
<td>Decreasing, slightly increasing</td>
<td>Decreasing</td>
<td>Increasing</td>
<td>Mixed</td>
</tr>
<tr>
<td>Survey data</td>
<td>na</td>
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<td>Decreasing</td>
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<td>na</td>
</tr>
</tbody>
</table>

na = not available

Table 1. Crude descriptions of trends in alcohol consumption and various harm categories by country
Explanations and implications of concurrent and diverging trends without a corresponding increase in registered consumption (Eriksen & Grønbæk 2007).

In the other three Nordic countries, the trends of per capita alcohol consumption and alcohol-related harm at the national level only concurred partially or not at all. In Norway, consumption increased, and so did alcohol-related hospitalisations and alcohol-related social harms, whereas alcohol-related mortality did not increase but rather decreased (Rossow 2007). In Iceland, the significant increase in per capita alcohol consumption was not accompanied by an increase in harm rates; on the contrary, these were either relatively stable or even decreased (Ólafsdóttir 2007). Finally, the analysis of Swedish data revealed that at the national level alcohol-related mortality did not increase along with the increase in alcohol consumption at the end of the 1990s. However, there was a large increase in alcohol-related mortality in the southern parts of the country, where alcohol consumption had increased more than average, due to imports from Denmark and Germany. Furthermore, the clear decreasing trend in intentional and unintentional injury mortality ceased in 1999 and was followed by an increase in the succeeding years. A similar change in the trend occurred also for alcohol-related somatic hospitalisations at the turn of the century. Hence the Swedish harm trends cannot be interpreted to be discordant with alcohol consumption trends (Ramstedt 2007a).

The question then is what may be the reasons for the remaining observed “mismatches” in trends in alcohol consumption and alcohol-related harm at the population level, and what may be the implications of such diverging trends. We will in the following first consider two major kinds of explanations: those that relate to methodology and measurement and those that relate to the associations between total alcohol consumption and levels of alcohol-related harm in a society. We will then continue to discuss what the likely implications may be, both in terms of the choice of good harm indicators for monitoring alcohol-related harm, the comparability of consumption–harm associations across countries/cultures, and in terms of forecasting harm in the event of alcohol policy changes.

**Methodological considerations**

When monitoring trends in alcohol-related harm we would like these trends to be driven not by changes in measurement procedures or by the changing content or criteria of the series used. Indeed many (or most) harm indicators are measured with error. To the extent that the problem of accuracy or imprecise reporting is of limited magnitude and does not change over time, it has no implications for the monitoring of trends. In the following we will address the questions of how various alcohol-related harms are potentially affected by various measurement problems and how such measurement problems may possibly have contributed to observed mismatches in trends in consumption and harm in the various Nordic countries.

The most commonly used indicator in studies of alcohol consumption and harm is some type of cause-specific mortality, for instance alcohol dependence, liver cirrhosis and acute alcohol intoxication. These may be measured with imprecision (for instance in cases where several diseases were present or if the quality of cause-
of-death registers is not good) as well as with varying content (for instance due to changes in ICD codes).

These same concerns regarding accuracy and content also apply to trends in morbidity. In addition, the trends in morbidity may also be affected by changes in various features of the health services (coverage, patient’s payment, profitability of various treatment regimes and various disease categories, supply or shortage of hospital beds, etc.) as well as people’s willingness or propensity to seek health services for their alcohol-related diseases.

The indicators of alcohol-related social harm that are based on police records of crimes, such as reported assaults and public drunkenness, may well be affected by changes in routines for recording crimes as well as by police resources, activities and priorities. Trends in reported assaults may also change in response to altered willingness to report violent assaults to the police.

The vast majority of alcohol-related (acute) harms are probably not recorded in any official statistics, mainly because they are less severe and therefore in little or no need of medical treatment and/or criminal proceedings. Such harm can be monitored by a series of population surveys over time, but also these trends may well be hampered by various measurement problems over time. Changes in survey procedures (e.g., from personal interviews to phone interviews), sampling procedures, response rates and the constitution of the non-respondents may to some extent bias the time trends, even if the survey design, sampling strategies, questionnaire etc. are identical over time. Even if the surveys in a series are carried out using identi-cal methods, changes in measurements may occur that do not correspond to real changes (for example Mustonen et al. 2005). People’s perception or understanding of concepts/phrases/wordings that are used in the surveys may change over time, so that a question or response category may have a different meaning at one point in time compared to another. People’s willingness to report alcohol-related harm may also change over time, for instance in response to changes in social acceptance or condemnation of drunken behaviour (social desirability bias). Finally, the accuracy with which people report behaviours and harm may change systematically over time, for instance if survey interviews are conducted at a higher pace, and/or if an increasing exposure to survey participation implies that people care less about responding as accurately as possible.

Next, we consider whether there are reasons to believe that these kinds of methodological issues could explain the partial non-convergence in alcohol consumption and related harm trends in the Nordic countries.

The discrepancy in Denmark was mainly that hospitalisations for alcoholism and alcohol intoxication increased in the 2000s, while alcohol consumption and hospitalisations for other alcohol-related diseases did not. This probably points to a methodological explanation regarding treatment availability or, alternatively, that portions of heavy drinkers have increased their consumption even if per capita consumption has been stable. However, we have no specific information to support either of these hypotheses.

In Finland, the trends in alcohol consumption and alcohol-related harm coin-
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cided quite well. In the few cases where they did not, there were clear reasons for this. For example, the number of arrests for drunkenness had decreased over a long period due to a conscious decision by the police to raise the threshold of arrests. But after the increase in disturbances following the 1995 Alcohol Act and the public dissatisfaction with the situation, the decreasing trend stopped and the arrests have followed the development of per capita consumption.

For Iceland, there are no methodological factors known to us that could explain the mismatch in consumption and harm. Moreover, as harm rates have been relatively stable or decreased for nearly all indicators, it seems unlikely that these trends would all be significantly affected in the same downwards direction due to methodological factors.

In Norway there has over the years been a decreasing number of autopsies performed, and this as well as a somewhat decreasing standard of quality of the cause-of-death register may have led to less precision in the recorded number of alcohol-related deaths. It is, however, not clear whether this may have led to a downward biased trend in recorded alcohol-related deaths. Over the past 10–15 years there has been a general trend in Norway that average duration of hospital stays has decreased, whereas the overall number of hospital admissions has increased significantly. This also seems to be the case with respect to admissions with alcohol-related diagnoses. This may imply that the observed increase in alcohol-related hospitalisations to some extent is due to readmissions of the same cases, and not only a real increase in the number of disease cases. Also with respect to violent crimes we may have reasons to assume that the observed increasing trend in Norway, at least to some extent, may be due to systematic measurement error. Olaussen (1995) has discussed the impact of changes in police routines for recording criminal offences during the 1980s and early 1990s and suggested that this was a very likely explanation for a subsequent significant increase in the reported number of violent crimes.

As for trends in self-reported harm in Norway, these were generally fairly stable and hence not concurrent with the significant increase in consumption. The surveys, conducted by SIRUS, have applied the same design, survey questions, response categories, and data collection methods over time. It is not clear whether response rates in these surveys have decreased over the past 15 years, although it has been a trend in many countries that the response rates in population surveys have become lower over time. As heavy drinkers tend to be overrepresented among non-responders in surveys, it is likely that a decrease in response rate over time affects the comparability of the prevalence of alcohol-related harm over time. Moreover, it seems probable that over a period of increasing alcohol consumption, there may also have been an increase in tolerance of drunken behaviour. In a similar vein, Nordlund (forthcoming) found that in Norway over the period from the 1960s until now (2006) people’s perception of what it takes to “misuse alcohol” has changed significantly in parallel with an increase in total consumption and thus an increasingly wetter drinking culture. Hence, it is possible that the more or less stable trends in self-reported alcohol-related harm in
Norway to some extent may be affected by an increasing tolerance of or change in the conception of alcohol-related harm in a wetter society.

In Sweden, there was a long-term decreasing trend for mortality particularly from injuries and also from suicide and alcohol-specific causes when alcohol consumption was stable during the 1990s. This suggests that there are factors other than alcohol that have driven the trends. Improvements in hospital care that have reduced the number of fatalities, more mobile phones at accident scenes and more road safety measures are examples of such factors that could have contributed to this development. Against the background of this decreasing trend, the increase in the number of injury deaths and in male alcohol-specific deaths in the 2000s—which occurred shortly after the increase in alcohol consumption—must be considered substantial. It may be that even though the number of hospitalisation cases responded quickly to the increase in alcohol consumption, there is a time lag for mortality. This could be the case if the increase had taken place to a larger extent among non-heavy drinkers, among whom it would take time before the increased drinking would lead to fatal outcomes.

The above review of relevant methodological considerations for the observed “mismatches” in alcohol consumption and alcohol-related harm suggests that there are a number of measurement problems and other methodological issues that, at least in part, may explain these mismatches for some harm indicators in some countries. As we have seen, such methodological explanations are only suggestive and can in any case not fully account for the observed diverging trends in alcohol consumption and related harm. For instance, in Iceland, there is no clear indication of any measurement or other methodological problems that may explain the general diverging trends between consumption and harm. Hence, we should also consider substantive issues related to the consumption–harm association at the aggregate level when attempting to explain the observed diverging trends, particularly in Norway and Iceland but also in the other countries where applicable.

The alcohol–harm association
The often-observed close association between total alcohol consumption and alcohol-related harm at the population level can mainly be ascribed to two kinds of underlying mechanisms. First, when total consumption goes up, the number and proportion of heavy drinkers in that society have been observed to go up as well (Skog 1985a). As heavy drinkers are at much higher risk of experiencing alcohol-related harm, we expect—all other things being equal—an increase in the number of harms. Second, when total alcohol consumption increases, we assume that so does the number of heavy-drinking episodes, implying an increase in the number of drinking situations with a heightened risk of acute alcohol-related harm. We will in the following consider four possible conditions under which these mechanisms will be at work to a lesser extent and consequently the alcohol-harm association may be weaker than expected. Furthermore, we will discuss whether and how this may have contributed to the observed mismatches in the trends of alcohol consumption and harm in some Nordic countries.
We may first consider the possibility that the distribution of alcohol consumption, either in terms of consumption groups or in terms of demographic subgroups of the population, changes. The shape of the consumption distribution has seldom been documented to have changed, but this was the case in Sweden when the “Bratt system” was abolished in 1955 and the right tail of the consumption distribution became significantly larger when there were no longer individual quotas for spirits purchase (Norström 1987). Typically, populations have been observed to change their consumption in a synchronized manner. A central explanation of this collectiveness of drinking cultures is that the population of drinkers is a network of actors that are in close interaction with each other (Skog 1985b). However, the extent to which changes are collective depends on the closeness of ties in the network. If in the Nordic countries the populations become more heterogeneous, according to Ole-Jørgen Skog (Stenius 2006), the result could be that changes are somewhat less collective than before and that the shape of the consumption distribution could change more easily. However, this would hardly be an explanation for diverging trends in alcohol consumption and related harm in Iceland, where there is still a very homogeneous population. Changes in the homogeneity of the Nordic populations are slow and gradual, and not very likely to affect the connection between consumption and harm over just one or two decades.

Even a relatively small change in the consumption distribution may affect the association between total alcohol consumption and the kind of harm where the number of heavy drinkers is what matters to the rate of harm, with cirrhosis mortality being a prime example (Skog 1985a). It is unfortunate that changes in the proportion of heavy drinkers are very difficult to study empirically. This is because, firstly, the proportion of really heavy drinkers is small and the changes in the estimated proportions may hence be more due to random variation than a sign of a real change, and secondly, heavy drinkers are a population subgroup in which the response rates are lower than in the whole population on the average.

In more recent times it is also possible that a shift in the distribution of consumption across demographic groups has taken place. To the extent that these population subgroups are differentially at risk of alcohol-related harm, this might imply a weaker alcohol–harm association at the population level. It is, however, likely that in the event of such shifts, these would have evolved gradually over a longer time span than 10 to 15 years, and they would probably not have affected the consumption–harm association very differently across the Nordic countries. Thus, the somewhat mixed picture in concurrent and diverging trends in the Nordic countries would imply that the trends in harm indicators have not been affected to any large extent by such demographic shifts in the distribution of consumption. Furthermore, it could be hypothesized that the drinking pattern or—to be more precise—the extent to which alcohol consumption involves heavy-drinking episodes may have changed over time. It has been found that the aggregate level association between population drinking (as measured by alcohol sales) and accident mortality and homicide rates is stronger in countries where intoxication is a
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A significant feature of the drinking culture as opposed to countries where this is not so much the case (Norström 2002). Consequently, if drinking patterns had changed from a hazardous to a less hazardous form, this could have contributed to explaining some of the observed mismatches in trends in alcohol consumption and related harm. However, a study of trends in drinking patterns in 15 European countries from 1950 to 2000 (Simpura & Karlsson 2001) concluded (although on the basis of few studies of long trends) that the share of occasions of heavy-drinking episodes may change only very slowly and hence that a qualitative feature of drinking such as binge drinking (i.e., heavy episodic drinking) can be “typically very resistant against change, despite changes in living conditions, economy and even alcohol policies.” Thus, on these grounds it does not seem very likely that significant changes in drinking patterns have occurred over the past one or two decades in the Nordic countries.

We may then consider the possibility that a change in types of drinking occasions and drinking contexts has occurred over time, for instance that an increase in consumption is mainly due to an increase in the number of drinking occasions and/or drinking contexts where risk of harm is significantly less. In Norway, the increase in alcohol consumption over the past 15 years is mainly due to an increase in wine consumption, while in Iceland and Sweden it is due both to wine and beer consumption. In Finland both wine and cider consumption has contributed to the overall increase in alcohol consumption up until 2003, with spirits, wine and beer contributing thereafter. In Denmark wine consumption has increased, whereas beer consumption has decreased. If wine consumption to a larger extent occurs with meals and in social contexts where the risk of alcohol-related harm is significantly less, this may have implied that the increase in the number of drinking occasions has not been followed by a similar increase in at-risk occasions. So far, this remains a hypothesis to be tested empirically in all the Nordic countries.

Finally, the association between alcohol consumption and related harm may be altered as a result of intervening forces. This may be the case if heavy drinkers to an increasing extent are offered and benefit from treatment and if medical progress or improved social services imply a lowered risk of harm from heavy drinking. For instance, in Iceland a significant increase in the number of people treated for alcohol misuse has occurred concomitant with the significant increase in alcohol consumption (Ólafsdóttir 2007), which may have reduced the risk of premature death as well as the risk of various social harms in this group. Hence, this may be one plausible explanation for the diverging trends in per capita alcohol consumption and various alcohol-related harms in Iceland.

Implications
We have laid out various possible explanations and discussed to what extent these explanations seem plausible. As we have seen, the very mixed—and somewhat confusing—picture of trends in alcohol consumption and related harm in the Nordic countries may have various explanations. It seems probable that no single explanation nor set of explanations apply to all countries, and it seems that we, for now, do
not have sufficient information to suggest what the (most) likely explanations would be for this mixed picture. Thus, a significant challenge for further research in this area would be to more thoroughly pursue this issue both empirically and theoretically. In the mean time we may nevertheless discuss some of the possible implications of the reported trends in consumption and harm and their interrelatedness.

First, we may ask whether some harm indicators are better—or less—susceptible to changes in reliability or validity over time than others? Generally, we would assume that cause-specific mortality data in our part of the world would comprise fairly reliable and valid indicators of alcohol-related harm due to common criteria, complete cause-of-death registers etc., whereas morbidity data, records on various social harms, and survey data are probably more susceptible to various changes in measurements both over time and between countries. On the other hand, mortality data capture only a very small fraction of severe alcohol-related harm, and we may thus ask whether other harm indicators could be developed for monitoring and comparative purposes. For instance, developing combined indices for capturing alcohol-related harm may be a promising strategy in this respect.

Another relevant issue is what the implications are with respect to forecasting harm in the event of policy changes (see for instance Holder et al. 1995; Holder et al. 2005; Andreason et al. 2006). If we suspect a significant change in the consumption–harm association over time, it is questionable whether estimates based on time series that date well back in time are useful for projections of future changes in harm given a certain change in policy measures and expected changes in consumption levels (e.g. Andreason et al. 2006). This should be carefully considered, separately for each country and each indicator of harm, before such forecasts are carried out. However, our evaluation is that the basic, underlying connection between total alcohol consumption and different types of alcohol-related harm still exists in the Nordic countries: if total alcohol consumption increases, the best guess as to what happens to alcohol-related harms is that they also increase. Special circumstances may prevent this from happening (e.g. a change in the shape of the drinking distribution, or a change in drinking patterns), but these processes are so difficult to predict that one should not count on them.

Finally, we may also ask what implications our findings have for the comparability of consumption–harm association estimates, whether the comparison is across countries or jurisdictions, across various drinking cultures or across large time spans. In several recent projects such as the European Comparative Alcohol Study (ECAS) (Norström 2002), estimates of associations between consumption and various harm indicators have been compared across countries, states or provinces, and differences in estimates have mainly been attributed to differences in drinking patterns (e.g. Norström 2002). However, the conditions mentioned in the above discussion on possible factors that may affect the consumption–harm association—such as changes in the collectivity of the drinking culture, changes in types of drinking contexts, or changes in intervening factors such as treatment and medical progress—
in addition to aspects of drinking patterns could be taken into consideration in such comparative analyses. We might for instance imagine a comparative study of associations between alcohol consumption and some harm outcome, say violent assaults, across cultures or jurisdictions. If we observe significant differences in the magnitude of the associations, such differences could have several possible explanations; they could be due to differences in drinking patterns (extent of heavy-drinking occasions), but we might also want to consider whether they could be due to for instance differences in violence-prone drinking contexts or differences in preventive strategies to reduce aggression and violence.

Concluding remarks
By addressing both methodological issues as well as factors that may affect the consumption–harm association at the population level, we have attempted to explain the observed mixture of both concurrent and diverging trends in alcohol consumption and alcohol-related harm in the Nordic countries. We have also addressed some possible implications of the findings. Rather than reaching clear conclusions pertaining to how the somewhat mixed picture of trends in alcohol consumption and related harm in the Nordic countries may be explained, we would like to emphasize two points. First, although we have observed that trends in total alcohol consumption are not necessarily followed by similar trends in all indicators of alcohol-related harm, there are still in general good grounds for assuming a significant association between alcohol consumption and related harm at the population level, and hence that for instance a significant increase in total alcohol consumption is—all other things being equal—likely to be followed by an increase in various alcohol-related harms in that population. Second, there is a need for further empirical evidence addressing the many suggestions and hypotheses we have outlined here. This would be of significant importance with respect to theoretical aspects of population drinking and harm as well as with respect to informing alcohol policy.

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Explanations and implications of concurrent and diverging trends

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