European Comparative Alcohol Study – ECAS
Final report

ALCOHOL IN POSTWAR EUROPE: A DISCUSSION OF INDICATORS ON CONSUMPTION AND ALCOHOL-RELATED HARM

Håkan Leifman, Esa Österberg & Mats Ramstedt

Stockholm
2002

European Comparative Alcohol Study – ECAS

The project receives financial support from the European Commission (DG V), National Institute of Public Health (Sweden), Swedish Ministry of Health and Social Affairs, and National Research Centre for Welfare and Health, Stakes (Finland).

National Institute of Public Health
European Commission
2002

FOREWORD

Ola Arvidsson, PhD, administration officer of the ECAS study

The European Comparative Alcohol Study (ECAS) was launched in the year 1998. In the first part of the project, A comparative analysis of alcohol policy and its effects in the EU-States, the ECAS I project, the aim is to study alcohol policies, alcohol consumption, and alcohol-related harm within a comparative and longitudinal approach. The focus in the ECAS-study is on the time period 1950-1995 in the member states of the European Union as of 1998. However, Luxembourg was not included for methodological reasons, while Norway has been added to the set of study countries to broaden the representation of Northern Europe.

The first part of the ECAS project was officially finished in summer 2001, and the final report *Alcohol in post-war Europe - Consumption, drinking patterns, consequences and policy responses in 15 European countries* was delivered to the EU in July 2001.

The project is structured into four interrelated but yet distinct areas:
1. Analyses of alcohol control policies.
2. Analyses of trends in overall consumption.
3. Analyses of drinking patterns.
4. Analyses of alcohol-related harm

In the present study, ECAS II, the aims, in more specific terms are
- to estimate the prevalence of unrecorded alcohol consumption in a cross-sectional study,
- to estimate trends in unrecorded alcohol consumption in the member states, and
- to assess the reliability and validity of alcohol-related harm indicators

We also want to discuss possible methods to measure alcohol consumption and problems in measuring alcohol-related mortality and make suggestions about future procedures and the need for further research.

A Swedish-Finnish project group from the University of Stockholm and the Finnish National Research and Development Centre for Welfare and Health (Stakes) carries out the ECAS project. The Swedish National Institute of Public Health (NIPH) has the administrative responsibility.

It is our hope that the ECAS study will contribute to an increased attention and consideration in Europe for alcohol and alcohol related problems.

CONTENTS

EUROPEAN COMMISSION

Summary of EU project A Comparative Analysis of Alcohol Consumption and its Public Health Effects in the EU-states – ECAS II.

File No: SOC98 201381 05FO3 (98CVVF3-506-0)

The European Comparative Alcohol Study (ECAS) concerns alcohol policies, alcohol consumption and alcohol-related harm within a comparative and longitudinal approach.

The main purpose of ECAS II is to scrutinise the indicators that are or could be used in the alcohol field.

Total alcohol consumption is an important overall indicator of alcohol-related problems. As an indicator in the public health area in the EU and its member states, total alcohol consumption per capita should include or at least take into account the contribution of unrecorded alcohol consumption to the total alcohol consumption.

The report suggests that alcohol-related mortality, along with total consumption and drinking patterns measured in national population surveys, should be monitored closely in Europe on a regular basis.

1. INTRODUCTION

1.1. The content of the report

An increased concern about alcohol consumption and related problems within the European Union (EU) highlights the importance of determining as accurately as possible indicators of both total alcohol consumption, different dimensions of drinking patterns, and various alcohol-related problems. The main purpose of this report is to scrutinise the indicators that are or could be used in the alcohol field, with emphasis on their usefulness for cross-country comparisons.

This report is divided into two major parts. The first part deals with indicators of alcohol consumption and drinking patterns. The second part concentrates on indicators dealing with alcohol-related problems. The report is completed with a chapter spelling out conclusions and recommendations.

The first part of this report is primarily devoted to different problems associated with national statistics on per capita alcohol consumption, i.e. problems inherent in recording alcohol consumption, and to how to measure that part of alcohol consumption which is left outside the official alcohol consumption statistics and which is usually called unrecorded alcohol consumption. Also discussed is the use of national survey data as tools for measuring total alcohol consumption and drinking patterns.

Part two mainly concerns statistics on alcohol-related mortality, but also gives a shorter description of the comparability of indicators of other alcohol-related problems, namely data on drunk driving and data on self-reported experiences of alcohol problems obtained in general population surveys.

1.2. The European Comparative Alcohol Study

In 1997, the Swedish National Institute of Public Health (NIPH) and the Finnish National Research and Development Centre for Welfare and Health (Stakes) applied for grants to accomplish a large comparative project concerning the development of alcohol policy, alcohol consumption, drinking patterns and alcohol-related problems in the EU member states and Norway. The proposed study period was from 1950 to the late 1990s.

The application for the European Comparative Alcohol Study (ECAS) was submitted to the European Commission Directorate General 5. The application, which was managed by the Health Promotion Programme, was initially postponed. It was then divided into two parts, and two separate applications were submitted, the first to the Health Promotion Programme and the second to the new Health Monitoring Programme. In August 1998, the first part of the project, A comparative analysis of alcohol policy and its effects in the EU-States, the ECAS I project, could start its work. The second part, A comparative analysis of alcohol consumption and its public health effects in the EU-States, the ECAS II project, could start its work only in spring 1999.

The first part of the ECAS project was officially finished in summer 2001, and the final report was delivered to the EU in July 2001. The final report, *Alcohol in post-war Europe* -

Consumption, drinking patterns, consequences and policy responses in 15 European countries will be published in a printed version in autumn 2002 (Norström, 2002).

A large number of annexes to the final report of the ECAS I project has already been published, and in autumn 2002, Stakes will further publish a monograph including detailed descriptions of the developments in alcohol policies during the 1950-2000 period in all EU member states and Norway (Österberg & Karlsson, 2002). Stakes has already published a report on the economic aspects of alcohol consumption as well as a report on developments in drinking patterns in the ECAS countries (Leppänen, Sullström & Suoniemi, 2001; Simpura & Karlsson, 2001). Nordic Studies on Alcohol and Drugs has published two supplements concerning the ECAS project. The first came out in 1999 and the second in 2001[1]. Furthermore, eight articles dealing with alcohol-related mortality in the ECAS countries have been published in a supplement of Addiction in February 2001[2]. Most ECAS reports include

[1] Nordic Studies on Alcohol and Drugs, Volume 16, English Supplement, 1999 included the following articles related to ECAS I project:
- NORSTRÖM, T. (1999) European Comparative Alcohol Study – ECAS. Project presentation, pages 5-6.
- ROOM, R. (1999) The idea of alcohol policy, pages 7-20.
- SKOG, O.-J. (1999) Alcohol policy: Why and roughly how, pages 21-34.
- SIMPURA, J. (1999) Drinking patterns and alcohol policy, pages 35-45.
- REHM, J. (1999) Draining the ocean to prevent shark attacks?, pages 46-54.
- RAMSTEDT, M. (1999) Liver cirrhosis mortality in 15 European countries, pages 55-73.

Nordic Studies on Alcohol and Drugs, Volume 18, English Supplement, 2001 included the following articles related to ECAS I project:
- SIMPURA, J. (2001) Trends in drinking patterns and alcohol consumption: sociological and economic explanations and alcohol policy, pages 3-14.
- LEIFMAN, H. (2001) Homogenisation in alcohol consumption in the European Union, pages 15-30.
- SIMPURA, J. & KARLSSON, T. (2001) Trends in drinking patterns among adult population in 15 European countries, 1950 to 2000: a review, pages 31-53.
- LEIFMAN, H. (2001) Estimations of unrecorded alcohol consumption levels and trends in 14 European countries, pages 54-70.
- TROLLDAL, B. (2001) Sales of alcoholic beverages and the inhabitants' consumption in 15 European countries. A correction based on consumption during journeys abroad and tax-free purchases, pages 71-81.
- KARLSSON, T. & SIMPURA, J. (2001) Changes in living conditions and their links to alcohol consumption and drinking patterns in 16 European countries, 1950 to 2000, pages 82-99.
- LEPPÄNEN, K., SULLSTRÖM, R. & SUONIEMI, I. (2001) Effects of economic factors on alcohol consumption in fourteen European countries, pages 100-116.
- KARLSSON, T. & ÖSTERBERG, E. (2001) A scale of formal alcohol control policy in 15 European Countries, pages 117-131.

[2] Addiction, Volume 96 Supplement 1, February 2001 included the following articles related to ECAS I project:
- NORSTRÖM, T. & SKOG, O.-J. (2001) Alcohol and mortality: Methodological and analytical issues in aggregate analyses, pages 5-18.
- RAMSTEDT, M. (2001) Per capita alcohol consumption and liver cirrhosis mortality in 14 European countries, pages 19-34.
- SKOG, O.-J. (2001) Alcohol consumption and overall accident mortality in 14 European countries, pages 35-48.
- SKOG, O.-J. (2001) Alcohol consumption and mortality rates from traffic accidents, accidental falls, and other accidents in 14 European countries, pages 49-58.
- RAMSTEDT, M. (2001) Alcohol and suicide in 14 European countries, pages 59-76.
- ROSSOW, I. (2001) Alcohol and homicide – a cross-cultural comparison of the relationship in 14 European countries, pages 77-92.
- HEMSTRÖM, Ö. (2001) Per capita alcohol consumption and ischaemic heart disease mortality, pages 93-112
- NORSTRÖM, T. (2001) Per capita alcohol consumption and all-cause mortality in 14 European countries, pages 113-128.

Norway and all the other EU member states except Luxembourg, often in these reports called the ECAS countries.

Some of the studies summarised in the main report of the ECAS I project and annexed to the ECAS I project are of great relevance also for the second part of the ECAS project. Some of these studies will, therefore, be included in this ECAS II report.

1.3. Health Monitoring Programme

The ECAS II project is part of the Health Monitoring Programme (HMP) of the EU Directorate General Health & Consumer Protection Unit G3 Health promotion, health monitoring and injury prevention. The objective of the HMP is to contribute to the establishment of a Community health monitoring system, which would make it possible
- to measure health status, trends and determinants throughout the Community,
- to facilitate the planning, monitoring and evaluation of Community programmes and actions, and
- to provide EU member states with appropriate health information to facilitate making comparisons and supporting their national health policies.

The HMP has been divided into three pillars. Pillar A deals with the establishment of community health indicators. Pillar B deals with the development of a Community network for sharing health data, and Pillar C deals with the working out of methods and tools necessary for analyses and reports.

The ECAS II project included all three pillars of the HMP. The main aims of the ECAS II project were to find indicators of alcohol consumption and alcohol-related mortality, and to examine the validity and relevance of these indicators. The ECAS II project also dealt with the elaboration of methods for collecting and analysing data to allow description of the development of alcohol consumption and its influence on health in the EU member states.

In more specific terms, the aims the ECAS II project were
- to estimate the prevalence of unrecorded alcohol consumption in a cross-sectional study,
- to estimate trends in unrecorded alcohol consumption in the member states, and
- to assess the reliability and validity of alcohol-related harm indicators (Agreement No SOC 98 201381 05F03 (98CVVF3-506-0).

INDICATORS OF ALCOHOL CONSUMPTION

2. TOTAL ALCOHOL CONSUMPTION

Today there are two basic sources for figures assessing total alcohol consumption in a country. One is the official records of alcohol consumption, the other representative population survey data of alcohol consumption. These figures overlap partly, as survey figures are often adjusted on the basis of official alcohol consumption figures, and as figures for recorded alcohol consumption may be partly based on survey data. Both basic sources for alcohol consumption figures will be addressed in this part of the report.

The *International guide for monitoring alcohol consumption and related harm*, published by the World Health Organization (WHO) in 2000, groups problems associated with the figures of recorded per capita alcohol consumption into three categories: what they do not measure, what they cannot measure, and whether the data on which they are based are reliable.

The part of alcohol consumption that is left out of official alcohol consumption statistics is usually called unrecorded alcohol consumption. Today, however, this definition does not completely apply in certain countries. In Finland, for instance, officially published alcohol consumption statistics have begun to give a figure for total alcohol consumption including both recorded and unrecorded alcohol consumption (see Yearbook of alcohol and drug statistics, 2001, 54). As all alcohol consumed is recorded in this figure, the unrecorded alcohol consumption in this context refers more to the fact that a certain share of officially recorded total alcohol consumption is a crude, or very crude, estimate.

In most countries, however, recorded and unrecorded alcohol consumption are clearly two different entities. As recorded alcohol consumption is defined in somewhat different ways in different countries, the exact definition and content of unrecorded alcohol consumption will not be the same in all countries. However, in broad terms, unrecorded alcohol consumption can be divided into six groups.

Alcoholic beverages produced privately at home. In all ECAS countries unlimited home distilling is illegal, and in almost all ECAS countries illegal home distillation falls into the category of unrecorded alcohol consumption (Österberg & Karlsson, 2002). In countries where wine and beer production is concentrated in large enterprises, and where commercial wine and beer production is taxed, making wine or beer legally at home is not included in recorded alcohol consumption. In some wine-producing countries, however, even wine produced on wine farms for family consumption is included in recorded alcohol consumption. This is because wine consumption is not calculated on the basis of taxes, as there are no taxes on wine, but on the bases on total wine production. In countries where wine consumption is estimated on the basis of wine production, the whole production, whether sold outside the farms or consumed in the farms, is included in the recorded consumption figure.

Alcohol imported by travellers. In almost all countries, those alcoholic beverages travellers are carrying with them, either bought from special duty-free stores or ordinary stores in countries they have visited, fall into unrecorded alcohol consumption. In some countries this category also includes cross-border shopping, by which shopping is the only reason or at least the most important one for crossing the border. On the other hand these imports by travellers

are recorded as alcohol consumption in the countries where these beverages were originally bought.

Smuggled alcoholic beverages. As an illegal activity, smuggling clearly belongs to unrecorded alcohol consumption. Here, smuggling may be synonymous with large-scale organised criminal commercial activity, but it may also include the part of travellers' alcohol imports or cross-border shopping that exceeds the legal limits.

Surrogate alcohol. Especially in countries with high alcohol taxation and prices or low alcohol availability, people drink substances containing alcohol or surrogates, which officially are not produced for drinking purposes and which are not defined as alcoholic beverages. Although these substances are usually intended for industrial, technical or medical purposes, sometimes they can be drunk like common alcoholic beverages. For instance, pure medical spirits need only to be mixed with a larger amount of non-alcoholic liquid than ordinary vodka to get a drinkable cocktail. Sometimes, however, surrogate alcohol may be very dangerous, as for example with denaturated alcohol or technical alcohol.

Alcoholic beverages consumed during visits to other countries. Alcoholic beverages consumed by tourists may or may not be included in recorded alcohol consumption. The basic question here is: does the recorded alcohol consumption aim to measure alcohol consumed by the inhabitants of the country in question, or the amount of alcohol consumed inside the country in question? If the consumption of alcohol by the inhabitants of the country while abroad is added to official consumption figures, the amount of alcohol consumed by foreigners inside the country must be deducted. In some countries, specific groups of people spending large amounts of time outside their native country, such as sailors or soldiers, may present special problems for alcohol statistics (Nordlund & Österberg, 2000).

Beverages containing alcohol but not defined as alcoholic beverages. In many countries there are no official definitions of alcoholic beverages. In most countries, however, alcoholic beverages are taxed, and these regulations may therefore indirectly define the alcohol content or other limits between alcoholic and non-alcoholic beverages. For instance, when setting the minimum excise duty rates for alcoholic beverages the EU uses the limit of 0.5 per cent alcohol by volume for beer and 1.2 per cent ethyl alcohol by volume for other alcoholic beverages. If alcohol consumption is calculated on the basis of tax records, these limits constitute the definition of alcoholic beverages. On the other hand, according to the EU minimum excise duty regulations the member states may let beer up to 2.6 per cent alcohol by volume to be untaxed which then may affect the definition of beer in alcohol statistics. In some countries, alcoholic beverages are clearly defined in special Alcohol Acts. In Finland, for instance, the lower limit for an alcoholic beverage is 2.8 per cent alcohol by volume. Officially, all beverages containing less than 2.8 per cent alcohol by volume are treated as non-alcoholic beverages and consequently fall outside the official alcohol consumption statistics. In some cases, as in Finland in 1969, these kinds of regulations have affected the picture official statistics give of the development of total alcohol consumption (Österberg 1979).

Besides unrecorded alcohol consumption, one could in many cases also discuss misrecorded alcohol consumption. Many items mentioned above, such as alcoholic beverages bought in ordinary stores by foreigners, are or are not, depending on the statistical system, included in the official recorded consumption figures of the country where alcoholic beverages were bought but not in the country where the consumers live and where they were consumed. Additionally, alcohol meant for industrial, technical or medical purposes is usually recorded, but not as an item in alcohol consumption statistics. Beverages containing alcohol but not defined as alcoholic beverages are also recorded in most countries. They are, however, found among other non-alcoholic drinks instead of under the heading of alcoholic beverages.

Since statistics on alcohol consumption do not necessarily reflect real total alcohol consumption, and since total alcohol consumption figures by their nature are not person-specific, they cannot describe individual drinking habits or drinking patterns among population groups. Hence, published statistics of alcohol consumption do not usually include measures of drinking patterns such as abstinence rates, frequency of heavy or binge drinking, proportion of heavy consumers, proportion of alcohol consumed during meals, or differences in alcohol consumption among population groups within a country, e.g., age and gender differences in per-capita alcohol consumption.

Figures for recorded alcohol consumption can, however, provide some broad measures of drinking patterns. One measure is the proportion of the total recorded alcohol consumption that each main alcoholic beverage category accounts for, e.g. the percentage of beer, wine and distilled spirits in the total recorded alcohol consumption figures (see, e.g., Sulkunen, 1976; Simpura, 1995). Beverage preferences are, however, quite a crude measure of drinking habits, and not very good indicators of changes in drinking habits. For instance, beer and wine, as well as distilled spirits, can be used as intoxicants. If the figure for total alcohol consumption, either as such or by beverage categories, can be broken down into off- and on-premises sales or different regional levels, more indicators of drinking patterns are available.

The major tool for describing and monitoring drinking patterns is, however, national representative population surveys. National surveys are also important, and often necessary, in estimating various items of unrecorded alcohol consumption, such as consumption of home-made alcoholic beverages and purchases of duty-free or privately imported alcoholic beverages, as well as consumption of alcoholic beverages while abroad. Consumption of smuggled alcohol and drinking surrogates for alcoholic beverages can also be gauged in surveys.

3. RECORDED ALCOHOL CONSUMPTION

Like most statistical data, those on recorded alcohol consumption also suffer from validity problems. Recorded alcohol consumption as presented in most statistical publications is not equivalent to total alcohol consumption. This is also one reason why various statistical publications give somewhat different figures for total alcohol consumption (see, e.g., World drink trends, 2002; Hurst, Gregory & Gussman, 1997; Nordic alcohol statistics, 2001). Moreover, the proportion of recorded alcohol consumption to total alcohol consumption varies among countries (Leifman, 2001a). It may also vary within one country over time (Thorsen, 1988; Bygvrå & Hansen, 1997; Norström, 1998; Kühlhorn, 1999; Österberg, 2000; Bygvrå, 2000).

3.1. The collection of data on recorded alcohol consumption

For the purpose of continuously collecting data on alcohol consumption a practical way to define alcohol consumption in broad terms is as the amount of alcoholic beverages sold to consumers through legal retail channels within the country. The alternative, to define alcohol consumption as the amount of alcoholic beverages consumed by the country's inhabitants, would pose two problems. First, alcohol consumption abroad by the country's inhabitants, as well as foreigners' alcohol consumption in the country, must be estimated continuously. Second, alcohol from all sources other than the legal retail channels must be estimated continuously. However, even the practical definition of alcohol consumption causes problems when comparing alcohol consumption figures across different countries. This is also true in comparisons among the ECAS countries, since even they differ in their exact mode of collecting alcohol consumption data, not to mention the different ways they respond to the problem of unrecorded alcohol consumption.

It is important to scrutinise in detail how the ECAS countries collect their alcohol consumption statistics. For this purpose, we sent a request to the contact persons in each ECAS country and asked them to give a short description of the system of recording alcohol consumption in their country, what is the definition of alcoholic beverages, what is collected and how is it collected, and what alcohol contents are used to convert beverage litres to litres of pure alcohol? (See Appendix 1 for the answers to this request).

The country-specific descriptions revealed three basic models of collecting alcohol consumption data. One should note that one country can use different models when collecting consumption data for different beverage categories, and even collect several estimates for the same beverage category (see, e.g., Appendix 1, Germany).

The retail sale and wholesale model. This model is used especially in the Nordic countries that have a retail monopoly system for off-premises sale of most alcoholic beverages, i.e. Finland, Norway and Sweden (for details on the monopoly system, see Holder *et al*., 1998; Österberg & Karlsson, 2002). The system by which restaurants are retailing alcoholic beverages in these countries does not differ from the systems in other ECAS countries. Despite this, Finland, Norway and Sweden, besides collecting very detailed data on the actual off-premises sales of alcoholic retail monopolies, also collect very detailed data of the wholesale sales of alcoholic beverages to restaurants and to grocery stores (for details on the role of grocery stores in retailing alcoholic beverages, see Holder *et al*., 1998; Österberg & Karlsson, 2002). One explanation as to why these countries still today put more emphasis on

collecting alcohol consumption figures than do other ECAS countries is that because of social policy and public health considerations alcohol control has been very strict in these three Nordic countries in earlier decades is. However accurate this model may be, it should still be stressed that it records retail- and wholesale-level sales, not actual consumption by alcohol users. Therefore, especially in cases of private or business hoarding of alcoholic beverages because of, for instance, tax increases at the beginning of the year, this method may fail to give accurate estimates of the developments in alcohol consumption (see, e.g., Österberg, 1979, 6).

The tax records model. This model is widely applicable in all countries where alcoholic beverages are taxed, and is usually based on excise duties. Value-added taxes are also collected on alcoholic beverages, but they are seldom shown separately for alcoholic beverages and for other commodities, as alcoholic beverages are usually sold in the same places or premises as are food, groceries or other consumer goods. The tax records model dominates in most of the Central European ECAS countries (Appendix 1). In principle the model is very accurate, since the state has a clear interest in collecting the tax money. On the other hand, the taxpayers naturally have an incentive to declare smaller than actual sales or production figures (see, e.g., Karlsson & Österberg, 2002).

The supply-utilisation model. The estimates of alcohol consumption in this model are based on data for alcohol production and for foreign trade in alcoholic beverages. The model is based on four recorded or estimated items. Like a formula, it is composed of estimated or recorded alcohol production minus recorded or estimated exports of alcoholic beverages, plus recorded or estimated imports of alcoholic beverages, and finally corrected by the estimated or recorded change in stocks of alcoholic beverages. This model is used in different degrees of completeness especially in South European countries, partially because in these countries the most frequently used alcoholic beverage, wine, does not have any positive excise duty.

Within the ECAS countries the retail sale and wholesale model predominates, in slightly different versions, in Finland, Norway and Sweden. In Sweden, the retail sales of the monopoly stores represent nowadays some 75 per cent of recorded alcohol consumption. In Finland and Norway the corresponding share is about 40 per cent. Monopoly retail sales are a lower share of the total recorded alcohol consumption in Finland and Norway than in Sweden, because medium strength beer, with an alcohol content of about 4.6 per cent by volume, is sold in grocery stores in Finland and Norway, whereas all beer over 3.5 per cent alcohol by volume is sold only in monopoly retail stores in Sweden.

The question of the relative accuracy of the data based on retail sale and wholesale model, as well as of the possibility to break down the data into finer divisions, does not have a general answer. In Finland, the system of collecting alcohol sales data is comprehensive. The system gives detailed information on medium beer sales on the grocery store level, whereas in Sweden the sales of ‘people’s beer’, alcohol content between 2.25 and 3.5 per cent by volume, is not recorded on this level. In Sweden, therefore, only the figures on the monopoly stores' retail sales can be broken down to sales in smaller or larger regions, since these sales figures are available from each monopoly store. This information is, however, not always very accurate as the location where alcoholic beverages are bought is not necessarily the same location where they will be consumed.

In the tax records model the data on recorded alcohol consumption is based, as in Ireland, on Annual Revenue Commissioners’ Statistical Reports or their equivalents. The alcohol sales

figures are, therefore, based on the point at which excise duty is paid, which with regard to imported beverages is usually at the time that alcoholic beverages are entering the country. Taking Ireland as an example, excise duty on imported alcoholic beverages must be paid at the point of import, unless the beverages are placed in bonded warehouses. When they are released from the bonded warehouses, the excise duty must then be paid, and alcoholic beverages will thus be included in the consumption figures for that period. Excise duty on alcohol products manufactured in Ireland must also be paid before distribution of the product to retailers, unless it is placed in bonded warehouses.

In the tax records model, alcohol sales figures thus technically show the amount of alcohol for sale in the marketplace, and not the amount sold, as is the case with the retail sale model in countries with alcohol retail monopolies. However, in the tax records model there may also be a period during which the actual payment must be made, and therefore, the sales may be recorded after the alcoholic beverages in question have already been consumed. In principle, in wholesale-based records, the beverages are treated as consumed when they enter the retail sale outlet, while in the retail-based records, the beverages are treated as consumed when the consumers buy them in the retail shop. In the tax records model, depending on the time during which the excise duty must be actually paid to the tax collecting body and the turnover time of the stock of alcoholic beverages, the consumers may or may not have drunk the beverages reported as consumed.

The supply-utilisation model is the most difficult to generalise, since in different countries it may involve elements from the above-mentioned models but also some kind of survey method to arrive at the consumption figure. Moreover, in many countries using the supply-utilisation model, there has not been a genuine interest in knowing the figure for total alcohol consumption in earlier decades, as this figure did not have any real meaning (see, e.g., Appendix 1, France; see also Room, 1999). The interest with regard to alcohol statistics were mostly satisfied when knowing the consumption of beer, wines and distilled spirits separately.

Strictly speaking, the outputs from all three methods mentioned above are not figures on actual alcohol consumption. The actual point of measuring in relation to the act of alcohol consumption differs, however, among the methods. It is closest to actual consumption in the retail sales model, and furthest away in the supply-utilisation model. In all three models, it is technically incorrect to call the collected data consumption figures. It would be more accurate to call the collected figures within these models “sales figures”.

3.2. Problems with the recorded data

There are several problems concerning the data on recorded alcohol consumption. Perhaps the most serious is unrecorded alcohol consumption, which will be addressed in the next section. However, unrecorded alcohol consumption is not the only validity problem that deserves attention.

When describing the total alcohol consumption in different countries, the ECAS I project used, for the most part, figures published in the compilations of the Brewers Association of Canada (Leifman, 2001b; see Hurst, Gregory & Gussman, 1997). These figures are mainly based on alcohol consumption figures collected by Dutch distillers and published today in World Drink Trends (see, e.g., World drink trends, 2002). Both publications show mostly similar figures for consumption in litres of the product, but figures for the total alcohol

consumption measures in litres of pure alcohol are often quite different (see Österberg & Karlsson, 2002). The reason for this is that in converting the product litres into litres of pure alcohol, the two publications often use different figures for alcohol content in wine and beer. Total consumption figures in these two publications may also differ from those published in national statistics (see, e.g., Eisenbach-Stangl *et al*., 2000; Hope *et al*., 2002). This should not be the case, as the basic material for international publications comes from national sources (see World drink trends, 2002).

Another reason for different figures for total alcohol consumption in different publications is that they use different definitions of alcoholic beverages. For instance, during the period when beer was prohibited in Iceland, one could still find a figure for beer consumption in Iceland in the statistics collected by Dutch distillers. The explanation for this is that the low alcohol content beer sold in Iceland was not defined as an alcoholic beverage in the Icelandic alcohol legislation. Therefore, it was not included in total alcohol consumption in Icelandic alcohol statistics, whereas the Dutch distillers regarded it as an alcoholic beverage presumably because beer with similar alcohol content was considered an alcoholic beverage in a statistical context in many other European countries. Low alcohol-content beverages are not the only problem in this context. Beverages such as cider and perry, which are clearly alcoholic beverages by their alcohol content, are also sometimes treated differently in various publications because they do not quite fit into the traditional categorisation of alcoholic beverages into beer, wine or distilled beverages. Even the fourth excise duty category in the EU, intermediate beverages, does not apply very well to traditional way of keeping alcohol statistics. Wine coolers, different kinds of mixed drinks, and local versions of alcoholic beverages may also cause problems for statistical purposes (see, e.g., Appendix 1, Austria).

One sometimes faces problems in analysing changes in alcohol consumption over longer periods of time, because alcohol consumption statistics have been corrected on a national level and this information will never be included in international publications. Another problem with corrected figures is that they are sometimes also corrected backwards but only for a certain time period. Therefore, in published alcohol consumption statistics, one may find an increase in alcohol consumption in the mid-1970s. This increase, however, is not a real change in alcohol consumption, but rather a change in the way of recording alcohol consumption. This change may have been made in the mid-1980s and corrected in statistics backwards for one decade (see, e.g., Hope *et al*., 2002). Still, the reader may easily get the impression that the change in the statistical system in the mid-1980s did not affect alcohol consumption figures, and at the same time wonder what is the explanation behind the change in the level of alcohol consumption in the mid-1970s.

A related problem is that in many countries alcohol consumption shows, according to statistics, peculiar ups and downs, which generally cannot be interpreted in changes in the amount of alcohol consumption or changes in drinking habits or alcohol control measures (Leifman, 2001b). The supply-utilisation model is apt to produce these kinds of inaccurate results if changes in alcohol production are great and the method of estimating alcohol production is not very accurate. In real life this often concerns wine production in the Mediterranean countries, which may show great yearly variations due to changing weather conditions.

3.3. Conclusions with regard to recorded alcohol consumption

The ECAS I report confirmed the results of earlier studies, according to which changes in total alcohol consumption are closely related to changes in alcohol-related mortality, especially liver cirrhosis (Norström, 2002). Therefore, total alcohol consumption per capita as well as its structure in terms of beverage categories, i.e. the percentage of beer, wine and distilled spirits comprising total alcohol consumption, and the mode of sale, i.e. the percentage of off- and on-premises sales of total alcohol consumption , are important indicators in following developments in the public health area in the EU and its member states. Total alcohol consumption is mostly an overall indicator of alcohol-related problems, whereas its structure with regard to beverage categories and modes of sale are more related to drinking patterns.

4. UNRECORDED ALCOHOL CONSUMPTION

As pointed out in the previous section, since the actual way of measuring alcohol consumption differs among the EU member states, not only will the factual definition of recorded alcohol consumption differ somewhat, but what is defined as unrecorded alcohol consumption will also be somewhat different in various EU member states. The six groups of unrecorded alcohol mentioned earlier will be addressed below.

Within each group of unrecorded alcohol consumption, the methods available to assess the quantity and perhaps trends concerning this kind of unrecorded alcohol will be mentioned. Broadly speaking, the methods of estimating unrecorded alcohol consumption can be divided into direct and indirect methods. The most important direct method is to ask people about their habits of buying, importing and consuming unrecorded alcohol in national population surveys. These survey data can provide both prevalence estimates, e.g., the rate of consumers of home distilled spirits during the past 12 months, and estimates of the consumed quantities of different categories of unrecorded alcohol, e.g., per capita consumption of home distilled spirits in litres.

In estimating total alcohol consumption, unrecorded quantities should be added to the quantities of recorded alcohol consumption. Thus, in estimating the total alcohol consumption in a country, the point of departure is the country's recorded alcohol consumption. To this figure should be added the items of unrecorded alcohol consumption that are of relevance in that particular country.

Finland, Norway and Sweden have for many years estimated the extent of unrecorded alcohol consumption by means of national population surveys. The experiences gained from these three Nordic countries in their attempts to estimate unrecorded alcohol consumption are an important source in this chapter and in the recommendations for how to measure different categories of unrecorded alcohol.

The indirect method usually assesses trends in unrecorded alcohol consumption by studying the relationship between recorded alcohol consumption and various indicators of alcohol-related harm. In the ECAS project, trends in unrecorded alcohol consumption were addressed by applying time series analyses to the relationship between recorded alcohol consumption and alcohol-related mortality (Leifman, 2001a; see also Norström 1997; Norström 1998). This method and the results concerning the ECAS countries have been presented in detail in Leifman (2001a see Appendix 3]).

Besides the direct and indirect methods, there are also many other ways to estimate figures or trends for some items of unrecorded alcohol consumption, or to check figures or trends arrived at by the survey method. Amounts of travellers' alcohol imports and changes in them can, for instance, be checked by using statistics on the amount of travelling and legal amounts of duty-free sales for travellers, as well as the legal amounts of alcohol import per traveller and per trip. In some special cases, statistics on alcohol exports can also be used. The Danes, for instance, import privately a great deal of beer from Germany. Almost all of the beer they import from Germany is Danish beer exported to Germany by Danish brewers. In the same way, some 75 per cent of the beer that Finnish travellers import is Finnish beer bought from tax-free stores or in Estonia and Russia (Österberg, 2002). Therefore, especially changes in beer exports can at least in these cases be used as checks for the trends in travellers' beer imports revealed by other estimation methods.

In some cases, the amounts of alcoholic beverages produced at home can be estimated on the basis of raw materials sold for that purpose. In Finland, for instance, the amount of sahti, a traditional home-brewed ale, can be estimated on the basis of the amount of sahti malt sold. In principle, this method could be used more frequently, but it is often impossible as the sales of raw materials and ingredients are considered business secrets.

4.1. Alcoholic beverages produced privately at home

The item ‘alcoholic beverages produced privately at home’ includes legally or illegally home-made alcohol such as home-distilled spirits, home-brewed beer, and home-fermented wine from grapes, fruits or berries, and beer or wine made from ready made and marketed kits. Another way to define these alcoholic beverages would be to call them 'alcoholic beverages produced at home but not sold through any legal retail off- or on-premises outlets'. They thus do not enter the legal alcohol market.

In every country with unrecorded home production of alcoholic beverages, omission of these quantities will lead to underestimation of actual per capita alcohol consumption. However, the amount of unrecorded home production of alcoholic beverages varies among countries. In the Nordic countries and most likely in the United Kingdom, Ireland and some Central European countries, practically all home production of alcoholic beverages is unrecorded. In Finland, Norway and Sweden, home-distilled spirits have at times attracted a great deal of attention. In Norway in 1999, home-produced alcohol, almost exclusively wine and distilled spirits, made up 15 per cent of the total alcohol consumption. In Sweden this figure was about 6 per cent with nearly no home production of beer. In contrast to Norway and Sweden, in Finland home distilling is nowadays quite uncommon, and therefore the proportion of home-made alcohol in the total alcohol figure is clearly lower, in 1998 approximately 3 per cent (Nordlund & Österberg, 2000).

Home-produced alcoholic beverages are also one of the few unrecorded items that could possibly be of any substantial quantity in the Mediterranean countries. However, depending on how alcohol consumption and production is estimated, it is also possible that all home-production of wine is recorded. If the wine consumption estimate is based on the estimate of total wine production, it makes no difference for statistical purposes whether the produced wine is sold through market or consumed at home. In addition, it must be stressed that is not known whether those alcoholic beverages that are bought directly from the producer in Southern Europe are unrecorded. Consequently, more investigations are needed in order to improve our knowledge of what is actually counted and recorded as wine consumption and what is not, as well as how large a part of home-produced alcohol remains unrecorded.

In the ECAS project an alcohol survey was conducted with, among other things, questioned about private imports of alcohol, home-distilled spirits and home-produced wine, cider or beer. The ECAS survey data were collected in spring 2000, the survey being directed to random samples of the general population aged 18-64 in six EU member states: France, Italy, Germany, the United Kingdom, Finland and Sweden. In each of the countries approximately 1,000 telephone interviews were conducted (for results, see Leifman, 2001a-c).

It should be noted that the meaning and kind of home-distilled spirits probably differ among countries. In the Nordic countries it is connected with cheap vodka-like spirits consumed in

order to get drunk, and is particularly common among heavy drinkers (Kühlhorn, *et al*., 1999). This is not necessarily the case in Italy, for example, where home-made *Grappa* could be associated with entirely different values.

The best approach to measuring home-made alcohol is to start with survey questions aiming at measuring the proportion of the population that has produced different kinds of home-produced beverages during a defined time period, for instance the past 12 months. For example: Have you made your own wine during the past 12 months?. If the answer is affirmative, more questions could be posed concerning frequency and total quantity produced or quantity produced per occasion. Similar questions could also be repeated, but instead of asking about production, consumption of these beverages could be addressed. This is especially important for those alcoholic beverages for which home production is an illegal activity.

Since these questions should measure the prevalence of unrecorded home-produced alcoholic beverages, it is important to formulate them so as to make as clear as possible what is meant by unrecorded home production. In many countries, this is a minor problem since the term used by its very nature indicates the production is unrecorded, e.g. "moonshine" in the Nordic countries and the British Isles. In other cases, however, it is not at all certain that the term home-produced wine is synonymous with wine that is unrecorded.

4.2. Travellers' alcohol imports

Alcohol imported by travellers concerns alcoholic beverages bought in special duty-free stores or in ordinary stores abroad, and then brought back to one’s home country. Imports by travellers also include cross-border shopping. In trips between EU member states, the indicative import limits for private use are 10 litres of distilled spirits, 20 litres of intermediate products, 90 litres of wine and 110 litres of beer. These limits can be exceeded if it is obvious that the quantities are for private use. For all alcoholic beverages Finland and Sweden, and Denmark only for distilled spirits, still have lower quotas for private imports, but these will increase gradually until January 1, 2004 when private import limits will reach the same level as for the other EU member states (see, e.g., Österberg & Karlsson, 2002).

The volume of alcoholic beverages bought in duty-free outlets has diminished since the abolition in July 1999 of duty-free sales for trips between EU member states. However, duty-free sales still occur in trips between an EU member state and a country outside the EU, and on travels to a few places within the EU, for example the Canary Islands and Åland. In contrast to cross-border shopping, duty-free sales is not recorded in any country’s official alcohol statistics. Sales figures, however, are available in international duty-free statistics. These sales data in each EU member state, as well as in the rest of the world, are available for different product categories and expressed in US dollars (see Bia, 2000). Since these sales statistics also record purchases by travellers living in countries other than where the actual duty-free purchase occurred, these country-specific sales data do not reflect the purchases by inhabitants from that particular country. Therefore, these duty-free sales figures presented for each country, which can be converted into litres of alcohol, cannot be added to the recorded alcohol consumption for each country, at least not without making assumptions about differences in the inclination to buy duty-free among inhabitants of different countries or different regions, depending on such things as country differences in price levels and in frequency of travelling.

Such assumptions were made in one ECAS sub-study correcting the recorded alcohol consumption figures for 1995 in each ECAS country for consumption abroad and for duty-free purchases. First, the study estimated that duty-free sales corresponded to slightly more than 1 per cent of the total sales of alcoholic beverages within the EU in 1995 (Trolldal, 2001). After applying certain assumptions, the results showed that duty-free sales are concentrated to the high-price countries, i.e. the Nordic countries, Ireland and the United Kingdom. The duty-free purchases vary between approximately 0.3 per cent of the official sales in France to 8 per cent in Finland.

Alcoholic beverages in cross-border shopping are actually recorded but are not included in the official statistics of the consumer's home country. Thus, in a sense the term "misrecorded" is more appropriate than "unrecorded" for this kind of alcohol sales and consumption. Since duty-free sales were abolished in July 1999 for trips within the EU member states, a higher proportion, and probably the majority, of all imported alcohol by travellers in the EU member states consists is based on cross-border shopping.

The six-country ECAS-survey revealed large cross-country differences in the quantities of privately imported alcohol (Table 4.1). Since alcohol imports are motivated by economic reasons, it is no surprise to find that the high-price countries, Finland, Sweden and the United Kingdom, showed the highest quantities of privately imported alcohol, duty-free alcohol and/or alcohol bought in other shops abroad. The results imply that private imports alone may contribute to underestimation of the real total alcohol consumption in these countries by about 1 to 1.5 litres pure alcohol per capita per year. In Southern Europe or in the ECAS-survey in France and Italy, the volumes were negligible. The study by Trolldal of duty-free purchases in 1995 and consumption of alcohol during journeys abroad pointed in the same direction (Trolldal, 2001). His results indicated that duty-free purchases were higher than average in the high-priced ECAS countries, namely Denmark, Finland, Ireland, Norway, Sweden and the United Kingdom.

Table 4.1. *Volume of privately imported alcohol in litres of pure alcohol per respondent 18-64 years of age* [1]

	Finland n=1003	France n=1000	Germany n=1000	Italy n=1000	Sweden n=998	Uinted Kingdom n=984
Beer	0.3	0.0	0.0	0.0	0.2	0.1
Wine	0.2	0.0	0.3	0.0	0.2	0.6
Distilled spirits	0.4	0.1	0.1	0.0	0.3	0.4
Total	0.9	0.1	0.4	0.03	0.7	1.1
Total per importer	2.0	1.2	2.5	0.7	1.9	4.1
Adjusted upward by a factor of 1.25[2]						
Total	1.1	0.1	0.5	0.04	0.9	1.4
Total per importer	2.5	1.4	2.9	0.8	2.3	5.0

[1] The limit for privately imported alcohol is set at 10 litres for spirits, 90 litres for wine and 100 litres for beer. For respondents reporting higher volumes than these, only the volumes up to these limits are counted.
[2] The adjustment factor of 1.25 is based on Swedish findings that suggest underreporting of the number of trips by roughly 20 per cent (Kühlhorn, *et al*., 1999).

There are several other studies from these high-priced countries on both legal and illegal import of alcoholic beverages. In the United Kingdom, there has been an increase in cross-channel shopping and smuggling since the opening of the single market in 1993, and it was estimated in 1997-98 to be a good 0.5 litres of pure alcohol per capita per year (see, e.g., HM Customs and Excise, 1999; WSA, 1999; IAS, 1999). In Finland and Sweden, private import and small-scale as well as large-scale smuggling of alcoholic beverages have increased during the 1990s, especially with the opening of the borders following EU membership in 1995 (Kühlhorn, *et al*., 2000; Österberg, 2000).

The increased legal and illegal commerce in the high-price countries has led to strong external and internal pressures to reduce excise duties on alcoholic beverages. In Denmark, unrecorded alcohol consumption has increased since the mid-1980s, largely due to increased cross-border trade between Germany and Denmark (see Bygvrå, 2000; Leifman, 2001a; Österberg, 2002).

Since alcohol prices are much lower in many Central and South European countries, the incentives to import alcohol are less in these countries. In addition, the transfer of alcohol still occurring between these countries is likely to be more multilateral than that in the high-priced countries.

Assessment of the quantities of imported alcohol is thus of greater importance for countries where this is rather common, and where it contributes to a non-negligible part of the overall alcohol consumption. These countries are in particular the four Nordic countries and the United Kingdom. In all of them, the inclusion of estimates of the quantities of imported alcoholic beverages would improve estimates of the total alcohol consumption.

In the Nordic countries, several surveys have included questions about alcohol imports. In general these questions ask about the number of trips during a specific time period and the quantities brought in during the last trip or on average during all trips. Alternatively respondents are asked to indicate the amount of alcoholic beverages brought in during the past 12 months. Questions about the consumption of privately imported alcoholic beverages are usually avoided, since it is often impossible for the respondent to know whether the consumed beverages served during a dinner or party were imported or bought in the country.

4.3. Smuggled alcoholic beverages

Smuggled alcoholic beverages may or may not be included in the recorded statistics of the country in which they were originally produced or purchased. Smuggling, small-scale as well as large-scale, is also motivated by economic profits. During the last decade smuggling alcohol has increased in some of the high-priced ECAS countries and it is higher in these high-priced ECAS counties than in the low-priced ECAS countries.

It is difficult to estimate the extent of smuggling. As regards simple prevalence measures, the questions asked in Nordic surveys usually focus on purchasing habits, though they also cover consumption and buying of smuggled spirits. The reason is the same as for privately imported alcohol: it is not always possible to know whether alcoholic beverages served by others have been smuggled.

4.4. Alcoholic beverages consumed during visits to other countries.

In conformity with alcoholic beverages that have been imported, alcoholic beverages consumed during visits abroad are also recorded, though not in the country where the consumers live. In the study by Trolldal (2001), on the effects of travellers' consumption of alcoholic beverages abroad and during travels on the official recorded alcohol consumption, tourist consumption was estimated at 1.2 per cent of the total official recorded alcohol consumption for the ECAS countries. The correction for net consumption during trips abroad varied among countries. In the Mediterranean countries, the adjustments involved recorded consumption being lowered due to a tourist surplus, the argument being that foreign tourists spend more nights in the Mediterranean countries than tourists from those countries spend abroad. This decrease varied from 0.1 per cent to 2.5 per cent. In the Nordic countries, the Benelux countries, Germany and the United Kingdom, the recorded consumption was adjusted upward, by between 0.2 per cent and 3.6 per cent.

4.5. Surrogate alcohol

The reasons for consuming surrogate alcohol are mostly economic because alcohol in the form of industrial, technical or medical spirits are usually much cheaper than ordinary alcoholic beverages. This is especially the case in countries where ordinary alcoholic beverages are taxed highly. A second set of reasons may be related to the physical availability of legal or ordinary alcoholic beverages. If the physical availability of alcoholic beverages is for legal or other reasons very restricted, people may simply resort to the surrogate alcohol if they are willing to become intoxicated.

With regard to drinking alcohol produced for industrial, technical or medical use one usually has an impression of severely dependent alcoholics drinking whatever they are able to procure. This picture is usually quite accurate. One should not, however, forget that pharmacies also sell alcoholic products, even alcoholic beverages for medical purposes. For instance, in Finland during the prohibition period 1919-1932 pharmacies were places where physicians and veterinarians could obtain pure spirits, cognac and different types of fortified wines for drinking purposes, even if officially they were prescribed for medical purposes (Kallenautio, 1979).

Drinking surrogate alcohol as well as alcohol for industrial, technical and medical purposes has clearly decreased in all Nordic countries in the period after the Second World War. This can be explained by the increased availability of legal commercial alcoholic beverages, the general rise in the standard of living and a better social security system, giving even the severe alcoholics the possibility to resort to ordinary alcoholic beverages. However, there still may be epidemic increases in the use of surrogate alcohol from time to time (Nordlund & Österberg, 2000).

4.6. Beverages containing alcohol but not defined as alcoholic beverages

Beverages containing alcohol but not defined as alcoholic beverages may be or may not be seen as one item in unrecorded alcohol consumption. In most EU member states beer over 0.5 per cent and all other alcoholic beverages over 1.2 per cent alcohol by volume are defined as a tax object, and these regulations also at least indirectly define them as alcoholic beverages in

statistics. In some countries, as in Finland, alcoholic beverages are defined in a special Alcohol Act. In Finland, for instance, the lowest limit for an alcoholic beverage is 2.8 per cent alcohol by volume. Officially, all beverages containing alcohol less than 2.8 per cent by volume are treated as non-alcoholic beverages and, therefore, fall outside the official alcohol consumption statistics. In some cases, as in Finland in 1969, these kind of regulations have affected the picture official statistics give of the development of the total alcohol consumption (Österberg 1979). On the other hand, also these lower alcohol content malt beverages or beer are recorded, and they could be added to official recorded figures if that is seen as appropriate.

4.7.Conclusions with regard to unrecorded alcohol consumption

In the Mediterranean countries, the effects of imported quantities and tourist flows of alcohol are small. The net effect could actually be that the recorded alcohol consumption should be somewhat reduced in order to reach the total alcohol consumption. It depends on the quantities of unrecorded home-produced alcohol, which are not known. The ECAS survey, however, indicates that buying from producers is not an uncommon practice.

The indirect method used in the ECAS project for estimating the consumption of unrecorded alcohol gave no indication of increased unrecorded alcohol consumption in these countries. On the contrary, the indirect measure in France, Italy and Spain would indicate a slight decrease in unrecorded alcohol. In all likelihood, unrecorded alcohol is highest and, in addition, has increased in the high price countries, which in relative terms show rather low recorded consumption.

Taken together, this means that the differences among the ECAS countries in total alcohol consumption, recorded plus unrecorded, will be somewhat reduced, compared to differences seen when only recorded consumption was considered. Moreover, since the results from the indirect method indicated small changes over the past 20 years in the Mediterranean and most Central European countries, but increases in the Nordic countries and in the United Kingdom, the convergence trends in consumption levels among the ECAS countries appear somewhat stronger if the analyses are based on total alcohol consumption instead of on recorded alcohol consumption alone.

As an indicator in the public health area in the EU and its member states, total alcohol consumption per capita by beverage category and by the mode of distribution should include, or at least take into account, the contribution of unrecorded alcohol consumption to total alcohol consumption.

The ECAS project has presented estimates of the prevalence of unrecorded alcohol consumption in a cross-sectional perspective and estimated trends in unrecorded alcohol consumption in the EU member states (Leifman, 2001a; see also Österberg & Karlsson, 2002). These findings show that there is much to be done in this field, as basic research is lacking in many EU member states. The EU should, therefore, conduct a new study, based on the ECAS study, on the importance of unrecorded alcohol consumption in its member states. This study should first assess the importance of different unrecorded alcohol items in different member states, and produce a detailed plan for how the amount of these items could be measured. In the second phase, the EU should either conduct such a study in all of its member states or encourage its member states to conduct such studies individually.

5. NATIONAL POPULATION ALCOHOL SURVEYS

Recorded per capita alcohol consumption does not permit any detailed analyses of consumption and drinking patterns, nor is it possible to break down these consumption data into sub-populations defined, for example, by gender and age. For these purposes national representative population surveys are needed.

There have been surprisingly few comparative studies on differences in drinking patterns among Western European countries. To our knowledge only three have included samples of the general population in several countries representing *different* drinking cultures, with data collection taking place during the same time period. One was conducted in 1988 in each of the 12 member states of the European Communities (EC) by appending a few alcohol questions to the 29th Eurobarometer (see Hupkens *et al.*, 1993), another in 1990 (Readers Digest Eurodata; see, e.g., Osservatorio…, 1994; WHO, 1995) and the third in 1992, also as part of a Eurobarometer (see Cassidy, 1997). The rather few alcohol questions included in these studies have made it possible to study only a few aspects of drinking patterns across the countries: frequency of drinking, including abstinence, and in the 1988 survey also the context of drinking (consumption of alcohol the previous day at breakfast, lunch, dinner and other times). Some comparative approaches have used these survey data complemented by national data sources from countries not included in the surveys (e.g., Hanhinen, 1995; Simpura *et al*., 1993).

In the Nordic countries, two comparative analyses of drinking patterns have been made, one in 1978/79 and another in 1995/96 (Mäkelä, 1999; Hauge & Irgens-Jensen, 1986, 1987). In addition, one study compared drinking patterns in the Netherlands, Germany and Switzerland (Knibbe and Lemmens, 1997). Data on adolescent drinking in several countries have been collected by the European School Survey Project on Alcohol and Drugs (ESPAD) in 1995 and 1999, and by World Health Organization (WHO) as part of the study on Health Behaviour among School Children (HBSC) (e.g., 1993/94 and 1997/98).

A comprehensive review of existing national surveys on adults populations in each EU member state was conducted within the frame of ECAS part I (Simpura & Karlsson, 2001). The results showed that comparable data on drinking patterns over time are lacking. This makes it impossible to present any systematic all-European long-term trends in drinking patterns, for example as regards binge drinking, information on which is of crucial importance when considering the links between alcohol consumption, drinking patterns and alcohol-related harm. Most European survey data have been collected during the past 20 years, and primarily in the Nordic countries and the Netherlands.

5.1. The ECAS survey

Given the scarcity of alcohol survey data in most EU member states, the ECAS project conducted a special survey in six of them. The survey was conducted in countries with different drinking cultures. The traditional wine-drinking countries were represented by France and Italy, the beer-drinking countries by Germany (excluding former East Germany) and the United Kingdom, and the former spirits-drinking countries, but now beer-drinking countries, by Finland and Sweden. In each country, about 1,000 respondents, aged 18 to 64 years, were randomly selected.

The frequency of drinking and abstinence were only two of the several aspects of drinking habits that were studied. Results on mean consumption, average quantity consumed when drinking, heavy drinking occasions, self-perceived alcohol-related problems and informal control were also presented. The survey data were collected specifically for the purpose of cross-country comparisons. Therefore, not only were the questions made as similar as possible in all six countries, but there was also co-ordination of the mode of data collection (telephone interviews), the sampling procedure (random sampling of telephone numbers) and the time of data collection (spring 2000). Different market institutes in each of the six countries conducted the data collection. It is possible that the data quality mirrors what is typical of market research-oriented telephone surveys in these countries.

Below are some experiences gained during the course of this study, with a focus on circumstances that make it difficult to obtain comparable survey data.

Each country has its own tradition of sampling procedures and fieldwork, and it seems to be hard to achieve a uniform approach

To choose an individual respondent from each household, the 'birthday method' was used, meaning that the person in the household next in line to have a birthday should be interviewed regardless of whether that person was available when the first contact with the household was made. If that person was unavailable, the interviewer was not allowed to interview someone else in the household. We are not certain that this rule was followed completely in all six countries. Another difficult rule to establish at each institute was that a maximum of seven calls should be made to the same household before it could be dropped and the subject could be categorised as a non-response (not reachable). In addition, these calls should not be made too close to each other, but should be spread out in order to increase the likelihood of contacting the person to be interviewed.

The willingness of the population to participate seems to vary considerably across countries, resulting in a great variation in response rate

The response rates are shown in table 5.1. Two measures are presented, one based on the number of refusals (the participants divided by the number of participants plus refusals), the other on the number of participants in relation to the net sample. Since France did not report the number of inaccessible cases on a household level, but only the actual number of attempts, this latter non-response measure could not be calculated in this case.

As shown, the response rate based on the refusal rate varied considerably among the six countries. The highest response rate was found in Sweden (75 per cent), followed by Finland (60 per cent), and the lowest in the Uinted Kingdom and Germany (both 41 per cent). Also the number of participants in relation to the whole net-sample was lowest in Germany and the United Kingdom, and highest in Sweden, followed by Finland.

It should be mentioned that the different categories presented in the table are not fully comparable. In the category "not available, no answer" (in the net sample), for instance, neither the proportion that would belong to the target group population, nor whether this proportion is similar across the six countries, is known. One reason for this is differences

among countries in the sampling procedure for filtering out the non-relevant telephone numbers. As a matter of fact, it is difficult even within a country to find a standardized way of presenting response rates in telephone surveys. For instance, different agencies in Sweden show remarkably large differences in response rates in the different categories, which suggests that the meaning and handling of non-response categories differ among these agencies. This may be part of the explanation as to why response rates range between 50 and 75 per cent in Swedish telephone alcohol surveys conducted during the past few years. It also means it is rather difficult to say anything about a typical response rate in telephone surveys.

There may well be cultural differences in the degree to which people give honest responses, as judged from the great variation in the coverage rate (the self-reported estimates of volume of drinking in relation to recorded per capita consumption)

Practically all general population surveys conducted over the years have shown that the estimated volume of drinking derived from the survey is lower than the volume derived from sales data. Typically some 40 to 60 per cent of actual alcohol consumption can be measured by surveys (see, e.g., Rehm, 1998), although lower and higher rates have been reported.

In comparative studies, underreporting of alcohol consumption may pose an additional validity problem, since it is possible that the degree of underreporting varies across countries, despite the use of similar measurement techniques and standardised questions. That this is the case in the ECAS-survey is shown in table 5.2, which, along with the coverage rate and official sales statistics (recorded alcohol consumption) for each country, shows the country-specific estimated mean alcohol consumption for each alcoholic beverage and for the sum of these beverages. According to the recorded consumption figures per adult, the French drink the most (13.4 litres of pure alcohol in 1998), followed by the Germans (12.7), with the Swedes recording the lowest consumption (6.1) and the Finns the second lowest (8.7). The British and the Italians report levels slightly over 9 litres of pure alcohol. However, according to the survey estimates, the inhabitants of the United Kingdom drink considerably more than do inhabitants of any of the other countries. Germany shows the second lowest self-reported consumption. The French and the Finns report almost the same mean consumption. Thus, the survey estimates do not correspond with the officially recorded consumption.

It should be noted that the recorded alcohol consumption is far from a perfect estimate of the total alcohol consumption. First it does not, by definition, cover unrecorded alcohol, which varies in amount among the six countries. However, differences in unrecorded alcohol consumption are unlikely to explain more than a small portion of the differences in coverage rates. The coverage rates vary so greatly across the countries that it was decided that direct country comparisons should be made very cautiously, and as regards volume of drinking that they should be avoided.

There is no certain answer to the question of why there was such disagreement between survey estimates and recorded statistics across the countries. The most obvious disagreement concerns the figures from the United Kingdom, with a survey estimate of roughly 9 litres per capita -- 3.7 litres higher than Italy, with the second highest reported per capita consumption. The differences in response rates might explain part of these consumption differences, but as argued above, this is most likely only a small part. Biases in the sample for a particular country might be another possible explanation. On the other hand, the data we have collected for different socio-demographics (e.g., age and regional distribution) do not support that

contention. In addition, according to the survey results, beverage preferences tally with the recorded sales figures, especially in the United Kingdom. Furthermore, previous general population surveys including alcohol questions in the United Kingdom show remarkably high per capita estimates in terms of coverage rates (see Leifman, 2001d).

One potential factor in the differences in coverage rate, and in estimated mean consumption, is that the degree of underreporting varies among the respondents in the different countries. This probably has several explanations, among them cultural differences in drinking behaviour and in norms and perceptions of drinking. One cannot exclude the possibility that in Britain there is a higher desirability associated with reporting high levels of alcohol consumption. On the other hand, there is also the possibility that the British tend to be more honest when reporting their drinking habits.

5.2. Discussion

In an increasingly integrated Europe, more attention will be paid to similarities and differences in drinking habits and alcohol-related problems across countries. In that respect, more knowledge is needed about differences and similarities in drinking habits across Europe. One way to do this is by using the direct method of general population surveys. Despite shortcomings, it is certain that survey data will be collected again in the future, also in international comparative projects. Survey data are a necessary tool, and of invaluable help in monitoring drinking patterns over time within one country and cross-sectionally across countries. There is, however, a great need to improve the comparability of these surveys. But this is not always a matter of increased standardisation in measurement techniques. For example, to measure alcohol intake more accurately, it might be necessary to phrase the questions according to the drinking pattern in that country.

In following developments in public health, questions that monitor trends in total alcohol consumption should be complemented by indicators of drinking patterns. The most important indicators in this regard seem to be:

- the share of abstainers in the total population, among males and females, and among adolescents, both boys and girls,
- the share of heavy drinkers in the total population, and among males and females,
- the share of the total alcohol consumption consumed as an intoxicant, among males and females, and among adolescents, both boys and girls,
- the frequency of heavy drinking occasions (binge drinking) among men and women, and
- the share of total alcohol consumption consumed with meals, among males and females.

Heavy consumption, as well as binge drinking, is directly related to alcohol-related health problems in society. In this regard measuring them supplements total alcohol consumption as an indicator of alcohol-related problems. The developments in the share of heavy consumers and in binge drinking, as well as in the share of abstainers and alcohol consumed with meals, are important indicators when trying to understand the role of alcohol in the society and the possibilities to influence alcohol consumption and related problems.

Table 5.1. *Non-response by cause, for the six ECAS study countries.*

Households with telephone numbers	Finland	Sweden	Germany	United Kingdom	France	Italy
Gross sample: number of telephone numbers	2927	2435	3767	4586	-	3565
Not relevant (not in the net sample):					-	
Not in the target group 18-64 years of age	640[1]	425[2]	281	705	-	541
Not speaking the native language or speaking or learning difficulties	30	59	10	45	-	
Wrong number (disconnected, referring to another number), number does not exist	429	284	307[3]	274	-	230
Fax /modem/business number	14	35	-	373	-	-
No interview but appointment made for call back	-	-	10	101	-	95
Net sample	1814	1632	3159	3088	-	2699
Non-response:	811	595	2169	2153	-	-
Incomplete interviews (quit)	3	8	36	77	-	-
Not available, no answer, others	99[1]	244[2]	688	470	-	554
Answering machine	45	4	-	37	-	-
Refuse on principle (incl. not relevant topic)	501	210	474	679	518	1145
Refuse because of lack of time	163	129	961	789	339	
Completed interviews	1003	1037	1000	1036	1000	1000
Response rate, alt 1 (% completed interviews / net sample)	55.3	63.5	31.7	33.5	-	37.1
Response rate, alt 2 (% completed interviews / refusals + completed interviews)	60.2	75.4	41.1	41.4	53.9	46.6

[1] The number of those not in the target groups seems to be too high, and the number of non-available too small, but these are the numbers received from the Finnish field agency.

[2] The number of people not belonging to the target group were not separated from the non-available. Here it is assumed that the proportion of non-available in relation to the gross sample is the same as in an another general population study in the (age groups 16-75 years) conducted in Spring year 2000, i.e. approx. 10% (0.10*2435=244).

[3] Including a few answering machines

Table 5.2. *Consumption levels and the distribution of alcohol consumption according to the survey, official sales statistics and the coverage rates.*

		Survey-based estimates in litres of100% alcohol per respondent (aged 16-64)	Proportion of total reported consumption (in %)	Official statistics 1998/99 in litres of 100% per capita, aged 15+[1]	Proportion of total sales (in %)	Coverage rate (%) (survey estimate as percent of official statistics)
Finland (n=1004)	Beer	2.4	51	4.2	48	57
	Wine	0.8	17	2.0	23	40
	Spirits	1.0	21	2.3	26	43
	Total	4.7		8.7		54
Sweden (n=999)	Beer[2]	2.0	57	2.7	44	74
	Wine	0.9	26	2.1	34	43
	Spirits	0.5	14	1.3	21	38
	Total	3.5		6.1		57
Germany (n=1000)	Beer	1.8	46	7.3	57	25
	Wine	0.7	18	3.0	24	23
	Spirits	1.3	33	2.4	19	54
	Total	3.9		12.7		31
United Kingdom (n=984)	Beer	4.7	52	5.0	53	94
	Wine	2.5	28	2.2	23	88
	Spirits	1.5	17	1.7	18	88
	Total	9.0		9.4		96
France (n=1000)	Beer	1.5	31	2.2	16	68
	Wine	2.5	52	8.7	65	30
	Spirits	0.7	15	3.0	22	23
	Total	4.8		13.4		36
Italy (n=1000)	Beer	1.0	19	1.4	15	71
	Wine	3.9	74	6.7	74	58
	Spirits	0.4	8	0.7	8	57
	Total	5.3		9.1		58

[1] 1999: Finland, Sweden; 1998: France, Germany, Italy, United Kingdom
[2] Strong beer (>3.5% alcohol by volume) and class II beer (2.8-3.5% alcohol by volume)

INDICATORS OF ALCOHOL-RELATED PROBLEMS

6. ALCOHOL-RELATED MORTALITY

The only indicator of alcohol-related harm that meet reasonable standards of temporal and geographical comparability is mortality data. The main argument is that the recording of (alcohol-related) mortality is systematically applied according to rules set up by the World Health Organisation (WHO) and that the number of cases often are fairly high to reduce the impact of randomness. However, as will be evident from below, alcohol-related mortality are far from unproblematic, in particular if one chooses to conduct comparative studies on the basis on the more narrow group of deaths with explicit mention of alcohol, e.g. alcoholism, (alcohol dependence) alcohol psychosis and alcohol poisoning. The two following sections address this issue, section 6.1 by studying how well alcohol-specific deaths correspond to variations in overall consumption of alcohol, as compared to the classical indicator of harmful drinking, chronic diseases of the liver, and section 6.2 by focusing on certification and coding practises.

6.1. The relationship between overall consumption of alcohol and alcohol-specific deaths across EU-countries

Previous ECAS studies have analysed the relationship over time between per capita consumption and causes of death for which alcohol is an established risk factor: alcohol poisoning, alcoholism (alcohol dependence) and alcohol psychosis (AAA), liver cirrhosis, pancreatitis, accidents, suicide and homicide. These analyses were country-specific, i.e. time series within each country were analysed. The results of these analyses of the effect of a one-litre increase in consumption can be summarised as follows (for estimates, see Norström, *et al.*, 2001):
Increased alcohol consumption leads to:

- an increase in cirrhosis or AAA in every country
- an increase in accidents, homicides and total deaths in half of the countries
- an increase in suicides in the northern European countries
- no increase or decrease in heart disease mortality
- generally stronger effects in the northern European countries

By and large, the results from these analyses confirm the importance of per capita consumption; in each country, alcohol-related mortality (cirrhosis or AAA-mortality) responds to changes in total consumption. However, for most outcomes there is a geographical gradient in the alcohol effect, such that it is stronger in Northern and weakest in Southern Europe, suggesting a modifying impact of drinking culture and related drinking patterns. Thus, although it is well known that excessive drinking is implicated in a wide range of causes of deaths, the effect of alcohol on different outcomes, or the fraction of cases attributed to alcohol, differs across countries. A succinct expression of this is the link between alcohol and suicide; it is quite marked in Northern Europe, but weak or non-existent in Southern and Central Europe.

The outcome of the time series analyses carried out in the ECAS-project suggests that it is not reasonable to assume the same importance of alcohol for alcohol-related deaths across

different countries and drinking cultures. This might particularly be the case for causes of death that are strongly influenced by drinking patterns or that have several causal factors other than alcohol, e.g., accidents. Moreover, evidence of national variation in the role of alcohol (estimations of attributable fractions) in various causes of death is found in the epidemiological literature (see, e.g., WHO, 2000).

For these reasons, the comparison of alcohol-related mortality across the ECAS-countries was only based on causes of deaths for which alcohol is the major risk factor: the classical indicator of alcohol-related problems, liver cirrhosis (code 571 in ICD-9), and a group of deaths for which alcohol is explicitly mentioned as the cause of death. Since the code 571 is labelled 'chronic liver disease and cirrhosis' in ICD-9 (as opposed to only cirrhosis of liver in ICD-8), we will use the term liver disease, even if cirrhosis of liver still is the major category. Further, since many studies have shown that there is a great overlap between many of the causes of death with explicit mention of alcohol, these diagnoses were collapsed into one single measure, denoted AAA. Table 6.1 lists the causes of death included in this composite measure and their corresponding code in ICD-9. It should be mentioned that these alcohol-specific causes of death have never previously been compared across the ECAS-countries.

Table 6.1. Causes of death included in AAA-mortality

Causes of death	ICD-9 code
Alcohol dependence syndrome	303
Alcoholic psychosis	291
Alcohol poisoning	E860
Alcohol abuse	305.0
Alcoholic cardiomyopathy	425.5
Alcoholic gastritis	535.3
Alcoholic polyneuropathy	357.5

Whether these diagnoses are comparable may be tested by analysing how well they correspond to variations in overall consumption of alcohol. Both theoretical considerations and empirical findings suggest that the higher the level of alcohol consumption in a population, the higher the rate of alcohol-related mortality (Edwards *et al.*, 1994). This expectation is borne out in Figure 6.1, which shows the relationship between liver disease mortality among men and per capita alcohol consumption for 1987-1995. Countries with a high consumption level tend to have more male deaths by liver disease than do countries with low consumption, although some individual countries deviate from the general pattern.

Could it be the case that a country scoring below the expected rate on liver diseases compensates for this by scoring higher than expected on other alcohol-related diagnoses? If this were so, the inclusion of AAA mortality would provide a composite measure displaying a better match than liver diseases with per capita consumption.

To illuminate this question, we look at the corresponding figure in which AAA-mortality has been added to liver disease mortality. However, the result does not support this conjecture; as a matter of fact, the fit is poorer (as indicated by a reduction in R^2 from 0.54 to 0.22), and the deviating countries remain the same, only with larger discrepancies (Figure 6.2).

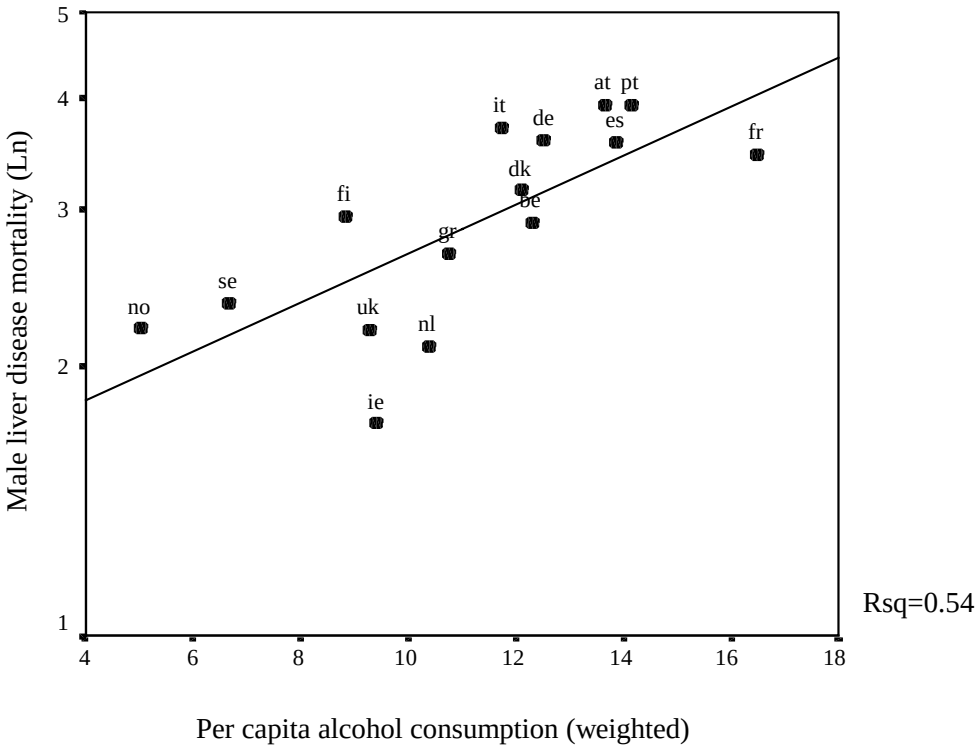

Figure 6.1. Relationship between per capita alcohol consumption and male liver disease mortality. Average for the period 1987-1995. (at=Austria, be=Belgium, de=Germany, dk=Denmark, es=Spain, fi=Finland, fr=France, gr=Greece, ie=Ireland, it=Italy, nl=The Netherlands, no=Norway, pt=Portugal, se=Sweden, uk=United kingdom).

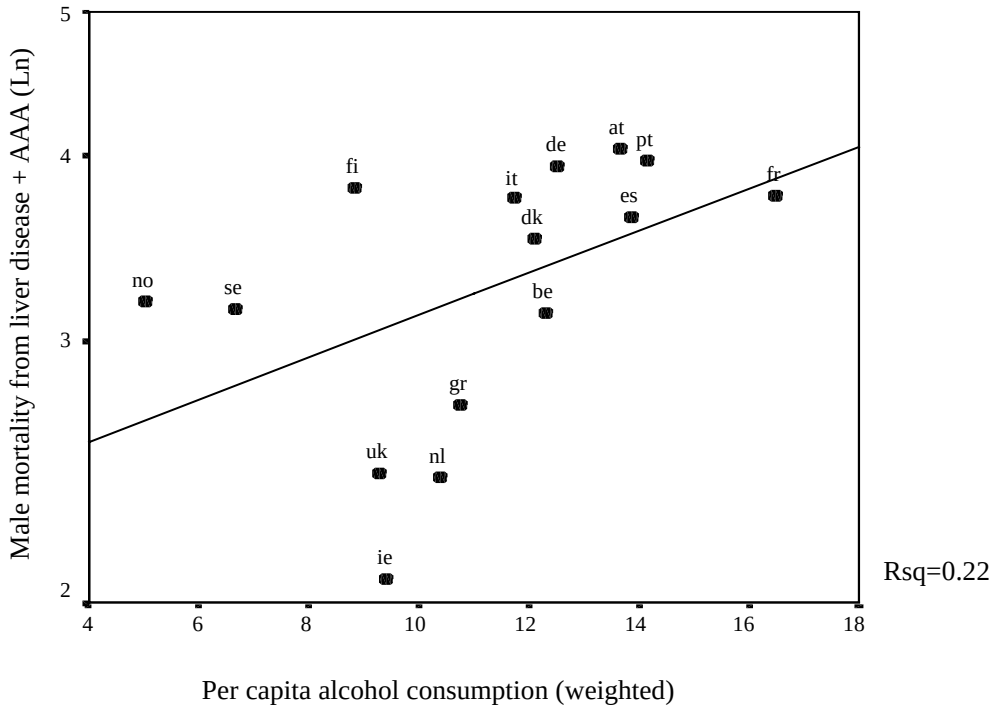

Figure 6.2. Relationship between per capita alcohol consumption and male liver disease mortality + AAA-mortality. Average for the period 1987-1995.

The explanation for this result becomes evident when we consider the paradox presented in Figure 6.3; the cross-national association between consumption and AAA-mortality is negative, i.e., the more alcohol consumed in a country, the lower the rates of deaths with explicit mention of alcohol. Thus, while variations in liver disease mortality seem to reflect variations in overall consumption, the cross-national variations in AAA-mortality appear to reflect something else.

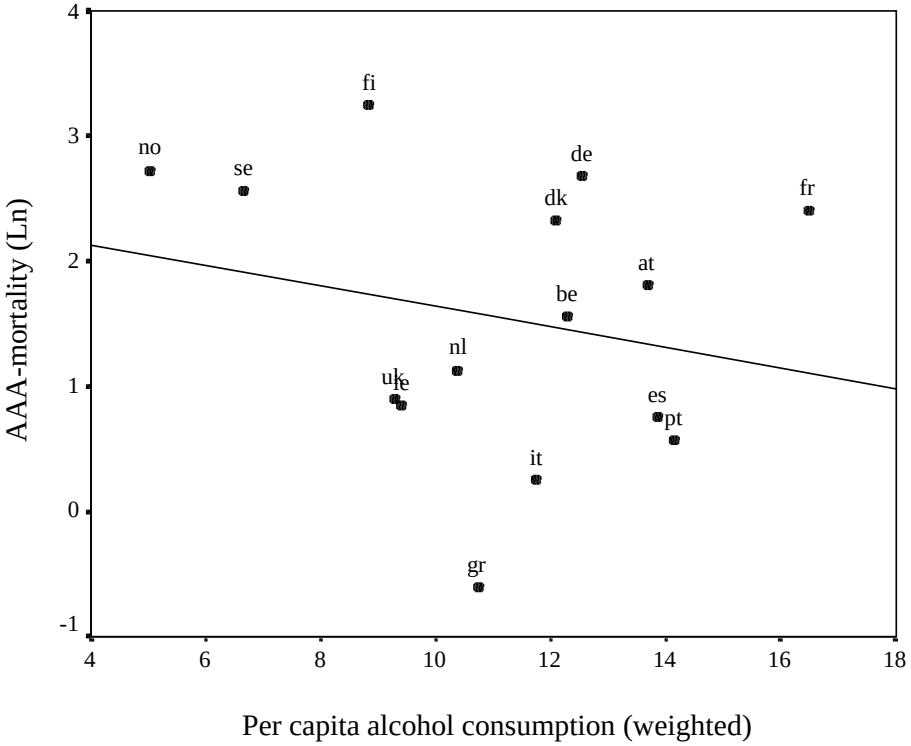

Figure 6.3. Relationship between per capita alcohol consumption and male AAA-mortality. Average for the period 1987-1995.

One possible explanation is cultural differences in recording practises, such that some drinking cultures have a higher tendency to attribute a death to alcohol abuse. If such differences exist, it is reasonable to assume that this pattern to some extent reflects differences across countries with regard to the general tendency to see alcohol as problematic. This idea is supported by the fact that the tendency to use explicitly alcohol-related diagnoses is highest in drinking cultures with long traditions of alcohol control, such as in Northern Europe, and lowest in Southern Europe where alcohol has not been regarded as a serious problem. Moreover, the existence of a cultural pattern in recording practises is supported by Figure 6.4, where the ECAS countries have been divided into three geographical groups with fairly homogenous drinking cultures. In fact, the expected positive relationship between per capita consumption and AAA-mortality is revealed in this graph.

Substantial cultural differences in recording practises across European countries have been revealed for non-controversial diagnoses such as diabetes (Jougla *et al*., 1993). Thus, it would not be surprising if controversial and sometimes vague diagnoses such as those related to

alcohol were also subject to great differences. The data presented here suggest that this is the case in different parts of Western Europe

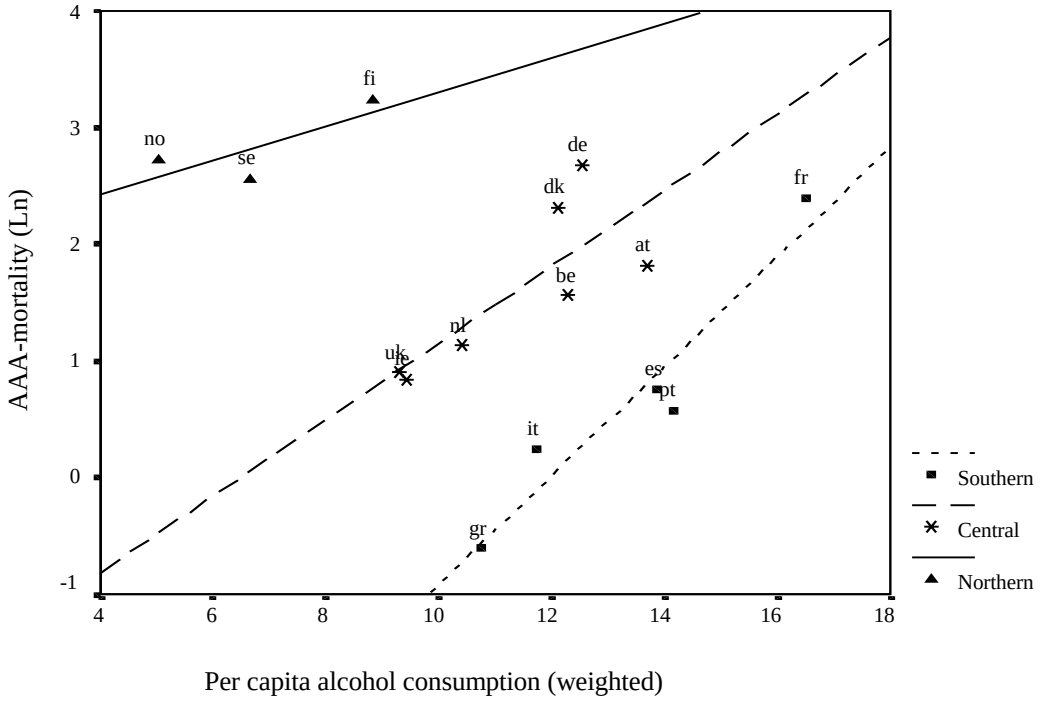

Figure 6.4. Relationship between per capita alcohol consumption and male AAA-mortality in Northern, Central and Southern Europe. Average for the period 1987-1995.

6.2. Certification and coding practices of alcohol-related and alcohol-specific diagnoses at death – results from a pilot study in four EU countries.

Two of the most important components in the process of registering deaths are certification practices and the coding of death certificates. The former includes the diagnostic process and the completion of a death certificate by physicians, the second the coding of the death certificate at a national coding centre, according to rules provided by the International Classification of Diseases (ICD) (e.g., WHO, 1977, 1993). Studies on certification and coding practices for respiratory diseases (Kelson, 1983), cancers (Kelson, 1987) and diabetes (Jougla, *et al.*, 1993) have shown that both the diagnosis and registration habits of physicians, as well as coding practices, differ across countries (see, e.g., Jougla, *et al.*, 1993).

The main purpose of the pilot study presented in this section was to compare certification and coding practices of alcohol-specific[3] (deaths with explicit mention of alcohol, e.g. *alcohol* dependence, *alcohol* poisoning) and alcohol-related diagnoses (alcohol-specific, diseases of liver [dominated by cirrhosis], and pancreatitis)[4] across countries. This was done by asking a random sample of certifying physicians in each of the participating countries to certify the causes of death associated with eight clinical case histories. Seven of the histories described deaths of people who had been drinking excessive amounts of alcohol. However, the contributory role of alcohol for the actual death differed among the cases. For each case, the physicians were requested to register the causes of death on death certificates and to send these to the national coding office, where the certificates were coded. All certificates were then centrally recorded by coders at the Swedish coding centre (Statistics Sweden). As far as we know, no such study has previously been conducted for these causes of death.

This should be regarded as a pilot study, since it included four EU-countries, and in several analyses only three; moreover the number of participating physicians in each country was small. Nevertheless, the results may shed light on some of the circumstances contributing to a reduction of comparability of alcohol mortality statistics. Of special interest was the selection of underlying cause of death, since the available international mortality statistics are based on this information.

6.2.1. Procedures

The four countries participating were Austria, Finland, Portugal and Sweden. In Austria, Finland and Sweden, a sample of 25 physicians representative of those issuing death certificates was drawn. This was done by randomly selecting completed death certificates from 1999 until a sample of 25 certifying physicians was obtained. In Portugal, however, this

[3] The number of diagnostic categories with reference to alcohol has increased in ICD-10 compared to ICD-9. In this study, the following ICD-codes occurred (on more than one certificate): harmful use of alcohol (F10.1) alcohol dependence (F10.2), alcoholic liver disease (K70.0-K70.9), alcohol-induced chronic pancreatitis, alcohol poisoning (X45).

[4] A wide range of individual level studies have shown that excessive alcohol use is a substantial risk factor, not only in cirrhosis mortality, but also in mortality from pancreatitis (see, e.g., Single *et al.*, 1999; English *et al.*, 1995; Schulz *et al.*, 1991). In addition, a population-level study of the relationship over time between per capita consumption and mortality from pancreatitis showed that, in all ECAS-countries, a change in overall consumption was positively associated with a change in pancreatitis mortality, and in most countries this relationship was statistically significant (Ramstedt, 2001).

was not possible, since the original death certificates are not sent to the statistical office in charge of coding death certificates, but only a document cleared of any information regarding the identities of both the deceased and the certifying physician. Instead, Central and District Hospitals were requested to recruit physicians who are specialists in internal medicine. In addition, the sample was complemented by two general practitioners and one physician from the public health sector. Thus, the physicians in Portugal were not randomly selected. In the presentation of results, the Portuguese data will be included, but will not be the subject of any any detailed cross-country analyses.

Each physician was sent an introductory letter explaining the purpose of the study, the eight case histories, a blank death certificate (used in that country) for each case, a short questionnaire with some basic questions about the physician and a stamped envelope addressed to the national coding office. A follow-up letter was sent to all physicians not responding to the first letter reminding them kindly to take part in the study.

Each physician was requested to send the death certificates (one for each case) and the questionnaire to their national coding centre. Thereafter the coding centre coded these death certificates according to normal procedures used in that country. It was stressed that the certificates should be handled as other death certificates and coded by personnel that perform this task on a daily basis. The coders had not read the clinical case histories. In Finland and Sweden, the 10th version of ICD (International Classification of Diseases) is used, in Austria and Portugal, the 9th. This makes the comparisons somewhat more difficult, especially those concerning differences among countries in national coding of underlying cause of death.

After the death certificates were coded and computerised, both the certificates and the computerised coding were sent to the Swedish National Institute of Public Health. The death certificates were then translated into Swedish and sent to Statistics Sweden, the Swedish coding centre, where a central recoding of the certificates was carried out The coders had no knowledge of the ICD-code assigned by the national coders. In Sweden, the death certificates were only coded (once) by Statistics Sweden. Thus, in Sweden national and central coding are identical.

The cross-country differences that might be found in national coding of the underlying cause of death could result from differences in coding practices at the coding centre, but could also be due to differences in the way physicians in the countries convert the information into diagnoses and complete the death certificates. The two stages of coding were performed to see whether differences were due to certification and/or to coding habits. If differences are mainly due to certification practices, we should expect cross-country differences even after central recoding of the certificates, since all certificates are then coded by the same coders using the same routines for all certificates from all countries. If the country differences in the coding of underlying cause of death are substantially reduced after central coding, the differences are mainly due to different coding habits among the countries.

The recoding made by Statistics Sweden of all certificates from Austria and Finland, in accordance with the classification and rules of the ICD-10, was thus not regarded as better than the national coding, but was done in order to distinguish the effects of certification habits from those of coding habits.

6.2.2. Data

The number of physicians responding to the survey varied. There were 10 in Sweden, 11 in Austria, 15 in Finland and 20 in Portugal, making a total of 56 physicians. The small number underlines the fact that this should be regarded as a pilot-study.

As mentioned, the case histories differed in the degree to which alcohol habits were likely to contribute to the actual death. Seven of the eight case histories described deaths of people who had been drinking excessive amounts of alcohol. However, the contributory role of alcohol for the actual death differed. All seven cases, except one, were contrived by a group of Swedish experts. For each case, the group assigned what they agreed to be the underlying and, if any, contributory cause of death. This is not necessarily always synonymous with the only "true" cause of death. It is used as a reference point in assessing the agreement across countries in choosing underlying causes of death. The seven cases were based on Swedish physicians' experiences of certifying deaths of patients with varying degrees of problem drinking, and could therefore be conceived of as rather "typical" of cases of alcohol-related deaths in Sweden.

The complete case histories are shown in Appendix 2. In four of the cases, alcohol-specific diagnoses were coded by the experts as underlying cause of death, and in another as contributory cause of death. As stated, two additional cases also described the death of men with histories of heavy alcohol consumption. The eighth case is identical to a diabetes case earlier described by Jougla *et al.* (1993), except that one additional sentence was included stating that the parents of the deceased 16-year-old boy suspected that he had been drinking alcohol with friends four days prior to the current event. This death was thus clearly not alcohol-related and was not subject to any detailed analyses.

Most, but not all, physicians completed all eight death certificates. In Finland, the 15 physicians completed altogether 117 of 120 certificates. In Sweden, the 10 physicians filled in 75 of 80 certificates, in Austria, 80 of 88 were completed by the 11 physicians, and in Portugal the 20 physicians filled in 160 certificates.

6.2.3. Method of analysis

The cross-country agreement in selecting the underlying cause of death was first assessed by comparing national coding and central recoding with the reference cause of death and, secondly, by counting the proportion of certificates coded nationally and centrally with the ICD-code most frequently occurring. Three different levels of classification were used: the four-character categories (4 digits), which is the most detailed, the three-character categories (3 digits), which is mandatory for reporting at the international level (e.g., to WHO), and the so-called European short list, which is the least detailed level consisting of 65 groups of causes of death.

The second part scrutinised the frequency of registration and coding of alcohol-related and alcohol-specific diagnoses. Diseases of the liver were included as a separate cause of death, since this is the classic indicator of harmful drinking in a population and still the primary marker in comparative studies (see, e.g., Ramstedt, 2001a). Most results were based on the seven cases (Case 4 excluded) describing deaths of people with long-term histories of excessive drinking.

6.2.4. Agreement in the selection of underlying cause of death

Table 6.2 shows the number of certificates, by case and country, in which the reference cause of death is coded as underlying cause, nationally and centrally. Table 6.3 summarises these for two groups of cases: Cases 1-3 with underlying causes of death other than alcoholic-specific, and Cases 5-8 with alcohol-specific causes of death. As shown, of all certificates based on Cases 1-3, only 2% in Portugal, 15% in Austria, 27% in Finland, and 30% in Sweden were coded with the reference cause centrally (weighted average for the three countries: 18%). The corresponding percentages for Cases 5-8 were 24% in Portugal, 28% in both Austria and Finland and 36% in Sweden (weighted average for the three countries: 31%). The rather low agreement with the reference cause of death also after recoding in all three countries implies that this was mainly due to the physicians' certification practices.

Thus, at the most detailed four-character level for most cases, few certificates were coded nationally as well as centrally with the reference cause of death (Table 6.3) Moreover, the differences across the countries in percentage of certificates coded with the reference cause of death were not reduced after central recoding. For all seven cases together, the differences were actually somewhat increased due to a lower percentage of certificates in Austria and Portugal (especially for Cases 1-3) coded with reference cause centrally than nationally, but a higher percentage in Finland.

Table 6.4 reveals the agreement after central recoding of the certificates bertween Austria, Finland and Sweden, both in terms of the percentage of certificates coded with the reference cause of death, and the percentage of certificates coded with the ICD-code most commonly applied for each case. (The corresponding percentages including also Portugal are shown in paranthesis). As can be seen, agreement was higher when compared with the most commonly used cause of death, especially for Cases 1-3. For instance, 22% of the certificates for Case 1 (average for the Austria, Finland and Sweden) were coded with the reference cause (ICD-10: I63.5), but 53% of the certificates were coded with another code, namely I63.9. For all three cases together, the (weighted) percentage of certificates coded with the most frequent cause of death was 51% (in Austria 54%, in Finland 51%, in Sweden 48%) compared to 31% of the certificates coded with the reference cause.

As concerns Cases 5-8, for two of them – Case 5 (alcoholic liver cirrhosis) and Case 8 (alcohol poisoning) – the reference cause of death was synonymous with the most frequently used cause. As regards Cases 6 and 7, however, which were assigned “harmful use” of alcohol (ICD-10: F10.1) as reference cause of underlying death, both were more often coded with “alcohol dependence” as underlying cause of death. (If also Portugal is included in the analyses, the most frequently used underlying cause of death for Case 7 according to central coding changed from alcohol abuse [“harmful use] to alcoholic cirrhosis. This is due to the fact that a large proportion [12 out of 20] of the Portuguese certificates based on Case 7 were coded centrally with alcoholic cirrhosis as underlying cause of death.)

These discrepancies between the reference cause and the cause of death most frequently coded as underlying cause could be interpreted as indicating that the reference cause was not the only possible cause. They could also mean that even though physicians more often chose to select another underlying cause than the reference cause, the physicians could be wrong. It should be emphasised, however, that these discrepancies was on the most detailed classification level, a level seldom used in international comparative studies.

Since the three-character category is the classification level mandatory for reporting at the international level (e.g., to WHO), this level is more important in terms of agreement in selecting the underlying cause of death. In comparison with the four-character category, the agreement was significantly improved at this three-character level, both nationally and centrally. As shown in Table 6.3, the percentages of certificates coded with the reference cause of death nationally increased in all four countries. (Not surprisingly, at this broader classification level, the best agreement for all seven cases was reached with the reference cause of death). However, the differences among the countries were not reduced. Finland showed by far the highest proportion of certificates coded with the reference cause for Cases 1-3, whereas Sweden showed the highest percentage for Cases 5-8. For the seven cases together, of all certificates 64% in Finland and 63% in Sweden were coded with the reference cause nationally at this three-character level; in Austria and Portugal the corresponding figures were 46% and 45%, respectively.

These national differences could be the result of cross-country variations in certification and/or coding practices. After central recoding of the certificates from Austria and Finland (for Sweden, national and central coding were identical), the cross-country differences were not reduced, on the contrary. Seventy-two percent of the certificates referring to Cases 5-8 were coded with the reference cause of death in Sweden, 55% in Finland and 35% in Austria (50% in Portugal). For all seven cases, two-thirds were coded with the reference cause in Sweden and Finland (49% in Portugal), but only 39% in Austria. This difference cannot be explained by differences in coding practices, nor by the fact that Austria (and Portugal) uses the ICD-9 whereas Finland and Sweden use ICD-10, since the central coding was done in one country only (Sweden) using the same classification rules for all certificates regardless of country of origin. Consequently, the explanation for this difference is most likely traceable to the certification process.

The broadest level of classification, the European short list consisting of 65 groups of causes, shows, naturally, the highest agreement. It is notable, however, that the agreement changes little, compared to the three-character level, for the alcohol-specific causes of death, but this is explained by the fact that, for these causes of death, the two classification levels are almost identical.

Table 6.2. *Number of certificates where the reference cause of death was coded as underlying nationally (N) and centrally (C) (n=number of death certificates).*

Case and reference underlying cause of death	Austria			Finland			Sweden			Portugal		
	4 digit level	3 digit level	European short list	4 digit level	3 digit level	European short list	4 digit level	3 digit level	European short list	4 digit level	3 digit level	European short list
Case 1: Cerebral infarction		n=11			n=15			n=10			n=20	
N	2	3	7	0	15	15	-	-	-	6	6	18
C	3	6	10	6	15	15	0	8	10	1	6	7
Case 2: Coronary heart disease		n=11			n=15			n=10			n=20	
N	0	2	10	6	7	15	-	-	-	2	3	10
C	2	2	9	6	8	15	0	1	10	0	2	7
Case 3: Liver tumour		n=11			n=14			n=10			n=20	
N	6	11	11	0	14	14	-	-	-	20	20	20
C	0	7	7	0	14	14	10	10	10	0	20	20
Case 4: Diabetes coma		n=10			n=13			n=9			n=20	
N	7	9	9	8	13	13	-	-	-	5	20	20
C	5	6	10	2	4	13	1	2	9	5	7	19
Case 5: Liver cirrhosis (alcoholic)		n=11			n=15			n=9			n=20	
N	4	9	9	8	15	15	-	-	-	9	19	19
C	4	5	10	9	15	15	5	8	9	9	19	19
Case 6: Alcohol abuse (harmful use) (ICD:9 Pancreatitis)[1]		n=11			n=15			n=9			n=20	
N	4 (303)	4	4	0	0	0	-	-	-	4	4	6
C	2	4	4	2	6	6	3	7	7	0	15	15
Case 7: Alcohol abuse (harmful use)[2]		n=10			n=15			n=9			n=20	
N	0	0	0	0	4	4	-	-	-	0	6	6
C	0	0	0	0	6	6	1	7	7	0	2	2
Case 8: Ethanol poisoning (ICD-9: Alcohol abuse)[3]		n=11			n=15			n=9			n=20	
N	6	6	6	7	7	7	-	-	-	0	11	11
C	6	6	6	6	6	6	4	4	4	4	4	4

[1] In ICD-9: physical disorders have precedence before mental, therefore pancreatitis should be selected as the underlying cause of death according to ICD-9. ICD-9 rules were used only in the national coding for Austria and Portugal. The central recoding followed ICD-10 rules.
[2] The reference cause alcohol abuse was coded as "harmful use" in ICD-10 and as alcohol abuse/dependence (303) in ICD-9.
[3]According to ICD-9: alcohol abuse (303), according to ICD-10: ethanol poisoning.

Table 6.3. *Percentage of certificates where reference cause of death was coded as underlying cause of death nationally (N) and centrally (C) at three levels of classification, by country and cases (n=number of certificates.)*

	Austria			Finland			Sweden			Portugal		
	4 digit level	3 digit level	European short list	4 digit level	3 digit level	European short list	4 digit level	3 digit level	European short list	4 digit level	3 digit level	European short list
Cases 1-3:	n=33			n=44			n=30			n=60		
N	24	48	85	14	82	100	-	-	-	47	48	80
C	15	45	79	27	84	100	30	63	100	2	47	62
Cases 5-8:	n=43			n=60			n=36			N=80		
N	33	44	44	25	43	43	-	-	-	24	42	58
C	28	35	47	28	55	55	36	72	75	16	50	50
All 7 Cases:	n=76			n=104			n=66			n=140		
N	29	46	62	21	60	67	-	-	-	34	45	67
C	22	39	61	28	67	74	33	68	86	10	49	53

Table 6.4. *Agreement at the four-character level in the central coding: percentage of certificates where the reference cause of death was coded as the underlying cause of death and the percentage coded with the most frequently occurring underlying cause. In Austria, Finland and Sweden. (In parenthesis: including Portugal).*

	Number of certificates	% with reference cause (weighted)	% with most frequently occurring cause (weighted)
Case			
1	36 (56)	22 (18)	53 (46)
2	36 (56)	19 (14)	65 (55)
3	35 (55)	33 (25)	55 (66)
Cases 1-3	107 (167)	25 (19)	58 (56)
Case			
5	35 (55)	51 (49)	51 (50)*
6	35 (55)	21 (16)	32 (43)
7	34 (54)	4 (3)	32 (26)[1]
8	35 (55)	48 (40)	48 (36)*
Cases 5-8	139 (219)	31 (27)	41 (39)
All 7 cases	246 (386)	28 (24)	48 (46)

* the reference cause of death was the most frequently assigned cause of death.

[1] Including Portugal the most frequently occurring cause of death (26% of all certificates) was alcoholic cirrhosis (ICD-10: K703).

6.2.5. The registration and coding of alcohol-specific and alcohol-related causes of death

Table 6.5 shows the results of certification, national coding and recoding of diseases of the liver, alcohol-specific diagnoses and alcohol-related diagnoses by country and case history. The results for two groups of cases are summarised in Table 6.6. The first row for each case – A – shows whether physicians registered these causes of death on any line on the certificate; the second row – O – shows whether they registered this as the originating antecedent cause of death (the cause that started the course of events). The third and fourth rows thus refer to the coding of underlying cause nationally (N) and centrally (C).

Alcohol-specific causes of death

As can be seen in Table 6.6, none of the certificates based on Cases 1-3 were coded with any alcohol-specific or alcohol-related underlying cause of death, neither in Finland nor in Sweden, which is thus consistent with the reference underlying causes not being alcohol-related. In Austria, however, 5 of 33 certificates (Case 1: 4; Case 2: 1) were (incorrectly) coded nationally with alcohol-specific diagnoses as underlying cause (4 alcohol dependence (303), 1 non-dependent alcohol abuse (305.0), and 1 of 20 in Portugal (303). Perhaps this was due to the fact that these physicians, being aware of the purpose of the study, assumed that also for these cases, the underlying cause of death should be alcohol-specific.

Although alcohol-specific diagnoses were rarely coded as underlying cause for Cases 1-3, they were more often registered by physicians on any line (A) on the certificates; this occurred most often in Finland (59% of all certificates) and Portugal (60%) and least often in Sweden (27%). Again it should be stressed that the high proportion for Portugal could most likely be due to a non-random selection of physicians who were uncommonly interested in the topic.

The presence of alcohol-specific diagnoses was, not surprisingly, more common for Cases 5-8, with some differences across the countries. In Finland, 93% of all certificates were coded nationally with an alcohol-specific diagnoses as the underlying cause, compared to 86% in Sweden, and 70% in Austria (90% in Portugal).

The differences in national coding among Austria, Finland and Sweden could be traced back to the certification process: on 93% of all certificates based on Cases 5-8, Finnish physicians registered one or several alcohol-specific causes of death, which is 28 percentage units more than Austria (65%). In Sweden, the percentage was 86%. In addition, central recoding caused little change compared to national coding, suggesting that the differences in selecting alcohol-specific underlying causes of death are mainly due to differences in certification practices.

Although Cases 5-8 were assigned alcohol-specific reference cause of death, these diagnoses were not mentioned on all of the certificates. This indicates an underdiagnosis of alcohol-specific causes of death on death certificates. This underreporting seems to be highest in Austria and lowest in Finland (Portugal excluded). One might perhaps suspect an even lower percentage of certificates with alcohol-specific diagnoses, since earlier studies have shown a very high degree of underreporting of alcohol-related deaths on death certificates. That this was not the case could perhaps be explained by the fact that the physicians were told about the purpose of the study in the introductory letter, which might have led to a selection bias towards participation of physicians uncommonly interested and experienced in this subject.

Finally, it should be noted that, for all cases together, the proportion coded centrally with alcohol-specific causes of death was rather similar across the three, and even four countries. However, this can partly be explained by the 5 certificates in Austria that were incorrectly registered and coded as alcohol-specific. (As concern Portugal, the unexpectedly high proportion coded centrally (54%) and nationally (53%) with alcohol-specific causes of death can be traced back to the fact that alcohol-specific diagnoses were mentioned on any line on all [100%] of the certificates based on Cases 5-8 and on as much as 60% of all 60 certificates referring to Cases 1-3.)

Table 6.5. *Number of certificates where diseases of the liver, alcohol-specific and alcohol-related causes of death were registered (on any line-A, as originating cause of death/underlying-O), coded as underlying cause (nationally–N, centrally-C), by country and clinical case history (n=number of death certificates).*

Case and reference cause of death	Austria			Finland			Sweden			Portugal		
	Liver-disease	Alc.-spec.	Alc.-rel.	Liver-disease	Alc.-spec.	Alc.-rel.	Liver-disease	Alc.-spec.	Alc.-rel.	Liver-disease	Alc.-spec.	Alc.rel.
Case 1: Cerebral infarction		n=11			n=15			n=10			n=20	
A	0	4	4	0	8	8	0	2	2	0	18	18
O	0	1	1	0	0	0	0	0	0	0	0	0
N	0	4	4	0	0	0	-	-	-	0	1	1
C	0	1	1	0	0	0	0	0	0	0	0	0
Case 2: Coronary heart disease		n=11			n=15			n=10			n=20	
A	0	3	3	0	6	6	0	1	1	0	14	14
O	0	1	1	0	0	0	0	0	0	0	7	7
N	0	1	1	0	0	0	-	-	-	0	4	4
C	0	1	1	0	0	0	0	0	0	0	0	0
Case 3: Liver tumour		n=11			n=14			n=10			n=20	
A	8 (0)	6	8	0	12	12	2 (0)	5	5	10(4)	19	19
O	1 (0)	3	4	0	0	0	0	3	3	0	16	16
N	0	0	0	0	0	0	-	-	-	0	0	0
C	4 (0)	4	4	0	0	0	0	0	0	0	0	0
Case 4: Diabetes coma		n=10			n=13			n=9			n=20	
A	0	2	2	0	0	0	0	0	0	0	0	0
O	0	0	0	0	0	0	0	0	0	0	1	1
N	0	0	0	0	0	0	-	-	-	0	0	0
C	0	0	0	0	0	0	0	0	0	0	0	0

Table 6.5 continued

Case and reference cause of death	Austria			Finland			Sweden			Portugal		
	Liver-disease	Alc.-spec.	Alc.-rel.	Liver-disease.	Alc.-spec.	Alc.-rel.	Liver-disease	Alc.-spec.	Alc.-rel.	Liver-disease	Alc.-spec.	Alc.rel.
Case 5: Liver cirrhosis (alcoholic) [1]		n=11			n=15			n=9			n=20	
A	10 (2)	5	10	15 (11)	14	14	9 (0)	7	9	20(4)	20	20
O	8 (2)	4	10	10 (9)	13	14	2 (0)	6	9	2(0)	15	17
N	9 (4)	5	10	15 (15)	15	15	-	-	-	19 (9)	19	19
C	10 (5)	5	10	15 (15)	15	15	9 (8)	8	9	19(9)	19	19
Case 6: Alcohol abuse (harmful use) (ICD:9 Pancreatitis)[2]		n=11			n=15			n=9			n=20	
A	2 (1)[2]	5	11	0	13	15	0	7	9	2(0)	20	20
O	1 (0)	5	10	0	8	15	0	7	9	0	12	14
N	2 (1)	7	11	0	12	15	-	-	-	2 (2)	15	19
C	2 (1)	5	10	0	8	15	0	7	9	2(2)	17	19
Case 7: Alcohol abuse[3]		n=10			n=15			n=9			n=20	
A	8 (0)	7	9	6 (2)	15	15	2 (0)	8	9	17(6)	20	20
O	3 (0)	5	6	0	13	13	1 (0)	6	7	1(0)	17	18
N	8 (7)	8	9	2 (2)	14	14	-	-	-	9 (9)	19	19
C	7 (6)	8	9	3 (3)	14	14	1 (0)	7	8	17(12)	20	20
Case 8: Ethanol poisoning (ICD-9: Alcohol abuse)[4]		N=11			n=15			n=9			n=20	
A	4 (0)	11	11	3 (2)	14	14	1 (0)	9	9	11(0)	20	20
O	0	10	10	0	14	14	0	8	8	2(0)	18	20
N	3 (3)	10	10	2(2)	15	15	-	-	-	2 (1)	19	20
C	3 (3)	11	11	1(1)	14	14	0	9	9	8(1)	19	19

[1] alcoholic cirrhosis

[2] In ICD-9: physical disorders have precedence before mental, therefore pancreatitis should be selected as the underlying cause of death according to ICD-9. ICD-9 rules were used only in the national coding for Austria and Portugal. The central recoding followed ICD-10 rules.

[3] The reference cause alcohol abuse was coded as "harmful use" in ICD-10 and as alcohol abuse/dependence (303) in ICD-9.

[4] According to ICD-9: alcohol abuse (303), according to ICD-10: ethanol poisoning.

Table 6.6. *Percentage of certificates where diseases of the liver, alcohol-specific and alcohol-related causes of death were registered (on any line-A, as originating antecedent cause of death/underlying-O), coded as underlying cause (nationally–N, centrally–C), by country and clinical case history (n=number of death certificates.*

	Austria			Finland			Sweden			Portugal		
	Liver-Disease	Alc.-spec.	Alc.-rel.	Liver-Disease	Alc.-spec.	Alc.-rel.	Liver-disease	Alc.-spec.	Alc.-rel.	Liver-disease	Alc.-spec.	Alc.-rel.
Cases 1-3:	n=33			n=44			n=30			n=60		
A	24	39	45	0	59	59	7	27	27	17	60	60
O	3	15	18	0	0	0	0	10	10	0	50	50
N	0	15	15	0	0	0	0	-	-	0	2	2
C	12	18	18	0	0	0	0	0	0	0	0	0
Cases 5-8:	n=43			n=60			n=36			n=80		
A	56	65	95	40	93	97	33	86	97	62	100	100
O	28	56	84	17	80	93	8	75	92	6	78	86
N	51	70	93	32	93	98		-	-	40	90	96
C	51	67	93	32	85	97	27	86	97	58	94	96
All 7 cases:	n=76			n=104			n=66			N=140		
A	42	54	74	23	79	81	21	59	65	50	83	83
O	17	38	55	10	46	54	5	45	55	4	61	66
N	29	43	59	18	54	57	-	-	-	23	53	56
C	34	46	61	18	49	56	15	47	53	33	54	55

Choice of alcohol-specific diagnoses

The clinical cases histories include the diagnostic information that would normally be available to hospital doctors or general practitioners certifying a death. As shown in the case histories (see Appendix 2), this information on alcohol is not very detailed. For example, in Case 1, a 46-year-old man, “had a many year history of heavy alcohol consumption and while on sick leave he had consumed 5-6 beers almost daily, occasionally hard liquor as well. His wife has repeatedly urged him to seek help for his alcohol problem". In Case 2, concerning a man aged 64, the only information related to drinking is that he “over the past ten years has consumed wine, often 1-2 bottles per day”. The information is somewhat more revealing for Case 7, a 38-year-old bachelor: “has a history of long-term abuse, his repeated treatment attempts have been unsuccessful. For the past 2-3 months, after a period of treatment, he has been drinking anything he could get hold of. Post-mortem findings and toxicology showed pronounced fatty degeneration of the liver, early indications of cirrhosis, and ethanol content 0.04 percent in femoral vein blood sample, 0.04 percent in urine”.

A survey of the actual certificates revealed that when the physicians diagnosed these cases as “problem drinkers”, the written diagnosis put on the certificate on any line (most often as contributory cause) was either “alcohol abuse,” (sometimes “over-consumption”), coded centrally as “harmful use of alcohol” (F10.1), or “alcoholism”, “chronic alcoholism” coded centrally as “alcohol dependence (syndrome)” (F10.2). (Interestingly, the term alcoholism, which is thus still used by the physicians, had already been replaced in ICD-9 by the term “alcohol dependence”).

Both harmful use of alcohol and alcohol dependence belong to a subsection of the ICD group "Mental and behavioural disorders due to psychoactive substance use". What distinguishes them from each other is, thus, the fourth character, which specifies the clinical state. In the ICD-10 classification volume (WHO, 1993), harmful use is defined as a pattern of use causing damage to physical or mental health. "Dependence syndrome" is described as follows: "a cluster of behavioural, cognitive, and physiological phenomena that develop after repeated substance use and that typically include a strong desire to take the drug, difficulties in controlling its use, persisting in its use despite harmful consequences, a higher priority given to drug use than to other activities and obligations, increased tolerance, and sometimes a physical withdrawal state." (WHO, 1993).

Thus, the clinical state of harmful use is much less specified than alcohol dependence. According to the *Diagnostic Criteria* volume (WHO, 1993), the criterion for harmful use is that substance use was responsible for (or substantially contributed to) physical or psychological harm. For alcohol dependence the criterion is that at least three of the mentioned symptoms must be manifested during a 12-month period.

Not one of the clinical case histories in this study contains sufficiently detailed information to allow diagnosis of alcohol dependence as a cause of death. However, as shown in Table 6.7, in Sweden, even more so in Finland, and particularly among the non-randomly selected physicians in Portugal, alcoholism (thus coded as "alcohol dependence" or F10.2) was used more often than alcohol abuse (coded as harmful use, i.e. F10.1), whereas the latter was somewhat more common in Austria. In Finland alcoholism (F10.2) was mentioned on over three times more certificates than was alcohol abuse (F10.1). (In Portugal 79 certificates included the mentioning of alcoholism [coded as F10.2], but only 5 alcohol abuse [F10.1]). Besides these country differences, no real pattern could be detected in the selection of either of these two diagnoses. Some physicians chose throughout to use only one of the diagnoses when long-term heavy drinking was registered, whereas others sometimes used alcohol abuse and sometimes alcoholism. Nor did any of the seven cases show any consistent pattern: not one of the cases was consistently assigned only one of these two diagnoses.

Even within each country, almost no case was consistently diagnosed by the physicians as either alcoholism (alcohol dependence) or alcohol abuse (harmful use). This can be illustrated by Case 6 – a 64-year-old man with a history of heavy alcohol consumption throughout his adult life and in recent years consuming at least 37 cL of hard liquor or 2 bottles of wine daily in addition to beer. Of the 11 physicians in Austria, 2 registered alcoholism (F10.2) as a cause of death on any line on the certificate, and 2 others chose harmful use (F10.1). In Finland, 10 out of 15 physicians registered alcoholism (F10.2), and 3 harmful use (F10.1), and in Sweden 4 of 9 participating physicians chose alcoholism (F10.2) and 3 alcohol abuse (F10.1). (Among the 20 non-randomly selected physicians in Portuguese, 18 registered alcoholism [F10.2[but only one alcohol abuse [F10.1]).

Alcohol-related causes of death

In contrast to alcohol-specific causes, the broader group of alcohol-related causes showed less differences across countries, due to the much larger proportion of alcohol-related than alcohol-specific certificates in Austria; 95% of all certificates based on Cases 5-8 had an alcohol-related cause of death mentioned by the physicians on any of the lines, while the

corresponding figure for alcohol-specific cause of death was only 65%. In Finland, the corresponding percentages for alcohol-related and alcohol- specific causes of death were 97% and 93%, respectively, and in Sweden, 97% and 86% (Table 6.6).

Thus, when the broader group of alcohol-related causes of death was compared, the country differences in registration and coding of these causes of death were small and most certificates for Cases 5-8 were coded as alcohol-related, nationally and centrally. The fact that a substantial portion of all certificates on Cases 1-3 in all countries were not assigned any alcohol-related diagnosis, however, points at an underdiagnosis even for this broader group of alcohol-related deaths, but to a lesser extent than for the alcohol-specific deaths.

Liver disease as a cause of death

The increase in Austria in the percentage of certificates registered and coded with alcohol-related causes of death compared to alcohol-specific causes was the result of the higher inclination of Austrian physicians to record diseases of the liver (but seldom alcoholic) and therefore also of the coders to select liver disease as the underlying cause. (Also Portugal showed a higher proportion of certificates coded with diseases of the liver as underlying cause [40% of the certificates based on Cases 5-8] compared to both Finland [32%] and Sweden [25%], but still lower than Austria's 51%.)

However, the fact that diseases of the liver were selected as underlying cause of death for cases other than the fifth (alcoholic cirrhosis), especially Case 3 (reference cause: liver tumour) and Case 7 (reference cause: "harmful use") both in Austria and Portugal, could indicate that even the classification of liver disease is not free from problems. Interestingly, this higher inclination in Austria and Portugal to select diseases of the liver as underlying cause, as revealed by national coding, is in agreement with the differences found in the mortality statistics showing a much higher proportion of liver diseases in relation to the total number of alcohol-related deaths in Austria and Portugal (Austria 84%, Portugal: 92% [average for 1990-95]) than in Finland and Sweden (Finland: 36%, Sweden: 49%) (see, e.g., Ramstedt, 2000).

Furthermore, as indicated above, the data revealed cross-national differences in the tendency to diagnose diseases of the liver as alcohol-specific. For example, in Austria, diseases of the liver were coded centrally as underlying cause in 10 of 11 certificates based on Case 5, 5 of which were alcohol-specific. (In Portugal, 19 certificates were coded with liver disease, 9 of them as alcoholic). In Finland, all 15 certificates were coded with liver disease as cause of death, all of them as alcohol-specific, and in Sweden 8 of 9 were coded as alcoholic liver disease. It should be noted that few of the Austrian physicians and none of the Swedish registered alcoholic liver disease on the death certificate. In Sweden, however, in contrast to Austria, the coders changed this to an alcoholic liver disease as the underlying cause of death. This was possible since on many of these certificates "alcohol abuse" or "alcoholism" was added as contributory causes.

That there are substantial cross-national variations in the use of alcoholic diseases of the liver in the EU countries is shown in Table 6.8. The tendency to use alcoholic liver disease as underlying cause of death follows a north-south gradient, opposite to that observed for the total number of cirrhosis deaths, but in line with the alcohol-specific deaths (see Ramstedt, 2001d).

Table 6.7. *Number and percentage of certificates where harmful use and alcohol dependence were registered on the death certificate on any line (n=number of death certificates).*

	Austria		Finland		Sweden		Portugal	
	Harmful use	Alcohol depen-dence	Harmful use	Alcohol depen-dence	Harmful use	Alcohol depen-dence	Harmful Use	Alcohol depen-dence
Cases 1-3:	*n=33*		*n=44*		*n=30*		*n=60*	
number of cert.	6	7	6	20	6	2	4	45
%	18	21	14	45	15	5	7	75
Cases 5-8:	*n=43*		*n=60*		*n=36*		*n=80*	
number of cert.	11	8	9	31	9	17	3	66
%	26	19	15	52	25	47	4	82
All Cases:	*n=76*		*n=104*		*n=66*		*n=140*	
number of cert.	17	15	15	51	15	19	7	111
%	22	19	14	49	23	29	5	79

Table 6.8. *Mortality from alcoholic liver diseases and its share of the total number of deaths from diseases of the liver. Average for the period 1987-1995 (source: Ramstedt, 2001d).*

Country	Men		Women	
	Alcoholic cirrhosis	Share of all liver diseases	Alcoholic cirrhosis	Share of all liver diseases
Northern Europe:				
Finland	16.9	90	4.2	56
Norway	7.9	79	2.5	50
Sweden	4.9	42	1.5	25
Central Europe, Ireland and the United Kingdom:				
Austria	4.9	10	1.7	6
Belgium	6.8	32	3.6	31
Denmark	15.2	65	5.8	55
Ireland	1.7	33	0.6	20
The Netherlands	4.5	61	1.9	40
United Kingdom	4.2	45	2.4	38
Germany	11.6	31	4.4	28
Southern Europe:				
France	19.2	56	7.3	54
Greece	1.3	9	0.2	3
Italy	3.5	8	0.9	4
Portugal	13.9	22	4.2	23
Spain	4.2	10	0.9	5

6.3. Discussion

The results presented in this chapter suggest that there are significant differences across EU countries in the recording of alcohol-specific causes of death, especially at the four-character level, and that (most likely) these differences are mainly the result of cross-national differences in diagnosis and registration habits among physicians. This was clearly illustrated by the different choices made when diagnosing "long-term heavy drinkers" of alcohol: Finnish physicians chose alcoholism, coded as alcohol dependence, more than three times as often as alcohol abuse, coded as harmful use, the Swedish physicians did so somewhat more often, whereas the Austrian physicians chose alcohol abuse ("harmful use") somewhat more often. (Also the Portuguese physicians chose alcoholism [coded as F10.2] much more often than alcohol abuse [coded as F10.1].) However, in order to validate these findings, a new study involving larger samples and several more countries is needed. The results presented here point to the importance of conducting such a study.

Not even combining these explicitly alcohol-related deaths into one composite measure is satisfactory from a comparative point of view. As indicated in both previous studies (Ch. 6.1, 6.2), underestimation, mainly due to physicians' underdiagnoses of these deaths, seems to vary across countries. It is likely that this pattern to some extent reflects differences across countries with regard to the general tendency to see alcohol as a cause of problems. The introduction of ICD-10 in an increasing number of countries will not solve this problem.

An attempt to evaluate the accuracy and comparability of alcohol-related mortality in different European countries was made as one part of the EU-funded project "Alcohol consumption and alcohol problems among women in European countries" (see Bloomfield, *et al.*, 1999). Eight countries participated in that study: The Czech Republic, Finland, Germany, Italy, The Netherlands, Scotland, Sweden and Switzerland (see Cipriani & Landucci, 1999). Data were gathered by mailed questionnaires sent out to each study partner with questions concerning availability and accuracy of these statistics on national and local levels. As concerns mortality, a review of data available from international sources was carried out and a request for information on alcohol-related causes of death was submitted to WHO.

Based on the answers from the mail questionnaire, project investigators concluded that mortality data are comparable across the study countries if large categories of alcohol-related diseases are considered, i.e. chronic diseases of the liver. As for alcohol-specific causes of death, the comparability may be low, since the number of these deaths is underestimated, but to a varying degree among the study countries. The results, thus, correspond with the findings in this chapter, namely that while liver disease (cirrhosis) mortality seems to reflect variations in overall consumption, country differences in alcohol-specific mortality do not. This suggests that there are substantial cross-country differences in recording practices for this group of causes of death.

These results imply that in cross-sectional comparative studies, one must include the broader group of alcohol-related diseases as indicators of harmful drinking, especially diseases of the liver and (possibly) pancreatitis. As concerns cross-sectional comparisons across countries, it is questionable whether the alcohol-specific causes of death should be added to this group. As shown in Ch. 6.1, the cross-country variations in liver disease mortality corresponded better with variations in overall alcohol consumption than did liver disease and alcohol-specific mortality together, in which case the relationship became weaker. However, it is also possible that the alcohol-specific deaths correspond better with dimensions of drinking other than

overall consumption. For example, it cannot be ruled out that variations in prevalence of alcohol-specific deaths reflect variations across countries in the proneness towards drinking to intoxication, i.e. binge drinking.

Although all liver disease deaths are not alcohol-related, it is generally thought that diseases of the liver classified as alcoholic are less reliable for cross-country comparisons (e.g., Hyman, 1981; Room, 1972). This was clearly illustrated in the large cross-national variation in the ratio of alcoholic liver diseases to the total number of deaths from liver disease. Differences in the use of alcoholic liver diseases as diagnosis were also found in the pilot-study. Austria showed the lowest proportion of alcoholic liver diseases of the total number of liver diseases coded as underlying cause of death. In Finland all certificates with diseases of the liver as underlying cause were coded as alcohol-specific. Thus, all these findings suggest that when only "conventional" death certificates are available, total rate of liver disease is a better indicator for comparative purposes than is liver diseases with mention of alcohol.

Several validation studies of diagnoses on death certificates have shown that alcohol-related deaths are considerably underreported on the certificates (e.g., Romelsjö, *et al.*, 1987; Pollock, *et al.*, 1987; Riddick & Luke, 1978), and as a consequence, that the number of alcohol-related deaths in official mortality statistics is considerably underestimated. These validation studies, often comparing death certificates with autopsy findings, have also shown that liver cirrhosis as underlying cause of death is much less underreported than are alcohol-specific deaths such as alcoholism (alcohol dependence), and alcohol poisoning (Romelsjö, *et al.*, 1987; Ågren & Jakobsson, 1987). Hence, these results also indicate that comparability is higher for diseases of the liver than for the alcohol-specific causes of deaths.

The underreporting of explicitly alcohol-related deaths in the international mortality statistics is not only a certification problem. It is quite seldom that long-term heavy drinking (alcohol abuse) is considered as a direct cause or underlying cause of death. Thus, alcohol abuse/long-term heavy drinking is often a condition that, at the very most, is registered as an indirect, contributory cause of death. This information, which in some countries is registered together with the underlying cause in the national mortality register, disappears completely for all countries when only the underlying cause of death is selected to be included in international mortality statistics.

Probably the most promising way to reduce this underreporting of alcohol in mortality statistics would be to encourage the assignment of multiple causes of death. A number of studies have recommended the coding and publication of multiple causes (Jougla, 1993; Crews, *et al.*, 1991). For example, a certification and coding study of diabetes patients (Jougla, 1993) stressed that this would be particularly useful for diabetes, which is often not the underlying cause but can still contribute to the death. In this respect it resembles the role of alcohol.

7. OTHER STATISTICS ON ALCOHOL-RELATED PROBLEMS

There are several other non-mortality-based register data on alcohol-related problems. However, because of major differences in measurement and reporting methodology, none of these data are comparable across countries. The previously mentioned EU-project "Alcohol consumption and alcohol problems among women in European countries" (Bloomfield, *et al.*, 1999) also attempted to assess the availabily, reliablity and validity of other registry data containing information on alcohol involvement. As concerns morbidity, for instance, it was shown that even though hospitalisation data were available in most of the countries, the quality of such data and the extent of availability varied widely. For a few countries, the data on a selected number of alcohol-related causes were possibly, but not clearly, comparable. As concerns other registries with information on alcohol involvement, it was concluded that they are not sufficiently homogenous to allow for cross-country comparisons. The lack of comparable data will be illustrated using data on drunk driving.

7.1. Drunk driving

During recent decades, drunk driving is perhaps the most noticeable of all alcohol-related problems in Western society. The effects of alcohol consumption in terms of driving impairment and traffic accidents are also well documented in the scientific literature (see, e.g., English *et al*., 1995). However, despite increased efforts to reduce the prevalence of drunk driving, alcohol is still an important contributory factor for accidents on European roads. In the countries most severely affected, alcohol is a contributory factor in 40-50 percent of all fatal road accidents.

Studies have shown that alcohol involvement is more common in fatal traffic accidents than non-fatal, in single vehicle accidents than non-single, in night-time accidents than day-time. Single vehicle fatal accidents are therefore seen as a good surrogate for alcohol-related accidents. These data are available in some countries, e.g. Finland, Norway, Sweden and the United Kingdom. In a Swedish study, for instance, it was shown that more than half of all those killed in single vehicle accidents were under the influence of alcohol (Öström & Eriksson, 1993).

Data on the number of traffic accidents involving alcohol, however, are available in most EU-countries, but due to major differences in measurement and reporting methodology, they are not comparable. One example is police reports of alcohol-related traffic accidents, which are available in most EU-countries (Table 7.1). An alcohol-related crash is in this case one in which one or more of the drivers have been drinking, according to the judgement of the reporting police. The judgement of whether alcohol was involved in the road accident may vary from time to time and in different locations. Generally, this measure underreports the true number of alcohol-involved traffic accidents (WHO, 2000), and the degree of underreporting differs across countries. Thus, the large differences shown in the table do not reflect the true differences.

Table 7.1. *Road traffic accidents involving one or more persons under the influence of alcohol (rate per 100,000 inhabitants 15 years or older) in EU countries 1992-1998*

	1992	1993	1994	1995	1996	1997	1998	Mean 1992-1996/'97/'98
Austria	38.8	33.9	35.5	33.0	31.4	30.8	27.5	33.0
Belgium	40.8	40.9	37.8	42.1	41.1	42.2	44.0	41.3
Denmark	29.7	27.4	25.9	24.5	23.7	23.7	-	25.8
Finland	23.9	17.6	15.5	21.6	19.5	19.1	19.7	19.6
Germany	50.6	50.5	48.9	45.3	42.2	40.1	35.0	44.7
Greece	-	16.1	17.5	-	-	-	-	-
Italy	1.8	2.2	3.1	4.3	4.8	4.2	4.3	3.5
Luxembourg	45.9	-	-	-	-	45.4	-	-
Netherlands	16.2	15.9	18.3	15.9	16.4	15.8	-	16.4
Portugal	24.5	26.0	20.5	18.8	20.7	17.8	-	21.4
Spain	10.6	-	-	-	-	-	-	-
Sweden	12.0	11.1	9.9	8.8	8.3	-	-	10.0
United Kuingdom	21.8	12.0	12.3	12.7	18.4	-	-	15.4

- = data not available

The problems are not less for fatal crashes involving alcohol. This becomes evident when looking at the alcohol-related crash rates published in a report from the EU Commission (Directorate General for Transport of the European Commission, 1995). The lowest proportion of alcohol-involved crashes was reported by Italy (1%) and the highest by France (40%). It is highly unlikely that all of these reported rates are accurate reflections of what the rates would be if measured using similar methods across the countries.

In a recent compilation, Stewart (2001) found that the data available on rates of fatal crashes involving alcohol across Western countries could not be compared. This was due to cross-country differences in:

- The definition of alcohol-involvement in crashes
- The definition of fatality
- The conditions under which alcohol testing occurs
- The percent of drivers in fatal crashes who are tested for alcohol
- The percent of pedestrians in fatal crashes who are tested for alcohol
- The availability and utilisation of autopsy results

Table 7.2 shows the results of this compilation of data on alcohol-involvement in fatal crashes for most EU-countries. The proportion of alcohol involvement varies substantially, as does the data reporting, collection methodologies, definitions of alcohol involvement, etc. The validity problems can be exemplified by the Swedish case. In Sweden, the official rate was 3.3% alcohol involvement in 1998, but this was based on police reports at the scene of fatal crashes. Autopsies carried out on all fatally-injured drivers found a rate of 18% alcohol involvement and even this figure is probably too low (Laurell, 1999). This discrepancy illustrates some of the serious reporting and measurement problems that may distort alcohol-related fatality rates and make comparisons across countries difficult and possibly misleading (for more information, see also Ross, 1993; Voas, 1993). The DG VII Working Group on Alcohol, Drugs and Medicines of the European Union is currently carrying out a project to describe the measurement and data collection methodologies and maintain a database for all of the EU member states.

Arrests for drunken driving or police reported drunken driving offences are sometimes used to study the trends of drunken driving within a country. However, such data are largely the result of responses by law enforcement and therefore usually not a valid indicator of the extent of drinking and driving within a country and certainly not for comparing differences across countries (see, e.g., WHO, 2000).

Table 7.2. *Alcohol involvement in fatal crashes in EU-countries (source: Stewart, 2000).*

Country	Percent of alcohol involvement	% of drivers tested
Austria	BAC ≥0.5‰ 1998: 8.5% of the drivers and pedestrians.	Unknown
Belgium	any alcohol 1998: 8.9% of the drivers and pedestrians.	24.7% of drivers and pedestrians total
Denmark	BAC ≥0.5‰: 20.2% of the drivers	49% of drivers in fatal accidents; 75% of fatally injured drivers
Finland	BAC ≥0.5‰: 24% of fatally injured drivers	Compulsory
France	BAC ≥0.5‰ 1998: 19% of all drivers	About 90%
Germany	BAC ≥0.3‰ 1997: 17% of all drivers	Unknown
Netherlands	Any alcohol: 7.8% of all drivers	68.3% (mostly non-injured drivers, some injured drives, few dead drivers)
Norway	BAC ≥0.5‰: 8.8%- multi-vehicle, 32.9% single vehicle of the drivers and pedestrians	Less than 60%
Spain	Any alcohol: 41%, ≥0.8‰: 29% of the drivers and pedestrians	17.5%
Sweden	Any alcohol suspected by police: 3.3%, any alcohol based on autopsies on fatally injured drivers: 18%:	More than 90%. Official statistics based on police suspicion only
United Kingdom	BAC ≥0.8‰: 19% of cars and other motor vehicles excluding motorcyclists of the drivers.	68%

7.2. Self declared alcohol-related problems in national population surveys

There is clear evidence that alcohol use increases the risk of various physical harms and that risk rises with the volume of drinking (Andersson, 1995). Many alcohol-related problems, however, reach beyond the realm of drinkers' own physical health and concern social and psychological consequences associated with alcohol use. Since these problems seldom come to the attention of the "formal" institutions of social response, they are not "measured" by any reporting system for health and social problems. These problems have been among the most difficult to measure adequately, but they are of great importance to policy makers, for example in terms of reducing accidents and injuries, family instability and hardships. The main approach, and often the only feasible way of measuring the prevalence of these types of alcohol-related problems, is to use general population surveys.

However, few comparative studies have been conducted in this area and almost none including countries with different drinking cultures. The ECAS-survey was probably the first comparative study based on countries with different drinking cultures (see Appendix 3: Ramstedt, 2001e). The survey included questions on both drinking and experiences of alcohol-related problems, which made it possible to carry out a cross-cultural comparative survey of prevalence rates of alcohol-related problems and their associations with volume of drinking and frequency of drinking larger amounts (see Ramstedt, 2001e [Appendix 3]).

To measure the prevalence of current drinking problems, the following eight items were used:
During the past 12 months, have you…
…got into a fight when you had been drinking?
…been in an accident of any kind when you had been drinking?
…ever felt that you should cut down on your drinking?
…regretted something you said or did after drinking?
…felt that your drinking harmed your home life or marriage?
…felt that your drinking harmed your work or studies?
…felt that your drinking harmed your friendships or social life?
…felt that your drinking harmed your health?

One common feature of most of these items is that they relate to social consequences; another is that the respondents' attribution of the consequences to their own drinking is built into the questions. In a cross-cultural frame, cultural variations in the attribution of negative experiences to drinking are a potential pitfall. However, it is not obvious that alternative approaches excluding self-attribution would yield more valid results.

At a four-day thematic meeting of the Kettil Bruun Society (KBS) for Social and Epidemiological Research on Alcohol (Stockholm 2000), measurement of drinking patterns, alcohol-related problems and their connection were on the agenda. As concerns problems from drinking, the researchers recommended several items to be included in international surveys on alcohol and harm, among them the majority of those used in the ECAS-survey (Dawson & Room, 2000).

Researchers attending the meeting agreed that there is a great need to develop and test measures of social harm from drinking, not only harm resulting from the respondent's own drinking, but also harm resulting from others' drinking. Preferably, both sides should be covered in studies on alcohol problems. Several important areas to be considered in studies measuring problems related to drinking were mentioned (Dawson & Room, 2000, p17):

- Marital and partner problems
- Problems with family, children, parents
- Problems with friendships and social life
- Work (school) problems
- Financial problems
- Health problems
- Casualty problems
- Criminal behaviour, police responses
- Drinking – driving and other criminal behaviour risking casualties
- Fighting and violence
- Sexual misbehaviour
- Risk-taking behaviours
- Spiritual well-being

Given this need for developing measures of social harm, it is too early to recommend how exactly these areas should be measured, that is what items should be included (and exact wordings) in future studies, especially if such studies are conducted from a cross-cultural comparative perspective. However, of particular importance, from a comparative perspective, would be to encourage more qualitative research focusing on the meanings of different alcohol-related problems and how these might differ across cultures. It should be mentioned that almost all the accumulated knowledge in this area derives from research conducted in Anglo-Saxon and Nordic countries.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1. Recorded alcohol consumption

The ECAS I report confirmed the results of earlier studies showing that changes in total alcohol consumption are closely related to changes in alcohol-related mortality, especially liver cirrhosis (Norström, 2002). Therefore, total alcohol consumption per capita as well as its structure in terms of beverage categories, i.e. the percentage of beer, wine and distilled spirits in total alcohol consumption, and the mode of sale, i.e. the percentage of off- and on-premises sales, are important indicators for following developments in the public health area in the EU and its member states. Total alcohol consumption is mostly an overall indicator of alcohol-related problems, whereas its structure with regard to beverage categories and mode of sales is more related to drinking patterns.

- The EU should prepare an authoritative report on total alcohol consumption according to beverage categories and, if possible, according to off- and on-premises sales in its member states. The data series should start, if possible, from 1950, but at least from 1970, and they should be presented both in beverage litres and in litres of pure alcohol, and both as absolute figures and per capita figures. As some countries may prefer giving the figures on a per adult rather than per capita basis, data series on total population and population 15 years and older should be presented for conversion purposes.

- The EU should, besides documenting the above-mentioned time series, also prepare a report on how basic figures for alcohol consumption are and have been collected and on how the product litres are and have been converted into alcohol litres. This document should also include information on such changes in methods of collecting alcohol consumption data that may have affected the comparability of the data on total alcohol consumption, according to beverage category and mode of retailing.

8.2. Unrecorded alcohol consumption

As an indicator in the public health area in the EU and its member states, total alcohol consumption per capita by beverage category and by mode of distribution should include, or at least take into account, the contribution of unrecorded alcohol consumption to total alcohol consumption.

The ECAS project has presented estimates of the prevalence of unrecorded alcohol consumption in a cross-sectional perspective and estimated trends in unrecorded alcohol consumption in the EU member states (Leifman, 2001a; see also Österberg & Karlsson, 2002). These findings show that there is much to do in this field, as basic research in the area is lacking in many member states.

- The EU should, therefore, conduct a new study – based on the ECAS study – of the importance of unrecorded alcohol consumption in its member states. This study should firstly assess the importance of different unrecorded alcohol items in different member states, and produce a detailed plan as to how the amount of these items could be measured. In the second phase, the EU should either conduct such a study in all of its member states or encourage its member states to conduct such studies individually.

8.3. National population alcohol surveys

In following developments in public health, questions that monitor trends in total consumption should be complemented by indicators of drinking patterns. The most important indicators in this regard seem to be

1. the share of abstainers in the total population, among males and females, and among adolescents, both boys and girls,
2. the share of heavy drinkers in the total population, and among males and females,
3. the share of the total alcohol consumption consumed as an intoxicant, among males and females and among adolescents, both boys and girls,
4. the frequency of heavy drinking occasions (binge drinking) among males and females, and
5. the share of total alcohol consumption consumed with meals, among males and females.

Heavy consumption, as well as binge drinking, is directly related to alcohol-related health problems in society. In this regard measuring such consumption supplements total alcohol consumption as an indicator of alcohol-related problems. The developments in the share of heavy consumers and in binge drinking, as well as in the share of abstainers and alcohol consumed with meals, are important indicators as regards trying to understand the role of alcohol in society and the possibilities to influence alcohol consumption and related problems.

- The EU should, in order to monitor developments in drinking with implications for public health in Europe, carry out such surveys on a regular basis. Along with the questions repeated at each data collection occasion to monitor trends in drinking patterns, special topics for which comparative data are desirable should be addressed on a one-time basis, or every few years if trends are desired. Such special topics might include questions on expectancies and attitudes concerning drinking, intoxication, and other patterns of drinking; questions on social and physical contexts of drinking; questions on social problems experienced as the result of one's own or others' drinking; and questions on attitudes towards alcohol policies and particular measures to reduce alcohol problems. Analysis of responses on topics such as these can contribute greatly to planning, shaping, and eventually to evaluating alcohol policy measures.

8.4. Alcohol-related harm

Recording of alcohol-related and alcohol-specific causes of death differ between EU countries. The causes of death with specific mention of alcohol (e.g. alcohol dependence, alcohol poisoning) are not directly comparable between countries. However, it is still important to monitor trends in prevalence of these causes over time within each country. (From a technical point of view, cross-cultural comparisons of trends over time have fewer problems of validity and reliability than cross-sectional one-time comparisons). An important change from past practice in ICD-10 is that the type of drug is denoted by the third character but the specific types of disorder by the fourth character. This holds implications for the data reporting, since traditionally most statistical reporting is in terms of three-character ICD-codes. In order to distinguish between these different disorders, and to be able to continue to study trends in different disorders such as alcohol dependence (ICD-9: 303, ICD-10, F10.2) and alcohol psychosis (ICD-9: 291, ICD-10: F10.5) it is necessary that these data be collected and reported at the fourth-character level.

Still, the only indicator of alcohol-related harm that meets reasonable standards of temporal and geographical comparability in the EU member states is mortality data. From a public health perspective, the group of alcohol-related causes of death, with diseases of liver as the main marker, is an important and indispensable indicator of harmful drinking to be used in cross-nationally comparisons and in comparisons of trends over time.

- It is therefore recommended that alcohol-related mortality, along with total consumption and drinking patterns, should be monitored closely in Europe on a regular basis, preferably every year. ECAS has created a substantial set of databases. The mortality database (with data from 1950 to 1995 for most countries) could be used as starting point in such an effort and be updated annually with more recent data from each member state.

It should be recognized that both the general level of liver disease (ICD-10: K70-K79) and the specific four-character subcodes (K70.1-K70.9) are important for alcohol epidemiology and monitoring, and that there is a need to study comparability and improve recording of both levels. Here we suggest several concrete actions that, if implemented, would enhance the comparability of data.

- EUROSTAT is responsible for the compilation and production of statistics in the EU and the former EFTA countries. In the section for mortality statistics in EUROSTAT there existed a voluntary group (task-force) working with a selected number of causes of death regarded as important from a public health perspective. The group worked under the leadership of the French statistical office INSERM. One of the projects concerned the quality and comparability of the mortality statistics. One very comprehensive survey has been sent to various producers of mortality statistics in the European Union with items on how the statistics are compiled and the validity and reliability of a selected number of diagnoses, among them the group of alcohol-related deaths. However, the report published in 2001 excluded alcohol mortality, and the working group is now dissolved. It is essential that this important data is analysed and published completed for the group of alcohol-related deaths. This work should be undertaken now, regardless of plans for new projects (see below).

- If EUROSTAT sets up a new stearing group, which is under consideration, it is recommended that the group of alcohol-related causes of death should be considered as a

subject of priority. One important task would be to produce a common European manual which should include common standards for crucial elements in the classification of alcohol-related deaths. This need came out clearly in the ECAS work, in which it was noticed that there are national deviations in rules of how to choose causes of death, and that these are poorly documented. As for alcohol-related diagnoses, no such documentation has been conducted. It is the ECAS viewpoint that such work should start with liver diseases, being the most important comparative indicator of alcohol-related harm, and continue with alcohol poisoning deaths. In all likelihood, it should be easier to study these two diagnostic groups, and to come up consistent classification rules, than alcohol disorders belonging to the group of "mental and behavioural disorders", for example alcohol dependence and harmful use.

- There is strong evidence that the role of alcohol as a cause of death is strongly underestimated. One way to reduce this would be to use multiple causes of deaths. This is of special relevance for alcohol-specific diagnoses, which are more commonly conceived of as a contributory than underlying cause of death. Some countries already compile these causes of death, but far from all. It is therefore recommended that all the EU member states start to code multiple causes of deaths, and that they are recorded in the international mortality data bases.

- In the area of casualty deaths, two new codes area available (Y90 and Y91) for recording the blood-alcohol level (BAL) or degree of intoxication of injured persons. A current WHO project is validating the use of theses codes for injuries when actually used in emergency services. For mortality, collecting BAL is a less difficult task. EU-member states should be encouraged to set up national projects to initiate the routine use of the Y90 and Y91 codes for injuries, including fatal injuries, as part of the shift to recording and reporting multiple causes of death.

9. REFERENCES

ÅGREN, G. & JAKOBSSON, S.W. (1987). Validation of diagnoses on death certificates for male alcoholics in Stockholm. *Forensic Science International*, 33, 231-241.

ANDERSSON, P. (1995) Alcohol and risk of physical harm, in: HOLDER, H.D. & EDWARDS, G. (Eds.) *Alcohol and public policy – evidence and issues*, pp. 832-108, (Oxford, Oxford University Press).

BLOOMFIELD, K., AHLSTRÖM, S., ALLAMANI, A., CHOQUET, M, CIPRIANI, F., GMEL, G., JACQUAT, B.J., KNIBBE, R., KUBICKA, L., LECOMTE, T., MILLER, P., PLANT, M. & SPAK, F. (1999) *Alcohol Consumption and Alcohol Problems among Women in European Countries*. *Project Final Report* (Berlin, Free University of Berlin, Institute for Medical Informatics, Biostatistics & Epidemiology).

BYGVRÅ, S. & HANSEN, C. Y. (1987) *Den dansk-tyske grænsehandel. Udvikling, indhold, årsager / 1977-1986* [Bordershopping between Denmark and Germany. Development, contents, reasons / 1977-1986] (Aabenraa, Institut for grænseregionsforskning).

CIPRIANI, F. & LANDUCCI, L. (1999) Alcohol-related mortality and morbidity data sources and a tentative analysis of alcohol-related mortality in Europe, in: (BLOOMFIELD, K., AHLSTRÖM, S., ALLAMANI, A., CHOQUET, M, CIPRIANI, F., GMEL, G., JACQUAT, B.J., KNIBBE, R., KUBICKA, L., LECOMTE, T., MILLER, P., PLANT, M. & SPAK, F.) *Alcohol Consumption and Alcohol Problems among Women in European Countries*. *Project Final Report*, pp. 205-234. (Berlin, Free University of Berlin, Institute for Medical Informatics, Biostatistics & Epidemiology).

CREWS, D.E., STAMLER, J. & DYER, A. (1991) Conditions other than underlying cause of death listed on death certificates provides additional useful information for epidemiological research, *Epidemiology*, 2, 271-275.

DAWSON, D. & ROOM, R. (2000) Towards an agreement on ways to measure and report drinking patterns and alcohl-related problems in adult population survyes: the Skarpö conference overview, *Journal of Substance Abuse*, 12, 1-21.

EDWARDS, G., ANDERSON, P., BABOR, T.F., CASSWELL, S., FERRENCE, R., GIESBRECHT, N., GODFREY, C., HOLDER, H.D., LEMMENS, P., MÄKELÄ, K., MIDANIK, L.T., NORSTRÖM, T., ÖSTERBERG, E., ROMELSJÖ, A., ROOM, R., SIMPURA, J., AND SKOG, O.-J. (1994) *Alcohol Policy and the Public Good* (Oxford, Oxford University Press).

ENGLISH, D.R., HOLMAN, C.D., MILNE, E., WINTER, M.J., HULSE, G.K., CODDE, G., BOWER, C.I., CORTU, B., DE KLERK, N., LEWIN, G.F., KNUIMAN, M., KURINCZUK, J.J. & RYAN, G.A. (1995) *The Quantification of drug Caused Morbidity and Mortality in Australia, 1992* (Canberra, Commonwealth Department of Human Services and Health).

EISENBACH-STANGL, I., UHL, A., KARLSSON, T. & ÖSTERBERG, E. (2002) Austria, in: Österberg, E. & Karlsson, T. (Eds) *Alcohol Policies in EU Member States and Norway. A Collection of Country Reports* (Helsinki, Stakes).

HEMSTRÖM, Ö. (2001) Per capita alcohol consumption and ischaemic heart disease mortality, *Addiction*, 96, Supplement 1, S93-S112.

HOLDER, H. D., KÜHLHORN, E., NORDLUND, S., ÖSTERBERG, E., ROMELSJÖ, A. & UGLAND, T. (1998) *European Integration and Nordic Alcohol Policies. Changes in Alcohol Controls and Consequences in Finland, Norway and Sweden, 1980-1997* (Ashgate, Aldershot).

HOPE, A. & BYRNE, S. & KARLSSON, T. & ÖSTERBERG, E. (2002) Ireland, in: Österberg, E. & Karlsson, T. (Eds) *Alcohol Policies in EU Member States and Norway. A Collection of Country Reports* (Helsinki, Stakes).

HURST, W., GREGORY, E. & GUSSMAN, T. (1997) *International Survey: Alcoholic Beverage Taxation and Control Policies, Ninth Edition* (Ottawa, Brewers Association of Canada).

HYMAN, M. M. (1981) ”Alcoholic”, ”unspecified” and ”other specified” cirrhosis mortality: A study in validity. *Journal of Studies on Alcohol*, 42, 336-343.

JOUGLA, E., BALKAU, B., PAPOZ, L. & THE EURODIAB SUBAREA C STUDY GROUP (1992) Death certificate coding practises related to diabetes in European countries - the Eurodiab study, *International Journal of Epidemiology*, 21, 343-351.

KARLSSON, T. & ÖSTERBERG, E. (2001) A scale of formal alcohol control policy in 15 European Countries, *Nordic Studies on Alcohol and Drugs*, 18 (English Supplement), 117-131.

KARLSSON, T. & SIMPURA, J. (2001) Changes in living conditions and their links to alcohol consumption and drinking patterns in 16 European countries, 1950 to 2000, *Nordic Studies on Alcohol and Drugs*, 18 (English Supplement), 82-99.

KELSON, M.C. & FAREBROTHER, M. (1987) The effect of inaccuracies in death certification and coding practices in the European Economic Community /(EEC) on international cancer mortality statistics, *International Journal of Epidemiology*, 16, 411-414.

KELSON, M.C. & HELLER, R.F. (1983) The effect on death certificates and coding practices on observed differences in respiratory disease mortality in 8 E.E.C. countries, *Rev Epidém Publ*, 31, 423-432

KÜHLHORN, E., HIBELL, B., LARSSON, S. RAMSTEDT, M. & ZETTERBERG, H. L. (1999) *Alkoholkonsumtionen i Sverige under 1990-talet* (Stockholm, Elanders Gotab).

LAURELL, H. (1999) *Impaired Driving: What's New in Other Countries*, Paper presented at the 78th Annual Meeting of the Transportation Research Board, Washington DC, January 1999.

LEIFMAN, H. (2001a) Estimations of unrecorded alcohol consumption levels and trends in 14 European countries, *Nordic Studies on Alcohol and Drugs*, 18 (English Supplement), 54-70.

LEIFMAN, H. (2001b) Homogenisation in alcohol consumption in the European Union, *Nordic Studies on Alcohol and Drugs*, 18 (English Supplement), 15-30.

LEIFMAN, H. (2001c) A comparative analysis of drinking habits in six EU countries in the year 2000. Stockholm University, SoRAD. Submitted to Contemporary Drug Problems.

LEIFMAN, H. (2001d) Validity problems in alcohol surveys with special emphasis on the comparative six country ECAS survey. Stockholm University, SoRAD. Submitted to Contemporary Drug Problems.

LEPPÄNEN, K., SULLSTRÖM, R. & SUONIEMI, I. (2001a) *The Consumption of Alcohol in Fourteen European Countries, A Comparative Econometric Analysis* (Helsinki, Stakes).

LEPPÄNEN, K., SULLSTRÖM, R. & SUONIEMI, I. (2001b) Effects of economic factors on alcohol consumption in fourteen European countries, *Nordic Studies on Alcohol and Drugs*, 18 (English Supplement), 100-116.

NORDLUND, S. & ÖSTERBERG, E. (2000) Unrecorded alcohol consumption: Economics and its effects on alcohol control in the Nordic countries, *Addiction*, 95, 551-564.

NORSTRÖM, T. (1997) Alkoholkonsumtionens mörkertal i Sverige 1960-94 (Unregistered alcohol consumption in Sweden 1960-94), *Nordic Studies on Alcohol and Drugs*, 14, 65-73.

NORSTRÖM, T. (1998) Estimating changes in unrecorded alcohol consumption in Norway using indicators of harm, *Addiction*, 93, 1531-1538.

NORSTRÖM, T. (1999) European Comparative Alcohol Study – ECAS. Project presentation, *Nordic Studies on Alcohol and Drugs*, 16 (English Supplement), 5-6.

NORSTRÖM, T. (2001) (ed.) *Alcohol in postwar Europe. Consumption, drinking patterns, consequences and policy responses in 15 European countries* (Stockholm, Folkhälsoinstitutet).

NORSTRÖM, T. (2001) Per capita alcohol consumption and all-cause mortality in 14 European countries, *Addiction*, 96, Supplement 1, S113-S128.

NORSTRÖM, T., HEMSTRÖM, Ö., RAMSTEDT, M., ROSSOW, I. & SKOG, O.-J. (2001) Mortality and population drinking, in: Norström (Ed.) *Alcohol in Postwar Europe: Consumption, drinking patterns, consequences and policy responses in 15 European countries*, pp. 149-168. (National Institute of Public Health (Sweden) & European Commission.)

NORSTRÖM, T. & SKOG, O.-J. (2001) Alcohol and mortality: Methodological and analytical issues in aggregate analyses, *Addiction*, 96, Supplement 1, S5-S18.

ÖSTERBERG, E. (1979) *Recorded consumption of alcohol in Finland, 1950-1975*. Reports from the Social Research Institute of Alcohol Studies No. 125 (Helsinki, Social Research Institute of Alcohol Studies).

ÖSTERBERG, E. (2000) Unrecorded alcohol consumption in Finland in the 1990s. *Contemporary Drug Problems*, 27, 271-299.

ÖSTERBERG, ESA (2002) Onko vuosi 2004 kohtalokas alkoholiveroillemme (Does alcohol excise duties collapse in Finland in 2004). *Hyvinvointipolitiikka* 67, 234-244.

ÖSTERBERG, E. & KARLSSON, T. (Eds.)(2002) *Alcohol Policies in EU Member States and Norway. A Collection of Country Reports* (Helsinki, Stakes).

ÖSTRÖM, M. & ERIKSSON, A. (1993) Single-Vehicle Crashes and Alcohol: A retrospective Study of Fatalities in Northern Sweden. *Accid. Anal. & Prev*., 25, 171-176

POLLOCK, D., BOYLE, C., DE STEFANO, F., MOYER, L. & KIRK, M. (1987) Underreporting of alcohol-related mortality on deaths certificates of young US ARMY veterans. *JAMA*, 258, 354-348.

RAMSTEDT, M. (1999) Liver cirrhosis mortality in 15 European countries, *Nordic Studies on Alcohol and Drugs,* 16 (English Supplement), 55-73.

RAMSTEDT, M. (2000) *Alcohol-related mortality in 14 Western European countries.* Paper presented at the Kettil-Bruun Conference (KBS) June 2000 (Oslo).

RAMSTEDT, M. (2001a) Per capita alcohol consumption and liver cirrhosis mortality in 14 European countries, *Addiction,* 96, Supplement 1, 19-34.

RAMSTEDT, M. (2001b) Alcohol and suicide in 14 European countries, *Addiction,* 96, Supplement 1, S59-S76.

RAMSTEDT, M. (2001c) *Per capita alcohol consumption and mortality from pancreatitis in 13 European* countries (Stockholm, Stockholm University, Centre for Social Research and Alcohol and Drugs. Mimeo).

RAMSTEDT, M. (2001d) Alcohol-related mortality in 15 European countries in the postwar period s, in: NORSTRÖM, T. (red) *Alcohol in postwar Europe. Consumption, drinking patterns, consequences and policy responses in 15 European countries*, pp. 127-147 (Stockholm, Folkhälsoinstitutet).

RAMSTEDT, M. (2001e) Alcohol consumption and the experience of adverse consequences – a comparison of six European countries, in: Ramstedt, M. *Comparative studies on alcohol-related problems in postwar Western Europe*, (Thesis) (Stockholm, Stockholm University, Department of Sociology)

REHM, J. (1999) Draining the ocean to prevent shark attacks?, *Nordic Studies on Alcohol and Drugs,* 16 (English Supplement), 46-54.

RIDDICK, L. & LUKE, J.L. (1978) Alcohol-associated deaths in the District of Columbia: a post-mortem study, *Journal of Forensic Science*, 23, 493-502.

ROMELSJÖ, A., KARLSSON, G., HENNINGSOHN, L & JAKOBSSON, S. (1987) The prevalence of alcohol-related mortality in both sexes: variation between indicators, Stockholm 1987, *American Journal of Public Health*, 83, 838-844

ROOM, R. (1972). Alcohol-related urban mortality: a cross-national study, *Drinking and Drug Practices Surveyor*, 5, 11-13

ROOM, R. (1999) The idea of alcohol policy, *Nordic Studies on Alcohol and Drugs*, 16 (English Supplement), 7-20.

ROSS, H. (1993) Prevalence of alcohol-impaired driving: An international comparison. *Accident Analysis and Prevention,* Vol. 25, No. 6, pp. 777-779

ROSSOW, I. (2001) Alcohol and homicide – a cross-cultural comparison of the relationship in 14 European countries, *Addiction,* 96, Supplement 1, S77-S92.
SCHULZ *et al.*, 1991).

SIMPURA, J. (1995) Trends in alcohol consumption and drinking patterns: Lessons from world-wide development, in: Holder, H.D. & Edwards, G. (Eds) *Alcohol and Public Policy: Evidence and Issues* (New York, Oxford University Press).

SIMPURA, J. (1999) Drinking patterns and alcohol policy, *Nordic Studies on Alcohol and Drugs*, 16 (English Supplement), 35-45.

SIMPURA, J. (2001) Trends in drinking patterns and alcohol consumption: sociological and economic explanations and alcohol policy, *Nordic Studies on Alcohol and Drugs*, 18 (English Supplement), 3-14.

SIMPURA, J. & KARLSSON, T. (2001) Trends in drinking patterns among adult population in 15 European countries, 1950 to 2000: a review, *Nordic Studies on Alcohol and Drugs*, 18 (English Supplement), 31-53.

SIMPURA, J. & KARLSSON, T. (2001) *Trends in Drinking Patterns among Adult Population in 15 European Countries, 1950 to 2000, A Collection of Country Reports* (Helsinki, Stakes).

SKOG, O.-J. (1999) Alcohol policy: Why and roughly how?, *Nordic Studies on Alcohol and Drugs*, 16 (English Supplement), 21-34.

SKOG, O.-J. (2001a) Alcohol consumption and overall accident mortality in 14 European countries, *Addiction,* 96, Supplement 1, S35-S48

SKOG, O.-J. (2001b) Alcohol consumption and mortality rates from traffic accidents, accidental falls, and other accidents in 14 European countries, *Addiction,* 96, Supplement 1, S49-S58.

SINGLE, E., ROBSON, L., REHM, J. & XIE, X. (1999) Morbidity and mortality attributable to alcohol, tobacco and illicit drug use in Canada, *American Journal of Public Health*, 89, 385-390.

STEWART, K. (2000) Alcohol involvement in fatal crashes. Comparisons among countries. Submitted to the National Highway Traffic Safety Administration

SULKUNEN, P. (1976) Drinking patterns and the level of alcohol consumption: An international overview. Research Advantages in Alcohol and Drug Problems, Vol. 3, pp.

223-281. Gibbins, R.J., Israel, Y.,Kalant, H., Popham, R.E., Schmidt, W. & Smart, R. (Eds.) New York, Wiley & Sons.

THORSEN, T. (1988) Danskerne drikker mere end som så [The Danes are drinking more than the statistics show], *A&N-Debat*, no. 33, 16-21.

TROLLDAL, B. (2001) Sales of alcoholic beverages and the inhabitants' consumption in 15 European countries. A correction based on consumption during journeys abroad and tax-free purchases, *Nordic Studies on Alcohol and Drugs*, 18, (English Supplement), 71-81.

VOAS, R. (1993) Issues in cross-national comparisons of crash data, *Addiction*, 88(7), pp. 959-967.

WHO (1977*) ICD-9. International Classifiaction of Diseases*. 1975 revision. (Geneva, World Health Organization).

WHO (1993*) ICD-10 International Statistical Classification of Diseases and Related Health Problems (Geneva,* World Health Organization).

WHO (2000) *International Guide for Monitoring Alcohol Consumption and Related Harm.* Department of Mental Health and Substance Dependence Noncommunicable Diseases and Mental Health Cluster. World Health Organization (Geneva, World Health Organisation).

APPENDIX 1. COUNTRY DESCRIPTIONS OF THE SYSTEM TO RECORD ALCOHOL CONSUMPTION

1. The inquiry

At the end of October, 2001 the following letter was sent to our contact persons in all ECAS countries.

" European Comparative Alcohol Study (ECAS) is approaching its final stage. In the second part of the ECAS we are scrutinising, among others, how the data on alcohol consumption are collected, and analysing the role played by unrecorded alcohol consumption. We are also discussing alcohol consumption figures as indicators in the alcohol field.

One part of our report deals with official recording systems of alcohol consumption. As an appendix we are giving our present view of the recording system in Finland, Ireland and Italy.

We are now asking you to **give a similar description of the system to record alcohol consumption in your country**. We are very happy if we are receiving a quite short description of the basic features but we are gladly reading also longer and more detailed reports. ECAS II should be ready by the end of 2001. Therefore, we hope that you could find time **delivering us the needed data no later than the 12 of November**. Thank you for your kind co-operation."

The following country descriptions have been sent to us descriptions by the end of January 2002.

2. Austria

In Austria the calculation of the per capita consumption of wine, beer and spirits is done separately. For the calculation of the per capita consumption of pure alcohol it is not only necessary to collect the different data, but also to calculate their alcohol content. Alcoholic beverages not belonging to the categories wine, beer and spirits – as for instance cider - are not registered at all. This is true for the time after WWII. During the time between WWI and WWII the per capita consumption of pure alcohol was calculated by the Österreichisches Statistisches Zentralamt and published annually in the Statistische Handbuch Österreichs.

Beer. The per capita consumption of beer is annually (1st January – 31th December) calculated by the beer industry – the Verband der Brauereien Österreichs with support of the Statistik Österreich for import and export figures. They do not consider alcohol free beer. The types of beers produced in Austria differ concerning the alcohol content. The Institut für Getränkeanalytik proposed to calculate the per capita consumption with 5 per cent pure alcohol by volume. The alcohol content of the beer has been increasing since 1945. The figures presented in our own calculation were nevertheless always based on the 5 per cent alcohol content. Until the mid-1990s the per capita consumption of beer was also calculated by the Österreichisches Statistisches Zentralamt / Statistik Österreich, based on the taxes of beer. Their figures did not differ remarkably from those of the beer industry. It is to be assumed that the figures are quite accurate, because beer is produced industrially.

Wine. The per capita wine consumption is calculated by a department of the Statistik Österreich responsible for agrarian issues. It is calculated by harvest, by changes of storage, import and export, and industrial use (a minus) for the so called "Weinjahre", that is form the 1st of November to the 31th of October. The Institut of Getränkeanalytik proposes an alcohol content of 11.5 per cent alcohol by volume though the alcohol content differs from year to year and from wine to wine. The alcohol content of wine seems to have been relatively stable during the last 100 years. The per capita consumption of wine is also calculated by the department responsible for nutrition (Ernährungebilanzen) but the Weinbilanzen are said to be the more precise. Since wine is an agrarian product, illegal production should be remarkable, but it should have decreased remarkably since WWII because of better instruments of surveillance, for instance pictures of wine growing areas from helicopters.

Spirits: The per capita consumption of pure alcohol consumed as spirits is calculated by the Verband der Spirituosenindustrie. They do not calculate the per capita consumption in liters of spirits. They consider the different levels of pure alcohol of the different types of beverages (average about 35 per cent). But they for instance do not count the rum containing 80 per cent alcohol because, as they say, it is only used for cooking. The per capita consumption of pure alcohol consumed as spirits does not include the consumption of home produced spirits (Hausbrand) – especially defined farmers have the right to produce a certain amount of spirits (27 – 58 liters in the different states) taxfree. The statistics on spirits for these and other reasons are the most unreliable of the alcohol statistics. The alcohol content of spirits decreased remarkably during the last 100 years.

3. Denmark

The data on recorded alcohol consumption is based on data from the Annual Report from Danish Statistics. Alcohol sales figures are based of where excise duty is paid.

Both domestic produced and imported alcohol products must pay excise duty. When alcohol products are released from producers or import agencies excise duty must be paid and are then recorded in the sales figures for that period.

There are three main alcoholic beverage types with different excise duty rates and which are used to calculate alcohol consumption rates.
Beer. Beer with 2.8 per cent alcohol by volume or more is charged a excise duty. With increasing alcohol content the excise duty is increased. There are five different excise duties on beer according to the alcohol content.
Distilled spirits. Distilled spirits are recorded as litres of pure alcohol. Only alcohol products produced for drinking are recorded. The excise duty is based on the content of alcohol in the product.
Wine including cider and other fruit wines. Wine with 1.2 per cent alcohol by volume or more is charged an excise duty. The excise duty is based on the alcohol content. Wine with more than 22 per cent alcohol by volume is charged as distilled spirits. There are three different excise duties on wine according the alcohol content. Sparkling wine is charged an extra excise duty. Wine sales are reported in litres of wine.

At the point of alcohol sales to the customer, the retailer must charge a Value Added Tax of 25%.

The main category of unrecorded consumption in Denmark is most likely to be from the import of alcoholic beverages by travellers. The cross border sale is increasing in Denmark with an import between Germany and Denmark and an export between Denmark and Norway and Sweden. The import is bigger than the export and between 10-20 per cent of the total alcohol consumption is unrecorded because of cross border sale. Smuggling of spirit between Germany and Denmark is increasing. Until 1st January 2004 there is a restriction in the level of import of distilled spirits between Denmark and other EU countries.

4. Finland

In Finland retail sales of alcoholic beverages are organised as follows:
1. The state alcohol company, Alko Ltd has a monopoly for off-premise retail sales of all distilled spirits with an alcohol content over 2.8 per cent by volume, all fortified wine with an alcohol content over 2.8 per cent by volume, all wine and similar kind of products with an alcohol content over 2.8 per cent by volume (with the exception of the sales of fruit wines produced and sold off-premise by the so called wine farms), and all beer (strong beer) and cider (strong cider) containing more than 4.7 per cent alcohol by volume. The proportion of the off-premise retail wine sales of the wine farms is very small of the total off-premise retail wine sales. Alko is also selling beer (medium beer) and cider with an alcohol content between 2.8 and 4.7 per cent by volume.
2. Grocery stores have the right to sell off-premise beer (medium beer) and cider and wine products with an alcohol content at most 4.7 per cent by volume, and all products including distilled spirits with an alcohol content at most 2.8 per cent by volume.
3. On premise retail sales of alcoholic beverages take place in licensed restaurants with either the right to retail all alcoholic beverages or only alcoholic beverages with an alcohol content of at most 22 per cent by volume or only alcoholic beverages with an alcohol content at most 4.7 per cent by volume.

In Finland alcoholic beverages are defined as all alcohol containing beverages with an alcohol content at most 80 and at least 2.8 per cent by volume.

Recorded alcohol consumption consists of two different parts. On the one hand it consists of:
off-premise retail sales of alcoholic beverages by Alko, i.e. the amount alcohol Alko is selling during the calendar year to its customers for off premise consumption. This figure includes also Alko's sales to enterprises and companies independently in what kind of circumstances these beverages are consumed. In other words alcohol consumption is here defined as alcohol sales to customers. Sales and consumption may here differ because customers are stocking alcohol at home.
On the other hand recorded alcohol consumption consists of :
sales of alcoholic beverages by alcohol importers, domestic alcohol producers and domestic alcohol wholesalers to grocery stores, gasoline stations, cafés and restaurants by the calendar year. In other words, here alcohol consumption is defined as deliveries to retail sales outlets, not to final customers. Consumption and sales may now also differ because restaurants and grocery stores are storing different amounts of alcoholic beverages at the end of the calendar year.

Total recorded alcohol consumption is Alko sales plus deliveries to other legal alcohol outlets.

The volume of alcoholic beverages in product litres is converted into litres of pure alcohol consumption by using the alcohol content for different product categories.

Consequently in Finland unrecorded alcohol consumption consists of
- consumption of alcohol in products with an alcohol content less than 2.8 per cent by volume
- home made beer, wine and distilled spirits
- smuggling of alcoholic beverages
- import of alcoholic beverages by travellers
- drinking substances or surrogates not defined as alcoholic beverages

5. France

In France there is no direct statistics about alcohol consumption. It is necessary to calculate this consumption from different sources: the taxes and excise duty rates of the alcohol sales, the total production and the difference between exportations and importations. Those statistics are compared with the results of panels studies.
Data of the Ministry of Finances (taxes and excise duty):
- Direction Générale des Douanes et des Droits Indirects (DGDDI).
- Direction Générale de la Concurrence, de la Consommation et de la Répression des Fraudes (DGCCRF).
Data of the Ministry of Agriculture: production.
Data of declaration about sales and purchases:
- Enquêtes INSEE: budget des ménages.
- Données des professionnels: données de vente par panel (INRA - IREB - ONIVINS).
Data of consumption declaration:
- INSEE : consommation des ménages (population).
- Baromètre Santé CFES (population).
- Enquête ESCAPAD (young people).
- Enquête ESPAD (pupils).

All these data are collected and analysed by the OFDT (observatoire français des drogues et des toxicomanies).

6. Germany

In Germany three kinds of alcohol are differentiated (Law for the Protection of the Youth in Public):
- Beverages containing spirits. Spirit is every product obtained by distillation of fermented, alcoholic liquid or by other ways (e.g. schnapps, rum, whisky, liqueur, brandy, corn schnapps). Mixed drinks such as cocktails also belong to this category, if they contain spirit (e.g. Cola-rum).
- Food, that contains more than a small amount of spirit. As small amount has been defined spirits used to preservation (according to food law) or flavouring (e.g. in sauces, soups, cake-cream etc.). If the alcohol content shapes the character of a food (e.g. ice cream with spirits), more than only a small amount will be assumed.
- Other alcoholic beverages. These are beverages, whose alcohol content is the result of fermentation or (wine-)pressing etc., and that are not processed to the high-proof alcoholic

beverages in the sense of no. 1. All beverages that contain alcohol without containing spirits belong to that category (biggest group are beer and wine/sparkling wine).

Alcoholic beverages with an alcoholic content of more than 1,2 vol.-% (at 20º Celsius) have to be labelled (Food-Labelling Prescription).

Statistics on production amounts of alcoholic beverages can be found both in official figures from the German Federal Office of Statistics as well as in publications by the German Brewers' Association, the German Winegrowers' Association and the National Association of German Spirits Industry Leaders and Importers (BSI).

Production levels alone, however, only serve as a limited indicator of the effects of alcohol consumption on health. The deciding factor is consumption. These figures result from production amounts after they have been adjusted for import, export, storage and cross-border activity.

Calculating consumption levels of beer, wine, sparkling wine and spirits:
(Data from Michael Breitenacher, ifo Institute for Economic Research[10], Munich).

Beer consumption. Total beer consumption is calculated as the sum of
- taxable beer profits. (The figures are derived from beer tax assessments. Exports are not included here as exported beer is not taxed in Germany, but in the respective country).
- employee on-premise consumption (Beer given to brewery employees. Employee on-premise consumption is not taxable).
- imports (taxed on the border).
- non-alcoholic beer, malt beverages (less an estimated portion for export).

Wine consumption. Total wine consumption is calculated as the sum of
- opening inventory (warehousing),
- import,
- current wine production,
less
- export,
- wine for further processing,
- closing inventory (warehousing).

There is no tax on wine. Therefore, no corresponding statistics are available.

Sparkling wine consumption. Total consumption of sparkling wine is directly calculated from the tax statistics data of the German Federal Statistical Office on sparkling wine (Technical series 14, No. 9.5)[11]. These statistics include imports and exports.

Consumption of spirits. Total consumption of spirits is calculated as the sum of
- the production of spirits in companies with ten or more employees (These statistics are regularly recorded by the German Federal Statistical Office.),
- production of spirits in small domestic companies (Here turnover is recorded, not production; production is then projected from the turnover. Turnover is not regularly recorded.),

[10] Ifo Institut für Wirtschaftsforschung
[11] Fachserie 14, Reihe 9.5 des Statistischen Bundesamtes

- imports of spirits (from export trade statistics),
less
- exports of spirits (from export trade statistics),
- imports of unfinished spirits made from wine and, in part, rum and whisky (to avoid double counting since the Germa Federal Statistical Office views bottling as production).
- Warehousing is not included.

The Munich-based Institute for Economic Research (ifo) calculates consumption levels for beer, wine, sparkling wine and spirits and publishes them at least once annually (ifo express service). These published figures are widely recognized in Germany and are used by all relevant institutions.

International comparisons of per capita consumption of pure alcohol as well as comparisons of German studies repeatedly encounter the problem that different factors are employed for converting alcoholic beverage consumption into pure alcohol. In Spring 1999, the following conversion factors were agreed upon by representatives of the German alcohol industry together with members of a working group initiated by the German Federal Ministry of Health (BMG):
- Beer 4.8 vol.-%
- Wine/sparkling wine 11.0 vol.-%
- Spirits 33.0 vol.-%

This agreement was based on data compiled from various studies focusing on the average alcoholic content of the most important beverages in Germany as well as their respective market shares. Participating specialists and associations have agreed to employ only these values for their estimations in the future. It was further agreed to periodically assess and, if necessary, adapt these values to reflect changes in drinking habits.

At present, quantitative information on unrecorded alcohol consumption in Germany is not available. The percentage of overall unrecorded alcohol, however, is assumed to be negliable small.

References
Bühringer, G., Augustin, R., Bergmann, E., Bloomfield, K., Funk, W., Junge, B., Kraus, L., Merfert-Diete, C., Rumpf, H.-J., Simon, R. & Töppich, J. (2000). *Alkoholkonsum und alkoholbezogene Störungen in Deutschland* (Schriftenreihe des Bundesministeriums für Gesundheit, Bd. 128). Baden-Baden: Nomos. *(English version in preparation)*
Kümmler, P., Jünger, S. & Kraus, L. (2000). *Comparative Alcohol Policy in Europe: Country Report Germany* (IFT-Reports Vol. 112). Munich: IFT Institute for Therapy Research.

7. Italy

In Italy recording of alcohol consumption is part of the producing food balance sheets by the National Institute of Statistics (ISTAT).

The annual consumption of alcoholic beverages is calculated as follows:
Consumption = production + imports - exports - other uses and wastes +/- change between opening and closing stocks.

Each parameter of the formula derives from surveys, estimates and samples carried out by several Institutes or Departments, running a somewhat measurement error.

8. Ireland

The data on recorded alcohol consumption is based on the Annual Revenue Commissioners Statistical Reports. The alcohol sales figures are based at the point of where excise duty is paid.

Imported alcohol products must pay excise duty, with accompanying documentation, at the point of import unless the alcohol products are placed in bonded warehouses (not available for sale). When alcohol products are released from bonded warehouses then excise duty must be paid and thus recorded in the sales figures for that period.

Alcohol products manufactured in Ireland must also pay excise duty before distribution of product to retailers, unless placed in bonded warehouses.

Therefore the alcohol sales figures technically show the amount of alcohol for sale in the market place. The retail sector have a certain amount of alcohol products in stock, however since this stock is continuously being replenished, it is reasonable to assume that the alcohol sales figures based on excise duty do reflect alcohol consumed over the 12 month period.

There are four main alcoholic beverage types with different excise duty rates and which are used to calculate alcohol consumption rates.

Beer . Up to 2nd October 1993, the unit of charge for excise duty on beer was the 'standard barrel' i.e. 36 gallons of worts (beer before fermentation of a specific gravity of 1055). Since 1993 the system for charging duty (thus recorded sales) was changed to an 'end product' basis, the unit of charge is now the hectolitre per percent alcohol by volume. Given this change, at where excise duty was charged, the quantities of beer sales for the year 1993 are lower than would have been recorded.
The beer figures include beer containing more than 0.5% of alcohol by volume.

Spirits. Spirits are recorded as litres of pure alcohol. The quantities of spirit sales exclude perfumed spirits, spirits deliver for methylation, scientific purposes, for use in arts and manufacture and other spirits delivered without payment of duty.

Wine. The rate of excise duty on wine is based on whether the product is still or sparking and on its alcoholic strength by volume. There are four different categories,
- still and sparkling not exceeding 5.5%,
- still exceeding 5.5% but not exceeding 15%,
- still exceeding 15%, and
- sparkling exceeding 15%

Prior to 1993 quantities of all wine not exceeding 5.5% volume were included with wine not exceeding 15% volume.

Wine sales are reported, by the Revenue Commissioners, in litres of wine. To calculate from wine litre to pure alcohol per litre, 12.5% volume is used by Department of Health and

Children, as by far the largest volume category in wine is category two above (between 5.5 – 15%).

Cider and Perry. The rate of excise duty on cider and perry is based on whether the product is still or sparkling and on its alcoholic strength by volume.

Cider and perry is reported in litres of cider and perry. To calculate from cider litre to pure alcohol per litre, 5% volume is used by Department of Health and Children.

At the point of alcohol sales to the customer, the retailer must charge a Value Added Tax of 20%. The retailer is then required to make VAT returns to the Revenue Commissioners every two months. These figures are only used for VAT collection and are not used in the calculation for alcohol consumption.

The main category of unrecorded consumption in Ireland is most likely to be from the import of alcoholic beverages by travellers.
Smuggling of alcohol beverages could also be a source of unrecorded sales. It was an issue when the differential in excise duty was greatest between Ireland and Northern Ireland, particularly during the 1980's.

9. The Netherlands

Spirits: Collection of spirits statistics derive from national revenue figures divided by tariff. Spirits consumption data is thus based on excise duties paid when the spirits in entering the market.

Beer: Responsible for the collection of statistics is the Brewers Association of Holland. They collect monthly figures (from breweries) as concerns production, import, export and changes on stocks. Beer are classified in four groups based on alcohol contents which makes it possible to give figures on of beer in litres of 100% alcohol?

Wine: Practically all wine is imported. Therefore the collection of recorded wine consumption is based on imports plus changes in stock (checked 1 October every year).

Population figures are the population in middle of the year.

Unrecorded consumption is considered to be very low.

10. Norway

In Norway retail sales of alcohol beverages are organised as follows

1. Licenses to sell alcohol are grantes by the municipal councils. Licences to sell spirits and wine can only be granted to Vinmonopolet and spirits and wine can only be sold in Vinmonopolets sales outlets. A key in Norweagian alcohol policy has been to remove the private motive from sales of wine, spirits and strong beer. Vinmonopolet is therefor wholly owned by the state. Before 1 March 1993 private persons who had been granted a licence, could sell strong beer. After this dates only Vinmonopolet is entitled to sell strong beer. To

obtain a licence for a Vinmonopol outlet, the Department of Health and Social Affairs must grant permission to the municipality.

2. Licence for sales of medium strong beer (4. 75% alcohol by volum) can be granted to private proprietors - generally those who operate grocery stores. A similar licence can also be granted to a so-called beer monopoly. This means that the licence holder is entitled to sell beer only from the sales location, and cannot combine this with sales of any other goods. It usually also means that there are no other licence holders in the municipality.

3. Recorded alcohol consumption and unrecorded alcohol consumption

Recorded alcohol consumption. Recorded alcohol consumption of beer, wine and spirits are based on sales figures and/or the excise duty on alcohol. Registered consumption of spirits, wine and strong beer (over 4.75 per cent alcohol by volume) was based on information from Vinmonopolet (the Norwegian Wine and Spirits Monopoly), on retail sales, sales to establishments that serve alcohol and registered private imports. After the Wholesale monopoly was revoked on 1.1. 1996, the recorded alcohol consumption is based on figures for production and import from the Directorate of Customs and Excise, the same as for beer. Registered consumption of beer is calculated on the basis of excise duty. Light beer (beer with an alcohol content of 0.7 -2.75 per cent by volume) is included in recorded alcohol consumption, even though drinks with less than 2.5 per cent alcohol by volume are not defined as alcoholic beverages.

Unrecorded alcohol consumption. Smuggling of fortified wines and spirits, home destilling, home production of wine, as well as a rather large volume of tourist imports are the most important sources of unregistered alcohol. The unrecorded alcohol comes in Norway partly from legal sources; tax-free shops, border trade and home production of wine and beer, and partly from illegal; smuggling and home made spirits. The consumption of unrecorded alcohol seems to have been fairly stable during the 1990`s, but there seems to have been a shift from illegal towards more legal goods (SIRUS rapport nr 1). Around one fourth of the total alcohol consumption is unrecorded.

11. Portugal

In Portugal the data concerning alcoholic beverages are collected by Instituto Nacional de Estatística (National Statistical Institute) and are published in the Issue “Balança Alimentar Portuguesa” (Portuguese Food Scale) which provides us a national overview on the subject.

The alcoholic beverages are gathered as follows:
- Fermented Alcoholic Beverages
- Wine and similar kind of products
- Beer;
  - Other fermented beverages
- Other alcoholic beverages
  - Fire-water (40 per cent alcohol by volume)
  - Liqueur (25 per cent alcohol by volume)
  - Others (40 per cent alcohol by volume)

The alcoholic beverages are referred in thousands of hectolitres and, using a mathematical formula, calculated as follows: Available for supply = Production + Imports – Exports – Other uses and wastes – Stock variation

Per capita alcohol consumption equals the total human consumption divided by the number of inhabitants (local residents) referred in litres.

There are no records concerning non-declared alcoholic beverages production and consumption.

In Portugal, the definition of "Alcoholic Beverage" implies an alcohol volume over 0,5 per cent.

There are several kinds of beer:
- Regular Beer (with an alcohol content over 1,2 per cent)
- Soft Beer (with an alcohol content over 0,5 per cent, but lower than 1,2 per cent)
- Non-Alcoholic Beer (with an alcohol content equal or lower than 0,5 per cent)

There is a general consumption tax on every alcoholic beverage. Beside this there is a special tax that is specific for each alcoholic beverage, except for wine and champagne.

In Portugal, the alcoholic beverages are still referred as food but, nowadays, is no longer included in the foodstuff category.

12. Spain

Per capita alcohol consumption, together with estimates from surveys, is a direct indicator of the consumption of alcoholic beverages in a population. Although the best way to approximate alcohol consumption in a population is by interview surveys, per capita consumption has a series of advantages, among them the availability of a large amount of data from different countries, which makes it possible to make international comparisons, carry out ecological studies, and study long temporal series.

The availability-use model is used to calculate per capita consumption of absolute alcohol. This model assumes that the alcohol available in a population is consumed by that population in a specific period of time, usually one year. The calculation is made by obtaining the amount of alcohol produced, adding imports and subtracting exports. The initial stock is added to this amount, and the stock at the end of the year is subtracted. It is also necessary to subtract from the production data alcohol that is not designated for human use, that which is designate for industrial use, and losses during the process of commercialisation and production. In practice, due to the absence of sources of information on stocks and uses other than human consumption, the model is limited to production and foreign commerce (exports and imports). In this way, the total alcohol available (converted into pure alcohol assuming mean proof grading for each type of beverage), is distributed among individuals (usually among the population aged 15 years and over) to obtain the number of litres of absolute alcohol consumed per person and year in the population.

Some of the disadvantages of this indicator are related with the methodology used and with the fact that it does not take into account such phenomena as illegal alcohol production or

consumption by different populations, such as tourists. Another disadvantage is that the estimates are for the nation as a whole, and no estimates are available by regions.

The consumption of absolute alcohol per person and year is considered a valid indicator for monitoring alcohol consumption in the population because it is strongly associated with the distribution of alcoholic beverages in a population. Specifically, the per capita consumption of absolute alcohol is related with the percentage of heavy drinkers in a population, according to the model described by Lederman more than 30 years ago. Thus, the monitoring of temporal trends of per capita consumption of absolute alcohol is a useful tool to know the proportion of drinkers at risk in the population.

This indicator is difficult to calculate because of the various and complex sources of information involved, therefore the data normally used are those published by various international organisations for different countries using a standardised methodology. We data that use are according to estimates of World Drink Trends.

SOURCE: MINISTERIO DE SANIDAD Y CONSUMO. HEALTH INDICATORS. FOURTH EVALUATION IN SPAIN OF THE EUROPEAN REGIONAL HEALTH FOR ALL PROGRAME. MADRID, 1999.

13. Sweden

In Sweden retail sales of alcoholic beverages are organised as follows:
1. The state owned Systembolaget AB has a monopoly for off-premise retail sales of all alcoholic beverages with more than 2,25 per cent of alcohol by volyme, except for beer with less than 3,5 per cent of alcohol by volyme
2. Grocery stores have the right to sell off-premise beer with less than 3,5 per cent of alcohol by volyme
3. On premise retail sales of spirits, wine and beer take place in licensed restaurants. The restaurants are allowed to buy the beverages from any licensed whole sale traders. On premise retail sales of beer with less than 3,5 is allowed without a license if certain requirements are fullfilled.
The so called “recorded alcohol consumption” in Sweden consists of the beverages sold in
-the state owended monpoly stores,
-grocery stores
-restaurants (including the on premise sales of beer with less than 3,5 per cent of alcohol by volyme
The “unrecorded alcohol consumption” consists of
- consumption of alcohol in products with an alcohol content less than 2.25 per cent by volume
- home made beer, wine and distilled spirits
- smuggling of alcoholic beverages
- import of alcoholic beverages by travellers
- drinking substances or surrogates not defined as alcoholic beverages

APPENDIX 2. CLINICAL CASE HISTORIES 1-8

1. STROKE

Social status
Male, age 48, married with grown children. Employed for 15 years as a high-school teacher in a medium-sized city and is an active member of a bowling club. Stopped smoking ten years ago.

Previous history
Diagnosed with hypertension at age 35. Has since been treated periodically with diuretics and gone for regular check-ups to his company doctor. In recent years he has repeatedly sought medical advice for fatigue, anxiety and sleep disturbances. For the past three months he has been on long-term sick leave due to "burnout".

A many year history of heavy alcohol consumption. While on sick leave he has consumed 5-6 beers almost daily, occasionally hard liquor as well. His wife has repeatedly urged him to seek help for his alcohol problem.

Current
His wife found him lying unconscious on the floor of their apartment. On arrival at hospital, CT scan of the skull showed extensive cerebral infarction in the distribution area of the right middle cerebral artery. He never regained consciousness and died two days after admission due to apparent herniation of the brain stem.

Cause of death
1a Cerebral infarction
2a Hypertension

2. CORONARY HEART DISEASE

Social status
Male, age 64, married, previously a commercial traveller, now on disability pension since age 58. Has smoked about 15 cigarettes daily since his teens.

Previous history
Chronic bronchitis for many years. Elevated blood cholesterol was diagnosed at a medical check-up and dieting recommended. Over the past ten years he has primarily consumed wine, often 1-2 bottles per day. He has never been treated within the health-care system for anything other than trivial complaints.

Current
Onset of angina pectoris at age 55 with gradual deterioration. Admitted to hospital at age 58 with acute myocardial infarction. Three years later he underwent aorto-coronary bypass surgery for incapacitating angina. Postoperatively he was essentially symptom-free for three years, following which he has experienced recurrence of his angina.

Taken ill at home with severe centralised chest pain. His wife called an ambulance, but before it arrived he became lifeless. Resuscitation attempts by the ambulance personnel and in the emergency room were unsuccessful.

Cause of death
1a Coronary heart disease

3. PRIMARY LIVER CANCER
Divorced mechanic, age 54. Two teenage children living with his former wife. Has smoked 20 cigarettes daily since his teens. Lost his driving licence as a result of repeated drunk-driving offences. Many year history of over-consumption of alcohol. Information from his company physician's records shows repeated periods of short-term sick leave for low-back pain and ”stomach ulcers”.

Previous history
Has received both institutional and outpatient care at a psychiatric clinic over several years for depression, anxiety and insomnia as well as alcohol abuse. Sustained a fractured skull five years ago and has also presented at emergency rooms on various occasions with minor trauma, at such times often arriving inebriated. No history of substance abuse other than alcohol.

Current
Became ill with weight loss, fatigue and ascites, gradually developing icterus and pruritus as well. Admitted to hospital in poor condition due to the above. Ultrasound investigation and CT scan identified one larger and several smaller tumours in his liver. There was no clinical evidence of tumours in other organs. Results of cytological investigation were consistent with primary hepatocellular carcinoma. No curative therapy was administered. The patient was transferred to a hospice where he received palliative care and died four weeks later.

Cause of death
1a Primary liver tumour (hepatocellular)
2 Alcohol abuse

4. DIABETIC COMA
Social status
Boy, age 16.

Previous history
Previously healthy.

Current
Parents called an ambulance urgently one morning when they were unable to wake their son. At the emergency room the parents stated that their son had been losing weight for just over a month. They had also noticed that he had been drinking a lot and he had himself volunteered that he had been voiding much more than usual. When visiting another physician three weeks earlier, the physician suggested that his symptoms were due to anxiety before exams and no laboratory tests were carried out. The parents suspect that their son had been drinking alcohol with friends four days prior to the current event.

On arrival the boy is profoundly comatose. His breath smells of acetone and his blood glucose level is extremely high (>20 mmol/L). Treatment is initiated, but the boy dies.

Cause of death
1a Diabetic coma
1b Diabetes mellitus

5. CIRRHOSIS OF THE LIVER

Social status
Female university graduate, age 59.

Previous history
Has been in contact with psychiatrist for 10 years due to periods of depression and mental inadequacy. Off work for the past two years due to her husband's malignant disease; now widowed since two months.

Current
Seeks medical attention due to a ten-day history of increasing jaundice. She is also suffering from fatigue and nausea and her urine is dark. She states that she has been drinking approx. 1-2 bottles of wine per week for many years, but admits that her consumption has increased in the past two years.

Medical examination shows icterus, palmar erythema, spider naevi and severe abdominal distension with a fluid wave. The liver is palpable three fingers below the arcus. Ultrasound investigation confirms ascites and liver enlargement without focal changes. Blood pressure is 185/105 mm Hg. Laboratory tests show significantly impaired liver function. She becomes increasingly unresponsive to treatment of her disease and dies three days later.

Cause of death
1a Alcoholic cirrhosis of the liver)
1b Alcohol abuse

6. PANCREATITIS

Social status
Male, age 64, worked in earlier years as engineer on cargo vessels. Over the past 20 years he has had various jobs, including construction worker and janitor. He has also been out of work and on sick leave for month-long periods and has been on disability pension for the past 8 years. He is married with two adult children who left home several years ago. Smokes about 20 cigarettes daily.

Heavy alcohol consumption throu  t his adult life, in recent years consuming at least 37 cL of hard liquor or 2 bottles of wine daily in addition to beer.

Previous history
Diagnosed with high blood pressure more than ten years ago. However, he has only taken his recommended medication sporadically. Disability pension due to back insufficiency and arthrosis of the knees and hips.

Current
Taken ill suddenly and presented at the surgical clinic with severe, acute and unremitting pain across the epigastric area radiating toward the back as well as with pronounced anxiety. On examination he is significantly affected by pain. His pain is unremitting, he is in a cold sweat and shows marked abdominal distension and tympanism. There is diffuse tenderness on palpation of the upper abdomen and costovertebrally to the left. Serum amylase is significantly elevated, bilirubin normal. He is transferred to intensive care but develops pronounced fluid imbalance, liver and kidney failure and respiratory insufficiency. After five days of hospital treatment, the last two on a respirator, he dies.

Post-mortem findings show an edematous pancreas with hemorrhagic and necrotic areas.

Cause of death
1a Pancreatitis
1b Alcohol abuse

7. ALCOHOLISM

Social status

Bachelor, age 38, always lived alone. With no permanent home of his own in recent years, he has been staying with friends on a temporary basis and subsisting on social welfare.

Previous history

Long-term alcohol abuse. Repeated treatment attempts have been unsuccessful. Has presented at various times to surgical clinics with traumatic injuries, including concussion and a broken arm. Has complained in recent years of numbness and ache in his legs. No heart disease.

Current

Following a period of treatment, he has been drinking "anything he can get hold of" for the past 2-3 months, according to his friends. Was found dead in a basement area by a janitor.

Post-mortem findings, toxicology

Several minor skin injuries (excoriations and subcutaneous hemorrhages) sustained at different times. Negligible coronary artery disease. Heart slightly dilated, the wall thinner than normal and flaccid. Pronounced fatty degeneration of the liver and early indications of cirrhosis.
Ethanol content 0.04 percent in femoral vein blood sample, 0.04 percent in urine.

Cause of death

1a Alcohol abuse

8. ETHANOL POISONING

Social status

Single, works as a welder, age 41, has had numerous short-term jobs. Cigarette smoker.
Father and one brother alcoholics.

Previous history

“Previously healthy”, apart from complaints of psoriasis of the scalp and extremities. Often seen by neighbours to be intoxicated.

Current

Was discovered dead in bed, having "consumed alcohol during the immediately preceding days", according to information received. Was taken into custody by police the day before due to intoxication and creating a disturbance.

Post-mortem findings, toxicology

Slight alcohol-related cardiomyopathy, no coronary sclerosis, pronounced hepatic steatosis, no hepatic cirrhosis. Other findings normal.
Ethanol content 0.46 percent in femoral vein blood sample, 0.56 percent in urine.

Cause of death

1a Ethanol poisoning
1b Alcohol abuse

APPENDIX 3: PUBLICATIONS FROM ECAS II

Nordic Studies on Alcohol and Drugs, 18, *English Supplement* 2001. Report from the ECAS project

LEIFMAN, H (2001) Estimations of unrecorded alcohol consumption levels and trends in 14 European countries, *Nordic Studies on Alcohol and Drugs*, 18, *English Supplement* 2001, 54-70.

TROLLDAL, B (2001) Alcohol sales figures in 15 European countries, a correction based on consumption abroad and tax-free purchases, *Nordic Studies on Alcohol and Drugs*, 18, *English Supplement* 2001, 71-81.

Contemporary Drug Problems (forthcoming)

HEMSTRÖM, Ö (2002) Informal alcohol control in six EU-countries. Submitted to *Contemporary Drug Problems*.

HEMSTRÖM, Ö (2002) Attitudes towards alcohol policy in six EU-countries. Submitted to *Contemporary Drug Problems*.

LEIFMAN, H (2002) A comparative analysis of drinking habits in six EU-countries in the year 2000. *Submitted to Contemporary Drug Problems*.

LEIFMAN, H (2002) The six-country survey of European comparative alcohol study: comparing patterns and validity. Submitted to *Contemporary Drug Problems*.

RAMSTEDT, M (2002) Alcohol consumption and the experience of adverse consequences – a comparison of six European countries. Submitted to *Contemporary Drug Problems*.

ECAS final report Alcohol in postwar Europe

LEIFMAN, H (2001) Trends in population drinking. *In ALCOHOL IN POSTWAR EUROPE: Consumption, drinking patterns, consequences and policy responses in 15 European countries. A comparative analysis of drinking habits in six EU-countries in the year 2000.* Stencil, Stockholm 2001 pp 49 – 81.

LEIFMAN, H; HEMSTRÖM, Ö & RAMSTEDT, M (2001) The ECAS study on drinking patterns and alcohol-related problem. *In ALCOHOL IN POSTWAR EUROPE: Consumption, drinking patterns, consequences and policy responses in 15 European countries. A comparative analysis of drinking habits in six EU-countries in the year 2000.*
Stencil, Stockholm 2001 pp 115 – 136.

Single articles published in different publications

RAMSTEDT, M (2002) Alcohol-related mortality in 15 European countries in the postwar period. *European Journal of Population* (in print).