Global Status Report on Alcohol 2004

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Foreword

This volume is the culmination of three years of dedicated collaborative work of the WHO Department of Mental Health and Substance Abuse and a WHO Collaborating Centre, the Swiss Institute for the Prevention of Alcohol and Drug Problems in Lausanne, Switzerland. It is an overview of the available data on alcohol consumption and drinking patterns worldwide.

WHO has been actively involved in documenting the global, regional and national dimensions of alcohol consumption since the start of the Global Alcohol Database in 1996. Out of the earlier work came the *Global Status Report on Alcohol (1999)*, the *Global Status Report on Alcohol and Young People (2001)* and the recently published *Global Status Report: Alcohol Policy (2004)*. This publication follows the same tradition of the first Global Status Report five years ago, but it represents a complete update of the information. It gives valuable new perspectives on the recent status of health and social consequences of alcohol use and levels and patterns of alcohol consumption worldwide.

A clear focus of this publication has been on developing countries, those long-neglected areas where alcohol problems are likely to increase at an alarming rate in the future. It tries through objective analysis to provide in a comprehensive and readily accessible way all the accumulated scientific information and knowledge on issues pertinent to alcohol consumption at global, regional and national levels.

However, it is clear that many gaps remain to be filled for a comprehensive picture of the global situation with alcohol use and its health consequences. For example, for many countries the data is very limited, and the alcohol per capita consumption estimates are clearly of varying quality. I hope that recognition of the limitations of available data will encourage WHO Member States and international organizations to work closely with WHO in improving data collection and reporting.

I sincerely recommend this as a reference source for a wide audience of policy-makers, teachers, students, scientists and all those interested in alcohol issues.

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Acknowledgements

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This document was prepared by Nina Rehn who was responsible for the overall management of the project that was initiated under the direction and supervision of Maristela Monteiro and completed under the direction and supervision of Vladimir Poznyak of the WHO Management of Substance Abuse team who also provided invaluable input. Kelvin Chuan Heng Khow, Management of Substance Abuse, WHO, is the principal author of the country profiles. Technical assistance in statistical analysis, production of graphs, graphic design and layout was provided by Momcilo Orlovic of the Management of Substance Abuse team in WHO. The global overviews were a collaborative effort of Gerhard Gmel, Swiss Institute for the Prevention of Alcohol and Drug Problems, Kelvin Chuan Heng Khow and Nina Rehn, Management of Substance Abuse. Laurent Emery and Matthias Wicki at the Swiss Institute for the Prevention of Alcohol and Drug Problems assisted with different sections of the profiles and the project as a whole. Thanks are also due to Isidore Obot of the Management of Substance Abuse team, Maria Elena Medina-Mora, Instituto Nacional de Psiquiatría Ramón de la Fuente, Mexico, Moira Plant, University of the West of England, Bristol, United Kingdom, and Robin Room, Centre for Social Research on Alcohol and Drugs, Stockholm, who provided useful comments on the draft of the document. Heidemarie Vaucher, Elisabeth Grisel and Edith Bacher, Swiss Institute for the Prevention of Alcohol and Drug Problems, and Mylène Schreiber and Tess Narciso, Management of Substance Abuse, WHO, all provided much needed secretarial and editorial assistance.

The project leading to this report was implemented under the overall guidance and supervision of Benedetto Saraceno, Director of the WHO Department of Mental Health and Substance Abuse.

Contents

Introduction

The World Health Organization (WHO) estimates that there are about 2 billion people worldwide who consume alcoholic beverages and 76.3 million with diagnosable alcohol use disorders. From a public health perspective, the global burden related to alcohol consumption, both in terms of morbidity and mortality, is considerable in most parts of the world. Alcohol consumption has health and social consequences via intoxication (drunkenness), alcohol dependence, and other biochemical effects of alcohol. In addition to chronic diseases that may affect drinkers after many years of heavy use, alcohol contributes to traumatic outcomes that kill or disable at a relatively young age, resulting in the loss of many years of life due to death or disability. There is increasing evidence that besides volume of alcohol, the pattern of the drinking is relevant for the health outcomes. Overall there is a causal relationship between alcohol consumption and more than 60 types of disease and injury. Alcohol is estimated to cause about 20–30% of oesophageal cancer, liver cancer, cirrhosis of the liver, homicide, epileptic seizures, and motor vehicle accidents worldwide (WHO, 2002).

Alcohol causes 1.8 million deaths (3.2% of total) and a loss of 58.3 million (4% of total) of Disability-Adjusted Life Years (DALY) (WHO, 2002). Unintentional injuries alone account for about one third of the 1.8 million deaths, while neuro-psychiatric conditions account for close to 40% of the 58.3 million DALYs. The burden is not equally distributed among the countries. Alcohol consumption is the leading risk factor for disease burden in low mortality developing countries and the third largest risk factor in developed countries. In Europe alone, alcohol consumption was responsible for over 55 000 deaths among young people aged 15–29 years in 1999 (Rehm & Eschmann, 2002).

Given alcohol's significance in world health, WHO has, since 1996, been developing a database, the Global Alcohol Database, to provide a standardized reference source of information for global epidemiological surveillance of alcohol use and its related problems. The database is the world's largest single source that documents global patterns of alcohol use, health consequences and national policy responses, by country. This monitoring system and database enables WHO to disseminate data and information on trends in alcohol consumption, drinking patterns and alcohol-related mortality, including details of policy responses in countries. The aim of the project is to provide up-to-date and comparative data regarding the status of alcohol consumption and alcohol problems.

WHO has been undertaking a major exercise in passive epidemiological surveillance, gathering published and unpublished data and information about key aspects of the alcohol situation in WHO Member States. Given that this was a pioneering effort to document a highly diverse and complex issue, the findings clearly reveal the shortcomings of global alcohol epidemiology. The data presented in this report can be found in the Global Alcohol Database and most of it is also available on the web site of the database (WHO, 2004a). Two earlier reports that were published by WHO using data from this database were the first *Global Status Report on Alcohol* (WHO, 1999) and the *Global Status Report: Alcohol and Young People* (2001a).

This new edition provides an update on the global picture of the status of alcohol as a factor in world health and contains data that is not found in the earlier edition. The *Global Status Report on Alcohol 2004* seeks to document what is known about alcohol consumption and drinking patterns among various population groups as well as alcohol's impact on health worldwide. This information will hopefully spur further research and action to prevent and

reduce alcohol-related injury and disease globally. For this new edition, more emphasis has been placed on the need to enhance the comparability of data by setting clear and comprehensive priorities in terms of data collection. As far as possible, there has been an effort to obtain the same indicators for the majority of countries. Unlike the earlier edition, the current report does not present data on alcohol trade and production, and alcohol policy. Alcohol policy is the topic of a separate report, the *Global Status Report: Alcohol Policy* (WHO, 2004c), which analyses alcohol policies in 118 WHO Member States. That data is based on focal point replies to a questionnaire. For further details please refer to the report, which is also available online at http://www.who.int/substance_abuse.

The report consists of two sections. The first section presents an overview and comparative analyses of the alcohol situation on a regional and global basis using indicators such as per capita alcohol consumption and drinking patterns. There is also a discussion on the health and social consequences of alcohol use.

The second section of the report consists of a CD-ROM which presents individual country profiles for 189 Member States for which sufficient data were available, bringing together information on each of these indicators: trends in adult per capita consumption as well as prevalence/drinking patterns data, information regarding traditional and/or locally produced alcoholic beverages, unrecorded alcohol consumption, health and social problems, including morbidity and mortality from alcohol-related causes and the social and economic costs of alcohol abuse.

The *Global Status Report on Alcohol 2004* stands as a picture of much of the state of knowledge and state of world health related to alcohol. The evidence it gives will hopefully stimulate further efforts to document alcohol use, problems and policies in WHO Member States.

Data sources and methods

General

The country profiles, presented in Part II of the report (in CD-ROM), attempt to give an overview of the current situation regarding alcohol in 189 WHO Member States. This was achieved on the basis of a select number of indicators chosen by a group of experts for which as much data as possible was collected. The indicators were: adult per capita consumption, drinking patterns (abstainers, high risk drinking and heavy episodic drinking, both for the general population and for young people separately), rates of alcohol dependence, traditional or local alcoholic beverages, unrecorded alcohol consumption, alcohol-related mortality (four chronic and four acute consequences), alcohol-related morbidity, health and social problems (including social and economic costs), and finally some country background information. Based on the different data searches, first drafts of the country profiles were prepared. These drafts were then sent to the countries requesting for changes or additions. Only a small number of countries returned comments or suggestions. The overview section is based mainly on the data from the existing profiles and summarizes some of the main features on a global level. In the preparation every attempt was made to include accurate and up-to-date information available as at April 2004. All the sources used are referenced under each country separately.

In the following sections the indicators mentioned above are explained in more detail.

Recorded adult (15+) per capita (APC) alcohol consumption

WHO often uses adult (people 15 years and older) per capita to measure alcohol consumption, instead of the also widely used per capita for the whole population. This is to balance the fact that population distributions in developing countries are quite different from developed countries, i.e. they have a much larger proportion of children and young people. Using per capita would mean that countries with many young people will underestimate the consumption among adults, if it is assumed that most young people below 15 do not consume significant quantities of alcohol.

Where available, the graph of the adult per capita consumption is shown as time series from 1961 until 2001 for all beverages, and for beer, wine and spirits separately, in litres of pure alcohol per adult per year in that particular country. The data is for recorded alcohol, i.e. unrecorded alcohol is not included, such as alcohol from cross-border shopping, smuggling, homemade (legal or not), and tourist consumption. For some countries estimates of the unrecorded alcohol is presented in a separate section.

The APC estimates are based on either FAO (Food and Agriculture Organization of the United Nations) or WDT (World Drink Trends) data, except for a few countries in Europe where the data comes directly from governments. Where both FAO and WDT data exist, a choice has been made in favour of the more accurate and reliable data. In the European Region WDT is used for 25 countries, FAO for 19 and government data for four countries. Outside Europe the overlap between FAO and WDT concerns 24 countries, from which 17 use FAO data and 7 WDT. The rest of the countries of the world use FAO, as no other source could be found. When using WDT data the per capita is recalculated into adult per capita consumption. The FAO data consists of estimates of production and trade in metric tonnes for

the following beverages: wine, vermouth, must of grape, fermented beverages, spirits, sorghum beer, millet beer, maize beer, barley beer, wheat fermented and rice fermented. All the beverages are converted into pure alcohol and then combined into the categories of beer, wine and spirits so that all beers make up the beer category, and all other beverages, besides spirits, belong to the wine category. FAO collects the data from the countries through a questionnaire to the Ministries of Agriculture and Trade once a year. It should be noted that a change took place in method of calculation for the group of wine, which does not influence the total alcohol consumption but which for some countries will show a sudden increase in wine consumption from 1996.

The data is clearly only as reliable as the original data from the sources used. For some countries large and sudden changes from one year to another can be seen, which unless there is a major natural or man-made disaster or conflict is in reality rare. For more precise data on the adult per capita please refer to the webpage of the Global Alcohol Database (WHO, 2004b), where the actual numbers are presented for each year and each country.

Drinking patterns

The adult per capita gives some idea about the level of alcohol consumption in a country, but survey data is much needed to understand better the picture of who drinks, how much they drink, etc. In the context of this report drinking pattern refers to the frequency, quantity and circumstances surrounding alcohol consumption. Besides looking at gender differences, it would also be useful to examine differences in age groups with regard to drinking patterns, as this is useful trying to target risk groups for certain behaviours. However, due to space constraints, this report has concentrated on drinking patterns in the total population and among young people only. Compared to supply surveys (i.e. data on production and trade such as FAO and WDT), these consumer surveys assessing people's own alcohol consumption usually show overall consumption figures which are much lower, quite often around 40% to 60% of supply-based estimates (WHO, 2000a). This would indicate that people are underestimating their own consumption and that these surveys do not reach the people with the highest consumption.

Table 1: Geographic coverage of the survey data

WHO Region	Countries with survey data/total number of countries	% population covered
AFR	28 / 46	76.72
AMR	32 / 35	99.96
SEAR	7 / 11	98.38
EMR	12 / 21	90.33
EUR	49 / 52	99.99
WPR	20 / 27	99.94
Total	148 / 192	96.22

***Note**: Survey data was also found for Puerto Rico and Tokelau (both Associate Members of WHO). The data for Puerto Rico is presented under the Region of the Americas and for Tokelau under the Western Pacific Region.*

The data for drinking patterns were obtained from surveys and other studies conducted in the respective countries, mainly from published peer-reviewed journal articles and official reports, and in some cases grey literature such as conference papers and reports found on the Internet. Priority was always given to published sources in peer-reviewed journals, and secondly to official government reports. Most of the data are referring to the total population

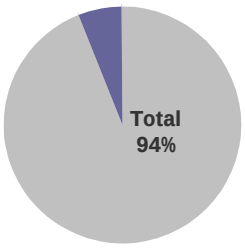
(unless otherwise specified), with data for males and females shown separately whenever available. Besides youths, which has been the main subgroup used in the report, sometimes data for other subgroups are also presented. This may include the incarcerated population, people attending health care facilities or treatment, occupational categories, demographic subgroups defined by race or ethnicity, religious subgroups, or subgroups defined by income or geographical place of residence. Within the drinking patterns section four indicators were chosen for the country profiles.

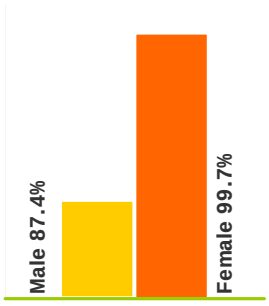
- Rates of abstainers in the population, i.e. people who have not consumed any alcohol in the last 12 months (if other definition of abstainer it has been separately noted).
- Problem drinkers, heavy drinkers or high risk drinkers, as defined in the corresponding source, people drinking regularly at a level where there is a high risk of chronic or acute consequences.
- Heavy episodic or binge drinkers, as defined in the corresponding source, people drinking occasionally at a level where there is a high risk of intoxication and acute consequences.
- Rates of alcohol dependence, either in the general population or some sub-population using some internationally validated instruments such as AUDIT and CAGE, and diagnostic criteria such as those found in the ICD-10 or DSM-IV.

If available, data were also presented for young people for all the categories above stemming from surveys conducted in schools or universities.

The data are presented as two graphs where possible: one showing the overall rate as percentages and the other showing data by gender. Please note that the graphs representing data by gender are merely for graphical purposes and are not to proportion. An example for Bangladesh (lifetime abstainers) is shown below:

Figure 1: Lifetime abstainers in Bangladesh





Data from the 2003 World Health Survey. Total sample size *n* = 5508; males *n* = 2567 and females *n* = 2941. Sample population aged 18 years and above.[1] Note: These are preliminary, early-release, unpublished data from the World Health Survey made available exclusively for this report. Some estimates may change in the final analyses of the World Health Survey.

[1]Ustun TB et al. The World Health Surveys. In: Murray CJL, Evans DB, eds. *Health Systems Performance Assessment: Debates, Methods and Empiricism*. Geneva, World Health Organization, 2003.

For example, the total lifetime abstainers in Bangladesh as measured by the 2003 World Health Survey is estimated to be 94% of the total population. The second graph shows the male to female proportion from the overall, e.g. 87.4% of male Bangladeshis are abstainers, and likewise, 99.7% of female Bangladeshis are abstainers (Ustun et al., 2003). Next to the graphs is a text box containing information about the kind of survey used, sample size and age group of the population sampled, the definition of the drinking pattern measured, and a

reference to the original source. When no national data were found, regional surveys or surveys of certain cities have been used, in which case this is clearly mentioned.

Traditional alcoholic beverages

This section gives examples of different local or traditional alcoholic beverages, with short descriptions of their alcohol by volume content, process of production, etc. Many of these beverages would not show up in the recorded APC figures used in the beginning of the profiles because they are locally produced in the villages, homes, etc. They are often outside the western beer, wine and spirits categories, and also outside the control of the local governments. The source of data is almost exclusively grey literature on the Internet, i.e. sources which often could not be corroborated by other independent sources. This is because there exists very little published materials about these kinds of beverages and is a fact which should be taken into account when considering the reliability of the data.

Unrecorded alcohol consumption

This section gives an estimate of the amount of alcohol which is unrecorded in a country, i.e. does not show up in the official APC data. Much of the unrecorded alcohol consists of the traditionally brewed beverages described above, but there is also unrecorded alcohol derived from means such as cross border trade and smuggling. However, only a few countries have estimates on unrecorded alcohol consumption. This is because very little published material exists about these kinds of beverages, which should be taken into account when considering the reliability of the data.

Alcohol-related mortality

The data for alcohol-related mortality are shown in two graphs, one for chronic and one for acute consequences, with time series since 1961 for each cause of death where available. It should be noted that chronic diseases are measured on two axes. The data clearly shows gaps in coverage, both in terms of the number of countries where no data exists and of the scarcity of data for some specific causes. The mortality rates are from the WHO mortality database where countries report their mortality each year using the (International Statistical Classification of Diseases and Related Health Problems (ICD) coding system. Those crude numbers of deaths have been converted into age standardized death rates per 1000 population for each country using the WHO standard population. Data is only shown if there is a time series of at least five years. One should be cautious about making any comparisons because reliability of these figures depends on the registration of deaths at the national level. Furthermore, death registration coverage and cross-national differences in coding practices, particularly in the use of codes for ill-defined and unknown causes, must be taken into account to validly compare mortality rates for specific causes across countries. Additionally, where coverage is less than 100%, the cause of death distribution for the uncovered population may differ from that of the covered population.

In total, eight causes of death were included here (ICD-10 codes used shown in Table 2): four causes which were assigned as showing consequences related to high level, long time chronic drinking (liver cirrhosis and liver disease; lip, oral cavity and pharynx cancers; alcohol dependence and ischaemic heart disease was added to this group, although depending on the drinking pattern, alcohol can have a protective effect for some subgroups of populations in

some, mainly developed countries). The other four causes show more acute consequences related to intoxication, i.e. motor vehicle traffic accidents, homicide and unintentional or intentional injury, falls, and poisonings.

Table 2: ICD codes used for causes where alcohol is one of the underlying risk factors

Cause of death	ICD-9 4-digit	ICD-9 3-digit	ICD-10 4-digit	ICD-10 3-digit
Mouth and oropharynx cancers	140-149	140-149	C00-C14	C00-C14
Alcohol use disorders	291, 303, 305.0	291, 303	F10	F10
Ischaemic heart disease	410-414	410-414	I20-I25	I20-I25
Cirrhosis of the liver	571	571	K70, K74	K70, K74
Road traffic accidents	E810-819, E826-829, E929.0	E810-819, E826-829	*	V01-V04, V06, V09-V80, V87, V89, V99
Poisonings	E850-869	E850-869	X40-X49	X40-X49
Falls	E880-888	E880-888	W00-W19	W00-W19
Intentional injuries	E950-978, 990-999	E950-978, 990-999	X60-Y09, Y35-Y36, Y870, Y871	X60-Y09, Y35-Y36, Y87

*****V01.1-V01.9, V02.1-V02.9, V03.1-V03.9, V04.1-V04.9, V06.1-V06.9, V09.2, V09.3, V10.4-V10.9, V11.4-V11.9, V112.3-V12.9, V13.3-V13.9, V14.3-V14.9, V15.4-V15.9, V16.4-V16.9, V17.4-V17.9. V18.4-V18.9, V19.4-V19.6, V20.3-V20.9, V21.3-V21.9, V22.3-V22.9, V23.3-V23.9, V24.3-V24.9, V25.3-V25.9, V26.3-V26.9, V27.3-V27.9, V28.3-V28.9, V29.4-V29.9, V30.4-V30.9, V31.4-V31.9, V32.4-V32.9, V33.4-V33.9, V34.4-V34.9, V35.4-V35.9, V36.4-V36.9, V37.4-V37.9, V38.4-V38.9, V39.4-V39.9, V40.4-V40.9, V41.4-V41.9, V42.4-V42.9, V43.4-V43.9, V44.4-V44.9, V45.4-V45.9, V46.4-V46.9, V47.4-V47.9, V48.4-V48.9, V49.4-V49.9, V50.4-V50.9, V51.4-V51.9, V52.4-V52.9, V53.4-V53.9, V54.4-V54.9, V55.4-V55.9, V56.4-V56.9, V57.4-V57.9, V58.4-V58.9, V59.4-V59.9, V60.4-V60.9, V61.4-V61.9, V62.4-V62.9, V63.4-V63.9, V64.4-V64.9, V65.4-V65.9, V66.4-V66.9, V67.4-V67.9, V68.4-V68.9, V69.4-V69.9, V70.4-V70.9, V71.4-V71.9, V72.4-V72.9, V73.4-V73.9, V74.4-V74.9, V75.4-V75.9, V76.4-V76.9, V77.4-V77.9, V78.4-V78.9, V79.4-V79.9, V80.3-V80.5, V81.1, V82.1, V83.0-V83.3, V84.0-V84.3, V85.0-V85.3, V86.0-V86.3, V87.0-V87.8, V89.2, V89.9, V99, Y850.

Morbidity, health and social problems from alcohol use

This section is not a comprehensive overview of all the health and social problems related to alcohol consumption, which are numerous. Rather it is a brief insight into some of the consequences alcohol causes for particular societies. The section presents in a qualitative manner some results from national studies on different issues such as traffic accidents, suicide, violence, work absenteeism, and public drunkenness. The briefs are based primarily on published scientific literature and reports from governments or national agencies.

Social and economic costs

This is a subsection to the above which deals with studies or published data on the economic and social costs of alcohol to societies. The section does not include description of the methodology used in estimating the costs; for that one has to refer to the original source. Due to the large methodological differences studies cannot be directly compared with each other.

Country background information

Country background information indicators were chosen to be of specific relevance for assessing the alcohol use and related problems in countries and was added in order to give some general picture about the different countries, i.e. population and age structure, level of urbanization, life expectancy, infant mortality rate and Gross National Income (GNI) per capita. The sources of data used were the WHO, the United Nations and the World Bank. Because of the influence of the Islamic religion on alcohol consumption, data on the approximate proportion of the Muslim population in a particular country was included in the background data field when the figure was estimated to be 50% or more.

References

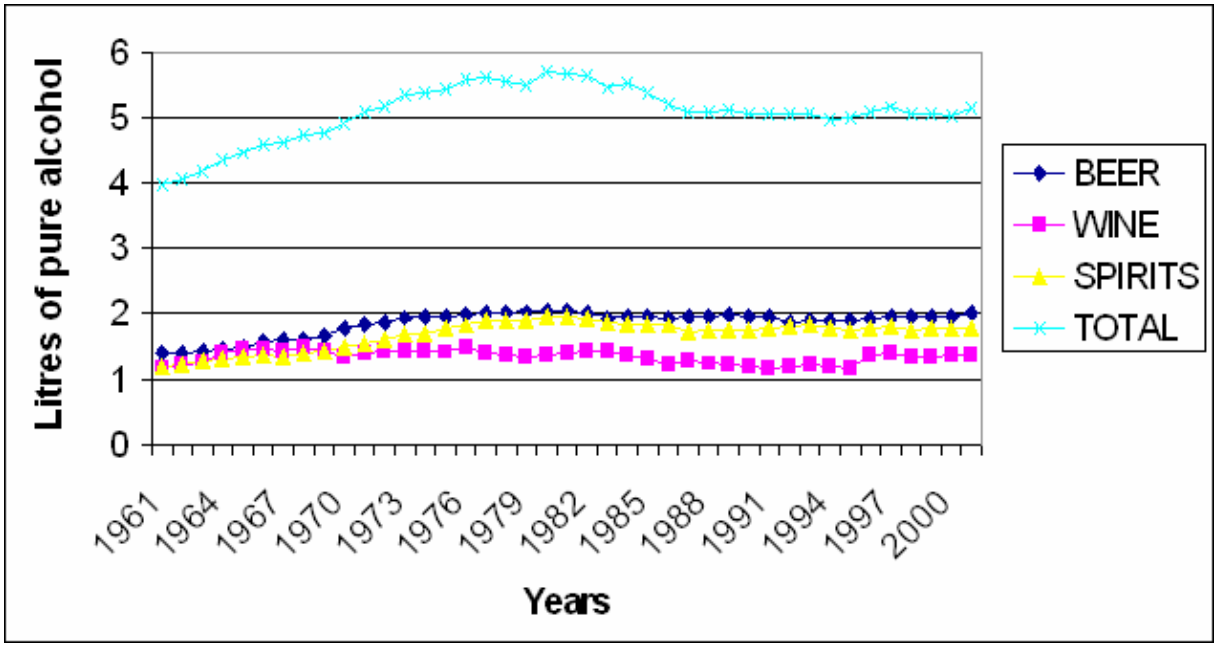
At the end of each country profile is a list of the references used. Most weight has been given to peer-reviewed journal articles and other published sources, which were primarily located through PUBMED, ETOH, or Lilacs (database which indexes the Latin American medical literature). Some data was obtained from websites or non-published sources, in which case caution is needed when interpreting the data.

Global overviews

Alcohol consumption and beverage preferences

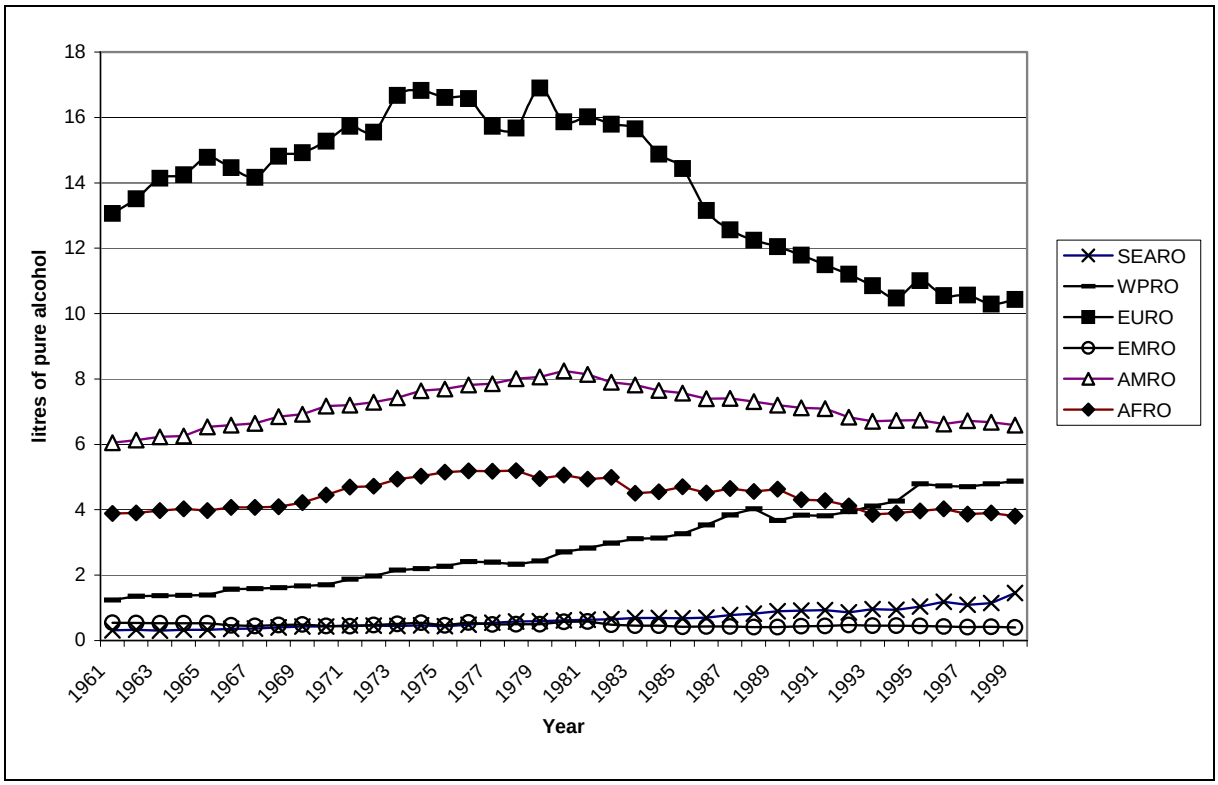
Figure 2 shows the unweighted means of adult per capita consumption across all countries for total consumption, and beer, wine and spirits separately. Unweighted here means that the corresponding population size of countries was not used, and hence each country received the same weight. The graph shows an increase in total consumption until the beginning of the 1980s, and then a slight decrease to a fairly stable level of about five liters of pure alcohol per adult capita. From the total alcohol consumption, close to equal parts are made up of beer, wine and spirits respectively. For all years the mean adult per capita is 5.1 litres of pure alcohol, of which beer accounts for 1.9 litres, wine 1.3 litres and spirits 1.7 litres. On a global level increases and decreases may cancel each other out and therefore there seems to be a rather stable level of consumption, and also stable for the different beverages.

Figure 2: Unweighted means of global per capita consumption 1961 to 2001



When the analysis of trends in consumption is done for the WHO Regions, a different picture emerges. Figure 3 shows the trend as population weighted means of adult per capita consumption in the different WHO Regions over a period of almost 40 years. The European Region (EUR), the African Region (AFR) and the Region of the Americas (AMR) all reached their highest consumption about the same time, in the early 1980s, although the level of the consumption is obviously much higher in the European Region (EUR) than in the other regions. The Eastern Mediterranean Region (EMR) displays a steady low consumption. The two regions showing recent and continuing increases in consumption are the South-East Asian Region (SEAR) and the Western Pacific Region (WPR).

Figure 3: Population weighted means of the recorded adult per capita consumption in the WHO Regions 1961-1999



The regional data indicates that for the WHO Regions other than EMR (mostly countries with majority Muslim populations) there is a certain trend towards harmonization of the consumption levels. On a regional level, those with the highest consumption are decreasing, while those with the lowest are increasing their consumption. This also falls within the explanatory model that many developing countries are increasing their alcohol consumption with an increasing level of economic development. On a more general level the link between economic prosperity and rising alcohol consumption can also be seen e.g. for the Nordic countries and Ireland. Of course the regional level also hides large differences within countries, as again increases and decreases may cancel each other out.

Data at the country level as regards adult per capita consumption can be found in each country profile. For an overview of all the countries with the most recent data, Table 3 shows the recorded adult per capita consumption for all available countries for the year 2000 or 2001, arranged from the lowest recorded consumption to the highest.

Table 3: Total recorded alcohol per capita consumption (15+), in litres of pure alcohol

Country	Total	Country	Total	Country	Total	Country	Total
Iran	**0.00**	Brunei Darussalam	**0.49**	Kiribati	**1.66**	Jamaica	**3.37**
Kuwait	**0.00**	Bhutan	**0.57**	Mozambique	**1.67**	Bolivia	**3.43**
Libyan Arab Jamahiriya (the)	**0.00**	Syrian Arab Republic (the)	**0.62**	Fiji	**1.69**	El Salvador	**3.45**
Saudi Arabia	**0.00**	Micronesia (Federated States of)	**0.64**	Côte d'Ivoire	**1.71**	Seychelles	**3.61**
Somalia	**0.00**	Tunisia	**0.65**	Maldives	**1.72**	Cuba	**3.65**
Bangladesh	**0.00**	Turkmenistan	**0.77**	Kenya	**1.74**	Cameroon	**3.66**
Mauritania	**0.01**	India	**0.82**	Lesotho	**1.83**	Cape Verde	**3.72**
Pakistan	**0.02**	Solomon Islands	**0.86**	Mongolia	**1.96**	Philippines (the)	**3.75**
Algeria	**0.03**	Equatorial Guinea	**0.90**	Israel	**1.99**	Ukraine	**4.04**
Nepal	**0.08**	Ethiopia	**0.91**	Ecuador	**1.99**	The form. Yugoslav Rep. of Mac.	**4.12**
Comoros	**0.08**	Togo	**0.95**	Dem. Republic of the Congo	**2.01**	Lebanon	**4.13**
Yemen	**0.08**	Papua New Guinea	**1.01**	Gambia (the)	**2.27**	Antigua and Barbuda	**4.24**
Indonesia	**0.10**	Malaysia	**1.06**	Honduras	**2.28**	Burkina Faso	**4.38**
Egypt	**0.10**	Djibouti	**1.08**	Congo	**2.36**	China	**4.45**
Niger (the)	**0.11**	Vanuatu	**1.11**	Namibia	**2.39**	Belize	**4.50**
Jordan	**0.11**	Benin	**1.22**	Georgia	**2.41**	Guam	**4.50**
Guinea	**0.14**	Armenia	**1.23**	Albania	**2.51**	Mexico	**4.62**
Sri Lanka	**0.18**	Oman	**1.32**	Nicaragua	**2.53**	Peru	**4.68**
Iraq	**0.20**	Viet Nam	**1.35**	Bahrain	**2.63**	Zimbabwe	**5.08**
Chad	**0.23**	Madagascar	**1.38**	Singapore	**2.73**	United Republic of Tanzania	**5.29**
Sudan (the)	**0.27**	Samoa	**1.42**	United Arab Emirates (the)	**2.75**	Brazil	**5.32**
Cambodia	**0.36**	Malawi	**1.44**	Guinea-Bissau	**2.76**	Botswana	**5.38**
Myanmar	**0.36**	Turkey	**1.48**	Kazakhstan	**2.89**	Costa Rica	**5.45**
Morocco	**0.41**	Uzbekistan	**1.52**	Angola	**2.91**	Kyrgyzstan	**5.50**
Tajikistan	**0.41**	Eritrea	**1.54**	Zambia	**3.02**	Dem. People's Republic of Korea	**5.68**
Qatar	**0.44**	Ghana	**1.54**	Liberia	**3.12**	Iceland	**5.74**
Senegal	**0.48**	Guatemala	**1.64**	Mauritius	**3.16**	Norway	**5.81**
Mali	**0.49**	Central African Republic (the)	**1.66**	Trinidad and Tobago	**3.22**	Suriname	**5.82**

Country	Total	Country	Total	Country	Total
Guyana	**5.84**	Gabon	**7.97**	Hungary	**11.92**
Colombia	**5.92**	Belarus	**8.12**	Denmark	**11.93**
Chile	**6.02**	Canada	**8.26**	Spain	**12.25**
Panama	**6.04**	Thailand	**8.47**	Lithuania	**12.32**
Sao Tome and Principe	**6.07**	United States of America (the)	**8.51**	Slovakia	**12.41**
Dominican Republic (the)	**6.11**	Argentina	**8.55**	Portugal	**12.49**
Haiti	**6.51**	Bosnia and Herzegovina	**8.62**	Austria	**12.58**
Slovenia	**6.55**	Poland	**8.68**	Croatia	**12.66**
Saint Vincent and Grenadines	**6.58**	Venezuela	**8.78**	Germany	**12.89**
Sierra Leone	**6.64**	Italy	**9.14**	Bermuda	**12.92**
Paraguay	**6.66**	Australia	**9.19**	Reunion	**13.39**
Cyprus	**6.67**	Dominica	**9.19**	France	**13.54**
Barbados	**6.70**	Bahamas (the)	**9.21**	Republic of Moldova (the)	**13.88**
Lao People's Democratic Republic (the)	**6.72**	Greece	**9.30**	Ireland	**14.45**
Malta	**6.74**	Latvia	**9.31**	Czech Republic (the)	**16.21**
Rwanda	**6.80**	*Burundi*	**9.33**	Luxembourg	**17.54**
Sweden	**6.86**	*Swaziland*	**9.51**	*Uganda*	**19.47**
Azerbaijan	**6.94**	Netherlands (the)	**9.74**		
Uruguay	**6.96**	New Zealand	**9.79**		
Bulgaria	**7.13**	Estonia	**9.85**		
Japan	**7.38**	Netherlands Antilles	**9.94**		
Grenada	**7.39**	*Nigeria*	**10.04**		
Saint Kitts and Nevis	**7.62**	Belgium	**10.06**		
Romania	**7.63**	United Kingdom (the)	**10.39**		
French Polynesia	**7.68**	Finland	**10.43**		
Republic of Korea (the)	**7.71**	Saint Lucia	**10.45**		
South Africa	**7.81**	Russian Federation (the)	**10.58**		
New Caledonia	**7.83**	Switzerland	**11.53**		

Sources: FAO (Food and Agriculture Organization of the United Nations), World Drink Trends 2003

Note: Several African countries (Burundi, Nigeria, Swaziland and Uganda) appear in the list in the top 30 positions of adult per capita consumption. This is because the calculations were based on FAO data which included fermented beverages and estimates of beer produced locally from sorghum, millet and other agricultural products.

Beverage preferences

Looking a bit further into beverage preferences shows that countries often can be categorized as mainly beer, wine or spirits countries. Table 4 gives an example of beverage preferences among the different countries. It shows the top 20 countries with the highest consumption for each beverage category, using simply the recorded adult per capita (APC) in litres of pure alcohol for that specific beverage type. Among the mainly beer drinking countries are mostly European countries, and a few African. The largest wine drinkers are the wine producing countries of Europe. Most of the large spirits consuming countries are found in Eastern Europe, Asia and some island states.

Table 4: Top 20 countries with highest beverage-specific adult per capita consumption

Beer		Wine*		Spirits	
Country	**APC**	**Country**	**APC**	**Country**	**APC**
Czech Republic (the)	9.43	Luxembourg	9.43	Republic of Moldova (the)	10.94
Ireland	9.24	France	8.38	Reunion	8.67
Swaziland	7.49	Portugal	7.16	Russian Federation (the)	7.64
Germany	7.26	Italy	6.99	Saint Lucia	7.27
Austria	6.42	Croatia	6.42	Dominica	7.20
Luxembourg	6.16	Switzerland	6.23	Thailand	7.13
Uganda	6.14	Argentina	5.63	Bahamas (the)	7.05
Denmark	6.02	Spain	5.07	Latvia	6.62
The United Kingdom	5.97	Bermuda	4.95	Haiti	6.46
Belgium	5.90	Greece	4.78	Belarus	6.34
Venezuela	5.69	Denmark	4.57	Lao People's Democratic Republic	6.09
Lithuania	5.53	Austria	4.47	Bosnia and Herzegovina	6.03
Slovakia	5.34	Hungary	4.47	Saint Vincent and Grenadines	5.98
Australia	5.20	Uruguay	4.35	Dem. People's Republic of Korea	5.48
Croatia	5.16	Germany	3.38	Slovakia	5.44
Netherlands Antilles	4.96	Romania	3.37	Grenada	5.06
Netherlands (the)	4.91	Chile	3.25	Lithuania	4.92
Finland	4.89	French Polynesia	3.10	Azerbaijan	4.66
United Republic of Tanzania	4.85	Bulgaria	3.05	Kyrgyzstan	4.61
Gabon	4.77	Republic of Korea (the)	2.99	Czech Republic (the)	4.41

**Throughout the report, fermented beverages are included in the wine category. However, for this table only average wine has been used to present the countries with the highest adult per capita wine consumption. If the fermented beverages were included, countries such as Uganda, Nigeria, Burundi, Sierra Leone, Rwanda and Sao Tome and Principe would appear to be among the top 'wine' drinking countries.*

Changes in beverage preferences can be illustrated with the case of Europe where consumption of beer is increasing, consumption of wine is decreasing and consumption of spirits is rather stable as in Europe non-wine producing countries are opening up to wine, while wine-producing countries are opening up to other alcoholic beverages.

An example of a typology of wine consumption in Europe:

1. Wine producers with a high level of production, a high level of consumption, and decreasing consumption continually (France, Greece, Italy, Portugal and Spain).

2. Wine producers with a medium level of production, a moderate level of consumption, and stable or slightly increasing consumption (Austria, the Czech Republic, Germany, and Switzerland).

3. Nonproducers, which have experienced a strong increase in wine consumption (Nordic countries, the Netherlands, the United Kingdom, Ireland and Belgium).

It should be noted that there are many different beverages outside the usual beer, wine and spirits categories, which are included in the per capita consumption figures. Alcohol can be produced from a wide range of agricultural products, such as grapes, barley, wheat, grains, fruit, and potatoes. On a country-wide basis dramatic increases or decreases in alcohol consumption are rare, with the exception of consumption associated with large natural disasters or conflicts. Where such changes appear in the data, they are more likely to reflect a change in the methods or that there has been a shift from legal alcohol production to illegal and unrecorded (or vice-versa). The report focuses on the three main beverage categories, although wherever possible data has been included on the more localized beverages, which were mostly included in the category of ‘wine and fermented beverages’. Another example is the category of alcopops, which in most places are diluted spirits beverages and thus are usually included in the spirits category in the statistics.

Unrecorded alcohol consumption

Total alcohol consumption is either derived from official records on consumption or representative population surveys on consumption. As mentioned in the data sources and methods section official statistics on alcohol consumption, sales or trade are usually only based on the recorded figures. In many countries there is alcohol available which lies outside of the recorded sphere. This is often called unrecorded alcohol. This alcohol mainly stems from the following sources:

- home production, in many countries licit for wine and beer, while illicit for spirits;
- travellers' imports and cross-border shopping;
- smuggling, either organized criminal activity or travellers importing amounts which exceed the legal allowance;
- surrogate alcohol intended for industrial, technical or medical purposes;
- tourist consumption i.e. alcoholic beverages consumed during visits to other countries;
- beverages with alcohol content below the legal definition of alcohol.

Relatively few countries have conducted studies on estimating the level of unrecorded alcohol consumption, thus, for the majority of countries, no official estimate of unrecorded alcohol could be found. Recently, a group of alcohol experts have attempted to estimate the level of unrecorded alcohol consumption in a number of countries (Rehm & Gmel, 2001). These estimates were derived from a variety of sources, including the first Global Status Report on Alcohol, specialized surveys that asked about unrecorded alcohol in particular countries, and through focal point reports or replies to questionnaires sent to individual countries. Table 5 shows estimates of unrecorded alcohol for a select number of countries (for complete table see Rehm & Gmel, 2001).

Some countries have an estimated unrecorded alcohol consumption level of zero or even negative. For instance, in the case of Luxembourg (-1.0 litres per adult capita), it is estimated that visitors or tourists account for a sizable portion of the alcohol consumed which could explain why the overall consumption level for the actual Luxembourg population may have been over-recorded. At the other end can be found countries where most of the alcohol is unrecorded, e.g. in East Africa where over 90% of alcohol consumed according to some estimates is unrecorded. Countries in Africa with a relatively high level of estimated unrecorded alcohol include Burundi (4.7 litres), Kenya (5.0 litres), Rwanda (4.3 litres), Seychelles (5.2 litres), Swaziland (4.1 litres), Uganda (10.7 litres) and Zimbabwe (9.0 litres). Also, certain countries in Eastern Europe and some of the former Soviet Union republics have a sizeable estimated unrecorded alcohol consumption e.g. Belarus (4.9 litres), Croatia (4.5 litres), Estonia (5.0 litres), Kazakhstan (4.9 litres), Latvia (7.0 litres), Republic of Moldova (12.0 litres), Russian Federation (4.9 litres), Slovakia (7.0 litres), and Ukraine (8.0 litres). Other countries with very high estimated unrecorded alcohol consumption include Mauritius (11.0 litres) and the Republic of Korea (7.0 litres). On a regional basis, unrecorded alcohol consumption is estimated to be at least two thirds of all alcohol consumption in the Indian subcontinent, about half of consumption in Africa, and about one third in Eastern Europe and Latin America (Rehm et al., 2003b).

Table 5: Estimated volume of unrecorded consumption in litres of pure alcohol per capita for population older than 15 for the years after 1995

Country	Unrecorded consumption	Country	Unrecorded consumption	Country	Unrecorded consumption
Albania	3.0	Fiji	1.0	Republic of Korea (the)	7.0
Algeria	0.3	Georgia	2.0	Republic of Moldova (the)	12.0
Argentina	1.0	Guatemala	2.0	Romania	4.0
Armenia	1.9	Guyana	2.0	Russian Federation (the)	4.9
Australia	0.0	Haiti	0.0	Rwanda	4.3
Austria	1.0	Honduras	2.0	Saudi Arabia	0.6
Azerbaijan	1.9	Hungary	4.0	Senegal	0.8
Barbados	-0.5	Iceland	1.0	Seychelles	5.2
Belarus	4.9	India	1.7	Slovakia	7.0
Belgium	0.5	Iraq	1.0	Slovenia	1.3
Belize	2.0	Jamaica	1.0	South Africa	2.2
Bolivia	3.0	Japan	2.0	Spain	1.0
Botswana	3.0	Kazakhstan	4.9	Sri Lanka	0.5
Brazil	3.0	Kenya	5.0	Sudan	1.0
Bulgaria	3.0	Kyrgyzstan	2.0	Suriname	0.0
Burkina Faso	3.3	Latvia	7.0	Swaziland	4.1
Burundi	4.7	Lithuania	4.9	Syrian Arab Republic (the)	0.4
Cameroon	2.6	Luxembourg	-1.0	Tajikistan	4.0
Chile	2.0	Malaysia	3.4	TFYR Macedonia	2.9
China	1.0	Mauritius	11.0	Thailand	2.0
Colombia	2.0	Mexico	3.0	Trinidad and Tobago	0.0
Costa Rica	2.0	Mongolia	2.0	Tunisia	0.5
Croatia	4.5	Myanmar	0.4	Turkey	2.7
Cuba	2.0	Nicaragua	0.5	Turkmenistan	1.0
Czech Republic (the)	1.0	Nigeria	3.5	Uganda	10.7
El Salvador	2.0	Paraguay	1.5	Ukraine	8.0
Eritrea	1.0	Peru	1.0	Uzbekistan	1.9
Estonia	5.0	Philippines (the)	3.0	Venezuela	2.0
Ethiopia	1.0	Poland	3.0	Zimbabwe	9.0

Source: Rehm & Gmel (2001)

One study that attempts to document the extent of unrecorded alcohol within the European Union (EU) is the ECAS project (European Comparative Alcohol Studies) which involved 13 EU member states (Greece and Luxembourg excluded) and Norway. According to this study, the approximate level of unrecorded alcohol consumption (litres of pure alcohol per inhabitant aged 15 or over) in the study countries ranged from about 0.5 litres (Netherlands and Belgium), around 1 litre (Austria, France, Germany, Ireland, Portugal and Spain), between 1 and 2 litres (Italy) and approximately 2 litres (Norway, Finland, Sweden, Denmark and the United Kingdom) (Leifman, 2001). The concern over the level of unrecorded alcohol has been the highest in the Nordic countries and in Norway and Sweden in particular. For example, in Norway, according to the Norwegian Institute for Alcohol and Drug Research (SIRUS), a notable amount of unrecorded alcohol is consumed in the country, mostly originating from legal (wine) or illegal home production, smuggling and travel imports. The proportion of the unrecorded alcohol is estimated at 25 to 30% of the total consumption (SIRUS, 2003). Estimates are even higher for other countries - in Lithuania for instance, it has been estimated that up to 65% of alcohol consumed in 1994 was illegally produced or imported (Logminiene

et al., 2004). According to the *1999 Lithuanian Human Development Report* published by the United Nations Development Program, consumption of alcohol is higher among the rural population. Traditions of drinking heavily became stronger when home brew alcohol became more widespread and accessible. The rural population in Lithuania remains the principal market for illegal alcohol (Subata, 1999).

In most cases, adult per capita (APC) alcohol consumption is useful for looking at population level trends in alcohol consumption, but they do not include unrecorded alcohol consumption, which in some countries is actually the majority of the alcohol available. In Nepal, for instance, unlicensed home-brewing accounts for a major part of alcohol production. In fact, the Liquor Control Act of Nepal allows for the production of homemade forms of alcohol for domestic use, although much homemade alcohol is produced for the market. Such activity takes place mostly in rural settings but also occurs in urban areas. The poor are quite often dependent on home-brewing for their livelihood (Jhingan et al., 2003). Variations may also exist within a country. In China for example, a 2001 survey of community residents in five areas of China found that 7.1% of respondents reported having consumed unrecorded alcoholic beverages in the three months prior to the interview (most frequently rice wine and paddy wine); the amount of unrecorded alcoholic beverage (in pure alcohol terms) accounted for 14.9% of overall alcohol consumption in the five areas studied. The amount of unrecorded alcohol consumption varied, e.g., in Shandong Province, 24.1% of respondents had consumed unrecorded alcoholic beverages in the past three months and the proportion of these beverages was 29.9% of the overall alcohol consumption (Hao et al., 2004). In most cases for APC, the national or local level data is more reliable than international data. When thinking about the impact on the overall level of alcohol consumption of issues like smuggling, tourism, overseas consumption, stockpiling, duty-free purchases, home- or informally produced alcohol, it is recommended that questions about sources of unrecorded alcohol should be added to national or regional drinking surveys.

The official sales statistics in a country do not, for various reasons, represent the actual consumption of alcoholic beverages among the inhabitants. Part of the unrecorded alcohol stems from consumption of alcohol when inhabitants are abroad and also from tax-free purchases. The first one is to a large extent included in the official statistics, but not in the country where the consumer lives. A European study looking at potential corrections for consumption abroad and tax-free purchases found that among the 15 countries of the study, the correction in the official sales was between +11.4% and -1.5%; on an aggregated level this corresponds to 2–3% of the official sales in the area (Trolldal, 2001).

It is not only for reasons of statistical accuracy that improved knowledge of unrecorded alcohol is needed. More important is the fact that variations in unrecorded alcohol consumption, both between and within countries over time, may indicate differences and changes in per capita consumption and in drinking patterns not otherwise revealed by changes in recorded consumption. Documentation of unrecorded alcohol is therefore of importance in alcohol policy studies, and especially in studying the links between alcohol policy, alcohol consumption and alcohol-related problems (Leifman, 2001).

Traditional or local alcoholic beverages

In many countries there are beverages which either fall outside of the usual beer, wine and spirits categories or which are traditionally produced at the local level, for example in villages and in homes. This kind of production seems especially common in many African countries, where a wide variety of different beverages can be found. Many of these are produced by fermentation of seeds, grains, fruit, vegetables or from palm trees, which is a rather simple procedure. Through fermentation the alcohol content does not rise very high and often the beverages have a very short shelf life before they are spoilt. Distillation is a more complex procedure requiring more equipment and time, but then the result is both more potent and has a longer shelf life date.

Even with the limited data available about prices, it seems that there is ground for the expectation that at least some home or locally made beverages are cheaper than mass or factory produced "branded" beverages. In some cases the price difference is quite significant. This means that it is mostly the poorer segments of the society which consume these local beverages, except in the case of some culturally important beverages which might have ceremonial value. In Nigeria for example, the alcoholic beverage called *burukutu* is popular in rural areas and in poor urban neighbourhoods because it is more affordable than commercially produced beer (Obot, 2000). Likewise, in the United Republic of Tanzania, domestically produced "homemade" or "informal-sector" drinks continue to dominate the market and local drinking habits (Green, 1999). In the case of Seychelles, although home brew is consumed only by a minority of the population (mainly of low socioeconomic status), home brew drinkers consumed particularly high amounts of alcohol derived from these homemade beverages. The much lower cost per alcohol unit of home brews compared to beer or spirits is likely to be an important factor to maintain home brew drinking in segments of the population (Bovet, 2001). Furthermore, in some countries (e.g. Namibia), the production of home-brewed beverages is the dominant channel for alcohol availability. Control was practically non-existent and cheap home-brewed beer found an easy market among the low-income or no-income consumers. Production of home-brewed beverages is closely connected to food production in both the urban and rural areas. The producers are a heterogenous group, but many of them are women, particularly widows or divorced older women. Especially for older women it is largely a question of improving their economic livelihoods (Mustonen, Beukes & Du Preez, 2001).

These traditional forms of alcohol are usually poorly monitored for quality and strength, and in most countries it is possible to find examples of health consequences related to harmful impurities and adulterants. Extreme cases might even result in death as was the case in Kenya in November 2000 where 140 people reportedly died, many went blind and hundreds were hospitalized after consuming an illegally brewed and poisonous liquor called *kumi kumi* in the poor neighbourhoods of Mukuru Kwa Njenga and Mukuru Kaiyaba. Made from sorghum, maize or millet, the alcoholic drink is common among Kenyans living in the country's low-income urban and rural areas who can ill-afford conventional legal beer. *Kumi kumi* contains methanol and other dangerous additives such as car battery acid and formalin (Mureithi, 2002). In Zimbabwe, it has been noted that in addition to home-brewed beer, alcohol industry representatives and government officials agree that there is a strong enough market for *kachasu*, a name given to home-distilled products with 10% to 70% alcohol content, to warrant it as a major problem. Occasional newspaper reports of alcohol poisonings from *kachasu* point not only to the high alcohol content, but also the continued use of lethal additives to speed drinkers to their desired high (Riley & Marshall, 1999). Similar cases have

also been reported in Bangladesh, India and Somalia (see country profiles for details). When viewed from a public health and welfare perspective, it is important for the state to gain effective control and oversight over informal alcohol production and distribution. Licensing and inspection of production, whether it be a matter of cottage, of small factory or of full-scale industrial production, is an important means of eliminating adulterants (Rehm et al., 2003b).

Although more expensive, there is indication that industrially produced beverages, particularly lager-style beer, are gaining popularity in many developing countries, due perhaps to issues of prestige attached to international brands and increasing marketing efforts by multinational alcohol beverage companies (Babor et al., 2003).

It would seem that there may be health benefits from replacing cottage-produced with industrially-produced alcohol in terms of the purity of the product. However, these benefits should also be empirically verified, since they can easily be overstated (Room et al., 2002). On the other hand, it could be speculated that traditionally produced alcoholic beverages may potentially carry the benefits of having a lower alcohol content, providing local employment opportunities and preserving values of the local culture (which may or may not promote lower levels of alcohol consumption).

The following case examples present some information regarding local and traditional alcoholic beverages in selected countries. As mentioned earlier, there exists a wide range of beverages - what is interesting to note here is the social context in which these beverages are produced and consumed in different parts of the world.

Case example 1: India

Country liquor is a distilled alcoholic beverage made from locally available cheap raw material such as sugar-cane, rice, palm, coconut and cheap grains, with an alcohol content between 25% and 45%. Common varieties of country liquor are *arrack* (from paddy or wheat), *desi sharab* and *tari*. Illicit liquor is mostly produced clandestinely in small production units with raw materials similar to that used for country liquor. With no legal quality control checks on them, alcohol concentration of illicit liquor varies (up to 56%). Adulteration is quite frequent, industrial methylated spirit being a common adulterant, which occasionally causes incidents like mass poisoning with consumers losing their lives or suffering irreversible damage to the eyes. Cheaper than licensed country liquor, illicit liquor is popular among the poorer sections of the population. In many parts of India, illicit production of liquor and its marketing is a cottage industry with each village having one or two units operating illegally.

Source: Mohan et al. (2001)

Case example 2: Venezuela

Corn liquor is consumed by an indigenous tribe in Venezuela. Several times each year, especially during the corn harvest season, the trunk of a large tree would be hollowed out and filled with corn mash by an individual specially chosen by the community. The corn mash would be allowed to ferment to create an alcoholic beverage with a high enough alcohol content to cause intoxication after consumption of only two glasses or gourdfuls. When the corn liquor is ready, a village festival would be held in which all adults would drink to the point of falling down. Men would typically bring their bows and arrows and fight to settle grudges. Festivals would end after two or three days, when the corn liquor ran out. There were rarely individuals who consumed alcoholic beverages at times other than festival celebrations.

Source: Seale et al. (2002)

Case example 3: Malaysia

In the East Malaysian states of Sabah and Sarawak on the island of Borneo, indigenous people traditionally drink a homemade rice wine called *tuak* or *tapai* in conjunction with harvest celebrations and social or communal gatherings. This rice wine is reportedly very potent. At such important functions, especially the harvest festival, which is of much significance for these agrarian folk, almost all are required to drink. Refusal by guests to partake of these drinks is a breach of etiquette. Such drinking is an integral part of the culture of these tribes.

Source: Arokiasamy (1995)

Case example 4: Uganda

Tonto is a traditional brew produced from juice obtained from special varieties of bananas. The common local banana varieties used in making *tonto* are *kisubi*, *ndizi*, *musa*, *kivuru*, *kabula* and *mbidde*. Another common name used for the brew in central Uganda is *mwenge bigere*. It is mostly consumed in central and western Uganda, where banana growing is a major agricultural activity, and in urban areas all around the country at social gatherings and in bars. In various parts of the country, it is a source of income for many families. The production of *tonto* is as follows: Green bananas are ripened for 3–5 days in a covered, previously warmed, pit lined with banana leaves to ensure uniform temperature. The juice is extracted from the ripe banana by squeezing, by a group of men using their feet after mixing with spear grass. The juice is then filtered through grass held in a calabash funnel and diluted with water in known ratios. Roasted and ground sorghum is added to the diluted banana juice in a canoe-shaped wood container. The fermentation broth is then covered with banana leaves and split banana stems in a warmed pit and incubated for 2–4 days. The alcohol content in *tonto* ranges between 6 and 11% v/v and is consumed from small gourds using straws.

Source: Mwesigye & Okurut (1995)

Case example 5: Botswana

Bojalwa (sorghum beer) and ***khadi*** are both home-brewed beer-like drinks that vary greatly in terms of taste, consistency and alcohol content depending on availability of ingredients and methods of fermentation. Indeed *khadi* could almost be described as a 'designer alcohol' often brewed to the consumer's needs and tastes. It is made from a base or 'mash' that can consist of a combination of any of the following ingredients: wild berries, wild pumpkins, wild roots, oranges, sorghum and maize. Yeast, black tobacco or other unspecified substances are sometimes added to this base to give it 'strength', and there have been rumours around Ghanzi of car battery acid also being added.

Source: Molamu & Macdonald (1996)

Case example 6: Ethiopia

Talla is an Ethiopian home-brewed beer which differs from the others in some respects. First it is brewed with barley or wheat, hops, or spices. Secondly, it has a smoky flavour due to the addition of bread darkened by baking and use of a fermentation vessel which has been smoked by inversion over smoldering wood. *Talla* is not processed under government regulations hence the alcohol content varies but is usually around 2% to 4%. Filtered *tella* has a higher alcohol content ranging from 5% to 6%.

Source: Selinus (2004)

Case example 7: Egypt

Bouza (traditional beer) is a fermented alcoholic beverage produced from wheat in Egypt, and has been known by the Egyptians since the days of the Pharaohs. It is a thick, pasty yellow beverage and produces a sensation of heat when consumed. Like other opaque beers, *bouza* has a very short shelf life and is expected to be consumed within a day. It has an alcoholic content of between 3.8% and 4.2%.

Source: Haard (1999)

Case example 8: Ghana

Pito (local brew made from millet) is widely consumed in Ghana. The brewing of *pito* is traditionally associated with the people in the northern part of the country, but migration has led to its production throughout the country. The industry is mostly controlled by women between the ages of 18 and 67 years old. *Pito* is golden yellow to dark brown in colour with taste varying from slightly sweet to very sour. It contains lactic acid, sugars, amino acids, 2% to 3% alcohol and some vitamins and proteins. There are four types of *pito* in Ghana – ***nandom***, ***kokmba***, ***togo*** and ***dagarti***. The peculiar characteristics of each lies in the differences in their wort extraction and fermentation methods.

Source: Akyeampong (1995); Sefa-Dedeh (1999)

Case example 9: Kenya

Muratina is an alcoholic drink made from sugar-cane and muratina fruit in Kenya. The fruit is cut in half, sun-dried and boiled in water. The water is removed and the fruit sun-dried again. The fruit is added to a small amount of sugar-cane juice and incubated in a warm place. The fruit is removed from the juice after 24 hours and sun-dried. The fruit is now added to a barrel of sugar-cane juice which is allowed to ferment for between one and four days. The final product has a sour alcoholic taste.

Source: The Schumacher Centre for Technology & Development (2004)

Case example 10: United Republic of Tanzania

A study that collected and analysed 15 homemade but commercially available alcoholic beverages in Dar es Salaam found that ethanol concentrations of the brewed samples ranged from 2.2 to 8.5% w/v whilst the two distilled samples contained 24.2% and 29.3% ethanol w/v. Aflatoxin B1 was found in nine brewed beverages, suggesting the use of contaminated grains or fruit for their production. The amount of zinc in four samples was double the World Health Organization recommended maximum for drinking water (5 mg/litre). One brewed beverage contained toxic amounts of manganese (12.8 mg/litre). Both distilled spirits were rich in fusel alcohols and one was fortified by caffeine. The results suggested that impurities and contaminants possibly associated with severe health risks, including carcinogens, are often found in traditional alcoholic beverages. Continuous daily drinking of these beverages is certain to increase health risks.

Source: Nikander et al. (1991)

Drinking patterns

The consumption of alcoholic beverages can be studied from a number of viewpoints, ranging from the viewpoint of an economist to that of a cultural anthropologist. When viewed from a public health perspective, alcoholic beverages can potentially be an agent of illness and mortality. Depending on the consumption pattern, use of alcoholic beverages can elevate the drinker's risk of health problems (traffic and other accidents, chronic illness such as cirrhosis and cancer, and mental disorders such as alcohol dependence) as well as social problems (inability to cope with work, family and other roles, and harm to those in the drinker's surrounding environment). Against this burden, there is some evidence that small amounts of alcohol may play a protective role in heart disease (Midanik & Room, 1992; Corrao et al., 2000).

The distribution of drinking patterns in the population at large is of interest from all these perspectives, although different perspectives tend to emphasize different aspects of drinking. A public health analysis should take into account environmental factors, because they put drinking in its socioeconomic context and can provide important information on potential means of harm reduction. However, a public health analysis should also take into account the amount of alcohol consumed, because the alcohol content of beverages is a key risk factor for its various adverse consequences – as a biochemical agent in the development of chronic health problems, as an intoxicant involved in accidents and other acute problems, and as a dependence-causing substance in chronic problems (Midanik & Room, 1992).

Alcohol consumption in the population can be measured in two main ways: by analysing production and distribution statistics for alcoholic beverages as market commodities and by asking samples of the population questions about their drinking behaviour (Midanik & Room, 1992).

Survey data offer important advantages. In the first place, it is one way to measure, however imperfectly, the alcohol consumption, which is not recorded in official statistics – which in many countries constitutes the greater share of total alcohol consumption. Second, survey data can give a picture of the social location of drinking in a society, and also allows a direct focus on charting the distribution and correlates in the population of the patterns of drinking most likely to be associated with harm – intoxication episodes, and long-term heavy drinking. Third, a survey offers a way to measure directly alcohol-related problems, which do not show up in police or health statistics: problems in family life, for instance, or in work performance. Fourth, analyses of survey data can explore directly the relationship between patterns and contexts of drinking and the occurrence of social and health problems. Fifth, when surveys are repeated over time, they can be used to monitor the situation in the society and to evaluate policy initiatives (WHO, 2001b).

However, the most important advantage of survey data over consumption statistics is that each respondent's patterns are recorded separately. A person's drinking pattern can thus be related to other personal characteristics and behaviours. Drinking patterns can be surveyed for all kinds of population subgroups, whereas consumption statistics can be broken down only geographically.

A further advantage of survey data is that they allow a detailed examination of different facets of drinking behaviour. Many drinkers have quite complex patterns of drinking. Consider an example of a week's drinking by a relatively heavy-drinking respondent (adapted from Midanik & Room, 1992):

- one drink after work on Monday with a work client
- two drinks with family dinner on Monday, Tuesday and Thursday
- no drinks on Wednesday
- eight drinks at a party on Friday night
- two drinks on a Saturday afternoon while relaxing in the backyard
- four drinks out at dinner with friends on Saturday evening
- no drinks on Sunday

The respondent's pattern can be summarized in a number of ways. In terms of *volume* of drinking, here the respondent drinks, on average, three drinks a day. In terms of *frequency* of drinking, the respondent drinks nearly every day – 5 days out of 7. But neither of these summaries provides a sense of *variability* in the drinking pattern – that the respondent drinks relatively moderate amounts on most days, but sometimes drinks much larger amounts. This aspect of drinking can be covered by a measure of dispersion (like the standard deviation), or with a summary of how often the respondent drinks more than a certain amount. For example, this respondent probably falls into the category of heavy episodic drinking – consuming five or more drinks on one occasion at least once a week (Midanik & Room, 1992).

The aspect of drinking pattern that should be emphasized during data collection and analysis depends in part on the purpose of the research. When viewed as a risk factor for many long-term physical consequences of drinking – such as cirrhosis of the liver – the overall volume of drinking is probably the most important aspect. But as a risk factor for accidents or social disruptions, it is the individual episodes of heavy drinking that are of interest, in combination with the drinking context. The greatest immediate risk associated with the above sample respondent's drinking week, for instance, would probably be if he or she attempted to drive home on Friday or Saturday night. For studies attuned to such consequences, the average number of drinks per day is less important than the frequency of drinking large amounts of alcohol. Someone who drinks one drink at lunch and two with dinner every day, for example, would be at less risk for problems associated with intoxication than the sample respondent, although the overall volume of drinking would be the same (Midanik & Room, 1992).

The modern tradition of survey research on drinking patterns and problems in the general population is a rather recent development. Some countries (mainly developed ones) have established in about the last 30 years or so a tradition of repeated surveys, allowing trends and developments to be monitored in the whole society and in subgroups of the population. Survey research on drinking patterns and problems in developing societies is much less common (although some exceptions such as in Costa Rica, India and Mexico can be found). Such surveys have contributed important information on the demography of drinking – where different patterns on drinking (or abstention) are distributed by subgroups of the population formed by differentiations such as gender, age, socioeconomic status and region of residence. They might have become a way of gathering information on alcohol consumption not recorded in official statistics. As a society builds up a tradition of such surveys, they also become tools for monitoring trends in different social groups, and sometimes for evaluating the effects of policy interventions in the society. They thus become an important tool for alcohol policymaking in a public health perspective (WHO, 2001b).

This report looked at rates of alcohol abstainers, some measure of heavy and hazardous drinking, high risk drinking or problem drinking, heavy episodic drinking or binge drinking and alcohol dependence.

Who are the abstainers?

As can be seen in Table 6, the rates of abstainers vary considerably across countries. The proportion of last year abstainers among the total adult population reported across countries ranged from a low of 2.5% in Luxembourg to a high of 99.5% in Egypt. In relation to lifetime abstainers (have never tried alcohol) among the total adult population, the rates range from 9.4% in Latvia to 98.4% in the Comoros (see country profiles for more information). Care must be taken when interpreting this table as the cut-off age for different countries varies (from 12 years and above to 18 years and above). Given the role of alcohol in different societies, these differences may be quite easily explained. The one consistency that appears to transcend cultures is the difference in abstention rates between males and females. A higher proportion of women abstain from alcohol than men. A second common finding is the role of religion in shaping drinking habits. For instance, countries with Islam as the official religion almost always have higher rates of abstinence. However, in each case, one must keep in mind that patterns of abstinence, like drinking patterns, may vary within specific subpopulations and across different regions of a particular country. This is especially true for multicultural and multiethnic societies, in which different groups may represent quite diverse traditions with respect to alcohol.

Table 6: Rate of last year abstainers among the adult population

Country	Year	**Total (%)**	**Male (%)**	**Female (%)**
Albania	1995	24.0	12.0	36.0
Algeria	1995	89.0	80.0	98.0
Argentina[a]	2003	16.2	7.5	23.2
Armenia	1995	24.0	12.0	36.0
Australia	2001	17.5	14.1	20.8
Austria	1993	11.0	5.8	16.1
Azerbaijan	1995	24.0	12.0	36.0
Barbados	1995	49.5	29.0	70.0
Belarus	1995	3.0	2.0	4.0
Belgium	2001	18.9	11.5	25.8
Belize	1995	34.0	24.0	44.0
Benin[a,b]	1998	N.A.	16.8	14.3
Bolivia	1995	34.5	24.0	45.0
Botswana	1995	53.5	37.0	70.0
Brazil[a]	2001–2002	51.5	40.0	60.5
Bulgaria	1997	N.A.	32.1	65.1
Cambodia	1995	85.0	74.0	96
Canada[b]	1998–1999	22.1	17.8	26.1
Chile	2002	25.3	22.0	28.6
China[a]	2000–2001	48.6	27.5	73.1
Colombia	2000–2001	15.1	4.9	20.7
Costa Rica	1995	60.0	45.0	75.0
Cuba	1995	49.5	29.0	70.0
Cyprus	1995	8.0	1.0	15.0
Czech Republic (the)	2002	14.6	9.1	20.0

Country	Year	Total (%)	Male (%)	Female (%)
Denmark[b]	1997–1998	3.0	2.0	4.0
Egypt	2000–2001	99.5	99.0	100.0
El Salvador	1995	23.5	9.0	38.0
Fiji[b]	1993	88.7	78.8	97.9
Finland	2000	7.4	7.1	7.7
France	1999	6.7	4.3	8.9
Georgia	2000–2001	22.9	8.7	33.5
Germany	2000	5.1	4.3	5.9
Greece	1995	8.0	1.0	15.0
Guatemala	1995	53.5	45.0	62.0
Guyana	1995	30.0	20.0	40.0
Haiti	1995	60.0	58.0	62.0
Honduras	1995	23.5	9.0	38.0
Hungary	2001	17.5	9.2	25.5
Iceland	2003	11.8	11.4	12.2
India[a]	2000–2001	79.1	67.1	89.3
Indonesia	2000–2001	94.8	89.8	98.9
Iraq	1995	89.0	80.0	98.0
Ireland[c]	2002	22.0	17.0	26.0
Israel	2001	35.5	25.7	45.4
Italy	2000	25.0	36.4	12.8
Jamaica	2001	57.6	43.8	69.4
Japan	2001	13.5	7.4	19.7
Jordan	1995	86.0	74.0	98.0
Kenya	1995	55.0	45.0	65.0
Kiribati[b]	1981	73.1	51.4	92.9
Kyrgyzstan	1995	70.0	60.0	80.0
Lebanon	2000–2001	77.4	67.4	86.7
Lesotho[a,b]	N.A.	74.0	47.0	81.0
Lithuania	1999	20.0	10.0	28.0
Luxembourg	1995	2.5	1.0	4.0
Malaysia	1995	49.5	35.0	64.0
Marshall Islands (the)	N.A.	66.3	80.6	95.5
Mexico	1998	41.6	22.4	55.0
Micronesia (Federated States of)	N.A.	67.6	45.1	90.9
Mongolia	1995	41.5	20.0	63.0
Myanmar	1995	69.5	45.0	94.0
Namibia	1998	N.A.	39.0	53.0
Netherlands (the)	2001	15.8	9.4	21.8
New Zealand[b]	2000	15.0	12.0	17.0
Nicaragua	1995	23.5	9.0	38.0
Nigeria[a]	2000–2001	75.6	51.3	89.6
Norway	1999	6.0	5.8	6.2
Pakistan	1995	94.5	90.0	99.0
Palau	1990–1991	N.A.	23.1	64.2
Papua New Guinea	1995	54.5	22.0	87.0
Paraguay	1995	28.0	18.0	38.0
Peru	2002	24.9	20.2	29.0
Philippines (the)	1995	40.0	10.0	70.0
Poland	1995	19.0	12.0	26.0
Portugal	1995	15.5	7.0	24.0

Country	Year	Total (%)	Male (%)	Female (%)
Republic of Korea (the)[b]	2001	27.1	12.4	38.9
Republic of Moldova (the)	1995	13.5	9.0	18.0
Romania	1995	38.0	23.0	53.0
Russian Federation (the)	1996	23.1	9.0	35.0
Saudi Arabia	1995	97.0	95.0	99.0
Seychelles	1995	27.5	10.0	45.0
Singapore	2000–2001	74.5	66.6	82.3
Slovakia	2000–2001	7.7	3.6	10.4
Slovenia	1995	24.0	12.0	36.0
South Africa	1995	69.0	55.0	83.0
Spain[a]	2003	37.7	26.9	48.7
Sri Lanka	2002	67.6	41.4	92.9
Suriname	1995	42.5	30.0	55.0
Sweden	2002	11.3	8.0	14.7
Switzerland	2002	22.5	14.2	30.4
Syrian Arab Republic (the)	2000–2001	95.7	92.4	98.8
Tajikistan	1995	70.0	60.0	80.0
Thailand[b]	2001	67.4	44.1	90.2
TFYR Macedonia[d]	1995	24.0	12.0	36.0
Tokelau[e]	1976	N.A.	50.0	92.0
Trinidad and Tobago	1995	49.5	29.0	70.0
Tunisia	1995	82.5	70.0	95.0
Turkey	2000–2001	80.4	77.5	82.5
Turkmenistan	1995	45.0	35.0	55.0
Uganda[a]	2003	54.3	48.2	60.3
The United Kingdom	2000	12.0	9.0	14.0
United States of America (the)	2002	33.9	29.3	38.2
Uzbekistan	1995	70.0	60.0	80.0
Venezuela	1995	42.5	30.0	55.0

a Regional survey
b No definition of abstainers given.
c Last month abstainers
d The former Yugoslav Republic of Macedonia
e Current abstainers
Note: *Please refer to individual country profiles for details of references/sources used.*

Who are the heavy drinkers?

Heavy drinking is a pattern of drinking that exceeds some standard of moderate drinking or – more equivocally – social drinking. Heavy drinking is often defined in terms of exceeding a certain daily volume (e.g. three drinks a day) or quantity per occasion (e.g. five drinks on an occasion, at least once a week), or daily drinking. Such persistent patterns of drinking may incur acute or chronic health and social consequences on the drinker in question. Table 7 presents some data for selected countries with data on heavy drinkers. Note that this table is not comparable as different surveys have varying definitions of heavy drinking and samples cover different age ranges. However, the majority of the data below are for the adult population of 18 years and above.

Table 7: Heavy drinkers among the adult population

Country	Year	Total (%)	Male (%)	Female (%)
Argentina[a,b,c]	2003	N.A.	11.5	2.0
Australia[d]	2001	7.0	6.7	7.2
Austria[b,c]	1993	N.A.	17.3	7.0
Brazil[b,c]	2001–2002	N.A.	17.8	18.2
Bulgaria[e]	1997	N.A.	18.2	0.8
Burkina Faso[b]	2003	11.6	10.0	13.2
Chad[b]	2003	11.0	12.8	9.5
Colombia[c,f]	2001–2002	31.8	52.4	21.0
Costa Rica[b,c]	2003	N.A.	5.0	3.0
Czech Republic (the)[b,c]	2002	N.A.	25.7	12.5
Dominican Republic (the)[b]	2003	2.1	1.1	3.1
Ecuador[b]	2003	4.1	7.3	1.7
Estonia[e]	1997	N.A.	9.3	0.5
Ethiopia[b]	2003	9.3	8.1	10.6
Finland[b,c]	2000	N.A.	5.8	3.4
France[b,c]	1999	N.A.	16.6	7.8
Georgia[c,f]	2001–2002	27.8	50.1	10.6
Germany[b,c]	2000	N.A.	11.2	11.3
Ghana[b]	2003	1.9	2.1	1.7
Hungary[b]	2003	12.4	16.9	9.3
India[b]	2003	1.4	2.4	0.4
Israel[b,c]	2001	N.A.	5.9	4.7
Italy[g]	2000	5.8	9.8	2.0
Japan[b,c]	2001	N.A.	22.7	4.9
Lao People's Dem. Rep.[b]	2003	2.7	3.8	1.8
Mexico[c,f]	2000–2001	14.2	18.1	11.6
Namibia[b]	2003	4.1	3.1	4.9
Nepal[b]	2003	3.5	3.0	4.0
Netherlands (the)[b,c]	1999	N.A.	10.4	11.1
Nigeria[b,c]	2003	N.A.	27.8	36.1
Norway[b,c]	1999	N.A.	3.0	5.2
Paraguay[b]	2003	3.1	5.6	1.0
Russian Federation (the)[b]	2003	2.4	3.7	1.6
Slovakia[b]	2003	7.0	5.2	7.9
South Africa[c,f]	1998	7.6	7.0	8.8
Switzerland[b,c]	1997	N.A.	8.6	6.1
Turkey[c,f]	2000–2001	1.7	1.3	2.5
Uganda[b,c]	2003	N.A.	40.1	20.3
The United Kingdom[c,f]	2000	N.A.	39.0	42.0
United States of America (the)[b,c]	1996	N.A.	6.4	5.0
Viet Nam	2003	2.9	5.7	0.6
Zimbabwe	2003	2.7	5.8	1.0

[a] *Regional survey*
[b] *Consumption of 40 g or more pure alcohol/day for men and 20 g or more pure alcohol/day for women.*
[c] *Among drinkers only*
[d] *Consumption of more than 40 g pure alcohol/day for men and more than 20 g pure alcohol/day for women.*
[e] *Consumption of 560 g of ethanol a week or more (80 g a day or more).*
[f] *Consumption of five or more standard drinks for males and three or more standard drinks for females on a typical drinking day.*
[g] *Consumption of more than 0.5 litres of wine daily.*
Note**:** *Please refer to individual country profiles for details of references/sources used.*

Who are the heavy episodic drinkers?

The term "binge drinking" or "heavy episodic drinking", as used in this report, has been rather ambivalently used in the literature. Gmel, Rehm and Kuntsche (2003) identified two main definitions: (a) a drinking occasion leading to intoxication, often measured as having more than *x* number of drinks on one occasion, and (b) a pattern of heavy drinking that occurs over an extended period of time set aside for this purpose, and linked to more clinical definitions of harmful use or dependence. This report uses the former definition of bingeing as a risky single drinking occasion. Data for some countries show continued trends of binge or heavy episodic drinking among those who drink. In Ireland, for example, results of a recent survey suggest that among those consuming alcohol, binge drinking is the norm among men and occurs in about a third of the drinking occasions of women (Ramstedt & Hope, 2003). A national survey conducted in New Zealand in 2000 found that 19% of male drinkers and 9% of female drinkers engaged in heavy episodic drinking at least weekly (Habgood et al., 2001). A more recent national survey conducted in the Republic of Korea found that 63.4% of drinkers (66.3% of male drinkers and 57.8% of female drinkers) had engaged in heavy episodic drinking (Ministry of Health and Social Affairs, 2002).

Table 8 presents data for a selected number of countries on rates of heavy episodic drinking among the total adult population. Again, caution must be taken when interpreting this table as the cut-off age for different countries varies (from 14 years and above to 18 years and above).

Table 8: Heavy episodic drinkers among the adult population

Country	Year	Total (%)	Male (%)	Female (%)
Australia[a]	2001	13.4	15.3	11.6
Belgium[b]	2001	20.1	32.6	8.4
Bosnia and Herzegovina[e]	2003	1.2	2.9	0.0
Brazil[e]	2003	9.9	17.2	4.1
Burkina Faso[e]	2003	10.9	13.9	7.7
Canada[c,f]	2001–2002	20.1	28.3	11.2
Chad[e]	2003	12.3	17.2	7.9
China[e]	2003	3.8	7.5	0.3
Colombia[g]	2001–2002	5.2	11.6	1.9
Comoros (the)[e]	2003	0.2	0.4	0.0
Congo[e]	2003	5.2	8.3	2.5
Costa Rica[c,d]	2003	N.A.	22.1	8.2
Côte d'Ivoire	2003	4.1	6.5	0.9
Czech Republic (the)[c,d]	2002	N.A.	28.8	9.9
Dominican Republic (the)[e]	2003	9.1	15.7	3.5
Ecuador[e]	2003	4.7	9.3	1.2
Estonia[e]	2003	6.9	15.2	2.3
Ethiopia[e]	2003	4.1	7.7	0.4
Finland[c,h]	2000	N.A.	49.1	14.1
France[c,h]	2000	N.A.	27.9	9.7
Georgia[e]	2003	10.8	22.3	1.2
Germany[c.d]	2000	N.A.	42.1	12.7
Ghana[e]	2003	1.4	2.5	0.4
Guatemala[e]	2003	1.3	3.4	0.2
Hungary[e]	2003	9.1	18.9	1.9
Iceland[c,d]	2001	N.A.	42.7	20.0
India[e]	2003	1.4	2.9	0.1

Country	Year	Total (%)	Male (%)	Female (%)
Italy[b,c]	2001–2002	N.A.	12.8	11.5
Japan[c,h]	2001	N.A.	38.3	10.7
Kazakhstan	2003	4.4	8.8	2.0
Lao People's Dem. Republic (the)[e]	2003	12.3	20.9	4.8
Mexico[c,d]	1998	N.A.	46.9	5.8
Namibia[e]	2003	6.2	9.5	4.0
Netherlands (the)[c,h]	1999	N.A.	36.6	11.6
Nigeria[c,d]	2003	N.A.	52.0	39.6
Paraguay[e]	2003	14.3	27.4	3.4
Philippines (the)[e]	2003	7.0	13.2	1.6
Russian Federation (the)[b]	2003	8.2	15.1	3.6
Slovakia[b]	2003	6.8	13.9	2.8
Spain[e]	2003	4.6	8.5	1.6
Sri Lanka[e]	2003	2.4	4.9	0.1
Ukraine[e]	2003	9.6	19.5	3.7
Uganda[c,d]	2003	N.A.	46.0	17.6
The United Kingdom[g]	2000	17.0	24.0	9.0
Viet Nam[e]	2003	4.7	10.2	0.3
Zimbabwe[e]	2003	4.0	10.1	0.9

a Consumption of seven or more standard drinks for males (five or more for females) on any one drinking occasion at least monthly.
b At least once a month six or more drinks on the same day.
c Among drinkers only
d Consumption of five or more drinks on one occasion at least once a month in the last year.
e At least once a week consumption of five or more standard drinks in one sitting.
f Consumption of five or more drinks on one occasion, 12 or more times in the last year.
g Consumption of six or more drinks on one occasion weekly or more.
h Consumption of six or more drinks on one occasion at least once a month in the last year.
***Note**: Countries in bold indicate that surveys were not national but regional. Please refer to individual country profiles for details of references/sources used.*

Alcohol dependence

The Tenth Revision of the International Classification of Diseases and Health Problems (ICD-10) defines alcohol dependence syndrome as being a cluster of physiological, behavioural, and cognitive phenomena in which the use of alcohol takes on a much higher priority for a given individual than other behaviours that once had greater value. A central descriptive characteristic of the dependence syndrome is the desire (often strong, sometimes overpowering) or sense of compulsion to take alcohol. It is worth noting here that reporting rates of alcohol dependence in different countries is complicated by the fact that there exists important differences in the diagnostic instruments and tools based on the Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised (DSM-III-R) or the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) and ICD-10; as well as if the prevalence rates measured refer to lifetime or last year alcohol dependence. Table 9 shows the rate of alcohol dependence among the national adult population in some selected countries. Again, caution must be taken when interpreting this table as the cut-off age and diagnostic measures used differed between countries.

Table 9: Alcohol dependence among adult population

Country	Year	Total (%)	Male (%)	Female (%)	Measure
Argentina[a]	1999	4.31	6.67	1.74	ICD-10
Australia[a]	1997	3.5	5.2	1.8	ICD-10
Austria[b]	1996	2.2	N.A.	N.A.	CAGE
Belgium[b]	2001	7.0	9.5	3.6	N.A.
Brazil[b]	2001	11.2	17.1	5.7	N.A.
Canada[c]	2002	9.3	14.0	4.5	mixed
Chile[d]	N.A.	6.4	11.0	2.1	DSM-III-R
China[b]	2001	3.8	6.6	0.2	DSM-III-R
Colombia[a]	2000–2001	4.8	9.8	2.2	ICD-10
Costa Rica[b,e]	2000–2001	7.0	10.8	2.4	mixed
Egypt[a]	2000–2001	0.2	0.4	0.0	ICD-10
Ethiopia[d]	1994	1.0	1.9	0.1	CAGE/CIDI
Finland[b]	2000	4.0	6.5	1.5	DSM-IV
France[b]	2000	N.A.	13.3	4.1	DETA[f]
Georgia[a]	2000–2001	3.2	7.3	0.2	ICD-10
Germany[b]	2000	3.8	6.0	1.5	DSM-IV
India[a]	2000–2001	3.6	6.8	0.7	ICD-10
Indonesia[a]	2000–2001	1.0	1.7	0.3	ICD-10
Iran[e]	N.A.	7.3	11.9	2.7	DSM-IV
Japan[d]	1997–1999	4.1	8.4	0.7	DSM-III-R
Mexico[a]	2000–2001	1.8	4.2	0.2	ICD-10
Netherlands (the)[b]	1996	5.5	9.0	1.9	DSM-III-R
Nigeria[a]	2001–2002	0.7	1.9	0.0	ICD-10
Peru[h]	2002	10.6	17.8	4.3	ICD-10
Poland[b]	1999	12.2	23.3	4.1	CAGE
Republic of Korea (the)[a]	2003	4.3	6.9	1.7	CIDI
Singapore[a]	2001–2002	0.6	1.1	0.2	ICD-10
Slovakia[A]	2001–2002	4.8	9.4	1.1	ICD-10
South Africa[d]	1998	N.A.	27.6	9.9	CAGE
Syrian Arab Republic (the)[a]	2001–2002	0.2	0.5	0.0	ICD-10
Turkey[A]	2001–2002	1.3	1.7	0.7	ICD-10
The United Kingdom[b]	N.A.	4.7	7.5	2.1	ICD-10
United States of America (the)[g]	2002	7.7	10.8	4.8	DSM-IV
Uruguay[b]	2001	5.0	8.5	1.3	DSM-IV

[a] *Last year alcohol dependence*
[b] *No definition of alcohol dependence given.*
[c] *Alcohol dependence classification was based on a set of questions which examined aspects of alcohol tolerance (for e.g. needing more to have an effect), withdrawal, loss of control, and social or physical problems related to alcohol use in daily life.*
[d] *Lifetime alcohol dependence*
[e] *Alcohol dependency/alcoholic was defined as an individual that presents/displays the inability to abstain from the consumption of spirits or is unable to stop when consuming spirits as well as symptoms of greater deprivation (e.g. tremors).*
[f] *Diminuer entourage trop alcohol (Reduce alcohol-based surroundings) test*
[g] *Alcohol dependence or abuse*
***Note**: Countries in bold indicate that surveys were not national. Please refer to individual country profiles for details of references/sources used.*

Youth drinking

With the large exception of Europe and North America, there is little uniformity in the means and scales used to monitor alcohol consumption among young people. Although it is more common for countries to survey their young populations regarding alcohol use than to conduct national population surveys, the range of ages being surveyed and of definitions of categories of consumption used render cross-national comparisons difficult in most regions.

In Europe, two large-scale international studies have been carried out in an attempt to collect comparable data on alcohol use among young people. The European School Survey Project on Alcohol and other Drugs (ESPAD) was conducted for the first time in 1995 and subsequently in 1999 and 2003. This study examined drinking (also smoking and illicit drug use) among representative samples of 15–16-year-old school students in Europe. The second ESPAD study carried out in 1999 involved more than 90 000 students from a total of 30 countries. This is probably the largest international study of the social and behavioural aspects of alcohol epidemiology ever attempted (Plant & Miller, 2001). The Health Behaviour in School Children (HBSC) study, established in 1982, is conducted by an international network of research teams in collaboration with the WHO Regional Office for Europe. It aims to gain new insight into and to increase understanding of young people's health, well-being, health behaviour and social context. There have since been several rounds of the HSBC surveys being conducted every four years involving young people aged 11 to 15 years. The most recent surveys were in 2001/2002 whereby 35 countries and regions participated (WHO, 2004d).

Other examples of large-scale studies on youth and alcohol include the Monitoring the Future Survey (MTF) – an annual survey among 8^{th}, 10^{th}, and 12^{th} graders in the United States, the Youth Risk Behavior Survey conducted among students in grades 9 to 12 in the United States, and the Harvard School of Public Health College Alcohol Study, and the recently initiated Health Behaviour and Lifestyle of Pacific Youth (HBLPY) survey conducted in the Federated States of Micronesia, Tonga and Vanuatu. Such initiatives should be strongly encouraged as a means to obtain reliable, useful and comparable data on monitoring alcohol consumption among youths.

In line with this, WHO has launched the Global school-based student health survey (GSHS) – an international collaborative surveillance project designed to help countries measure and assess the behavioural risk factors and protective factors in ten key areas (alcohol use being one of them) among young people aged 13 to 15. The GSHS is a relatively low-cost school-based survey which uses a self-administered questionnaire to obtain data on young people's health behaviour and protective factors related to the leading causes of morbidity and mortality among children and adults worldwide. Among the countries participating in this study are the Bahamas, Botswana, Chile, China, Guatemala, Guyana, Jordan, Kenya, Mozambique, the Philippines, Swaziland, Trinidad and Tobago, Uganda, Venezuela, Zambia and Zimbabwe (to access more information on the GSHS, please see WHO, 2004b).

There is widespread agreement that the health and well-being of many young people today are seriously being threatened by the use of alcohol. Worries have arisen as emerging trends in consumption are starting to permeate youth culture, showing increasing signs of transcending national boundaries. There appears to be an international pattern towards a more hedonistic attitude to drinking, consciously using alcohol for its pleasurable psychological effects. Associated with this is a trend of increased drinking to intoxication. Increased binge drinking and intoxication in young people – the pattern of consumption associated with Northern

Europe – is now reported even in countries such as France and Spain in which drunkenness was traditionally alien to the drinking culture and in which the overall level of alcohol consumption is declining fairly steeply. In the Mediterranean countries, changes in drinking styles are associated with changes in beverage preferences, beer replacing wine as the main beverage of choice for young people. There are anecdotal reports that this change of beverage preference is linked to the increasing spread and popularity of Anglo-Irish style pubs across Europe (Global Alcohol Policy Alliance, 2001).

Internationally, therefore, an important current feature of young people's drinking is the importance of the 'buzz'. Many young people now drink in order to get drunk. Drunkenness is widely tolerated, indeed positively approved. Drinking to get drunk does seem to be the pattern favoured by a substantial and growing minority of young people and to have a disproportionate cultural importance (Global Alcohol Policy Alliance, 2001). Studies have shown a high prevalence of drunkenness as well as the trend towards more drunkenness – especially that involving the use of spirits – among youths in many countries (Schmid, 2003). A comparative study conducted in six European Union (EU) countries found that in all countries but one (Italy), the young people show a higher frequency of intoxication than their elders (Leifman, Österberg & Ramstedt, 2002). Another issue of concern is the emergence of alcoholic carbonated drinks (or more commonly known as alcopops) in the market today. Given their marketing, cartoon-style labeling and sweet taste, many of these drinks are targeted at young people (McKibben, 1996, cited in McKeganey, 1998) and concerns are raised as to whether alcopops act as a bridge to other, stronger alcohol products and/or reduce the age at which young people begin to start consuming alcohol.

Table 10 shows data for selected countries on the rate of heavy episodic drinking among youths (below 20 years old) and Table 11 shows data for selected countries on the rate of heavy episodic drinking among young adults (aged 18–24 years old). Again, care has to be taken when interpreting the data as different age group samples and definitions of heavy episodic drinking are used in the various studies.

Table 10: Heavy episodic drinkers among youths

Country	Year	Total (%)	Male (%)	Female (%)	Age group
Australia[a]	2001	10.7	9.6	11.8	14–19
Bulgaria[b]	1999	11.0	15.0	6.0	15–16
Canada[c]	2000–2001	15.3	26.3	5.2	15–19
China[d]	2000–2001	1.3	2.5	0.0	15–19
Colombia[c]	2000–2001	7.8	14.5	4.1	15–19
Cyprus[b]	1999	12.0	18.0	6.0	15–16
Denmark[e]	2002	N.A.	62.0	54.0	11–15
Finland[b]	1999	18.0	21.0	15.0	15–16
France[b]	1999	12.0	16.0	7.0	15–16
Georgia[d]	2000–2001	2.7	4.4	1.3	15–19
Greece[b]	1999	9.0	13.0	5.0	15–16
Hungary[f]	2003	27.5	39.2	22.2	15–16
Iceland[b]	1999	17.0	18.0	15.0	15–16
Ireland[b]	1999	31.0	32.0	32.0	15–16
India[d]	2000–2001	0.5	1.2	0.0	15–19
Indonesia[d]	2000–2001	1.1	1.1	1.1	15–19
Lithuania[b]	1999	9.0	12.0	18.0	15–16
Malta[b]	1999	22.0	25.0	23.0	15–16
Mexico[d]	2000–2001	2.5	0.8	1.5	15–19
Nigeria[d]	2000–2001	1.2	1.0	1.3	15–19
Norway[b]	2003	15.0	17.0	14.0	15–16
Poland[b]	1999	31.0	41.0	23.0	15–16
Sweden[b]	1999	17.0	22.0	13.0	15–16
Syrian Arab Republic (the)[d]	2000–2001	0.4	0.0	0.2	15–19
Turkey[d]	2000–2001	1.4	0.5	1.1	15–19
The United Kingdom[b]	1999	30.0	33.0	27.0	15–16
United States of America (the)[f]	2002	10.7	11.4	9.9	12–17

[a]Consumption of seven or more standard drinks on any one drinking occasion for males and five or more standard drinks on any one drinking occasion for females (at least weekly).
[b] Consumption of five or more drinks in a row three times or more in the last 30 days.
[c] Consumption of five or more drinks on one occasion, twelve or more times in the last year (among drinkers only).
[d] At least once a week consumption of six or more standard drinks in one sitting.
[e] Consumption of five or more standard drinks in one day at least once in the last month.
[f] Consumption of five or more drinks on one occasion at least once in the past month.
***Note**: Countries in bold indicate that surveys were not national. Please refer to individual country profiles for details of references/sources used.*

Table 11: Heavy episodic drinkers among young adults aged 18–24 years old

Country	Year	Total (%)	Male (%)	Female (%)
Bosnia and Herzegovina[a]	2003	0.8	1.8	0.0
Brazil[a]	2003	15.3	26.3	5.2
Burkina Faso[a]	2003	6.4	8.4	5.1
Chad[a]	2003	9.3	13.7	5.6
China[b]	2000–2001	2.1	3.9	0.3
Colombia[b]	2000–2001	7.8	14.5	4.1
Comoros[a]	2003	0.3	0.6	0.0
Congo (the)[a]	2003	3.9	6.4	2.2
Côte d'Ivoire[a]	2003	3.9	6.9	0.3
Croatia[a]	2003	4.6	9.6	0.0
Czech Republic (the)	2003	20.1	32.7	9.0
Dominican Republic[a]	2003	12.0	17.9	7.4
Ecuador[a]	2003	5.1	11.2	0.5
Estonia[a]	2003	6.0	10.4	3.5
Ethiopia[a]	2003	2.0	4.2	0.2
Georgia[a]	2003	10.1	19.6	2.1
Ghana[a]	2003	0.6	1.0	0.3
Guatemala[a]	2003	1.7	4.8	0.0
Hungary[a]	2003	12.2	20.8	3.5
India[b]	2000–2001	0.7	1.6	0.0
Indonesia[b]	2000–2001	0.8	1.3	0.3
Kazakhstan[a]	2003	3.1	6.8	1.1
Lao People's Democratic Republic (the)[a]	2003	11.5	19.2	5.3
Latvia[a]	2003	14.4	27.3	4.3
Lebanon[b]	2000–2001	0.2	0.4	0.0
Malawi[a]	2003	1.9	4.5	0.2
Malaysia[a]	2003	0.2	0.5	0.0
Mali[a]	2003	0.3	0.6	0.0
Mauritius[a]	2003	2.8	5.2	0.0
Mexico[a]	2003	3.1	6.3	0.8
Morocco[a]	2003	0.6	1.2	0.2
Namibia[a]	2003	5.4	10.6	2.0
Nepal[a]	2003	0.6	1.3	0.2
Nigeria[b]	2000–2001	1.0	1.7	0.6
Paraguay[a]	2003	16.1	29.2	4.4
Philippines (the)[a]	2003	7.3	13.6	0.9
Russian Federation (the)[a]	2003	5.7	6.9	4.6
Slovakia[a]	2003	17.8	28.4	9.0
Spain[a]	2003	8.6	15.1	3.2
Sri Lanka[a]	2003	0.8	1.5	0.0
Tunisia[a]	2003	3.3	6.3	0.0
Turkey[a]	2003	0.8	2.1	0.0
Ukraine[a]	2003	8.5	13.4	4.9
Uruguay[a]	2003	8.4	13.5	2.8
Viet Nam[a]	2003	3.7	8.1	0.0
Zimbabwe[a]	2003	2.8	6.6	0.3

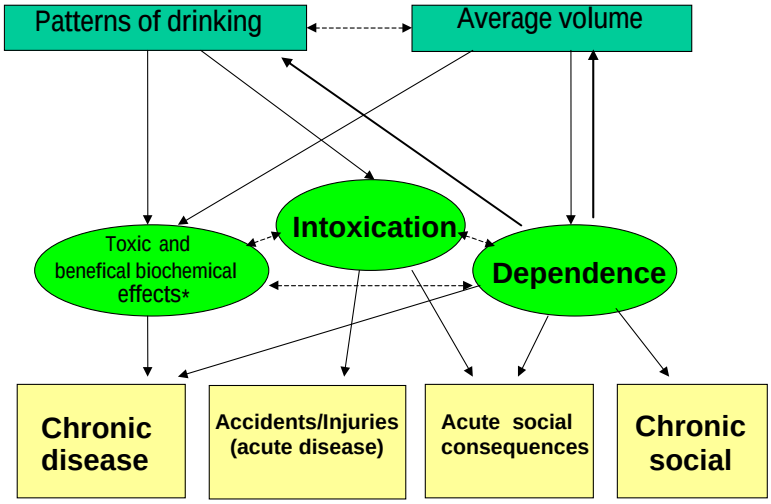
[a] *At least once a week consumption of five or more standard drinks in one sitting.*
[b] *At least once a week consumption of six or more drinks in one sitting.*
Note: *Countries in bold indicate that surveys were not national. Please refer to individual country profiles for details of references/sources used.*

Health effects and global burden of disease

Alcohol use is related to wide range of physical, mental and social harms[1]. Most health professionals agree that alcohol affects practically every organ in the human body. Alcohol consumption was linked to more than 60 disease conditions in a series of recent meta-analyses (English et al., 1995; Gutjahr, Gmel & Rehm, 2001; Ridolfo & Stevenson, 2001; Single et al., 1999). The present chapter mainly draws on the work of Gutjahr and Gmel (2001) and Rehm et al. (in press).

The link between alcohol consumption and consequences depends a) on the two main dimensions of alcohol consumption: average volume of consumption and patterns of drinking; and b) on the mediating mechanisms: biochemical effects, intoxication, and dependence (see Figure 4 for the main paths).

Figure 4: Model of alcohol consumption, mediating variables, and short-term and long-term consequences



** Independent of intoxication or dependence*
***Source**: Rehm et al. (2003c)*

Direct biochemical effects of alcohol may influence chronic disease either in a beneficial (e.g., protection against blood clot formation of moderate consumption (Zakhari, 1997), which is protective for coronary heart disease) or harmful way (e.g., toxic effects on acinar cells triggering pancreatic damage (Apte, Wilson & Korsten, 1997). ***Intoxication*** is a

[1] Social outcomes of alcohol are defined as changes that affect the social behaviour of individuals, or their interaction with partners and other family members, or their circumstances (Klingemann & Gmel, 2001). Social outcomes would include family problems, public disorder, or workplace problems. Social outcomes or consequences will not be addressed as part of this chapter unless they are part of the International Statistical Classification of Diseases and Related Health Problems (ICD). The majority of these problems are not covered by the ICD classification, even though health by WHO is defined in a broad way to include well-being. However, the quantification of such outcomes is difficult to derive and fraught by methodological difficulties. It is nevertheless important to note that social harm has a major impact on wellbeing, which may even exceed that from "quantifiable" diseases. For overviews see e.g. Klingeman and Gmel (2001) or Gmel and Rehm (2003).

powerful mediator mainly for acute outcomes, such as accidents, or intentional injuries or deaths, domestic conflict and violence (Klingemann & Gmel, 2001; Gmel & Rehm, 2003). ***Alcohol dependence*** is a powerful mechanism sustaining alcohol consumption and thus impacting on both chronic and acute consequences of alcohol (see Drummond, 1990), though it is also a consequence of drinking itself.

Total consumption or average volume of consumption has been historically the usual measure of exposure linking alcohol to disease (Bruun et al., 1975). Average volume of consumption as a risk factor is mainly linked to long-term consequences (WHO, 2000a). Acute effects of alcohol related to injury and death are much better predicted by *patterns of drinking* (Rehm et al., 1996; Bondy, 1996; Puddey et al., 1999), although there is also an association with volume of drinking. For example, the same overall average volume of alcohol can be consumed in small quantities regularly with meals (e.g. two drinks a day with meals) or in large quantities on few occasions (e.g. two bottles of wine on a single occasion every Friday). In other words, the impact of an average volume of consumption on mortality or morbidity is partly moderated by the way alcohol is consumed by the individual, which in turn is influenced by the social context (Room & Mäkelä, 2000). It should be noted that patterns of drinking have not only been linked to acute health outcomes such as injuries (Greenfield, 2001; Rossow, Pernanen & Rehm, 2001), but also to chronic diseases such as coronary heart disease (CHD) and especially sudden cardiac death (Britton & McKee, 2000; Chadwick & Goode, 1998; Puddey et al., 1999; Trevisan et al., 2001a; Trevisan et al., 2001b).

Thus, the variation of disease burden due to alcohol consumption across countries depends at least on two factors. First, it depends on the overall amount consumed in a country for which an indicator is *per capita* consumption. *Per capita* consumption of course is also influenced by the percentages of drinkers (or abstainers) in a country. Second, it depends on the way alcohol is consumed, e.g. regularly in moderate amounts with meals versus irregular in heavy drinking occasions often outside meals. Similarly, the distribution of alcohol related burden across diseases may vary widely across countries. At the risk of oversimplifying, chronic alcohol-related diseases predominantly depend on volume of drinking and should thus have a bigger share of the total burden in countries in which total *per capita* consumption is high, but the prevailing drinking pattern is a regular drinking pattern, whereas the share of acute consequences on the total burden should be higher in countries, where alcohol is commonly used more infrequently but often in high amounts when alcohol consumption takes place.

"Alcohol relatedness" varies across diseases. This is commonly expressed in alcohol attributable fractions (AAF). Some diseases or consequences are fully attributable to alcohol (e.g. the alcohol dependence syndrome), other consequences have a high alcohol attribution such as liver cirrhosis, for some consequences there are many other factors which may cause a disease, among which alcohol often plays one role, and thus the alcohol attributable part may be low. Low, however does not mean negligible. If 10% of all cases may be attributable to alcohol, for some highly prevalent diseases (e.g. breast cancer for women) the alcohol-related share may clearly outnumber diseases that are fully attributable to alcohol, but commonly rare. There are different ways to determine AAFs of diseases (for details see English et al., 1995). One is the indirect way, where relative risk estimates derived from meta-analyses are combined with country-specific disease prevalences to yield country-specific AAFs. The second is to use directly estimated AAFs, e.g. the percentage of traffic accidents where an involved person was tested positive for a blood alcohol concentration (BAC) exceeding a certain amount (e.g. 0.5 per mille). For most chronic diseases the indirect method is used. Behind this calculation stands the assumption that the mechanism for the development of a disease depend mainly on the consumed amount of alcohol and is therefore cross-culturally

stable. Therefore, Relative Risks (RR) can be derived by meta-analytical pooling of epidemiologic studies across different countries and regions all over the world. Differences in AAFs across countries then depend mainly on the prevalence of consumption distribution, e.g. the prevalence of chronic heavy drinking.

For most acute diseases, however, AAFs should be derived directly, because they depend on the way alcohol is consumed, e.g. a drinking pattern of frequent drinking to intoxication. An example for consequences for which the AAF are commonly directly derived are road accidents for which an alcohol attributable fraction is based on whether the accident-responsible driver tested positive for alcohol and to what degree (e.g. at blood alcohol concentration BAC $\geq$0.05%).

Harmful effects of alcohol consumption excluding depression and coronary heart disease

Wholly alcohol-attributable diseases

A number of diseases are by definition fully attributable to alcohol (AAF = 1 or 100%). These are listed in Table 12

Table 12: Disease conditions which are by definition alcohol-related (attributable fraction of 1)

ICD-9	Disease
291	Alcoholic psychoses
303	Alcohol-dependence syndrome
305.0	Alcohol abuse
357.5	Alcoholic polyneuropathy
425.5	Alcoholic cardiomyopathy
535.3	Alcoholic gastritis
571.0–571.3	Alcoholic liver cirrhosis
790.3	Excess blood alcohol
980.0, 980.1	Ethanol and methanol toxicity

Source: Rehm et al. (2003c)

Diseases with a contributory role

Cancer

Oropharyngeal, oesophageal and liver cancers: Alcohol has consistently been related to the risk of cancer of the mouth (lip, tongue), pharynx, larynx, hypopharynx, oesophagus and liver (Corrao et al., 1999; English et al., 1995; Gurr, 1996; Single et al., 1999; US Department of Health and Human Services, 2000; WHO, 2000a). The relationship between average volume of alcohol consumption and cancer is usually characterized as almost monotonically increasing relative risks with increasing volume of drinking (Bagnardi et al., 2001).

Female breast cancer: Much research has been conducted over the last decade on breast cancer. Prior to 1995, it has most often been concluded that evidence of a causal relationship with alcohol was insufficient (English et al., 1995; Rosenberg, Metzger & Palmer, 1993;

Schatzkin & Longnecker, 1994). However, recent studies and reviews have shown that not only hazardous or harmful drinking, but also even moderate alcohol consumption, can cause female breast cancer (Single et al., 1999). A meta-analysis by Smith-Warner et al. (1998) found a clear linear relationship over the whole continuum of consumption. Other original studies supported this finding (Bowlin et al., 1997; Corrao et al., 1999; Nasca et al., 1994; Royo-Bordonada et al., 1997; Swanson et al., 1997; van den Brandt, Goldbohm & van 't Veer, 1995; Wingo et al., 1997).

Cancers of the stomach, pancreas, colon, rectum, prostate, salivary glands, ovarium, endometrium, bladder: Many recent research projects have investigated whether these cancers are alcohol-related. Overall, evidence for a causal relationship between alcohol and cancer of the stomach, pancreas, colon, rectum, if any was found, was weak and inconclusive (Bode & Bode, 1997; Boutron et al., 1995; De Stefani et al., 1998; Gapstur, Potter & Folsom, 1994; Harnack et al., 1997; Ji et al., 1996 ; Longnecker & Enger, 1996; Lundberg & Passik, 1997; Piette, Barnett & Moos, 1998; Sarles, Bernard & Johnson, 1996; Seitz, Poschl & Simanowski, 1998; Seitz et al., 1998; Soler et al., 1998). A recent meta-analysis assessing the link between alcohol and various types of cancer showed that statistically significant increases in risk existed for cancers of the stomach, colon, rectum and ovaries (Bagnardi et al., 2001).

On prostate cancer, again most studies did not report observing an increased risk (Breslow & Weed, 1998; Ellison et al., 1998; Hiatt et al., 1994; Tavani et al., 1994), whereas two cohort studies (Ajani et al., 1998; Putnam et al., 1998) and one case–control study (Hayes et al., 1996) reported a small increased risk in men who consume even moderate amounts of alcohol.

It has been hypothesized that alcohol might constitute a risk factor for cancer of the major salivary glands (Horn-Ross, Ljung & Morrow, 1997; Muscat & Wynder, 1998), ovarium, endometrium (Bradley et al., 1998; Longnecker & Enger, 1996; Newcomb, Trentham-Dietz & Storer, 1997; Parazzini et al., 1995), and the bladder (Bruemmer et al., 1997; Donato et al., 1997; Longnecker & Enger, 1996; Yu et al., 1997). For each of these sites, results were either scarce or heterogeneous, or the effects, if any were found, not statistically significant. In sum, evidence for a causal relationship between alcohol and cancers of these sites so far has not produced consistent results, especially with regard to physiological pathways.

Overall, the risk relationship between alcohol and alcohol-related cancers can be characterized by an almost linear dose–response relationship between volume of drinking and the relative risk of outcome. Although there have been speculations about the impact of patterns of drinking**,** especially for breast cancer (Kohlmeier & Mendez, 1997), the current state of knowledge does not suggest that patterns of drinking play an important role in the etiology of cancer.[2]

Cardiovascular disease

There is increasing research in the past decades about the role of alcohol as both a risk and protective factor for cardiovascular disease. *Coronary heart disease* and the protective role of alcohol has been the focus of most research and will be discussed in a separate point below. Most studies suggest that low-level consumption equally offers some protection against *ischaemic stroke*.

[2] Part of this lack of an influence on patterns of cancer risk may be due to methodological reasons. Most epidemiological studies only measure volume of consumption and only model monotonically increasing trends and thus could not detect any influence of patterns of drinking even it were present.

In contrast, *hypertension* and other cardiovascular disorders such as *cardiac arrhythmias* or *heart failure* are adversely affected by alcohol (see Friedman, 1998; Klatsky, 1995; Puddey et al., 1999; Rosenqvist, 1998; US Department of Health and Human Services, 1997; Wood et al., 1998). There are some indications that hypertension may be related to the pattern of heavy drinking occasions (Murray et al., 2002; Puddey et al., 1999; Wannamethee & Shaper, 1991).

For *haemorrhagic stroke***,** the weight of evidence suggests an increase in risk for males even at low levels of consumption (Berger et al., 1999; Jackson, 1994; Sacco et al., 1999; You et al., 1997). For females the most recent meta-analyses of Ridolfo and Stevenson (2001) suggested a protective effect for drinking below 40 g pure ethanol per day, but an 8-fold increased risk for drinking above these limits. Patterns of drinking not only play a role in any protective effects of alcohol on CHD, drinking patterns are also relevant to risks of stroke (Hillbom, Juvela & Karttunen, 1998) and for sudden cardiovascular death or cardiovascular death in general (Kauhanen et al., 1997a; Kauhanen et al., 1997b; Kozarevic et al., 1982; Poikolainen, 1983; Wannamethee & Shaper, 1992) with heavy drinking occasions and intoxication resulting in increased risk.

Liver cirrhosis

Alcohol has been estimated as the leading cause of liver cirrhosis in established market economies (Corrao et al., 1997; Corrao et al., 1998; English et al., 1995). There is some debate whether alcohol's contributory role should be restricted to alcoholic liver cirrhosis alone or be extended to unspecified liver cirrhosis. Several authors contend that, empirically, it is extremely difficult to separate alcoholic from unspecified liver cirrhosis, and that the term "unspecified liver cirrhosis" is applied when no specific etiological factor is reported or identified (English et al., 1995). Research in the United States and in Central and South American countries indicated that an appreciable proportion of cirrhosis deaths without mention of alcohol was in fact attributable to alcohol (Haberman & Weinbaum, 1990; Puffer & Griffith, 1967; Room, 1972).

On the other hand, applying RRs of liver cirrhosis derived in established market economies to other countries can be extremely misleading. In many countries (e.g. China or India), liver cirrhosis is mainly caused by other factors such as viral infections. The corresponding AAFs have been shown to vary between less than 10% (China) and 90 % (Finland) (WHO, 2000a).

The relationship between alcohol consumption and liver cirrhosis seems to be mainly dependent on volume of drinking and independent of patterns of drinking (Lelbach, 1975; Lelbach, 1976). However, some research also indicates a potential effect of occasions of heavy drinking (Rhodés, Salaspuro & Sorensen, 1993).

Effects of prenatal alcohol exposure

Alcohol consumption during pregnancy is related to various risks to the fetus, which include gross congenital anomalies and Fetal Alcohol Spectrum Disorders (FASD), which include conditions such as fetal alcohol syndrome (Alvear, Andreani & Cortes, 1998; Church et al., 1997; Faden, Graubard & Dufour, 1997; Habbick et al., 1997; Larkby & Day, 1997; Larroque & Kaminski, 1996; Mattson et al., 1997; Passaro & Little, 1997; Passaro et al., 1996; Polygenis et al., 1998; Roebuck, Mattson & Riley, 1998; Shu et al., 1995; Windham et al., 1995). FASD ranges from individual anomalies at one end and serious neurobiological dysfunctions, including mental retardation, on the other (Connor & Streissguth, 1996). The prenatal teratogenic effects of alcohol also include lethal consequences. They comprise spontaneous abortion, low birth weight, fetal damage, prematurity, and intrauterine growth retardation (Abel, 1997; Bradley et al., 1998; Windham et al., 1997).

Mental conditions
The co-morbidity of alcohol dependence with other mental conditions is high, both in clinical and in general population samples (e.g. Grant & Harford, 1995; Merikangas et al., 1998). The crucial question in this respect is about causation. Sufficient evidence for a causal role of alcohol consumption at this point of research appears to exist mainly for depression. Since this relationship is controversial it will be discussed below in a separate section.

Other chronic conditions
Other risks of alcohol consumption currently discussed in the literature include *epilepsy* (see e.g. Jallon et al., 1998; Leone et al., 1997; Martín et al., 1995), *acute and chronic pancreatitis* (Ammann, Heitz & Klöppel, 1996; Skinazi, Lévy & Bernades, 1995; Damström Thakker, 1998; Robles-Diaz & Gorelick, 1997) and *psoriasis* (English et al., 1995).

Beneficial health effects of alcohol consumption excluding CHD

Ischaemic stroke
Cerebrovascular disease (stroke) consists of several subtypes, the most common subtypes being ischaemic stroke and haemorrhagic stroke, which are affected differently by alcohol. For ischaemic stroke, the predominant type of stroke, the weight of evidence including biological mechanisms, suggests effects similar to those for CHD, namely that low to moderate consumption may offer some protection (Beilin, Puddey & Burke, 1996; Hillbom, 1998; Keil et al., 1997; Kitamura et al., 1998; Knuiman & Vu, 1996; Sacco et al., 1999; Thun et al., 1997; Yuan et al., 1997; Wannamethee & Shaper, 1996). Alcohol consumption has detrimental effects on haemorrhagic stroke.

Other beneficial health effects of alcohol consumption

Alcohol may offer some protection against *diabetes* and cholelithiasis (gallstones) (English et al., 1995; see also Ashley et al., 2000, for a recent overview on beneficial effects of alcohol). Findings from a cohort of more than 40 000 male health professionals showed that moderate alcohol consumption may decrease the risk of diabetes, perhaps through the effects of alcohol on insulin sensitivity (Rimm et al., 1995). The protective effect was further substantiated, mainly in studies in established market economies (Perry et al., 1995; Ajani et al., 1999), however there may be differential effects on men and women, and even detrimental effects at higher levels of intake (Wei et al., 2000; Kao et al., 1998). Plausible biological mechanisms were seen to exist in mediating effects of moderate alcohol intake on glucose tolerance and insulin resistance (Facchini, Chen & Reaven, 1994; Kiechl et al., 1996; Lazarus, Sparrow & Weiss, 1997; Flanagan et al., 2000).

With regard to *cholelithiasis* (gallstones) there is some evidence that alcohol may offer some protection against gallstones (English et al., 1995; Holman et al., 1996). These findings have been substantiated by recent large-scale cohort and case-control studies, which reported an inverse relationship (Attili et al., 1998; Caroli-Bosc et al., 1998; Chen et al., 1999; Leitzmann et al., 1998).

Table 13 gives an overview of diseases on which alcohol potentially has beneficial effects.

Table 13: Relative risks for beneficial alcohol-related health effects for different drinking categories (compared to abstainers)

Disease	ICD-9	RR					
		Drinking category I		Drinking category II		Drinking category III	
		F	M	F	M	F	M
Diabetes	250	0.92	0.99	0.87	0.57	1.13	0.73
Ischaemic stroke	433-435	0.52	0.94	0.64	1.33	1.06	1.65
Cholelithiasis	574	0.82	0.82	0.68	0.68	0.50	0.50

Source*: Gutjahr, Gmel & Rehm (2001), Ridolfo & Stevenson (2001); Rehm et al. (in press).*

***Definition of drinking categories**: **category I**: for females not exceeding on average 0 to 19.99 g pure alcohol per day; for males not exceeding on average 0 to 39.99 g pure alcohol per day; **category II**: for females not exceeding on average 20 to 39.99 g pure alcohol per day; for males not exceeding on average 40 to 59.99 g pure alcohol per day; **category III**: for females on average 40 g pure alcohol and above per day; for males on average 60 g pure alcohol and above per day. For comparison: a 75 cl. bottle of wine contains about 70 g of pure alcohol.*

CHD as a chronic condition where alcohol has harmful and beneficial consequences

Coronary heart disease[3] is one of the leading causes of death in the world (Murray & Lopez, 1996a). The most important health benefits of alcohol have been found in the area of coronary heart disease at low to moderate levels of average volume of alcohol consumption (Beaglehole & Jackson, 1992; Doll, 1998; Edwards et al., 1994; Fuchs et al., 1995; Goldberg, Hahn & Parkes, 1995; Hillbom, 1998; Holman et al., 1996; Jackson, 1994; Rehm et al., 1997; Single et al., 1999; Svärdsudd, 1998). Only a few individual-level studies have failed to substantiate this association in men (Hart et al., 1999) or women (Fillmore et al., 1998; Maskarinec, Meng & Kolonel, 1998).

While some studies have found that alcohol may offer protection against CHD not only at low to moderate average intake, but across the continuum of alcohol consumption (Camargo et al., 1997; Doll et al., 1994; Keil et al., 1997), they nevertheless show that most of the protective effect is gained at low levels of consumption such as one drink every other day. The common assumption nowadays is that – at least in established market economies - average volume of drinking and CHD shows a J-shape relationship (Corrao et al., 2000), with detrimental effects compared with abstainers at higher levels of alcohol intake. The epidemiological evidence that light to moderate average alcohol consumption protects against CHD is strengthened by substantial evidence concerning the biological mechanisms by which a protective effect could be mediated:

- Favourable lipid profiles, especially an increase in high-density lipoproteins (HDL) (Baraona & Lieber, 1998). It has been estimated that as much as 40%–50% of the protective effect may be attributable to this mechanism (Criqui et al., 1987; Criqui & Ringek, 1994; Shu et al., 1992).
- Favourable effects on coagulation profiles, in particular, through its effects on platelet aggregation (McKenzie & Eisenberg, 1996; Rubin, 1999) and fibrinolysis (Reeder et al., 1996).

[3] CHD is used here for denoting all diseases with ICD 9 rubrics 410–414 (ICD 10: I20–I25). The same categories have also been labelled ischaemic heart disease (IHD).

- Favourable effects on insulin resistance (Kiechl et al., 1996; Lazarus, Sparrow & Weiss, 1997; Rankin, 1994).
- Favourable effects on hormonal profiles, in particular, its estrogen effects (Svärdsudd, 1998).
- Alcohol metabolite acetate has been postulated to protect against CHD by promoting vasodilation (US Department of Health and Human Services, 1997).
- Alcohol may affect inflammation (Imhof et al., 2001; Jacques et al., 2001; Morrow & Ridker, 2000; Ridker, 2001).

Finally, it is possible that some of the protective effects are mediated through the anti-oxidative constituents of alcohol beverages, especially wine (Reinke & McKay, 1996). However, most of the protective effect appears to be linked to ethanol, per se. In sum, the relationship between average volume of drinking and CHD seems to be J-shaped. Light to moderate drinking is associated with a lower CHD risk than abstaining or heavy drinking. However, the studies on average volume of consumption and CHD are heterogeneous, indicating that factors other than the ones included in the study co-determine the relationship. One of the main factors is pattern of drinking (i.e. the way in which the same average amount of alcohol is consumed). In this respect two patterns deserve mentioning: irregular heavy drinking occasions and drinking with meals.

As regards **heavy drinking occasions**, several studies showed that for the same volume consumed (i.e. adjusting for volume in multiple regression models) heavy drinking occasions (e.g. eight drinks in one sitting) have detrimental effects on CHD (McElduff & Dobson, 1997; Murray et al., 2002; Trevisan et al., 2001a).

In addition to the effect on CHD, there appears to be a relationship between irregular heavy drinking occasions and other forms of cardiovascular death, especially sudden cardiac death (Kauhanen et al., 1997b; Wannamethee & Shaper, 1992; Wood et al., 1998). This is consistent with the physiological mechanisms of increased clotting and reducing the threshold for ventricular fibrillation after heavy drinking occasions, which have been reviewed by McKee and Britton (1998). Specifically, heavy drinking occasions have been shown to increase low-density lipoproteins, which in turn have been linked to negative cardiovascular outcomes. Contrary to low or moderate steady drinking, heavy irregular drinking occasions are not associated with an increase of high-density lipoproteins, which themselves have been linked to favourable cardiovascular outcomes. In addition, irregular drinking is associated with increased risk of thrombosis, occurring after cessation of drinking (Renaud & Ruf, 1996). Finally, irregular heavy drinking seems to predispose to histological changes in the myocardium and conducting system, as well as to a reduction in the threshold for ventricular fibrillation. In sum, irregular heavy drinking occasions are mainly associated with physiological mechanisms increasing the risk of sudden cardiac death and other cardiovascular outcomes, in contrast to the physiological mechanisms triggered by steady low to moderate consumption and linked to favourable cardiac outcomes.

With respect to **drinking with meals,** Trevisan and colleagues (2001a; 2001b) reported more protective effects of alcohol consumption when it was predominately consumed with meals compared to alcohol consumption outside meals.

The potential mechanisms linking consumption of alcoholic beverages with meals to a lower CHD risk, remain to be fully clarified. Mechanisms may be the reduced postprandial blood pressure (Foppa et al., 1999), positive effects on fibrinolysis (Hendriks et al., 1994) and lipids

(Veenstra et al., 1990), and an increased alcohol elimination rate or a reduced alcohol absorption rate with food in the gastrointestinal tract (Gentry, 2000; Ramchandani, Kwo & Li, 2001). Several studies - mainly conducted at the aggregate level - showed that cultural drinking patterns are related to differential effects of volume on CHD mortality and morbidity. Most of them were either related to drastic changes in alcohol consumption and CHD mortality connected with the anti-alcohol campaign of the last years of the Soviet Union (Shkolnikov & Nemtsov, 1997; Bobak & Marmot, 1999; Britton & McKee, 2000; Leon et al., 1997; McKee, Shkolnikov & Leon, 2001; Notzon et al., 1998; Shkolnikov, McKee & Leon, 2001). Another indirect line of research on the effect of heavy drinking on CHD shows that countries with a tradition of heavier or binge-drinking occasions on weekends show proportionately high CHD or cardiovascular disease morality on or immediately after the weekend [Germany: CHD, (Willich et al., 1994); Moscow, Russian Federation: cardiovascular disease events, (Chenet et al., 1998); Lithuania: CHD events, (Chenet et al., 2001); Scotland: CHD events (cf. Evans et al., 2000)]. Finally, in the Global Burden of Disease (GBD) 2000 study, the moderating effect of drinking patterns on CHD could be demonstrated (Gmel, Rehm & Frick, 2003; Rehm et al., in press).

Depression

Alcohol is implicated in a variety of mental disorders which are not alcohol-specific. However, before the GBD 2000 study no major overview on alcohol-attributable burden of disease has included these conditions (English et al., 1995; Gutjahr, Gmel & Rehm, 2001; Rehm & Gmel, 2001; Ridolfo & Stevenson, 2001; Single et al., 1999). While the causality of the relation is hard to define, sufficient evidence now exists to assume alcohol's causal role in depression, a common mental disorder.

In the general population, alcohol dependence and major depression co-occur over-proportionally, on both a 12-month and a lifetime basis (Kessler et al., 1996; Kessler et al., 1997; Lynskey, 1998). Among alcohol consumers in the general population, higher volume of consumption is associated with more symptoms of depression (Graham & Schmidt, 1999; Mehrabian, 2001; Rodgers et al., 2000). Among patients in treatment for alcohol abuse and dependence, the prevalence of major depression is higher than in the general population (Lynskey, 1998; Schuckit et al., 1997). Higher prevalence of alcohol use disorders has been documented for patients in treatment for depression (Alpert et al., 1999; Blixen, McDougall & Suen, 1997).

This suggests that alcohol use disorders are linked to depressive symptoms, and that alcohol dependence and depressive disorders co-occur to a larger degree than expected by chance. However, it is not clear in the individual case whether the depression caused alcohol problems, whether the alcohol consumption or alcohol problems caused depression, or whether both could be attributed to a third cause (Vaillant, 1993). The pathway from depression to harmful alcohol use and alcohol dependence has long been discussed under the heading of self-medication (i.e. the use of alcohol to alleviate depressive symptoms). In addition, a shared third cause could be certain neurobiological mechanisms (see Markou, Kosten & Koob, 1998) or genetic predisposition. To be a causal factor, one condition is that alcohol use disorders must precede depression, i.e. only that fraction of depression can logically be caused by alcohol dependence where the onset of dependence preceded the onset of depression. Such fractions can be found in many countries (see data of the International Consortium in Psychiatric Epidemiology (ICPE), Merikangas et al., 1998). Commonly, proportions of depressive disorders, which are preceded by alcohol dependence, were higher

for males than for females. This corresponds to the higher prevalence rates of alcohol dependence in men. In fact, the proportion of depressive disorders and alcohol dependence rates correlate to about 0.80 (Rehm et al., in press; Rehm & Eschmann, 2002). Besides strength of association (commonly two-fold to three-fold increase in risk of depressive disorders have been found, e.g. Schuckit, 1996; Swendsen et al., 1998; Hilarski & Wodarki, 2001), reversibility (remission during abstinence) is a key indicator for causal effect of alcohol dependence on depressive disorders. There is sufficient evidence that abstinence substantially removes depressive symptoms in alcohol dependent persons within a short time frame (Brown & Schuckit, 1988; Dackis et al., 1986; Davidson, 1995; Gibson & Becker, 1973; Penick et al., 1988; Pettinati, Sugerman & Maurer, 1982; Willenbring, 1986).

The evidence indicates that a clear and consistent association exists between alcohol dependence and depressive disorders and that chance, confounding variables and other bias can be ruled out with reasonable confidence as factors in this association.

Summary on diseases related mainly to chronic alcohol consumption

Table 14 gives an overview of relative risks of major chronic diseases related to alcohol consumption.

Table 14: Relative risk for major chronic disease categories by sex and average drinking category

Disease	ICD-9 4digit	ICD-10 4digit	F			M		
			Drinking cat.I	Drinking cat.II	Drinking cat.III	Drinking cat.I	Drinking cat.II	Drinking cat.III
Conditions arising during the perinatal period	760–779 minus 771.3	P00-P96						
Low birth weight	764–765	P05-P07	1.00	1.40	1.40	1.00	1.40	1.40
Malignant neoplasms	140–208	C00-C97						
Mouth and oropharynx cancers	140–149	C00-C14	1.45	1.85	5.39	1.45	1.85	5.39
Oesophagus cancer	150	C15	1.80	2.38	4.36	1.80	2.38	4.36
Liver cancer	155	C22	1.45	3.03	3.60	1.45	3.03	3.6
Breast cancer*			1.14	1.41	1.59	n.a.	n.a.	n.a.
Under 45 years of age*	174	C50	1.15	1.41	1.46	n.a.	n.a.	n.a.
45 years and over*			1.14	1.38	1.62	n.a.	n.a.	n.a.
Other neoplasms	210–239	D00-D48	1.10	1.30	1.70	1.10	1.30	1.70
Diabetes mellitus	250	E10-E14	0.92	0.87	1.13	1.00	0.57	0.73
Neuro-psychiatric conditions	290–319, 324–359	F01-F99, G06-G98						
Unipolar major depression	300.4	F32-F33	AAF were directly assessed using dependence rates, but varied widely across regions and sex. For details see Rehm et al. (in press).					
Epilepsy	345	G40-G41	1.34	7.22	7.52	1.23	7.52	6.83
Alcohol-use disorders	291, 303, 305.0	F10	AAF 100%	AAF 100%	AAF 100%	AAF 100%	AAF 100%	AAF 100%
Cardiovascular diseases	390–459	I00-I99						
Hypertensive disease	401–405	I10-I13	1.40	2.00	2.00	1.40	2.00	4.10
			0.82	0.83	1.12	0.82	0.83	1.00
Coronary heart disease	410–414	I20-I25	AAFs need modelling of drinking patterns and thus widely vary across regions and sex. For details see Rehm et al. (in press).					
Cerebrovascular disease	430–438	I60-I69						
Ischaemic stroke*	433-435		0.52	0.64	1.06	0.94	1.33	1.65
Haemorrhagic stroke*	430-432		0.59	0.65	7.98	1.27	2.19	2.38
Digestive diseases	530–579	K20-K92						
Cirrhosis of the liver	571	K70, K74	1.30	9.50	13.00	1.30	9.50	13.00

Sources: *Gutjahr & Gmel (2001), Ridolfo & Stevenson (2001); if indicated by *; the category III estimates for CHD were based on Corrao et al. (2000) and Rehm et al. (in press).*

***Definition of drinking categories**: **category I**: for females not exceeding on average 0 to 19.99 g pure alcohol per day; for males not exceeding on average 0 to 39.99 g pure alcohol per day; **category II**: for females not exceeding on average 20 to 39.99 g pure alcohol per day; for males not exceeding on average 40 to 59.99 g pure alcohol per day; **category III**: for females on average 40 g pure alcohol and above per day; for males on average 60 g pure alcohol and above per day. For comparison: a 75 cl. bottle of wine contains about 70 g of pure alcohol.*

Acute adverse health consequences: accidental injury and poisoning, suicide, interpersonal violence and assaults

Alcohol use has been associated with increased risk of injury in a wide variety of settings including road traffic accident (vehicles, bicycles, pedestrians), falls, fires, injuries related to sports and recreational activities, self-inflicted injuries or injuries resulting from interpersonal violence (Cherpitel, 1992; Freedland, McMicken & D'Onofrio, 1993; Hingson & Howland, 1987; Hingson & Howland, 1993; Hurst, Harte & Firth, 1994; Martin, 1992; Martin & Bachman, 1997; US Department of Health and Human Services, 1997; US Department of Health and Human Services, 2000). There is also some evidence that the presence of alcohol in the body at the time of injury may be associated with greater severity of injury and less positive outcomes (Fuller, 1995; Li et al., 1997).

Unintentional injuries

Alcohol consumption produces effects that are often perceived as positive, as evidenced by the widespread popularity of drinking. But it also leads to actions that result in unintentional injury and death. This section highlights research findings on causality of alcohol involvement and findings relevant to establishing dose–response relationships and drinking patterns. It focuses on traffic injuries, as most of the research has been conducted in this area, and traffic accidents are the most important component of unintentional injuries (Rehm et al., 2003a).

Studies relating average volume of drinking to risk of injury have found the risk of injury to be positively related to increasing average intake levels of alcohol, with the risk increasing at relatively low volumes of intake (Cherpitel et al., 1995). Several patterns of drinking have been related to injury risk. Frequent heavy drinking and frequent subjective drunkenness are both associated with injury, particularly injury resulting from violence (Cherpitel, 1996). Often, the greatest risk was found in individuals who consume relatively large amounts on some occasions, and whose highest amounts are markedly greater than their average amount per occasion (Gruenewald & Nephew, 1994; Gruenewald, Mitchell & Treno, 1996; Gruenewald, Treno & Mitchell, 1996; Treno, Gruenewald & Ponicki, 1997; Treno & Holder, 1997). This was also confirmed in a statistically adequate re-analysis of the Grand Rapids study, that indicates that though all levels of BAC are associated with an increased risk of crashes, relative to a BAC of zero, the risk slope was accelerated for less frequent drinkers (Hurst, Harte & Firth, 1994).

There are clear biological mechanisms why alcohol is related to injury. Moderate doses of alcohol have been demonstrated in controlled experimental studies to have cognitive and psychomotor effects that are relevant to the risk of injury, such as reaction time, cognitive processing, coordination and vigilance (Eckhardt et al., 1998; Krüger et al., 1993; Moskowitz & Robinson, 1988; US Department of Health and Human Services, 1997). The comprehensive recent review by Eckardt and colleagues (1998) concluded that the threshold dose for negative effects on psychomotor tasks is generally found at around 40 to 50 mg% (equivalent to 0.04%–0.05%).

In summary, the evidence indicates that the amount consumed per occasion, and more specifically blood alcohol content, is the critical feature in determining risk of injury. Table 15 gives the attributable fractions for alcohol for different kinds of injuries in four recent reviews. The reviews based their estimates on meta-analyses or other summaries of the

relations found in published studies. It should be recognized that, while there are many such studies, they are mostly from a relatively small range of countries, mostly from established market economies. Hence, such estimates cannot necessarily be projected to other countries with different patterns of drinking and different average volumes of drinking.

Intentional injuries

Alcohol is strongly associated with violent crime (Graham & West, 2001), although this association varies considerably across settings (Murdoch, Pihl & Ross, 1990; Room & Rossow (2001), Rossow, Pernanen & Rehm, 2001). Studies on violence have repeatedly shown that alcohol consumption precedes violent events, and that the amount of drinking is related to severity of subsequent violence. Based on meta-analyses of experimental studies there appears to be a small effect size of about 0.22 (Bushman, 1997) in the overall relationship between alcohol consumption and aggression. However, experimental research was not able to attribute effects on aggression to pharmacological effects only. Specific expectations of consumers as regards the effects of alcohol must accompany alcohol consumption to result in aggression (Gmel & Rehm, 2003). The general conclusion is that expectations form part of the "psycho-pharmacological" effects of alcohol (Bushman, 1997; Graham et al., 1998), and should not be separated in attempting to understand the effects of alcohol.

There are a number of different effects of alcohol contributing to increased likelihood of aggressive behaviour. Alcohol may have an effect on the serotonin (5HT) and GABA brain receptors that may reduce fear and anxiety about social, physical or legal consequences of one's actions. Alcohol also affects cognitive functioning (Peterson et al., 1990), leading to impaired problem solving in conflict situations (Sayette, Wilson & Elias, 1993) and overly emotional responses or emotional ability (Pihl, Peterson & Lau, 1993). Other behavioural and attitudinal effects of alcohol related to aggression have been identified, although at this point not necessarily linked to particular pharmacological effects on the brain. These include a narrow and tenacious focus on the present (Graham, West & Wells, 2000; Washburne, 1956), also described as "alcohol myopia" (Steele & Josephs, 1990), and increased concerns with demonstrating personal power, at least for men (Graham, West & Wells, 2000; McClelland et al., 1972; Tomsen, 1997).

Estimating the proportion of alcohol induced intentional injuries is problematic and needs assessment from different sources, such as time-series analyses, natural experiments, case–control studies, emergency-room studies, general population surveys, and experimental designs (Pernanen, 2001). For details of a potential approach, using volume of drinking and drinking patterns in a cross-cultural approach see Rehm et al. (in press).

Table 15: Attributable fractions of acute alcohol-related health effects in the adult general population

Injury	ICD-9	USA Stinson et al. (1993)		AUSTRALIA English et al. (1995)		CANADA Single et al. (1996)		AUSTRALIA Ridolfo & Stevenson (2001)	
		F	M	F	M	F	M	F	M
Motor vehicle traffic accidents	E810–E819	0.42	0.42	0.18	0.37	0.43	0.43	0.11 for deaths (d) and hospitali-zations (h); pedestrians 0.17 (d); 0.06 (h)	0.33 (d); 024 (h); pedestrians 0.40 (d); 0.37 (h)
Motor vehicle nontraffic accidents	E820–E825	0.42	0.42	0.18	0.37	0.43	0.43		
Bicycle accident injuries	E826	0.20	0.20	0.18	0.37	0.20	0.20		
Other road vehicle accident injuries	E829	0.20	0.20	0.18	0.37	0.2	0.20		
Water transport accident injuries	E830–E839	0.20	0.20	No data	No data	0.20	0.20	No data	No data
Air-space transport accident injuries	E840–E845	0.16	0.16	No data	No data	0.16	0.16	No data	No data
Accidental ethanol and methanol poisoning	E860.0–E860.2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Accidental fall injuries	E880–E888	0.35	0.35	0.34	0.34	0.13-0.34	0.20-0.34	0.14 for age <65; 0.04> = 65	0.22 for age <65; 0.12> = 65
Arson injuries	E890–E899	0.45	0.45	0.44	0.44	0.38	0.38	0.44	0.44
Accidental excessive cold	E901	0.25	0.25	No data	No data	0.25	0.25	No data	No data
Accidental drowning	E910	0.38	0.38	0.34	0.34	0.31–0.50	0.31–0.50	0.34	0.34
Accidental aspiration	E911	0.25	0.25	1.0	1.00	0.25	0.25	1.00	1.00
Striking against / struck by objects	E917	0.25	0.25	No data	No data	0.07	0.07	No data	No data
Caught in / between objects	E918	0.25	0.25	No data	No data	0.07	0.07	No data	No data
Occupational and machine injuries	E919–E920	0.25	0.25	0.07	0.07	0.07	0.07	0.07	0.07
Accidental firearm missile injuries	E922	0.25	0.25	No data	No data	0.25	0.25	No data	No data
Suicide, self-inflicted injuries	E950–E959	0.28	0.28	0.08	0.12	0.11–0.19	0.23–0.31	0.29	0.32
Victim, fight, brawl, rape	E960	0.46	0.46	0.47	0.47	0.27	0.27	0.47	0.47
Victim assault firearms	E965	0.46	0.46	0.47	0.47	0.27	0.27	0.47	0.47
Victim assault cutting instrument	E966	0.46	0.46	0.47	0.47	0.27	0.27	0.47	0.47
Victim child battering	E967	0.46	0.46	0.16	0.16	0.16	0.16	0.16	0.16
Victim assault other	E968	0.46	0.46	0.47	0.47	0.27	0.27	0.47	0.47
Late effects of injuries by another	E969	0.46	0.46	0.47	0.47	0.27	0.27	0.47	0.47

***Remarks**:Ranges refer to age-specific attributable fractions; minimum (>0) and maximum estimates are shown.*
***Source**: Rehm et al. (in press)*

To sum up, in some countries there would be even more alcohol-related "prevented" death than caused deaths, mainly owing to the beneficial effect of low and moderate alcohol consumption on cardiovascular disease in some populations, like women of advanced age. This, however applies mainly to countries with established market economies, where life expectancy is high and the country's prevailing drinking pattern is a regular drinking pattern of moderate amounts, preferably consumed with meals. If one considers, however, life years lost instead of counting deaths only, a different picture emerges. There are more life years lost due to alcohol consumption than deaths "prevented". This can be explained by the fact that the years gained from alcohol consumption's beneficial effect on CHD are usually gained at higher ages and comprise only few years compared to the many years lost in deaths at early ages, e.g. in alcohol-related traffic-casualties. The balance would even bend down more stronger to the detrimental side, if in addition to life years lost also years spent in disability were included in estimates, such as in the burden of disease measure of disability adjusted life years lost (for details see next paragraph). Figures 5 and 6 demonstrate the difference in counting death versus other measures of life years lost for alcohol use disorders.

Figure 5: Global disease burden (in DALYs) in 2001 from alcohol use disorders, by age group and sex

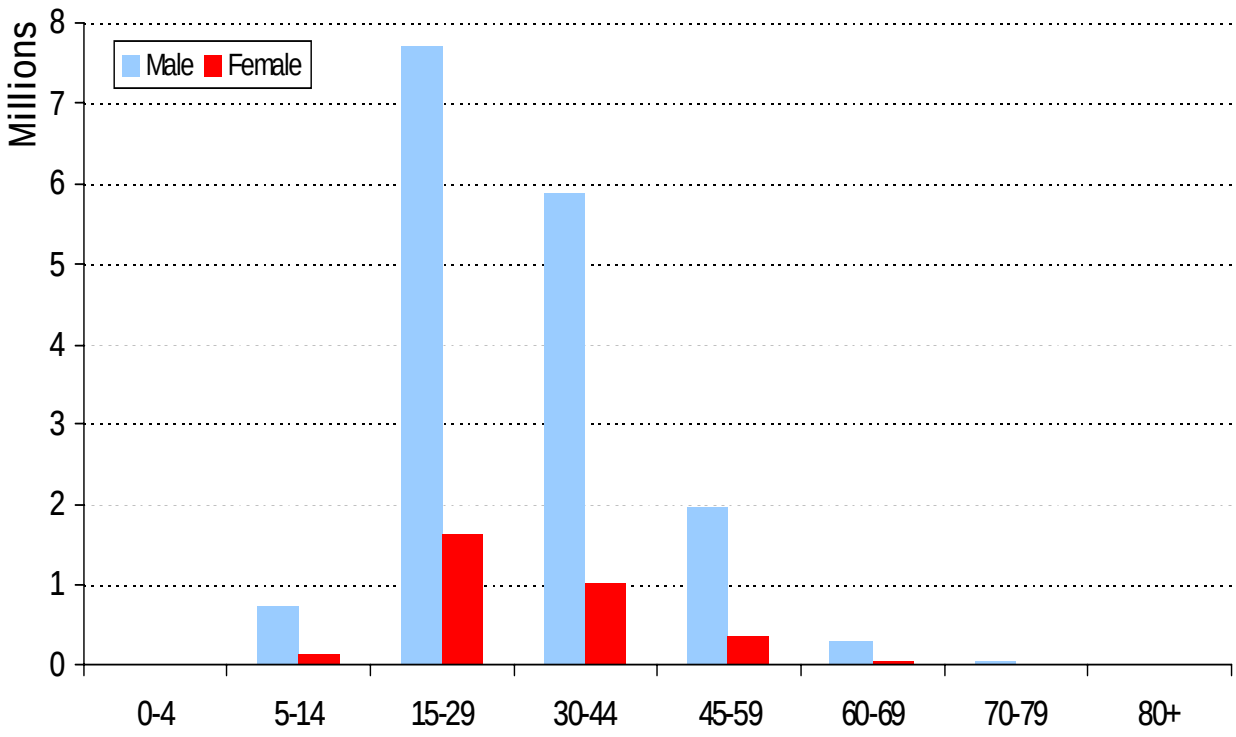
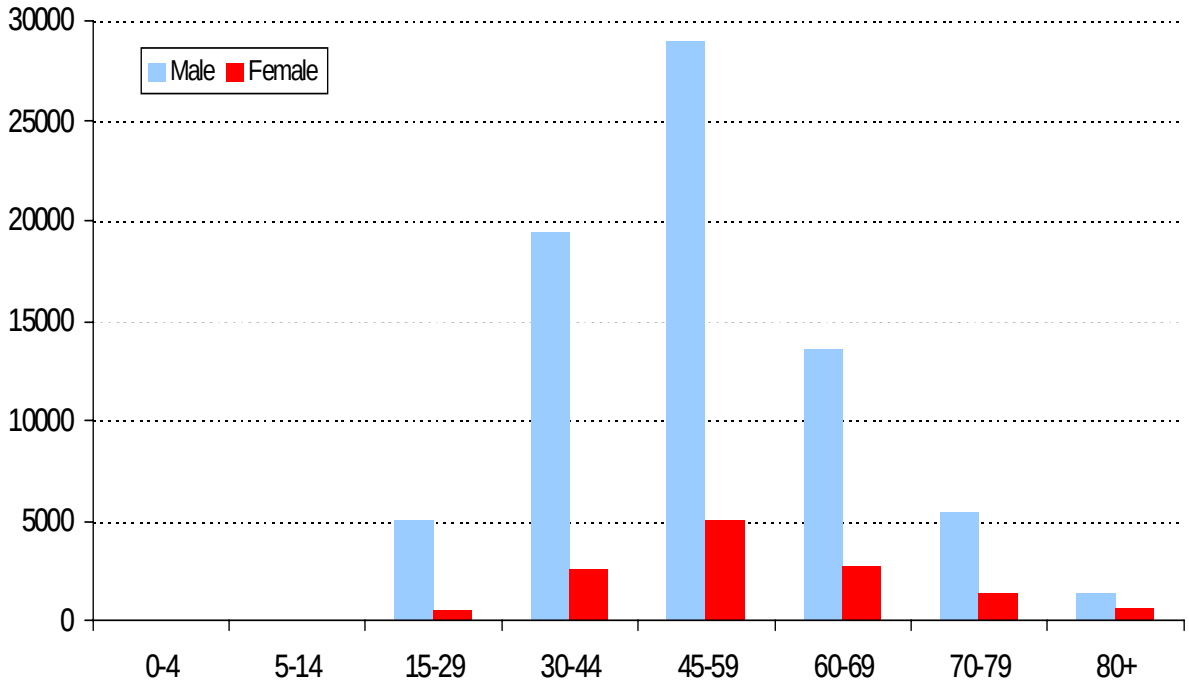


Figure 6: Global deaths in 2001 from alcohol use disorders, by age group and sex



The global burden of disease

A common measure of disease burden today are disability adjusted life years lost (DALYS, Murray & Lopez, 1996b). Such a measure combines mortality in terms of life years lost (YLL) due to premature death, and morbidity in terms of life years lived in disability (YLD). The latter weights the severity of a disease and its duration. For example, with a severity factor of 0.2 for a disease, five years spent in disability equals one year of life lost due to premature mortality. Alcohol-attributable DALYs are summarized in Table 16.

Table 16: Global burden of disease in 2000 attributable to alcohol according to major disease categories (DALYs in 000s)

Disease or Injury	Female	Male	Total	% of all alcohol-attributable DALYs
Conditions arising during the perinatal period	55	68	123	0%
Malignant neoplasm	1021	3180	4201	7%
Neuro-psychiatric conditions	3814	18 090	21 904	38%
Cardiovascular diseases	-428	4411	3983	7%
Other noncommunicable diseases (diabetes, liver cirrhosis)	860	3695	4555	8%
Unintentional injuries	2487	14 008	16 495	28%
Intentional injuries	1117	5945	7062	12%
Alcohol-related disease burden all causes (DALYs)	**8926**	**49 397**	**58 323**	**100%**
All DALYs	693 911	761 562	1 455 473	
% of all DALYs that can be attributable to alcohol	**1.3%**	**6.5%**	**4.0%**	*In comparison: estimate for 1990: 3.5%*

***Source**: Rehm et al. (2003d)*

What are the most striking differences between regions? Clearly alcohol-related burden is most detrimental in the developed world. Here 9.2% of all the disease burden is attributable to alcohol, only exceeded by the burden attributable to tobacco and blood pressure (see Table 17 and WHO, 2002). Here also the ratio of males to females is lowest. However, as Table 17 indicates, alcohol also places a toll on health in the developing world with relatively low mortality patterns. Here the disease burden attributable to alcohol is the highest of all 26 risk factors examined in the CRA of the GBD 2000 study (Ezzati et al., 2002). In the developing world with high mortality patterns like Africa and parts of South-East Asia, alcohol is not yet one of the major risk factors. Here, the most important risk factors are being underweight, unsafe sex, unsafe water sanitation and hygiene and other environmental factors. However, if seems to be predictable that alcohol–attributable burden will increase in these regions as well with economic development (Rehm et al., in press).

Table 17: Burden of disease in 2000 attributable to tobacco, alcohol and drugs by developing status and sex

	High mortality developing (AFR-D, AFR-E, AMR-D, EMR-D, SEAR-D)			**Low mortality developing (AMR-B, EMR-B, SEAR-B, WPR-B)**			**Developed (AMR-A, EUR-A, EUR-B, EUR-C, WPR-A)**		
	Male	*Female*	*Total*	*Male*	*Female*	*Total*	*Male*	*Female*	*Total*
Total DALYs (000s)	420 711	412 052	832 763	223 181	185 316	408 497	117 670	96 543	214 213
Smoking and oral tobacco (%)	3.4	0.6	2.0	6.2	1.3	4.0	17.1	6.2	12.2
Alcohol (%)	2.6	0.5	1.6	9.8	2.0	6.2	14.0	3.3	9.2
Illicit drugs (%)	0.8	0.2	0.5	1.2	0.3	0.8	2.3	1.2	1.8

***Source**: Rehm et al. (in press).*

As stated above, the impact of alcohol consumption on diseases and the distribution of alcohol-related diseases should vary according to two factors: the volume and the drinking pattern.

Table 18 gives an overview of differences in alcohol consumption across WHO regions. The regional subgroupings have been defined by WHO (2000b) on the basis of high, medium or low levels of adult and of infant mortality. 'A' stands for very low child and very low adult mortality, 'B' stands for low child and low adult mortality, 'C' for low child and high adult mortality, 'D' for high child and high adult mortality, and 'E' for very high child and very high adult mortality (WHO, 2000b). From this it can be seen that in the developed low mortality countries (EUR-A, AMR-A, WPR-A) alcohol consumption of drinkers is usually high but alcohol is commonly consumed in a less detrimental way (e.g. regularly with meals; for details as regards the average drinking pattern, see Rehm et al., in press), and thus one would expect a larger share of chronic diseases including alcohol abuse and dependence, and a lower share of acute consequences such as injury. In developing countries with low mortality (AMR-B, EMR-B, SEAR-B, WPR-B) volume of drinking is high but drinking patterns are more detrimental. Thus, there should be a larger share of acute consequences. The same is true for high mortality developing countries (AFR-D, AFR-E, AMR-D, EMR-D, SEAR-D), for which however volume of drinking is usually low and thus the total alcohol-related burden should also be lower compared to the developing countries with low mortality. The greatest burden from alcohol consumption should be expected in the EUR-B and EUR-C regions where both volume of drinking is high and alcohol is consumed mostly in a detrimental pattern, and thus there should again be a high share of acute consequences again.

As Table 19 shows, empirically the aforementioned predictions could be confirmed, with the highest alcohol-related burden in the former socialist countries and the lowest burden in regions with low volume of drinking. Burden from acute consequences are highest in those regions, where regular drinking is rare, but alcohol is often consumed in large amounts when drinking takes place.

Table 20 shows the average attributable alcohol fractions (AAF) which were derived from calculations described in Babor, Rehm and Room (in press), for the categories of disorders for which alcohol was considered to be causal. The average AAFs are shown for men and women separately and together, for the world as a whole and for the three categories of high-mortality developing countries, low-mortality developing countries, and developed countries. Looking at the table, there are obvious gender differences to be found, with males having higher AAFs than females globally and in all regions. Also, the AAFs for developed countries are considerably higher than those of developing countries.

Table 21 gives an overview of standardized death rates for the chronic and acute diseases used in the current report (data shown is for most recent year available). It should be noted that these are not purely alcohol-related deaths. Traffic injuries, for example, also depend on the development of the transport system in a country, traffic or car densities, or road safety issues. Similarly, liver cirrhosis in many countries do not have a high alcohol involvement, but are related to poor sanitary conditions (poor drinking water quality causing high levels of hepatitis infections and liver diseases). Also, the numbers here do not imply that alcohol is responsible for all deaths from say cirrhosis of the liver or mouth and oropharynx cancer - with the exception of alcohol use disorders, the standardized mortality rates shown here are derived from the total number of deaths from the eight causes chosen irrespective of whether alcohol was a direct or indirect contributor to the deaths.

Table 18: Characteristics of adult alcohol consumption in different regions of the world 2000 (population weighted averages)

WHO Region (Definition see below)	Beverage type mostly consumed	Total consumption[1]	% unrecorded of total[2]	% heavy drinkers[3]	% drinkers among males	% drinkers among females	Consumption per drinker[4]	Average drinking pattern[5]
Africa D (e.g. Nigeria, Algeria)	Mainly other fermented beverages	4.9	53	5.3	47	27	13.3	2.5
Africa E (e.g. Ethiopia, South Africa)	Mainly other fermented beverages and beer	7.1	46	10.3	55	30	16.6	3.1
Americas A (Canada, Cuba, the United States)	> 50% of consumption is beer, about 25% spirits	9.3	11	11.2	73	58	14.3	2.0
Americas B (e.g. Brazil, Mexico)	Beer, followed by spirits	9.0	30	9.1	75	53	14.1	3.1
Americas D (e.g. Bolivia, Peru)	Spirits, followed by beer	5.1	34	2.7	74	60	7.6	3.1
Eastern Mediterranean B (e.g. the Islamic Republic of Iran, Saudi Arabia)	Spirits and beer, but scarce data	1.3	34	1.5	18	4	11.0	2.0
Eastern Mediterranean D (e.g. Afghanistan, Pakistan)	Spirits and beer, but scarce data	0.6	56	0.1	17	1	6.0	2.4
Europe A (e.g. Germany, France, the United Kingdom)	Wine and beer	12.9	10	15.7	90	81	15.1	1.3
Europe B (e.g. Bulgaria, Poland, Turkey)	Spirits	8.3	41	8.8	72	52	13.4	2.9
Europe C (e.g. the Russian Federation, Ukraine)	Spirits	13.9	38	18.6	89	81	16.5	3.6
South-East Asia B (e.g. Indonesia, Thailand)	Spirits	3.1	27	1.2	35	9	13.7	2.5
South-East Asia D (e.g. Bangladesh, India)	Spirits	2.0	79	0.9	26	4	12.9	3.0
Western Pacific A (e.g. Australia, Japan)	Beer and spirits	8.5	20	4.2	87	77	10.4	1.2
Western Pacific B (e.g. China, the Philippines, Viet Nam)	Spirits	5.0	26	4.1	84	30	8.8	2.2

1 Estimated total alcohol consumption per resident aged 15 and older in litres of absolute alcohol (recorded and unrecorded)
2 Percentage of total adult per capita consumption (= column 3) which is estimated to be unrecorded
3 Estimated % rate of heavy drinking (males ≥ 40 g and females ≥ 20 g) among those aged 15+
4 Estimated total alcohol consumption (in litres of absolute alcohol) per adult drinker
5 Estimated average pattern of drinking (1-4 with 4 being the most detrimental pattern i.e. based on many heavy drinking occasions, drinking outside meals, high level of fiesta drinking and drinking in public places, etc. and 1 being the least detrimental pattern i.e. least heavy drinking occasions, drinking with meals, no fiesta drinking, elast drinking in public places, etc.)
***Source**: Rehm et al. (2003b)*

Table 19: Alcohol-related harm in different regions of the world (population weighted averages), DALYs (000s)

	Developing countries				Developed countries				World	
	very high or high mortality		low mortality		very low mortality only burden		Former Socialist: low mortality			
	AFR-D, AFR-E, AMR-D, EMR-D, SEAR-D		AMR-B, EMR-B, SEAR-B, WPR-B		AMR A, EUR A, WPR A		Eur B, C			
	DALYs	%	DALYs	%	DALYs	%	DALYs	%	DALYs	%
Neuro-psychiatric conditions* and other NCD**	4369	33.2	12 006	47.0	6484	68.7	3601	30.7	26460	44.2
Alcohol use disorders	3885	29.5	5715	22.4	6318	65.8	2550	21.7	18469	31.7
Unintentional injuries	5033	38.2	5961	23.4	1571	16.4	3929	33.5	16494	28.3
Intentional injuries	1689	12.8	2940	11.5	558	5.8	1874	16.0	7061	12.1
Total alcohol related burden in DALYs	13 165	100.0	25 519	100.0	9445#	100.0	11742	100.0	58323	100.0
Total burden of disease in DALYs	845 628		411268		115246		100250		1472392	
% of total disease burden which is alcohol related	1.6		6.2		8.3		11.7		4.0	

**dominated by alcohol use disorders (plus epilepsy and depression)*
*** other noncommunicable diseases, dominated by liver cirrhosis (plus diabetes)*
 # before reduction of – 1548 DALYs due to protective effects of vascular diseases
***Source**: Rehm et al. (2003d); WHO (2001c, p. 150) (also available www.who.int/whr2001/2001/main/en/annex/Annex3-en-WEB.xls); own calculations*

Table 20: Selected population alcohol-attributable fractions, by disease category, sex and level of development (% DALYs for each cause) in 2000

GBD disease categories	World			High mortality developing (AFR-D, AFR-E, AMR-D, EMR-D, SEAR-D)		Low mortality developing (AMR-B, EMR-B, SEAR-B, WPR-B)		Developed (AMR-A, EUR-A, EUR-B, EUR-C, WPR-A)	
	Males	Females	Both	Males	Females	Males	Females	Males	Females
Mouth and oropharynx cancers	22	9	19	11	4	28	10	41	28
Oesophagus cancer	37	15	29	17	6	42	16	46	36
Liver cancer	30	13	25	23	10	32	11	36	28
Other neoplasms	6	3	4	2	1	5	2	11	8
Unipolar depressive disorders	3	1	2	2	0	3	0	7	2
Epilepsy	23	12	18	14	7	27	13	45	36
Alcohol use disorders	100	100	100	100	100	100	100	100	100
Ischaemic heart disease	4	-1	2	7	0	5	0	2	-3
Haemorrhagic stroke	18	1	10	7	2	21	2	26	0
Ischaemic stroke	3	-6	-1	1	0	3	0	5	-16
Cirrhosis of the Liver	39	18	32	19	7	45	13	63	49
Motor vehicle accidents	25	8	20	19	5	25	8	45	18
Drownings	12	6	10	8	4	10	6	43	25
Falls	9	3	7	5	1	8	3	21	8
Poisonings	23	9	18	7	3	11	7	43	26
Other unintentional injuries	15	5	11	10	4	15	6	32	16
Self-inflicted injuries	15	5	11	8	2	10	5	27	12
Homicide	26	16	24	18	12	28	16	41	32
Other Intentional injuries	13	7	12	7	3	20	11	32	19

Source: Babor, Rehm & Room (in press)

Table 21: Standardized mortality rates (per 100 000) for acute and chronic disease and injury, by WHO regional subgroupings (data shown is for most recent year available)

	Country	Falls	Intentional injuries	Traffic casualties	Accidental poisoning	Alcohol use disorders	Liver cirrhosis	Mouth and oropharynx cancer	Ischaemic heart disease
AFR-D	Mauritius	2.77	14.44	15.91	N.A.	2.04	15.78	3.85	173.51
AMR-D	Ecuador[a]	3.42	22.16	11.95	1.96	2.97	15.45	0.97	31.32
EMR-D	Egypt[a]	0.93	0.51	6.65	0.15	0.00	35.89	0.57	27.05
AMR-B	Argentina	0.79	15.51	9.56	0.45	1.83	6.39	2.14	49.38
	Bahamas (the)[a,b]	0.45	26.02	20.04	0.30	3.98	16.91	2.49	85.79
	Brazil[a]	3.53	29.63	16.63	0.17	3.28	11.31	3.87	72.26
	Chile	0.83	10.26	10.69	0.27	1.47	20.49	1.35	62.42
	Colombia[a]	3.34	69.15	17.71	0.29	0.03	6.25	1.72	89.80
	Costa Rica[a]	2.35	11.78	17.83	0.27	0.93	7.81	2.22	93.08
	El Salvador[a]	3.92	50.62	33.51	0.22	19.50	12.41	1.05	77.84
	Mexico	3.14	15.00	11.64	1.05	5.82	36.15	1.33	75.78
	Panama[a]	3.69	15.88	15.25	0.41	1.03	7.91	2.83	59.02
	Paraguay[a]	0.74	16.38	10.42	0.43	1.42	6.26	2.05	51.31
	Trinidad and Tobago	2.48	16.74	11.87	3.33	0.67	9.55	3.87	170.91
	Uruguay	1.43	15.18	10.05	4.02	1.45	5.95	3.27	60.10
	Venezuela	3.19	19.39	23.20	2.24	0.84	11.21	1.81	119.36
EMR-B	Kuwait	2.20	3.93	19.01	0.65	0.05	4.01	0.97	79.10
WPR-B	Philippines (the)[a]	2.35	19.80	8.60	0.30	0.71	10.00	4.67	86.22
	Republic of Korea (the)[a]	6.59	16.00	20.00	0.92	2.48	20.02	1.69	27.01

	Country	Falls	Intentional injuries	Traffic casualties	Accidental poisoning	Alcohol use disorders	Liver cirrhosis	Mouth and oropharynx cancer	Ischaemic heart disease
AMR-A	Canada	3.08	12.09	8.45	2.73	1.61	5.24	2.06	82.97
	Cuba	12.26	18.22	12.19	0.32	2.31	7.61	3.82	108.52
	United States of America (the)	6.78	20.21	15.00	0.58	1.90	7.47	2.00	112.40
EUR-A	Austria	6.76	15.38	9.84	1.11	2.98	14.95	3.96	100.03
	Croatia	8.33	17.32	11.27	1.72	3.18	20.90	5.27	127.98
	Czech Republic (the)	12.18	14.31	8.65	2.76	0.76	12.36	4.04	141.13
	Denmark	12.20	13.00	9.57	2.96	6.90	11.70	3.17	90.91
	Finland	10.84	23.20	7.77	9.12	3.63	9.60	1.82	122.98
	France	8.69	15.01	13.06	0.79	3.37	11.45	5.85	39.12
	Germany	4.40	11.15	8.05	1.14	4.01	13.36	3.77	95.74
	Greece	3.20	4.06	18.88	2.57	0.05	3.83	1.22	63.65
	Iceland[b]	2.81	11.42	6.16	0.57	2.29	2.58	1.60	108.20
	Ireland	7.00	11.97	10.14	1.04	1.98	3.94	3.04	133.70
	Israel	1.46	8.26	5.57	0.26	0.93	3.85	1.20	77.33
	Italy	7.48	6.38	11.76	0.37	0.22	10.73	2.90	57.20
	Luxembourg[b]	5.25	16.77	17.36	5.22	4.17	12.19	4.28	59.33
	Malta[b]	8.70	9.55	4.49	1.30	0.37	5.46	4.64	144.63
	Netherlands (the)	2.66	9.54	6.59	0.74	1.39	4.44	2.47	70.17
	Norway	8.05	12.16	6.05	1.99	3.44	3.10	2.47	81.19
	Portugal	3.38	4.82	12.50	0.64	0.32	13.08	4.06	50.51
	Spain	2.31	7.49	13.98	2.03	0.52	8.45	3.75	49.94
	Sweden	18.45	21.10	5.84	1.49	2.47	3.97	1.69	89.28
	Switzerland	2.88	14.65	6.50	3.85	2.31	5.79	3.33	70.55
	United Kingdom (the)	14.80	14.62	5.62	1.91	0.87	7.36	2.15	112.41
WPR-A	Australia	2.27	13.63	8.91	3.05	0.99	3.77	2.69	85.46
	Japan	2.78	18.80	7.38	0.38	0.24	6.15	2.23	27.29
	New Zealand	4.17	13.23	11.57	0.83	0.46	2.40	2.65	102.50
	Singapore[a]	3.09	9.47	4.96	0.09	N.A.	2.84	5.83	91.24

	Country	Falls	Intentional injuries	Traffic casualties	Accidental poisoning	Alcohol use disorders	Liver cirrhosis	Mouth and oropharynx cancer	Ischaemic heart disease
EUR-B	Albania[a]	1.22	11.52	7.83	2.97	0.39	N.A.	1.88	77.81
	Armenia	0.72	3.62	5.43	1.32	N.A.	13.07	2.16	261.22
	Azerbaijan[a]	0.30	6.80	5.15	1.14	N.A.	34.02	1.23	284.62
	Bulgaria	3.06	14.95	10.92	2.18	0.77	12.74	3.12	144.31
	Kyrgyzstan[a]	3.39	21.81	11.36	13.61	1.98	38.36	2.98	240.83
	Poland	7.87	15.04	13.21	3.72	2.91	10.67	3.61	102.65
	Romania	5.80	13.75	11.23	5.10	3.38	37.09	5.72	175.06
	Slovenia	11.82	24.24	13.42	1.57	4.90	26.29	6.34	78.62
	TFYR Macedonia	0.99	19.09	5.12	0.97	0.80	5.70	2.51	84.17
	Turkmenistan[a]	4.01	28.40	8.60	19.04	N.A.	42.35	3.63	319.76
	Uzbekistan[a]	11.25	14.68	8.89	1.31	N.A.	39.05	2.59	316.50
EUR-C	Belarus	5.14	38.92	13.97	29.09	N.A.	12.76	4.37	331.23
	Estonia	7.99	38.35	14.35	25.65	3.63	17.39	6.18	274.79
	Hungary	18.67	25.96	11.69	1.40	2.87	45.79	12.64	179.07
	Kazakhstan[a]	2.41	42.20	12.02	44.47	1.90	23.20	3.54	269.93
	Latvia	13.25	37.26	22.78	13.60	8.15	12.10	3.99	250.55
	Lithuania	10.22	45.94	18.16	16.20	1.10	14.36	5.58	250.20
	Republic of Moldova (the)[a]	3.33	22.37	11.69	8.60	1.58	65.03	4.72	311.58
	Russian Federation (the)	8.42	61.42	25.82	36.62	N.A.	N.A.	4.49	285.38
	Ukraine	9.30	8.72	10.56	1.85	N.A.	20.72	5.21	368.11

[a]Caution should be exercised when interpreting the results as death registration level is incomplete.
[b]As countries with very small population size are likely to have spurious trends, care should be exercised when making inter-country comparisons.

Social problems associated with alcohol use

Alcohol consumption is linked to many harmful consequences for the individual drinker, the drinker's immediate environment and society as a whole. Such social consequences as traffic accidents, workplace-related problems, family and domestic problems, and interpersonal violence have been receiving more public or research attention in recent years, indicating a growing interest in a broader concept of alcohol-related consequences (Klingemann & Gmel, 2001). On the other hand, however, social consequences affect individuals other than the drinker e.g. passengers involved in traffic casualties, or family members affected by failure to fulfill social role obligations, or incidences of violence in the family. Ultimately, however, these events have an impact on society as a whole insofar as they affect economic productivity or require the attention and resources of the criminal justice or health care system, or of other social institutions (Gmel & Rehm, 2003). Due to space constraints, this section will only highlight some issues and data involving the following selected social problems: alcohol consumption and workplace problems, alcohol consumption and family problems, poverty, and domestic violence.

Alcohol consumption and the workplace

Heavy drinking at the workplace may potentially lower productivity. Sickness absence associated with harmful use of alcohol and alcohol dependence entails a substantial cost to employees and social security systems. There is ample evidence that people with alcohol dependence and problem drinkers have higher rates of sickness absence than other employees (Klingemann & Gmel, 2001).

Klingemann & Gmel (2001) note that a number of studies have demonstrated an association between heavy drinking or alcohol abuse and unemployment. Here, a causal association may go in either direction, heavy drinking may lead to unemployment, as suggested by Mustonen, Paakkaned & Simpura (1994) and Mullahy & Sindelar (1996); but loss of work may also result in increased drinking, which may become heavy drinking, as indicated by Gallant (1993), Dooley & Prause (1998) and Claussen (1999).

Blum, Roman & Martin (1993) and Mangione et al. (1999) found that work performance was related to volume and pattern of drinking. Blum and her colleagues found no significant relationship between work performance and average daily volume when performance was assessed by self-reports of the drinker. However, lower performance, lack of self-direction and problems in personal relations were found to be related to heavy drinking, particularly when collateral reports were used. In the Mangione et al. study, it was found that although moderate-heavy and heavy drinkers reported more work performance problems than very light, or moderate drinkers, the lower-level-drinking employees, since they were more plentiful, accounted for a larger proportion of work performance problems than did the heavier drinking groups. A study conducted by Ames, Grube & Moore (1997) found modest but significant relationships between drinking behaviours and self-reports of workplace problems.

Some examples may highlight the extent to which alcohol affects work performance. It has been estimated that 30% of absenteeism and workplace accidents in Costa Rica were caused by alcohol dependence (Pan American Health Organization, 1990). According to industry association sources from India, 15% to 20% of absenteeism and 40% of accidents at work are due to alcohol consumption (Saxena, Sharma & Maulik, 2003). A study by the Department of

Hygiene and Industrial Safety in three factories in La Paz, Bolivia found that 7.3% of absenteeism in the first two days of the work week and 1.2% of work-related accidents were directly related to the consumption of alcohol (Pan American Health Organization, 1990). It has been estimated that 20–22% of work-related accidents in Chile have a direct or indirect relationship with recent alcohol use. In a study of patients who required hospitalization for severe work-related accidents, it was found that 15% reported recent use of alcohol (Trucco et al., 1998). It has been reported that in Latvia, alcoholism has had adverse impacts on productivity in the workplace and increased absenteeism. No figures have been published on the extent of absenteeism due to excessive alcohol use. It is estimated that drinking and alcoholism have reduced labour productivity by some 10% (Trapenciere, 2000). A recent survey conducted in the United States of America found that farm residents who drank more frequently had significantly higher farm work injury incidence rates (3.35 per 10 000 person-days of observation) than others who consumed less frequently (1.94 injuries per 10 000 person-days) (Stallones & Xiang, 2003).

With regards to trauma, alcohol is the cause of 10% to 20% of work accidents in France (Costes & Martineau, 2002). A survey conducted in Australia of 833 employees at an industrial worksite found that problem drinkers were 2.7 times more likely to have injury-related absences than non-problem drinkers (Webb et al., 1994). In a 1994 survey, 90% of personnel directors from British organizations cited alcohol consumption as a problem within their workplace. Their major concerns included loss of productivity, absenteeism, safety, employee relations, poor behaviour and impacts on company image. About 8–14 million working days are lost annually to alcohol-related problems. With regard to safety, up to 25% of workplace accidents and around 60% of fatal accidents at work may be associated with alcohol (Hughes & Bellis, 2000). It is estimated that the annual alcohol-related costs to workplaces in the United Kingdom is £6.4 billion (Prime Minister's Strategy Unit, 2003).

Alcohol consumption and the family

It is well established that drinking can severely impair the individual’s functioning in various social roles. Alcohol misuse is associated with many negative consequences both for the drinker’s partner as well as the children. Maternal alcohol consumption during pregnancy can result in fetal alcohol syndrome in children, and parental drinking is correlated with child abuse and impacts a child’s environment in many social, psychological and economic ways (Gmel & Rehm, 2003). Drinking can impair performance as a parent, as a spouse or partner, and as a contributor to household functioning. There are also other aspects of drinking which may impair functioning as a family member. In many societies, drinking may be carried out primarily outside the family and the home. In this circumstance, time spent while drinking often competes with the time needed to carry on family life. Drinking also costs money and can impact upon resources particularly of a poor family, leaving other family members destitute. Also, it is worth noting that specific intoxicated events can also have lasting consequences, through home accidents and family violence (Room, 1998; Room et al., 2002). A recent paper by Bonu et al. (2004) suggests that adverse child health effects of alcohol use are primarily through two distal determinants (indirect effects) - forgone household disposable income and caretakers' time for childcare. Diversion of scant economic resources for alcohol use that could have otherwise been used for seeking health care, may lead to self-care or delay in seeking health care. The other potential ways by which alcohol use can reduce the household income are through morbidity associated with the drinking habit among the consuming individuals, resulting in increase in medical expenditures and loss of income due

to lost wages, and, sometimes, resulting in the premature death of sole wage earners in a household (Bonu et al., 2004).

Implicit in the habitual drinker's potential impact on family life is the fact that the drinking and its consequences can result in substantial mental health problems of family members. Such effects, though potentially common, are not often documented. Some insight into this issue can be gained from interviews with members of Al-Anon, a companion organization to Alcoholic Anonymous for spouses and family members of people with alcohol dependence. In interviews with 45 Al-Anon members in Mexico (82% of them the wife of a husband who was alcohol-dependent), 73% reported feelings of anxiety, fear, and depression; 62% reported physical or verbal aggression by the spouse toward the family; and 31% reported family disintegration with serious problems involving money and the children (Rosovsky et al., 1992, cited in Room et al., 2002).

The effects of men's drinking on other members of the family is often particularly on women in their roles as mothers or wives of drinkers. The risks include violence, HIV infection, and an increased burden in their role of economic providers. In a paper that looked at alcohol and alcohol-related problems facing women in Lesotho, it was noted that as in many other developing countries, the cultural position of women in Lesotho facilitates a vicious circle in which women are at one time brewers of alcohol, then sellers, then become excessive consumers due to the problems created by their drinking husbands (Mphi, 1994).

Case example 1: Botswana

The economic consequences of chronic alcohol use are devastating and can seriously hinder any sense of development. In a study of alcohol use among the Basarwa of the Kgalagadi and Ghanzi districts in Botswana, informants stated that since a significant proportion of household income was spent on liquor, less cash was available for food, clothing and other essential items. As one informant succinctly stated ‘alcohol makes poor people poorer’. A person who is regularly under the influence of alcohol will have little motivation or interest in working, unless it is to obtain money to buy more alcohol. One particular problem is that a regular drinker can easily become economically tied and indebted to alcohol vendors who are only too pleased to provide alcohol ‘on credit’.

Child neglect is an increasing problem when parents are intoxicated so early in the day that they are not able to prepare food for their children, even if there is food available. A concern is that some parents will sell food to buy alcohol while others will give alcohol to their children as a food substitute and to stave off hunger. Generally, the neglect of young children due to alcohol abuse means that these children are under-socialized as well as malnourished, leading to a refusal to attend school, begging and stealing for food, and other delinquent activities.

Source: Molamu & MacDonald (1996)

Case example 2: Nepal

In a large-scale study covering about 2400 households in 16 of Nepal's 70 districts, the adult respondents perceived the impact of family members use of alcohol and drugs on children as violence and physical abuse (33.4%), neglect and mental abuse (28.5%), deprivation from education (20.2%) and push factor for children to use intoxicants (11.1%), malnutrition and running away from home. 35.9% of children interviewed felt that there was an impact of parental drinking on the family. The impact included domestic violence (40%), loss of wealth and indebtedness (27.8%), loss of social prestige and bad relationship with neighbours.

Source: Dhital et al. (2001)

Alcohol and poverty

The economic consequences of expenditures on alcohol are significant especially in high poverty areas. Besides money spent on alcohol, a heavy drinker also suffers other adverse economic effects. These include lowered wages (because of missed work and decreased efficiency on the job), lost employment opportunities, increased medical expenses for illness and accidents, legal cost of drink-related offences, and decreased eligibility of loans. A recent study conducted in 11 districts in Sri Lanka examining the link between alcohol and poverty found that 7% of men said that their alcohol expenditure was greater than their income. Though a relatively small percentage, this is still a worrying statistic for the families concerned and for those interested in helping the worst-off families (Baklien & Samarasinghe, 2001).

Case example 3: Cameroon

What is problematic in Cameroon is the high cost of purchasing even one beer a week given the income of an average rural family. When comparing the price of two major beers sold in a rural village in 1983 as a percentage of male and female wages, it was found that the cost of one beer represented 60–84% of women's and 36–50% of men's daily wages. Drinking even in these small amounts means that one day's wages is quickly consumed. The danger is when individuals start forsaking paying children's school fees because their money is spent on beer. Such individuals are considered disruptive of community life because their negligence impedes others from doing their work or meeting obligations towards friends, association members and kin.

Source: Diduk (1993)

Case example 4: India

In a 1997 study comparing two groups of families within the same community in Delhi, India (Group A having at least one adult consuming alcoholic drinks at least three times per week in the last month and Group B having no adult consuming more than one drink in the last month), it was found that Group A, on an average, spent almost 14 times more on alcohol per month compared with Group B. A larger proportion of families in Group A had significant debt compared with Group B. The implications of this are towards fewer financial resources for food and education of children and fewer resources for purchasing daily living consumables. The more heavily drinking Group A was more likely to report major illnesses or injuries during the past one year and was more likely to require medical treatment.

Source: Saxena, Sharma & Maulik (2003)

Case example 5: Malaysia

Alcohol is a major factor in exacerbating poverty. In a month a rural labourer can spend about RM 300 (US$ 80) on alcohol which is about how much he earns. The alcohol menace ruins families and contributes to the breakdown of the basic social fabric of society. Often it is the women who bear the brunt of this problem – wife battery, discord in the home, abused and deprived children, non-working or chronically ill husbands who become a burden to both the family and society. Besides loss in family income, the burden on the family is worsened when the drinker falls ill, cannot work and requires medical attention.

Source: Assunta (2001–2002)

Alcohol and domestic violence

Research has found that alcohol is present in a substantial number of domestic violence accidents. The most common pattern is drinking by both offender and victim. Alcohol has been shown to be a significant risk factor for husband-to-wife violence. Studies have shown that the relationship between alcohol and domestic violence is complex.

Drinking frequently has been associated with intrafamily violence. Reviews have found that excessive alcohol use is a strong and consistent correlate of marital violence, but that violence rates vary based on research designs, methodologies, and samples. Therefore, the role of alcohol remains unclear. Studies based on interviews with abused wives tend to report higher proportions of alcohol involvement than do general population studies or police samples. In a study examining episodes of domestic violence reported to the police in Zurich, Switzerland, evidence of alcohol involvement was found in 40% of the investigated situations. Police officers thus believed there was a clear link between alcohol and violence in at least 26% of the cases studied (Maffli & Zumbrunn, 2003).

Regarding partner violence, research evidence indicates that it is more strongly associated with heavy drinking, whether usual or occasional, than is non-partner violence, and conflicts as to whether drinking by the victim makes violent acts by a partner more likely. That alcohol consumption has a stronger association with partner violence than with nonpartner violence may be a matter of access, with partners having more contact and thus more opportunities for violent encounters (Gmel & Rehm, 2003). Studies also report an association between drinking patterns and intimate partner violence; excessive drinkers and alcohol-dependent individuals are more likely to act violently toward their intimate partners (White & Chen, 2002).

To give some examples from the literature, a study conducted in Nigeria showed a strong association between domestic violence and alcohol use. Alcohol use was involved in 51% of the cases in which a husband stabbed a wife (Obot, 2000). In a 1998 cross-sectional study of violence against women undertaken in three provinces in South Africa, it was found that domestic violence was significantly positively associated with the women drinking alcohol and conflict over the partner's drinking (Jewkes, Levin & Penn-Kekana 2002).

In a 2000–2001 survey of 5109 women of reproductive age in the Rakai District of Uganda, it was found that the strength of the association between alcohol consumption and domestic violence was particularly noteworthy. Women whose partner frequently or always consumed alcohol before having sex faced risks of domestic violence almost five times higher than those whose partners never drank before having sex. Of women who recently experienced domestic violence, 52% reported that their partner had consumed alcohol and 27% reported that their

partners had frequently consumed alcohol. This finding supports the conclusion that alcohol may play a direct precipitating role for domestic violence (Koenig et al., 2003).

In a study of 180 women seeking prenatal care in rural South India, it was found that 20% of the women reported domestic violence and 94.5% of these women identified their husbands as the aggressors. Husband's alcohol use was a significant risk factor for domestic violence (Halasyamani, Davis & Battacharjee, 1997). The role of alcohol in domestic violence is also cited in another Indian study which found that 33% of spouse-abusing husbands were using alcohol. Of these 15% were occasional, 45% frequent and about 40% were daily users of alcohol. More than half of the spousal abuse took place during the period of intoxication (AIIMS, 1997). A cross-sectional study of a random sample of 275 women in Barranquilla, Colombia found that habitual alcohol consumption in the women and in the spouses were factors associated with marital violence (Tuesca & Borda, 2003).

It has been suggested that because alcohol-dependent individuals are intoxicated more frequently than non-dependent individuals, the observed association between spousal abuse and intoxication may occur simply by chance. In addition, most instances of spouse abuse occur in the absence of alcohol intoxication, suggesting the need to understand better the processes through which some episodes escalate into violence (Martin, 1992). Although many studies have found that alcohol use is associated with intimate partner violence, the nature of the association needs to be clarified.

In conclusion, however, there is little doubt that alcohol consumption is associated with many social consequences. The available data on consequences to the direct social and personal environment from short-term as well as long-term use of alcohol are sparse. Much more research into this issue would be required to obtain standard measures or data that would allow quantification of these consequences in a meaningful and comparable manner.

Economic and social costs of alcohol use

There is a strong interest in many countries regarding the development of scientifically valid, credible estimates of the economic costs of alcohol use (and use of other psychoactive substance use like tobacco and drugs). It is a well established fact that the use of alcohol entails a large number of adverse consequences in such widely differing areas as physical and mental health, traffic safety, violence, and labour productivity. There has been much effort in the past three decades in attempting to estimate these costs and recent investigations have suggested that they account annually for a substantial part of the Gross Domestic Product of industrialized countries (Klingemann & Gmel, 2001).

On the assumption that the harmful effects of drinking can be evaluated in monetary terms, health researchers and economists have attempted to estimate the costs of alcohol consumption to society. According to Klingemann & Gmel (2001), social costs are largely defined as costs to society, i.e. all costs arising from alcohol consumption that are not borne exclusively, knowingly and freely by the drinker, such as spending on the drinks. Thus, social costs are the negative economic impact of alcohol consumption on the material welfare of society. When defining costs, a key distinction is made between direct and indirect costs. According to Harwood, Fountain & Livermore (1998, cited in Klingemann & Gmel, 2001), direct costs refer to the value of goods and services actually delivered to address the harmful effects of alcohol consumption. In contrast, indirect costs represent the value of personal productive services that are not performed because of the adverse consequences of drinking.

Single and colleagues (2003) summarize the many purposes that estimates of the social and economic costs of alcohol use can serve:

- Economic cost estimates can be used to argue or justify certain policies on alcohol i.e. such policies to reduce the harm associated with alcohol use should be given a high priority on the public policy agenda. The public is entitled to a quality standard against which individual cost estimation studies can be assessed.
- Cost estimates help to appropriately target specific problems and policies. It is important for policy makers to be aware of which psychoactive substances involve the greatest economic costs. For example, the recent study conducted in Australia concluded that the costs of alcohol (and tobacco) far exceeds the social costs from illicit drugs, thus drawing greater attention on public policy towards the licit drugs. The specific types of cost may also draw attention to specific areas which need public attention, or where specific measures may be effective.
- Economic costs studies help to identify information gaps, research needs and desirable refinements to national statistical reporting systems.
- The development of improved estimates of the costs of alcohol abuse offers the potential to provide baseline measures to determine the efficacy of drug policies and programmes intended to reduce the damaging consequences of alcohol use.

Relatively few countries have attempted to estimate the costs of alcohol use. Estimating the costs of alcohol consumption encounters problems over availability of data as well as methodological difficulties. However, the fact that studies carried out in different countries using a variety of approaches and methods all seem to lead to convergent results is a positive indication that results are valid. In all cases, there is confirmation that alcohol consumption imposes significant damage on society.

Table 21 presents some data on the estimated social and economic costs of alcohol use in various countries. Note that this table is not comparable as different methods of estimations have been used, and for some data, the year of the study/estimate was not available. Most of the literature on social costs of alcohol consumption comes from the English-speaking, non-European countries, especially from the United States of America, Canada, Australia and New Zealand. It is difficult to make any comparisons as such given that a variety of approaches and methods are used. Please refer to the individual country profiles and the original sources for a more detailed description of the estimation methods used.

Table 21: Social and economic costs of alcohol abuse for selected countries

Country	Year	Total Cost Estimate	% of GDP
Australia	1998–1999	A$ 7560.3 million	N.A.
Canada	1992	$7.52 billion	1.1
Chile	N.A.	$2.969 billion	N.A.
Finland	1990	$3.351-5.738 billion	N.A.
France	1997	115 420.91 FF	1.42
Ireland	N.A.	€2.4 billion	N.A.
Italy	2003	€26–66 billion	5–6
Japan	1987	US$ 5.7 billion	N.A.
Netherlands (the)	N.A.	€2.577 billion	N.A.
New Zealand	1990	$16.1 billion	4.0
Scotland	2001–2002	$1.071 billion	1.5
South Africa	N.A.	$1.7 billion	2.0
Switzerland	1998	6480 million Swiss francs	N.A.
United Kingdom (the)	N.A.	£15.4 billion	N.A.
United States (the)	1998	$184.6 billion	N.A.

***Note**: Please refer to the individual country profiles to obtain the original source used.*

It has been argued that economic cost studies should be conducted within the framework of cost-of-illness studies. In cost estimation studies, the impact of alcohol use disorders on the material welfare of a society is estimated by examining the social costs of treatment, prevention, research, law enforcement and lost productivity plus some measure of the quality of life years lost. It is recognized that data are frequently lacking for many of these costs. However, in many countries it will be possible to develop reasonable estimates for some, if not most, of the costs associated with alcohol consumption. Thus, these guidelines should be viewed as a framework rather than a rigorous methodology to be applied in every situation (Single et al., 2003).

Conclusion

Alcohol is not an ordinary commodity. While it carries connotations of pleasure and sociability in the minds of many, harmful consequences of its use are diverse and widespread. As documented in this report, globally, alcohol problems exert an enormous toll on the lives and communities of many nations, especially those in the developing world. Research has shown that when extrapolating from historical trends, the role of alcohol as a major factor in the burden of disease will be increasing in the future. Particularly worrying trends are the increases in average volume of drinking predicted for the most populous regions of the world (e.g. in China and India) and the emerging trend of more harmful and risky patterns in drinking especially among young people.

A global perspective on alcohol policy needs to acknowledge and take into account the characteristics, effects and consequences of alcohol use in different societies, and yet to focus and act on the public health goal which is to minimize the harm caused by drinking. Alcohol-related burden is linked to at least two different dimensions of consumption: average volume and patterns of drinking. Thus, in order to avoid or reduce burden, both dimensions should be taken into consideration. In other words, one may reduce burden by decreasing the average volume of alcohol consumed or by shifting patterns of drinking to less harmful patterns. One may also change burden by weakening the link between exposure and disease, e.g. by disaggregating the link between alcohol and traffic injuries by not combining drinking and driving (Rehm et al., 2003b).

This report has contributed to the knowledge base for doing so, by documenting levels and trends in alcohol-related problems, and showing how drinking levels and patterns contribute to these problems. Another recent WHO publication - the *Global status report: alcohol policy* - seeks to evaluate and disseminate knowledge of strategies and policies that are effective in reducing the rates of alcohol problems. The Global Alcohol Database, as well as this report, aims at providing a standardized reference source of information for global epidemiological surveillance of alcohol use and related problems. It is evident from this report that there is a need for countries to develop national monitoring systems to keep track of alcohol consumption and its health and social consequences. This would be particularly useful in raising awareness among the general public and policy-makers of the serious implications that alcohol use have within the public health domain.

To effectively reduce the level of harmful social and health consequences from alcohol use requires much preparation and planning. It is now the responsibility of governments worldwide and concerned citizens to encourage healthy debate and formulate effective public health-oriented countermeasures in order to minimize the harm caused by alcohol use.

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