Alcohol Consumption and Indicators of Alcohol-related Harm in Slovenia, 1981-2002

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Aim. To document over-time per capita alcohol consumption and connection between per capita alcohol consumption and indicators of short and long term alcohol-related harm.

Methods. Registered alcohol consumption was calculated from the data on production and trade of alcoholic beverages, using World Health Organization recommended methodology for the 1981-2002 period. The indicators of alcohol-related harm, alcohol-related mortality, and alcohol-related road-traffic accidents were calculated from mortality data and alcohol-related traffic accidents data for the 1986-2001 period.

Results. Estimates of apparent per capita alcohol consumption in Slovenia over the past 20 years indicate a decrease in alcohol consumption, beginning in 1982 and continuing with some fluctuations in subsequent years through 2002. Per capita consumption of ethanol from all beverages combined decreased from 1981 to 2002 by 15.1%. The drop was substantial in the period from 1981 to 1991. On average, 32 people per 100,000 aged ≥15 years died annually from all alcohol-related causes. The number of years of potential life lost (YPLL) due to all alcohol related causes decreased by 21%, with a 40% decrease in YPLL due to premature deaths from alcoholic liver disease and 113% increase in YPLL due to premature deaths from mental and behavioral disorders due to use of alcohol.

Conclusion. Indicators of alcohol-related harm reflect high per capita alcohol consumption. With a strong legislative and public health support the situation is expected to improve.

Key words: accidents, traffic; alcohol drinking; alcohol related disorders; mortality; primary prevention; Slovenia

Misuse of alcohol represents one of the leading causes of preventable death, illness, and injury throughout the world. Alcohol consumption is associated with a variety of adverse health and social consequences. Its use can equally harm drinkers and non-drinkers (1). A study of the international literature on disease and death related to alcohol has identified at least 61 different types of injury, illness or death, which are potentially caused by the consumption of alcohol with some of them 100% attributed to alcohol. World Health Organization (WHO) estimates that alcohol accounts for 10-11% of all illness and death each year in developed countries. Its use is also strongly related to social consequences, such as drink driving injuries and fatalities, aggressive behavior, family disruption, and reduced industrial productivity (2).

Research over the past two decades has found that the level of alcohol problems is related to the overall amount of drinking in the country (per capita alcohol consumption) as well as to the particular patterns of drinking (3).

Consumption trends and drinking habits have changed substantially over the past 20 years in the European countries as well as in Slovenia (4,5). In the European countries (the entire WHO European Region), aggregated recorded alcohol consumption has decreased by 5.4% from 1987 to 2000. In European Union (EU) countries (precalculated regional averages for these countries) during the same period, the consumption decreased by almost 15% (6). The decrease was higher in the high-consumption countries and lower in the low-consumption countries. One of the most frequently used labels to denote the trends in alcohol consumption in the industrialized world is that of homogenization. National differences in consumption levels are diminishing and the countries’ traditionally dominant type of beverage is losing ground in general terms (7). These facts are important, especially from an alcohol policy point of view.

Slovenia is among the European countries with the higher overall (registered and unregistered) consumption of alcohol per capita, and among EU countries with the highest alcohol related disease ratio, such as liver diseases, traffic accidents due to alcohol, and alcohol-related deaths (8,9). The harmful consequences of the use of alcohol affect a significant number of Slovenians and represent an important public health issue. According to the Slovenian Public Opinion Survey, conducted in 1999, 173,000 people were...
alcohol consumption. The statistics cover both the total consumption of alcohol and the data of selected alcohol-attributable causes of alcohol-related harm was analyzed as well.

This article seeks to document over-time per capita alcohol consumption as well as the connection between per capita alcohol consumption and health consequences. Short and long term alcohol-related harm is presented by the most commonly used indicators, alcohol-related mortality and alcohol-related road traffic accidents. The summary of existing control policy, ie, actions undertaken for further reduction of alcohol consumption and prevention of alcohol-related harm was analyzed as well.

Methods
A set of indicators was chosen to assess the most important aspects of the situation in Slovenia as they relate to public health.

Data sources for the article included registered alcohol consumption and the data of selected alcohol-attributable causes of death and alcohol-related road traffic accidents.

The analysis of consumption trends was based on recorded alcohol consumption. The statistics cover both the total per capita consumption of alcohol and per capita consumption of beer, spirits, and wine, expressed in liters of 100% alcohol. Conversion factors used to estimate the amount of pure alcohol in beer was 5% and 11% in wine.

Until 1994, per capita annual consumption of pure alcohol had been calculated on the basis of the data obtained from the sale of alcoholic beverages in stores and restaurants, as well as home production. Since 1995, consumption of pure alcohol has been calculated on the basis of the data on production, trade, and stocks. For the purpose of this analysis all available data on alcohol production and trade was obtained from the Statistical Office of the Republic of Slovenia (12).

Annual per capita alcohol consumption was derived as follows:

\[
\text{alcohol production + alcohol imports - alcohol exports + stocks} \div \text{population}
\]

Total estimated recorded alcohol consumption in a country in a given year equals total alcohol production plus alcohol imports minus alcohol export in that year (2,13). Stocks were also taken into account.

Alcohol-attributable causes of death were taken from death certificates. Causes of death were analyzed and classified by the International Classification of Diseases (ICD) and related health problems, ICD-9 and ICD-10 Revisions (14). The following diseases and injuries were gathered in a group and presented as all alcohol-attributable causes of death: Mental and behavioral disorders due to use of alcohol (F10), Degeneration of nervous system due to alcohol (G31.2), Alcoholic polyneuropathy (G62.1), Alcoholic myopathy (G72.1), Alcoholic cardiomyopathy (H42.6), Alcoholic gastritis (K29.2), Alcoholic liver disease (K70), Alcohol-induced chronic pancreatitis (K86.0), Maternal care for (suspected) damage to fetus from alcohol (O35.4), Fetus and newborn affected by maternal use of alcohol (P04.3), Fetal alcohol syndrome (Q86.0), Findings of alcohol in blood (R87.0), Accidental poisoning by and exposure to alcohol (X45), Intentional self poisoning by and exposure to alcohol (X65), and Poisoning by and exposure to alcohol (Y45). Findings of alcohol in blood (R87.0), Accidental poisoning by and exposure to alcohol (X45), Intentional self poisoning by and exposure to alcohol (X65), and Poisoning by and exposure to alcohol (Y45), undetermined intent (Y15). Death rates were calculated per 100,000 adult population (14). Age standardized death rates were calculated by using the Europe Standard Population based on the year 1997, the year closest to the years for which the data were collected (15).

Death rates of selected alcohol-related causes from WHO database were presented separately. This group of causes included: Liver cirrhosis, Alcoholic psychosis, Alcohol dependency, Alcohol-related traffic accidents, Pancreatitis, Alcohol-related external injury and poisoning, and Cancers of upper digestive tract and of the pancreas (6).

Years of potential life lost (YPLL) before the age of 65 were calculated for all alcohol-related causes of death. YPLL is a sophisticated measure of the impact of premature mortality on a population (17). The advantage of YPLL over the more familiar mortality measures is that YPLL allows a selective evaluation of the leading causes of death in younger age groups, because they are calculated as the sum of the differences between some predetermined minimum or desired life span and the age of death of individuals who died earlier than that predetermined age, usually 65 years of age (17,18).

Data on road traffic accidents were obtained from the Ministry of Internal Affairs and from WHO’s Health For All database (6,19). Alcohol-related car accidents were those in which one or more drivers had been drinking according to the report of the police officer.

Results
Consumption

Apparent per capita consumption of ethanol from all beverages combined decreased from 11.5 L in 1981 to 9.8 L in 2002. The decline was substantial in the period from 1981 to 1991. From 1991 to 2000 per capita alcohol consumption decreased by 8.5%, and increased again in 2001 and 2002 (Table 1, Fig. 1).

When volumes of consumed beer, wine, and spirits were converted into per capita ethanol volume, apparent per capita ethanol consumption in 2002 was 9.8 liters, which was 15.1% less than in 1981 (Table 1). This reduction did not reach the targeted 20% set by the Health For All project (20).

Between 1981 and 1991, the consumption of all alcoholic beverages decreased, with the biggest decline noted for spirits (20.8%, Table 1). The trend of the last 20 years is a reduction in per capita spirits and wine consumption.

The beer proportion of per capita pure alcohol consumption increased after 1993, peaked at 5 L in 1997, and afterwards declined to 4.1 L in 1998, and remained at about 4.3 L in 2000, 2001, and 2002. The amount of pure alcohol consumed through beer was in the last years almost the same as the amount consumed through wine (Fig. 1). The increased proportion of beer in relation to the total consumption is mainly due to a substantial decrease in spirits consumption and partly to a reduction in wine consumption.

<table>
<thead>
<tr>
<th>Type of beverage</th>
<th>Per Capita consumption (L/year)</th>
<th>Percent difference in per capita consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beer</td>
<td>70.1</td>
<td>55.2</td>
</tr>
<tr>
<td>Wine</td>
<td>48.9</td>
<td>45.2</td>
</tr>
<tr>
<td>Spirits</td>
<td>7.5</td>
<td>4.7</td>
</tr>
<tr>
<td>Alcohol</td>
<td>11.5</td>
<td>9.4</td>
</tr>
</tbody>
</table>

*Available method: consumption = national production + (import – export) + stocks.*
Because of the high level of unrecorded consumption, which was estimated to be between 7 and 8 liters per capita (21,22), as well as large fluctuations in alcohol consumption levels from one year to another, it is difficult to precisely display the different movements of the trend during the observed period.

**Alcohol-related Mortality**

A decrease of overall mortality from the selected alcohol-related diseases and injuries was noted in the observed period of 1986 to 2001 (Fig. 2). There were also yearly oscillations of the number of deaths per 100,000. Decrease in the number of deaths was highest in the period from 1993 to 1999. After that, yearly oscillations continued. The curve of mortality from all alcohol-related deaths showed a decreasing trend despite substantial yearly oscillations (Fig. 2). In the observed period the average number of all alcohol-related deaths in population aged ≥15 years was 32 per 100,000, with a share of 3% of all deaths in Slovenia.

Alcohol liver cirrhosis was the most frequent single cause of all alcohol-related deaths, with a share of 64.2%, followed by alcohol dependence syndrome (13.1%) and alcoholic cardiomyopathy (12.4%, Fig. 2). There was an increasing trend of alcohol dependence syndrome mortality (Fig. 3). The external cause of death for more than 40% of deaths from mental and behavioral disorders due to use of alcohol was suicide.

**Alcohol-related Premature Mortality**

A trend of decrease is visible in years of potential life lost due to premature deaths from alcohol-related causes in the period from 1987 to 2002 (Fig. 4). The major contributor of YPLL was alcoholic liver disease with an average number of 2,999.8 YPLL, followed by alcohol dependence syndrome.
by mental and behavioral disorders due to the use of alcohol with an average number of 1,024.4 YPLL. In the period from 1987 to 1995, alcohol liver disease was responsible for more than 70% of all YPLL due to alcohol related premature deaths. In the same period, the share of mental and behavioral disorders due to alcohol was 14%. After 1996, the share of YPLL due to mental and behavioral disorders due to alcohol increased to 32% and has been rising since. In the same period, the share of YPLL due to alcohol liver disease started to drop and leveled at about 56% in 1997.

Figure 3. The link between per capita alcohol consumption and age-standardized death rates for selected alcohol-related causes due to long term alcohol abuse in Slovenia for 1986-2001. Open diamonds – alcohol dependence; open squares – alcoholic psychosis; triangles – alcoholic liver disease; crosses – all alcohol-caused deaths; closed diamonds – per capita consumption (L); open circles – targeted consumption.

Figure 4. Years of potential life lost (YPLL) due to selected alcohol-related causes in Slovenia for 1987-2002. Triangles – all alcohol-related causes of death; squares – mental and behavioral disorders due to use of alcohol; diamonds – alcoholic liver disease.

**Road Traffic Accidents Due to Alcohol**

The level of alcohol-related traffic accidents had been relatively stable from 1986 to 1993. In 1994, a substantial increase of 87% in the number per 100,000 was registered, i.e., an increase from the average number of 35.5 per 100,000 to 66.5 per 100,000 (Fig. 2). The number has been high ever since, on average 72.6 per 100,000 road traffic.

**Discussion**

Based on the recorded level of alcohol consumption for the past 20 years, with an average adult per capita consumption of more than 10 L of pure alcohol, the consumption of pure alcohol decreased by 12.2% and 8.2% in the past 20 and 10 years, respectively, which was less than the targeted 25%. Target 17 of the WHO Health For All by the Year 2000 program was to reduce alcohol consumption by 25%, i.e., from the 9.2 L per capita in 1991 to the targeted 6.9 L in 2000 (15). Slovenia did not achieve that goal. Furthermore, if this trend of consumption continues, the targeted consumption of 6 L per capita by the year...
counted for relatively more mortality in younger persons, e.g., an average of 30 years of life lost for each death from alcohol consumption.

Until 1994, Slovenia was a typical wine-drinking country, with an average share of pure alcohol consumption amounting to more than 50%. After that, beer became a very popular beverage. Since then, the share of pure alcohol consumed in the form of beer has risen substantially, and was almost equal to the share of pure alcohol consumed in wine, ie, about 5 liters. This shift away from the dominant type of beverage towards various other beverages is also seen in other European countries, (which clearly do not belong to a single group). As in most EU countries, the proportion of spirits has declined in Slovenia since 1981 (11).

Data on alcohol consumption presented in this article are based on the recorded consumption. Due to the fact that retail sales data were not available in Slovenia, per capita estimates of alcohol consumption were calculated, primarily on the basis of data on production and trade of alcohol beverages. These estimates did not account for unrecorded consumption, which has been estimated at about 7 to 8 L of pure alcohol per capita (or approximately 8.7 to 10 L per adult) (11,21,22). According to this information, overall per capita consumption would be about 19 L. Even if the unregistered consumption had been half of the assessed volume, the total consumption would have been more than 14 L of pure alcohol per adult, which puts Slovenia among other countries with the highest alcohol consumption.

The ups and downs of the consumption curve imply that the data reported on the production and trade had not been as accurate as they should be.

With an average death rate of more than 20 deaths per 100,000 population for liver disease and cirrhosis, Slovenia ranks among the countries with an intermediate death rate (between 10 and 25 deaths per 100,000). An upward trend, particularly from 1996, can be seen for alcohol liver disease mortality, which has been the most important cause of death in the observed period. This could also be the result of more accurate coding of causes of death. It has to be stressed however, that there is underreporting of alcohol-related underlying causes of death on death certificates.

Premature mortality of all alcohol-related causes has been decreasing (Fig. 4), but there has been an increasing trend in premature mortality from mental and behavioral disorders due to alcohol since 1996. Alcohol dependence and alcoholic cirrhosis, the two most reported cases of alcohol-related mortality, account for a substantial number of years of potential life lost due to alcohol use. However, when average YPLL per death was examined, it was apparent that deaths resulting from the acute effects of alcohol accounted for relatively more mortality in younger persons, e.g., an average of 30 years of life lost for each death associated with excessive blood alcohol levels, in contrast with 12 years lost for each death from alcoholic cirrhosis. In 2002, premature deaths from liver disease and cirrhosis accounted for 4,635 YPLL (6.7% of all YPLL) and ranked fourth among all single causes of death (24).

Despite the fact that in Slovenia every death is medically certified and that we use the common tool, ICD-10 instructions for coding the underlying cause of death, there are always deviations in the interpretation of coding rules among nine physicians who are in charge of coding in the regional institutes of public health, differences in medical training of medical practitioners who fill in the death certificates and in diagnostic possibilities in different levels of health institutions in the country. There is also probably a certain degree of underreporting of causes of death that can be 100% attributed to alcohol.

With an average number of 72.6 road traffic accidents per 100,000 inhabitants in the period from 1994 to 2001, Slovenia was among the countries with the highest rates (6). According to the data from the Health For All Database, in 2000, Slovenia ranked second (77.4 traffic accidents per 100,000), followed by Croatia (75.7). Greece ranked first with a total of 216.1 traffic accidents per 100,000.

There was a substantial increase in the number of alcohol-related traffic accidents in 1994, which was partly due to the changes in methodology of defining causes of accidents. Until 1993, alcohol was treated as the primary cause of accident. In 1994, new methodology was introduced which classified alcohol as a secondary cause of accidents, together with overtaking or changing lines, and speeding as the primary cause of accidents. The most frequent primary cause of accidents thus became speeding, and the most frequent secondary cause alcohol.

The number of alcohol-related non-fatal road traffic accidents depends on whether the individuals had their blood tested for alcohol or not. There is a general under-reporting of car accidents, especially the less severe ones (24). Reliable blood alcohol concentration testing of drivers in fatal crashes is available in Slovenia, but in non-fatal crashes blood alcohol concentration testing is more selective. Yearly oscillations probably depended on the extent of testing drivers for blood alcohol concentration.

The experience of many EU countries shows that reduction of harm can be achieved through various restrictions defined by legislation, health promotion, and education (school based education — training in social skills, self-control, information programs, mass media campaigns) as well as coordinated approaches for the improvement of resource utilization and specific training in primary health care (early detection, brief intervention), ensuring easy access to cost-effective health care programs.

One of the steps Slovenia has taken in reducing alcohol consumption, which particularly targeted youngsters, was the law on alcohol adopted by the Slovenian Parliament in 2003 (25). The law restricted access to alcohol and provided an official background for a national alcohol policy. It also reduced the availability of alcoholic beverages. There is a minimum legal age limit of 18 years for drinking alcoholic beverages.
ages and for buying alcohol in shops, grocery stores, or gasoline stations. There is a prohibition of sale of distilled spirits before 10 a.m. (25).

The advertising of alcoholic beverages in schools, sport centers, and health care institutions is also prohibited. Advertising alcoholic beverages on television and radio is permitted only after 10 p.m. (26). The aim of these measures has been to reduce the prevalence of male and female drinkers consuming more than 40 g and 20 g of alcohol daily, respectively, to postpone one's first drink as much as possible, and to reduce binge drinking among youngsters. Results from the European School Survey Project on Alcohol and Drugs (ESPAD) conveyed on 15 to 16 year-olds in 1995 showed that 73% of the respondents had drunk alcoholic beverages in the last 12 month, and 43% of them had drunk till the state of intoxication (27). Lifetime prevalence of alcohol use was 87% (88% for boys and 86% for girls). The ESPAD survey conducted in 1999 showed that 30% of boys and 25% of girls consumed their first glass of beer at the age of 11; 91% of pupils aged 15 had already experienced alcohol; more than two-thirds of them have experienced drunkenness; for almost 25% of them binge drinking was an everyday activity (27). Most of them experienced alcohol for the first time at home (27).

In 1998, some changes relating to alcohol and driving were adopted in the existing legislation. The blood alcohol concentration limit was set at 0.05 g% for the general public, 0.0 g% for professional drivers and young drivers (during the first 2 years after receiving a driving license, ref. 28). Driving license is taken away from all drivers having a blood alcohol concentration more than 0.15 g%, and from all drivers causing an accident, while having a blood alcohol concentration more than 0.11 g%. In the year following the adopted changes, the number of alcohol-related road traffic accidents decreased by 37%. Also, the number of consequences decreased substantially, i.e., by 39%, but with an 18% decrease in the number of deaths. The source of worry was the fact that blood alcohol concentration of drivers who caused accidents was 13% on average higher than in the year prior to the adoption of more restrictive measures. This led to the conclusion that more severe restrictions have had little effect on heavy drinkers (29).

Experience of many other countries show that restrictions, when adopted by law, have to be controlled and violations strictly punished. There is an ongoing public debate on lowering blood alcohol concentration to 0.02 g%. So far, public opinion is against this proposal.

These measures will not be efficient until people’s attitude towards drinking changes. In a household survey from 2001, 91% of people supported the law on alcohol which would have restricted availability of alcoholic beverages (29). The percentage of the interviewers who were opposed to it was the highest in age groups aged from 18 to 24 years and from 25 to 34 years (30). This population group should be one of the target groups for preventive activities and measures.

Despite the high level of unrecorded consumption, there is no doubt that overall consumption of alcohol is decreasing in Slovenia. The registered consumption of pure alcohol decreased by 12.2% in the past 20 years. On average 32 people per 100,000 aged 15 years died annually from alcohol-related causes in the observed period, mostly of liver disease and cirrhosis, with alcohol liver disease being the most important cause of death as well as premature death. In the period from 1994 to 2001, the average number of road traffic accidents due to alcohol per 100,000 inhabitants was 72.6 which put Slovenia among the countries with the highest rates. The existing legislation is a good ground for the reduction of short and long-term alcohol-related harm. There is a need for improvement of the reporting system for alcohol consumption as well as for alcohol-related short and long-term harmful consequences.

References


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