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Status report on alcohol consumption, harm and policy responses in 30 European countries 2019

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ABSTRACT

Per capita alcohol consumption in the WHO European Region, including the European Union (EU), is the highest in the world, which results in proportionally higher levels of burden of disease attributable to alcohol use compared to other regions. While there have been welcome improvements in terms of overall mortality and alcohol-attributable mortality in EU+ countries (EU Member States, Norway and Switzerland), there was no statistically significant decline in total alcohol per capita consumption between 2010 and 2016 and the observed decreases in heavy episodic drinking seem to have come to a halt. Assessment of alcohol policies in the 10 areas defined in the *European action plan to reduce the harmful use of alcohol 2012–2020* revealed huge variability across the countries, including the implementation of the three WHO "best buys" policy measures to reduce noncommunicable diseases related to alcohol. Countries scored relatively low on reducing the negative consequences of drinking and alcohol intoxication and very low in pricing policies, and scored generally high in the areas of leadership, awareness and commitment, drink–driving policies and countermeasures, and monitoring and surveillance. Further steps are needed to maintain reductions in alcohol-attributable harm, specifically in the implementation of evidence-based alcohol policies to decrease levels of per capita alcohol consumption and heavy episodic drinking.

KEYWORDS

ALCOHOL DRINKING – PREVENTION AND CONTROL
ALCOHOL DRINKING – ADVERSE EFFECTS
ALCOHOL-RELATED DISORDERS – PREVENTION AND CONTROL
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FOREWORD

Alcohol is one of the most commonly used psychoactive and dependence-producing substances in Europe. Despite being a major risk factor for burden of disease, with substantial impacts not only on individual drinkers but also on society at large, alcohol consumption in Europe continues to be almost double the global average.

In 2011, the WHO European Region adopted the European action plan to reduce the harmful use of alcohol 2012–2020 *(EAPA). Through collaboration with the European Commission, countries have been supported to collect data and ensure harmonization across key indicators described in the EAPA. This collaboration has contributed to strengthening of national monitoring systems for assessing changes in alcohol consumption and alcohol-related harms, identifying effective and ineffective policy measures and feeding into revisions of national alcohol-related plans and strategies.*

This report provides a snapshot of alcohol consumption, alcohol-related harm and alcohol policy responses in 30 European countries – European Union Member States, Norway and Switzerland (EU+). The report also summarizes changes in alcohol consumption and alcohol-related harm between 2010 and 2016.

While there were very welcome improvements in alcohol-related death rates between 2010 and 2016, the report shows that alcohol remains a major public health priority. More than 290 000 people died in 2016 due to alcohol-attributable diseases, and 7.6 million years of life were lost due to either premature mortality or disability.

We therefore should not be complacent.

As this report highlights, alcohol consumption in EU+ countries has stagnated. Reducing alcohol-related harm requires the implementation of effective and decisive alcohol policies, notably by adopting marketing controls, reducing access to alcohol and using taxation to affect consumption. Other measures, such as better and more informative labelling of alcoholic beverages and the implementation of screening and brief interventions in primary health care, are also important.

To make progress and reduce alcohol-attributable harm in European countries, it is important to significantly curb alcohol consumption and, especially, the prevalence of heavy episodic drinking. Cost-effective alcohol policies known as WHO "best buys", as cited in this report, will alleviate the societal costs attributable to alcohol consumption, the harm to people other than the drinker, and reduce inequities in alcohol harm. We therefore call upon all stakeholders to accelerate progress to achieve health-related Sustainable Development Goals.

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WHO Regional Director for Europe

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DATA SOURCES AND METHODS

The data sources and methods used in this report for presenting data on alcohol consumption, estimations of alcohol-attributable mortality and morbidity, and national status of alcohol policies are presented in the complementary online publication, ***Status report on alcohol consumption, harm and policy responses in 30 European countries 2019. Data sources and methods***, which can be accessed at the WHO Regional Office for Europe website.[1]

[1] Status report on alcohol consumption, harm and policy responses in 30 European countries 2019. Data sources and methods. Copenhagen: WHO Regional Office for Europe; 2019 (http://www.euro.who.int/en/alcoholSR2019data).

ABBREVIATIONS

AAF	alcohol-attributable fraction
APC	alcohol per capita consumption
BAC	blood alcohol concentration
CVD	cardiovascular disease
CI	confidence interval
DALY	disability-adjusted life-years
EAPA	European action plan to reduce the harmful use of alcohol 2012–2020
EU	European Union
EU+	countries of the European Union, Norway and Switzerland
GDP-PPP	gross domestic product at purchasing power parity
HED	heavy episodic drinking
ICD	International Classification of Diseases
SBI	screening, brief intervention
YLD	years lived with disability
YLL	years of life lost

EXECUTIVE SUMMARY

The WHO European Region continues to have the highest level of alcohol consumption per capita globally. Given this high average drinking level, the WHO European Region, including Member States that are part of the European Union (EU), has proportionately higher levels of burden of disease attributable to alcohol use compared to other regions.

The monitoring of changes in alcohol consumption, harm to health and development of public health policy are priorities for both the European Commission and the WHO Regional Office for Europe. This report is the most recent overview of alcohol consumption, alcohol-related harm and alcohol policy responses in 30 European countries (EU Member States, Norway and Switzerland) (EU+) in 2016. The report also summarizes changes in alcohol consumption and alcohol-related harm between 2010 and 2016, elaborating further on the possible causes of changes. The most important data source for alcohol-related information for all parts of the report is the WHO Global Survey on Alcohol and Health, the last iteration of which was conducted in 2016 in collaboration with all six WHO regional offices[2] and the European Commission (in countries of the EU).

Parts 1 and 2 of the report describe alcohol consumption as a risk factor for burden of disease in the EU+ countries. The methodology underlying the report is the same as that for the *Global status report on alcohol and health 2018 (1)* and is described in the *Data sources and methods source* (see "Data sources and methods", page viii). Table ES.1 lists countries in each geographical area considered in this report.

Table ES.1. Countries in each geographical area

Subregion	Countries
Western Europe	Ireland and the United Kingdom
Central–western Europe	Austria, Belgium, France, Germany, Luxembourg, the Netherlands, Slovenia and Switzerland
Central–eastern Europe	Czechia, Hungary, Poland and Slovakia
Eastern Europe	Bulgaria and Romania
Baltic countries	Estonia, Latvia and Lithuania
Mediterranean countries	Cyprus, France, Greece, Italy, Malta, Portugal and Spain
Nordic countries	Denmark, Finland, Norway and Sweden

Part 3 presents results on Members States' progress towards implementing the policy measures outlined in the *European plan to reduce harmful use of alcohol 2012–2020* (EAPA) *(2).* Responses were provided by Member States through relevant survey questions from the WHO 2016 Global Survey on Alcohol and Health and from the WHO 2014 Atlas on Substance Abuse questionnaire. The methodology is described in detail in the WHO publication *Policy in action – a tool for measuring policy implementation (3).*

Part 4 discusses the main findings and highlights the main conclusions of the report and implications for alcohol policy action in EU+ countries.

Alcohol consumption

Per capita alcohol consumption (APC) varied widely by country in 2016. In general, APC was lower in northern and southern European Member States and higher in the middle band of countries. Similar patterns were found for the prevalence of current drinkers and heavy episodic drinking.

In brief:

- adult (age 15+ years) APC was 11.3 litres of pure alcohol, comprising 9.9 litres recorded alcohol and 1.4 litres unrecorded alcohol, equivalent to an average of more than 170 grams of alcohol per week;
- on average, men consumed 18.3 litres of pure alcohol and women 4.7 litres, meaning the average level of drinking was nearly four-fold higher in men;

[2] WHO regional offices for Africa, the Americas, Europe, the Eastern Mediterranean, South-East Asia and the Western Pacific.

- the gap between women and men for APC and current drinker prevalence was greatest in people over 65; the prevalence gender gap was greater in Mediterranean and eastern European countries compared to the remaining EU+ countries, and per capita consumption peaked in women among 20–24-year-olds and in men among those aged 35–49;
- the prevalence of current drinkers (that is, people who reported drinking alcohol within the last 12 months) was 72% (61.4% women; 83.3% men);
- APC in current drinkers was 15.7 litres of pure alcohol (7.7 litres for women and 21.9 litres for men), which is equivalent to an average weekly intake of about 240 grams of alcohol; and
- the prevalence of heavy episodic drinking (60+ grams of alcohol on at least one occasion during past 30 days) was 30.4% (14.4% among women; 47.4% among men).

Between 2010 and 2016:

- APC decreased from 11.5 to 11.3 litres of pure alcohol (in the EU+), a proportional drop of 1.5% that was not statistically significant when accounting for measurement errors;
- there was wide variability in changes in APC of pure alcohol across EU+ countries, with 17 countries reporting overall decreases and 13 overall increases (the decrease was most significant in Nordic and Mediterranean countries);
- APC in the age group 15–19 decreased from 7.2 litres to 7.0 litres of pure alcohol; the percentage of current drinkers also decreased in this age group from 64.9% in 2010 to 61.4% in 2016;
- APC in the age group 20–24 decreased from 12 litres to 11.7 litres of pure alcohol; the percentage of current drinkers also decreased in this age group from 78.6% in 2010 to 75.9% in 2016;
- the gender gap in consumption widened, with a greater decline for women (–6.2%) than men (–2.8%) in the proportion drinking within the past year;
- the prevalence of current drinkers decreased from 75.3% to 72.0%, a statistically significant proportional drop of 4.3%;
- the average intake of pure alcohol among current drinkers increased from 15.2 to 15.7 litres, a proportional increase of 2.9% that was not statistically significant when accounting for measurement errors; and
- the prevalence of heavy episodic drinking decreased from 34.1% to 30.4%, a statistically significant proportional drop of 10.7%; observed reductions of heavy episodic drinking patterns in EU+ countries seem, however, to have come to a halt.

Alcohol-related health and social harm

There was large variation across countries in overall alcohol-attributable health and social harm in 2016, similar to the variation in adult APC. People of low socioeconomic status across a number of European countries had a three-fold mortality risk for causes of death fully attributable to alcohol use compared to people with high socioeconomic status. Both APC and alcohol-attributable years of life lost (YLL) were lowest in Nordic and Mediterranean countries, with the exception of Portugal.

In brief:

- overall in 2016, 5.5% of all deaths in the EU+ were caused by alcohol; in absolute numbers, 291 100 people died due to alcohol consumption in 2016;
- alcohol-attributable deaths were largely due to cancer (29% of alcohol-attributable deaths), liver cirrhosis (20%), cardiovascular disease (19%) and injury (18%);
- 19.0% of all deaths in the 15–19 years age group were alcohol-attributable, meaning about every fifth death in this group was caused by alcohol;
- the proportion in the 20–24 years age group was 23.3%, meaning that about every fourth death was caused by alcohol;
- overall in 2016, alcohol use caused 8.3% of the YLL in the EU+, representing 7.6 million years lost prematurely because of alcohol consumption;
- alcohol-attributable YLL rates in 2016 were affected by the same major influencing factors that impacted on mortality rates: average level of alcohol consumption, prevalence of heavy episodic drinking, rates of all-cause mortality, and the wealth of countries as measured in gross domestic product at purchasing power parity;
- alcohol-attributable YLL made up a larger proportion of all YLL (8.3%) in 2016 than the proportion of alcohol-attributable deaths of all deaths (5.5%);
- alcohol-attributable deaths happened relatively early in the life-course, mainly due to injury: on average, premature death due to alcohol use involved a loss of 26.1 life years (women: 21.2 years; men: 27.5 years);

- overall, more than 10.3 million disability-adjusted life-years (DALYs) were attributable to alcohol use in 2016, either because of premature death or due to living with a disability;
- injuries and alcohol-use disorders made up 93% of all alcohol-attributable years lived with disability in the EU+ in 2016;
- men are more affected than women in relation to alcohol-attributable disease burden, by a ratio of about 3.5 : 1; and
- the impact of alcohol use depends on various risk factors such as tobacco use, diet and nutrition, inequality, poverty and other economic conditions, as well as on the health-care system; these factors resulted in different mortality burdens per litre of pure alcohol per capita in different countries.

Between 2010 and 2016:

- the absolute number of alcohol-related deaths in the EU+ decreased by 3%, from 300 900 to 291 100;
- there was wide variability in changes in alcohol-related harm by country, with no consistent pattern emerging; the alcohol-attributable fraction (AAF) for alcohol-related deaths decreased from 6.0% to 5.5%, a 7.9% proportional reduction;
- the age-standardized alcohol-attributable death rate decreased from 35.5/100 000 to 30.5/100 000, a proportional 14.1% reduction;
- the age-standardized alcohol-attributable death rate decreased by 31% and 30% for adolescents and young adults, respectively;
- the absolute number of alcohol-attributable YLL decreased by 11%, from 8.6 million to 7.6 million;
- the AAF for alcohol-related YLL decreased from 9.2% to 8.3%, a 9.6% proportional reduction;
- the age-standardized alcohol-attributable YLL rate decreased from 1234/100 000 to 1016/100 000, a proportional 17.6% reduction;
- the reduction in the age-standardized alcohol-attributable YLL rate contributed to the overall reduction of YLL rates in Europe over the last half decade;
- the absolute number of alcohol-attributable DALYs decreased by 9.6%, from 11.4 million to 10.3 million;
- the AAF for alcohol-related DALYs decreased from 7.5% to 6.8%, a 9.4% proportional reduction;
- the age-standardized alcohol-attributable DALY rate decreased from 1704/100 000 to 1468/100 000, a proportional 13.9% reduction; and
- there is still a clear west–east gradient, with the largest AAFs, alcohol-attributable mortality and DALYs in the eastern part of the EU+.

Causes of changes in alcohol-related health and social harm

Age-standardized death rates for all causes of death in EU+ countries decreased by 9% between 2010 and 2016. This decrease is the largest driver of the 14.1% decrease in age-standardized death rates for alcohol-related causes of death. Reductions in alcohol-attributable YLL and DALY rates were also observed, contributing to the overall reduction of YLL and DALY rates in Europe and impacting on life expectancy.

Socioeconomic inequalities are an important determinant of diminished life expectancy. At the same time, trends in alcohol-attributable mortality are greatly impacted by trends in overall mortality; if the death rates on which alcohol operates go down, alcohol-related death rates inevitably will also go down, even if there is no change in alcohol consumption. This means that the observed changes seem to be driven mostly by overall improvement in health and health care for the EU+ population rather than by reduction in prevalence of heavy episodic drinking and alcohol consumption in current drinkers.

A comparison between 2010 and 2016 suggests that the observed reductions of heavy episodic drinking patterns in EU+ countries seem to have come to a halt. This means that countries cannot continue to rely on the favourable trends to continue without taking any further steps toward better controlling alcohol consumption in the future through implementation and enforcement of evidence-based policies.

Alcohol policies

Alcohol policies in EU+ countries in 2016 were assessed using the WHO tool for measuring alcohol policy implementation in the 10 areas defined in the EAPA. The results showed huge variability across the countries for all 10 policy areas, indicating possibilities for large areas of improvement.

In brief:

- there were three areas for which Member States as a whole scored more than two thirds of the total possible policy score (based on the mean): leadership, awareness and commitment (area 1); drink–driving policies and countermeasures (area 4); and monitoring and surveillance (area 10);
- there were two areas for which Member States as a whole scored less than one third of the total possible policy score (based on the mean): pricing policies (area 7); and reducing the negative consequences of drinking and alcohol intoxication (area 8);
- regarding implementation of the three WHO "best buys" policy measures to reduce noncommunicable diseases (availability, advertising and pricing):
  - for availability, area 5, the range in scores was wide, with no country scoring in the top decile and three scoring in the bottom decile;
  - for marketing, area 6, scores ranged across all 10 deciles, with few countries employing a complete ban across all media;
  - the area of pricing polices (area 7) was the worst performer, with only five countries adjusting the price of beer and spirits for inflation, and only three adjusting the price of wine;
- within area 8, reducing the negative consequences of drinking and alcohol intoxication, only two countries had a legal requirement for warning labels on bottles or containers; and
- in area 2, health services' response, which was completed by only 18 of 30 countries, countries were unable to provide data on the proportion of primary health-care services implementing screening and brief advice programmes to reduce harmful use of alcohol.

Conclusions

The WHO European Region is the region with the highest alcohol consumption. The level of consumption has not changed in the EU+ since 2010. While there is some improvement in alcohol-attributable mortality and harm, alcohol-attributable burden of disease and mortality in the EU+ is still at a high level, and the decreases in deaths from 301 000 in 2010 to 291 000 in 2016 cannot be seen as real success. The highest proportion of alcohol-attributable deaths was found in young adults.

Overall, there seem to be encouraging signs of alcohol policy development in some countries, which have resulted in larger decreases in alcohol-attributable burden in these countries than neighbouring countries without such policies. To be able to maintain reductions in alcohol-attributable health and social harm, EU+ countries need to accelerate progress in the implementation of evidence-based alcohol policies to decrease levels of APC and harmful drinking patterns. This means that well proven evidence-based policy measures, such as better regulation and control of marketing, reduced availability and accessibility to alcoholic beverages and use of taxation to reduce their affordability, and the implementation of screening and brief interventions at primary health-care level need to be further strengthened.

References[3]

1. Global status report on alcohol and health 2018. Geneva: World Health Organization; 2018 (http://apps.who.int/iris/bitstream/handle/10665/274603/9789241565639-eng.pdf?ua=1).
2. European action plan to reduce the harmful use of alcohol 2012–2020. Copenhagen: WHO Regional Office for Europe; 2012 (http://www.euro.who.int/__data/assets/pdf_file/0008/178163/E96726.pdf).
3. Policy in action – a tool for measuring alcohol policy implementation. Copenhagen: WHO Regional Office for Europe; 2017 (http://www.euro.who.int/__data/assets/pdf_file/0006/339837/WHO_Policy-in-Action_indh_VII-2.pdf).

[3] All weblinks accessed 12 February 2019.

PART 1

ALCOHOL CONSUMPTION AS A RISK FACTOR FOR BURDEN OF DISEASE IN THE EUROPEAN UNION, NORWAY AND SWITZERLAND

BACKGROUND

Alcohol consumption has been established as one of the major risk factors for global burden of disease and mortality *(1–3).* Given the high average level of consumption, the WHO European Region, including the European Union (EU), has proportionately higher levels of burden of disease attributable to alcohol use compared to other regions *(3).*

Alcohol-attributable burden can be described in two ways: first, as the proportion of health burden, usually measured either in number of deaths, or years of life lost (YLL), or disability-adjusted life-years (DALYs) caused by alcohol exposure (for instance, 9.9% of all female breast cancer deaths in the countries of the EU, Norway and Switzerland (EU+) in 2016 were due to alcohol[1]). Such proportions can be calculated with the usual attributable fractions approach based on Levin's classic work in the 1950s *(4–7).* Alternatively, alcohol-attributable burden can be expressed by alcohol-attributable population rates of burden indicators (in 2016 in the EU+, for example, 1.9 women per 100 000 died of alcohol-attributable breast cancer). In the former statistic of attributable fractions, the EU would be among the higher regions globally. In the latter statistic of attributable burdens, the EU would be surpassed by many regions that have lower alcohol consumption and proportionally lower alcohol-attributable fractions, but much higher rates of causes of death affected by alcohol, as in some middle-income countries *(3).*[2] Alcohol-attributable rates of mortality and burden of disease in EU+ countries are therefore lower than the global average.

Given the high burden of disease attributable to alcohol use, a global monitoring and surveillance system for this risk factor was established *(8).* Data from this system are regularly updated as part of the World Health Statistics *(9),* based on the global monitoring frameworks for noncommunicable disease *(10)* and for monitoring the targets of the United Nations Sustainable Development Goals *(11).* This report is part of the monitoring for alcohol use and health and social harm in the WHO European Region. It follows the reports on alcohol use, harm and policy in the EU from 2012 and 2013 *(12,13)* and trend analyses from 1990–2014 on alcohol and harm in the Region in which the EU was one of the regions reported *(14).*

Socioeconomic inequalities are an important determinant of diminished life expectancy. Over the past several years, for example, life expectancy in the United States of America has been stagnating and even slightly decreasing *(15,16).* This development can be explained in part by increasing mortality rates from causes of death such as suicide, liver cirrhosis and overdoses from psychoactive substances. These causes, which Case & Deaton have termed "deaths of despair", are closely linked to alcohol and other substance use *(17).* Increases in mortality rates and, in particular, for "deaths of despair" were highest in populations with low socioeconomic status *(17).* Overall, the evidence suggests that the joint effect of alcohol use and low socioeconomic status has contributed to the disconcerting developments in life expectancy in the United States *(18,19)*; this effect is probably more than just the addition of both factors (that is, an interaction).

Such socioeconomic differences are also observed for causes of death attributable to alcohol use across a number of countries, including some in Europe *(20–22).* Particularly large differences in alcohol-attributable mortality have been found in eastern–central and Baltic countries, and in Denmark and Finland. People of low socioeconomic status across a number of European countries had a three-fold mortality risk for causes of death fully attributable to alcohol use compared to people with high socioeconomic status. This socioeconomic inequality was higher than for other causes of death *(23).*

Looking at developments over the past years shows that, fortunately, all-cause mortality rates have continuously declined for all socioeconomic strata in a number of European countries *(24,25).* In some EU+ countries, however, mortality rates from causes of death fully attributable to alcohol use have increased among people with low socioeconomic status *(22).* Consequently, socioeconomic inequalities in fully alcohol-attributable deaths have widened. Alcohol-attributable mortality already explains 10% of the total socioeconomic inequalities in mortality in some EU+ countries *(22).*

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[1] This proportion is usually called the alcohol-attributable fraction (AAF). Formally, AAFs are used to express the extent (quantify the proportion) to which alcohol use contributed to a health outcome, such as number of deaths, YLL or burden of disease as measured in DALYs. It is calculated against the counterfactual scenario of no alcohol use in the past (see the *Data sources and methods* source (see "Data sources and methods", page viii) on the methodology for burden estimation).

[2] As indicated above, alcohol-attributable rates of mortality are based on two components: first, the level of mortality; and second, the level of alcohol consumption. High-income countries such as those in the EU have lower levels of mortality due to a number of factors, including better living circumstances, fewer risk factors and better health-care systems.

In relation to economic developments, there are some indications that income inequalities – the extent to which income is distributed in an uneven way across the population – are rising in Europe *(26).* An examination of alcohol use and attributable harm for the EU+ is therefore timely to determine how these developments have affected overall trends in mortality and what developments can be expected for the future.

ALCOHOL CONSUMPTION IN THE EU+ IN 2016 AND TRENDS SINCE 2010

Key indicators of alcohol consumption in the EU+ countries (total number of countries: N = 30) are shown in Table 1. In 2016, adults (aged 15 and above (15+)) across all countries consumed 11.3 litres of pure alcohol per capita (women: 4.7 litres; men: 18.3 litres), 9.9 litres of which were consumed in the form of recorded alcohol and 1.4 litres in the form of unrecorded alcohol.

Table 1. Alcohol exposure indicators in EU+, 2016 and 2010

		2016			2010			Proportional change (%)		
		Women	Men	Total	Women	Men	Total	Women	Men	Total
APC[a] in litres pure alcohol	Total	4.7 (4.4–5.0)	18.3 (17.3–19.3)	11.3 (10.7–11.9)	4.9 (4.7–5.2)	18.4 (17.5–19.4)	11.5 (10.9–12.0)	-4.5	-0.8	-1.5
	Recorded	4.1	16	9.9	4.4	16.6	10.3	-7.0	-3.4	-4.2
	Unrecorded	0.6	2.3	1.4	0.5	1.8	1.1	18.6	23.3	22.3
Total APC among drinkers		7.7 (7.2–8.1)	21.9 (20.7–23.1)	15.7 (14.8–16.5)	7.5 (7.1–7.9)	21.5 (20.4–22.6)	15.2 (14.4–16.0)	1.8	2.1	2.9
Lifetime abstainer (%)		17.5 (15.3–20.0)	5.7 (4.9–6.7)	11.8 (10.2–13.5)	16.8 (14.8–19.1)	5.4 (4.7–6.3)	11.3 (9.9–12.9)	3.9	4.6	4.0
Current drinkers (%)		61.4 (58.3–64.4)	83.3 (81.4–85.1)	72 (69.5–74.4)	65.4 (62.7–68.1)	85.7 (84.2–87.1)	75.3 (73.1–77.3)	-6.2	-2.8	-4.3
Heavy episodic drinking[b] (%)		14.4 (12.7–16.3)	47.4 (44.1–50.6)	30.4 (27.9–32.9)	17.2 (15.2–19.3)	52 (48.7–55.2)	34.1 (31.4–36.7)	-16.0	-8.9	-10.7

Note: numbers in parentheses refer to 95% confidence intervals (CI).
[a] APC = alcohol per capita consumption, in litres of pure alcohol per adult (15+).
[b] Heavy episodic drinking is defined as the percentage of all adults (15+) with at least one occasion with a minimum intake of 60 grams of pure alcohol in the past 30 days.

Unrecorded alcohol is not taxed in the country where it is consumed because it is usually produced, distributed or sold outside the formal channels under government control *(3).* There are several sources for unrecorded alcohol, which can be legally or illegally produced, sold and purchased. In EU+ countries, this is a large heterogeneous group of different products that vary between, and within, countries. Four broad categories of unrecorded alcohol can be distinguished: 1) homemade alcoholic beverages (legal and illegal); 2) illegally produced alcohol and/or counterfeit alcoholic products, or informally produced alcohol that was not declared to state authorities to avoid taxation; 3) alcoholic products not or not officially intended for human consumption, but consumed as surrogate alcohol (such as medicinal or cosmetic alcohols); and 4) alcohol that is brought across the border (smuggled or legally brought, but registered in another jurisdiction).

This report uses a mix of indirect and direct assessment methods as well as expert judgement to estimate consumption of unrecorded alcohol (see the *Data sources and methods* source for information on the methodology of estimation and Box 1 for the methods of estimating unrecorded alcohol consumption). The current estimate for EU+ countries is 1.4 litres of unrecorded alcohol per capita, making up about 12% of total alcohol per capita (see Table 1).

Box 1. How can unrecorded alcohol consumption be estimated?

By its very nature, unrecorded alcohol consumption is difficult to measure as it evades governmental control and monitoring. There are various assessment methods that use different indicators and which have different advantages and limitations, depending on the context and the subtype of unrecorded alcohol.

Direct assessment methods are individual-level screenings and surveys, which include other important demographic indicators about the individual (sex, age, socioeconomic status), but are prone to the usual biases that affect survey responses. The most important biases in this case are: 1) selection bias – many surveys do not include special populations in which consumption of unrecorded alcohol (and alcohol in general) is over-proportionally high, such as homeless or institutionalized people; 2) recall bias – respondents tend to forget their actual alcohol intake, regardless of whether recorded or not; and 3) social desirability bias – which is closely connected to the stigmatization of problematic drinking behaviours and consumption of at least certain types of unrecorded alcohol. All three factors contribute to a substantial underreporting of drinking levels in surveys and screenings, which leads to the need for adjustment.

Indirect assessment methods encompass different estimation techniques, which are based on indirect indicators that are related to unrecorded alcohol consumption. In most cases these are routine data commonly collected by national statistical services or other institutions, such as records on cultivated vineyard areas, sugar sales or records of produced ethanol for medicinal purposes, and customs and police records on smuggled or counterfeit alcohol. Further indicators can be alcohol-related problems such as alcohol-attributable mortality or 100% alcohol-attributable conditions, such as alcoholic psychoses or poisonings. Such aggregate-level estimates, however, can be very inaccurate as they are based on assumptions and allow for many confounding factors that cannot properly be controlled. They further require elaborated statistical modelling, as indicators cannot be used in the initial form.

Finally, different techniques of expert judgement exist that can be utilized to produce estimates of unrecorded alcohol consumption. Besides the usual social and cognitive biases in judgement, conflict of interest is one of the biggest challenges connected to expert estimates.

TRENDS IN ALCOHOL USE BETWEEN 2010 AND 2016 IN EU+ COUNTRIES

Recorded alcohol consumption decreased in EU+ countries by 4.2% (–0.4 litres per capita) between 2010 and 2016, while unrecorded alcohol consumption increased by +22.3% (+0.3 litres per capita). Total alcohol per capita consumption (APC) in the EU+ in 2016 was 11.3 litres of pure alcohol (men: 18.3; women: 4.7), compared to 11.5 litres in 2010.

Variations in trends of APC at country level were large (17 countries increasing and 13 countries decreasing) and the overall trend of –0.2 litres per capita in the adult population was not significant when measurement errors were accounted for (proportional reduction = –1.5%). The reduction of recorded alcohol use in EU+ countries could mainly be attributed to decreasing use of wine (–0.2 litres; –4.9%) and spirits (–0.2 litres; –7.3%) and, to a lesser extent, to beer (–0.05 litres; –1.3%) and other beverages (–0.03 litres; –14.1%).

The proportion of current (past-year) drinkers in the EU+ decreased between 2010 and 2016 (–4.3%), with more pronounced declines among women (–6.2%) than men (–2.8%). Because of the decline in the prevalence of current drinkers, the average alcohol intake among drinkers in the EU+ increased by +2.9% (women: +1.8%; men: +2.1%). The average intake of pure alcohol among drinkers in 2016 added up to 15.7 litres per year, or 34 grams per day – the equivalent of three standard drinks.[3] In parallel with the prevalence of current drinking, the prevalence of heavy episodic drinking (HED) patterns (at least one occasion with an intake of at least 60 grams of pure alcohol in the past 30 days) decreased by –10.7% (women: –16.0%; men: –8.9%).

Trends in the entire WHO European Region

Total APC for the entire WHO European Region in 2016 was 9.8 litres of pure alcohol (men: 16.0; women: 4.2) *(3).* Decreasing levels of recorded per capita consumption were more pronounced in the entire WHO European Region (–1.1 litres; –12.2%)

[3] As a rough guide, a standard drink contains about 10–12 grams of pure alcohol, but some restaurants and bars serve larger drinks than the standard. Differences also exist in the assumed size and strength of a standard drink across European countries *(27).*

compared to EU+ countries alone, and all subcategories decreased. The largest decreases were recorded for beer (–0.3 litres; –8.6%) and spirit use (–0.5 litres; –17.6%).

Different trajectories are observed between EU+ and WHO European Region countries in relation to unrecorded alcohol use. Per capita consumption of unrecorded alcohol increased by +22.3% (+0.3 litres) in EU+ countries between 2010 and 2016, while it fell by –12.8% (–0.3 litres) in WHO European Region countries.

Fig. 1 displays the disaggregated trajectory of recorded alcohol use by beverage type for EU+ and all WHO European Region countries (N = 50; all Member States with the exception of Andorra, Monaco and San Marino).

Country-level alcohol consumption

Overall, there is high variability in the level of alcohol consumption between EU+ countries (Fig. 2).[4] The general picture in 2016 shows lower consumption in the northern and southern part of the EU+ (lowest per capita consumption in Norway and Italy with 7.5 litres adult APC), with the highest level of consumption in a middle belt starting from Ireland and stretching to Romania in the south-east and the Baltic countries in the north-east. A similar pattern was found in 2010. Over time, average alcohol consumption in all northern European and most southern European countries tended to decrease, while average alcohol consumption tended to increase in the middle belt, resulting in a slightly larger variability of alcohol consumption in EU+ countries in 2016 than in 2010. Over longer time periods, it seems that the prior convergence of drinking levels within the EU seems to have come to an end, although the reasons for this are not entirely clear.

Fig. 1. APC among adults (15+) between 2010 and 2016, by region and beverage type

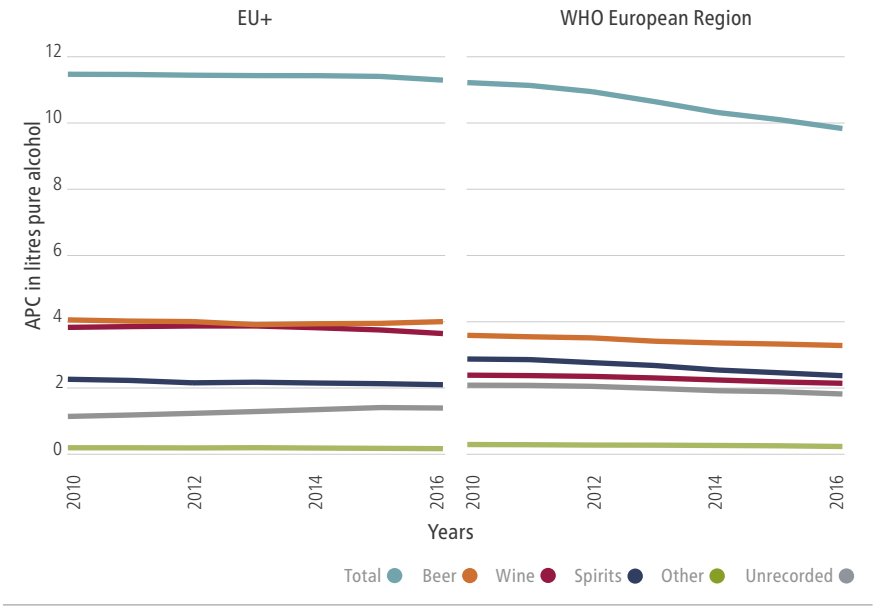
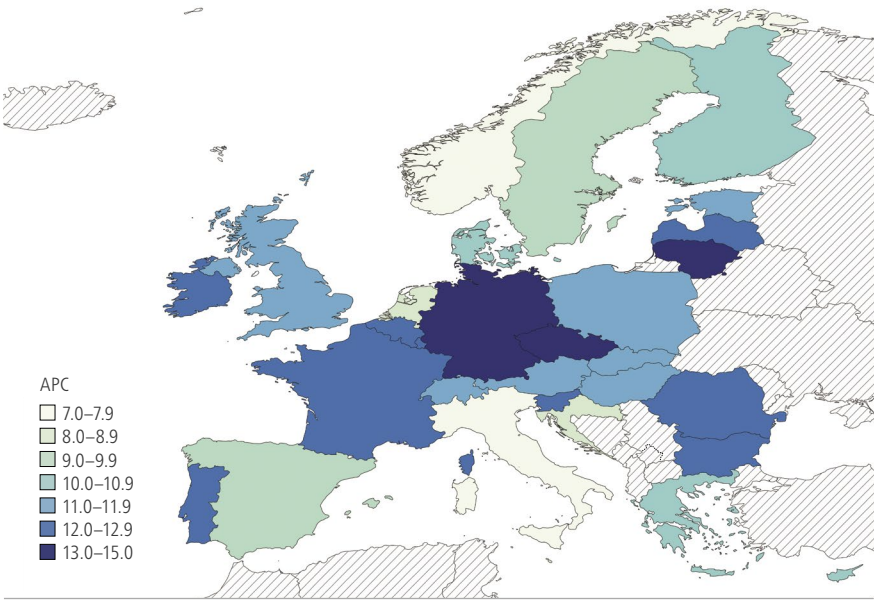


Fig. 2. APC among adults (15+) in EU+ in litres of pure alcohol, 2016



CURRENT DRINKERS

The geographic patterns of prevalence of current drinking (defined as the proportion of adults aged 15+ with at least one alcohol intake occasion in the past 12 months) in

[4] While there was high variability in drinking levels between countries in 2016, this variability had decreased markedly since 1990. The variance of adult APC between EU countries decreased from 8.3 litres in 1990, to 6.0 litres in 2000, to 3.4 in 2010. Variance is a statistical concept which measures deviations from the average, in this case from the average level of alcohol consumption. The dramatic average decrease of variance in EU countries indicates that the overall level of alcohol consumption became increasingly similar in this region.

Fig. 3. Current drinker prevalence (proportion of adults aged 15+ with at least one alcohol intake occasion in the past 12 months) in EU+ countries, 2016

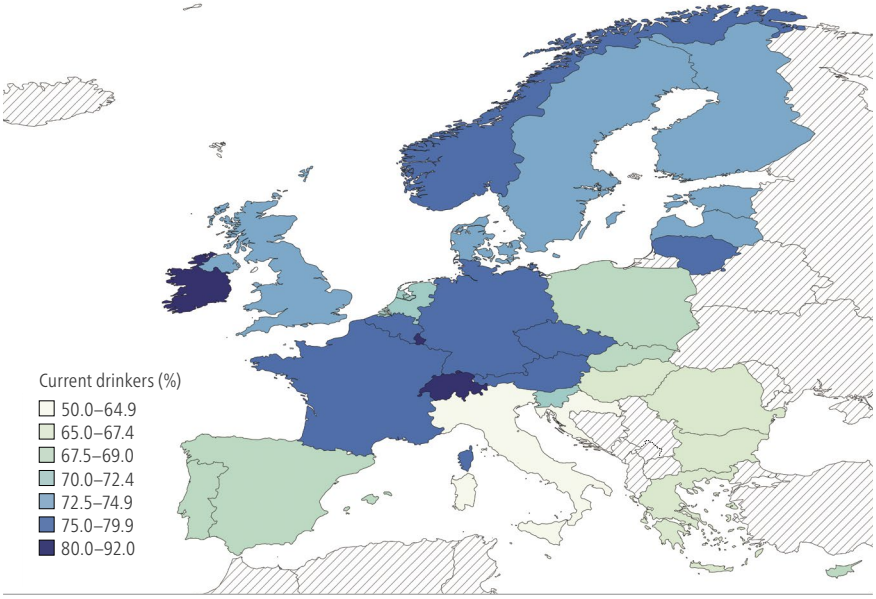
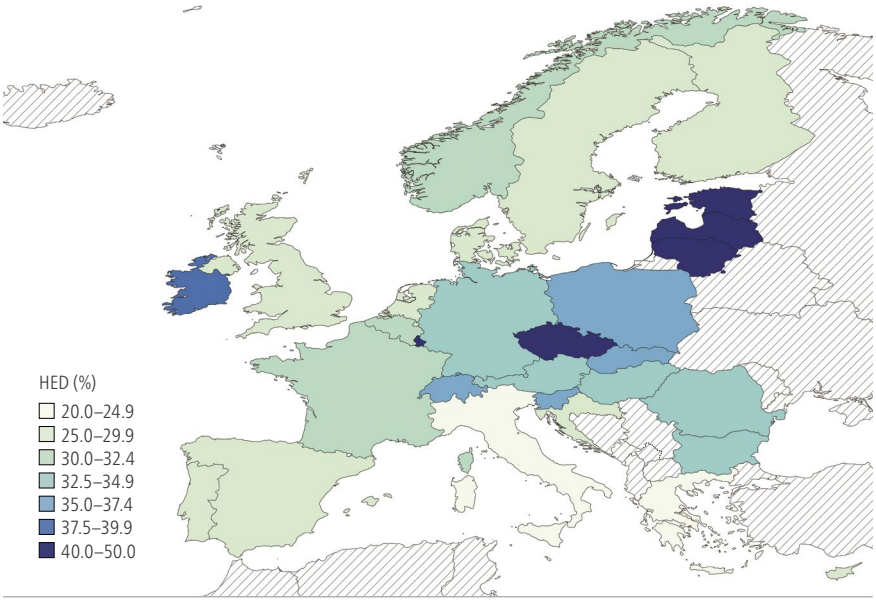


Fig. 4. Prevalence of HED (defined as the percentage of all adults 15+ with at least one occasion with a minimum intake of 60 g pure alcohol in the past 30 days) in EU+ countries, 2016



2016 are displayed in Fig. 3. The prevalence of current drinking in the EU+ as a whole has declined, with reductions in most countries, albeit to different degrees. Only in Latvia has past-year drinking become more prevalent (increased from 72.6% to 75.0%). In contrast, the prevalence of current drinking was above the EU+ average (72%) in most countries in the central–western, Nordic and Baltic subregions.

HEAVY EPISODIC DRINKING

Country-level variations in HED in 2016 are shown in Fig. 4. HED is defined as the percentage of all adults (15+) with at least one occasion with a minimum intake of 60 grams of pure alcohol in the past 30 days. Patterns of HED among the adult population are most prevalent in Germany, Luxembourg, Czechia, Slovenia and the Baltic countries, while it is least prevalent in Mediterranean countries.

Overall, HED has become less prevalent in 29 of the 30 countries of the EU+, the exception being Latvia (increased from 42.8% to 44.3%). The trend for the EU+ showed a significant decline. By sex, the prevalence of adults with HED patterns followed the same trends, with annual reductions amounting to –0.4% ($p < 0.001$) and –0.6% ($p < 0.001$) for females and males, respectively.

COUNTRY-LEVEL TRENDS

Changes in adult APC between 2010 and 2016 at country level are shown in Fig. 5.

Substantial variations in changes in per capita consumption of pure alcohol between 2010 and 2016 were observed across EU+ countries, with 17 reporting overall decreases and 13 overall increases. The largest absolute declines in per capita consumption were observed in Romania (–2.4 litres), Croatia (–2.3 litres) and Finland (–1.9 litres). Countries with the largest growth in per capita consumption were Latvia (+1.3 litres), Slovenia (+1.2 litres) and Malta (+1.1 litres).

Disaggregating per capita consumption to its constituent parts – recorded, unrecorded and tourist consumption[5] – shows

[5] Tourist consumption was calculated for each country, contrasting the alcohol use of inbound tourists with that of outbound tourists. Values greater than zero indicate that the population from a given country drank more abroad than tourists coming to their home country.

that for most countries, total alcohol consumption was mainly impacted by recorded and unrecorded consumption, while the level of tourist consumption was negligible. Estonia was an exception to this, with meaningful changes in tourist consumption (–1.8 litres) offsetting increases in both unrecorded and recorded per capita consumption and resulting in a decrease in total alcohol consumption (–0.8 litres).

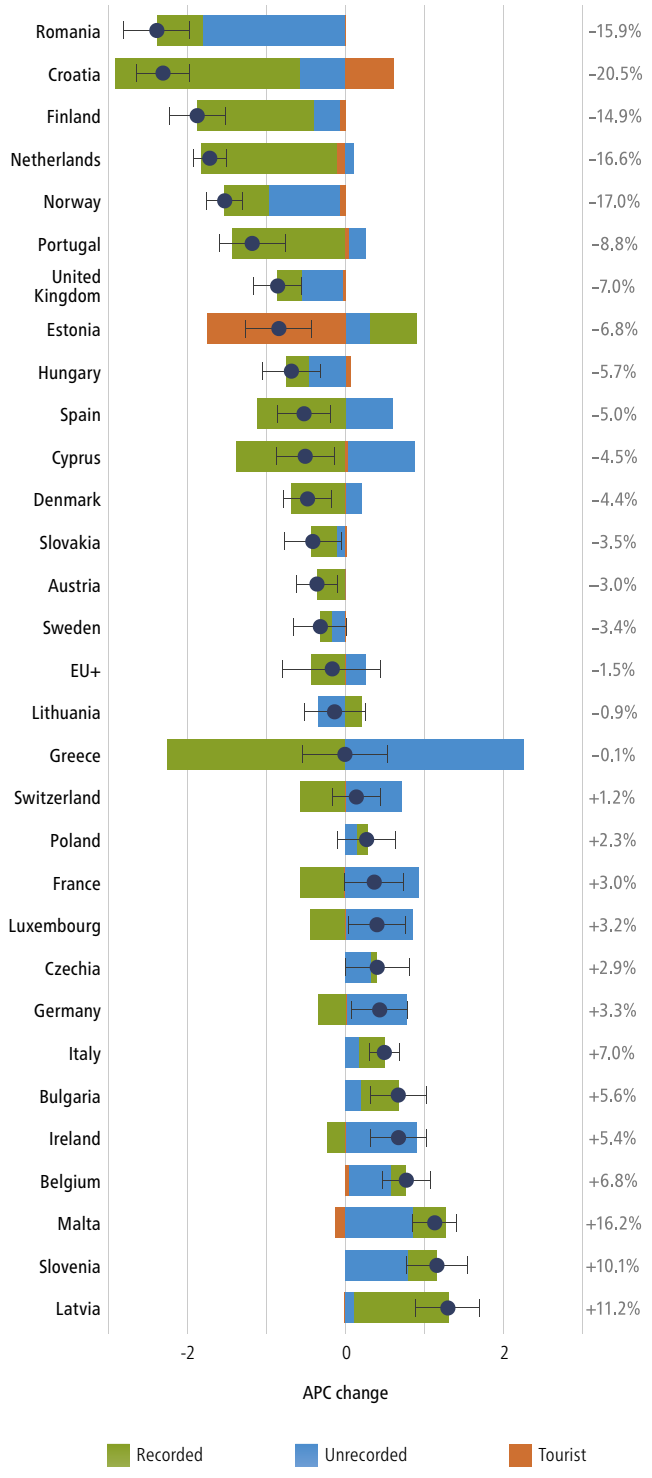
Changes in both recorded and unrecorded consumption followed the same direction as changes in total consumption in most EU+ countries. Notable exceptions were Spain, Cyprus and Greece, where reductions in recorded alcohol consumption were substantially counterbalanced by increases in unrecorded alcohol consumption. There were no substantial changes in tourist consumption in most of the countries except, as mentioned above, for Estonia, where tourist consumption decreased by 1.8 litres, and Croatia, where it increased by 0.6 litres.

AGE DIFFERENCES

Overall, changes in adult APC in EU+ countries were not uniform across sex and age. Across the lifespan, alcohol use peaks among 35–49-year-olds (per capita consumption 13.4 litres) but is lowest among the youngest (15–19-year-olds: per capita consumption 7.0 litres) and oldest age groups (65 years and older: per capita consumption 8.5 litres). APC in males follows a similar distribution across the lifespan (peaking among 35–49-year-olds at 21.4 litres; for all males, it is 18.3 litres) while per capita consumption in females peaks earlier in life (peaking among 20–24-year-olds at 5.7 litres; for all females, it is 4.7 litres).

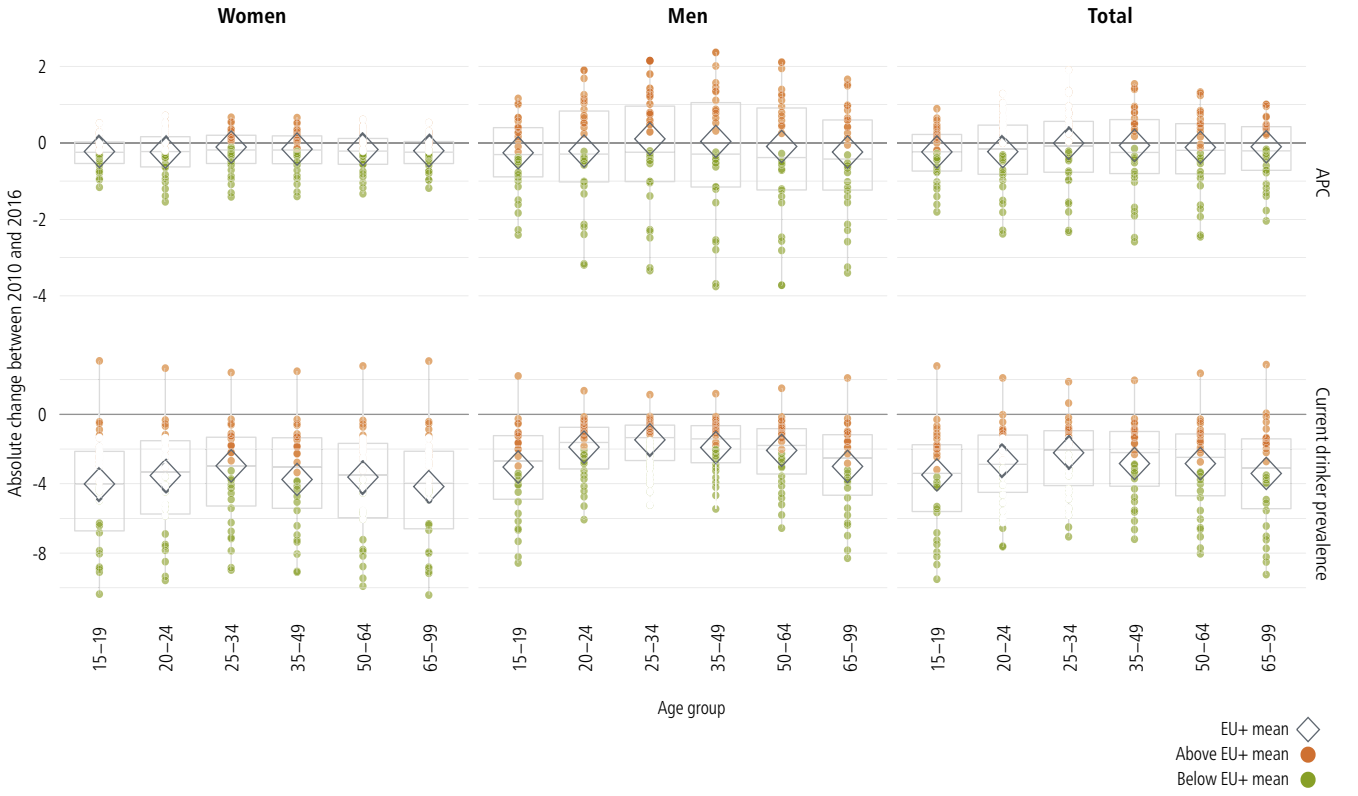
Fig. 6 summarizes changes in per capita consumption and prevalence of current drinkers between 2010 and 2016 by age and sex. Average per capita consumption between 2010 and 2016 fell by –0.2 litres (–3.3%) among 15–19-year-olds (from 7.19 to 6.98 litres) and by –0.2 litres (–1.9%) among 20–24-year-olds (from 11.97 to 11.74 litres). In all other age groups, per capita consumption decreased less than the adult average (–1.5%). In relation to the prevalence of past-year drinkers, reductions were observed across all age groups, with the most pronounced decreases recorded among 15–19-year-olds (–5.4%) and those over 65 (–5.3%). Changes in prevalence of current drinking were below the adult average (–4.3%) in all other age groups.

Fig. 5. Adult APC between 2010 and 2016 by country and across all EU+ countries.



Note: round dots represent the change in total APC along with the CIs (thin bars with whiskers to the left and right of the dot).

Fig. 6. Changes in APC among adults (15+) and prevalence of current drinkers between 2010 and 2016 by age and sex displayed as boxplots[a] (covering 50% of the estimates)



[a] Within the boxplots, horizontal lines refer to the EU+ median. The rhomboids represent the EU+ mean and each dot along the vertical line denotes one country estimate.

GENDER DIFFERENCES

The average level of drinking in 2016, measured in APC, was nearly four-fold among men compared to women in the adult population (men-to-women ratio: 3.9 : 1). The gap was greatest in older age groups (the maximum men-to-women ratio among those older than 65 was 4.2 : 1) and smallest among adolescents and young adults (the minimum among 15–19-year-olds was 3.0 : 1). A similar sex pattern across the lifespan was also observed with current-drinker prevalence, which was consistently higher among men compared to women across all age groups (a men-to-women ratio of 1.4 : 1). The largest gaps were recorded among the youngest (15–19-year-olds: 1.5 : 1) and the oldest (65 and over: 1.5 : 1) age groups and the narrowest gap between women and men was found in young adults (25–34-year-olds: 1.2 : 1).

The prevalence of current drinking tended to be below the EU+ average (72%) in Mediterranean and eastern European countries, with indications that this effect is in part due to higher rates of abstinence in women in these countries. This is also reflected in a higher sex ratio of male-to-female drinkers in Mediterranean and eastern European countries (ratio: 1.47 : 1 male prevalence: 78.4%; female prevalence: 53.2%) compared to the remaining EU+ countries (ratio: 1.31 : 1 male prevalence: 85.4%; female prevalence: 64.7%).

PART 2

ALCOHOL-ATTRIBUTABLE BURDEN OF DISEASE AND INJURY IN EU+ COUNTRIES

BACKGROUND

Alcohol is a unique risk factor for morbidity and mortality as it has two dimensions of exposure – the average level of consumption and patterns of drinking – that need to be taken into consideration when estimating attributable harm *(28–30)*. It is also unique by virtue of the sheer number of diseases with which it is associated: more than 230 three-digit disease and injury codes described in the International Statistical Classification of Diseases and Related Health Problems (ICD), 10th Revision *(31,32)* alone would fulfil causal criteria, including infectious diseases, noncommunicable diseases and injuries. Not all of the disease codes can be captured in this part: comparable burden estimates exist only for a limited number of disease codes, and smaller categories, such as "alcohol-induced pseudo-Cushing's syndrome", cannot be captured (for more details, see Rehm & Imtiaz *(1)* and the *Data sources and methods* source for the methodology for burden estimation).

This part outlines the country and EU-wide impacts of alcohol on health, including estimates of harm to others by alcohol in road injuries (for harm to others, see Laslett et al. *(33)*). The numbers of deaths, YLL and DALYs lost in 2016 through alcohol use were estimated by comparing the risks of mortality and morbidity to these same risks under a counterfactual scenario *(34)* in which there was no historical consumption of alcohol (that is, the number of deaths and DALYs lost that would not have occurred in the absence of alcohol use).

CHANGES IN UNDERSTANDING OF HEALTH CONSEQUENCES OF ALCOHOL USE RESULTING IN CHANGES OF METHODOLOGY

This report uses the same methodology used in the *Global status report on alcohol and health 2018 (3)*. Since the publication of the *Global status report on alcohol and health 2014 (35)*, additional evidence has been produced on the risk relationship between alcohol use and the occurrence of diseases and injuries. This evidence has been incorporated into the methodologies used to produce the report and influences its conclusions.

First, recently published meta-analyses update the relative risks used to model the deaths and the burden of disease attributable to alcohol use. Secondly, unlike the 2014 report, this report includes the burden of disease caused by alcohol-attributable cardiomyopathy *(36)*. Methods to estimate the burden among cardiomyopathy attributable to alcohol were developed only recently *(36)*, as the standard method could not be applied due to lack of systematic data on risk relations *(37)*. Thirdly, the effect of alcohol on the risk of HIV/AIDS *(38)* was modelled based on condomless sex as opposed to the effect of alcohol on adherence to taking highly active antiretroviral therapy (the latter method of modelling *(39,40)* leads to the reporting of fewer alcohol-attributable HIV/AIDS deaths). Lastly, unlike the 2014 global status report on alcohol and health, this report does not indicate the number of deaths, YLL and DALYs under fetal alcohol spectrum disorder/fetal alcohol syndrome, as these are aggregated in the Global Health Estimates *(41)* with burden indicators from other alcohol-use disorders, such as deaths directly attributed to alcohol dependence or alcohol poisoning; there is no way to disaggregate them (for estimates on incidence of fetal alcohol spectrum disorder/fetal alcohol syndrome, see Popova et al. *(42)* and Lange at al. *(43)*; for a general description of burden, see Popova et al. *(44)*).

KEY INDICATORS OF ALCOHOL-ATTRIBUTABLE HEALTH BURDEN

This report uses standard measures for burden of disease *(45–47)*. Number of deaths and age-standardized death rates are presented for overall deaths, then separated by cause of death. As many alcohol-attributable deaths occur early in life *(48)*, time-based measures are even more important. This report presents YLL, which are calculated from the number of deaths multiplied by the gap between the age of death and a standard life expectancy at the age at which the death occurs, thereby quantifying premature death. The report also uses DALYs, which can be defined as a summary measure combining YLL due to premature mortality and due to disability *(49)*.

ALCOHOL-ATTRIBUTABLE MORTALITY

Mortality indicators for EU+ in 2016 and changes since 2010

More than 290 000 people in EU+ countries[6] died due to alcohol consumption in 2016 (point estimate: 291 100; 95% CI: 227 000–352 500). This means that more than every 19th death in these countries was caused by alcohol, which in turn means they could have been avoided if alcohol had not been consumed (for details on the counterfactual scenario above, see Rehm et al. *(50)*).

As expected by their different levels and patterns of consuming alcohol, men had a higher number of alcohol-attributable deaths (215 800) than women (75 300). The ratio of deaths between men and women was about 3 : 1; once these were standardized for age, the ratio was even higher at 4 : 1. While the toll of alcohol-attributable mortality was considerable in 2016, it had decreased from 2010 by about 3% in absolute numbers (from 300 900 to 291 100), by about 8% in the proportion of alcohol-attributable mortality, and by 14% in age-standardized alcohol-attributable mortality rates (Table 2).

Table 2. Alcohol-attributable mortality in the EU+, 2016, and change from 2010, by sex

	2016			2010			Proportional change (%)		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Mortality AAF (%)	2.8 (1.0–4.6)	8.3 (6.8–9.6)	5.5 (4.3–6.7)	3.1 (1.0–5.2)	8.9 (7.2–10.4)	6.0 (4.6–7.3)	-8.6	-7.2	-7.9
Attributable mortality rates	12.8 (8.5–17.4)	50.6 (42.5–57.1)	30.5 (26.0–34.7)	15.0 (9.2–20.8)	58.9 (48.8–66.7)	35.5 (29.7–40.7)	-14.2	-14.2	-14.1

Note: proportional change is based on 2010. Mortality rates refer to age-standardized rates per 100 000 population.

An explanation of how to interpret changes in alcohol-attributable deaths indicators is provided in Box 2.

Box 2. How to interpret changes in alcohol-attributable deaths indicators

All indicators for alcohol-attributable deaths went down between 2010 and 2016. The absolute number of alcohol-attributable deaths reduced by 3%, from 300 900 to 291 100 deaths. This trend is contrary to the overall mortality trend: the number of deaths overall in the EU went up by 5%, from 5 003 600 to 5 253 900.

How can these trends be explained? The population in the EU+ has slowly been increasing (by 1% between 2010 and 2016, from about 517 million to 522 million). Within this slowly increasing population, the age structure is changing. The average age in this region is increasing, with proportionally fewer people in younger age groups and more in older age groups. Given the increase in the older age groups, it is no surprise that the absolute number of deaths rose (as indicated above, by 5% between 2010 and 2016). In each age group, however, the proportion or, more technically, the rate of people who die, is decreasing. The decrease in age-standardized mortality rates for the EU+ was 9% between 2010 and 2016, which is quite substantial.

Alcohol-attributable mortality rates, however, have been decreasing more than overall mortality rates. This may be due to the level of alcohol exposure decreasing, or to some important dimension for burden (such as HED) decreasing, or some interaction between alcohol use and other risk factors decreasing, or the rates of causes of death that are alcohol-attributable decreasing more pronouncedly than other causes of death. Two factors played an important role in alcohol-attributable mortality rates for the EU+ between 2010 and 2016: first, the prevalence of HED decreased; and secondly, mortality rates for injuries, in part connected with HED, decreased.

While the number of alcohol-attributable deaths is highest later in life (Fig. 7a), the proportion of alcohol-attributable deaths of all deaths is highest in early adulthood (Fig. 7b). In 2016, for example, alcohol was responsible for 23.3% of all deaths in EU+ countries in the age group 20–24 years. Alcohol use during this phase of life is also the most important risk factor globally *(2,49)*.

[6] All main tables refer to EU+ (the 28 EU Member States, Norway and Switzerland). The *Data sources and methods* source provides some key statistics for the EU alone (see Additional Tables 2–4).

Fig. 7a. Absolute numbers of deaths caused by alcohol by age and sex in the EU+, 2016

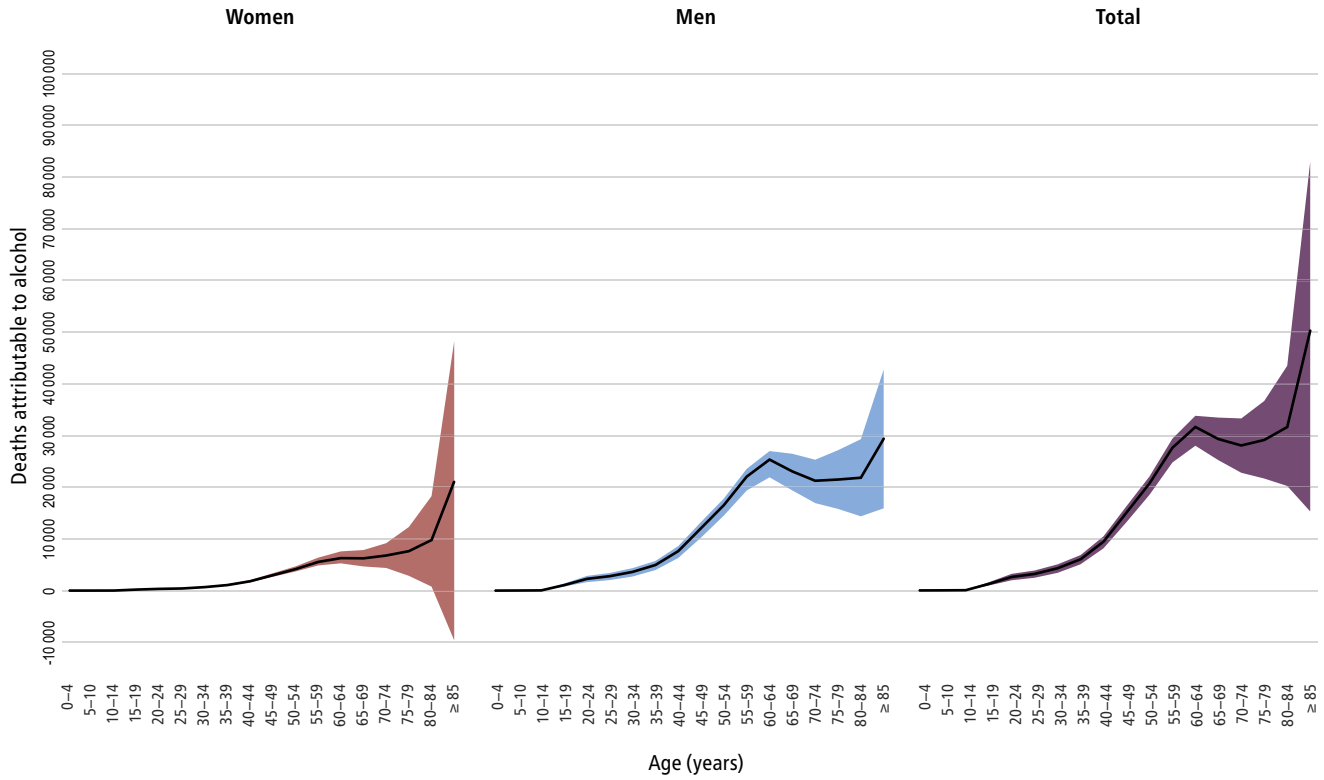
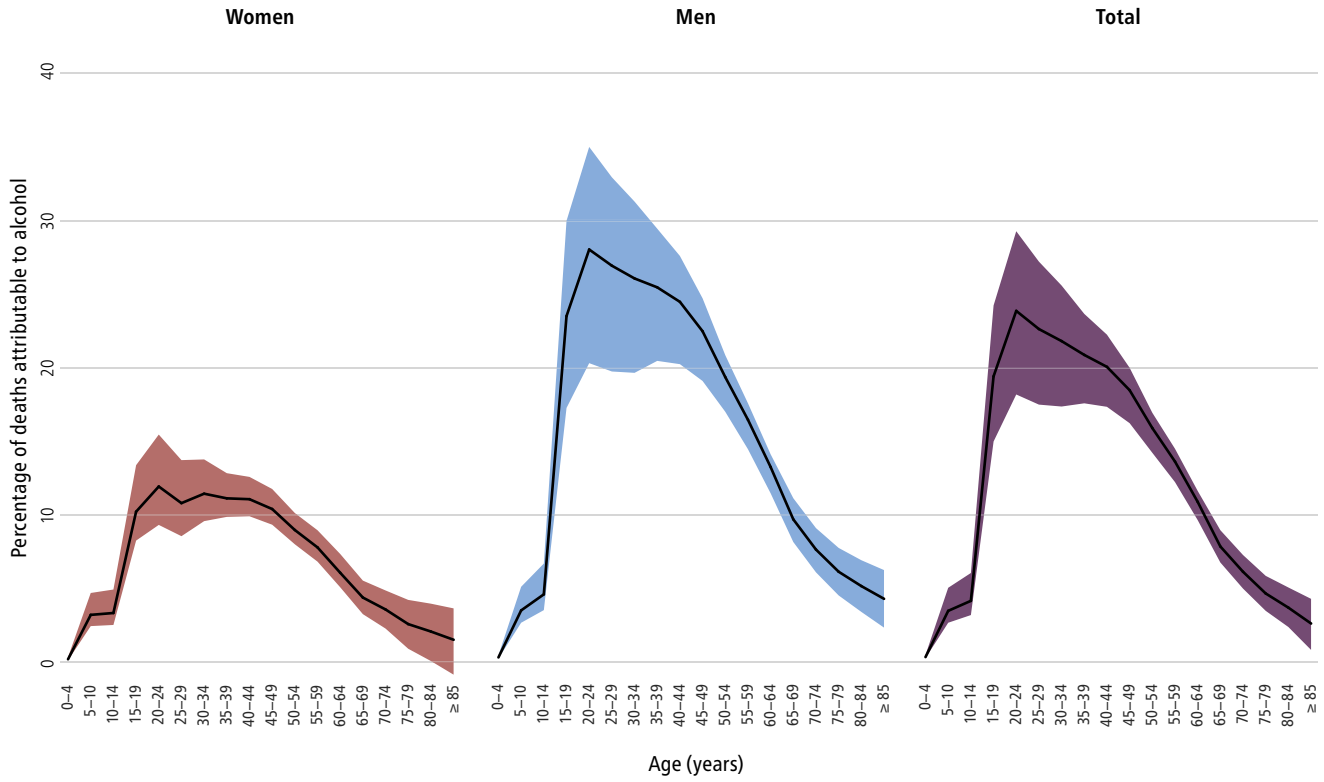


Fig. 7b. Proportion of deaths caused by alcohol by age and sex in the EU+, 2016



Causes of death

While alcohol use is causally related to more than 230 ICD-10 three-digit categories (see above), the overwhelming majority of alcohol-attributable mortality is found in four broad categories *(14)*: cancer; cardiovascular disease (CVD); liver disease (with mainly liver cirrhosis as a cause of death); and injury. The following smaller categories of cancer, as defined in the Global Health Estimates (for details and ICD-10 codes, see the *Data sources and methods* source methodology for burden estimation), have been determined to be attributable to alcohol use (that is, the causal impact of alcohol use on these categories has been established *(51,52)*): lip and oral cavity cancer, pharynx cancer, oesophagus cancer, colon and rectum cancers, liver cancer, breast cancer and larynx cancer.

The analysis in this report followed a conservative approach and only included cancers with the highest level of evidence for a causal impact from alcohol use: mouth and oropharynx cancers (lip and oral cavity, other pharyngeal cancers), oesophagus cancer, colon and rectum cancers, liver cancer, breast cancer and larynx cancer (based on classifications of the International Agency for Research on Cancer *(53)*). The following categories were included for CVD (for causality, see Rehm et al. *(30)*): hypertensive heart disease, cardiomyopathy, ischaemic heart disease, ischaemic stroke and haemorrhagic stroke.

Liver cirrhosis is given its own disease category in the ICD, while categories such as cancer and CVD *(54)* consist of groups of diseases. Liver cirrhosis, however, is arguably the single most important disease category from which to study the effects of alcohol use. From a classification point of view, liver diseases are part of the group of digestive diseases, which also includes another disease impacted by alcohol, pancreatitis. Both liver cirrhosis and pancreatitis have subcategories that are 100% alcohol-attributable, but research has established that such classifications always underestimate the true level of causal impact *(55,56)*, mainly because of stigmatization *(57)*. For instance, in a study of 12 cities in 10 countries *(58)*, after triangulating data on death certificates with data from hospital records and interviews of attending physicians or family members, the number of deaths due to alcoholic liver cirrhosis more than doubled, with most new cases being originally recorded under categories of cirrhosis that do not mention alcohol. Consequently, the attributable-fraction approach was used for these disease categories (see Rehm et al. *(59)* and Samokhvalov et al. *(60)*). Since almost all types of injuries are causally impacted by alcohol use *(28,61,62)*, all subcategories were included except for war. Other causes of death included that were not part of these four main categories are listed in the *Data sources and methods* source.

GENDER DIFFERENCES

Table 3 gives an overview of the distribution of alcohol-attributable mortality by sex and cause of death. There are significant differences in the distribution of causes of deaths by sex, with the biggest difference for cardiovascular deaths, where a considerably lower number of deaths would have been expected for women (expected number of deaths: 15 853; actual number

Table 3. Distribution of alcohol-attributable mortality (number of deaths), by cause of death and sex

	Women		Men		Total	
Cause of death	Number	%	Number	%	Number	%
Communicable disease	3 452	4.6	11 965	5.5	15 416	5.3
Noncommunicable disease	63 030[a]	83.7	159 396[a]	73.8	222 426[a]	76.4
Cancer	*22 493*	*29.9*	*62 986*	*29.2*	*85 479*	*29.4*
Alcohol-use disorder	*4 387*	*5.8*	*16 717*	*7.7*	*21 104*	*7.2*
CVD	*26 155*	*34.8*	*29 704*	*13.8*	*55 860*	*19.2*
Liver cirrhosis	*16 329*	*21.7*	*41 465*	*19.2*	*57 794*	*19.9*
Injury	8 784	11.7	44 478	20.6	53 261	18.3
Unintentional injury	*6 616*	*8.8*	*28 517*	*13.2*	*35 133*	*12.1*
Intentional injury	*2 168*	*2.9*	*15 961*	*7.4*	*18 129*	*6.2*
Harm to others – traffic	*1 830*	*2.4*	*3 217*	*1.5*	*5 048*	*1.7*
All alcohol-attributable causes	**75 265**	**100.00**	**215 838**	**100.00**	**291 103**	**100.00**

Note: disease and injury categories *in italics* are subcategories (for instance, cancer is a subcategory of noncommunicable disease, unintentional injury is a subcategory of injury). "Harm to others – traffic" is a special subcategory that is also part of unintentional injury, both within the broader category of injury. [a] The sum of deaths of subcategories of noncommunicable disease may exceed the number of deaths for main category due to the beneficial effects of alcohol use on diabetes leading to deaths avoided.

of deaths: 26 155; standardized residual: 82). Otherwise, the data corroborate what is already known regarding causes of death from the literature: 87% of alcohol-attributable deaths were from the four major categories of cancer, cardiovascular disease, liver cirrhosis and injury (98% in women and 83% in men).

NONCOMMUNICABLE DISEASES AND ALCOHOL USE

Table 3 also lends empirical support to the inclusion of alcohol use as a risk factor in the noncommunicable disease strategy *(10)* and the United Nations Sustainable Development Goals *(11)* (see also Rehm et al. *(63)*). Alcohol caused 222 426 noncommunicable disease deaths[7] in 2016, including 141 339 in the major disease categories covered by the target of reducing premature mortality from noncommunicable diseases by 25% by 2025 (cancer and CVD *(11)*). This means 609 adults died every day in the EU+ of alcohol-attributable noncommunicable diseases.

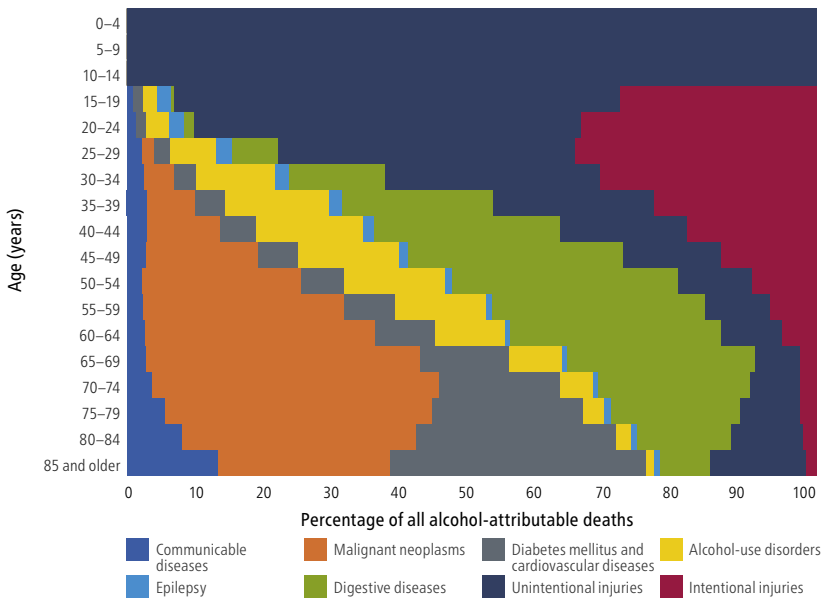
The largest category of alcohol-attributable deaths in the EU+ countries was cancer, followed by liver cirrhosis, CVD and injury. While about 30% of all alcohol-attributable deaths were due to cancer, only around 6% of all cancer deaths were caused by alcohol use.

This pattern was similar for cardiovascular deaths: 19% of all alcohol-attributable deaths in 2016 were from cardiovascular causes of death, and about 3% of these were caused by alcohol. It is different for liver cirrhosis, which makes up almost 20% of all alcohol-attributable deaths, but more than 70% of all liver cirrhosis deaths in the EU+ were attributable to alcohol. For injury, 18% of all alcohol-attributable deaths were injury deaths, and 23% of all injury deaths were due to alcohol use.

AGE DIFFERENCES

The distribution of alcohol-attributable causes of death changed markedly over the life-course. As Fig. 8 shows, injuries are most important in childhood (harm to others via traffic injury) and early adulthood (both intentional and unintentional injury) up to about age 35, then gastrointestinal disease is the relatively most important cause of death (particularly liver cirrhosis) and, later in life, cancer, and finally, CVD for very late adulthood. The same patterns can be found for both sexes (see the *Data sources and methods* source, Additional Table 2).

Fig. 8. Causes of alcohol-attributable death by age in the EU+, 2016



Country variations in alcohol-attributable mortality

Fig. 9 shows alcohol-attributable mortality in the EU+ in 2016 as a proportion of all deaths. There was substantial variability between countries, much larger than in alcohol exposure levels. Overall, a west–east gradient is seen, with the largest AAFs in the Baltic counties, followed by

[7] Again, these are net numbers of deaths, after taking into consideration the deaths avoided by alcohol use in the categories of ischaemic disease and diabetes. While the beneficial effect of alcohol is not public-health relevant at global level *(64)* and is heavily outweighed by the detrimental effects in each region *(3)*, it plays a role in the EU for ischaemic disease and diabetes because of relatively large populations of light drinkers (see also the analyses of Wood et al. *(65)*, based on cohort studies from similar high-income countries).

Romania. As with APC, there was higher mortality in the middle belt of the EU+ and lower mortality in the north and south. Two Nordic (Norway and Sweden) and four Mediterranean (Italy, Malta, Greece and Cyprus) countries were in the lowest group of alcohol-attributable mortality, characterized by a proportion of less than 4%.

A similar picture is seen for age-standardized rates of alcohol-attributable mortality (Fig. 10). Again, there is a clear general west–east gradient in the middle belt of the EU+, with the highest standardized rates for alcohol-attributable mortality in Slovakia, Hungary, Romania and the Baltic countries. The lowest rates could be found in the north and south, specifically in the Nordic countries of Norway and Sweden, and the Mediterranean countries (Spain, Italy, Malta and Cyprus). The Netherlands and Switzerland were also part of this group, but not part of the regional patterns of alcohol-attributable mortality rates.

Trends at country level

Most countries decreased their proportion of mortality attributable to alcohol (Fig. 11), but seven had higher proportions of alcohol-attributable mortality, most notably Bulgaria, with a proportional increase of more than 10%. Overall, an examination of the change in AAFs between 2010 and 2016, studied using mixed-effects models with random intercepts for each country, yielded a small but significant decrease.

Fig. 9. Alcohol-attributable mortality as a proportion of overall mortality (%) in the EU+, 2016

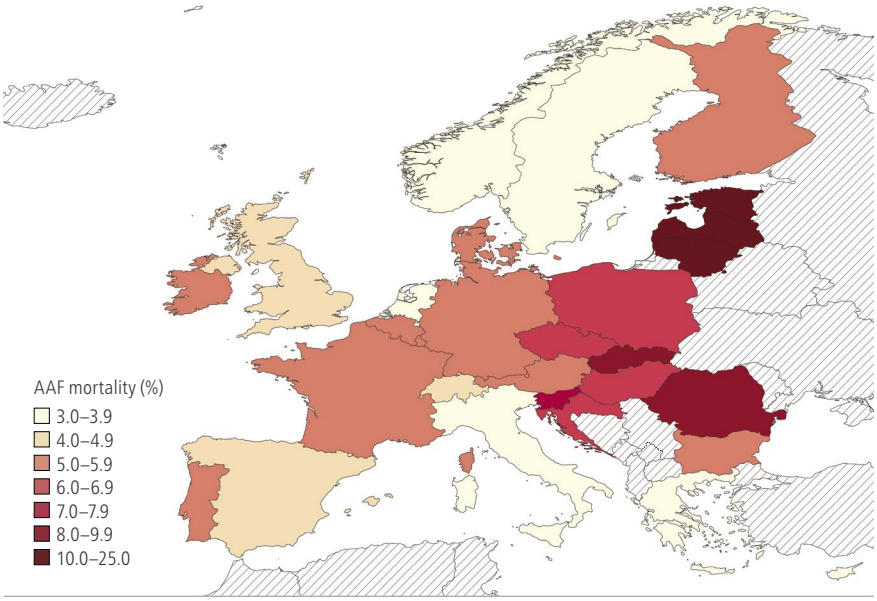
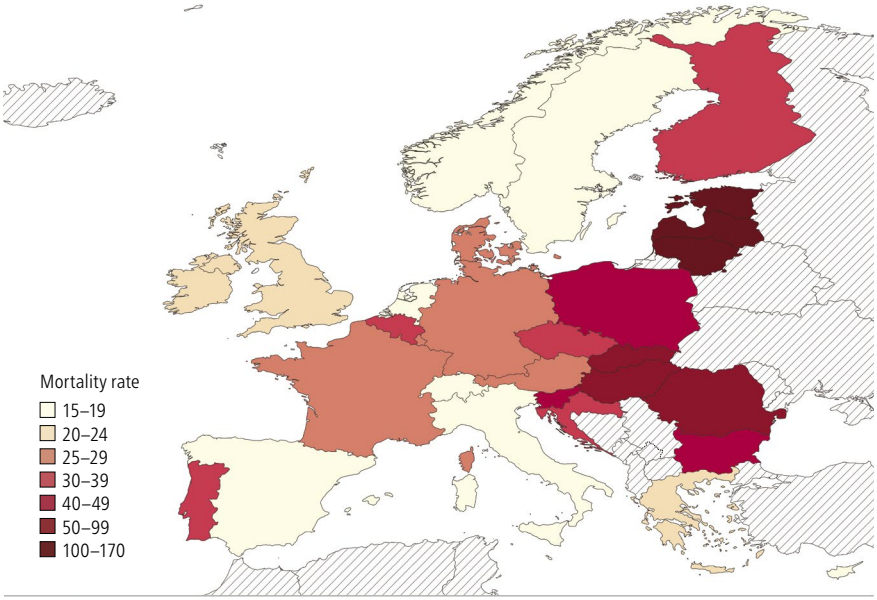


Fig. 10. Age-standardized rates (per 100 000) of alcohol-attributable mortality in the EU+, 2016



In contrast, the change in age-adjusted alcohol-attributable mortality rates from 2010 was almost uniformly downward for all countries, resulting in an average effect between 2010 and 2016 of –1.3%.

Only Bulgaria increased its alcohol-attributable mortality rate minimally, and the following countries had improvements of less than 10% (in order of least improvement (Fig. 12)): Malta, Sweden, Belgium, Greece, the Netherlands, Ireland, the United Kingdom, Slovakia, Germany and Switzerland. Most of these countries are in the central–western or western regions of the EU+. In contrast, most of the countries that reduced their alcohol-attributable mortality most markedly were located in the central–eastern or eastern regions of the EU+. Reductions in alcohol-attributable mortality rates across countries were correlated with reductions in all-cause mortality rates and, as one would expect, they were also correlated with changes in APC and prevalence of heavy drinking occasions.

As indicated above, while a change could be detected in all but one of the EU+ countries, it was most pronounced in Denmark, Estonia, Hungary and Romania, as these countries had among the highest alcohol-attributable mortality rates.

Impacts on age-standardized alcohol-attributable mortality rates in the EU+ in 2016

Changes in alcohol-attributable mortality rates are much more uniform than changes in AAFs. The main determinants of alcohol-attributable mortality rates were analysed (see the *Data sources and methods* source, Additional Table 6 for details) and the following points emerge consistently.

1. Clearly, alcohol-attributable mortality rates are linked to both levels and patterns of drinking, with similar sizes of coefficients of correlation.
2. Modelling of HED was in part based on per capita consumption, and the two variables correlated highly.
3. In addition, there is a consistent and independent impact of the level of the age-standardized all-cause mortality rate upon the alcohol-attributable mortality rate.[8] In other words, alcohol-attributable mortality depends not only on alcohol use, but also on the overall level of mortality and life expectancy in a country. In countries with overall higher mortality rates and lower life expectancy, alcohol-attributable mortality rates will also be higher. As shown previously, the change in alcohol-attributable mortality rates across countries from 2010 to 2016 was more highly correlated with the change in all-cause rates than with the change in alcohol exposure. In 2016, the level of

Fig. 11. Proportional change (%) in AAFs between 2010 and 2016 in EU+

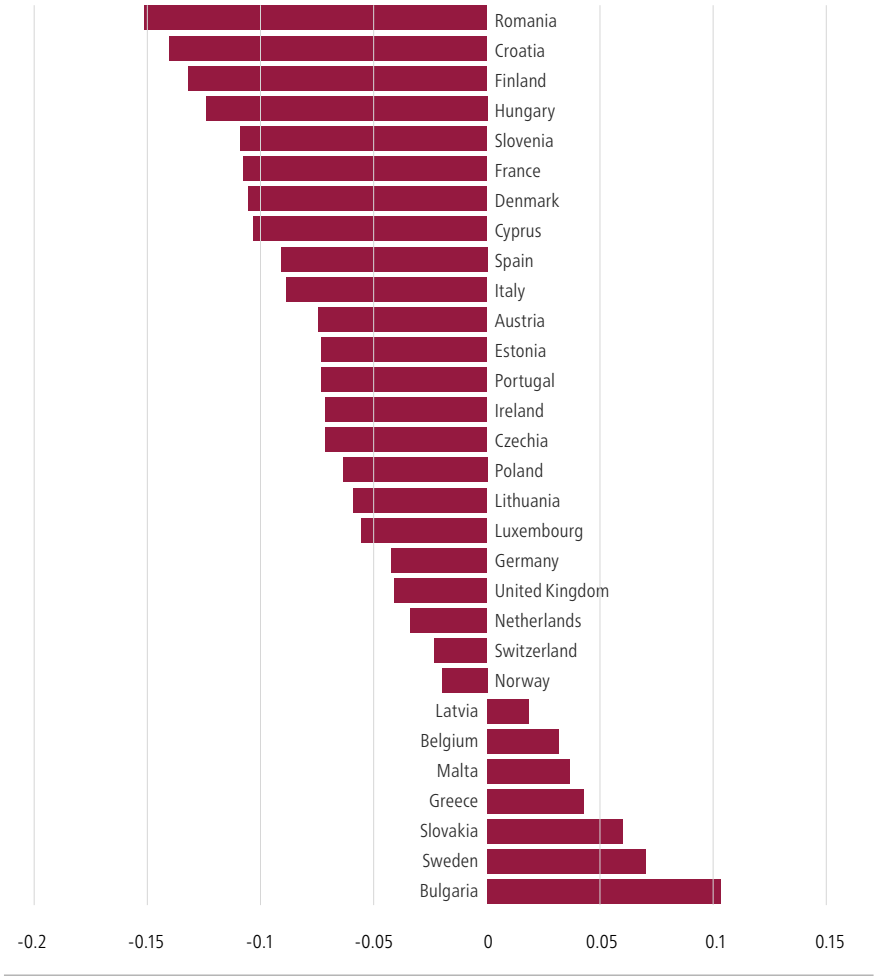
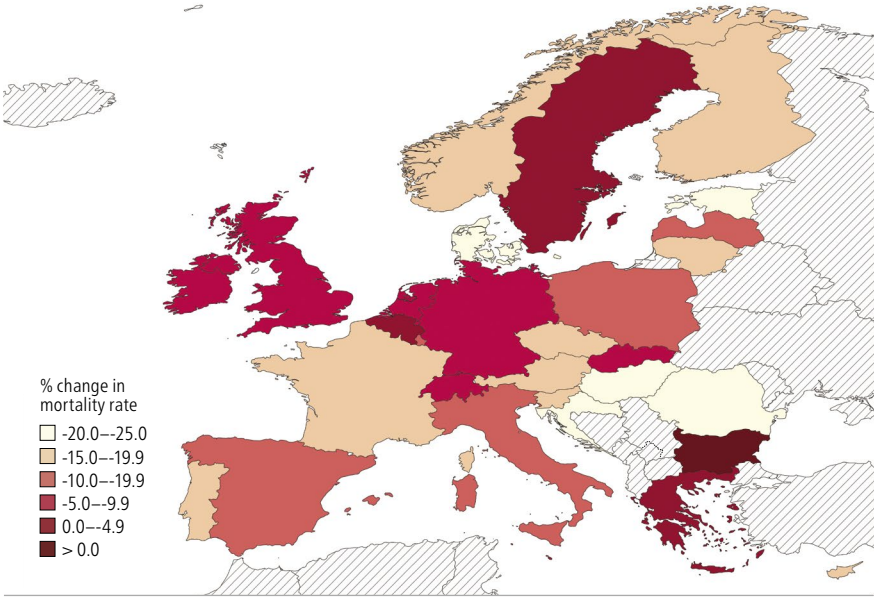


Fig. 12. Proportional change (%) in age-standardized alcohol-attributable mortality rates, 2010–2016 (basis: 2010)



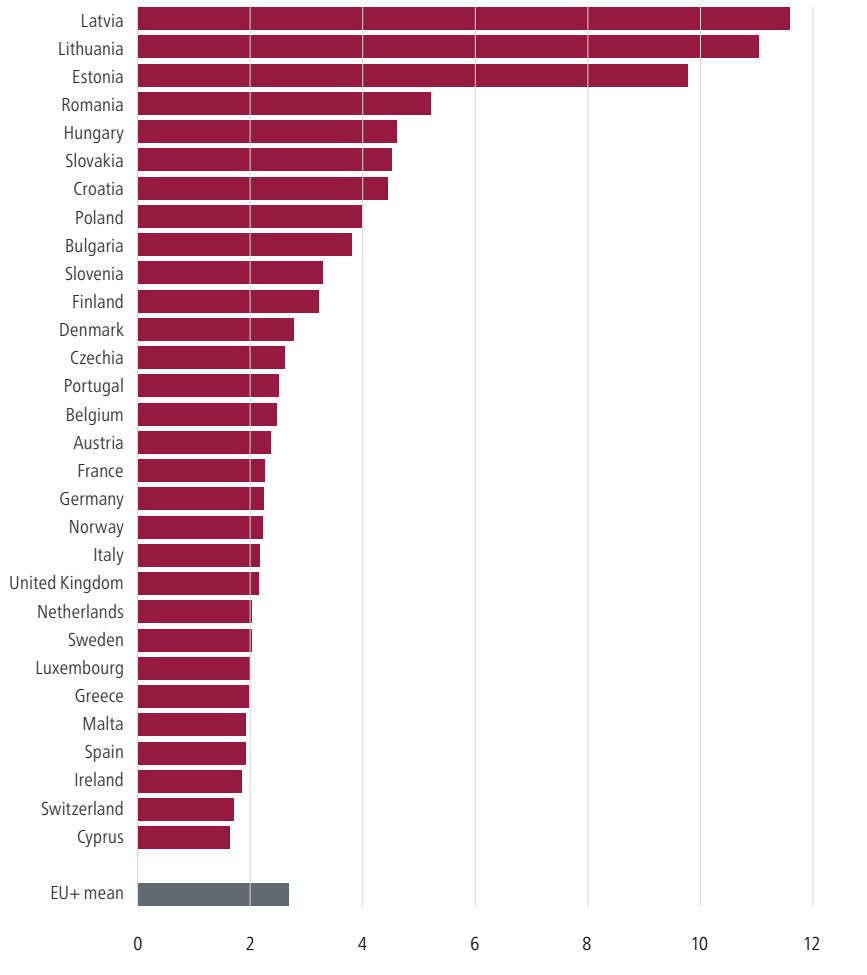
[8] The all-cause mortality rate denotes the overall level of mortality in a country, which will mainly depend on various risk factors including, but not limited to, alcohol use (such as hypertension, tobacco use and nutrition *(2)*, the health-care system *(70,71)*, inequality *(22,72,73)*, poverty and other economic conditions (see Cutler et al. *(74)* and Marmot *(75)*).

the alcohol-attributable mortality rate was impacted by the level of the all-cause mortality rate, suggesting that the alcohol-attributable burden was not only affected by alcohol exposure, but also independently and significantly by the overall level of mortality. This may be conceptualized as an interaction between it and alcohol use. For instance, the overall incidence rate of liver cirrhosis depends on various factors, including risk factors such as alcohol use, hepatitis and obesity *(66)*, but also on other factors, such as the health-care system. Alcohol use may lead to a negative course of liver cirrhosis (leading possibly to liver transplantation, or even death), even if the original liver cirrhosis was caused by factors other than alcohol *(67)*. In summary: the higher the overall rate of liver cirrhosis in a country, the higher the rate of alcohol-attributable liver cirrhosis.

4. Another influencing factor is the overall wealth of a country as measured by the per capita gross domestic product at purchasing power parity (GDP-PPP) *(68)*. The higher the per capita GDP-PPP, the lower the level of the alcohol-attributable mortality rate. Per capita GDP-PPP is used in these calculations rather than per capita GDP as it allows for better comparability between countries for a consumer good, such as an alcoholic beverage. GDP-PPP adjusts the GDP by comparing the average cost of a basket of consumer goods in each country (for details, see World Bank *(69)*).

These impacts and others resulted in different mortality burden per litre of pure alcohol per capita in different countries (Fig. 13). Among other impacts not measured here, income and educational inequality have been shown to be associated with alcohol-attributable mortality *(22,72)*.

Fig. 13. Age-standardized alcohol-attributable mortality rate per 100 000 for 1 litre of adult APC in EU+, 2016



Mortality of adolescents and young adults

Table 4 provides an overview of the contribution of alcohol use to mortality in adolescents and young adults. As expected, alcohol plays a proportionally bigger role in mortality for these age groups than later in the life-course. Absolute mortality rates in adolescence and young adulthood are small, but the relative contribution to mortality is markedly larger than for later ages in the life-course *(48)*.

While 5.5% of all deaths in the EU+ in 2016 were caused by alcohol, 19.0% of all deaths in the 15–19 years age group were alcohol-attributable; in the 20–24 years age group, the proportion was 23.3%. This means that about every fifth death among those aged 15–19 years and about every fourth death in the 20–24 years age group was caused by alcohol. The ratio of the proportion of alcohol-attributable deaths in adolescents/young adults to such deaths in the adult population of all ages is about 4 : 1. This ratio is around the same for women, but closer to 3 : 1 for men. Mortality rates for adolescents and young adults are less than half of the overall standardized mortality rate.

Table 4. Alcohol-attributable mortality in the EU+, 2016, and trend from 2010 among young people and all adults (15+)

	2016			2010			Proportional change (%)		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
Mortality AAF (15–19-year-olds) (%)	10.3 (8.3–13.5)	23 (16.9–29.3)	19 (14.6–23.7)	12.2 (10.1–15.5)	26.4 (19.9–32.9)	22.1 (17.3–27.3)	-15.5	-15.5	-14.2
Mortality AAF (20–24) (%)	12 (9.4–15.5)	5.7 (19.9–34.2)	11.8 (17.8–28.6)	16.8 (11.2–17.7)	5.4 (23.2–37.8)	11.3 (20.7–32.2)	-14.3	-10.6	-10.6
Overall mortality AAF (%)	*2.8 (1.0–4.6)*	*8.3 (6.8–9.6)*	*5.5 (4.3–6.7)*	*3.1 (1.0–5.2)*	*8.9 (7.2–10.4)*	*6 (4.6–7.3)*	*-8.6*	*-7.2*	*-7.9*
Alcohol-attributable rate (15–19)	61.4 (1.3–2.2)	83.3 (5.7–9.9)	72 (3.7–6.0)	65.4 (2.0–3.1)	85.7 (8.6–14.2)	75.3 (5.5–8.6)	-28.8	-31.7	-31.2
Alcohol-attributable rate (20–24)	14.4 (2.0–3.2)	47.4 (10.9–18.9)	30.4 (6.8–11.0)	17.2 (2.7–4.2)	52 (16.4–26.8)	34.1 (9.9–15.4)	-25.1	-30.5	-29.6
Overall attributable mortality rate	*12.8 (8.5–17.4)*	*50.6 (42.5–57.1)*	*30.5 (26.0–34.7)*	*15 (9.2–20.8)*	*58.9 (48.8–66.7)*	*6 (29.7–40.7)*	*-8.6*	*-7.2*	*-7.9*

Note: proportional change is based on 2010. Mortality rates are per 100 000 population and overall population rates are age-standardized.

The main cause of death leading to premature mortality in adolescents and young adults is injury (91.3% of all alcohol-attributable mortality in this age group was due to injury), with traffic fatalities causing 40.7% of all alcohol-attributable mortality in this category for this age group.

The impact of alcohol use on the mortality burden of adolescents and young adults decreased more markedly since 2010 than the impact of alcohol on overall mortality burden. In fact, the age-standardized rates for alcohol-attributable mortality decreased by 31% and 30% for adolescents and young adults, respectively, while the same rates for the entire adult population decreased by 14%.

YEARS OF LIFE LOST DUE TO ALCOHOL-ATTRIBUTABLE PREMATURE MORTALITY

YLL indicators for the EU+ in 2016 and changes since 2010

Almost 7.6 million YLL in the EU+ countries in 2016 were due to alcohol use; 7.6 million years were therefore lost prematurely because of alcohol consumption. Every 12th year of life lost in the EU+ was lost due to alcohol use; affected people could have lived longer without alcohol (see explanation on the counterfactual scenario above and Shield & Rehm *(48)*).

Alcohol-attributable deaths happen relatively early in the life-course, mainly due to injury. On average, premature death due to alcohol use involved a loss of 26.1 life years (women: 21.2 years; men: 27.5 years).[9] This is also reflected in the fact that alcohol-attributable YLL made up a larger proportion of all YLL (8.3%) than the proportion of alcohol-attributable deaths to all deaths (5.5%).

[9] For all causes of death in the EU+ in 2016, the following average numbers of years of life were lost: women 15.0 years, men 20.0 years, total 17.4 years. Alcohol-attributable deaths occur earlier in life than overall (all-cause) deaths and, on average, an alcohol-attributable death represents the loss of 8.7 years more than any other kind of death (such as an average death caused by another risk factor).

As expected by their different levels and patterns of consuming alcohol, men had a higher number of alcohol-attributable YLL (5 930 700) than women (1 668 700). The ratio of deaths between men and women was about 3.5 : 1; it was even higher for age-standardized rates, at 4 : 1 (Table 5).

Table 5. Alcohol-attributable YLL in the EU+, 2016, and change from 2010, by sex

	2016			2010			Proportional change (%)		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
YLL AAF (%)	4.2 (2.9–5.6)	11.4 (9.8–12.7)	8.3 (7.2–9.3)	4.7 (3.2–6.3)	12.5 (10.6–13.8)	9.2 (7.9–10.2)	-10.3	-8.6	-9.6
Attributable YLL rates	398.0 (334.7–475.5)	1 665.5 (1 418.6–1 850.2)	1 016.1 (887.5–1 119.1)	476.5 (395.0–573.6)	2 028.6 (1 707.4–2 246.9)	1 233.6 (1 072.2–1 358.5)	-16.5	-17.9	-17.6

Note: proportional change is based on 2010. YLL rates refer to age-standardized rates per 100 000 population.

As with alcohol-attributable mortality, the burden of YLL decreased between 2010 and 2016 in all indicators: numbers of YLL decreased by 11%, from about 8.6 million to 7.6 million, the proportion of alcohol-attributable YLL by 10%, and the alcohol-attributable YLL rates by 18% (Table 5).

The interpretation of these results is similar as for deaths (see Box 1 above). All indicators of alcohol-attributable premature mortality decreased between 2010 and 2016, and the proportional decrease of alcohol-attributable YLL was more pronounced than the decrease in all YLL. The age-standardized rates of YLL therefore decreased more than the all-cause YLL rates (alcohol-attributable rates: women –16.5%; men –17.9%; total –17.6%; all-cause YLL rates: women –9.0%; men –12.4%; total 11.0%). In other words, the reduction of alcohol exposure and of causes of YLL, which are alcohol-related (especially injury, which is more important for YLL than for deaths), contributed to the overall reduction of YLL rates in Europe over the last half decade.

Causes of alcohol-attributable premature mortality and associated YLL

The major causes for YLL are summarized in Table 6. YLL due to cancer still made up the largest part of all alcohol-attributable deaths, at 25.6%. Injuries had almost the same number of alcohol-attributable YLL (24.7%), as did liver cirrhosis (22.6%). Roughly, it could be assumed that these three big categories – cancer, injuries and liver cirrhosis – each constitute one quarter of alcohol-attributable YLL; together, they comprise almost three quarters of all YLL.

Table 6. Distribution of alcohol-attributable YLL, by cause of death and sex, 2016

	Women		Men		Total	
Cause of death	YLL	%	YLL	%	YLL	%
Communicable disease	46 265	2.8	220 799	3.7	267 064	3.5
Noncommunicable disease	1 360 870[a]	81.6	4 097 684[a]	69.1	5 458 554[a]	71.8
Cancer	*487 845*	*29.2*	*1 458 664*	*24.6*	*1 946 509*	*25.6*
Alcohol-use disorder	*144 875*	*8.7*	*590 279*	*10.0*	*735 153*	*9.7*
CVD	*363 246*	*21.8*	*557 704*	*9.4*	*920 949*	*12.1*
Liver cirrhosis	*444 316*	*26.6*	*1 271 950*	*21.4*	*1 716 266*	*22.6*
Injury	261 547	15.7	1 612 200	27.2	1 873 747	24.7
Unintentional injury	*172 731*	*10.4*	*940 744*	*15.9*	*1 113 476*	*14.7*
Intentional injury	*88 815*	*5.3*	*671 456*	*11.3*	*760 271*	*10.0*
Harm to others – traffic	*69 042*	*4.1*	*146 102*	*2.5*	*215 144*	*2.8*
All alcohol-attributable causes	**1 668 682**	**100.00**	**5 930 683**	**100.00**	**7 599 364**	**100.00**

Note: disease and injury categories in italics are subcategories (for instance, cancer is a subcategory of noncommunicable disease, unintentional injury is a subcategory of injury). "Harm to others – traffic" is a special subcategory that is also part of unintentional injury, both within the broader category of injury. [a] The sum of YLL of subcategories of noncommunicable disease may exceed the number of deaths for main category due to the beneficial effects of alcohol use on diabetes leading to deaths avoided.

Injury becomes relatively more important, however, as on average, alcohol-attributable injury fatalities happen relatively early in life. To quantify these effects, the average YLL for alcohol-attributable causes of death are as follows: communicable disease, 17.3 years; noncommunicable disease, 24.5 years (cancer, 22.8 years; alcohol-use disorders, 34.2 years; CVD, 16.5 years; liver cirrhosis, 29.7 years); and injury, 35.2 years. When YLL is the indicator for alcohol-attributable burden, injuries, alcohol-use disorders and liver cirrhosis become more significant. As would be expected, these health outcomes also have a higher impact on life expectancy.[10]

The *Data sources and methods* source, Additional Table 4 shows the proportions of YLL attributable to alcohol use.

Country variation in alcohol-attributable YLL

Overall, alcohol use caused 8.3% of the YLL in the EU+ in 2016. Seven countries had AAFs higher than 10% for this indicator (that is, more than every 10th YLL was caused by alcohol use). Countries with the highest burden of YLL to lowest burden, but still greater than 10%, were: Lithuania, Latvia, Estonia, Slovakia, Slovenia, Romania and Finland. All of these countries are in the east of the EU and are in geographical proximity to each other, from Finland in the north-east to Romania in the south-east (Fig. 14).

The lowest AAFs can be found in the following seven counties (starting with the lowest burden of alcohol-attributable YLL to the highest of 6%): Malta, Italy, the Netherlands, Cyprus, Greece, Norway and Sweden. The distribution of AAFs for YLL was similar to Fig. 3, where a relatively lower average level of consumption was found in Mediterranean countries and the Nordic countries of Norway and Sweden.

Fig. 15 gives an overview of the second indicator used for each burden category: the age-standardized alcohol-attributable rate (of YLL). A similar picture emerges as with the AAFs of YLL: a clear west–east gradient, with the lowest burden in the Mediterranean region and the Nordic countries of Norway and Sweden. Portugal seems to be the exception.

Finally, Fig. 16 displays the changes in YLL rates between 2010 and 2016. The picture here is not as clear, and no clear geographical pattern emerges. Neighbouring countries such as Bulgaria

Fig. 14. Alcohol-attributable YLL as proportion of overall YLL in the EU+, 2016

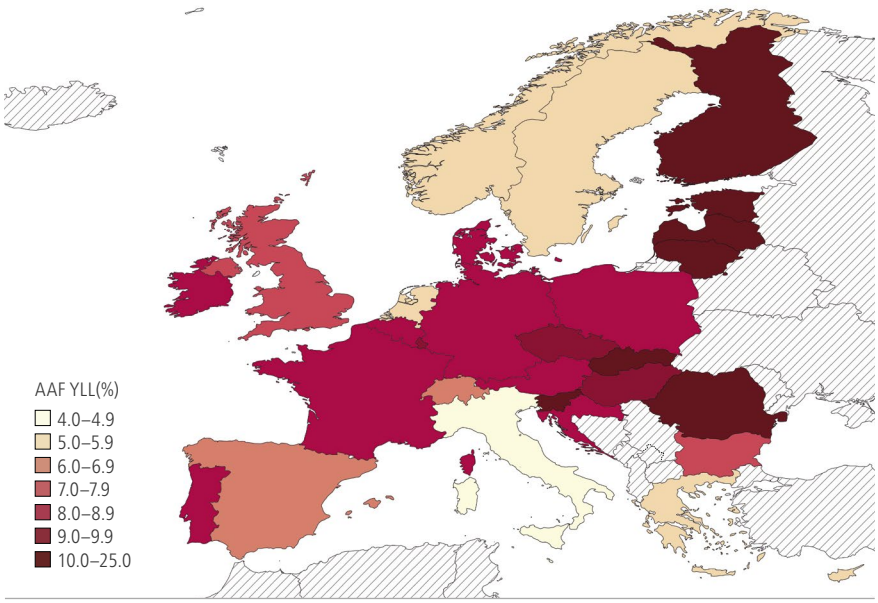
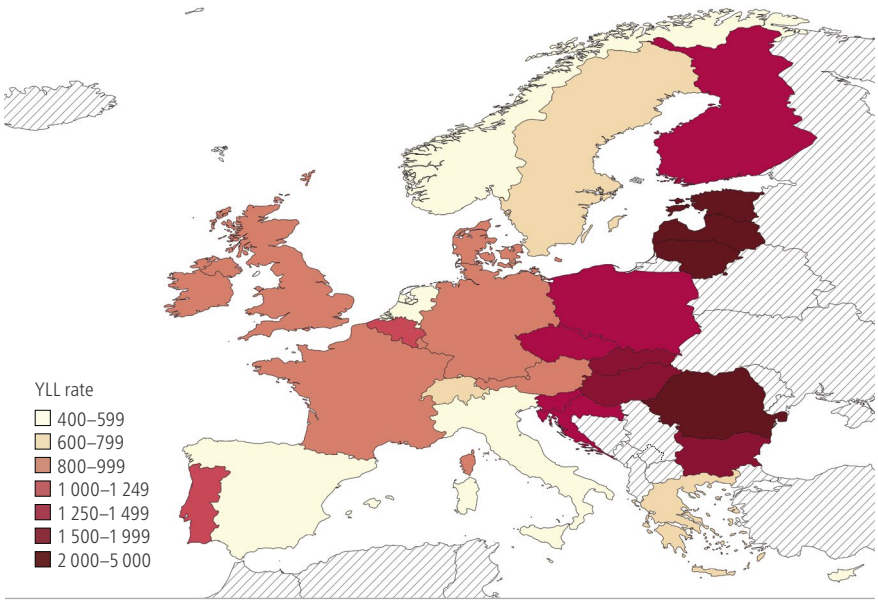
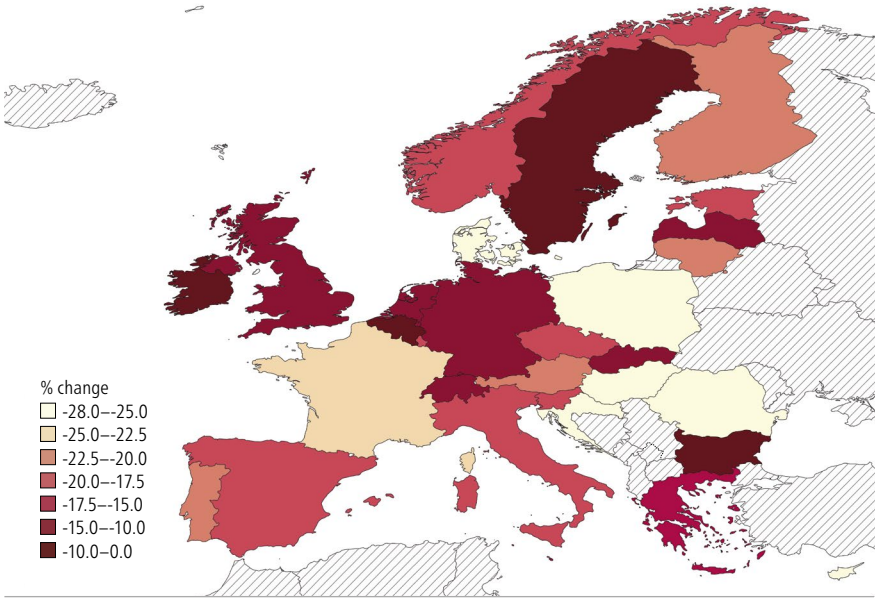


Fig. 15. Age-standardized rates of alcohol-attributable YLL to premature mortality in the EU+, 2016



[10] Notably, exactly these disease categories are among the most important underlying the recent stagnation/decline in life expectancy in the United States *(15,16,19,76)*.

Fig. 16. Proportional change in age-adjusted alcohol-attributable rates of YLL per 100 000 in the EU+ between 2010 and 2016



(no decrease in alcohol-attributable YLL) and Romania (–26%) can be found in different extremes of trends based on a number of factors, such as economic trends or alcohol policy measures. The latter shows that alcohol-attributable mortality and YLL can be impacted, and can be impacted quickly.

Lithuania serves as a prime example. In 2010, Lithuania had the highest alcohol-attributable YYL rate, by far, in the EU+. Implementation of a number of effective alcohol policy measures, however, led to a reduction of the burden of YLL of 20% between 2010 and 2016.

BURDEN OF DISEASE (IN DISABILITY-ADJUSTED LIFE-YEARS) ATTRIBUTABLE TO ALCOHOL USE IN THE EU+

Indicators for alcohol-attributable burden of disease (based on DALYs)

Almost since the first Global Burden of Disease study was published in the mid-1990s *(77,78)*, DALYs has been the most commonly used summary measure of population health[11] *(46,79)*. This indicator combines years of life lost due to premature mortality and YLD. The latter are usually calculated by multiplying prevalence of a disease category by its corresponding disability weight *(81,82)*, with disability weights being a value anchored between 0 (perfect health) and 1 (equivalent to death) to reflect the impact of a specific health condition on health functioning.

Using this indicator, more than 10.3 million DALYs lost (6.8% of all DALYs) were attributable to alcohol use in 2016 either because of premature death or due to living with a disability, corresponding to each 15th DALY in the EU+.

As with the other measures of alcohol-attributable disease burden, men are more affected than women, by a ratio of about 3.5 : 1. The ratios for attributable fractions and for age-standardized rates were also between 3 : 1 and 4 : 1; as with the other indicators, the ratio was higher for age-standardized rates compared to fractions (see Table 7 for an overview of alcohol-attributable DALY statistics for 2016 by sex).

As with the other main indicators, the alcohol-attributable DALY indicators have decreased since 2010 – in absolute numbers from 11.4 million to 10.3 million DALYs in 2016, by about 9% in the proportion of alcohol-attributable DALYs, and by 14% in alcohol-attributable DALY rates. Age-standardized rates of DALYs also decreased more than the all-cause DALY rates (alcohol-attributable DALY rates: women –12.6%; men –14.3%; total –13.9%; all-cause DALY rates: women –4.0%; men –8.0; total –6.1%). This could be interpreted to mean that the reduction of alcohol exposure contributed to the overall reduction of DALY rates in Europe.

[11] Summary measures of health have become increasingly important as they are not restricted to fatal health outcomes, but reflect modern health-care system priorities in most parts of the world after the epidemiological transition *(80)*.

Table 7. Proportional change (%) in alcohol-attributable burden of disease (DALYs) between 2010 and 2016, EU+

	2016			2010			Proportional change (%)		
	Women	Men	Total	Women	Men	Total	Women	Men	Total
DALY AAF (%)	3.2 (2.4–4.1)	10.1 (8.7–11.3)	6.8 (6.0–7.6)	3.6 (2.6–4.6)	11.1 (9.5–12.3)	7.5 (6.6–8.4)	-10.0	-8.5	-9.4
DALY AAF (%)	625.6 (541–738)	2 348.6 (2 024–2 624)	1 468.3 (1 306–1 622)	716 (612–846)	2 739.7 (2 351–3 056)	1 704.3 (1 511–1 880)	-12.6	-14.3	-13.9

Note: proportional change is based on 2010. DALY rates refer to age-standardized rates per 100 000 population.

Causes for lost DALYs

Table 8 provides an overview of the number of alcohol-attributable DALYs for various disease categories. Injuries were responsible for more than one third of alcohol-attributable DALYs (34%). Included within the broader category of injuries, the subcategory of unintentional injuries was far more important than intentional injuries. The other main difference between mortality measures and DALYs, which include non-fatal events, concerns the much higher contribution of alcohol-use disorders. Alcohol-use disorders made up only 7.2% of all alcohol-attributable deaths, but 15.9% of all alcohol-attributable DALYs. While alcohol-use disorders via the effects of heavy drinking are associated with high mortality *(83–85)*, they are relatively rarely mentioned as a cause of death on death certificates, so do not appear prominently as causes of death. As alcohol-use disorders were responsible for a higher proportion of DALYs, the relative importance of all other disease categories to DALYs was lower, in contrast to cause-of-death distributions (most importantly, cancer and CVD: while these two categories comprised 29.4% and 19.2% of deaths, they comprised only 19.4% and 9.2% of DALYs, respectively, each reduced by about 10%).

The relative importance of injuries and alcohol-use disorders for alcohol-attributable DALYs is in part based on their disabling nature and because the onset of these disorders is often at a young age (for injuries, see Haagsma et al. *(86)* and Polinder et al. *(87)*; for alcohol-use disorders, see Rehm et al. *(85)* and Samokhvalov et al. *(88)*); these two categories made up 93% of all alcohol-attributable YLD in the EU+ in the year 2016 (for a definition of YLD, see Murray *(49)*). The *Data sources and methods* source, Additional Table 5 shows proportions of DALYs that are attributable to alcohol use.

Table 8. Distribution of alcohol-attributable burden of disease (DALYs) by cause of death and sex, 2016

	Women		Men		Total	
Category of disease/cause of death	DALYs	%	DALYs	%	DALYs	%
Communicable disease	48 013	2.1	232 242	2.9	280 255	2.7
Noncommunicable disease	1 575 562[a]	67.6	4 975 264[a]	62.1	6 550 826[a]	63.3
Cancer	*512 237*	*22*	*1 499 480*	*18.7*	*2 011 717*	*19.4*
Alcohol-use disorder	*427 740*	*18.4*	*1 213 246*	*15.1*	*1 640 986*	*15.9*
CVD	*351 962*	*15.1*	*601 515*	*7.5*	*953 477*	*9.2*
Liver cirrhosis	*474 676*	*20.4*	*1 329 052*	*16.6*	*1 803 728*	*17.4*
Injury	705 962	30.3	2 806 919	35.0	3 512 881	34.0
Unintentional injury	*604 330*	*25.9*	*2 095 212*	*26.1*	*2 699 542*	*26.1*
Intentional injury	*101 632*	*4.4*	*711 707*	*8.9*	*813 339*	*7.9*
Harm to others – traffic	*201 164*	*8.6*	*244 148*	*3.0*	*445 311*	*4.3*
All alcohol-attributable causes	**2 329 538**	**100.00**	**8 014 425**	**100.00**	**10 343 962**	**100.00**

Note: disease and injury categories in italics are subcategories (for instance, cancer is a subcategory of noncommunicable disease, unintentional injury is a subcategory of injury). "Harm to others – traffic" is a special subcategory, as it is also part of unintentional injury, both within the broader category of injury. [a] The sum of DALYs of subcategories of noncommunicable disease may exceed the number of deaths for main category due to the beneficial effects of alcohol use on diabetes leading to deaths avoided.

Fig. 17. Alcohol-attributable DALYs as a proportion of overall DALYs in the EU+, 2016

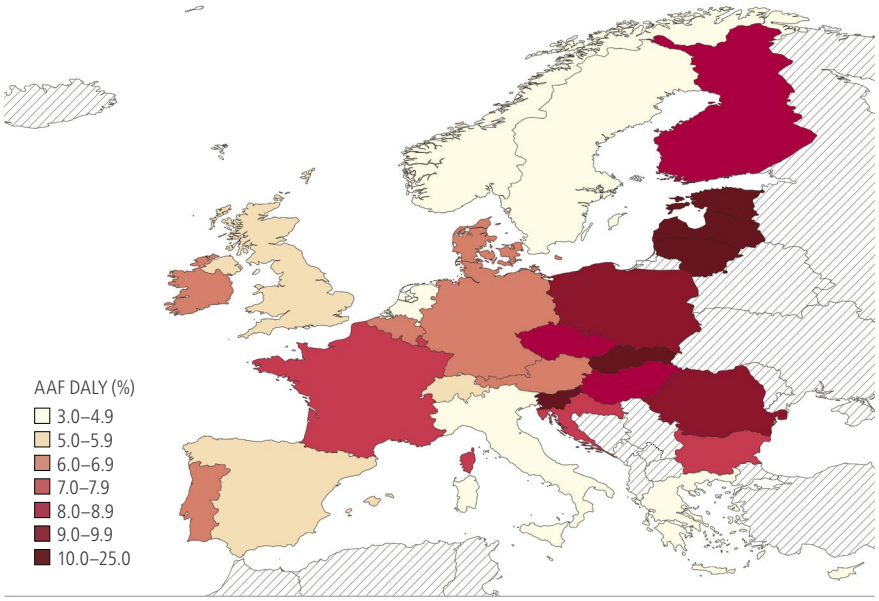
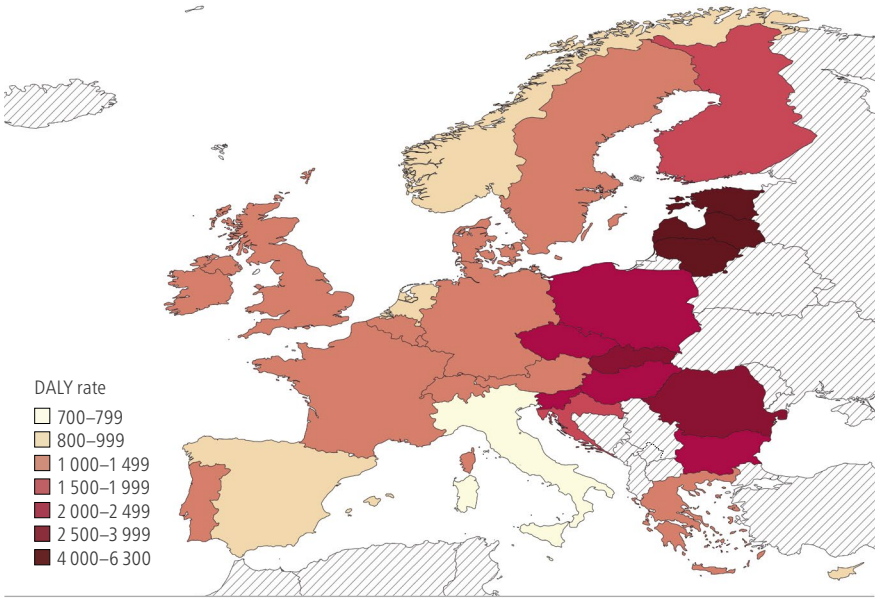


Fig. 18. Age-standardized rates of alcohol-attributable DALYs in the EU+, 2016



Country variation in alcohol-attributable DALYs

Fig. 17 illustrates distribution of alcohol-attributable proportions of DALYs in the EU+ in 2016. As the AAFs of YLL and DALYs correlate highly, the map of the AAFs of DALYs looks similar to Fig. 14 for AAFs of YLL. Again, a general west–east gradient in the middle belt is seen, with the highest levels recorded in the Baltic countries, Slovakia and Slovenia, and the lowest attributable fraction in the Nordic countries of Norway and Sweden, Mediterranean countries of Italy, Malta, Greece and Cyprus, and in the Netherlands.

A similar picture emerges for the alcohol-attributable age-adjusted DALY rates (Fig. 18).

Impacts on age-standardized alcohol-attributable rates of DALYs

Age-adjusted alcohol-attributable DALY rates in 2016 were impacted by the same major influencing factors as mortality and YLL rates: average level of alcohol consumption, prevalence of HED, the all-cause death rates, and the wealth of countries as measured in GDP-PPP (see the *Data sources and methods* source, Additional Table 8).

An explanation of how to interpret changes in alcohol-attributable mortality in relation to other indicators is provided in Box 3.

The same influencing factors on mortality rates resulted in markedly different DALYs per litre of pure alcohol per capita in different countries. While only four influencing factors were measured, the high variability shown in Fig. 19 suggests that other factors must also exist (that is, that alcohol-attributable burden of disease must be dependent on other interactions of alcohol and risk factors such as tobacco use or socioeconomic inequalities (see Rehm et al. *(63)* for a discussion in the framework of noncommunicable disease risks).

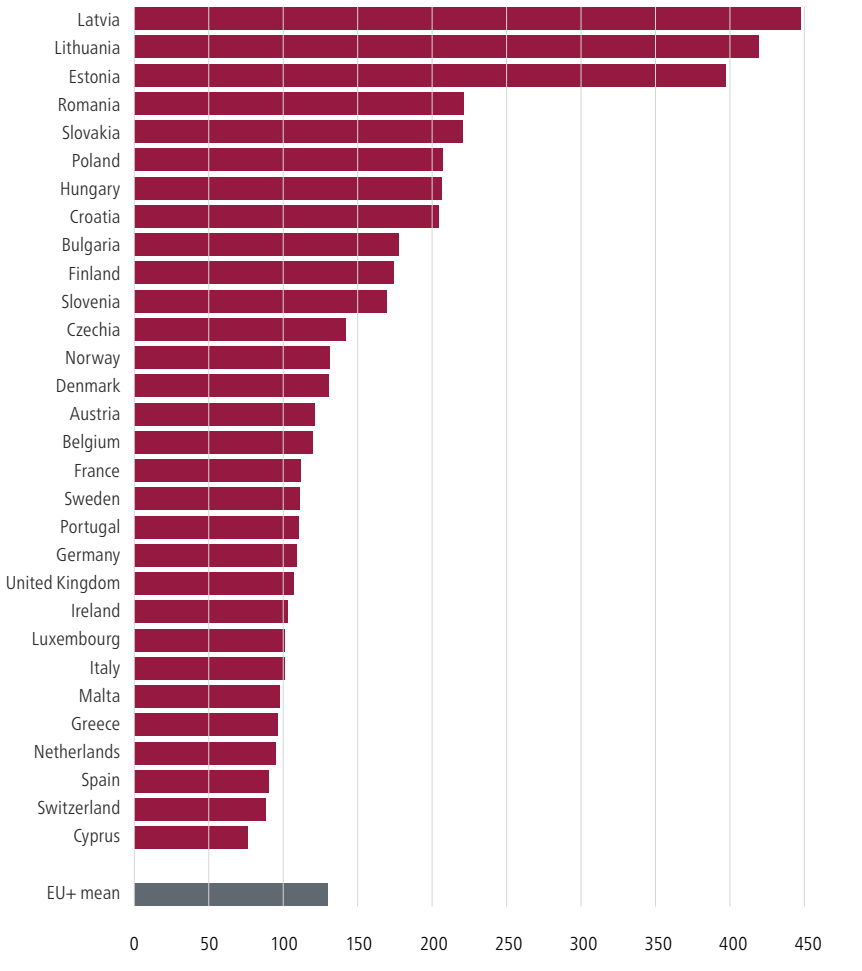
Box 3. How to interpret changes in alcohol-attributable mortality in relation to other indicators

There were no statistically significant changes in APC and average alcohol intake per drinker between 2010 and 2016, while the prevalence of current drinkers and HED decreased. At the same time, all indicators for alcohol-attributable mortality have been decreasing and declined more than overall mortality rates.

How can these trends be interpreted in relation to other factors?

As already discussed, changes in alcohol-attributable harm (mortality and DALYs) are hugely impacted by changes in overall mortality, which in turn depend on other factors such as age structure of a certain population, health systems and the level of wealth in a country. This complex relationship of factors can be described as the following in this case: the higher the level of alcohol consumption in litres of pure alcohol per capita, the higher is the prevalence of heavy drinking and the level of all-cause mortality; and the lower the wealth (in GDP-PPP) of a particular country, the higher is the age-adjusted alcohol-attributable DALY rates.

Fig. 19. Age-standardized alcohol-attributable mortality rate per 100 000 for 1 litre of adult APC in EU+, 2016



The role of unrecorded alcohol consumption in influencing alcohol-attributable burden in the EU+

As the main health burden from unrecorded alcohol is due to ethanol, not contaminants, the burden due to unrecorded alcohol use is generally not calculated separately from the total APC. Various studies have nevertheless documented an association between levels and patterns of alcohol consumption and socioeconomic factors. In most cases, unrecorded alcohol is cheaper than recorded alcohol and, depending on the setting, is also more available in terms of sales outlets and sale times, since the usual regulations do not apply to this type of alcohol. Unrecorded alcohol is therefore commonly consumed by particularly vulnerable parts of the population, especially people from lower socioeconomic strata *(89)*. Some subgroups of unrecorded alcohol, such as alcohol surrogates, are associated with increased levels of alcohol intake, problematic drinking patterns, alcohol-use disorders and associated harm *(90–92)*. Consumers are more diverse in relation to socioeconomic status for other categories of unrecorded alcohol, such as homemade alcohol, but overall, unrecorded alcohol use is likely to contribute to socioeconomic differences in mortality.

PART 3

ALCOHOL CONTROL POLICY IN THE EU+

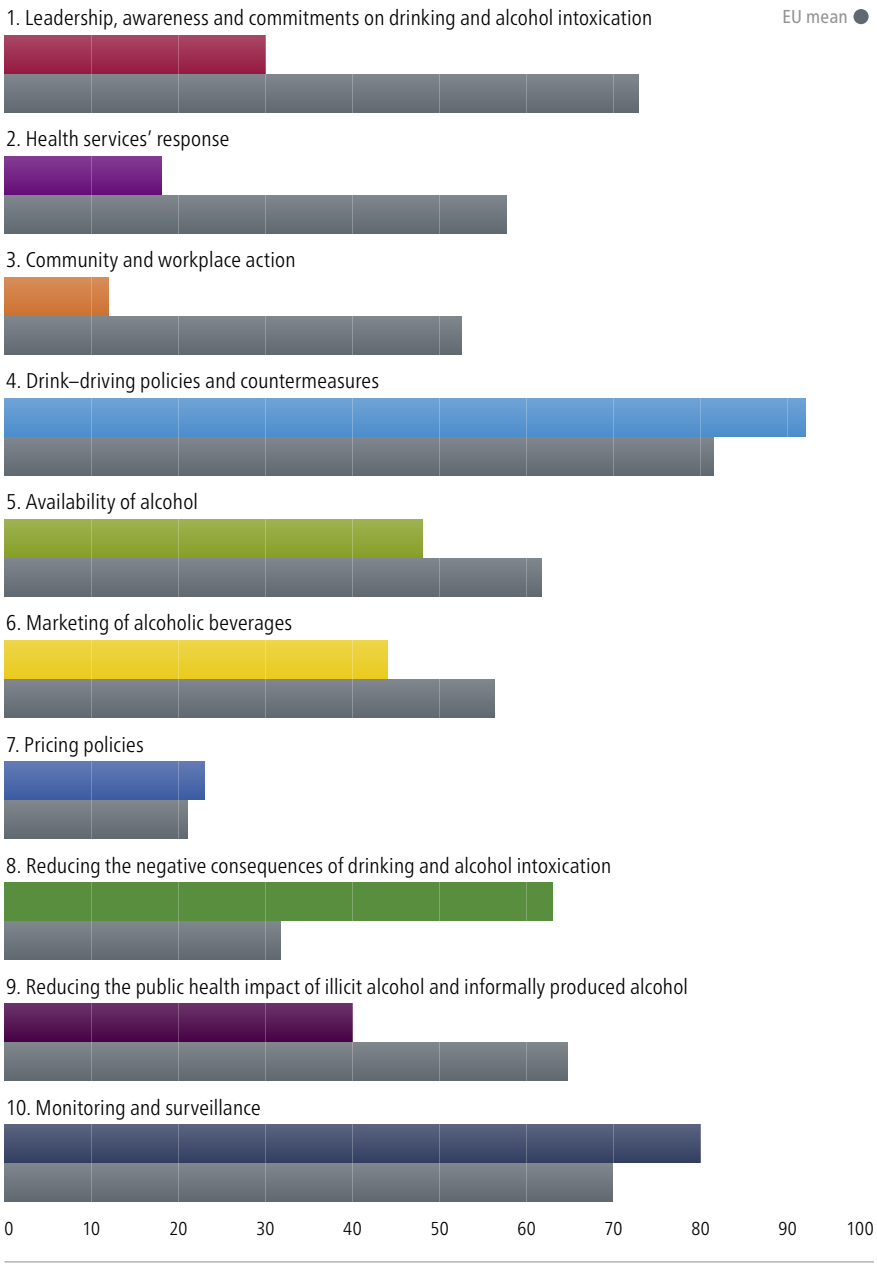
BACKGROUND

There is extensive evidence to demonstrate the effectiveness, cost–effectiveness and societal impact of implementing alcohol policies in reducing the harmful use of alcohol and the harm caused by alcohol *(93–95)*.

The WHO European Region was the first region to adopt an alcohol action plan in 1992 *(96)*. Twenty years later, and building on the momentum for action created by the global strategy to reduce the harmful use of alcohol of 2010, the Region launched the *European action plan to reduce the harmful use of alcohol 2012–2020 (97)* (EAPA). This action plan was endorsed by all 53 Member States of the WHO European Region in September 2011 and includes a range of evidence-based policy options to reduce the harmful use of alcohol.

The WHO Regional Office for Europe published a tool for evaluating Member States' progress towards implementing the policy measures outlined in the EAPA in 2017 *(98)*. The tool consists of 10 composite indicator scores, representing each of the 10 action areas of the EAPA. One of the big advantages of such composite indicators lies in their ability to convey, at a glance, a large amount of information that is relevant to decision-making and priority-setting to give guidance to policy-makers and quantify the completeness of national alcohol strategies and plans (that is, the number of policies and the degree to which each meets certain prescribed standards). The method for calculating the policy scores is described in detail in *Policy in action – a tool for measuring alcohol policy implementation (98)*. Fig. 20 shows the overall distribution of scores for all Member States.

Fig. 20. Mean and median scores for participating Member States for the 10 action areas of the EAPA



The updated scores presented in this report are based on Member State responses to relevant survey questions from the 2016 Global Survey on Alcohol and Health and from the 2014 ATLAS on Substance Use questionnaire. These WHO surveys take the form of a self-completion questionnaire. Designated national experts were asked to fill out the questionnaire in consultation with other experts from their respective countries. Survey data were then uploaded to regional and global alcohol databases maintained by WHO, including the European Information System on Alcohol and Health and the European Regional Information System on Resources for the Prevention and Treatment of Substance Use Disorders. Estimates of gross national income at PPP for 2016 were obtained from the World Bank *(99)*. National experts nominated as contact persons for WHO were given the

opportunity to validate the scores during the period November 2017 through to February 2018. The most recent available data were used. Missing values were replaced with zero points. If a substantial portion (> 20%) of the data were missing in an action area, the composite indicator was not calculated for that Member State. Policy variables from the datasets were recoded manually to achieve compatibility with the scoring scheme. The bands for the pricing policies action area were revised in April 2018 to reflect updated price indices.

Table 9. Number of Member States (out of 30) with valid data, by action area

Action area	Member States
Leadership, awareness and commitment	28
Health services' response	18
Community and workplace action	28
Drink–driving policies and countermeasures	30
Availability of alcohol	30
Marketing of alcoholic beverages	30
Pricing policies	26
Reducing the negative consequences of drinking and alcohol intoxication	30
Reducing the public health impact of illicit alcohol and informally produced alcohol	30
Monitoring and surveillance	30

Table 9 indicates the number of composite indicator scores generated for each action area; that is, the number of EU Member States for which at least 80% of the data were available. The data presented in this part, including the subindicators, reflect only the responses of countries for which there was sufficient data to calculate scores for that action area.

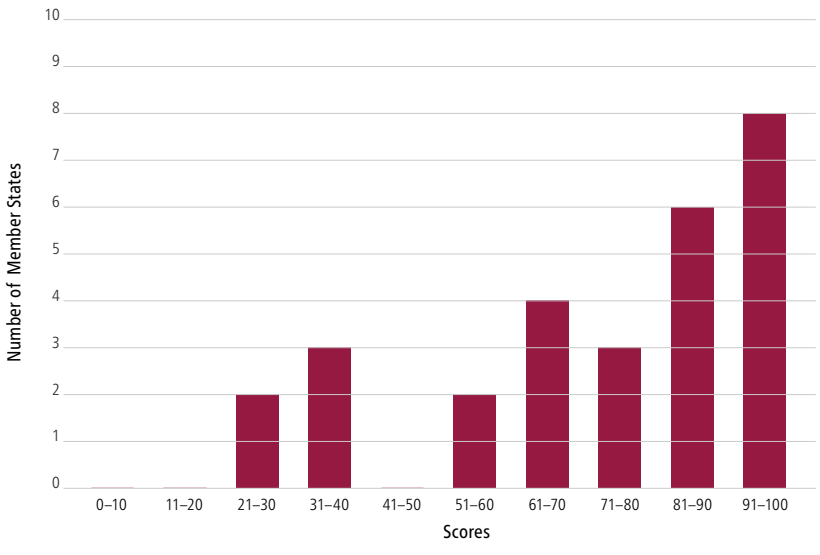
This part is structured according to the 10 action areas of the EAPA, condensing a large amount of national-level policy information. The scores take into account not only whether a Member State has a recommended policy measure, but also how comprehensive the policy is.

ACTION AREA 1. LEADERSHIP, AWARENESS AND COMMITMENT

The action area of leadership, awareness and commitment highlights the importance of long-term, coordinated, intersectoral governmental efforts to prioritize the reduction of harmful use of alcohol through goal-setting, implementation of comprehensive evidence-based measures tailored to local circumstances, and monitoring and evaluation of policies and interventions.

Composite indicator scores show that countries performed relatively well in this area, with a median scaled score of 80 points (Fig. 21). Five countries achieved the maximum possible score.

Fig. 21. Distribution of scores for action area 1, leadership, awareness and commitment (n = 28)



Two of the key indicators in this area are whether a country has a national alcohol policy in place and has implemented measures to increase public awareness of the dangers of harmful alcohol use, and the resources available for reducing harmful consumption. The most recent WHO survey results show that 22 of the 28 participating countries have a written national policy, defined as an organized set of values, principles and objectives for reducing the burden attributable to alcohol in the population, adopted at national level.

Of the six countries without a written national policy on alcohol, four were in the process of developing such a policy. All 28 countries reported that they had carried out some form of national awareness-raising activities in the previous three years. The most commonly addressed topics were drink–driving/road safety (26 countries), parent awareness (20 countries) and alcohol's impact on health (16 countries).

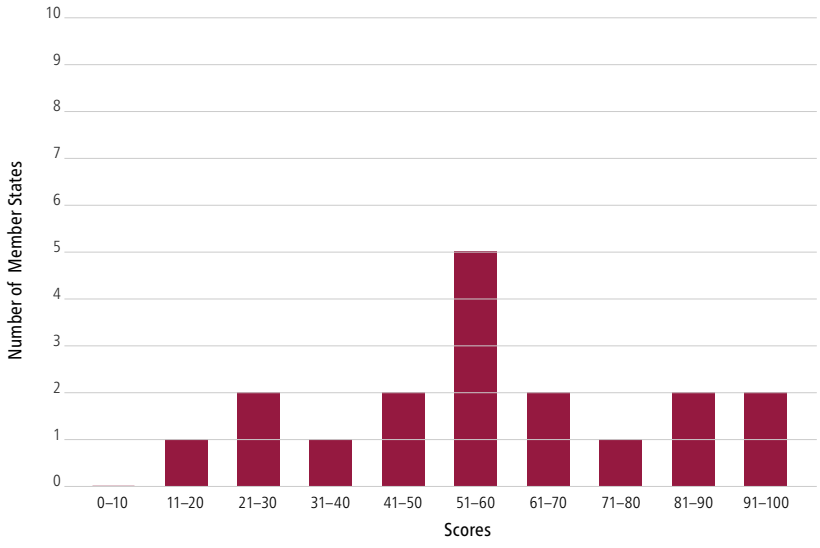
ACTION AREA 2. HEALTH SERVICES' RESPONSE

Primary and specialized health-care services play a crucial role in identifying and providing treatment for people who are drinking at hazardous or harmful levels. An effective health services' response is also important for meeting Sustainable Development Goal 3, of ensuring healthy lives and promoting well-being for all at all ages. Target 3.5 specifically highlights the need to strengthen the prevention and treatment of substance misuse, including narcotic drug use and harmful use of alcohol *(100)*. Screening and brief interventions (SBIs) for harmful and hazardous alcohol use in primary care settings provide one tool for achieving this goal. SBIs employ targeted or widespread screening to detect people who are drinking at harmful levels and then provide alcohol consumption advice to motivate behaviour change. There is good evidence for the effectiveness of SBIs on reducing alcohol consumption in primary care settings *(101)*. WHO recently published a training manual to expand and improve training for health professionals in primary health-care settings on alcohol and SBIs *(102)*.

The median composite indicator score for this action area was 57; no country achieved the maximum possible number of points (Fig. 22). Large amounts of data were missing in this area, so scores for 12 countries could not be calculated.

The most recent data show that 12 of the 18 participating countries have clinical guidelines for brief interventions, but that many countries are unable to estimate the proportion of primary health-care services and antenatal services that have implemented SBIs for harmful and hazardous substance use at national level. This knowledge gap highlights the need to plan for and integrate procedures and infrastructures for monitoring and reporting prior to the implementation of widespread SBI programmes.

Fig. 22. Distribution of scores for action area 2, health services' response (n = 18)



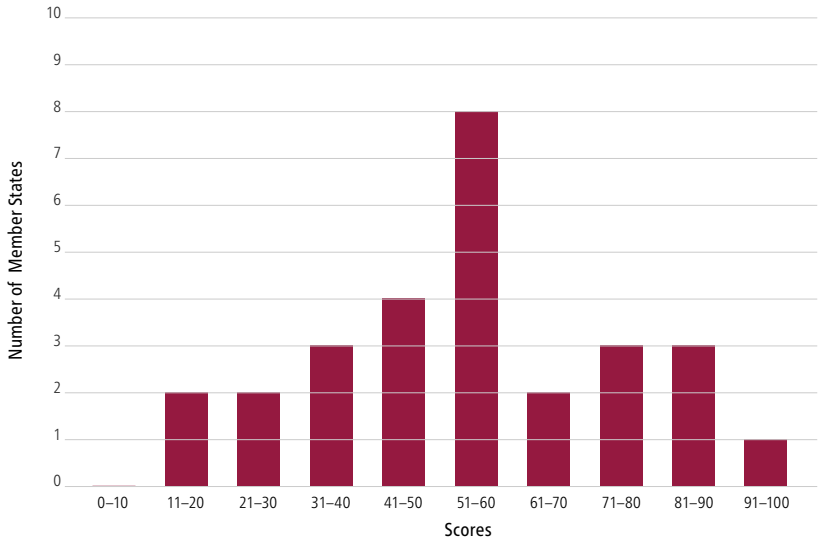
ACTION AREA 3. COMMUNITY AND WORKPLACE ACTION

Actions to reduce the harmful use of alcohol at municipal, school and workplace levels provide direct avenues for identifying, prioritizing and responding to local needs. These settings also play an important part in tackling alcohol's harm to people other than the drinker by, for example, providing family-based support to children and partners of heavy drinkers or reducing the economic burden of alcohol consumption to wider society by addressing alcohol-related workplace absenteeism and reduced productivity. Community programmes can be useful for changing collective behaviour by increasing support for regulation and enforcement of alcohol policies. It is important that attention be paid to capacity-building, resource development, and programme evaluation and reporting when developing community-based activities.

Implementation of recommended community and workplace action among Member States varied widely, with the largest number of Member States (N = 8) earning the midrange scores of 51–60 points for this action area (Fig. 23).

In relation to individual policy measures, 22 of 28 participating Member States have a legal obligation in place to include alcohol prevention in the school curriculum, while 13 of 28 have national guidelines for preventing and reducing alcohol-related harm in school settings. Twelve of 28 reported high coverage of community-based programmes for prevention of substance use and substance-use disorders, indicating that greater than 31% of the target population is included. Sixteen Member States have national guidelines for alcohol problem prevention and counselling at workplaces.

Fig. 23. Distribution of scores for action area 3, community and workplace action (n = 28)



ACTION AREA 4. DRINK–DRIVING POLICIES AND COUNTERMEASURES

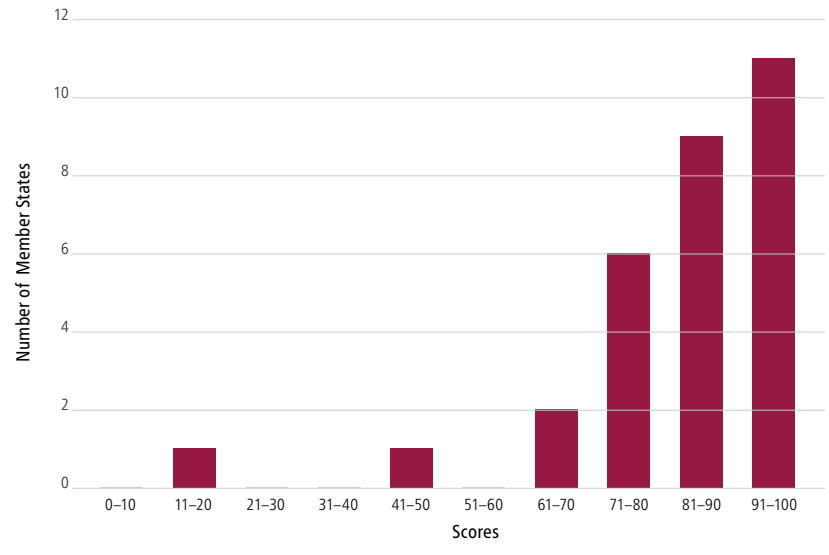
Even small amounts of alcohol can impair the ability to drive. To be effective, actions to reduce drinking and driving, injuries and fatalities require sustained joined-up activity involving government, traffic police, the criminal justice system, safety authorities, the health sector, local communities and other stakeholders. Maximum legal blood alcohol concentration (BAC) limits when driving a vehicle, sobriety check-points and random breath testing have proved effective strategies in creating a safer driving environment and minimizing the likelihood and severity of alcohol-influenced road-traffic crashes.

EAPA composite indicator scores show that in general, countries are performing quite well on drink–driving policies and countermeasures (Fig. 24); the median score for this action area was 85. Twenty countries scored above 80 points; of these, three earned the maximum number of points.

The risk of a road-traffic crash rises at any level of BAC above zero *(12)*, increasing exponentially with higher levels of intoxication *(103)*. The EAPA therefore highlights the importance of reducing legal BAC levels for drivers. Countries are encouraged to consider a maximum legal BAC of 0.02%.

Seven EU countries reported a maximum legal BAC level of 0.02% or below for general population drivers. Four of these countries have legislated for a zero-tolerance level

Fig. 24. Distribution of scores for action area 4, drink–driving policies and countermeasures (N = 30)



(Fig. 25). As the risks of driving under the influence of alcohol are even more pronounced among young drivers, many countries have implemented stricter BAC levels for young/novice drivers (Fig. 26).

Fig. 25. National maximum BAC levels for general population drivers, by number of countries (N = 30)

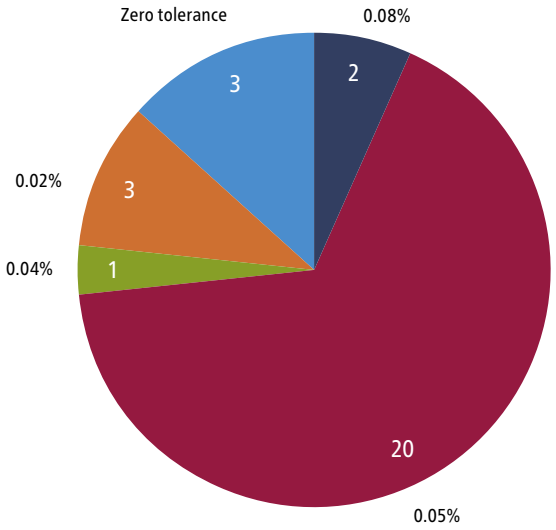


Fig. 26. National maximum BAC levels for young/novice drivers, by number of countries (N = 30)

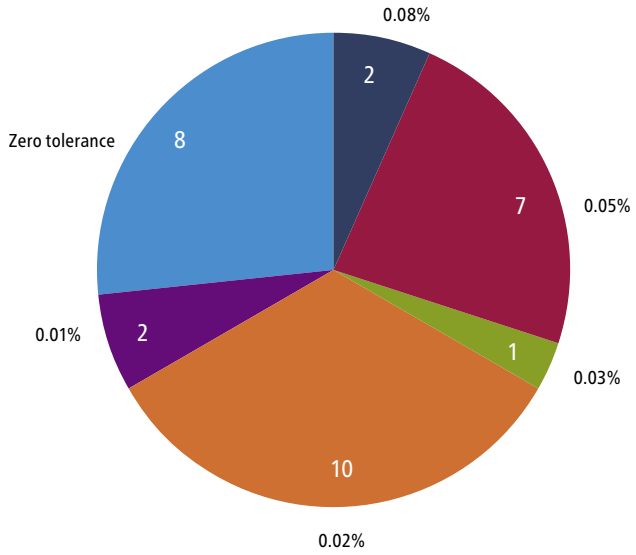


Table 10. Penalties for drink–driving by number of countries

Penalties	Number of countries (N = 30)
Fines	30
Penalty points	19
Short-term detention	17
Vehicle impounded	14
Mandatory treatment	7
Mandatory education and counselling	16
Driving licence suspension	30
Driving licence revoked	20
Imprisonment	22
Community/public service	12
Ignition interlock	4

BAC legislation is only successful in reducing drink–driving incidents, however, if it is combined with other actions and supported by enforcement measures that increase drivers' perceived risk of detection. Random breath testing, meaning that any driver can be stopped by the police at any time to test their breath for alcohol consumption, is used by 27 countries. Sobriety checkpoints, which are defined as checkpoints or roadblocks established by the police on public roadways to control for drink–driving, are used by 19 countries.

The EAPA notes that BAC laws are most effective in deterring drink–driving when punishment has severe personal consequences for the driver. The range of penalties reported for offenders against drink–driving laws are presented in Table 10.

ACTION AREA 5. AVAILABILITY OF ALCOHOL

Reducing the availability of alcohol decreases consumption and subsequent associated harm. Preventing easy access to alcohol for vulnerable and high-risk groups, first and foremost minors, and changing social and cultural norms that promote the harmful use of alcohol are the two underlying major rationales. A variety of policy options can be enacted to decrease access to alcohol in a country. These include: limiting the number of outlets that sell alcohol by requiring retail licensing or through measures to reduce density; reducing the times at which alcohol can be purchased through restrictions on the permitted hours and days of

sales; and reducing the number of people who can obtain alcohol by enforcing a minimum age for purchase or consumption of alcoholic beverages. Creation of alcohol-free public environments through drinking bans in public places has also been shown to have the potential to reduce drinking among young people.

Implementing and enforcing restrictions on the physical availability of retailed alcohol, specifically reducing the hours of alcohol sales, is recognized by WHO as one of the three "best buy" policy measures to reduce noncommunicable diseases *(104)*. A "best buy" is defined as an effective intervention with a cost-effectiveness analysis of less than or equal to I$ 100 per DALY averted in low-income and lower-middle-income countries *(105)*.

The median EAPA composite indicator score for this action area was 70; most countries (N = 17) scored in the 71–90 range. There is room for improvement in this area, as no country obtained the maximum score and three scored under 10 points (Fig. 27).

The EAPA suggests that countries should consider raising the minimum purchase age to at least 18 years for all beverage categories and at all sales outlets, including supermarkets and bars. Currently, 22 countries have an 18-year minimum age limit (Fig. 28).

Twelve countries have a comprehensive restriction on either days or hours of sales (beer, and wine and spirits) for both on- and off-premise sales. Five additional countries have a comprehensive restriction on either days or hours of sales (beer, and wine and spirits) for either on- or off-premise sales (Table 11).

Fig. 27. Distribution of scores for action area 5, availability of alcohol (N = 30)

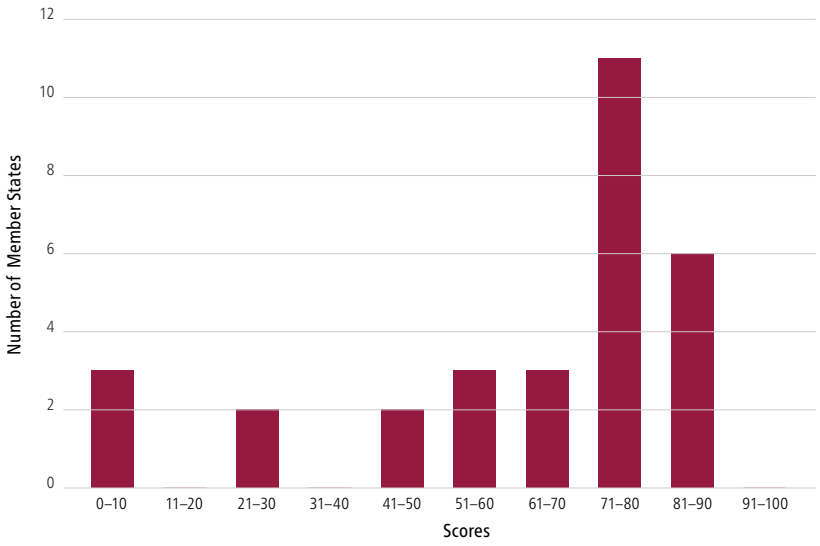


Fig. 28. Minimum age limits for sales of beer, wine and spirits at on- and off-premise sale outlets, by number of countries (N = 30)

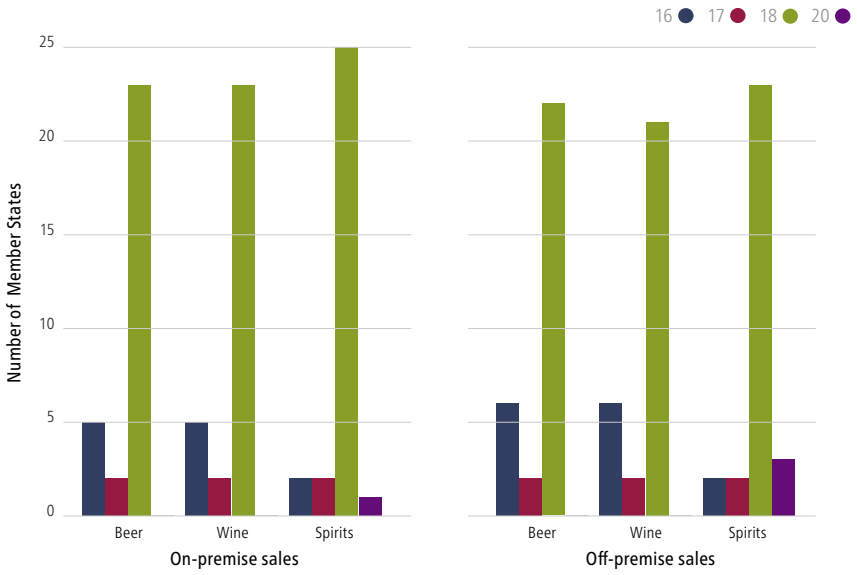


Table 11. Number of countries with on- and off-premise restrictions on alcohol availability, by time and beverage type

	On-premise			Off-premise		
	Beer	Wine	Spirits	Beer	Wine	Spirits
Hours of sale	12	12	13	15	15	16
Days of sale	4	4	4	6	7	7

ACTION AREA 6. MARKETING OF ALCOHOLIC BEVERAGES

Evidence for the association between exposure to alcohol marketing and harmful alcohol use among young people is growing. Recent longitudinal studies show that young people with higher levels of exposure to marketing are more likely to initiate alcohol use and consume alcohol in harmful patterns *(106).* Regulation of the marketing of alcoholic beverages, including content and volume, is an important instrument for reducing alcohol consumption, particularly among young people, and is recognized as another WHO "best buy" policy measure to reduce noncommunicable diseases. Introducing bans or partial restrictions are cost-effective policy measures to reduce consumption and associated harm *(107).* The EAPA composite indicator takes into account restrictions in several marketing platforms, including advertising, product placement, sponsorships and sales promotions (see WHO Regional Office for Europe *(98*:Annex 2*)*), including digital media.

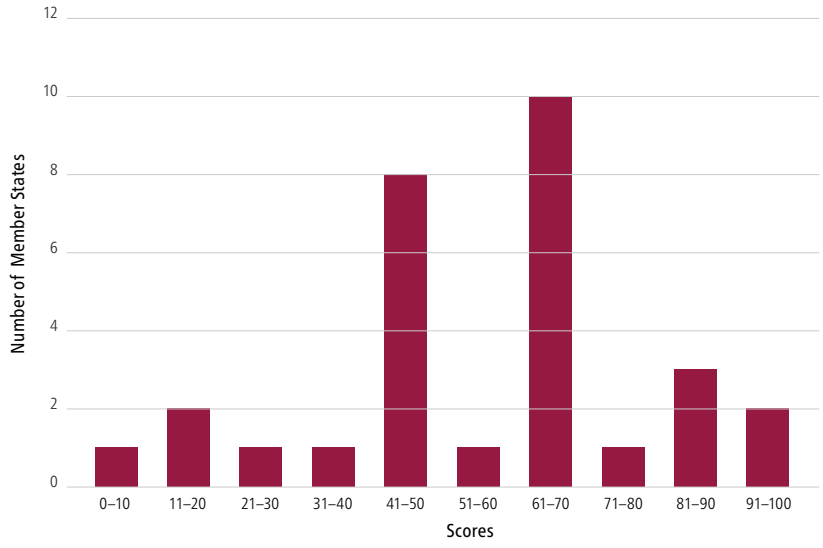
Technological progress through digital media provides stakeholders with new opportunities and new ways to reach, influence and interact with consumers *(108–112)*, particularly with young people. This is achieved through a combination of paid media (such as pop-up adverts or advertisements), owned media (branded websites and social media pages) and content co-created with users. Marketing through these new media channels can be targeted at specific audiences, virally spread between users and accessed in almost any context (via smartphones), and can actively recruit users into the marketing process. This has led to claims that digital marketing may be more powerful and less controllable than traditional alcohol marketing. It is a challenge to monitor these marketing strategies to children and young people with traditional approaches adopted by public health researchers and governments.

Governments and regulators face challenges as content arising from different countries and regulation and standards are not consistent. Any regulation in place is often designed and/or monitored by the alcohol and/or advertising industries.

Most Member States scored above 40 points on marketing restrictions, with the largest numbers in the category 61–70 points (n = 10). In general, few countries employ a complete ban on alcohol marketing across different types of media, meaning scores are spread quite wide (Fig. 29).

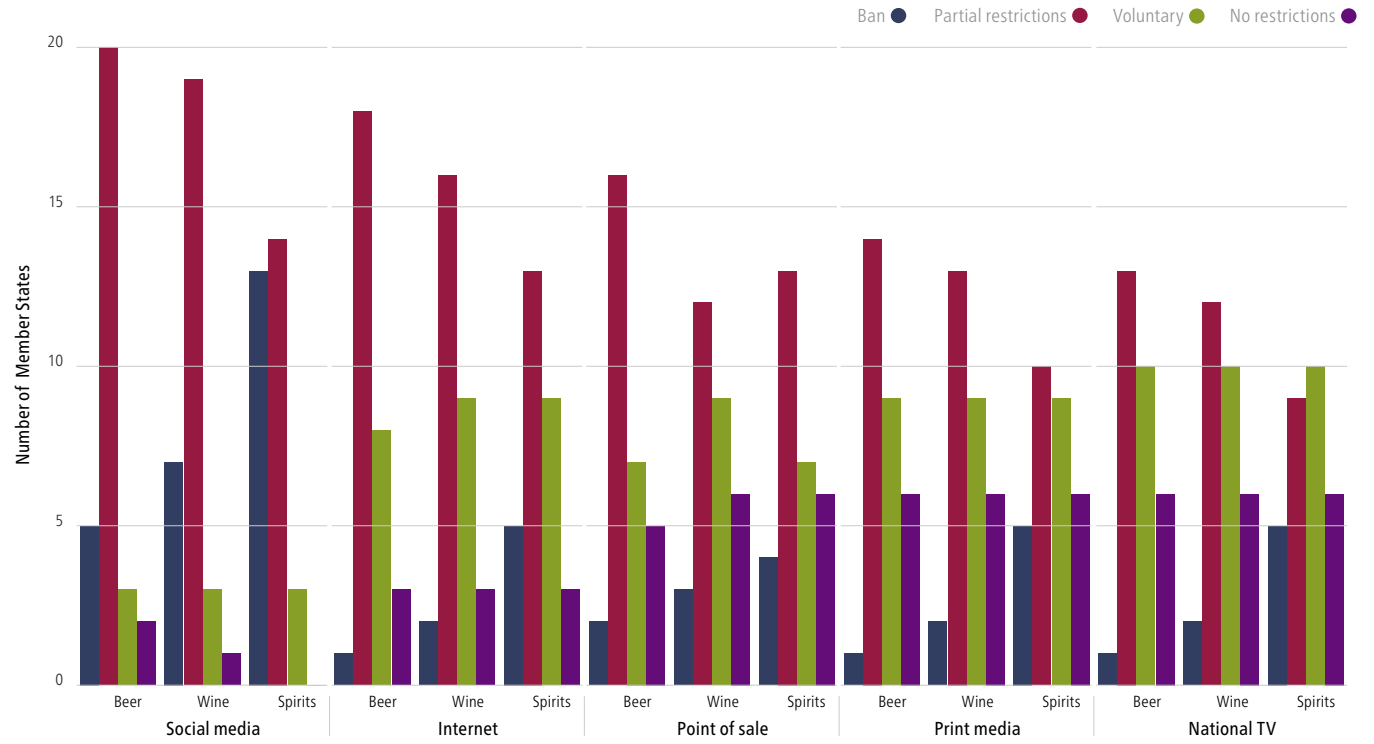
Fig. 30 shows the level of legally binding restrictions for advertising in a range of selected media sources across Member States. For all but one area and beverage type, partial restriction on content and/or placement of advertising is the most common type of regulation. Overall, spirits was the beverage type most commonly reported to have a full advertising ban. National television was the medium with the highest numbers of Member States enforcing a ban on advertisements of beer (n = 5), wine (n = 7) and spirits (n = 13).

Fig. 29. Distribution of scores for action area 6, marketing of alcoholic beverages (N = 30)



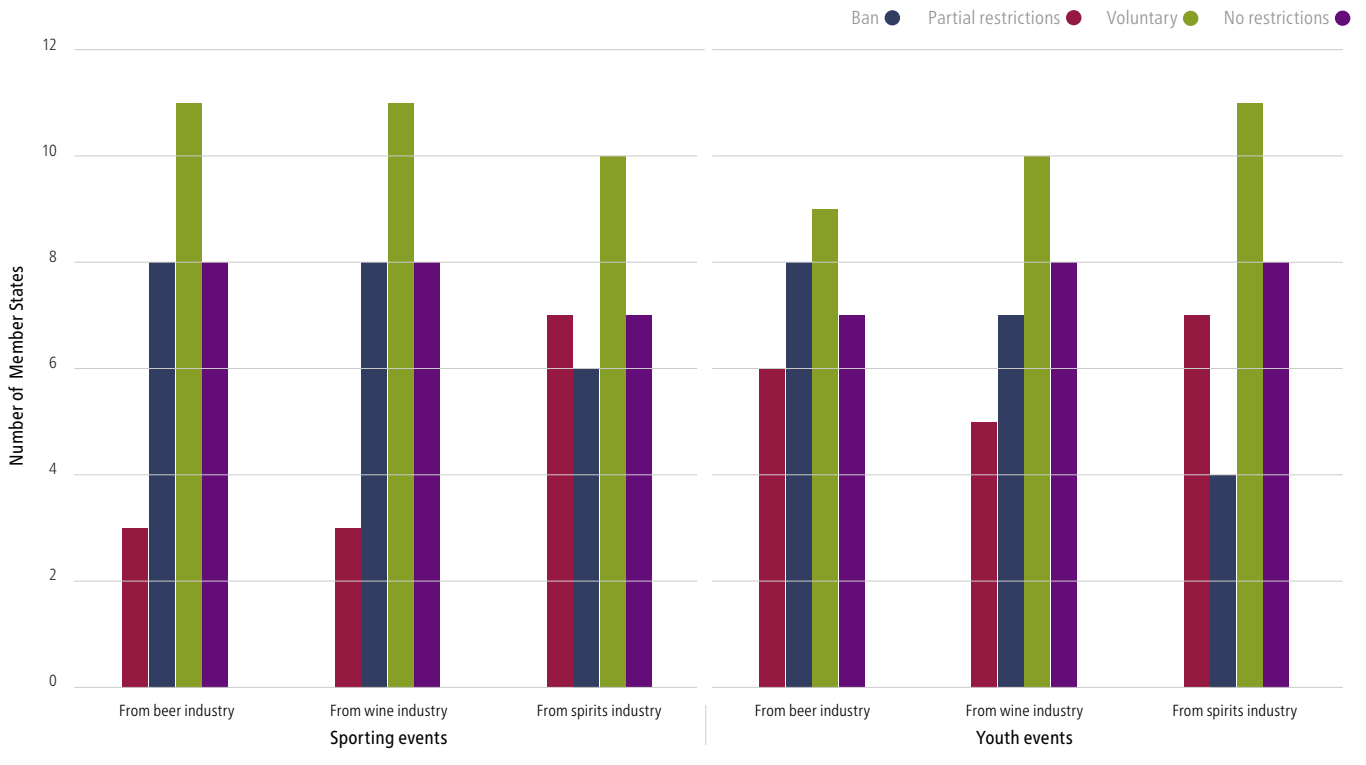
The EAPA also recommends that countries consider legally binding regulation of sponsorship activities that promote alcoholic beverages and restrictions on promotions in connection with activities targeting young people. Voluntary agreements were the most common type of restriction related to industry sponsorship of sporting events and youth events for all beverage industries. Of the beverage types, full legally binding bans were most common for spirits, as was the case with advertising. A ban on spirit industry sponsorship was reported by seven Member States for sporting events and seven for youth events (Fig. 31).

Fig. 30. Level of advertising restrictions in selected media sources[a] (N = 30)



[a] Partial statutory restriction means that the restriction applies during a certain time of day or for a certain place, or to the content.

Fig. 31. Level of restrictions on industry sponsorship for sporting and youth events (N = 30)



ACTION AREA 7. PRICING POLICIES

Increasing the price of alcoholic beverages has been identified as one of the three "best buy" policies due to the considerable evidence showing that regulating the price of alcohol through means such as taxation, or other policies like minimum unit pricing, reduces overall consumption and associated harm *(105)*. Price increases on cheap alcohol were shown to have the biggest impact on consumption through, for instance, discounting increased off-premise purchase of alcohol and heavier on-premise drinking. Price control also plays a crucial role in combatting alcohol-related risks in vulnerable populations, such as young people, influencing consumers' preferences and halting progression towards drinking large volumes of alcohol and/or episodes of heavy drinking.

Fig. 32 shows the distribution of scores for pricing policies. It indicates that all Member States with data for this action area scored below 50 points, and most scored at the lower end of the distribution.

While weighted points for the affordability of alcohol[12] were low for most Member States (only one scored the maximum 16 points), other pricing policies were significant factors in the low overall scores due to their weighted contribution to scores for the action area. Fig. 33 shows the number of Member States that adjust the price of alcohol in relation to the level of inflation, indicating that five adjust the price of beer and spirits, and three the price of wine.

Other key indicators in this action area include establishing minimum prices for alcohol, requiring non-alcoholic beverages to be sold at a lower price, banning below-cost selling and volume discounts, and implementing an additional levy on specific alcoholic products. Sixteen Member States lacked all of these policies. One EU Member State has implemented a minimum unit price for alcohol, two have policies on selling non-alcoholic beverages at a lower price than alcoholic beverages, two have a ban on below-cost selling, three have a ban on volume discounts, and five have an additional levy on specific alcoholic beverages.

Fig. 32. Distribution of scores for action area 7, pricing policies (n = 26)

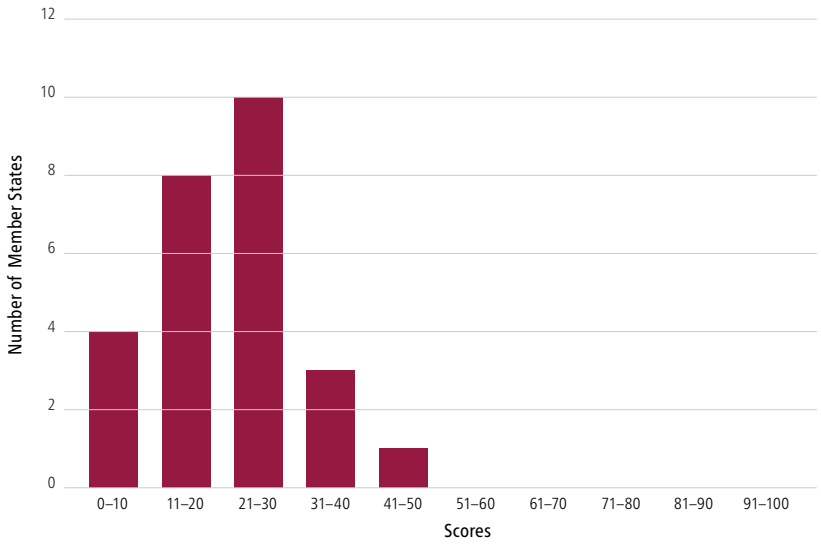
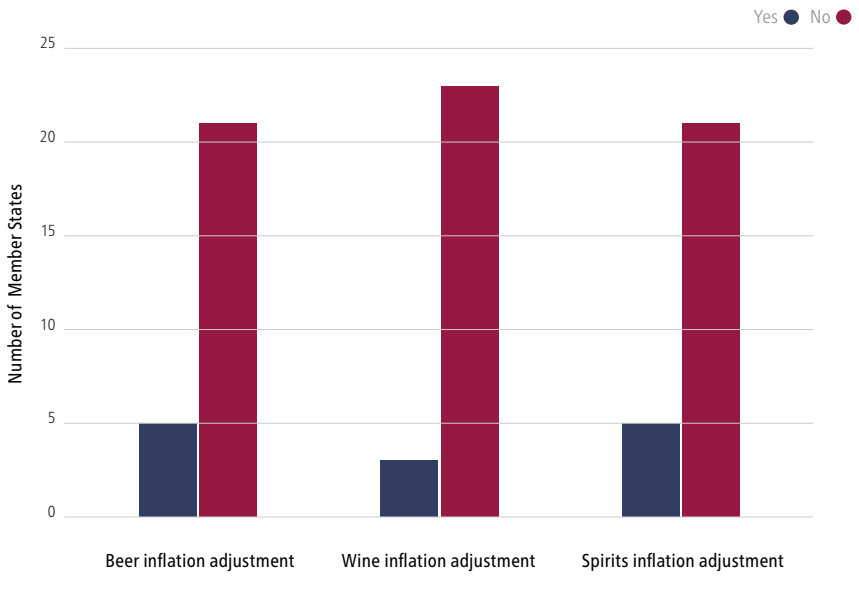


Fig. 33. Member States that adjust the prices of alcoholic beverages for inflation (n = 26)



[12] This is based on an affordability index for 50 cl beer, 75 cl wine, 70 cl spirits (local brand) and 70 cl spirits (imported brand).

ACTION AREA 8. REDUCING THE NEGATIVE CONSEQUENCES OF DRINKING AND ALCOHOL INTOXICATION

Heavy drinking patterns not only contribute to specific harms such as injuries, violence and alcohol poisoning, but also to long-term chronic harm *(12)*. Policy options to reduce these harms by influencing the way in which alcohol is consumed focus on modifying the drinking environment to discourage heavy drinking and on informing consumers and raising awareness of the risks of consuming large amounts of alcohol on a single occasion. Concrete examples include server training (teaching servers, for example, not to serve any more alcohol to people who are already intoxicated) and health warning labels on alcoholic beverage containers.

The EAPA composite indicator score distribution in this action area is towards the lower end, with most countries scoring 40 points or less (Fig. 34). Seven countries scored between 60 and 70 points.

Fig. 35 shows that most Member States have not implemented the three policy measures covered by this action area. Half have not implemented server training, 20 do not have legal requirements for health warning labels on alcohol advertisements, and 28 do not have a legal requirement for warning labels on bottles or containers.

Fig. 34. Distribution of scores for action area 8, reducing the negative consequences of drinking and alcohol intoxication (N = 30)

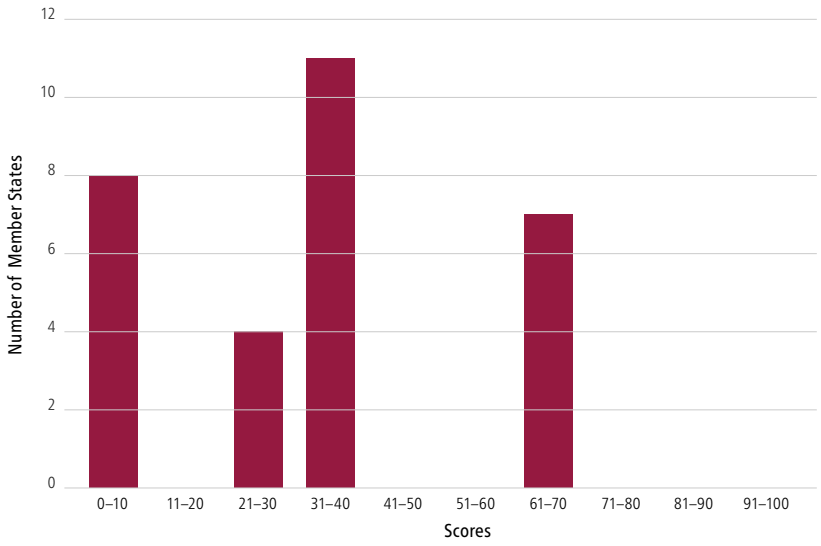
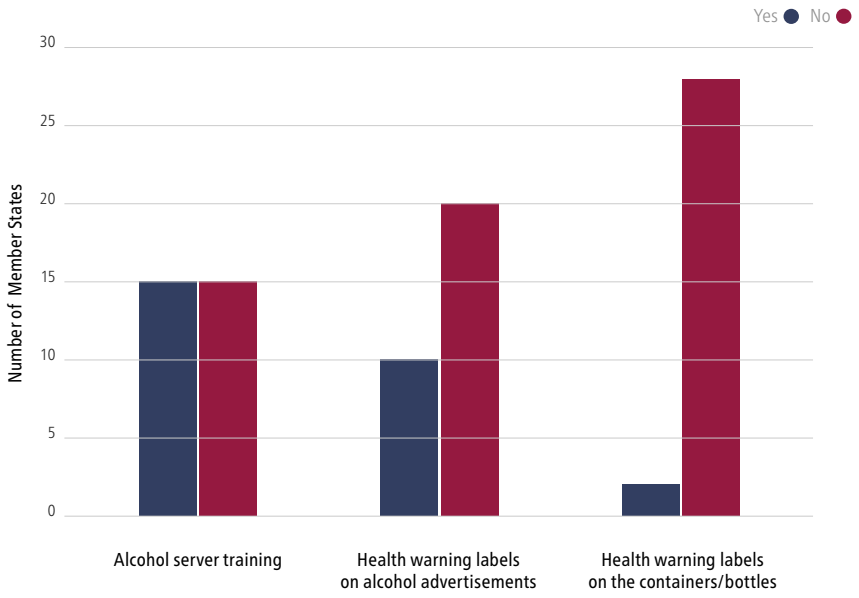


Fig. 35. Implementation of alcohol server training and warning labels (N = 30)



ACTION AREA 9. REDUCING THE PUBLIC HEALTH IMPACT OF ILLICIT ALCOHOL AND INFORMALLY PRODUCED ALCOHOL

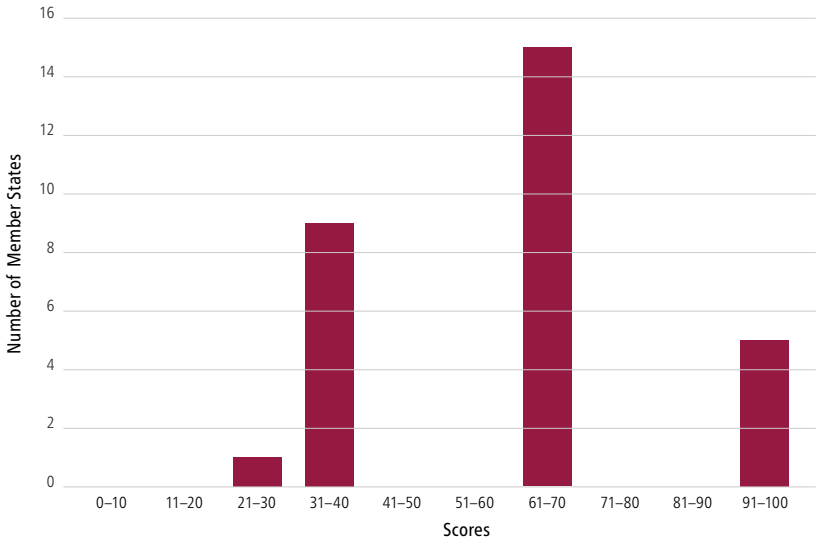
New estimates for the EU+ show that unrecorded alcohol consumption accounts for 12.4% of the total APC (see Part 1). Illicitly and informally produced alcohol can not only have a potentially greater negative health impact than commercially produced alcohol, mainly due to lower cost and less restricted availability, but may also contribute to losses in tax revenue and potentially undermine national alcohol policy through cross-border trade *(12)*. Steps should be taken to ensure that national alcohol policy addresses the health harm stemming from illicit and informally distributed and/or produced

alcohol. Measures such as computerized tracking should be introduced to facilitate the tracking and identification of illicit products, and national surveillance systems should be improved to regularly monitor the extent of unrecorded alcohol in the country. To do so, good market knowledge, an appropriate legislative framework and active enforcement of policy measures are required.

The scores for this action area were widely dispersed, with 10 Member States scoring between 21 and 40 points, 15 scoring 61 to 70, and five scoring in the highest category of 91 to 100 points (Fig. 36).

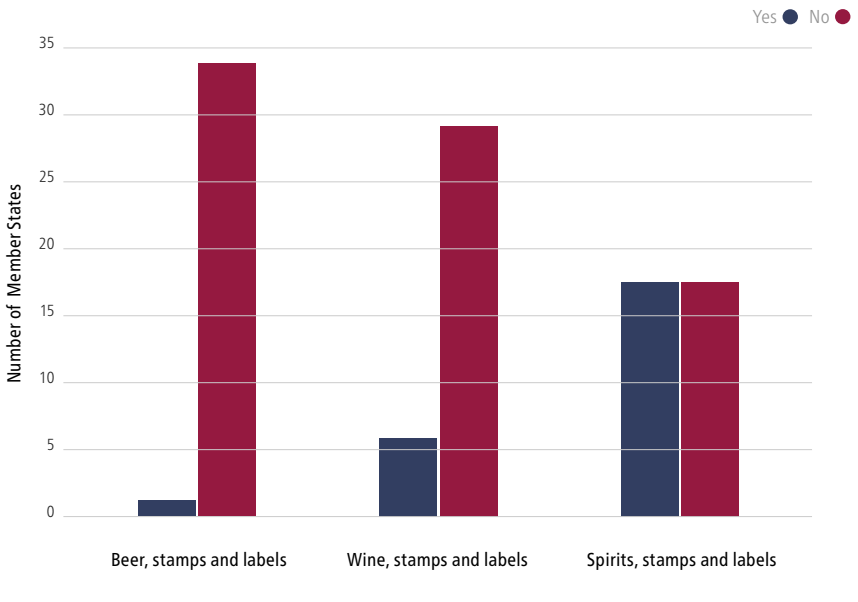
One of the main instruments for ensuring that alcohol is managed and taxed within the system is the excise tax stamp, the main purpose of which is to provide a physical means of collecting tax. The stamp is proof to a recognized governing authority that a payment has been made for a particular alcohol product. The excise stamp system also acts, at least to some extent, as a guarantee that the product is genuine and has been certified by a governing authority. Depending on the technical standards and security features of the excise stamp, production, sale and consumption of counterfeit alcohol products could effectively be prevented: holographic excise stamps in combination with security holograms, for instance, have been shown to be good, physical anticounterfeiting technologies.

Fig. 36. Distribution of scores for action area 9, reducing the public health impact of illicit alcohol and informally produced alcohol (N = 30)



The beverage type for which most Member States report an existing system of stamps and labels on containers was spirits (n = 15), followed by wine (n = 5). Only one Member State reported having a system for stamps and labels on beer (Fig. 37).

Fig. 37. Stamps and labels on beer, wine and spirits (N = 30)



The vast majority of Member States have legislation to prevent illegal production of alcohol (n = 29) and illegal sale (n = 29). Establishing the level of unrecorded consumption in a country is difficult and requires several data sources to produce estimates. Eleven Member States reported having a monitoring system that includes regular estimation of consumption of illicit and illegal alcohol. Reported sources of these estimations included expert opinion, research on unrecorded consumption, indirect estimates using government data on confiscated/seized alcohol, and indirect estimates using survey data.

ACTION AREA 10. MONITORING AND SURVEILLANCE

A well established monitoring and surveillance system of alcohol consumption and associated harm is an important component of following trends and enabling the introduction of policy measures to respond to increasing levels of harmful alcohol use and alcohol-related harm. Such systems also allow for an evaluation of the impact of alcohol policies *(12)*. Most Member States scored towards the higher end of the distribution of scores: 21 Member States scored 61 points or higher (Fig. 38).

Most Member States reported having monitoring systems in place that include data on alcohol consumption in the population (n = 24), and most also reported having national population-based surveys that include questions about alcohol (n = 20). Fig. 39 shows further aspects of national monitoring systems. Regular reports are available in most Member States (n = 28), and the monitoring of alcohol and health is mandated by a person, institution, department or organization within the country in 21. While data on health consequences are included in the monitoring system in most Member States, data on policy responses and social consequences appear to largely be absent.

In line with the *Action plan on youth drinking and on heavy episodic drinking (binge drinking), 2014–2016* endorsed by the Committee on National Alcohol Policy and Action *(113)*, data on these specific areas are important for monitoring drinking among young people and risky drinking patterns. While 28 Member States reported having national surveys on the rates of HED, fewer have monitoring systems that include national youth surveys (n = 21).

Fig. 38. Distribution of scores for action area 10, monitoring and surveillance (N = 30)

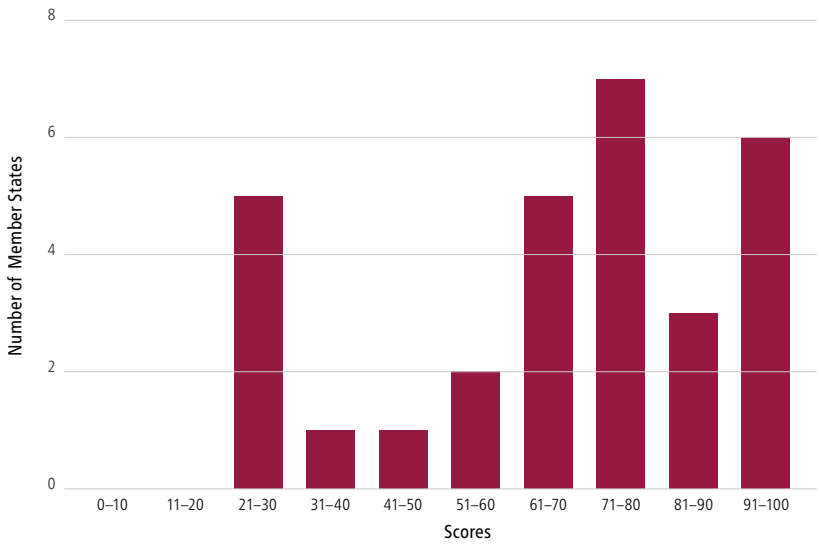
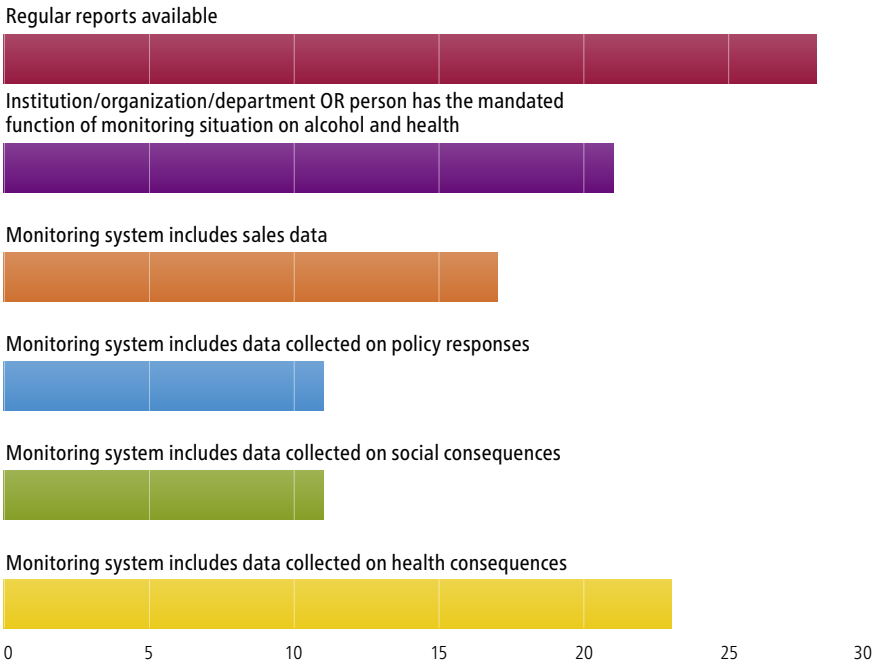


Fig. 39. Alcohol monitoring system components (N = 30)



PART 4

DISCUSSION AND CONCLUSION

DISCUSSION

Trends in alcohol consumption and harm in the EU+

The observed decline of total APC in the EU+ is not statistically significant, except for adolescents (age group 15–19 years). Although alcohol-attributable harm, especially age-adjusted alcohol-attributable harm, and heavy drinking occasions have decreased since 2010, which is positive, the burden of alcohol in the EU+ in 2016 remains too high. Average adult alcohol consumption was 11.3 litres of pure alcohol per person (including life-time abstainers and former drinkers). This is an average intake of about 170 grams of pure alcohol per week, which is equivalent to more than two bottles of wine. In current drinkers (people who reported drinking alcohol within the last 12 months), the number was as high as 15.7 litres per person, which is equivalent to an average weekly intake of about 237 grams of pure alcohol, or more than three bottles of wine, per week.

There were 291 000 preventable deaths, 7.6 million YLL and 10.3 million DALYs attributable (or due) to alcohol in the EU+ in 2016. This means that alcohol remains one of the most important risk factors for burden of mortality and disease in this subregion, being responsible for 5.5% of all deaths in the EU+ and 6.8% of all DALYs in 2016.

The fact that the harm decreased in almost all EU+ countries but the APC decreased in only about half needs to be discussed further.

How can these developments be explained?

The composition of death and disease in the EU+

It is essential to acknowledge that change in alcohol-attributable burden is always a function of alcohol exposure **and** other environmental variables. This is true even for **AAFs**, which, at first sight, would seem to depend only on alcohol exposure and time-invariant relative risks (see the *Data sources and methods* source, Formula 1). Overall AAFs, YLLs or DALYs are nevertheless very much dependent upon their composition of different disease and injury categories, and how this composition changes over time. Changes in alcohol-attributable burden fractions between 2010 and 2016 therefore depended not only on changes in overall consumption and heavy drinking occasion prevalence, but also on the composition of death and disease in the EU+: that is, whether causes of death or DALYs with high AAFs increased or decreased relative to other causes. Causes with high AAFs decreased substantially in the time period since 2010, which explains how a 1.5% decrease in alcohol exposure coupled with a 11% decrease in prevalence of HED can be associated with an 8.6% decrease in the AAF for number of deaths, a 10.3% decrease for YLL, and a 10% decrease for DALYs.

Age-adjusted alcohol-attributable rates of standard health outcomes (mortality, YLL and DALYs) depend even more heavily on factors other than alcohol use (such as other risk factors, the health-care system and economic conditions, including issues such as poverty and inequality). How can other risk factors impact on alcohol-attributable rates? Consider the example of oesophagus cancer. Imagine a case where alcohol is constant, but tobacco smoking decreased markedly. This means that the interaction effects of alcohol and smoking on oesophagus cancer will be smaller and the overall incidence and mortality rates of this cancer type will decrease. Once the same AAF is applied to a smaller rate, the alcohol-attributable rate will also decrease.

General (meaning all-cause) rates of mortality, YLL and DALYs, and changes to them, can be used as overall indicators for the net effects of these influences. All-cause mortality rates strongly affect alcohol-attributable rates and, as indicated above, the changes in alcohol-attributable rates between 2010 and 2016 were more dependent on changes in all-cause rates than on changes of alcohol exposure levels.

This means that the decreases in alcohol-attributable mortality, YLL and DALY rates were due mainly to the overall improvement in rates of mortality for conditions causally related to alcohol. EU+ countries have shown a considerably decreased prevalence of morbidity and mortality from cancer, CVD, liver cirrhosis and injury since 2010, so alcohol-attributable rates have also decreased, even if the level of alcohol consumption did not decrease that much (except in the age group 15–16 years).

Against this background, the EU+ is in a favourable position to have decreased rates for all-cause mortality and DALYs. Lower levels of alcohol exposure indicators have contributed to the decrease, but the contribution of lowered alcohol exposure could

have been greater with further decreases in consumption and HED, as these two dimensions affect disease incidence and mortality *(30)*.

The impact of unrecorded alcohol consumption

At the same time, the relative increase of +22.3% in unrecorded alcohol consumption between 2010 and 2016 needs to be better understood and calls for evidence-based policy measures. The *Global strategy to reduce the harmful use of alcohol (114)* and the EAPA provide a series of recommendations to reduce the risk stemming from unrecorded alcohol consumption, which can be classified into three categories:

1. developing and strengthening monitoring systems for illicit alcohol production and sale – for instance, countries like Sweden or Finland include questions on unrecorded alcohol in their national systems for monitoring alcohol consumption;
2. regulating the sale of informally produced alcohol and bringing it into taxation systems by, for example, offering financial incentives for small-scale alcohol producers to sell the alcohol to a state-managed trade organization and not directly to the consumer, as in the case of the German spirits monopoly; and
3. ensuring the necessary cooperation and information exchange on combating illicit alcohol production and use among authorities at national and international levels.

Given the role alcohol consumption plays in contributing to socioeconomic inequities in mortality, unrecorded alcohol consumption should be monitored and reduced via the enactment of alcohol policies and interventions to prevent the socioeconomic gap in mortality widening even further *(20)*.

Scaling up evidence-based alcohol policy

There are some warning signs that the outlined developments may not continue automatically in the future: the simultaneous decrease in the level of alcohol consumption with a reduction of heavy drinking patterns in EU+ countries seems to have come to a halt. Apparent increases in income inequality in some countries and in some high-income countries seem to be linked to increases in mortality, and alcohol use may play a role *(22,115)*.

Based on previous experiences, it cannot be assumed that the favourable trends will continue without any effort to better control alcohol consumption in the future, specifically through implementation of evidence-based policies.

The analysis of policy implementation in countries has shown, however, areas where Member States clearly should further invest to improve policy response. Although caution should be exercised when interpreting the total achieved scores per country as well as the aggregated country policy mean (Fig. 1), observed distributions per action area provide important hints.

Out of the 10 policy action areas of the EAPA, there were three in which Member States as a whole scored more than two thirds of the total possible policy score (based on the mean): leadership, awareness and commitment (action area 1); drink–driving policies and countermeasures (area 4); and monitoring and surveillance (area 10). There were three areas for which Member States as a whole scored less than one third of the total possible policy score (based on the mean): reducing the negative consequences of drinking and alcohol intoxication (area 8), with only two countries having a legal requirement for warning labels on bottles or containers, despite alcohol being classified as a carcinogen; pricing policies (area 7), with only five countries adjusting the price of beer and spirits for inflation and only three adjusting the price of wine; and marketing of alcoholic beverages (area 6), with no country employing a complete ban on alcohol advertising and product placement across different types of media.

This is not surprising, as policies in the former three areas (awareness-raising, drink–driving and surveillance) are relatively easy to implement and enforce, while those in the latter three are rather unpopular (pricing and marketing restrictions) or difficult to implement due to the stigma of alcohol dependence (negative consequences of drinking and alcohol intoxication). More can and should be done in these three policy areas, especially given the robust evidence that increasing the price of alcohol is one of the most cost-effective alcohol policies available. In practice, effective pricing and marketing controls to reduce alcohol harm are often well accepted by the general public.

Evaluation of national alcohol policies and data collection

Unfortunately, the assessment of alcohol policy in 2016 was a snapshot, and it has not been possible to look at changes from 2010 due to differences in indicators used to calculate the policy scores. Despite the obvious benefits and potential the new tool offers, the tool and results it produces also have some substantial limitations. EAPA composite indicators in their current form take the reported legislation and policies at face value, without any measurement of enforcement. This substantially limits cross-country comparability of results in the 10 areas, as enforcement rates might vary strongly. Limitations are also linked to alcohol policy scales being self-reported at country level, with no external validity checks, and some countries having decentralized prevention, health and treatment responsibilities and services that lack good reporting mechanisms to national level. It is difficult to describe this variation within a single country-level report.

Despite these limitations, the EAPA composite indicators provide a tool for evaluating national policies to ensure they reflect the current evidence base and recommended best practices. As they are explicitly tied to EAPA, which has been endorsed by all 53 Member States of the European Region, they provide Member States with an opportunity to monitor their individual trends over time and compare policy options adopted by other countries. At the same time, the tool and the country fact sheets *(116)*[13] can also be good indicative instruments for identifying which countries are excelling in particular areas and facilitate networking and sharing of good practices.

The international comparability achieved through one joint instrument presents the potential to coordinate international efforts to reduce alcohol consumption and alcohol-attributable harm. This is particularly important when policy-makers have to adopt vital but unpopular policies, such as alcohol price increases, which are likely to prove unpopular with economic operators, or when international coordination is required to harmonize policies and enforcement in one broader region, as, for instance, in the case of reducing unrecorded alcohol consumption related to smuggled alcohol or in cross-border marketing through broadcast or social media.

The large amount of missing data, particularly in action area 3 (health services' responses), where data were missing for 12 Member States, needs to be addressed in the next round of data collection. Composite scores could not be calculated for these countries due to insufficient data. Data mainly were missing for the existence and implementation of SBI programmes in both service provision and monitoring, signalling a need for improvement in this area. In combination with action area 9 (reducing the public health impact of illicit alcohol and informally produced alcohol), wider implementation of SBIs and better access to specialist treatment might contribute to the development and implementation of high-risk strategies to reduce consumption and harm in vulnerable populations.

CONCLUSION

Alcohol was responsible for over 290 000 deaths and 7.6 million YLL in the EU+ in 2016. Wide variability in rates of alcohol-attributable deaths and YLL were also seen across EU countries, with the pattern of differences similar, but not identical, to the pattern of differences in APC. In absolute numbers, most alcohol-related deaths occurred in middle and older age, but the proportion of all alcohol-related deaths was much higher among younger age groups. This means that compared to middle-aged and older people, deaths in younger people are more likely to be alcohol-attributable, often due to injuries. Countries with higher APC tended to have higher death rates and more alcohol-related YLL than countries with lower APC, but there was almost a six-fold variability in alcohol-related death rates per one litre consumption of alcohol between the country with the lowest alcohol-related death rate and the country with the highest, predominantly due to differences between countries in the underlying death rates from all causes, and different patterns of disease and levels of wealth and inequality within countries. If the levels of alcohol consumption in higher-consuming countries were to decrease, poorer countries were to become richer and income differentials that were higher in some countries were to decrease, alcohol-related harm for the EU+ would decrease.

APC for the EU+ did not change significantly between 2010 and 2016: it was 11.5 litres per adult in 2010 and 11.3 in 2016, the small difference being within the margin of measurement error. The prevalence of HED, however, decreased from 34.1% to

[13] The country fact sheets have been developed in parallel to this report and are complementary to it.

30.4%, a proportional drop of 10.7%, and alcohol consumption decreased substantially in the age group 15–19 years. There was very wide variability in changes over the six-year period. The range extended from a proportional drop in APC of 20% to an increase of 11%.

Despite no change in APC in the adult population, the absolute numbers and age-standardized rates of alcohol-attributable death, YLL and DALYs declined for EU+ countries, which can likely be explained by overall improvements in health for the EU+ population.

It is a welcome sign that overall age-standardized death rates have reduced, but this provides no room for complacency for the following reasons.

- There seems to be a general flattening of gains in all-cause death rates, and an associated flattening of life expectancy. There will therefore be a flattening of decreases in alcohol-related death rates independent of changes in alcohol consumption.
- Gender trends differ, with falls in consumption and harm being greater for women than men.
- There seem to be increases in income inequality, which will lead to increases in alcohol-attributable harm independent of changes in alcohol consumption.
- Reductions of heavy drinking patterns in EU+ countries, which may have had an impact in reducing alcohol-related harm, seem to have come to a halt.

The decline in young people's alcohol consumption between 2013 and 2015 seemed to have levelled out in some EU Member States in 2016. All of these signs indicate that to maintain reductions in alcohol-attributable health and social harm, implementation of evidence-based alcohol policies needs to be stepped up to decrease levels of APC, which have not changed for the whole EU+ over the last six years, at least. It also means that existing alcohol policy responses need to continue to be strengthened. Existing policy scores can be a useful tool for measuring policy application, but further development of objectively identifiable and verifiable detailed policy measures with specific data on their implementation is needed.

REFERENCES

REFERENCES[14]

1. Rehm J, Imtiaz S. Alcohol consumption as a risk factor for global burden of disease. A narrative review. Subst Abuse Treat Prev Policy. 2016;11:37. doi:10.1186/s13011-016-0081-2.
2. GBD 2016 Risk Factors Collaborators. Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet 2017;390:1345–422. doi:10.1016/S0140-6736(17)32366-8.
3. Global status report on alcohol and health 2018. Geneva: World Health Organization; 2018 (http://apps.who.int/iris/bitstream/handle/10665/274603/9789241565639-eng.pdf?ua=1).
4. Levin ML. The occurrence of lung cancer in man. Acta Unio Int Contra Cancrum. 1953;9:531–41.
5. Walter SD. The estimation and interpretation of attributable risk in health research. Biometrics 1976;32:829–49.
6. Walter SD. Prevention of multifactorial disease. Am J Epidemiol. 1980;112:409–16.
7. Benichou J. A review of adjusted estimators of attributable risk. Stat Methods Med Res. 2001;10:195–216.
8. Poznyak V, Fleischmann A, Rekve D, Rylett M, Rehm J, Gmel G. The World Health Organization's Global Monitoring System on Alcohol and Health. Alcohol Res. 2013;35:244–9.
9. World health statistics 2018: monitoring health for the SDGs. Geneva: World Health Organization; 2018 (http://www.who.int/gho/publications/world_health_statistics/2018/en/).
10. NCD global monitoring framework: ensuring progress on noncommunicable diseases in countries. Geneva: World Health Organization; 2017 (https://www.who.int/nmh/global_monitoring_framework/en/).
11. United Nations. Sustainable Development Goals: 17 goals to transform our world [website]. New York (NY): United Nations; 2017 (http://www.un.org/sustainabledevelopment/sustainable-development-goals/).
12. Alcohol in the European Union: consumption, harm and policy approaches. Copenhagen: WHO Regional Office for Europe; 2012 (http://www.euro.who.int/__data/assets/pdf_file/0003/160680/e96457.pdf).
13. Status report on alcohol and health in 35 European countries. Copenhagen: WHO Regional Office for Europe; 2013 (http://www.euro.who.int/en/publications/abstracts/status-report-on-alcohol-and-health-in-35-european-countries-2013).
14. Shield KD, Rylett M, Rehm J. Public health successes and missed opportunities. Trends in alcohol consumption and attributable mortality in the WHO European Region, 1990–2014. Copenhagen: WHO Regional Office for Europe; 2016 (http://www.euro.who.int/en/health-topics/disease-prevention/alcohol-use/publications/2016/public-health-successes-and-missed-opportunities.-trends-in-alcohol-consumption-and-attributable-mortality-in-the-who-european-region,-19902014-2016).
15. Xu J, Murphy SL, Kochanek KD, Arias E. Mortality in the United States, 2015. NCHS Data Brief 2016;267:1–8.
16. Kochanek KD, Murphy S, Xu J, Arias E. Mortality in the United States, 2016. NCHS Data Brief 2017;293:1–8.
17. Case A, Deaton A. Mortality and morbidity in the 21st century. Brookings Pap Econ Act. 2017;397–476.
18. Imtiaz S, Probst C, Rehm J. Substance use and population life expectancy in the USA: interactions with health inequalities and implications for policy. Drug Alcohol Rev. 2018;37(Suppl. 1):S263–7. doi:10.1111/dar.12616.
19. Rehm J, Probst C. Decreases of life expectancy despite decreases in non-communicable disease mortality: the role of substance use and socioeconomic status. Eur Addict Res. 2018;24:53–9. doi:10.1159/000488328.
20. Probst C, Roerecke M, Behrendt S, Rehm J. Socioeconomic differences in alcohol-attributable mortality compared to all-cause mortality: a systematic review and meta-analysis. Int J Epidemiol. 2014;43:1314–27.
21. Probst C, Roerecke M, Behrendt S, Rehm J. Gender differences in socioeconomic inequality of alcohol-attributable mortality: a systematic review and meta-analysis. Drug Alcohol Rev. 2015;34:267–77. doi:10.1111/dar.12184.
22. Mackenbach JP, Kulhánová I, Bopp M, Borrell C, Deboosere P, Kovács K et al. Inequalities in alcohol-related mortality in 17 European countries: a retrospective analysis of mortality registers. PLoS Med. 2015;12:e1001909.
23. Mackenbach JP, Kulhanova I, Bopp M, Deboosere P, Eikemo TA, Hoffmann R et al. Variations in the relation between education and cause-specific mortality in 19 European populations: a test of the "fundamental causes" theory of social inequalities in health. Soc Sci Med. 2015;127:51–62. doi:10.1016/j.socscimed.2014.05.021.
24. Mackenbach JP, Kulhanova I, Artnik B, Bopp M, Borrell C, Clemens T et al. Changes in mortality inequalities over two decades: register based study of European countries. BMJ 2016;353:i1732. doi:10.1136/bmj.i1732.
25. Mackenbach JP, Valverde JR, Artnik B, Bopp M, Bronnum-Hansen H, Deboosere P et al. Trends in health inequalities in 27 European countries. Proc Natl Acad Sci U S A. 2018;115:6440–5. doi:10.1073/pnas.1800028115.
26. Understanding the socio-economic divide in Europe. In: OECD [website]. Paris: Organisation for Economic Co-operation and Development; 2018 (http://www.oecd.org/inclusive-growth/about/centre-for-opportunity-and-equality/understanding-the-socio-economic-divide-in-europe-26-january.htm).
27. European code against cancer: 12 ways to reduce your cancer risk. Lyon: International Agency for Research on Cancer; 2016 (https://cancer-code-europe.iarc.fr/index.php/en/ecac-12-ways/alcohol-recommendation/27-standard-drink)

[14] All weblinks accessed 12 February 2019.

28. Rehm J, Room R, Graham K, Monteiro M, Gmel G, Sempos CT. The relationship of average volume of alcohol consumption and patterns of drinking to burden of disease: an overview. Addiction 2003;98:1209–28.
29. Rehm J, Baliunas D, Borges GL, Graham K, Irving H, Kehoe T et al. The relation between different dimensions of alcohol consumption and burden of disease: an overview. Addiction 2010;105:817–43. doi:10.1111/j.1360-0443.2010.02899.x.
30. Rehm J, Gmel GE, Gmel G, Hasan OSM, Imtiaz S, Popova S et al. The relationship between different dimensions of alcohol use and the burden of disease – an update. Addiction 2017;112:968–1001. doi:10.1111/add.13757.
31. Rehm J, Mathers C, Popova S, Thavorncharoensap M, Teerawattananon Y, Patra J. Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. Lancet 2009;373:2223–33. doi:10.1016/S0140-6736(09)60746-7.
32. International statistical classification of diseases and related health problems, 10th revision. Geneva: World Health Organization; 2007 (http://apps.who.int/classifications/apps/icd/icd10online2007/).
33. Laslett AM, Room R, Ferris J, Wilkinson C, Livingston M, Mugavin J. Surveying the range and magnitude of alcohol's harm to others in Australia. Addiction 2011;106:1603–11. doi:10.1111/j.1360-0443.2011.03445.x.
34. Murray CJ, Lopez AD. On the comparable quantification of health risks: lessons from the Global Burden of Disease Study. Epidemiology (Cambridge, Mass.) 1999;10:594–605.
35. Global status report on alcohol and health 2014. Geneva: World Health Organization; 2014 (http://www.who.int/iris/bitstream/10665/112736/1/9789240692763_eng.pdf?ua=1).
36. Manthey J, Probst C, Rylett M, Rehm J. National, regional and global mortality due to alcoholic cardiomyopathy in 2015. Heart 2018;104(20):1663–69. doi:10.1136/heartjnl-2017-312384.
37. Rehm J, Hasan O, Imtiaz S, Neufeld M. Quantifying the contribution of alcohol to cardiomyopathy: a systematic review. Alcohol 2017;61:9–15.
38. Rehm J, Probst C, Shield KD, Shuper PA. Does alcohol use have a causal effect on HIV incidence and disease progression? A review of the literature and a modelling strategy for quantifying the effect. Popul Health Metr. 2017;15:4.
39. Gmel G, Shield K, Rehm J. Developing a methodology to derive alcohol-attributable fractions for HIV/AIDS mortality based on alcohol's impact on adherence to antiretroviral medication. Popul Health Metr. 2011;9:5.
40. Hendershot CS, Stoner SA, Pantalone DW, Simoni JM. Alcohol use and antiretroviral adherence: review and meta-analysis. J Acquir Immune Defic Syndr. 2009;52:180–202.
41. Global health estimates (GHE). In: World Health Organization [website]. Geneva: World Health Organization; 2019 (http://www.who.int/healthinfo/global_burden_disease/en/).
42. Popova S, Lange S, Probst C, Gmel G, Rehm J. Estimation of national, regional and global prevalence of alcohol use during pregnancy and fetal alcohol syndrome: a systematic review and meta-analysis. Lancet Glob Health 2017;5:e290–e9. doi:10.1016/S2214-109X(17)30021-9.
43. Lange S, Probst C, Gmel G, Rehm J, Burd L, Popova S. Global prevalence of fetal alcohol spectrum disorder among children and youth: a systematic review and meta-analysis. JAMA Pediatr. 2017;171:948–56. doi:10.1001/jamapediatrics.2017.1919.
44. Popova S, Lange S, Shield K, Mihic A, Chudley AE, Mukherjee RAS et al. Comorbidity of fetal alcohol spectrum disorder: a systematic review and meta-analysis. Lancet 2016;387:978–87. doi:10.1016/S0140-6736(15)01345-8.
45. Murray CJ, Lopez AD. Measuring the global burden of disease. N Engl J Med. 2013;369:448–57. doi:10.1056/NEJMra1201534.
46. Murray CJL, Salomon J, Mathers C, Lopez A. Summary measures of population health: concepts, ethics, measurement and applications. Geneva: World Health Organization; 2002 (http://apps.who.int/iris/handle/10665/42439).
47. Gmel G, Rehm J. Zusammenfassende Gesundheitsmasse von Sterblichkeit und Krankheit: Der steinige Weg zwischen PYLL, YLD, DALY und HALE. Suchttherapie 2006;7:143–53.
48. Shield KD, Rehm J. Global risk factor rankings: the importance of age-based health loss inequities caused by alcohol and other risk factors. BMC Res Notes 2015;8:231.
49. Murray CJL. Quantifying the burden of disease: the technical basis for disability-adjusted life years. Bull World Health Organ. 1994;72:429–45 (http://apps.who.int/iris/handle/10665/52181).
50. Rehm J, Taylor B, Patra J, Gmel G. Avoidable burden of disease: conceptual and methodological issues in substance abuse epidemiology. Int J Methods Psychiatr Res. 2006;15:181–91.
51. IARC monographs on the evaluation of carcinogenic risks to humans: alcohol consumption and ethyl carbamate. Lyon: International Agency for Research on Cancer; 2010.
52. IARC monographs on the evaluation of carcinogenic risks to humans 100E. Personal habits and indoor combustions. Lyon: International Agency for Research on Cancer; 2012.
53. IARC's approach to assessing the level of evidence. Lyon: International Agency for Research on Cancer; 2018 (https://www.icnirp.org/cms/upload/presentations/RiskAssessmentRestricted/CoglianoSalzburgICNIRP.pdf).
54. Understanding the ICD-10 code structure: anatomy of ICD-10 codes. In: Health Network Solutions [website]. Cornelius (NC): Health Network Solutions; 2006–2025 (http://www.healthnetworksolutions.net/index.php/understanding-the-icd-10-code-structure).
55. Pollock DA, Boyle CA, DeStefano F, Moyer LA, Kirk ML. Underreporting of alcohol-related mortality on death certificates of young US Army veterans. JAMA 1987;258:345–8.
56. Tuusov J, Lang K, Väli M, Pärna K, Tõnisson M, Ringmets I et al. Prevalence of alcohol-related pathologies at autopsy: Estonian forensic study of alcohol and premature death. Addiction 2014;109:2018–26. doi:10.1111/add.12695.
57. Schomerus G, Lucht M, Holzinger A, Matschinger H, Carta MG, Angermeyer MC. The stigma of alcohol dependence compared with other mental disorders: a review of population studies. Alcohol Alcohol. 2011;46:105–12.

58. Puffer RR, Griffith GW. Patterns of urban mortality: report of the Inter-American Investigation of Mortality. Washington (DC): Pan American Health Organization; 1967.
59. Rehm J, Taylor B, Mohapatra S, Irving H, Baliunas D, Patra J et al. Alcohol as a risk factor for liver cirrhosis – a systematic review and meta-analysis. Drug Alcohol Rev. 2010;29:437–45.
60. Samokhvalov AV, Rehm J, Roerecke M. Alcohol consumption as a risk factor for acute and chronic pancreatitis: a systematic review and a series of meta-analyses. EBioMedicine 2015;2:1996–2002.
61. Cherpitel CJ, Ye Y, Bond J, Borges G. The causal attribution of injury to alcohol consumption: a cross-national meta-analysis from the emergency room collaborative alcohol analysis project. Alcohol Clin Exp Res. 2003;27:1805–12. doi:10.1097/01.alc.0000095863.78842.f0.
62. Cherpitel CJ, Ye Y, Bond J, Borges G, Monteiro M. Relative risk of injury from acute alcohol consumption: modeling the dose–response relationship in emergency department data from 18 countries. Addiction 2015;110:279–88. doi:10.1111/add.12755.
63. Rehm J, Hasan OSM, Imtiaz S, Probst C, Roerecke M, Shield K. Alcohol and noncommunicable disease risk. Curr Addict Rep. 2018;5:72–85.
64. GBD 2016 alcohol collaborators. Alcohol use and burden for 195 countries and territories, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet 2018; 392(10152):1015–35. doi: 10.1016/s0140-6736(18)31310-2.
65. Wood AM, Kaptoge S, Butterworth AS, Willeit P, Warnakula S, Bolton T et al. Risk thresholds for alcohol consumption: combined analysis of individual-participant data for 599 912 current drinkers in 83 prospective studies. Lancet 2018;391:1513–23. doi:10.1016/S0140-6736(18)30134-X.
66. Tsochatzis EA, Bosch J, Burroughs AK. Liver cirrhosis. Lancet 2014;383:1749–61. doi:10.1016/S0140-6736(14)60121-5.
67. Schwarzinger M, Baillot S, Yazdanpanah Y, Rehm J, Mallet V. Contribution of alcohol use disorders on the burden of chronic hepatitis C in France, 2008–2013: a nationwide retrospective cohort study. J Hepatol. 2017;67:454–61. doi:10.1016/j.jhep.2017.03.031.
68. GDP per capita, PPP (current international $) [online database]. Washington (DC): World Bank; 2018 (http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD).
69. PPP calculation and estimation. In: Word Bank [website]. Washington (DC): World Bank; 2018 (http://www.worldbank.org/en/programs/icp/brief/methodology-calculation).
70. Gianino MM, Lenzi J, Fantini MP, Ricciardi W, Damiani G. Declining amenable mortality: a reflection of health care systems? BMC Health Serv Res. 2017;17:735. doi:10.1186/s12913-017-2708-z.
71. Halm EA, Lee C, Chassin MR. Is volume related to outcome in health care? A systematic review and methodologic critique of the literature. Ann Intern Med. 2002;137:511–20.
72. Probst C, Parry CDH, Wittchen HU, Rehm J. The socioeconomic profile of alcohol-attributable mortality in South Africa: a modelling study. BMC Med. 2018;16:97. doi:10.1186/s12916-018-1080-0.
73. Marmot M. Social determinants of health inequalities. Lancet 2005;365:1099–104.
74. Cutler DM, Huang W, Lleras-Muney A. Economic conditions and mortality: evidence from 200 years of data. Cambridge (MA): National Bureau of Economic Research; 2016 (NBER Working Paper No. 22690; http://www.nber.org/papers/w22690).
75. Marmot M. The health gap: the challenge of an unequal world. London: Bloomsbury; 2015.
76. Tapper EB, Parikh ND. Mortality due to cirrhosis and liver cancer in the United States, 1999–2016: observational study. BMJ 2018;362:k2817. doi:10.1136/bmj.k2817.
77. Murray CJ, Lopez AD. Global mortality, disability, and the contribution of risk factors: Global Burden of Disease Study. Lancet 1997;349:1436–42. doi:10.1016/S0140-6736(96)07495-8.
78. Murray CJL, Lopez ADL, editors. The global burden of disease: a comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020. Cambridge (MA): Harvard University Press; 1996.
79. Murray CJ, Salomon JA, Mathers C. A critical examination of summary measures of population health. Bull World Health Organ. 2000;78:981–94.
80. Omran AR. The epidemiologic transition: a theory of the epidemiology of population change. Milbank Q. 2005;83:731–57. doi:10.1111/j.1468-0009.2005.00398.x.
81. Haagsma JA, Polinder S, Cassini A, Colzani E, Havelaar AH. Review of disability weight studies: comparison of methodological choices and values. Popul Health Metr. 2014;12:20. doi:10.1186/s12963-014-0020-2.
82. Rehm J, Frick U. Valuation of health states in the US study to establish disability weights: lessons from the literature. Int J Methods Psychiatr Res. 2010;19:18–33.
83. Rehm J, Shield KD, Gmel G, Rehm MX, Frick U. Modeling the impact of alcohol dependence on mortality burden and the effect of available treatment interventions in the European Union. Eur Neuropsychopharmacol. 2013;23:89–97. doi:10.1016/j.euroneuro.2012.08.001.
84. Rehm J, Guiraud J, Poulnais R, Shield KD. Alcohol dependence and very high risk level of alcohol consumption: a life-threatening and debilitating disease. Addict Biol. 2018;23:961–8. doi:10.1111/adb.12646.
85. Rehm J, Dawson D, Frick U, Gmel G, Roerecke M, Shield KD et al. Burden of disease associated with alcohol use disorders in the United States. Alcohol Clin Exp Res. 2014;38:1068–77. doi:10.1111/acer.12331.
86. Haagsma JA, Polinder S, Lyons RA, Lund J, Ditsuwan V, Prinsloo M et al. Improved and standardized method for assessing years lived with disability after injury. Bull World Health Organ. 2012;90:513–21. doi:10.2471/BLT.11.095109.
87. Polinder S, Haagsma JA, Lyons RA, Gabbe BJ, Ameratunga S, Cryer C et al. Measuring the population burden of fatal and nonfatal injury. Epidemiol Rev. 2012;34:17–31. doi:10.1093/epirev/mxr022.
88. Samokhvalov AV, Popova S, Room R, Ramonas M, Rehm J. Disability associated with alcohol abuse and dependence. Alcohol Clin Exp Res. 2010;34:1871–8. doi:10.1/j.1530-027.2010.01275.x.

89. Rehm J, Kailasapillai S, Larsen E, Rehm MX, Samokhvalov AV, Shield KD et al. A systematic review of the epidemiology of unrecorded alcohol consumption and the chemical composition of unrecorded alcohol. Addiction 2014;109:880–93. doi: 10.1111/add.12498.
90. Consumption and trade of illegal alcohol in Estonia (based on population survey). Tallinn: Estonian Institute of Economic Research; 2005.
91. Leon DA, Saburova L, Tomkins S, Andreev E, Kiryanov N, McKee M et al. Hazardous alcohol drinking and premature mortality in Russia: a population based case-control study. Lancet 2007;369(9578):2001–9.
92. Neufeld M, Wittchen HU, Rehm J. Drinking patterns and harm of unrecorded alcohol in Russia: a qualitative interview study. Addict Res Theory 2017;25(4):310–7.
93. Anderson P, Chisholm D, Fuhr D. Effectiveness and cost-effectiveness of policies and programmes to reduce the harm caused by alcohol. Lancet 2009;373(9682):2234–46.
94. Tackling harmful alcohol use: economics and public health policy. Paris: Organisation for Economic Co-operation and Development; 2015 (http://www.oecd.org/health/tackling-harmful-alcohol-use-9789264181069-en.htm).
95. Chisholm D, Moro D, Bertram M, Pretorius C, Gmel G, Shield K et al. Are the "best buys" for alcohol control still valid? An update on the comparative cost-effectiveness of alcohol control strategies at the global level. J Stud Alcohol Drugs 2018;79(4):514–22.
96. European alcohol action plan 1992–1999. Copenhagen: WHO Regional Office for Europe; 1992.
97. European action plan to reduce the harmful use of alcohol 2012–2020. Copenhagen: WHO Regional Office for Europe; 2012 (http://www.euro.who.int/__data/assets/pdf_file/0008/178163/E96726.pdf).
98. Policy in action – a tool for measuring alcohol policy implementation. Copenhagen: WHO Regional Office for Europe; 2017 (http://www.euro.who.int/__data/assets/pdf_file/0006/339837/WHO_Policy-in-Action_indh_VII-2.pdf).
99. GNI per capita, PPP (current international $) [online database]. Washington (DC): World Bank (http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD).
100. Transforming our world: the 2030 agenda for sustainable development. New York (NY): United Nations; 2015 (https://sustainabledevelopment.un.org/post2015/transformingourworld).
101. Kaner EFS, Beyer FR, Muirhead C, Campbell F, Pienaar ED, Bertholet N et al. Effectiveness of brief alcohol interventions in primary care populations. Cochrane Database Syst Rev. 2018;2:CD004148.
102. WHO alcohol brief intervention training manual for primary care. Copenhagen: WHO Regional Office for Europe; 2017 (http://www.euro.who.int/en/health-topics/disease-prevention/alcohol-use/publications/2017/who-alcohol-brief-intervention-training-manual-for-primary-care-2017).
103. Global status report on road safety 2015. Geneva: World Health Organization; 2015 (http://www.who.int/violence_injury_prevention/road_safety_status/2015/en/).
104. From burden to "best buys": reducing the economic impact of non-communicable diseases in low- and middle-income countries. Geneva: World Health Organization and World Economic Forum; 2011 (http://www.who.int/entity/nmh/publications/best_buys_summary.pdf?ua=1).
105. Tackling NCDs. "Best buys" and other recommended interventions for the prevention and control of noncommunicable diseases. Geneva: World Health Organization; 2017 (http://apps.who.int/iris/handle/10665/259232).
106. Jernigan D, Noel J, Landon J, Thornton N, Lobstein T. Alcohol marketing and youth alcohol consumption: a systematic review of longitudinal studies published since 2008. Addiction 2017;112(Suppl. 1):7–20.
107. Burton R, Henn C, Lavoie D, O'Connor R, Perkins C, Sweeney K et al. A rapid evidence review of the effectiveness and cost-effectiveness of alcohol control policies: an English perspective. Lancet 2017;389(10078):1558–80.
108. Nicholls N. Everyday, everywhere: alcohol marketing and social media – current trends. Alcohol Alcohol. 2012;47(4):486–93.
109. Brooks O. "Routes to magic": the alcoholic beverage industry's use of new media in alcohol marketing. Stirling: Institute for Social Marketing, University of Stirling; 2010.
110. Promoting good health from childhood. Reducing the impact of alcohol marketing on children in Scotland. A report by the virtual expert network on alcohol marketing. Glasgow: Alcohol Focus Scotland; 2017 (https://www.alcohol-focus-scotland.org.uk/media/213609/Promoting-good-health-from-childhood-report.pdf).
111. Chester J, Montgomery K, Dorfman L. Alcohol marketing in the digital age. Berkley (CA): Berkley Media Studies Group; 2010.
112. Lobstein T, Landon J, Thornton N, Jernigan D. The commercial use of digital media to market alcohol products: a systematic review. Addiction 2012;112(1):21–7.
113. Action plan on youth drinking and on heavy episodic drinking (binge drinking) (2014–2016). Brussels: European Commission, Directorate for Health and Food Safety; 2014 (https://ec.europa.eu/health//sites/health/files/alcohol/docs/2014_2016_actionplan_youthdrinking_en.pdf).
114. Global strategy to reduce the harmful use of alcohol. Geneva: World Health Organization; 2010 (http://www.who.int/substance_abuse/msbalcstragegy.pdf).
115. Mackenbach JP, Bopp M, Deboosere P, Kovacs K, Leinsalu M, Martikainen P et al. Determinants of the magnitude of socioeconomic inequalities in mortality: a study of 17 European countries. Health Place 2017;47:44–53.
116. Alcohol consumption, harm and policy response fact sheets for 30 European countries. Copenhagen: WHO Regional Office for Europe; 2018 (http://www.euro.who.int/en/health-topics/disease-prevention/alcohol-use/publications/2018/alcohol-consumption,-harm-and-policy-response-fact-sheets-for-30-european-countries-2018).

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