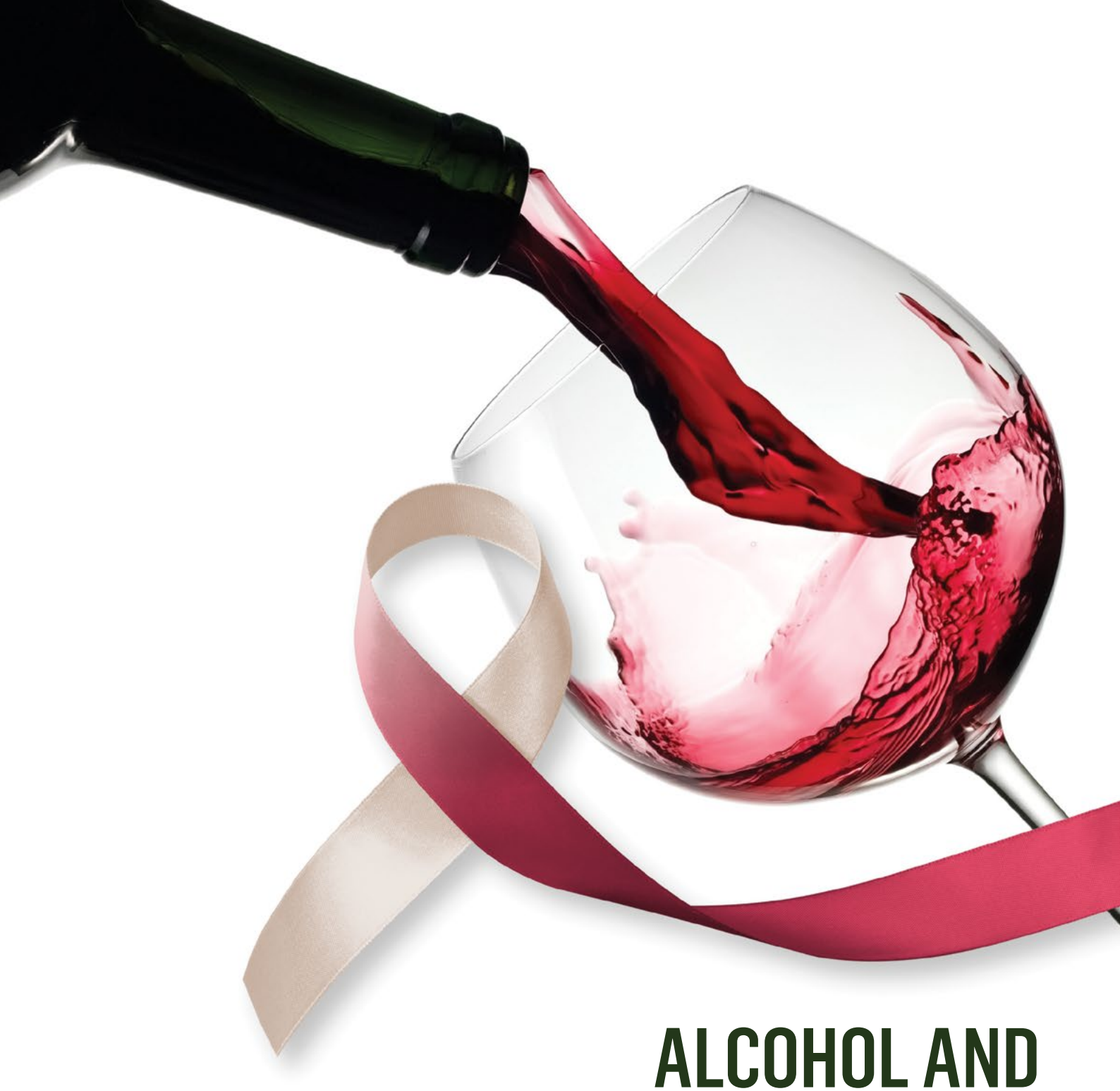

# ALCOHOL AND CANCER IN THE WHO EUROPEAN REGION

## AN APPEAL FOR BETTER PREVENTION

World Health Organization
REGIONAL OFFICE FOR Europe

International Agency for Research on Cancer
World Health Organization

Document number: WHO/EURO:2020-1435-41185-56004


**Suggested citation**. Alcohol and cancer in the WHO European Region: an appeal for better prevention. Copenhagen: WHO Regional Office for Europe; 2020. Licence: CC BY-NC-SA 3.0 IGO.

**Cataloguing-in-Publication (CIP) data.** CIP data are available at http://apps.who.int/iris.

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## Contents

# ALCOHOL AND CANCER IN THE WHO EUROPEAN REGION

## AN APPEAL FOR BETTER PREVENTION

# 1. INTRODUCTION

Reducing the burden of noncommunicable disease, including cancer, is one of the main health priorities in Europe, as outlined in the Joint Statement putting prevention at the heart of Europe's Beating Cancer Plan and WHO's European Programme of Work, 2020–2025.[1,2] Noncommunicable diseases are causally linked to a number of modifiable risk factors, including tobacco and alcohol use, unhealthy nutrition, insufficient physical activity and pollution, and are thus largely preventable if exposure to these risk factors is reduced.

Globally, alcohol is responsible for almost 3 million deaths every year, and in the WHO European Region alone, it accounts for about 2545 deaths every day.[3] The adverse effects of alcohol consumption are visible relatively early in the life-course, mainly due to injury, but its damaging impact is felt at every life stage. Overall, alcohol is one of the leading risk factors of premature mortality – globally, and in the WHO European Region in particular, where it is responsible for one in every four deaths among young adults (aged 20–24).

Specifically, alcohol consumption plays a causal role in several types of cancer. Epidemiological research on alcohol and cancer is expanding, and its findings support recent biological evidence showing that ethanol causes irreversible damage to DNA, which can give rise to cancer.[4] In addition, there are other biological mechanisms at play, and our understanding of these is growing as well. Given the causal evidence, in the WHO European Region – the region with the highest levels of alcohol consumption in the world – alcohol-attributable cancer is a major health concern. For example, a study by the International Agency for Research on Cancer demonstrated that alcohol was the second leading risk factor for cancer (after tobacco) in one of the countries with the largest population in the European Union.[5] In spite of this, awareness of alcohol as a risk factor for cancer is generally low, which has the effect of diminishing wider public support for a range of policies, such as reductions in alcohol affordability and availability or limits on advertising and promotion.

This fact sheet provides up-to-date information and guidance on the links between alcohol and cancer for those involved in designing and implementing policies that affect public health. At the same time, it sets out policy options to reduce the alcohol-attributable cancer burden within the WHO European Region.

› There is a causal link between alcohol use and a range of cancers, including some of the most common types, such as female breast cancer and colorectal cancer.

- Within the WHO European Region, about 180 000 cases of cancer and almost 92 000 cancer deaths were caused by alcohol in 2018.

- There is no safe level of alcohol consumption – the cancer risk starts to increase even with low levels of alcohol consumption.

- Alcohol-attributable cancers and deaths can be prevented by reducing alcohol consumption, and this can be achieved by policies that already exist and are known to be effective, such as increasing taxes on alcoholic beverages.

- Alcohol is a causal risk factor for cancer, yet many people are not familiar with this fact – placing health warnings on alcoholic beverages would raise awareness and inform consumer choices.

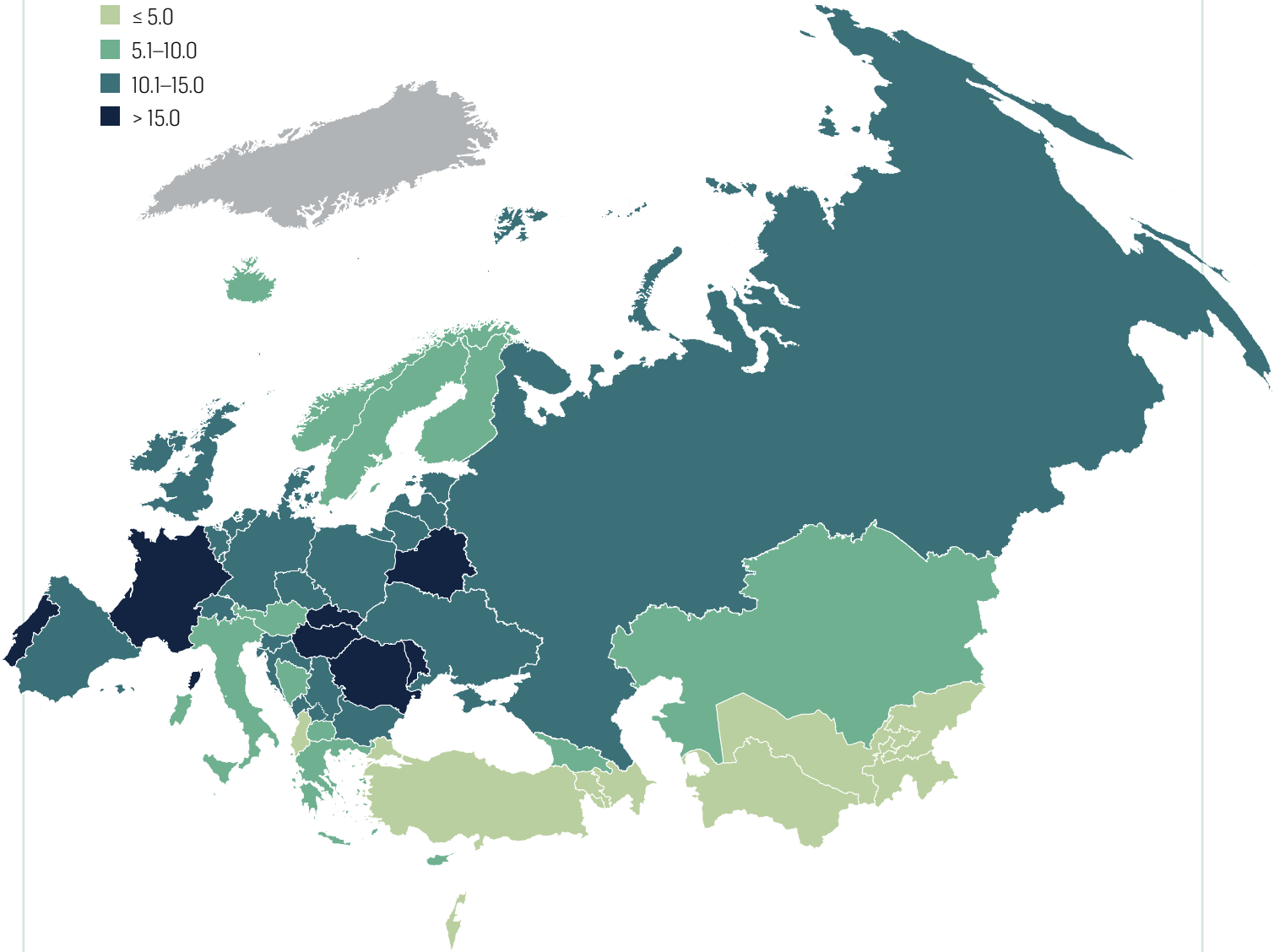
# KEY MESSAGES

# 2. THE INCIDENCE OF ALCOHOL-ATTRIBUTABLE CANCERS WITHIN THE WHO EUROPEAN REGION

In 2018, about 4.2 million people developed cancer (excluding non-melanoma skin cancer) within the WHO European Region, of which 4.3% were attributable to alcohol. Thus, a total of about 180 000 cases of cancer (almost 70 000 cases in women and more than 110 000 cases in men) were caused by alcohol.* In the same year, alcohol drinking contributed to almost 92 000 cancer deaths.

There was a wide variation in alcohol-attributable cancer rates across the WHO European Region, ranging from less than two per 100 000 people in Azerbaijan, Israel, Tajikistan, Turkey and Uzbekistan to almost 20 per 100 000 in Hungary, Romania and the Republic of Moldova (**Fig. 1**). It is likely that these differences are due in part to interactions with other risk factors (such as tobacco).

**Fig. 1.** Age-standardized rates of cancer cases in Europe caused by alcohol, per 100 000, 2018[a]




[a] Age-standardized rates of incident cancer cases caused by alcohol in the WHO European Region, per 100 000 people, are presented for 2018. Data were obtained from the International Agency for Research on Cancer. The darker the colour, the higher the age-standardized rate of cancer cases.

* Causality is considered according to the Bradford Hill criteria; for further details, see Hill (1965) and Rothman & Greenland (2005).[6,7] For more details on alcohol-attributable fractions of cancer, see the Methodology section at the end of the fact sheet.

# 3. WHICH CANCERS ARE CAUSED BY ALCOHOL?

There is an established causal link between alcohol intake and cancer development in the oral cavity, oropharynx, oesophagus, liver, larynx, colorectum and female breast.[8,9,10]

The effect of alcohol as a risk factor, in terms of developing cancer or dying from it, varies across different cancer types. In the WHO European Region, in 2018, the proportion of fatal cancer outcomes due to drinking was highest for cancers of the oral cavity, oesophagus and oropharynx, while cancers of the colorectum and breast caused by alcohol resulted in proportionally fewer deaths (**Fig. 2**).

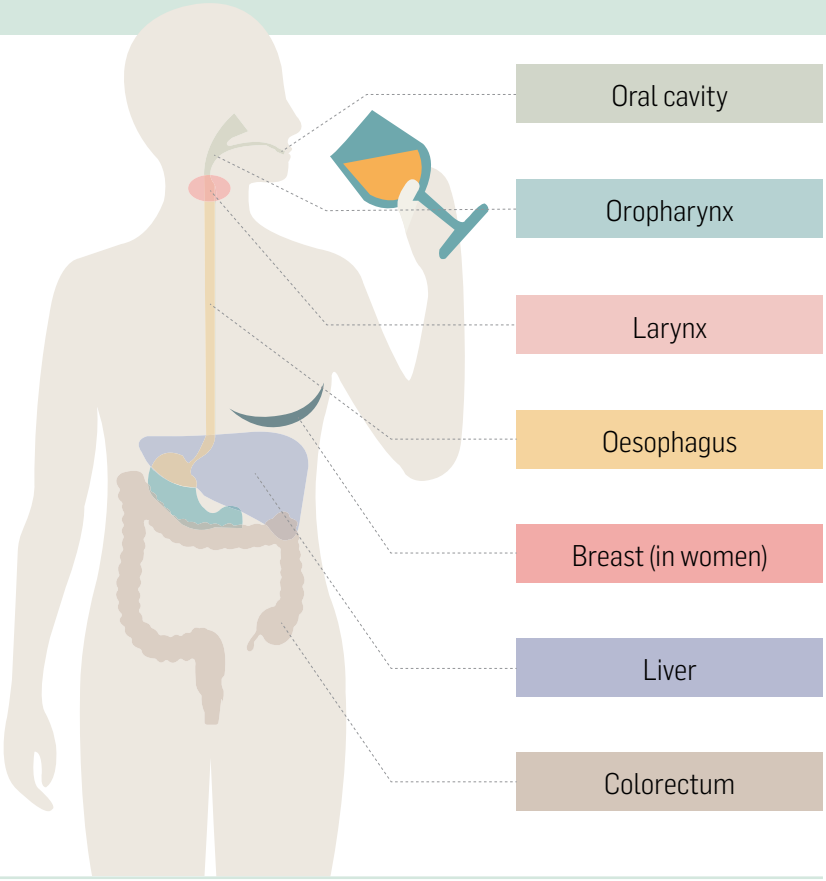
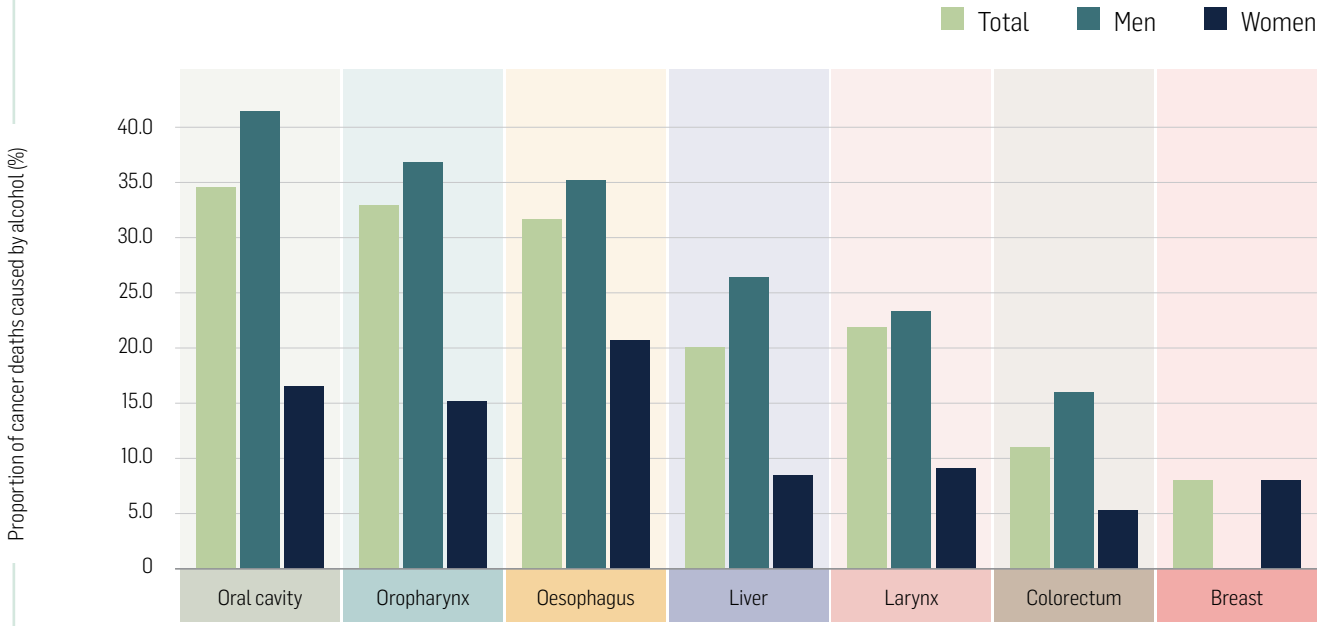


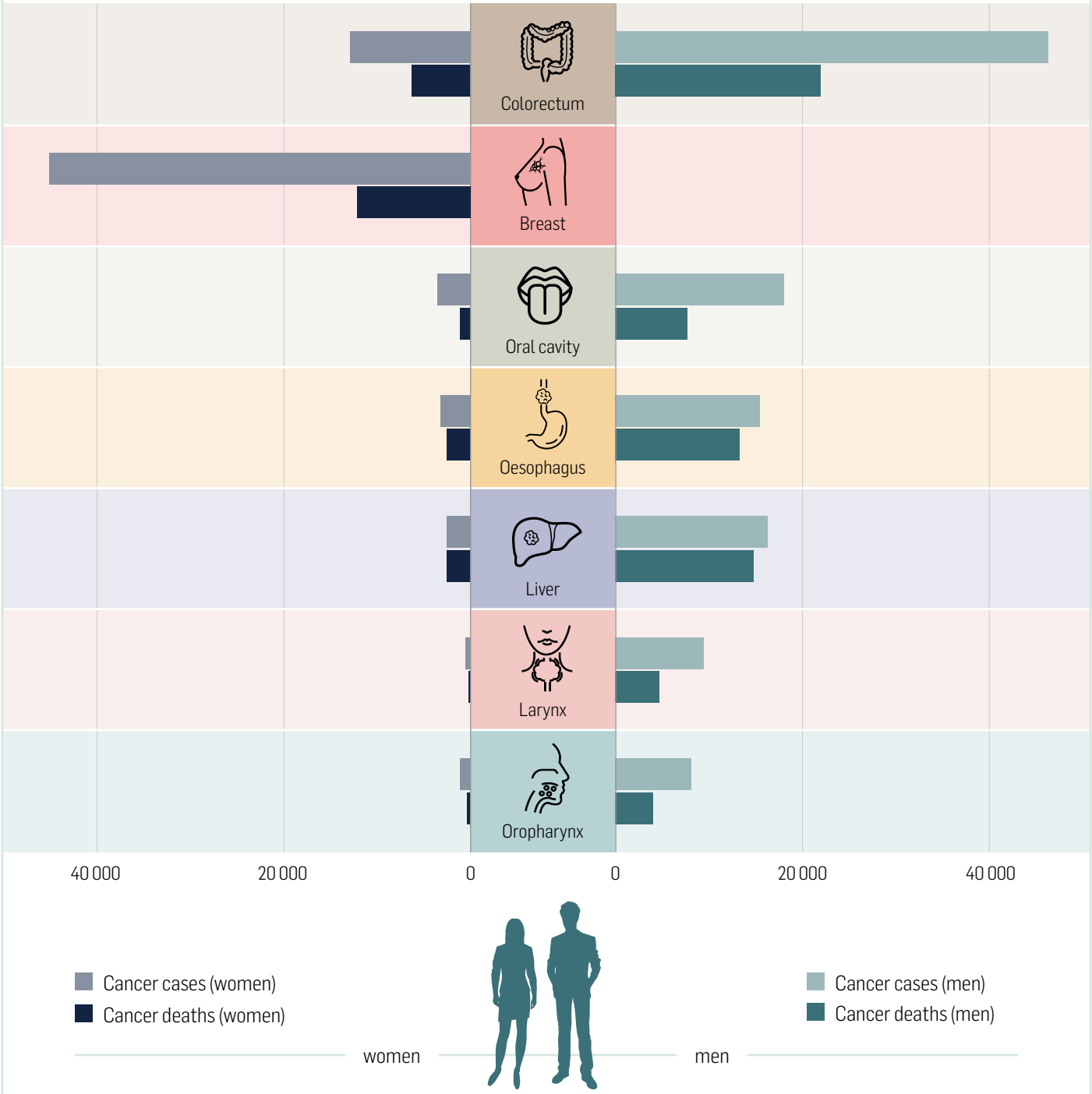

**Fig. 2.** Proportion of cancer deaths, per cancer type, that are attributable to alcohol (alcohol-attributable fractions), by sex, 2018[a]




[a] Displayed are alcohol-attributable fractions (AAFs) for the entire WHO European Region. The AAFs denote the proportion of deaths that are caused by alcohol (i.e. the proportion that would disappear if alcohol consumption were removed). Data were obtained from the International Agency for Research on Cancer.

Although the proportion of breast and colorectal cancer deaths related to alcohol is relatively small, they constituted the most common sites of alcohol-attributable cancer within the WHO European Region in 2018, with about 45 500 cases and 12 100 deaths due to breast cancer in women and about 59 200 cases and 28 200 deaths due to colorectal cancer in women and men (**Fig. 3**). Cancers at other sites such as the larynx and oropharynx occurred less frequently but had relatively higher proportions of fatal outcomes due to drinking.

**Fig. 3.** Cancer cases and deaths caused by alcohol in the WHO European Region, by sex and cancer site, 2018[a]




[a] The graphs show incident cancer cases (lighter colours) and number of deaths (darker colours) caused by alcohol in 2018 within the WHO European Region. Data were obtained from the International Agency for Research on Cancer.

# 4. IS THERE A SAFE LEVEL OF DRINKING?

All types of alcoholic beverages are linked to cancer, with the primary carcinogenic compound being ethanol.[9,10,11] There are four mechanisms that contribute to how alcohol causes cancer.[9]

**1 Acetaldehyde**
Alcohol is converted into acetaldehyde in the body, mainly in the liver but also in other parts such as the gut or mouth. Acetaldehyde can cause cancer by damaging DNA and stopping cells from repairing this damage.

**2 Hormone changes**
Alcohol can change the levels of hormones such as oestrogen or insulin. Hormones act as important messengers in the body and can regulate cell growth and division.

**3 Alcohol-induced oxidative stress**
Chronic alcohol intake can induce oxidative stress, which damages DNA and affects its repair; it has been linked to alcohol-induced carcinogenesis in various organs.

**4 Folate depletion and DNA methylation**
Alcohol per se, and an unhealthy lifestyle related to alcohol consumption, cause folate deficiency, which, in turn, impairs DNA methylation. Folate deficiency is associated with colorectal cancer, among others.

**There is no safe level of alcohol consumption for cancer** and all types of alcoholic beverages, including beer, wine and spirits, are linked to cancer, regardless of their quality and price.[12] The risk of developing cancer increases substantially the more alcohol is consumed.

For instance, drinking the amount of alcohol you would find in just a single glass of wine* every day caused more than 4600 breast cancer cases in women in the WHO European Region in 2018, and the number of cases increased dramatically with the amount of alcohol consumed:

THERE IS NO SAFE LEVEL OF ALCOHOL CONSUMPTION FOR CANCER

Additional 6865 breast cancer cases resulting from a daily consumption of alcohol equivalent to 1–2 glasses of wine*

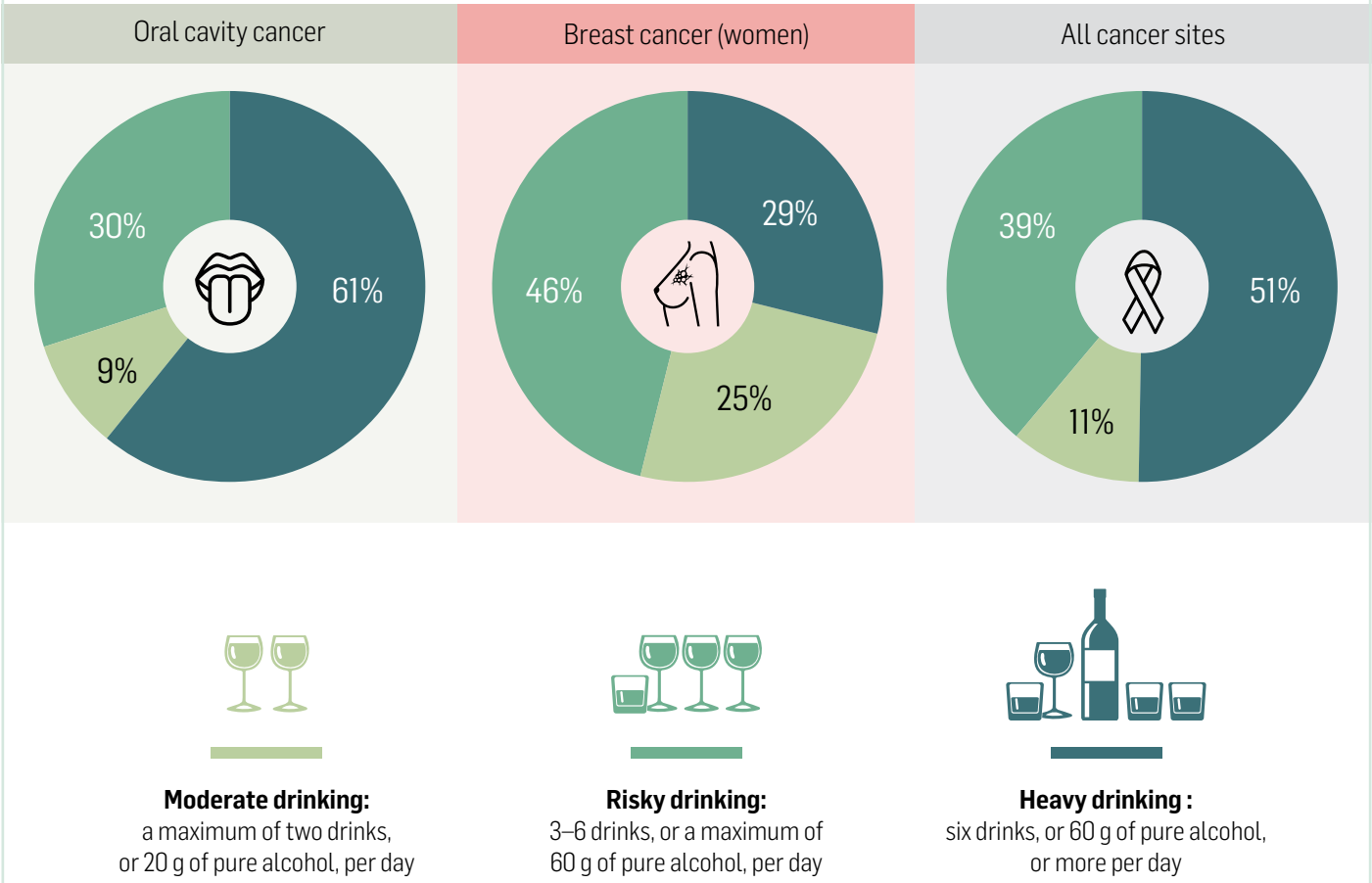
Additional 12 303 breast cancer cases resulting from a daily consumption of alcohol equivalent to 2–4 glasses of wine*

Additional 14 086 breast cancer cases resulting from a daily consumption of the alcohol equivalent of up to a bottle of wine*

* Or the equivalent amount of any other alcoholic drink, in terms of grams of pure alcohol.

In 2018, drinking less than two drinks, or 20 g of pure alcohol, per day caused almost one in 10 alcohol-attributable cases of oral cavity cancer and one in four alcohol-attributable breast cancer cases in women (**Fig. 4**). Overall, oral cavity cancers are the cancer type with the highest proportion of fatal outcomes due to drinking (**Fig. 2**). Taking into account all cancer cases causally linked to alcohol, 11% were due to drinking below this threshold – i.e. consumption of no more than one big bottle of beer (500 ml), two glasses of wine (200 ml) or 60 ml of spirits per day.

**Fig. 4.** Proportion of cancer cases due to alcohol in the WHO European Region, by cancer type and drinking level, 2018[a]




[a] Definition of drinking levels in terms of drinks per day was derived from SHAAP, 2019[11] and EMA, 2010.[13] The WHO Regional Office for Europe does not define risk levels as such, because the evidence shows that the ideal situation for health is not to drink at all. Data were obtained from the International Agency for Research on Cancer.

Proportions may not add up to 100% due to rounding.

Globally, the WHO European Region has the highest alcohol consumption level, with an annual per capita intake of 9.8 litres of pure alcohol per adult.[3] Overall, three out of five people drink alcohol, which means that over 200 million people within the Region are at risk of developing alcohol-attributable cancer. This does not mean that everyone who drinks alcohol will develop cancer, but the likelihood of developing cancer is higher among people who drink alcohol, especially among those who drink more than two drinks, or more than 20 g of pure alcohol, per day. Overall, one in four people in the WHO European Region (27%) will develop cancer at some point in their life.[14]

## 5. THE COMBINED RISK OF USING ALCOHOL AND TOBACCO

Research shows that people who use both alcohol and tobacco have a 30 times increased risk of developing cancers of the oral cavity, oropharynx, larynx and oesophagus, compared to people who use either alcohol or tobacco alone.[11,15] This is based on the following mechanisms:


- Alcohol acts as a solvent for other carcinogenic compounds and thus facilitates the absorption of carcinogenic compounds into the cells of the mouth and throat; this allows tobacco toxins to pass through more easily and can make it easier for cancers to develop.
- Tobacco smoke contains formaldehyde, a poisonous chemical similar to acetaldehyde produced by the breakdown of alcohol.
- Combining alcohol and tobacco may overwhelm the body's defence mechanism, which can make it easier for cancers to develop.

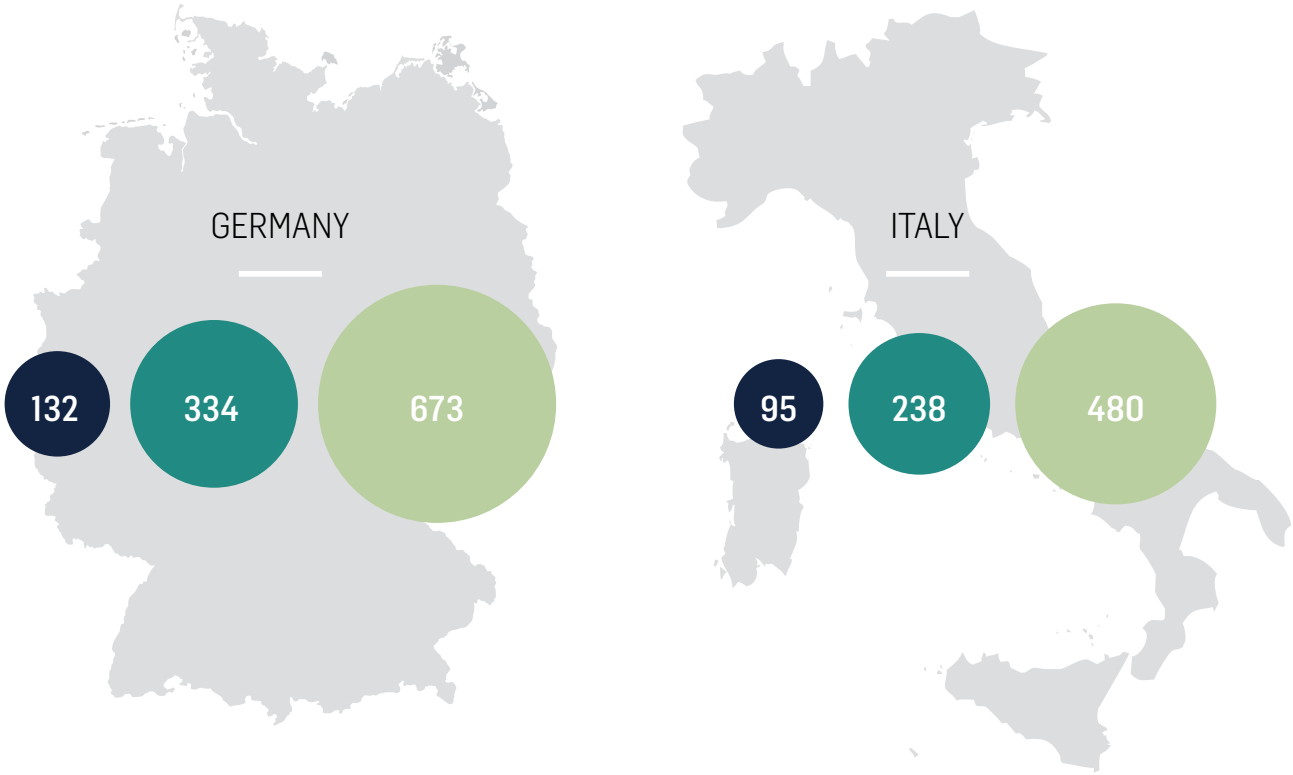
## 6. POLICY OPTIONS TO REDUCE ALCOHOL-ATTRIBUTABLE CANCERS

Given that alcohol is a major factor in causing cancers (as described above), alcohol control policies are necessary to prevent alcohol-attributable cancer cases and deaths. WHO's "best buys" are policy options to reduce noncommunicable diseases, including cancer, which are highly cost-effective and easy to implement. The three "best buys" for alcohol are:[16,17]

1. increase excise taxes on alcoholic beverages;
2. enact and enforce bans or comprehensive restrictions on exposure to alcohol advertising (across multiple types of media); and
3. enact and enforce restrictions on the physical availability of retailed alcohol (for example, via reduced hours of sale).

The evidence of impact of these measures has been widely acknowledged.[18] Pricing policies might also include other measures, such as the establishment of minimum prices for alcohol. Such policies are already in place in some countries across the Region and can be particularly valuable in countries where alcoholic beverages are sold at very low prices.

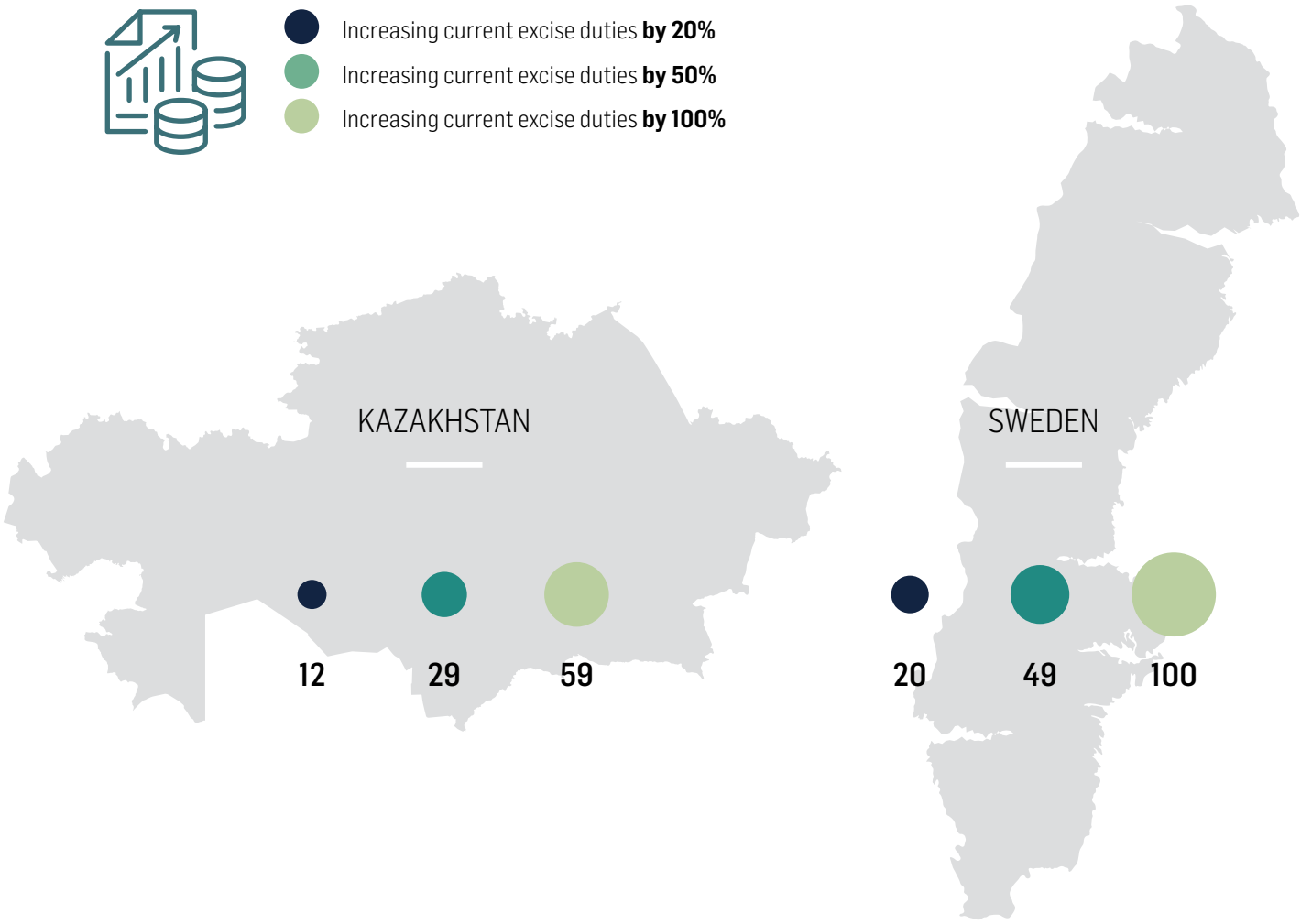
**Fig. 5.** Number of new cancer cases **that could have been prevented** in 2018 by increasing alcohol excise tax in four European countries




### Reducing alcohol affordability and consumption by increasing excise duties

Increasing excise duties on alcohol is the most widely used instrument of pricing. A recent modelling study on four countries in the WHO European Region, representing different drinking patterns and levels, highlighted the effectiveness of excise taxation in decreasing alcohol-attributable cancers.[19] Depending on the increase in excise duties, a sizeable number of cancer cases could be prevented in the selected countries (**Fig. 5**).This example shows that there are ways to substantially reduce the cancer burden in the WHO European Region, with potentially thousands of cancer cases that could be prevented if higher excise taxes were introduced. From a public health perspective, there is no reason why such measures should not be used, especially as they would increase tax revenues for the countries concerned.

The recently published update report on the evidence and recommended policy actions on alcohol pricing in the WHO European Region provides key policy recommendations to be considered for successful implementation of alcohol taxation.[20] These recommendations include inflation-indexed taxation, uniform tax rates across all products except for high-strength alcohol, and consideration of a special regulation for unrecorded alcohol alongside pricing policies. As a complement to taxation, minimum pricing has proved to be an effective approach to reduce alcohol-attributable harm.




*Source:* Rovira et al. (2020)[19]

### Raising awareness and informing consumer choice through alcohol labelling

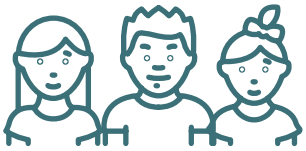
Although it is well established that alcohol can cause cancer, this fact is still not widely known to the public in most countries.[21] Even for people who indicate some awareness of such an impact, their knowledge is not necessarily specific to alcohol but may be part of a general belief that "everything causes cancer".[22] Finally, even in the case of people with knowledge of the alcohol–cancer link, many believe it applies only to heavy drinking, even though no lower threshold for the impact of alcohol has been established.

Given the current situation, in which the link between alcohol and cancer is not common knowledge to the public, better dissemination and communication of this information is necessary. Health warnings are already standard practice for tobacco products and different types of health warning for alcoholic beverages are already implemented in some countries of the WHO European Region, with the Member States of the Eurasian Economic Union* clearly taking the lead.[23] Health warnings through labelling on alcoholic beverages are a cost-effective tool for raising awareness, as they reach all consumers, and heavy drinkers in particular, as they are exposed to these labels more often.[24]

* Armenia, Belarus, Kazakhstan, Kyrgyzstan and the Russian Federation.

RAISING AWARENESS AND INFORMING CONSUMER CHOICE THROUGH ALCOHOL LABELLING

HEALTH PROFESSIONALS INFORMING CONSUMERS ABOUT ALCOHOL AND RELATED RISKS



EFFORTS TO PROMOTE HEALTH AND PROTECT FUTURE GENERATIONS

According to the WHO Health Evidence Network Synthesis Report 68,[25] only 15 of the 53 Member States of the WHO European Region have so far considered some form of health warning on alcoholic beverages. The warnings currently in place mainly inform the consumer about the general harm to health caused by drinking. Although alcohol is a major cause of cancer, not a single country provides health warnings for cancer. In order to enable consumers to make informed decisions, they have the right to know the potential risk posed by drinking alcohol.

For successful implementation of labelling policies, a comprehensive approach should be used, as research has shown that stand-alone cancer risk health warnings may not be sufficient to provoke behavioural change but merely encourage fatalistic thoughts such as "everything causes cancer".[26] Comprehensive approaches should stipulate inclusion of health information, ingredients and nutritional information on alcoholic beverages, and they should also ensure regulated message presentation and independent monitoring and evaluation. Comparing labelling practices for tobacco products and alcoholic beverages, it is clear that the latter is lagging well behind.

### The role of health professionals in informing consumers about alcohol and related risks

Public policies should encourage and support health professionals to ask about alcohol consumption, to recognize signs of risky alcohol use in individuals, and to advise and support behavioural changes. For cancer, the risks start at low daily drinking levels (a single glass of any type of alcoholic beverage), and health professionals need to inform people of these risks, so that as consumers they can make informed choices about their behaviours. Consistent evidence exists to support large-scale implementation of screening and brief intervention (SBI) programmes in primary care.[27,28]

### Efforts to promote health and protect future generations

Alcohol use is part of many cultural, religious and social practices in the WHO European Region and provides perceived pleasure to many users. However, at the same time alcohol claims lives, triggers diseases, causes injuries, and inflicts pain and suffering. It remains the only psychoactive and dependence-producing substance with significant global impact on population health that is not controlled at the international level by a legally binding regulatory framework.[17]

Reducing alcohol consumption is a public health imperative. The evidence of alcohol's contributory role in cancer development and cancer death has not yet been sufficiently recognized and addressed in the relevant global and European responses. Promoting better health and well-being through effective protection from alcohol-attributable harm requires a suite of interconnected measures: a clear message that there is no safe level of drinking; concerted action at international level; increased levels of political commitment; effective coordination of multisectoral efforts to combat the influence of vested interests opposed to alcohol control policies; and appropriate and widespread engagement of public health-oriented nongovernmental organizations, professional associations and civil society groups.

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# METHODOLOGY

Data on alcohol-attributable cancer incidence and mortality and alcohol-attributable fractions were calculated by the International Agency for Research on Cancer using the methodology reported in Shield et al.[a] Alcohol-attributable fractions of cancer incidence and mortality were estimated by combining country-, sex-, and age-specific alcohol prevalence information with the risk of cancer incidence or mortality at each level of alcohol consumption, assuming the theoretical minimum risk exposure level as lifetime abstention. These fractions were then applied to the number of cancer cases and deaths to obtain the population-attributable fraction of cancer cases and deaths linked to alcohol consumption in each country and the total for the WHO European Region.

The estimates of cancer cases and deaths for 2018 were extracted from the GLOBOCAN 2018 database in the Global Cancer Observatory[b] for cancer types with sufficient evidence of a causal relationship with alcohol based on the classification of the International Agency for Research on Cancer:[c] oral cavity cancer (ICD-10 C00-06); oropharyngeal cancer (ICD-10 C09-10); oesophageal cancer (ICD-10 C15); colon cancer (ICD-10 C18); rectal cancer (ICD-10 C19-20); liver cancer (ICD-10 C22); female breast cancer (ICD-10 C50); and laryngeal cancer (ICD-10 C32). Assuming a 10-year latency period between alcohol exposure and cancer incidence/mortality, alcohol consumption data for 2008 were taken from Manthey et al.[d] (numbers for 2008 are the same as modelled in the WHO *Global status report on alcohol and health 2018*[e]). The relative risks used were obtained from the World Cancer Research Fund Continuous Update Project Expert Report[f] and Shield et al.[a] and were applied to both cancer incidence and mortality assuming alcohol consumption does not affect cancer survival. The analysis covered 50 of the 53 Member States of the WHO European Region, with information missing for Andorra, Monaco and San Marino.

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## The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

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WHO/EURO:2020-1435-41185-56004