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Evidence for the effectiveness and cost-effectiveness of interventions to reduce alcohol-related harm

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# Evidence for the effectiveness and cost-effectiveness of interventions to reduce alcohol-related harm



## ABSTRACT

There is a substantial evidence base on the effectiveness of different policies in reducing the harm done by alcohol. Policies that regulate the economic and physical availability of alcohol are effective in reducing alcohol-related harm. Enforced legislative measures to reduce drinking and driving and interventions individually directed to drinkers already at risk are also effective. The evidence shows that information and education programmes do not reduce alcohol-related harm; nevertheless, they have a role in providing information, reframing alcohol-related problems and increasing attention to alcohol on the political and public agendas. In all parts of the European Union, population-based interventions represent a highly cost-effective use of resources to reduce alcohol-related harm. Brief interventions for individual high-risk drinkers are also cost-effective, but are harder to scale up because of their associated training and manpower needs.

## Keywords

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## Foreword

Alcohol policies aim to minimize the health and social harms that arise from the use of alcohol. Since alcohol is not an ordinary commodity, these policies need to address market failures by seeking to deter children from using alcohol, protecting people who are not drinking from the harm drinking can cause, and providing all consumers with information about alcohol's effects. As health constitutes a substantial resource in modern society, and as health inequalities hinder human development at both the individual and the societal level, an additional goal of alcohol policy is to reduce health inequalities related to alcohol. In addition, alcohol policy should reflect the concept of stewardship, the liberal state's commitment to look after the basic needs of its people, individually and collectively. The state that is guided by the ideal of stewardship recognizes that the health of the people is one of its primary assets, and that better health is associated with greater well-being and productivity.

Since the 1970s, the WHO Regional Office for Europe has promoted an evidence-based approach to alcohol policies, and it has sponsored a wide range of reviews and supporting material for Member States to use in developing them. This report updates the evidence base, which is remarkable for its extent and robustness. The present evidence base is largely built on systematic reviews, systematic reviews of systematic reviews, and meta-analyses. It is noteworthy that the present evidence base expands and confirms previous findings but does not alter their fundamental conclusions.

There is indisputable evidence that the price of alcohol matters. If the price of alcohol goes up, alcohol-related harm goes down. Younger drinkers are affected by price, and heavy drinkers are more affected than light drinkers; in fact, if a minimum price were established per gram of alcohol, light drinkers would hardly be affected at all. There is also indisputable evidence that the more readily available alcohol becomes, the greater the harm, and strong evidence that the more alcohol is marketed, the greater the risk of harm. The evidence that drink-driving policies matter is also incontrovertible: lowering the legal blood alcohol concentration limit for drivers – and enforcing it – saves lives. The evidence is equally clear that providing brief advice for hazardous and harmful drinking and treating alcohol disorders are effective interventions that reduce harm. In addition, there is incontestable evidence that school-based alcohol education does not lead to sustained changes in



behaviour. That does not mean that these educational efforts should be abandoned, but rather that they should be reframed to build support for alcohol policy among young people. Finally, the evidence tells us that drinking environments need to be prohibited from selling alcohol to minors and intoxicated persons, and that community action and workplace programmes are potentially effective, although further research on them is needed.

Knowing the evidence and instituting policy measures on its basis is not enough, however. Political and public support is needed to implement these measures effectively, and each country needs to fine-tune the balance between its alcohol policies and its cultural understanding of alcohol problems. Fortunately, behaviour is an important determinant of attitudes, and support for alcohol policies tends to increase after they are implemented and harmful alcohol consumption decreases.

*Dr Nata Menabde, Deputy Regional Director*  
WHO Regional Office for Europe

## **Summary**

Alcohol policies can be defined as sets of measures aimed at minimizing the health and social harms from the use of alcohol, recognizing that other contextual factors also have an impact on alcohol consumption and alcohol-related harm. Noting that the alcohol beverage industry has become increasingly involved in the policy arena in order to protect its commercial interests, it is argued that the responsibilities of economic operators in reducing the harm done by alcohol should be related to their products, the core of their businesses. Alcohol policy must also allow an expression of voice from civil society to balance other interests which may dominate political decision-making. Supranational common markets and international trade agreements can have an impact on alcohol policy, but pessimistic interpretation of both European Union (EU) and global trade agreements is unwarranted, provided alcohol policy focuses on health objectives rather than any protectionist objectives.

## **Harm done by alcohol**

Both the volume of lifetime alcohol use and a combination of frequency of drinking and amount drunk per occasion increase the risk of a wide range of health and social harm, largely in a dose-dependent manner. At a societal level, the EU is the heaviest drinking region of the world, with over one fifth of the European population aged 15 years and over reporting heavy episodic drinking (defined as five or more drinks on one occasion, or 50g alcohol) at least once a week. Heavy episodic drinking is widespread across all ages and all of Europe. The European Region of the World Health Organization (WHO) has the highest proportion of total ill health and premature death due to alcohol in the world, with a very close relationship between a country's total alcohol consumption per capita and its prevalence of alcohol-related harm and alcohol dependence. This high level of harm hides enormous alcohol-related health inequalities between eastern and western Europe, particularly as regards deaths from injuries. The overall social cost of alcohol to the EU is estimated to be €125 billion per year.

## **Raising awareness and political commitment**

While providing information and education is important to raise awareness and impart knowledge, by themselves information and education do not lead

to sustained changes in alcohol-related behaviour. Campaigns and health education messages funded by the alcohol industry seem to have negative effects, serving to advance both the industry's sales and public relations interests. Although warning labels have little impact on behaviour, they are important in helping to establish a social understanding that alcohol is a special and hazardous commodity. There is evidence of public support for a wide range of alcohol policy measures, although there is still much work to do, given the existing negative views about the potential impact of higher alcohol prices. Although at country level it is ultimately a government's responsibility to define and be accountable for a clear alcohol policy with targets, an adequate research base and available intelligence systems, the existence of an alcohol policy is not enough. A lack of transparency and information, poor organization and preparation for the introduction of new policies and laws, poor public health infrastructures, vertically as opposed to horizontally organized government, a lack of financing, the presence of corruption and public distrust of authority can all impede the implementation of effective policy.

## **Health sector**

Although brief advice heads the list of effective and cost-effective evidence-based treatment methods, commonly less than 10% of the population at risk of becoming hazardous and harmful drinkers are identified and less than 5% of those who could benefit are offered brief advice. Much is now also understood about the mechanisms for implementing brief advice programmes countrywide. For individuals with more severe alcohol dependence and related problems, a wide variety of specialized treatment approaches have been evaluated, with evidence for their effectiveness for cognitive behavioural and pharmacological therapies.

## **Community action**

Community-based programmes that include education and information campaigns, media advocacy, counter-advertising and health promotion, controls on selling and consumption venues and other regulations reducing access to alcohol, enhanced law enforcement and surveillance, can all have an impact on creating safer drinking and living environments, reducing underage drinking, reducing harmful patterns of drinking, and reducing drink-driving accidents, although they can be costly to implement and sustain. Alcohol use can increase the risk of absenteeism and poor performance at work, and structural factors at work can increase the risk of harmful alcohol use. The

available evidence suggests that workplace-based interventions can have some limited impact in reducing alcohol-related harm.

### **Drink-driving**

Establishing a blood alcohol concentration (BAC) level and lowering it is effective in reducing drink-driving casualties. Intensive random breath-testing and checkpoints reduce alcohol-related injuries and fatalities. There is evidence for some effectiveness in the setting of lower BAC levels (including a zero level) for young or novice drivers, administrative suspension of the driver's licence for a driver caught with a positive BAC level, and mandatory treatment and the use of an ignition interlock (a mechanical device which does not allow a car to be driven by a driver with a BAC above a low level) for repeat drink-drivers.

### **Availability of alcohol**

The implementation of laws setting a minimum age for the purchase of alcohol shows clear reductions in drink-driving casualties and other alcohol-related harms. The most effective means of enforcement is on the sellers, who have a vested interest in retaining the right to sell alcohol. An increased density of alcohol outlets is associated with increased levels of alcohol consumption among young people, with increased levels of assault and with other harms such as homicide, child abuse and neglect, self-inflicted injury and, with less consistent evidence, road traffic accidents. While extending times of sale can redistribute the times when many alcohol-related incidents occur, such extensions generally do not reduce the rates of violent incidents and often lead to an overall increase in consumption and problems. Reducing the hours or days of sale of alcoholic beverages leads to fewer alcohol-related problems, including homicides and assaults.

### **Marketing of alcohol**

Longitudinal studies have shown that various forms of alcohol marketing, including exposure to alcohol advertising in the traditional media as well as promotion through the content of films and alcohol-branded merchandise, have an impact on when young people start to drink and on riskier patterns of drinking among young people. The effects of exposure seem cumulative and, in markets where alcohol advertising is more widespread, young people are more likely to continue to increase their drinking as they move into their mid-twenties, while drinking declines at an earlier age in those who are less exposed. In some jurisdictions, alcohol marketing relies on self-regulation

implemented by economic operators, including advertising, media and alcohol producers. Evidence from a number of studies shows, however, that these voluntary systems do not prevent the kind of marketing that make an impact on younger people.

## **Price of alcohol**

When other factors are held constant, such as income and the price of other goods, a rise in alcohol prices leads to less alcohol consumption and vice versa. Price increases reduce the harms caused by alcohol and can also indicate that heavier drinking has been reduced. Policies that increase alcohol prices delay the initiation of drinking, slow young people's progression towards drinking larger amounts, and reduce heavy drinking among them. Setting a minimum price per gram of alcohol can be as effective as an across-the-board increase in tax, with both options costing heavy consumers far in excess of the cost to light consumers. Natural experiments in Europe consequent to economic treaties have shown that as alcohol taxes and prices have gone down, so sales and alcohol consumption have usually increased. Cross-border issues are not solved by lowering alcohol taxes.

## **Drinking environments**

Interventions in drinking environments can be important, since the problems potentially averted commonly harm others than the drinker, including the consequences of drink-driving and violence. Unfortunately, the evidence shows that such interventions are of limited impact unless they are backed up by adequate enforcement.

## **Illegal and informal alcohol**

Non-beverage alcohols and illegally-produced or home-made alcohols can have health consequences due to a higher ethanol content and contamination with harmful substances such as methanol, phthalates or ethyl carbamate. Illegally-traded alcohol can bring a health risk due either to contamination during the trading process or to its lower cost and thus higher consumption than legal alcohol. It is estimated that in the mid-1990s, fraud cost the EU around 8% of the total alcohol excise duty at the time.

## **Introduction**

Alcohol policies are sets of measures aimed at minimizing health and social harm from the use of alcohol, although other political, sociocultural and economic factors also have an impact on alcohol consumption and alcohol-related harm. Much of the evidence for the impact of alcohol policies derives from North America and northern Europe, but the general principles on which particular alcohol policy strategies work are fairly well understood and can often be applied across societies. Noting that the alcohol beverage industry has become increasingly involved in the policy arena in order to protect its commercial interests, this section argues that the responsibilities of economic operators in reducing the harm done by alcohol should be related to their products, the core of their businesses. Alcohol policy must also allow an expression of voice (the capacity of individuals to influence the decisions that shape their lives) by civil society to counteract the vested trade interests which often dominate political decision-making. While alcohol policies have traditionally been national matters, enacting policy at local level has a number of advantages. This section draws attention to the potential impact of supranational common markets and international trade agreements on alcohol policy, and reflects that the pessimistic interpretation of both European Union (EU) and global trade agreements is unwarranted, provided alcohol policy focuses on health objectives rather than on any protectionist objectives. Nevertheless, given the need for an international community of support for such policies and potential help to manage the relationship between alcohol and trade, a number of public health bodies and scientists have called for a Framework Convention on Alcohol Policy modelled explicitly on the current Framework Convention on Tobacco Control.

### **What are alcohol policies?**

Alcohol policies have been defined as sets of measures aimed at minimizing health and social harm from the use of alcohol (1). There are also a variety of other policies which can reduce or increase alcohol-related problems but which are not normally described as alcohol policies, since they are not implemented specifically to reduce alcohol-related harm as a primary aim. An example is general road safety measures.

A main goal of alcohol policy is to promote public health and social well-being. In addition, policy can address market failures by deterring children from using

alcohol, protecting people other than drinkers from the harm done by alcohol, and providing all consumers with information about the effects of alcohol. As government increasingly turns its attention to health inequalities, the reduction of inequalities in alcohol-related ill health becomes an additional policy goal.

Further, the concept of stewardship implies that liberal states have a duty to look after the important needs of people individually and collectively (2). It emphasizes the obligation of states to provide conditions that allow people to be healthy and, in particular, to take measures to reduce health inequalities. The stewardship-guided state recognizes that a primary asset of a nation is its health: higher levels of health are associated with greater overall well-being and productivity (3,4).

The optimal levels and mix of alcohol policy will depend on each society's particular goals and willingness to accept different policy instruments. For example, any attempt to determine the optimal tax on alcohol depends on empirical facts that can be difficult to measure, such as the scale of the costs to all consumers and non-consumers, and the differing costs to consumers with different income levels. It also depends on varying societal values, such as the extent to which children should be protected, and the specific goal that the tax seeks to achieve, such as a specific gain in revenue or a specific reduction in alcohol-related harm.

Alcohol policies can be evaluated in terms of their effectiveness, defined as a measure of the extent to which a specific policy, programme or intervention, when deployed in the real world, does what it is intended to do for a specified population, and their cost-effectiveness, defined as an economic evaluation that compares the costs of two or more interventions with differences in one single measure of outcome (5).

## **What is the evidence base for alcohol policies?**

Much of the evaluation literature to establish the effectiveness of alcohol policies stems from North American and northern European societies, although some policies have been evaluated throughout Europe (6). The general principles on which particular alcohol policy strategies work are fairly well understood and can often be applied across societies. For example, drink-driving countermeasures are premised on a general deterrence effect, and taxes on alcoholic beverages are premised on influencing consumer demand by increasing the cost relative to alternative spending choices. Thus, the fact that there is a conceptual framework underlying alcohol policies, and

the fact that these principles generally operate across societies, suggest that research findings from one society will have applicability in another (7).

## **Political, sociocultural and economic factors that impact on harm**

Although alcohol policy measures may have a significant impact on alcohol consumption and alcohol-related harm, there are a number of other contextual factors that also affect consumption and harm. In the southern European Mediterranean countries, for example, wine consumption fell considerably before the introduction of alcohol policies and prevention programmes. These decreases were largely consequent on urbanization and shifts from agriculture to factory and service work, as well as changes in family structure and the de-structuring of meals, supported in more recent years by increased health consciousness and alcohol policies (8).

## **Stakeholders and alcohol policy**

Reducing alcohol-related harm inherently requires multi-component action, involving the activities of many stakeholders other than health impinging on the potential of harmful alcohol use.

In the fiscal sector, alcohol taxes can not only reduce the harm done by alcohol, including to people other than the drinker, but can also bring in extra government revenue (9). Taxes can be set at their maximum revenue potential, although that is seldom achieved. Such taxes are also an efficient source of revenue to fund publicly-provided, equity-enhancing programmes that can be used to reduce inequalities. Despite the simplicity of the implicit model sometimes suggested in debates (reduced consumption leads to reduced output leads to job losses leads to higher unemployment), most of these connections in practice require assumptions that rarely hold fully (10). For example, if people spend less money on alcohol, they will spend more money on other goods, which will create jobs elsewhere in the economy. In the long run, the evidence suggests that the effect of alcohol policy on employment would effectively be zero. On the other hand, the costs that should be considered are the adjustment costs in the medium and short term, i.e. over a matter of a few years.

Capital investment has increased considerably in the alcohol production sector and is associated with higher levels of productivity, particularly for beer and spirits. In some countries, innovation in the brewing industry has led to a



fivefold increase in the amount of beer produced per employee. Similarly for wine, mechanical harvesting and pruning are increasingly used in lower-quality as well as higher-quality production, while the labour intensity of wine grape production has been reduced by mechanization and the computerization of irrigation. A greater number of jobs are linked with alcohol in other sectors, particularly retail and the hotels, restaurants and catering sector. Here, in general, adjustment costs will be much lower than for drinks production (10).

There are significant commercial interests involved in promoting the manufacture, distribution, pricing and sale of alcohol (11). The alcohol beverage industry consists of relatively large-scale producers and wholesalers who market alcoholic beverages to retailers, who then distribute them through bars, restaurants and off-premise establishments for sale to consumers. The alcohol industry has become increasingly involved in the policy arena in order to protect its commercial interests. A common claim among public health professionals is that the representatives of the alcohol industry are influential in setting the policy agenda, shaping the perspectives of legislators on policy issues and determining the outcome of policy debates. To promote their interests and influence on national policy decisions, industry sources have funded a network of national, regional and global “social aspects” organizations which sponsor selected prevention initiatives or industry-friendly views on alcohol problems and policies through promoting the concept of corporate social responsibility (12). The *Economist* has pointed out that caution should be exercised against the role of the private sector in trying to do the work of governments, which are the proper guardians of the public interest, are accountable to all citizens to set goals for regulators, deal with externalities, mediate among different interests, attend to the demands of social justice and provide public goods and collect the taxes to pay for them (13). Thus it has been argued that the responsibilities of economic operators in reducing the harm done by alcohol should be related to their product, the core of their businesses. For example, economic operators could consider ways in which the price and strength of their product can be managed to reduce harm, such as commitments to support regulation for a minimum pricing structure. Producers and retailers could commit themselves to share intelligence and knowledge of illegally traded and illicit alcohol, together with a commitment to support Europe-wide tax stamps and mechanisms to track the movements of all alcohol products in the distribution chain.

To be effective, alcohol policy must also allow an expression of voice from civil society to counteract the vested trade interests which often dominate political decision-making (14). Nongovernmental organizations are important partners for all elements of alcohol policy as they are a vital component of

modern civil society, raising people's awareness of issues and their concerns, advocating change and creating a dialogue on policy (15).

## **Alcohol policy at different jurisdictional levels**

While alcohol policies have traditionally been a matter for country and sub-country levels of administration, in recent decades this situation has in many ways been transformed (7). Along with greatly increased trade and travel have come much greater opportunities for the transfer of alcoholic beverages across national borders, whether as legal imports or as smuggled goods. Transnational aspects of alcohol production and distribution have grown enormously in terms of exports and imports, of rapidly consolidating multinational producers, of international licensing and co-production arrangements, and of multinational advertising agencies to promote the products. More important than any of these factors, however, has been the growth of supranational common markets and international trade agreements.

The level of jurisdictional responsibilities for alcohol policies varies from country to country, with differing responsibilities at country or federal level, at regional level and at municipal or local level. Enacting policy at the local level has a number of advantages (7). Local citizens are close to where alcohol problems are experienced personally. The community must deal with injuries and deaths from road traffic accidents. It must provide hospital and emergency medical services and interventions for people with harmful alcohol use and alcohol dependence. Alcohol problems are experienced personally by community members, and efforts to prevent or reduce future problems are also a personal matter. When local policy advocates propose future policy positions, they also encounter those who may oppose such policies and who may have vested interests. This means that policy can create, in a local forum, a debate between opposing community groups and thus draw news media attention to such issues. Urban settings can also be risk factors for harmful alcohol use and harmful patterns of drinking, particularly in areas of low social capital and when cities develop the night-time economy and nuisance and harassment from other people's drinking is common (16). When alcohol policies and programmes are devolved to jurisdictions within countries, including local government authorities and municipalities, it is vital that national or regional legislation enables rather than restricts the ability of local government authorities and municipalities to act (17). It is also important to avoid the risk that the least cost-effective policies, including education, are adopted in local policies.

## **Alcohol policies in a European framework**

Alcohol consumption, the harm done by alcohol policy, and alcohol policy itself are influenced to a great extent by EU trade law (18). Where a product like alcohol is both traded and relevant for health, it becomes important to recognize the Treaty's obligation that "a high level of human health protection shall be ensured in the definition and implementation of all Community policies and activities." This means there is substantial scope for health concerns to be incorporated within policies of other Directorates-General and within activities to improve the single market.

Nevertheless, European trade law can constrain alcohol policies, despite the existence of certain exemptions on public health grounds. This is particularly true when legislation treats alcohol only as an economic commodity, without considering the substantial impact on health of many of these laws. Given that the EU has a legal commitment to consider health in all its activities, there is a potential to close this gap at the European level. Governments should be mindful of when alcohol policy is best implemented at local and municipal levels, when respect for the laws of different countries in relation to alcohol policy should be upheld (comity), and when collective action at the European level is more appropriate.

As observed for social policy more generally, a review of European Court of Justice and European Free Trade Association court judgments has shown that they have extended far into the domain of health and social policy (18). Such a partial "juridification" involves passing the authority for national health policies to international courts, which is of concern to some civil society groups. Furthermore, this extended scope is potentially biased towards economic rather than social interests in its structure, and in practice court cases show that economic considerations are sometimes put above health interests.

Yet it can be argued that the pessimistic interpretation of most commentators on the role of EU law in alcohol policy should be tempered. The courts have established that retail monopolies are permissible, and confirmed since 1980 the right of national governments to make health-motivated alcohol policies that distort the EU single market. It can even be argued that the impact of negative integration on national alcohol policy has been small. In the mid-1990s, the Finnish and Swedish governments took the view that abolishing the wholesale, import and export monopolies in the Nordic countries was unlikely to have an impact on alcohol-related harm as long as the retail monopoly was maintained. Import restrictions may have been lifted, but the Swedish

Government has stated that “Swedish alcohol policy stands firm”, given that private importers will still have to pay Swedish alcohol taxes.

Policy-makers can draw at least two lessons from experience of the court cases in drawing up alcohol policy compliant with EU law. First, broadly-focused policies have more difficulty in passing proportionality tests, and policy-makers should recognize that even a slight targeting of a generally broad policy, for example as seen with the French Evin law on advertising, could make a significant difference (19). Second, alcohol policies have historically often resulted from intertwined economic and health concerns, but this has now become much more problematic. Policies must therefore be explicitly targeted at health and social concerns, which means that one potential influence on alcohol policy (national alcohol producers) is removed at a stroke. Perhaps the strongest conclusion to draw is that EU law is unquestionably relevant to alcohol policy and must be closely watched as case law and any future treaty negotiations continue to develop.

### **Alcohol policies in a global framework**

International trade law is a generic term for many legal provisions covering varying geographical areas and issues. The most high-profile global agreement for many years was the General Agreement on Tariffs and Trade (GATT) on goods, which was agreed in 1948 by 23 countries and progressively revised and expanded to over 100 countries by the 1970s. In 1995, the World Trade Organization (WTO) was created as a permanent body, and a further agreement was signed, the General Agreement on Trade in Services (GATS), that covered broadly-defined services. These are the agreements that are most likely to affect alcohol policies (20,21).

There are two parts to the WTO system. First, there is the law itself: a set of agreements that all members have signed up to, although there are many areas where countries can either opt in or out of commitments in particular areas. Second, there is the enforcement of the law, which approximately follows a three-step process: (i) a country makes a complaint to the WTO; (ii) after a delay for negotiations, WTO members appoint a panel of international legal experts who judge the case, if necessary with the help of scientific/technical experts; (iii) if the judgment is subject to appeal, the case is referred to the permanent Appellate Body who make a new judgment.

The WTO agreements potentially prohibit a wide range of alcohol policies that could inadvertently benefit domestic businesses over foreign ones (22). Yet

both GATT (Article XX) and GATS (Article XIV) explicitly state that nothing in either agreement “shall be construed to prevent the adoption or enforcement by any contracting party of measures ... necessary to protect ... human health.” This applies as long as such measures are not a “disguised restriction on trade” or “unjustifiable discrimination”. While this health defence therefore appears to allow countries to implement alcohol policies when they are violating international trade commitments, the crucial word here is “necessary”. Those alcohol policies that violate a country’s trade commitments must pass a WTO necessity test, which means that “the measure be the least trade-restrictive measure reasonably available in the circumstances to meet the objective of protecting health”.

The argument that the WTO is a threat stems, therefore, from the nature of this necessity test, which is interpreted narrowly and whose burdens are “substantial and difficult”. As well as the burden of proof being upon the defending country to show that the policy is not a disguised restriction on trade, countries must also show that the alternatives will not be equally effective.

Policies that aim to protect domestic alcohol industries from foreign competition are unlikely to be permissible under WTO law, whether they are tariff- or non-tariff-based (22). The removal of such policies could lead to increased alcohol consumption via a combination of reduced prices (through comparative advantage and improvements in productivity) and increased marketing. In Switzerland, the liberalization of spirits was found to lead to price reductions and their increased consumption (23). WTO agreements are, therefore, likely to lead to an increase in alcohol-related harm, independently of their effect on health policies.

The consistent response of the arbitrating bodies when dealing with fused protectionist and public health policy interests has been to rule against the former objective (protectionist) while reaffirming the rights to meet the latter (public health).

In contrast, policies that are motivated purely by health considerations are likely to be defended by the WTO, with the caveat that policies will still be subject to a necessity test which certain highly trade-restrictive policies are unlikely to pass. For example, freezing preferences for particular drinks or quantitative restrictions such as economic needs tests are unlikely to be possible for countries that have made commitments in relevant sectors. Nevertheless, countries are entirely free to set their own level of health protection, and a purely health-motivated policy can be confident of being

upheld in the WTO courts. When considering less trade-restrictive alternatives, they are further permitted to take into account issues of implementation. They can also follow minority reasonable scientific opinion when assessing risks – which is arguably a form of the precautionary principle. The view of the European Spirits Organization – CEPS that voluntary self-regulation and education are “reasonable alternatives” to regulation is, therefore, unlikely be upheld by a WTO panel (22).

This conclusion is also true for the ongoing discussions about domestic regulation, which appear to threaten a necessity test on all (even trade-irrelevant) policies. Such a development would increase the number of alcohol policies deemed illegal, but only those that are fully or partly protectionist; those that are fully motivated by health considerations would be unaffected. This still raises the question of how a country can demonstrate to WTO that its policies are motivated by health considerations alone. It is not easy for an outside observer to decide on the goals of a policy: is an alcohol advertising ban a way of reducing alcohol-related harm, a political response to public pressure, a way of protecting domestic companies from foreign competition – or all three? Furthermore, support for many policies depends on a coalition of actors with different reasons for agreeing with a policy (the government itself, health professionals, the domestic and international alcohol industries, drinkers, etc.).

In the face of this complexity, a promising avenue seems to be clearly demonstrating motives in the design, architecture and structure of a policy. In other words, a policy can be explicitly designed to maximize the impact on health with minimal economic disruption (mirroring the terms of the necessity test).

Thus, trade policies are likely to increase alcohol-related harm through their effect on fully or partly protectionist policies. Countries are, however, effectively still free to regulate purely on health grounds, and in this sense the view that the health defence is ineffective or weak is overstated. Indeed, the WTO is arguably highly deferential to health policies, at least compared to other safeguards in the WTO agreement (22). Yet there are signs of a belief among the public health community that a greater number of health-motivated policies may not be permissible under WTO law. For example, one recent review for the World Health Organization (WHO) notes that “current international trade law and the presence of the free trade movement over controls on public health suggest that [controls on manufacture and distribution] may be of limited relevance in a number of countries” (23). Similar comments for areas including taxation policy and advertising

restrictions can also be found in a WHO review on trade law and alcohol and a resolution of the American Public Health Association (22).

It is important to send a clear message to policy-makers that, in general, they are free to adopt nearly any policy on alcohol as long as it is motivated purely by health considerations and is designed to be as trade-friendly as possible. For existing policies that are compromises between health and protectionist interests, policy-makers can decide to wait and see if they are challenged at the WTO, and if they are, to redesign the policy on health grounds rather than abolish it completely. Any perceptions to the contrary may be needlessly damaging to public health.

It is accepted almost unanimously by those in the health field that trade negotiations and disputes must be made more transparent, increase the involvement of civil society and of health interests such as WHO, particularly given the diversity in how different stakeholders perceive relevant issues (22). The extension of the necessity test to domestic regulation may be unlikely to occur but it is still possible and therefore in need of close attention.

The potential impact of a number of different policy options for changes in trade obligations on alcohol has been considered in the public health literature, as under.

- WTO agreements – or more easily, their interpretation – can be changed in various ways that would be beneficial for health (24). In particular, the burden of proof for the health defence could be changed by requiring a country invoking the health exception simply to show that it was not patently unreasonable to keep its present policies. Alternatively, measures could be given a rebuttable presumption of legitimacy under international trade law. Such changes would change the balance between trade and health when considering partly protectionist and partly health-motivated policies.
- The World Medical Association and others have suggested carving alcohol out of trade agreements completely (25). While this is the strongest way of defending partly protectionist policies, alcohol is no different to other commodities whose regulation also commonly combines legitimate and illegitimate objectives, and it may be hard to argue that alcohol is an exceptional case. Where alcohol differs from other commodities is in the potential increase in harm from the removal of purely protectionist policies. The importance of this depends on whether alternative measures are seen as capable of counteracting the

effects of liberalization. The Secretariat of the Pacific Community has argued that resisting globalization will always be a stronger option for alcohol, and this has led to the carving out of both alcohol and tobacco from the Pacific Islands Community Trade Agreement (26).

- Increasingly, some of those in the alcohol field suggest that there should be a framework convention on alcohol policy (27) modelled explicitly on the current Framework Convention on Tobacco Control, or an alternative method for creating a binding international agreement on alcohol (28). This would not automatically make WTO-inconsistent policies somehow permissible, but it would provide an international community of support for such policies and potentially help to manage the relationship between alcohol and trade. It may also add weight to the defence of such policies under trade disputes, although how this would affect partly protectionist policies would remain to be seen.

Whatever the views on these options, governments can take action within the current system to minimize the possible effects of trade on alcohol-related harm (22). First, they can avoid making any further commitments related to alcohol in future, thus allowing themselves to pursue partly health-focused and partly protectionist policies – which is what most existing alcohol policies are likely to be. This also allows them to avoid the negative effects of liberalization per se and to pursue purely health-focused but, potentially, highly trade-distorting policies. Second, to the extent that this is politically feasible and desirable, they can introduce stringent alcohol policies to counteract the effect of liberalization that is taking place. Finally, they can ensure, and be shown to ensure, that their alcohol policies try to achieve their health and social welfare goals with the minimum possible impact on trade, in order to make the chances of being found to breach WTO law as remote as possible.

## **What is Europe?**

This report sometimes refers to the WHO European Region and sometimes to the EU. The WHO European Region includes 53 Member States: Albania, Andorra, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Georgia, Greece, Hungary, Iceland, Ireland, Israel, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Malta, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Republic of Moldova, Romania, Russian Federation, San Marino, Serbia, Slovakia,



Slovenia, Spain, Sweden, Switzerland, Tajikistan, The former Yugoslav Republic of Macedonia, Turkey, Turkmenistan, Ukraine, United Kingdom, Uzbekistan.<sup>1</sup>

The EU includes 27 member states: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.<sup>2</sup> For descriptive purposes in this report, they are sometimes grouped as follows:

- EU15: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom
- EU10: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia
- EU7: Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovakia, Slovenia
- EU5: Czech Republic, Hungary, Poland, Slovakia, Slovenia
- EU3: Estonia, Latvia, Lithuania
- EU2: Bulgaria, Romania.

The EU member states are also sometimes grouped according to the following WHO classification.

- *Eur-A: very low adult/very low child mortality*  
Andorra, Austria, Belgium, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Monaco, Netherlands, Norway, Portugal, San Marino, Slovenia, Spain, Sweden, Switzerland, United Kingdom.
- *Eur-B: low adult/low child mortality*  
Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Bulgaria, Georgia, Kyrgyzstan, Montenegro, Poland, Romania, Serbia, Slovakia, Tajikistan, The former Yugoslav Republic of Macedonia, Turkey, Turkmenistan, Uzbekistan.

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<sup>1</sup> WHO Regional Office for Europe [web site]. Copenhagen, WHO Regional Office for Europe, 2009 (<http://www.euro.who.int/AboutWHO/About/MH>, accessed 13 July 2009).

<sup>2</sup> Europa [web site]. *European countries*. Brussels, European Union, 2009 ([http://europa.eu/abc/european\\_countries/index\\_en.htm](http://europa.eu/abc/european_countries/index_en.htm), accessed 13 July 2009).

- *Eur-C: high adult/low child mortality*  
Belarus, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Republic of Moldova, Russian Federation, Ukraine.

### **Summary of the introduction to alcohol policies**

#### *What we know*

- ✓ States have a duty to look after the important needs of their populations, including the harm done by alcohol.
- ✓ Higher levels of health are associated with greater overall well-being and productivity.
- ✓ There is an extensive evidence base for alcohol policies.
- ✓ Contextual factors can influence the level of alcohol-related harm, independently of alcohol policy.
- ✓ Different sectors and different jurisdictional levels have differing and specific responsibilities to reduce alcohol-related harm.
- ✓ Alcohol policy is influenced by EU trade law, but case law has often supported alcohol policy measures supportive of public health.
- ✓ Alcohol policies are also influenced by WTO agreements, but policies motivated purely by considerations of health are likely to prevail.

#### *What we do not know*

- ⊗ There is no specific evaluation of alcohol policies in some countries of southern and eastern Europe.
- ⊗ The real extent to which trade law at both European and global levels can undermine effective alcohol policy.

**Policy implications of the introduction to alcohol policies**

Alcohol policies are the tool by which governments take the responsibility to reduce the harm done by alcohol to both drinkers and non-drinkers. In implementing such policies, governments could encourage a wide range of stakeholders and jurisdictional levels to fulfil their responsibilities in reducing alcohol-related harm. Governments could closely monitor the potential impact of trade agreements on alcohol policy, and ensure that their policies have a strong and effective public health base.

## **The health, social and economic impact of alcohol**

This section notes that both the volume of lifetime alcohol use and a combination of frequency of drinking and amount drunk per occasion increase the risk of a wide range of health and social harm, largely in a dose-dependent manner. The risk of a lifetime-attributable death from a chronic alcohol-related condition is found to increase linearly from zero consumption in a dose-response manner with the volume of alcohol consumed, and from an acute alcohol-related condition increases from zero consumption in a dose-response manner with frequency of drinking and exponentially with the amount drunk on any one occasion. The risk of death remains below 1 in 100 for both men and women if they stick to an upper limit of 20g alcohol or less on one occasion, even if these occasions are every day. At a societal level, the EU is the heaviest drinking region of the world, with over one fifth of the European population aged 15 years and over reporting heavy episodic drinking (defined as five or more drinks on one occasion, or 50g alcohol) at least once a week. Heavy episodic drinking is found not to be a prerogative of young people or of northern European people, but is widespread across all ages and all of Europe. The WHO European Region has the highest proportion of total ill health and premature death due to alcohol in the world, with a very close relationship between a country's total per capita alcohol consumption and its prevalence of alcohol-related harm and alcohol dependence. This high level of harm hides enormous alcohol-related health inequalities between eastern and western Europe, particularly as regards deaths from injuries. The overall social cost of alcohol to the EU is estimated to be €125 billion per year, with an intangible cost of some €270 billion/year.

### **At individual level**

Both the volume of lifetime alcohol use and a combination of frequency of drinking and amount drunk per occasion increase the risk of alcohol-related harm, largely in a dose-dependent manner (29). Alcohol is an intoxicant affecting a wide range of structures and processes in the central nervous system which, interacting with personality characteristics, associated behaviour and sociocultural expectations, are causal factors for intentional and unintentional injuries and harm to people other than the drinker (29), including interpersonal violence (30), suicide (31), homicide (32), crime (33)

and drink-driving fatalities (34), and a contributory factor for risky sexual behaviour (35), sexually transmitted diseases (36) and HIV infection (37). Alcohol is a potent teratogen with a range of negative outcomes to the foetus, including low birth weight, cognitive deficiencies and foetal alcohol disorders (38). Alcohol is neurotoxic to brain development, leading in adolescence to structural hippocampal changes (39) and, in middle age, to reduced brain volume (40). Alcohol is a dependence-producing drug, similar to other substances under international control, through its reinforcing properties and neuroadaptation in the brain (41). It is an immunosuppressant, increasing the risk of communicable diseases (42), including tuberculosis (43). Alcoholic beverages are classified as a carcinogen by the International Agency for Research on Cancer, increasing the risk of cancers of the oral cavity and pharynx, oesophagus, stomach, colon, rectum and breast in a linear dose-response relationship (44,45). Acetaldehyde, which occurs in alcoholic beverages as well as being produced in ethanol metabolism, is a potential pathway for cancer risk, with a global average of lifetime cancer risk from alcoholic beverages of 7.6 in 10 000 (46).

Alcohol has a bi-form relationship with coronary heart disease. In low and apparently regular doses (as little as 10g every other day), alcohol appears to be cardio-protective (47), but at high doses, particularly when consumed in an irregular fashion, it is cardio-toxic (48). It should be noted that considerable concern remains about the extent to which the observed cardio-protection is due to systematic definition errors (49,50), drinking patterns and genetic factors (51), and the extent to which the size of the protective effect is overestimated (52,53).

The risk of hospitalization for an alcohol-related diagnosis increases linearly with alcohol consumption (54). As stated above, the risk of a lifetime-attributable death from a chronic alcohol-related condition increases linearly from zero consumption in a dose-response manner with the volume of alcohol consumed (55), and from an acute alcohol-related condition increases from zero consumption in a dose-response manner with frequency of drinking and exponentially with the amount drunk on an occasion (56). Estimates for Australia show that for people who regularly drink 20g alcohol per day, the lifetime risk of death from an alcohol-related disease is about 0.4 in 100. Above that level, the risk increases with the number of drinks per day and is above 1 in 100 at 30g/day, increasing more sharply for women than for men (57). Similar estimates show that the risk of death from an alcohol-related injury increases with the frequency of drinking, with the risks of death for men being higher than those for women at all levels of drinking. The risk of death from injury remains below 1 in 100 for both men and women if they

always drink 20g alcohol or less on an occasion, even if the occasions are every day (57).

Surrogate and illegal alcohols can bring an extra health risk from high ethanol levels and toxic contaminants, such as methanol and lead (58), often compounded by social marginalization (59).

Wide socioeconomic differences in alcohol-related mortality are well documented (60). In the United Kingdom, occupational social class is a risk factor for alcohol-related mortality and hospitalization, particularly among men (61), while in Nordic studies, alcohol-related mortality rates are 1.9–3.2 times higher among male manual workers than among non-manual workers (62). Research from Finland further suggests that socioeconomic variables act on the collective as well as the individual level (63): areas with the most manual workers had 20% more mortality directly attributable to alcohol than areas with the least, even after accounting for the individual relationship of occupation to mortality. Similar effects held for unemployment, urbanization and social cohesion (measured as both family cohesion and voter turnout), which accounted for around 40% of the alcohol-attributable mortality gap between areas after taking account of all of these variables at individual level. This suggests that the drinking behaviour of people living nearby may be important for the behaviour of the individual.

### **At societal level**

The EU is the heaviest drinking region of the world with, on average, each adult drinking 11 litres of pure alcohol each year – a level over two and a half times the average of the rest of the world (9). Some 53 million adults (14%) do not drink alcohol at all, while some 58 million (16%) can be classified as heavy drinkers (women who consume on average more than 20g alcohol/day and men more than 40g/day) (9). In any one year, some 23 million adults (6%) are found to be dependent on alcohol. The Eurobarometer survey conducted at the end of 2006 found that some 80 million Europeans aged 15 years and over (over one fifth of the adult EU population) reported heavy episodic drinking (defined in the Eurobarometer survey as five or more drinks on one occasion, or 50g alcohol) at least once a week in 2006, a proportion that has increased since 2003 (64). A much higher proportion of all men (31%) than women (12%) reported heavy episodic drinking at least once a week. Some 25 million Europeans aged 15 years and over (1 in 15 of the adult population) reported that heavy episodic drinking was their usual pattern of consumption during the previous month. According to the Eurobarometer

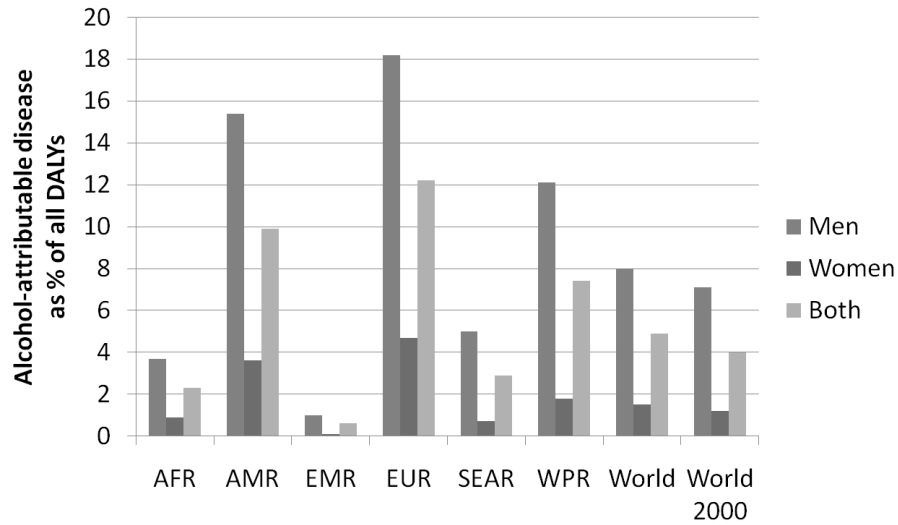
survey, heavy episodic drinking was not a prerogative of the young or of northern Europeans. Whereas 24% of those aged 15–24 years reported heavy episodic drinking at least once a week in 2006, such drinking was also common among those aged 55 years and over, with 18% reporting heavy episodic drinking at least once a week. The proportion of the total population reporting that they were heavy episodic drinkers was 54% in Ireland and 33% in Spain, much higher than in Finland (17%) and Sweden (11%).

Not surprisingly, this high level of consumption and pattern of drinking brings with it a high level of harm: the WHO European Region has the highest proportion of total ill health and premature deaths due to alcohol in the world (Fig.1) (65).

At the ecological level there is a very close relationship between a country's total per capita alcohol consumption and its prevalence of alcohol-related harm and alcohol dependence, implying that when alcohol consumption increases, so does alcohol-related harm and the proportion of people with alcohol dependence, and vice versa (66–67).

It is difficult to estimate the overall social harm due to alcohol in the EU (9). Alcohol is associated with crime across the whole of Europe, with estimates from differing countries and differing types of crime ranging from 20% to 80%, much of it with alcohol playing a causal role. Seven million adults in the EU15 report being in fights when drinking over the past year and, based on a review of a small number of national costing studies, the economic cost of alcohol-attributable crime has been estimated to be €33 billion in the EU for 2003 (9). This cost is split between police, courts and prisons (€15 billion), crime prevention expenditure and insurance administration (€12 billion) and property damage (€6 billion). Property damage due to drink-driving has also been estimated at €10 billion, while the intangible cost of the physical and psychological effects of crime has been valued at €9–37 billion. Some 2000 homicides (4 in 10 of all murders) are estimated to be due to alcohol. An estimated 23 million Europeans are dependent on alcohol in any one year, with the pain and suffering this causes for family members leading to an estimated intangible impact of €68 billion. Estimates of the scale of harm in the workplace are more difficult, although nearly 5% of drinking men and 2% of drinking women in the EU15 report that alcohol has a negative impact on their work or studies. Based on a review of national costing studies, lost productivity due to alcohol-attributable absenteeism and unemployment has been estimated to cost €9–19 billion and €6–23 billion, respectively.

Fig. 1. Alcohol-attributable burden of disease in DALYs as a proportion of all DALYs, by sex and WHO region, 2004 (%)



Notes: AFR: African Region; AMR: Region of the Americas; EMR: Eastern Mediterranean Region; EUR: European Region; SEAR: South-East Asia Region; WPR: Western Pacific Region.

<sup>a</sup>WHO uses a measure called disability-adjusted life years (DALYs) to estimate the number of healthy years of life lost due to each risk factor. For example, while a year of perfect health will count as 1 and a year of death will be 0, a year of damaged health that significantly affects quality of life will be somewhere in between. DALYs measure a gap in health between the current position and what could be achieved.

Source: Rehm et al (65).

Much of the harm caused by alcohol is borne by people other than the drinker responsible (9). This includes 60 000 low-birth-weight babies, 16% of child abuse/neglect and 5–9 million children living in families adversely affected by alcohol. Alcohol also affects other adults, including an estimated 10 000 deaths in drink–driving accidents for people other than the drink-driver, and a substantial share of alcohol-attributable crime also likely to occur to others. Parts of the economic cost are also paid by other people or institutions, including much of the estimated €33 billion due to crime, €17 billion for health care systems, and €9–19 billion of absenteeism.

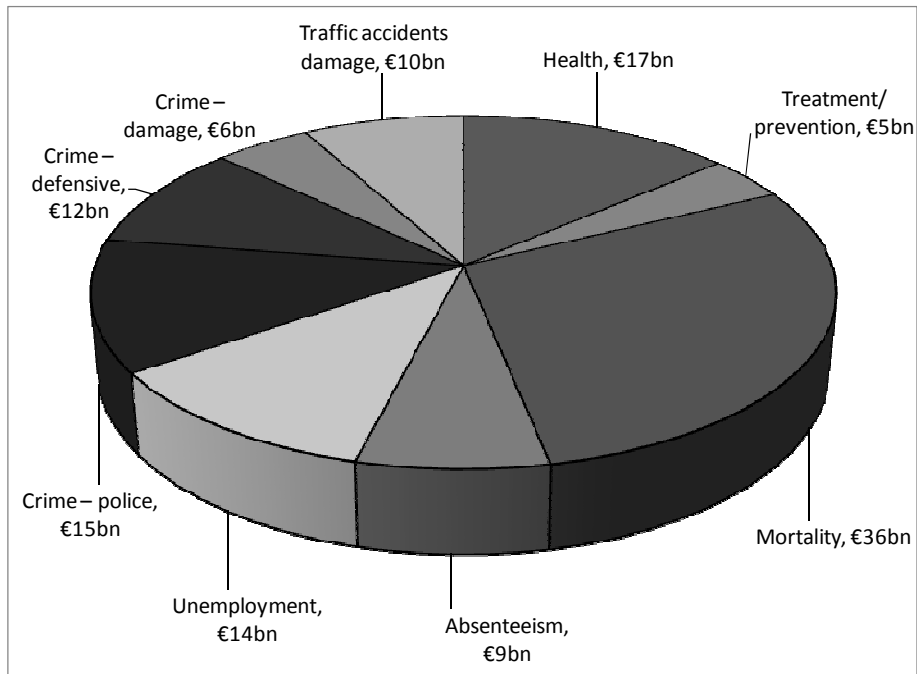
Based on the results of 21 European studies, the total tangible cost of alcohol to the EU was estimated to be €125 billion (range of estimates: €79–220 billion) in 2003, equivalent to 1.3% of gross domestic product (0.9–2.4%) (Fig. 2) (9). Actual spending on alcohol-related problems accounts for



€66 billion of this, while potential production not realized due to absenteeism, unemployment and premature mortality accounts for a further €59 billion.

Aside from the tangible monetary costs, alcohol causes an intangible cost of somewhere between €152 and €764 billion, which incorporates the value people place on pain, suffering and life itself due to crime and lost healthy life due to alcohol. This intangible cost is not an economic loss in the normal sense of the term and cannot be compared to, for example, gross domestic product (nor can it be simply added to the tangible cost, given that they both include estimated values for lost life but the estimates are done in different ways). This cost does, however, offer a more accurate estimate of the full economic and human cost of alcohol to the EU.

Fig. 2. The tangible cost of alcohol in the EU by cost component, 2003



Source: Anderson & Baumberg (9).

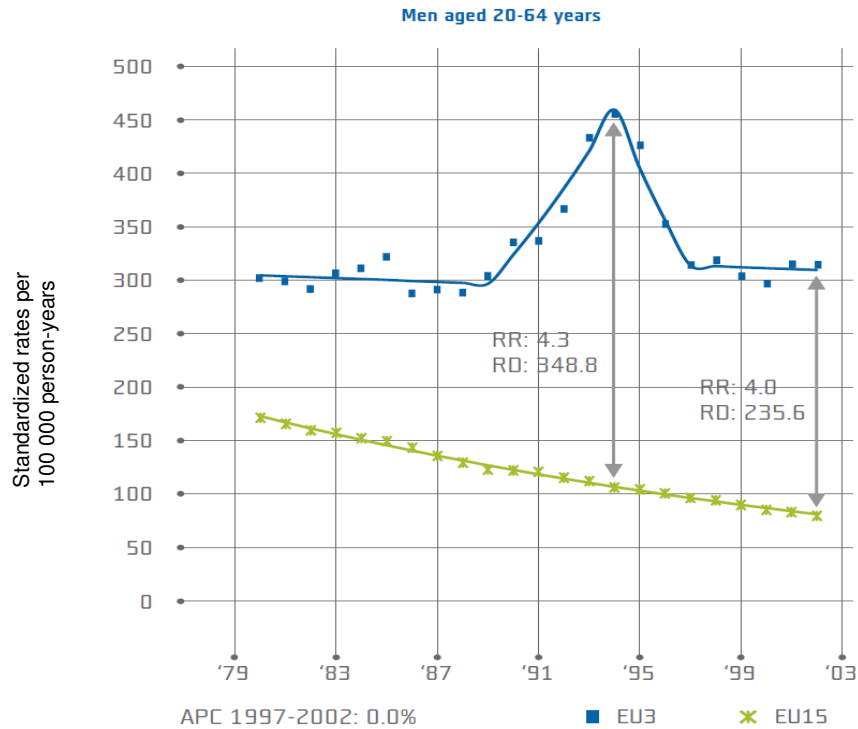
## **Health inequalities**

There are enormous differences in life expectancy between different parts of the EU, revealing a waste of human capital, threatening the cohesion and stability of the Union and leading to inefficiency in overall productivity. For example, in 2002 the difference in male life expectancy at the age of 20 years between the EU15 and EU5 was 5.8 years, the EU2 6.8 years, and the EU3 9.8 years. About 25% of the difference in life expectancy between the EU10 and the EU15 for men aged 20–64 years in 2002 can be attributed to alcohol, largely as a result of differences in heavy episodic drinking patterns (68).

The alcohol-related health gap is reflected largely in differences from cardiovascular and injury mortality. For example, in contrast to western European countries, cardiovascular mortality in eastern European countries, markedly in the Baltic States, rose suddenly to a peak in 1994 and then fell back to its previous level (Fig. 3). This trend exactly mirrored that for intoxication-related deaths – for example, those from injury – and for more direct measures of alcohol consumption, suggesting that the vascular risk in these countries was due to the rise in peak drinking between 1990 and 1994. The most widely accepted interpretation of this phenomenon is that it is mainly a consequence of the temporal pattern of alcohol consumption. As the volume of alcohol consumed is concentrated into fewer drinking occasions, the vascular risk increases (48). Another, and not mutually exclusive, explanation may be due to interaction with folate intake, whose intake tends to be lower in eastern Europe (68). Alcohol interferes with folic acid absorption and metabolism at several points (69), and the benefits of alcohol consumption on risk of cardiovascular disease disappear with low intake of folic acid (70).

Another example is premature mortality from injuries, the cause of one in seven of all preventable mortality in the EU (68). In Europe, there are three clear strata of fatal injury mortality: compared with the EU15 countries, the rates are double in the seven central and eastern European countries and at least five times as high in the three Baltic States. The leading cause of fatal injury mortality is alcohol, causing one third of all mortality from accidents and injuries among Europeans aged 20–64 years. In the Baltic States, one third of all premature mortality is due to injuries, with nearly one half of all deaths from injury due to alcohol (Table 1). Since half of the health gap between the EU15 and the Baltic States is attributed to injuries, it can be concluded that at least one quarter of the health gap is due to alcohol. A major

Fig. 3. Cardiovascular mortality in the Baltic States (EU3) compared with the EU15, men aged 20–64 years, 1980–2002



RR: rate ratio, RD: rate difference, APC: annual percentage change.

Source: Zatonski et al (68).

Table 1. Alcohol-attributable mortality from injuries in people aged 20–64 years, 2002

<b>Alcohol-attributable injury mortality</b>		<b>EU15</b>	<b>EU7</b>	<b>EU3</b>
<i>Men:</i>	Mortality rate of alcohol injuries	16.9	44.1	160.0
	Proportion of alcohol injuries in all injuries	29%	38%	48%
<i>Women:</i>	Mortality rate of alcohol injuries	3.1	7.0	27.9
	Proportion of alcohol injuries in all injuries	19%	29%	42%

Source: Zatonski et al (68).

cause of the health gap results from poor health infrastructures in some of the EU10 countries, including an historical exclusively epidemiological focus on communicable as opposed to noncommunicable diseases, a lack of

understanding and access to modern epidemiology and public health and to evidence-based medicine, and a lack of effective public health interventions, as well as harmful drinking patterns, an insecure environment and high levels of social exclusion (68).

**Summary of the evidence of the health, social and economic impact of alcohol**

*What we know*

- ✓ The risk of death from an alcohol-related illness or injury increases with increasing alcohol consumption.
- ✓ At 20g of alcohol consumed on average per day or per drinking occasion per day, the lifetime risk of death from an acute or chronic condition is less than 1 in 100.
- ✓ For a given level of alcohol consumption, people from lower socioeconomic groups are at increased risk of an alcohol-related death, compounded by areas with a higher degree of disadvantage.
- ✓ The burden of the social harm done by alcohol is estimated at €125 billion each year in the EU.
- ✓ Twenty-five per cent of the difference in male middle age life expectancy between eastern and western Europe can be attributed to alcohol.

*What we do not know*

- ⊗ The avoidable burden of the social cost of alcohol that could be averted with effective alcohol policies in Europe.

**Policy implications of the evidence of the health, social and economic impact of alcohol**

For the individual, the lifetime risk of death from alcohol can be averted by reducing alcohol consumption. Consuming less than 20g/day reduces the lifetime risk of death from alcohol to below 1 in 100. Concerted support could be given to the development and implementation of alcohol policy in many of the newer member states to lessen the health inequalities between different regions of the EU and to support increases in overall efficiency and productivity in Europe.

## **Raising awareness and political commitment**

This section notes that while the provision of information and education is important to raise awareness and impart knowledge, by themselves information and education do not lead to sustained changes in alcohol-related behaviour. Education can, however, be a tool for awareness and raising support, and an important feature of a broader alcohol strategy. Campaigns and health education messages funded by the alcohol industry seem to have negative effects, serving to advance the interests of both the industry's sales and public relations. Although warning labels have little impact on behaviour, they are important in helping to establish a social understanding that alcohol is a special and hazardous commodity. Popular perceptions of actions and responsibilities relating to alcohol are of obvious importance for policy-making, with policy-makers both contributing to perceptions as well as responding to them. There is evidence of public support for a wide range of alcohol policy measures, although there is still much work to do, given the existing negative views about the potential impact of higher alcohol prices. Although at country level, it is ultimately a government's responsibility to define and be accountable for a clear alcohol policy, with targets, an adequate research base and available intelligence systems, the presence of an alcohol policy is not enough. A lack of transparency and information, poor organization and preparation for the introduction of new policies and laws, poor public health infrastructures, vertically as opposed to horizontally organized government, a lack of financing, the presence of corruption, and public distrust of authority are all impediments to the implementation of effective policy.

### **Impact of education and information campaigns**

Providing information and education is important to raise awareness and impart knowledge, but, particularly in an environment in which many competing messages are received in the form of marketing and social norms supporting drinking, and in which alcohol is readily accessible, do not lead to sustained changes in alcohol-related behaviour (7).

#### ***School-based information and education***

Many systematic reviews have evaluated school-based education and concluded that classroom-based education is not effective in reducing alcohol-

related harm (71,72). Although there is evidence of positive effects on increased knowledge about alcohol and on improved alcohol-related attitudes, there is no evidence for a sustained effect on behaviour. One systematic review of 14 systematic reviews identified 59 high quality programmes, of which only 6 were able to demonstrate any evidence for effectiveness (72). It is interesting to note that one of the series of reviews that did find a positive outcome (73) was based on inappropriate analyses which, on proper analysis, found no effect (74). It has been suggested that parenting and social marketing programmes might have more promise but, even here, mixed effects have been found. For example, a systematic review of 14 parenting programmes found reductions in alcohol use in only 6 programmes (75), and a systematic review of 15 social marketing programmes found 8 out of 13 studies showing some significant effects on alcohol use in the short term (up to 12 months), 4 out of 7 studies showing some effect at 1–2 years, and 2 out of 4 studies showing some effect over 2 years (76).

A systematic review of preventive interventions addressing under-age drinking identified 25 reviews and over 400 interventions. The evidence for 127 of these was reviewed and only 12 were found to have promising evidence on alcohol outcomes (77). The promising interventions were mixed, and it was not possible to identify any clear group or category of programmes that showed promise.

A number of suggestions have been made as to how the impact of school-based education programmes might be improved by: encouraging programme planners to adopt a formative phase of development that involves talking to young people and testing the intervention with young people and teachers; providing the programme at relevant periods in young people's development; ensuring programmes are interactive and based on skill development; setting goals for changing behaviour that are relevant and inclusive of all young people; including booster sessions in later years; including information that is of immediate practical use to young people; and including appropriate teachers (78–82). Further, any improvements to school education should be embedded in the concept of the school as a health-promoting setting (83).

While education primarily aims to affect behaviour through influencing attitudes, there is some evidence to suggest that in fact attitudes are influenced by behaviour, thus raising the question of whether interventions should focus on attitudes or behaviour. Research in adolescent smoking has found that attitudes towards smoking were neither a consistent nor strong predictor of smoking behaviour over time (84). The same study found that in fact, past smoking was related to attitudes indicating that adolescents adapted their

attitudes to match their behaviour. It also suggests that other factors play important roles in beginning and continuing to smoke, such as favourable social images and peers who smoke.

*Public education campaigns.* In general, public information campaigns have been found to be ineffective in reducing alcohol-related harm (1). Exceptions are mass media campaigns to reduce drinking and driving which, when implemented in the presence of strong drinking and driving countermeasures, can have an impact (85). Counter-advertising, a variant of public information campaigns which provides information about a product, its effects and the industry that promotes it in order to decrease its appeal and use, has inconclusive effects (1).

### ***Campaigns based on drinking guidelines***

While campaigns based on drinking guidelines have been used in a number of countries, there have been no rigorous evaluations of whether or not publicizing such guidelines has any impact on alcohol-related harm (9).

*Campaigns funded by the alcohol industry.* Most of the research comparing tobacco industry prevention campaigns with tobacco control campaigns suggests they perform less well and, in many instances, can be counterproductive, with tobacco company advertisements being more likely to elicit positive emotions and less likely to elicit negative emotions than tobacco control advertisements. Further, industry prevention campaigns consistently cause young people to become more favourably inclined towards the tobacco industry (86,87). This is not surprising as it reflects the true purpose of these campaigns: they are part of what are becoming increasingly elaborate corporate social responsibility programmes, designed to improve the image and reputation of the company (88).

With alcohol, there is evidence that social responsibility messages, whether stand-alone or when added to product advertisements, benefit the reputation of the sponsor more than public health. For example, a study that assessed the impact of adding drink-driving messages to bar advertisements showed that inclusion of the message had positive effects on the perception of the advertiser in terms of concern about the safety of bar customers, but did not affect the attitudes or intentions variables (89). Similarly, another study found the message in alcohol industry social responsibility spots to be ambiguous, especially for 16–18-year-olds, but that the source of the message (the alcohol company) was favourably perceived. Two thirds of the sample perceived the

spots to be fairly or very similar to beer commercials, with over two thirds agreeing that the spots suggested that beer drinking was fun (90).

There is also evidence, as with tobacco, that alcohol companies are more circumspect about their messaging than public health sources are (91). Thus they tend to avoid the negative consequences of irresponsible drinking (92) and set their messages within a “drinking is normal” context. They also co-opt social responsibility messaging to serve product marketing objectives, conflating the two agendas. Thus, seemingly pro-health messages can end up serving to advance both industry sales and public relations interests (12).

*Consumer labelling and warning messages.* Evaluation of the impact of the mandated health warnings on alcohol product containers that were introduced in the United States did not demonstrate that exposure produced a change in drinking behaviour, although some intervening variables were affected, such as intention to change drinking patterns (93). Since 2007, a health warning has been placed on alcoholic drinks packaging in France in order to promote abstinence during pregnancy, supported by a press campaign and extensive media coverage. Two telephone surveys were conducted in 2004 and 2007 among two independent representative quota samples of the French population aged 15 year and over (approximately 1000 people interviewed in each survey) (94). It was found that the recommendation that pregnant women should not drink alcohol was better known after the introduction of the health warning (87% of the respondents) than before (82%) ( $p < 0.001$ ). After the introduction of the label, 30% thought that the risk for the foetus started after the first glass compared with 25% in 2004 ( $p < 0.01$ ). These rather modest results contrast with evidence from tobacco, where there is evidence of impact, but this may reflect the nature of the warning labels, since it seems that the introduction of more graphic and larger warnings for cigarettes, with rotating messages, has affected behaviour (95). Nevertheless, warning labels are important in helping to establish a social understanding that alcohol is a special and hazardous commodity (96).

*What to do about education and information.* When looking at education alone, the lack of evidence for effectiveness could lead to policy-makers considering withdrawing funds from education programmes altogether. This would involve several risks, including: losing the importance of education for society in improving individual capital; losing an important means of gaining awareness of and support for other control measures; and leaving a gap which may be filled by better-funded industry-backed programmes. Many education programmes focus on young people, and there is evidence that young adults and adults are often overlooked. These groups often serve as drinking role



models for young people and also support easy access to alcohol, which is associated with increased drinking in all age groups, and are therefore an important target audience (97). The conceptual shift from influencing attitudes to affecting behaviour to looking at the influence of behaviour on attitudes is important to consider, especially among young people. It may be more effective to focus education/information activities on policy-makers and the general public as a means to raise awareness of the burden of alcohol-related harm and the benefits of effective measures to reduce this harm. Interventions could be reframed to encourage and support consumer advocacy by providing information on how the public can influence alcohol policy.

### **Summary of the evidence of education and information campaigns**

#### *What we know*

- ✓ There is extensive and consistent evidence that school-based information and education programmes do not lead to sustained changes in behaviour.
- ✓ Although showing some promise, there is no consistent evidence to demonstrate that parenting programmes and social marketing programmes lead to sustained changes in behaviour.
- ✓ Although poorly researched, there is no consistent evidence that public education campaigns lead to sustained changes in behaviour.
- ✓ There are no rigorous evaluations to demonstrate whether or not campaigns based on drinking guidelines lead to sustained changes in behaviour.
- ✓ Although there is limited research, there is some evidence that campaigns funded by the alcohol industry can have negative effects.
- ✓ There is some evidence to show that consumer labelling and warning messages do not lead to sustained changes in behaviour.

*What we do not know*

- ⊗ The extent to which educational and information campaigns can be made more effective.

**Policy implications of the evidence of educational and information campaigns**

Providing information and education on the risk of alcohol and how to reduce it is needed for an educated population and for the development of individual capital, although as an isolated policy measure it will not reduce alcohol-related harm. Education policy could benefit from incorporating a conceptual shift from influencing attitudes to effect behaviour to looking at the influence of behaviour on attitudes. Education and information activities could be reframed to encourage and support consumer advocacy by providing information on how the public can influence alcohol policy.

## **Public support for alcohol policy measures**

Popular perceptions of actions and responsibilities relating to alcohol are of obvious importance for policy-making, with policy-makers both contributing to perceptions and responding to them. The 2006 Eurobarometer report provided some European comparative results on public attitudes towards alcohol policy areas (64).

### ***Drink-driving***

The Eurobarometer survey found that although 51% of the EU population appears to know that the maximum legal blood alcohol level (BAC) for drivers is between 0.01 and 0.59 g/litre, which is indeed the case in 19 member states, 36% of the EU population did not know the current legal BAC level in their own countries. In two countries with a zero limit, the population is more aware of the limit – the Czech Republic (75%) and Slovakia (57%) – although in the third country, Hungary, there is less awareness (39%). In Ireland, Malta and the United Kingdom, where the legal BAC is above 0.8 g/litre, 96% of respondents in Malta, 70% in the United Kingdom and 66% in Ireland did not know their current legal BAC level. A higher proportion of those ignorant of the rate was found among women (43%),

respondents aged 55 years and over (44%), respondents who had finished their full-time education by the age of 15 years (51%), “house persons” (53%), retired persons (42%), inhabitants of large towns (41%) and those who do not drink alcohol (52%).

In the 2004 Sartre study, more than 88% of the drivers interviewed thought that the penalties for drink-driving offences should be much more severe, with homogeneity across countries (98). Forty-five per cent of participants thought that drivers should not be allowed to drink any alcohol before driving, more in the eastern European countries (60%), a similar figure in northern (47%) and western (43%) European countries, and lower in southern European countries (26%). More than two thirds of all drivers were in favour of having a maximum alcohol limit of 0.5 g/litre. Eighty per cent of drivers from countries where this limit is already in place and 75% of drivers from countries with a limit of 0.8 g/litre are in favour of the 0.5 g/litre limit. In general, the more the current legal limit differs from 0.5 g/litre, independent of whether it is higher or lower, the less do the drivers favour a maximum limit of 0.5 g/litre. This result indicates that the acceptance of legal regulation is strongly influenced by habituation and personal experience. Eighty-two per cent of the drivers interviewed were very or fairly in favour of having a legal BAC limit for novice drivers of 0.0 g/litre.

In the Eurobarometer survey, almost three quarters of Europeans surveyed (73%) said they tended to agree that the legal BAC for young and novice drivers should be lowered to 0.2 g/litre, including 70% from Spain and 64% from Italy, with 51% of Europeans totally agreeing to this proposal. People from Germany, the Netherlands and Sweden were most likely to agree to a lower level. People from the Czech Republic, Hungary and Slovakia were least likely to agree, but this is probably explained by the fact that the limit in those three countries is already zero for all drivers. Eight in ten (80%) EU citizens, including 90% from Spain and 82% from Italy, tended to believe that random police alcohol checks on EU roads would reduce people’s alcohol consumption before driving, with 47% totally agreeing with this statement. There was support for this statement in all countries surveyed.

In the Sartre study, one third (32%) of the drivers were very much in favour and another 25% somewhat in favour of having an alcohol meter in the car to prevent them from driving if over the BAC limit. More than 70% of people were in favour in France, Greece, Portugal and Sweden, while in Austria, Germany and Greece, fewer than 30% of the drivers were in favour. Interestingly, drivers who were in favour of an alcohol meter were nearly 50%

more likely to have reported drinking and driving while over the limit than those who were not in favour of an alcohol meter.

### ***Consumer information***

According to the Eurobarometer survey, three quarters (77%) of the population of the EU, including 79% from Italy and 84% from Spain, agreed with putting warnings on alcohol bottles and advertisements, to warn pregnant women and drivers of the dangers of drinking alcohol. In all the countries surveyed, the majority of respondents would support such a concept, with the lowest support in Finland (45%), Denmark (41%) and the Netherlands (38%). Seventy-five per cent of alcohol consumers and 72% of those considering the protection from alcohol-related harm to be the responsibility of individuals supported warnings on bottles and advertisements, compared with 83% of those who had not drunk alcohol in the previous 12 months, and 84% of those who think public authorities have to intervene to protect individuals from alcohol-related harm.

### ***Availability of alcohol***

Eighty-seven per cent of EU citizens, including 82% from Italy and 92% from Spain, stated in the Eurobarometer survey that they agreed with banning the selling and serving of alcohol to people under the age of 18 years, with two thirds of the population (65%) saying that they “totally agreed” with such restrictions. Public opinion in all countries was in favour of the concept of prohibiting the selling and serving of alcohol to young people under 18 years of age. Even in countries where there were fewest people in favour, the majority of the population – Belgium (72%), Denmark (72%) and the Netherlands (61%) – responded with a considerable degree of support. As many as three quarters of respondents aged between 15 and 24 years agreed with the statement.

### ***Advertising of alcohol***

According to the Eurobarometer survey, three quarters of the EU population (76%), including 81% from Spain and 70% from Italy, would approve the banning of alcohol advertising targeting young people in all member states, with every second respondent (50%) responding that they “agree totally” with this idea. A country-by-country analysis shows that in all countries the majority of respondents would favour such a ban, the strongest support (93%) being seen in Slovakia (with 68% “totally agreeing”), and less support in Luxembourg (58%, with 41% “totally agreeing”) and Denmark (59%, with 37% “totally agreeing”).

### **Price**

According to the Eurobarometer survey, two thirds of the EU population (68%), including 64% from Spain and 54% from Italy, believed that higher prices for alcohol would NOT discourage young people and heavy drinkers from alcohol consumption. Eighty-five per cent of people from the Netherlands doubted that price would have a dissuasive effect, whereas 60% of people from Finland thought that higher alcohol prices would restrain younger people and heavy drinkers from consumption; the higher support in Finland could be due to the increases in alcohol consumption and related harm that followed reductions in tax at the time of the survey. Over half of the people in Romania also considered that higher prices would restrain young people's and heavy drinkers' alcohol consumption; this view might be explained by a lower level of income in Romania compared to other EU countries.

There is evidence that media advocacy can lead to reframing the solution to alcohol-related problems in terms of a coordinated approach by relevant sectors, such as health, enforcement, nongovernmental organizations and municipal authorities, resulting in increased attention to alcohol on the political and public agendas (7). Further, public perspectives of what constitutes alcohol-related harm are influenced by changes in alcohol policy, such that when policy becomes more rigorous, what is perceived as individual alcohol-related harm becomes stricter (99).

#### **Summary of the evidence of the public support for alcohol policies**

##### *What we know*

- ✓ Three quarters of Europeans would support a lower legal BAC level for young and novice drivers; four fifths believe that random breath testing would reduce drinking and driving.
- ✓ Three quarters of Europeans would support labels warning pregnant women and drivers not to drink.
- ✓ Nine tenths of Europeans support a ban on selling and serving alcohol to young people aged under 18 years.
- ✓ Three quarters of Europeans would support a ban on advertising that targets young people.

- ✓ Two thirds of the European population believe that higher prices would not discourage young people and heavy drinkers from alcohol consumption.

*What we do not know*

- ⊗ How best to convey the message and seek public support for higher prices on alcohol to reduce alcohol-related harm.

### **Policy implications of the evidence of public support for alcohol policies**

There is a range of effective policy measures, including those on drinking and driving, consumer labelling, advertising controls and controls on a minimum age of purchase, for which there is overwhelming public support from European citizens. The one policy measure that European citizens are sceptical about is that which is most effective – price. Concerted campaigns could be mounted to seek public support for price policy measures.

## **Infrastructures for alcohol policy**

At country level, it is ultimately a government's responsibility to define and be accountable for a clear alcohol policy for the whole country and for regions within a country (7). Many different decision-making authorities are involved in the formulation and implementation of alcohol policy, including the health ministry, the transportation authority and the taxation agency. Governments need to establish effective and permanent coordination machinery, such as a national alcohol council, comprising senior representatives of many ministries and other partners, to ensure that a coherent approach is taken to alcohol policies and that policy objectives are properly balanced in both their political and technical aspects.

Targets make policy objectives more specific, allow progress towards them to be monitored and inspire many partners actively to support alcohol policy developments (9). Targets require an assessment of the present situation and help to determine priorities. They can focus discussion on what it had been hoped to achieve and why, and whether or not this was successful and why.

They provide a powerful communication tool, taking policy-making out of bureaucratic confines and making it a clearly understood public issue; they give all partners a clearer understanding of the scope of the policy; they strengthen accountability for health; and they motivate people for action.

Accountability for the health impact of alcohol policies and programmes rests with all sectors of society, as well as government officials who create policy, allocate resources and initiate legislation (9). Mechanisms such as alcohol policy audits, litigation for damage to health and public access to reports on impact assessments can ensure that both the public sector and private industry are publicly accountable for the health effects of their alcohol policies and activities. Accountability can be achieved through mechanisms for coordinating, monitoring and evaluating progress in policy implementation and through procedures for reporting to elected bodies, as well as through the mass media.

One method of financing programmes to reduce the harm done by alcohol is an earmarked tax (100). This means that a proportion of tax revenue collected from alcohol is devoted to a specific activity, such as policy implementation or health care.

But the presence of an alcohol policy, although important, is not enough (101). Policy needs to be sensitive to cultural values and historical experience and to engage the many different sectors that have an impact on alcohol-related harm. Policy needs to be comprehensive, minimizing any negative consequences due to perverse incentives (102,103). A lack of transparency and information, poor organization and preparation for the introduction of new policies and laws, poor public health infrastructures, vertically as opposed to horizontally organized government, a lack of financing, the presence of corruption, and public distrust of authority are all impediments to the implementation of effective policy (104,105).

### ***Research***

A firm research base is a pre-requisite for alcohol policies and actions (106). A clear finding is that Europe, and particularly southern and eastern Europe, lags behind other parts of the world in carrying out and publishing research on alcohol and alcohol policy (9). The scientific community should be involved in developing scientifically sound, socially relevant and feasible bases for decisions relating to alcohol policy. Research is not value-free, in the sense that the framing and choice of topics inevitably reflects judgments and choices between competing priorities. The duty of the scientific community is

to be faithful to the research evidence, which means that the findings of research may contradict current policies and programmes. There is good reason, then, for there to be some distance between the public health scientific community and both governments and the alcohol beverage industry.

However, there must be a much better match between the needs for alcohol policy research as perceived by decision-makers and planners on the one hand, and the research priorities set by the research community on the other. To be useful, research evidence has to be communicated simply and given meaning by making it relevant to current issues. Such sustained contributions may only be possible in the context of a long-term, publicly-funded research programme designed to engage members of the scientific community in each country in the collection, evaluation and interpretation of research data relevant to a country's alcohol policy needs.

Research and development efforts cannot be implemented without building the appropriate capacity. Effective alcohol policy needs competent and well-informed personnel working in settings supportive of their efforts. Investments must, therefore, be made in both institutional and human capacity for the development of research.

The responsibility for translating scientific research into effective policy is distributed across a wide variety of government agencies and public interest groups. In addition, there need to be systematic mechanisms for ensuring that new evidence from research is actually introduced into policy and programme practice. If all existing knowledge about which alcohol policy approaches work and which do not were fully applied, there could be a major impact on improving public health.

Information systems are key components in making knowledge more widely available (9). Intelligence is broader than information. It implies identifying and interpreting essential knowledge for making decisions from a range of formal and informal sources. Intelligence should include: current and future trends and system performance (e.g. levels, trends and inequalities in areas of alcohol consumption and alcohol-related harm); risk factors for harm; vulnerable groups; organizational or institutional challenges in implementing policy; governance; important contextual factors and actors (the political, economic and institutional context); actors' roles and motivations; users' and consumers' preferences; opportunities and constraints for change; and events and reforms in other sectors with implications for alcohol policy. This information should be available on electronic media and be published regularly in a publicly accessible form, so as to promote an informed and open



debate among politicians, professionals and the public concerning outcomes and determinants, and future priorities for action and investment.

### **Summary of the evidence of infrastructures**

#### *What we know*

- ✓ An alcohol policy supported by adequate resources is a pre-requisite for government action.
- ✓ Alcohol policies need to be supported by an adequate research base, ensuring that the knowledge of research is widely available.
- ✓ Alcohol policies need to be supported by effective information systems that allow monitoring of the implementation of policy.

#### *What we do not know*

- ⊗ We do not know the most effective infrastructures to ensure the effective and transparent implementation and enforcement of policy.

### **Policy implications of infrastructures**

Alcohol policies are best prepared and implemented based on research and information. Having a good policy is not enough: to be effective, policy requires public support and the action of a wide range of stakeholders working across different levels of governance.

## **Response of the health sector**

There is a clear gap in the potential contribution of the health sector's response in reducing the harm done by alcohol. In primary health care settings, commonly less than 10% of the population at risk of becoming hazardous and harmful drinkers are identified and less than 5% of those who could benefit are offered brief interventions (107). A 2004 needs assessment study in England found that only 1 in 18 (5.6%) of alcohol-dependent drinkers actually accessed treatment each year, with regional variations ranging from 1 in 102 to 1 in 12 (108). The health sector workforce in Europe is an enormous resource with great potential. Disorders related to alcohol use are included as mental and behavioural disorders within the ICD-10 classification of mental and behavioural disorders, and there is a legal imperative to provide help and treatment for alcohol use disorders. This section notes that brief advice heads the list of effective and cost-effective evidence-based treatment methods. Much is now also understood about the mechanisms for implementing brief advice programmes countrywide. For individuals with more severe alcohol dependence and related problems, a wide variety of specialized treatment approaches have been evaluated with evidence for their effectiveness for behavioural and pharmacological therapies.

### **Screening and brief advice programmes**

Brief advice heads the list of effective evidence-based treatment methods (109). A systematic review and meta-analyses of the effectiveness of brief interventions for hazardous and harmful alcohol consumption have found a positive impact of such interventions on alcohol consumption, mortality, morbidity, alcohol-related injuries, alcohol-related social consequences, use of health care resources and laboratory indicators of harmful alcohol use (110).

Brief interventions have been shown to be effective in both men and women, with evidence suggesting a trend towards increased effectiveness among men. Study populations are made up primarily of adult populations, although limited evidence has been identified for the effectiveness of brief interventions in children, adolescents and young adults. Socioeconomic status has not been shown to influence the effectiveness of such interventions. The available evidence suggests that even very brief interventions may be effective in reducing negative alcohol-related outcomes, enhanced by

motivational interviewing (111), but with little additional benefit arising from increased exposure (110).

While the majority of studies have been conducted in primary care settings, limited evidence has also been identified for other health care settings. Three reviews specifically focusing on the use of brief interventions in emergency care have found limited evidence for the effectiveness of such interventions in emergency care settings (112–114). A further review presented inconclusive evidence of the effectiveness of brief interventions in inpatient and outpatient settings (115). No systematic reviews presenting information on the effectiveness of brief interventions in non-health care settings have been identified, and there are no recent systematic reviews of the impact of brief interventions in pregnancy (116). One US-based study of 304 pregnant women, selected because they screened positive on the T-ACE<sup>3</sup> score and were considered at risk for prenatal alcohol use, were randomized with a support partner of their choice (usually husbands or biological fathers of their unborn children) to receive a brief intervention or not. Brief interventions for prenatal alcohol reduced subsequent consumption most significantly for the women with the highest consumption initially (regression coefficient:  $b = -0.163$ ; standard error:  $(b) = 0.063$ ,  $p < 0.01$ ) (117). Moreover, the effects of the brief intervention were significantly enhanced when a partner participated ( $b = -0.932$ ; standard error:  $(b) = 0.468$ ),  $p < 0.05$ ).

There is evidence from a range of studies in primary care settings for the potential influence of training and support for general practitioners in alcohol screening and the use of brief intervention materials on implementation rates and the detection of at-risk drinkers (118). A systematic review of 12 studies found that a combination of educational and office support programmes increased screening and advice-giving rates of primary health care providers from 32% to 45% (119). Evidence from qualitative studies show that some nurses in the United Kingdom see training as an incentive in carrying out alcohol-related work; a sample of general practitioners in Finland perceived that they lacked training in identifying the early stages of alcohol misuse; and general practitioners in a Danish focus group study felt that they lacked training in counselling skills.

Evidence has been found for the actual and perceived effect that implementation of screening and brief interventions has on a practitioner's workload, particularly if all young people and adults are screened as routine

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<sup>3</sup> T-ACE is a modification of the CAGE screening for alcoholism test and was designed for use in obstetric settings to identify at-risk drinkers.

practice. The extra time that such implementation demands can be a barrier to acceptability and therefore willingness to deliver such a programme. Implementation of routine screening and brief intervention programmes requires team-working between physicians, nurses and non-clinical personnel, with consideration required regarding the extent of involvement and specific roles of team members.

Visits to primary care for specific clinics and registrations of new patients are seen to be less threatening occasions on which to discuss drinking, embedded in a general discussion around lifestyle issues such as diet, exercise and smoking. There is further evidence from three United Kingdom qualitative studies that practitioners and users regard clinics, registration sessions and routine consultations as opportunities for discussions in a less threatening environment and context.

There is evidence for general under-activity in discussing drinking with service users. Evidence suggests that even when drinking is heavy, service users are not being asked about their drinking, and advice on drinking behaviour is provided less often than for other lifestyle behaviour, such as exercise, diet and smoking, and less often than service users expect. Some possible reasons are found in a Finnish qualitative study of general practitioners, who reported that they were reluctant to ask users about their drinking unless they saw clear signs of risky drinking behaviour (120).

There is evidence from primary care practitioners' views of a shortfall in perceived knowledge in terms of detecting individuals at risk. There is also evidence of confusion regarding current guidelines relating to drinking behaviour and the known benefits of drinking in moderation. This can affect practitioners' confidence in and motivation towards implementing screening and brief intervention programmes effectively. There is qualitative evidence from three studies focusing on users' views that a discussion of drinking is facilitated by a good relationship with the health professional. In addition, there is evidence that practitioners are concerned not to offend users in relation to discussing alcohol for fear of disturbing the therapeutic relationship.

Several studies show that even when considering a very brief intervention, the cost-effectiveness results appear encouraging. As would be expected, the studies which consider more extended interventions generally show greater effects from consumption and resource use. The results of several studies are driven by the long-term cost savings made in the use of resources, particularly as regards motor vehicle accidents. These costs are uncertain – limited data

means that they can only be estimated with wide confidence intervals. However, the two studies where it was possible to split out the costs of motor vehicle accidents from other costs both presented favourable economic results, even if such accidents were not included (121,122).

Four studies provide evidence on the likely quality-adjusted life-year (QALY) gain associated with screening plus brief intervention for hazardous and harmful alcohol use (122–125). These studies estimate that the lifetime QALY gain due to screening plus brief intervention is likely to be in the region of 4–19 per 1000 compared to no intervention, depending on the exact intervention and whether it is repeated over time. Further evidence suggests that this could be higher if within-family external quality of life effects are included in the analysis. The primary care studies overall appear to show that screening plus brief intervention result in modest effects. However, the economic analyses suggest that the size of these effects, in tandem with resource use and other cost effects, are sufficient for the interventions to be classed as cost-effective.

## **Treatments for alcohol use disorders and alcohol dependence**

For individuals with more severe alcohol dependence and related problems, a wide variety of specialized treatment approaches have been evaluated (109,126–128), with evidence of effects for behavioural therapies, where a systematic review of 17 studies found a combined effect size of 0.33 (SE=0.08) for reduced alcohol consumption and alcohol-related difficulties (129), and pharmacological therapies including  $\gamma$ -Aminobutyric acid (GABA) agonists, where a systematic review of 17 randomized controlled trials found a relative risk of point prevalence abstinence of 1.40 (95% CI: 1.24, 1.59) at 6 months and 1.62 (95% CI: 1.37, 1.92) at 12 months (130), and those including opiate antagonists, where a systematic review of 29 randomized controlled trials found a significant reduction in relapse, at least in the short term (3 months): the relative risk (95% CI) equalled 0.64 (0.51, 0.82) (131). There is evidence that matching individuals with alcohol use disorders to specified treatment does not improve outcome (132). Although Project MATCH found a significant positive impact of treatment and no differences in outcome between 12-step facilitation therapy designed to help patients become engaged in the fellowship of Alcoholics Anonymous, a 12-session cognitive behavioural therapy designed to teach patients coping skills to prevent a relapse into drinking, and a motivational enhancement therapy designed to increase motivation for and commitment to change (132), the mesa-grand study found

evidence of ineffectiveness of 12-step facilitation from 6 studies and of ineffectiveness of Alcoholics Anonymous from 7 studies (109). An additional systematic review of 8 studies found no studies that unequivocally demonstrated the effectiveness of Alcoholics Anonymous or 12-step facilitation approaches for reducing alcohol dependence or alcohol-related problems (133).

There is a limited literature related to economic models for the assessment of treatments for alcohol use disorders (128), and it is dominated by studies exclusively based on premature mortality outcomes from those abstaining from drinking after an intervention rather than attempting to model the natural flow of patients with alcohol use disorders. A promising approach is to use a modified Markov model to model lifetime QALYs and health care costs from different drinking patterns over time (134).

### **Summary of the evidence of the health sector's response**

#### *What we know*

- ✓ There is extensive and consistent evidence that brief advice in health care settings reduces alcohol-related harm.
- ✓ There is consistent evidence that organizational factors can increase the implementation of brief advice programmes.
- ✓ There is consistent evidence that brief interventions are cost-effective.
- ✓ There is consistent evidence that behavioural and pharmacological therapies are effective in treating alcohol use disorders.

#### *What we do not know*

- ⊗ The extent to which brief advice works in non-health care settings.
- ⊗ The extent to which interventions reduce risk in pregnancy.
- ⊗ Sufficient information about the cost-effectiveness of treatments for alcohol use disorders.

**Policy implications of the health sector's response**

Organizational factors, including training and office support, can enhance the widespread implementation of early identification and brief advice programmes for hazardous and harmful alcohol consumption. Options should be considered for delivering either universal programmes to all drinkers at risk, or targeted programmes to particular groups (for example, adult males) or to those attending particular clinics (for example, hypertension clinics) (135). Brief advice programmes could be supported by the availability of evidence-based treatments for alcohol use disorders, a classified ICD-10 disorder.

## **Community action**

This section shows that there is evidence that community-based programmes can have an impact on creating safer drinking and living environments and reducing underage drinking, harmful patterns of drinking and drink–driving accidents, although they can be costly to implement and sustain. Such programmes should include controls on venues for the sale and consumption of alcohol, other regulations reducing access to alcohol, enhanced law enforcement and surveillance, and the development of community organization and coalitions supported by education and information campaigns, media advocacy, counter-advertising and health promotion. The section also shows that alcohol use can increase the risk of absenteeism and poor performance at work, and structural factors at work can increase the risk of harmful alcohol use. The available evidence suggests that workplace-based interventions have some limited impact in reducing alcohol-related harm.

## **Community activities**

Community-based prevention programmes can be effective in reducing drinking and driving, alcohol-related traffic fatalities and injuries from assault (136), although they can sometimes be associated with adverse consequences (137). Community mobilization has been used to raise awareness of problems associated with on-premise drinking, develop specific solutions to problems, and pressure bar-owners to recognize that they have a responsibility to the community in terms of such bar-related issues as noise level and customer behaviour. Evaluation results from community mobilization approaches, as well as documentation from grassroots projects, suggest that community mobilization can be successful in reducing aggression and other problems related to drinking on licensed premises.

A review of 10 community-based prevention trials which have sought to reduce harm from alcohol found that strategies included education and information campaigns, media advocacy, counter-advertising and health promotion, controls on venues for the sale and consumption of alcohol, other regulations reducing access to alcohol, enhanced law enforcement and surveillance, and community organization and coalition development (136). Interventions which showed promise were those that paid particular attention to controls on access, included the environmental contexts of where the



products are sold and distributed, and involved enforcement of public health polices (138).

Community and neighbourhood characteristics are important in moderating the pricing and promotion of beer, as well as reducing binge-drinking. Communities with more effective enforcement of minimum purchase ages have lower rates of alcohol use and binge-drinking (139). Community action projects can mobilize awareness and concern about alcohol-related harm (140,141). Social capital as measured by aggregate reports of student volunteerism is associated with a decreased risk of binge-drinking, drunkenness and alcohol-related harm (142), and as measured by high trust is related to a reduced risk of illegally produced and purchased alcohol (143).

Since 1996, a multi-component programme based on community mobilization, training in responsible beverage service for servers and stricter enforcement of existing alcohol laws has been conducted in Stockholm, Sweden. This has shown no significant difference in serving practices to intoxicated customers but, from time-series analysis, an estimated 29% reduction in violent crimes in the intervention area compared with the control area (144). The cost of the programme was estimated as €796 000. The average cost of a violent crime was estimated as €19 049, which implied overall savings of €31 314 million related to the judicial system (78%), production losses (15%), health care issues (5%) and other damages (2%), with a base case cost-savings ratio of 1:39 (145).

The Community Trials Project was a five-component community-level intervention to reduce alcohol-related harm among all residents of three communities (146). It included components covering media and mobilization, responsible beverage service, sales to young people to reduce underage access to alcohol, drinking and driving, and access to reduce the availability of alcohol. The project led to a reduction in drink-driving accidents, injuries from assaults and harmful alcohol use. Finally, cost-benefit analyses estimated that the trial resulted in savings of €2.9 for every €1 spent on programme implementation, based on reductions in automobile crashes alone.

A community intervention project in the Northern Territories in Australia aimed to reduce levels of alcohol consumption and related harm down to national levels by 2002 by using a range of strategies including education, increased controls on alcohol availability and expanded treatment and rehabilitation services (147). The Living With Alcohol (LWA) programme was originally funded by a specific levy on the sale of alcohol products with more than 3% alcohol by volume until 1997, when a federal ruling prohibited

states and territories from raising licence fees and additional taxes on alcoholic beverages, tobacco and petrol. As a direct result, the LWA levy was removed in August 1997 which, in turn, resulted in a fall in the real price of alcoholic beverages with more than 3% alcohol by volume. The Federal Government continued to fund the LWA programme at the same level until 2000. After this time, LWA funds were dispersed directly to existing programmes and services. The programme was effective in reducing acute alcohol-related deaths by 4.6 per 100 000 adults in the Northern Territories compared with reductions of 1.6 per 100 000 acute alcohol-related deaths in the control area, largely owing to the period of the tax levy.

### **Summary of the evidence of community action**

#### *What we know*

- ✓ There is some evidence that multi-component community-based programmes including community mobilization, responsible beverage service and stricter enforcement of existing alcohol laws can lead to reductions in alcohol-related traffic fatalities and injuries from assault.
- ✓ There is limited evidence that such community-based programmes can be cost-effective.

#### *What we do not know*

- ⊗ Although community programmes are implemented across a range of European countries with differing cultures, we do not know the extent to which specific community programmes developed in one culture or setting are fully transferable to another culture or setting.

### **Policy implications of community action**

Community-based programmes can be expensive to implement, and to be effective require long-term sustainability. Although there is some evidence for cost-effectiveness, caution should be taken in terms of transferability from other cultures as well as gaining local support and mobilization before evidence-based community action programmes are designed and implemented.

## **Alcohol and the workplace**

At the societal level, there are relationships between per capita alcohol consumption and sickness absence rates. A Swedish study found that a one litre increase in total consumption was found to be associated with a 13% increase in sickness absence among men ( $p < 0.05$ ) (148). The relationship was not statistically significant for women. This has been confirmed with individual level micro-data from Finland, which showed that alcohol consumption is associated with sickness absence, particularly among low-educated males (149). Based on 21 European studies, it has been estimated that at €59 billion (range €39 billion–102 billion), productivity losses contributed 47% of the total social cost of alcohol to Europe (9). These findings are similar to other estimates (65).

Although earlier overviews analysing absenteeism rates of people at all levels of alcohol consumption yielded mixed results (150), more recent studies have found that alcohol is related to absenteeism. For example, a small-scale United States study found a significant relationship between alcohol use and workplace absences (151). Workers were roughly twice as likely to be absent from work the day after alcohol was consumed. A much larger and more recent study of 13 582 Australian workers found clear evidence of the impact of drinking patterns on absenteeism (152). Compared to low-risk drinkers, workers drinking at short-term high-risk levels at least yearly, at least monthly or at least weekly were 3.1, 8.7 and 21.9 times, respectively, more likely to report alcohol-related absenteeism. Workers drinking at long-term risky or high-risk levels were 4.3 and 7.3 times, respectively, more likely to report alcohol-related absenteeism compared to low-risk drinkers. Compared to workers who were low-risk drinkers, the odds of illness/injury absenteeism in the previous 12 months were 1.3 times greater for workers who drank at least yearly at short-term high-risk levels and 1.5 times greater for workers who drank at least weekly at short-term high risk levels. The odds of illness/injury sick leave in the previous three months were not significantly greater for workers who drank at long-term risky or high-risk levels compared to workers who were low-risk drinkers.

Harmful alcohol use and episodic heavy drinking increase the risk of arriving late and leaving early from work or disciplinary suspension, resulting in loss of productivity, turnover due to premature death, disciplinary problems or low productivity from the use of alcohol, inappropriate behaviour (such as behaviour resulting in disciplinary procedures), theft and other crime, and poor co-worker relations and low company morale (153). One study conducted at 114 worksites of seven corporations showed an almost linear

relationship between increasing average consumption and a summary measure of job performance, finding the strongest associations between consumption and getting to work late, leaving early, and doing less work, and only a weak association with missing days of work (154).

There has been little research on the role of an adverse work environment in increasing the risk of disorders from alcohol use (155). There is some evidence of an association of shift-work, low levels of technical responsibility at work and job insecurity with alcohol consumption. However, associations of an adverse work environment with alcohol use are often moderated by workers' distinct coping characteristics. Moreover, studies in this area are rarely based on an explicit stress-theoretical model that identifies "toxic" components of an adverse work environment, with special emphasis on its psychosocial dimensions such as the demand–support control model of job strain, and the effort–reward imbalance model.

Recent analysis of the Whitehall II occupational cohort of London-based civil servants study found that, as regards women, there was a clear grade gradient with the highest proportion of problem drinkers being among those in the highest two grades, which was not the case for men (155). In men, the effort–reward imbalance was associated with alcohol dependence after taking account of age and employment grade, with those classified as putting in high efforts but receiving low rewards being at highest risk of becoming alcohol-dependent. This association was also seen for women, although it was not as marked. In addition, low decision latitude in women was associated with increased risk of alcohol dependence. Neither high job demands nor low work support were associated with alcohol dependence. These associations between work characteristics and alcohol dependence did not appear to be mediated through physical illness, poor mental health, or adverse changes in social supports or network size. Most other studies of psychosocial work characteristics and alcohol have used measures of alcohol consumption rather than alcohol problems or alcohol dependence, and most have found little or no association between work characteristics and amount consumed.

A Finnish study found a relationship between burnout and the risk of alcohol dependence in both men and women (156). Burnout is a consequence of chronic work stress. According to the most used definition in scientific research, burnout is a state of exhaustion in which one becomes doubtful about the value of one's work and one's competence. It has been related most consistently to psychosocial work characteristics, mainly high demands and low resources at work, but also to individual, interpersonal, other organizational and societal factors. In the Finnish study, each one-point

increase in burnout score was associated with an 80% increase in the incidence of alcohol dependence among women and a 51% increase among men. After adjustment for sociodemographic factors, the odds ratio of burnout for alcohol dependence was 2.06 (95% CI 1.52–2.81) in a logistic regression analysis for women and 1.51 (95% CI 1.28–1.79) for men. Again, the association between burnout and alcohol dependence can also derive from a connection between stress and alcohol use on a neurobiological level. Both intracellular and dopaminergic extracellular mechanisms may be involved in the interaction between stress, craving for stress relief and addictive forms of behaviour such as alcohol use.

Despite the structural relationships between the work environment and the risk of alcohol use disorders, few intervention studies have investigated the impact of changing work structures on reducing workplace alcohol-related harm (157). An exception to this is a study that compared two work settings with distinctly different managerial cultures (158). One setting had a traditional hierarchical United States management design and the other was based on a Japanese management model transplanted to the United States. Although overall alcohol consumption rates in both populations were similar, the traditional management design was associated with more permissive norms regarding drinking before or during work shifts (including breaks) and higher workplace drinking rates. By contrast, the transplant management design was associated with greater enforcement of alcohol policies which, in turn, predicted more conservative drinking norms and lower alcohol availability at work. Qualitative research clearly indicated that the transplant design facilitated the social control of alcohol problems, whereas the traditional design appeared to undermine such control.

A recent systematic review of workplace interventions for alcohol-related problems identified only 10 intervention studies (159). Interventions comprised three broad types of strategy: psychosocial skills training; brief interventions, including feedback of results of self-reported drinking, lifestyle factors and general health checks; and alcohol education delivered via an internet website. The psychosocial interventions included peer referral, team-building, stress management and skills derived from the social learning model. For health checks, topics covered in addition to alcohol were smoking, exercise, diet, weight, stress, depression, blood pressure, cholesterol, diabetes, cancer, safety and preventive health-care risks. Only one study reported no statistically significant results, while seven studies reported significant reductions in various self-reported measures of alcohol consumption or alcohol-related problems. The counselling-based interventions either reported no effect, or the effect was small, self-reported only, or measured desire to

change rather than actual behaviour. The four mail-out/feedback brief intervention studies were practical and, possibly, sustainable interventions that achieved outcomes somewhat comparable to the more intensive counselling interventions, although the outcomes were self-reports.

One study which used objective outcome measures described the impact of a workplace peer-focused substance abuse programme in the transportation industry, implemented in phases from 1988 to 1990 (160). The programme focused on changing workplace attitudes towards on-the-job substance use in addition to training workers to recognize and intervene with co-workers who had a problem. The programme was strengthened by federally mandated random drug and alcohol testing (implemented, respectively, in 1990 and 1994). With time-series analysis, the association of monthly injury rates and costs with phased programme implementation was analysed, controlling for industry injury trend. The combination of the peer-based programme and testing was associated with an approximate one third reduction in injury rate, avoiding an estimated US\$ 48 million in employers' costs in 1999. In the same year, the peer-based programme cost the company US\$ 35 and testing cost another US\$ 35 per employee. The programme avoided an estimated US\$ 1850 in injury costs to employers per employee in 1999, corresponding to a benefit–cost ratio of 26:1.

#### **Summary of the evidence of workplace policies**

##### *What we know*

- ✓ Alcohol can increase the risk of absenteeism and poor performance at work.
- ✓ Structural work factors can influence the risk of alcohol-related harm.
- ✓ There is some limited evidence that alcohol policies and programmes at the workplace, including peer support and brief advice, can reduce alcohol-related harm.

##### *What we do not know*

- ⊗ The impact of structural changes at the workplace on the risk of alcohol-related harm has not been studied.

**Policy implications for workplaces**

Alcohol policy that reduces per capita alcohol consumption will reduce the harm done by alcohol in the way of absenteeism and poor performance at work. A number of programmes can be implemented at the workplace, including peer support and brief advice, which will probably reduce the harm done by alcohol. The way that work is organized should also be considered so that work itself does not increase the likelihood of harmful alcohol use, particularly for those occupations most at risk such as bar staff, seafarers and miners (161).

## **Drink–driving policies and countermeasures**

This section shows that the setting of a BAC level and lowering it is effective in reducing drink–driving casualties. Intensive random breath-testing, where police regularly stop drivers on a random basis to check their BAC level, and checkpoints where all cars are stopped and drivers suspected of drink–driving are breath-tested, do reduce alcohol-related injuries and fatalities. There is evidence for some effectiveness in setting lower BAC levels, including a zero level, for young or novice drivers, administrative suspension of the driver’s licence for a driver caught with a positive BAC level, and mandatory treatment and the use of an ignition interlock (a mechanical device which does not allow a car to be driven by a driver with a BAC above a low level) for repeat drink-drivers. In contrast, there is evidence that designated driver schemes have no effect.

### **Alcohol policy and drink–driving**

Many alcohol policy measures can reduce alcohol-related road traffic fatalities, including higher prices for alcohol, minimum purchase age laws and control over the density of outlets (162,163). The implementation of effective drink–driving policies can lead not only to high public and political commitment for such measures (164) but also to reductions in overall alcohol consumption (165), indicating how other policy measures can be progressively implemented to reduce the harm done by alcohol in a way that often generates increased public support for the policy concerned.

#### ***Introducing and lowering legal blood alcohol levels***

*Effects of introducing a legal limit.* A systematic review of studies evaluating the impact of introducing laws that set a legal BAC limit found beneficial effects when such limits were introduced, although the magnitude of these effects varied considerably (166). For example, the impact of introducing a 0.8 g/litre limit appeared to be much stronger in the United Kingdom than in Canada. Beneficial effects often appeared to decrease over time, perhaps due to a diminishing perceived risk of being caught.

*Effects of reducing a legal limit.* Systematic reviews have evaluated the impact of lowering legal limits in parts of Canada, the United States, Australia



and Europe (166–169). In the great majority of cases, the lower limit introduced and evaluated is either 0.5 or 0.8 g/litre.

An analysis conducted in the EU15 of the impact of reducing BAC levels from 0.8 g/litre to 0.5 g/litre found that lowering BAC levels did not have a global impact unless the regulation was enforced in practice by random checks on the road (170). When the two regulatory measures were implemented together, the fatality rate per population declined 4.3%, while the fatality rate per kilometre driven fell by 6.1%, with a time lag of two years to observe the effectiveness.

Sweden has two BAC limits, a lower one for drunken driving and a higher one for aggravated drunken driving. The lower legal limit was reduced from 0.5 g/litre to 0.2 g/litre in 1990. Time-series analyses controlling for alcohol consumption and distance driven found significant reductions in fatal collisions, single-vehicle collisions and all collisions of 9.7%, 11% and 7.5%, respectively (171,172). The age distribution of drivers had changed somewhat, which could have accounted for about a third of the reduction in fatal collisions and reduced the impact on fatal collisions to about 6%. The average BAC of those convicted declined significantly, although modestly, from 0.168 g/litre before to 0.154 g/litre after the 0.2 g/litre limit was introduced, with the largest reductions appearing at the highest BAC levels.

The limit for aggravated drunken driving was reduced from 1.5 to 1 g/litre in 1994. Time-series analyses controlling for the effects of alcohol sales and gasoline sales, and incorporating the reduction of the lower limit in 1990 as a control variable, demonstrated a significant intervention effect of the 1994 law on fatal collisions, with reductions of about 13% being observed (173). The effects on collisions resulting in severe injury appeared somewhat more variable but in the same direction. The 1994 law also introduced other changes, including an increase in the maximum term of imprisonment for the aggravated drunken driving offence; thus it is not possible to ascribe the traffic safety effects of the 1994 law exclusively to the reduced legal limit.

France reduced its legal limit from 0.8 g/litre to 0.5 g/litre in 1996. In a study in the French province of Haute-Savoie, total fatalities involving a drinking-driver declined from about 17.5/100 000 total population per year in the years preceding the introduction of the law (1993–1995) to 11.2/100 000 in 1997 (174). The effect seems, however, to have been delayed for unknown reasons or may have involved factors additional to the introduction of the 0.5 g/litre limit, since the first year of operation of the new law seemed to have no effect. The

impact of the new law was more pronounced for drivers at higher BACs (over 0.8 g/litre) than for drivers in the range 0.5–0.8 g/litre.

Denmark reduced its limit from 0.8 g/litre to 0.5 g/litre in 1998. Survey data indicated that after the introduction of the new law drivers reduced the amount of alcohol they consumed before driving, and that these reductions were attributed to the changed legal limit (175). Inspection of collision data suggested that while the proportion of collisions resulting in injury involving a drinking-driver (BAC of 0.5 g/litre or more) appeared to decline with the introduction of the law, the proportion of fatal collisions involving a drinking-driver appeared to increase. It is possible that the follow-up period of 10 months may have been too short to assess the impact of the change accurately.

Austria reduced its limit from 0.8 g/litre to 0.5 g/litre in 1998. There appeared to be declines in both the numbers of drivers with BACs over 0.8 g/litre and those with BACs between 0.5 and 0.8 g/litre, although statistical tests were not reported (176). The absolute numbers of drunk-driving collisions resulting in personal injuries appeared to decline with the introduction of the law.

In the United States, several states have reduced their legal limits to 0.8 g/litre. A meta-analysis of nine research studies of sufficient design quality and level of implementation found that laws setting a legal BAC level of 0.8 g/litre resulted in a median reduction of 7% in alcohol-related motor vehicle fatalities (177).

### ***Lower limits for young and novice drivers***

A systematic review of the impact of laws setting a lower BAC level for young or inexperienced drivers found that the three studies that examined fatal crash outcomes reported declines of 24%, 17% and 9%; the two studies that examined crashes resulting in injuries reported declines of 17% and 4%; and the one study that examined crashes in which the investigating police officer believed that the driver had been drinking alcohol reported a decline of 11% (177). Graduated driver licensing, which gradually introduces novice drivers to higher-risk driving situations, is effective in reducing crash rates among novice drivers (178).

### **Unrestricted breath-testing**

Unrestricted or random breath-testing means that there are no restrictions on the police as regards motorists they can stop and require to take a breath, even if these have not been suspected of having committed an offence or been

involved in an accident (179). Any motorist, at any time, may be required to take a test, and there is nothing that the driver can do to influence the chances of being tested. Testing varies from day to day and from week to week, and refusal to submit to a breath test is equivalent to failing. Selective breath testing refers to checkpoints in which police must have reason to suspect the driver has been drinking.

Australia has considerable experience with random breath-testing. A time-series analysis for four Australian states found that unrestricted breath-testing was twice as effective as selective checkpoints (180). In Queensland, for example, unrestricted breath-testing resulted in a 35% reduction in fatal accidents, compared with 15% for selective checkpoints. Since their implementation, drink-driving enforcement and publicity campaigns in Victoria have emphasized their effectiveness in reducing serious crashes during peak alcohol consumption times (181).

A meta-analysis of 23 studies of unrestricted and selective breath-testing has found that crashes thought to involve alcohol dropped by a median of 18% (for random breath-test checkpoints) and 20% (for selective breath-test checkpoints) following the establishment of sobriety checkpoints. Fatal crashes thought to involve alcohol dropped by a median of 22% (for random breath-test checkpoints) and 23% (for selective breath-test checkpoints) following the establishment of sobriety checkpoints. Crashes declined regardless of the follow-up time of the study, dropping by a median of 18% for follow-up times of less than one year and 17% for follow-up times of more than one year (177).

## **Licence suspension**

Suspending the licence of those convicted of impaired driving is only partially effective as a way to reduce drink-driving recidivism and alcohol-related crashes. Without some form of education, counselling or treatment programme, the effects of suspension on alcohol-impaired driving last only as long as the driver is incapacitated by suspension of his/her licence, and these periods can be relatively short. A review of 46 studies on licence suspension found that suspension was followed by an average reduction of 5% in alcohol-related accidents and a reduction of 26% in fatal accidents (182). There is little evidence that prison sentences or fines have a specific deterrent effect by promoting avoidance of future offences. Nevertheless, the authority to impose a prison sentence may provide the legal basis for referring offenders to treatment programmes, which have been shown to reduce recidivism of

drink-driving in first and multiple offenders. A meta-analysis of 215 independent evaluations of remedial programmes found them to yield an average reduction of 8–9%, both in recurrence of alcohol-impaired driving offences and in alcohol-related accidents (183).

## **Alcohol locks**

One measure to prevent drink-driving offenders from driving while impaired is to place interlocks in the ignition to prevent an alcohol-impaired driver from operating the vehicle. To operate a vehicle equipped with an ignition interlock device, the driver must first provide a breath specimen. If the alcohol concentration in the specimen breath exceeds the predetermined level, the vehicle will not start. As a measure to reduce circumvention of the device (i.e. someone else blows into the mouthpiece), random retests are required while the vehicle is running. Interlocks can also be fitted to public service and heavy goods vehicles as a preventive measure.

A review of eight studies of interlock programmes conducted under the authority of a local court or a motor vehicle department found them to be more effective than full licence suspension in preventing recidivism among alcohol-impaired drivers (184). However, seven of the studies found that, once the interlock is removed, offenders have the same recidivism rate as suspended offenders.

A systematic Cochrane review identified 1 randomized controlled trial, 10 controlled trials and 3 ongoing trials (185). In the randomized control trial, recidivism was lower in the intervention group while the device was still installed in the vehicle, but the benefit disappeared once the device was removed. In all 13 non-randomized controlled trials, recurrence of offences was again lower among interlock participants than the controls. However, the favourable results did not extend to the period after the interlock was removed.

Alcolock devices and programmes were introduced in Sweden in 1999 in two types of programme (186,187). A primary prevention strategy was initiated to prevent alcohol-impaired driving in three commercial transport companies (buses, trucks, taxis). A secondary prevention trial was begun as a voluntary two-year programme for drink-driving offenders involving strict medical requirements, including counselling and regular checkups by a medical doctor. Alcolocks in commercial vehicles have been well accepted by professional drivers, their employers and their passengers, and the number of vehicles with alcolocks as a primary prevention measure is rapidly growing in Sweden. Three

out of a thousand starts in the primary prevention programme were blocked by the alcolock after measuring a BAC higher than the legal limit with a lock point of 0.2 g/litre. Only 11% of eligible drink-driving offenders took part in the voluntary secondary prevention programme, of whom 60% had a diagnosis of alcohol dependence. During the programme, alcohol consumption decreased as measured by five biological alcohol markers, and the rate of drink-driving offences fell sharply from a yearly rate of approximately 5% to almost zero. However, those dismissed from the programme appeared to return to their previous drink-driving behaviour, although more recent follow-up suggested some evidence of lasting changes in reduced accidents and recidivism (188).

### **Training for servers of alcohol and civil liability**

Training programmes for servers of alcohol and bartenders aiming to prevent impaired driving by teaching them how to identify impairment, refuse service and provide transport have been evaluated in Australia, the Netherlands and North America. A systematic review of server intervention training programmes, while noting that the evidence reviewed primarily comes from small-scale studies in which the participants may have been unusually motivated and the researchers had a high degree of control over the training, identified three qualifying studies which found that such training was associated with decreases in the proportion of intoxicated drinkers ranging from 17% to 100% (median = 33%), and one study assessing a state-wide server-training programme that found that training was associated with a 23% decrease in single-vehicle night-time injury crashes (177).

### **Designated driver and safe ride programmes**

There is no universal definition of a designated driver. The most common definition requires that the designated driver abstain from all alcohol, be assigned before alcohol is consumed and drive other group members to their homes (189). Other definitions employ a risk and harm reduction strategy, in which the primary goal is not necessarily abstinence but to keep the designated driver's BAC under the legal limit.

A systematic review was conducted to assess evidence of the effectiveness of designated driver programmes for reducing alcohol-impaired driving and alcohol-related crashes. This evaluated population-based campaigns encouraging the use of designated drivers as well as programmes conducted in drinking establishments that provided incentives for people to act as designated drivers (189). Only one study of a population-based designated

driver promotion campaign was identified. Survey results indicated a 13% increase in respondents “always” selecting a designated driver, but no significant change in self-reported alcohol-impaired driving or riding with an alcohol-impaired driver. Seven studies (five of which were reported in the same journal article, and six of which were by the same two principal authors) evaluated the number of patrons who identified themselves as designated drivers before and after programmes were implemented, with a mean increase of 0.9 designated drivers per night. An eighth study reported a 6% decrease in self-reported alcohol-impaired driving or riding in a car with an intoxicated driver among respondents exposed to an incentive programme.

Interpretation of these results was complicated by the fact that only two of the studies reported the number of patrons or groups of patrons in the bar during each observation period. Thus, although the incentive programmes generally found small increases in the number of patrons identifying themselves as designated drivers, the extent to which these changes related to the actual use of designated drivers was unclear. Finally, it was impossible to estimate the public health effects of observed changes in the number of self-identified designated drivers without information on what their behaviour would have been in the absence of a designated driver programme. Thus, due to the small sizes of the effects observed and the limitations of the outcome measures, the present evidence is insufficient to draw any conclusions about the effectiveness of either type of designated driver promotion programme evaluated. Further, no study has evaluated whether the use of designated drivers actually decreases alcohol-related motor vehicle-related injuries.

## **Educational programmes**

A systematic review of the literature to assess the effectiveness of school-based programmes for reducing drinking and driving and riding with drinking drivers identified 13 peer-reviewed papers or technical reports which met specified quality criteria and included evaluation outcomes of interest (85). The papers evaluated three classes of intervention: school-based instructional programmes, peer organizations and social norming campaigns. For instructional programmes, whereas the median effects of five studies found no effect on self-reported drinking and driving, the median effects of four studies found a reduction in self-reported riding with drinking drivers. Only one study looked at crashes and found no effect. Two studies of the effectiveness of peer organization programmes provided evidence for effect. Two studies of social norming programmes appeared to reduce drink-driving and led to more frequent use of designated drivers.

## **Mass media campaigns**

As mentioned in the section on raising awareness and political commitment above, a systematic review of the effectiveness of mass media campaigns for reducing alcohol-impaired driving and alcohol-related crashes identified seven qualifying studies that found that mass media campaigns were associated with a median decrease of 13% in total alcohol-related crashes (interquartile range, 6–4% decrease), and six qualifying studies that found that mass media campaigns were associated with a median decrease of 10% in injury-producing alcohol-related crashes (interquartile range, 6–4% decrease) (85).

The mass media campaigns evaluated had several components in common: pretested messages; high levels of audience exposure to the message, generally achieved through paid advertising; and complementary prevention efforts at the local level such as high-visibility enforcement of laws covering alcohol-impaired driving. Campaign messages ranged from those focused on law enforcement activities and the legal consequences of drinking and driving to the social and health consequences of alcohol-impaired driving. There was no clear difference in the effectiveness of the two kinds of campaign.

### **Summary of the evidence of drink–driving policies**

#### *What we know*

- ✓ There is consistent evidence that the introduction and/or reduction of legal BAC levels for driving reduces motor vehicle accidents and fatalities, when these are enforced.
- ✓ There is consistent evidence that the introduction of sobriety checkpoints and random breath-testing reduces motor vehicle accidents and fatalities.
- ✓ There is some evidence that lower legal BAC levels for novice drivers reduce motor vehicle accidents and fatalities.
- ✓ There is some evidence that licence suspension can reduce motor vehicle accidents and fatalities.
- ✓ There is some evidence that mandatory treatment can reduce motor vehicle accidents.
- ✓ There is some evidence that alcohol locks can reduce motor vehicle accidents.

- ✓ There is some evidence that mass media campaigns enhance the effectiveness of drink-driving policies.
- ✓ There are studies that find no evidence for any impact from designated driver and safe ride programmes in reducing motor vehicle accidents and fatalities.

*What we do not know*

- ⊗ The most effective ways to ensure the existence of adequate and sustained resources to enforce legal BAC levels.

**Policy implications of drink-driving policies**

There is clear evidence that drink-driving accidents would be prevented were legal BAC levels for driving reduced to 0.2 g/litre and enforced through random breath-testing programmes, supported by other enforcement measures such as licence suspension, mandatory treatment and alcohol locks, and mass media campaigns. There is also good evidence for the introduction of a 0 g/litre level for novice and young drivers. Consideration could be given to the use of alcohol locks for all professional drivers.



## Addressing the availability of alcohol

While there are total bans on the sale of alcohol in several countries with majority Muslim populations, as well as at community level in a number of indigenous communities, there are also other widely dispersed bans on the use of alcohol in particular locations and circumstances, such as drinking in parks or streets, hospitals or at the workplace (7). A licensing system for the sale of alcohol allows for control, since infringement of the laws can be punished by revocation of the licence. On the other hand, a licensing system with fees generated from licences can lead to a proliferation of licensed establishments as an income-generating mechanism for jurisdictions. Government monopolies on the sale of alcohol can reduce alcohol-related harm. Such systems tend to have fewer outlets open for shorter hours than private retailers (190–192).

The implementation of laws setting a minimum age for the purchase of alcohol shows clear reductions in drink–driving casualties and other alcohol-related harms (193). The most effective means of enforcement is on sellers, who have a vested interest in retaining the right to sell alcohol (194). In general, the number of alcohol outlets is related to the level of alcohol-related harm, which is strongest when there are major changes in the number or type of such outlets. A greater density of alcohol outlets is associated with higher alcohol consumption among young people (195), with increased levels of assault and with other harms such as homicide, child abuse and neglect, self-inflicted injury and, with less consistent evidence, road traffic accidents (196–198). While extending the times of sale can redistribute the times when many alcohol-related incidents occur, such extensions generally do not reduce the rates of violent incidents and often lead to an overall increase in consumption with association problems (199). Reducing the hours or days of sale of alcoholic beverages leads to fewer alcohol-related problems, including homicides and assaults (200).

Strict restrictions on availability can create an opportunity for a parallel illicit market, although in the absence of substantial home or illicit production, this can in most circumstances be managed with enforcement. Where a large illicit market exists, licence-enforced restrictions may increase the competitiveness of the alternative market, and this will need to be taken into account in policy-making.

## **Minimum age for purchase of alcohol**

Although legal restrictions on the age at which young people may purchase alcohol vary widely from country to country, ranging typically from 16 to 20 years of age depending on the beverage type and outlet, almost all countries legally restrict these sales. A review of 132 studies published between 1960 and 1999 found very strong evidence that changes in minimum drinking-age laws can have substantial effects on drinking among young people and alcohol-related harm, particularly road traffic accidents, often for well after young people reach the legal drinking age (193). A systematic review of minimum legal drinking age laws in the United States found that among 14 studies looking at the effects of raising the minimum legal drinking age, crash-related outcomes declined by a median of 16% for the targeted age groups, and that among 9 studies looking at the effects of lowering the minimum legal drinking age, crash-related outcomes increased by a median of 10% within the targeted age groups (177). The effects were stable over follow-up times ranging from seven months to nine years. The full benefits of a higher drinking age are only realized if the law is enforced. Despite higher minimum drinking age laws, young people do succeed in purchasing alcohol. In most EU countries in the European School Survey Project on Alcohol and other Drugs, a majority of students aged 15–16 years thought that getting any type of alcoholic beverage was fairly or very easy, rising to 70–95% for beer and wine (201). Such sales result from low and inconsistent levels of enforcement, especially where there is little community support for enforcement of the law regarding alcohol sales to minors. Even moderate increases in enforcement can reduce sales to minors by as much as 35% to 40%, especially when combined with media and other community activities (193). The most effective means of enforcement is on sellers who, as stated above, have a vested interest in retaining the right to sell alcohol.

## **Number of outlets and outlet density**

In general, the number of alcohol outlets is related to the level of alcohol-related harm, which is strongest when there are major changes in the numbers or types of such outlets. An increased density of alcohol outlets is associated with reduced social capital (202) and increased levels of alcohol consumption among young people, with increased levels of assault and with other harms such as homicide, child abuse and neglect, self-inflicted injury and, with less consistent evidence, road traffic accidents (198,203).

Studies which have capitalized on natural experiments in alcohol availability have come largely from the Nordic countries, where access to alcohol has traditionally been more restricted than in many other developed countries. These studies have examined substantial changes in alcohol availability such as the opening of a store in a community that previously had none, or the introduction of beer into supermarkets. Studies in Finland used the introduction of outlets in villages and changes to regulations permitting grocery stores to sell beer to study the impact on changes in consumption (204). These changes resulted in a marked increase in the consumption of beer, with marginalized and heavy drinkers affected more than the average. Swedish studies have focused similarly on the introduction or removal of medium-strength beer (4.5% by volume) from supermarket shelves, finding substantial effects on consumption as well as alcohol-related hospitalization, particularly among teenagers (205). Outside the Nordic countries, studies have focused on the dismantling of government retail monopolies, generally resulting in substantial increases in numbers of outlets. The privatization of the retail wine monopolies in five states in the United States produced significant increases in wine sales, without substantial changes in beer or spirits sales (206).

A time-series analysis relating two measures of assault to the density of outlets selling alcohol on the premises in Norway between 1965 and 1990 found significant associations, suggesting that as the density of outlets in Norway changed, assault rates changed correspondingly (207).

A number of studies from California have used secondary data to explore the association between outlet density and alcohol-related harm. A significant association was found between alcohol-related hospitalization (based on a rough fractional approach using ICD 9 codes) and total licences across San Diego zip codes (208). For each unit increase in outlet density per 10 000 persons, there was a 0.48 increase in morbidity per 10 000 persons. In San Francisco, outlet density measured as the number of licences per kilometre of roadway was found to be positively related to pedestrian injuries (209). Child abuse and neglect in census tracts of California have been found to be positively related to per-capita density of bars, restaurants and off-licences, such that a one unit increase in density resulted in 2.2 additional cases of abuse (210). After controlling for spatial autocorrelation, off-premise outlet density was related to substantiated cases of abuse, whereas bar density was related to neglect. Further evidence of a longitudinal relationship was found in a study of 6 years of data from 581 Californian postal areas undertaking time-series analyses of the link between outlet density and assault (211). The study incorporated a range of environmental controls (e.g. other

retail places) and sociodemographic controls (e.g. median household income) across the six years, as well as measures of densities of three types of outlet: bars, restaurants and off-premise retailers. The study found significant positive effects for both bars and off-premise outlets on violence, and a negative effect for restaurants. The density of bars in neighbouring regions was also associated positively with violence, suggesting that new bars influence violence not only in their local area but in surrounding regions as well. The authors estimated that an average reduction of one bar in each of the 581 postal codes analysed would have resulted in 290 fewer assaults over the 6 years studied.

A Los Angeles study, focusing on rates of gonorrhoea as a measure of risky sexual behaviour, presented evidence from a natural experiment on the effects of a reduction in alcohol outlets (212). After the 1992 civil unrest in Los Angeles, in which many liquor stores were burned, 270 alcohol outlets surrendered their licences in the wake of a community campaign to prevent damaged outlets from reopening. The study attempted to differentiate between alcohol outlets as a causal factor (through alcohol consumption and risky behaviour) and as a marker of social disorganization. The results of this study showed a marked impact of alcohol outlets on rates of gonorrhoea, suggesting that outlets play a significant role in the spread of gonorrhoea even when social disorganization was controlled for.

An Australian study into the impact of outlet density of licensed premises on neighbourhood amenities used an innovative method whereby responses to a nation-wide survey on crime and safety were linked to locations of licensed premises in New South Wales (213). The study used two measures of alcohol outlet concentration: accessibility and density, and examined the impact of each on reported levels of neighbourhood drunkenness, property damage and assault in the home. Using geo-coded locations of licensed premises linked to respondents' residence, statistical modelling demonstrated that people who lived closest to licensed premises (relative accessibility) reported the highest levels of drunkenness and property damage in their neighbourhoods. The relationship remained significant after statistical adjustment for possible confounding factors. The study also demonstrated that outlet density was significantly associated with residents' reported levels of drunkenness and related problems in their neighbourhoods.

## **Days and hours of sale**

A number of studies have indicated that although changing either hours or days of alcohol sale can redistribute the times at which many alcohol-related crashes and violent events related to alcohol take place, it does so at the cost of an overall increase in problems (see 9). Around-the-clock opening in Reykjavik, for instance, produced net increases in police work, emergency room admissions and drink-driving cases. The police work was spread more evenly throughout the night, but a change in police shifts was necessitated to accommodate the new work (199).

A series of studies in Sweden found a net 3.6% increase in alcohol sales when government alcohol stores opened on Saturdays, although the changes in harm were not big enough to be significant (214,215).

Following the 2003 Licensing Act in the United Kingdom, which recommended in general that shops and supermarkets be allowed to sell alcohol at any time they choose to open (24 hours opening) (216), pubs stayed open on average only an extra 27 minutes (217,218). No real change in alcohol-related crimes was found until 03:00, but a 22% increase in crimes occurred between 03:00 and 06:00. In other words, alcohol-related crimes were shifted until later in the night (219). In some studies, changes in the Licensing Act appeared to have little impact on the numbers of people treated for injuries sustained through assault (220,221), although in other studies, there were large increases in the number of night-time alcohol-related visits to accident and emergency departments (222).

A study in Western Australia showed that extending opening hours from 24:00 to 01:00 increased violent incidents at the late-night venues by 70% (223). The increased problems associated with the late-trading venues appeared to result from increased alcohol consumption rather than increased opportunity for crime to occur, since there was no apparent difference between the two groups after controls for alcohol sales. The BACs of drivers in road crashes who had been drinking at the extended trading premises were significantly higher than those drinking at the control premises.

There is also evidence that restricting days and hours of sale reduces problems. Homicide is a leading cause of death in Brazil, with one of the highest murder rates occurring in the city of Diadema. To respond to this situation, local policy measures were introduced which included a new licensing law in 2002 prohibiting on-premises alcohol sales after 23:00. To evaluate the effect on restricting alcohol availability through limiting opening

hours on homicides and violence, data from the local police archives on homicides and assaults were analysed. Models were adjusted for contextual conditions, municipal efforts and law enforcement interventions that took place before and after the closing-time law was adopted. The introduction of a limit on opening hours resulted in a significant fall in homicide rates in Diadema and a 44% decline in the number of murders (200).

### **Summary of the evidence of addressing the availability of alcohol**

#### *What we know*

- ✓ There is consistent evidence that maintaining and raising minimum purchasing ages for alcohol can reduce alcohol-related harm, provided that they are enforced.
- ✓ There is consistent evidence that government monopolies on the retail sale of alcohol can reduce alcohol-related harm.
- ✓ There is consistent evidence that regulating and limiting outlet densities can reduce alcohol-related harm.
- ✓ There is consistent evidence that regulating and limiting the days and hours of sale can reduce alcohol-related harm.

#### *What we do not know*

- ⊗ The most efficient ways to improve public and political support for limiting the availability of alcohol.

### **Policy implications of addressing the availability of alcohol**

Consideration should be given to regulating and limiting the availability of alcohol through enforcing a minimum purchase age, and regulations and limitations on outlet density and days and hours of sale. The introduction or maintenance of government-owned retail monopolies for the sale of alcohol can limit the level of alcohol-related harm.

## **Addressing the marketing of alcoholic beverages**

This section will show that, despite their methodological difficulties, econometric studies of the link between alcohol advertising and consumption have found effects of alcohol advertising on behaviour, although not across all studies. The strongest evidence comes from longitudinal studies that have shown an impact of various forms of alcohol marketing, including exposure to alcohol advertising in the traditional media as well as promotion in the contents of films and via alcohol-branded merchandise, on when young people start to drink and on riskier patterns of drinking by young people. The effects of exposure seem to be cumulative; in markets where alcohol is more widely advertised young people are more likely to continue to increase their drinking as they move into their mid-twenties, whereas drinking declines at an earlier age among those who are less exposed. These findings of the impact that advertising can have on young people's behaviour are supported by experimental studies, and are in keeping with research on young people's smoking and children's food preferences. In some jurisdictions, alcohol marketing relies on self-regulation by economic operators, including in advertising, the media and by alcohol producers. Evidence from a number of studies shows that these voluntary systems do not, however, prevent the kind of marketing that has an impact on younger people.

It should be noted that a total marketing strategy is multilevel, including not only marketing and promotional activities but also product development, pricing, physical availability, and market segmentation and targeting (224). Further, while alcohol is marketed through increasingly sophisticated advertising in the mainstream media, it is also promoted by linking alcohol brands to sports and cultural activities through sponsorships and product placements, and by direct marketing using new technologies such as the internet, podcasting and mobile telephones (225).

### **Advertising and expectancies**

Alcohol advertising is one of the many factors that have the potential to encourage young people to drink. The expectancies of young people who have not started to drink are influenced by normative assumptions about teenage drinking as well as through observation of drinking by parents, peers and models in the mass media. Research has linked exposure to portrayals of alcohol use in the mass media with the development of positive drinking

expectancies by children and adolescents (226). Young people with more positive affective responses to alcohol advertising hold more favourable drinking expectancies, perceive greater social approval for drinking, believe drinking is more common among peers and adults, and intend to drink more as adults (227). Fourteen-year-olds who are more exposed to advertisements in magazines, at sporting and music events and on television are more aware of them than those with less exposure, as are teenagers who watch more television, pay attention to beer advertisements and know adults who drink (228). Among 10–17-year-olds, the perceived likeability of beer advertisements is a function of the positive affective responses evoked by the specific elements featured in the advertisements. The liking of specific elements featured in beer advertisements, such as humour, animation and popular music, significantly contribute to the overall likeability of these advertisements and subsequently to the effectiveness of advertising indicated by intent to purchase the products and brands they promote (229).

Although experimental studies find positive relations between alcohol expectancies and alcohol use (230), expectancy studies, by themselves, do not establish whether alcohol advertising actually influences young people's drinking behaviour. Further, there is increasing evidence that such pre-behaviour cognitions, e.g. expectancies and attitudes, are related to consumption in a more complex way. For example, for adolescent smoking, it has been shown that, over time, behaviour can predict attitudes more strongly than attitudes can predict behaviour (231).

## **Experimental studies**

An experimental study has found that the portrayal of alcohol on television influences actual drinking behaviour (232). In a naturalistic setting (a bar laboratory), 40 young adult male pairs (80 participants) watched a film clip with two commercial breaks for 1 hour and were allowed to drink non-alcoholic and alcoholic beverages. The films *American Pie 2* (2001) and *40 Days and 40 Nights* (2002) were selected because they were comparable concerning genre and Motion Picture Association of America rating. In *American Pie 2*, characters drank alcohol 18 times and alcoholic beverages were portrayed an additional 23 times. In *40 Days and 40 Nights*, characters consumed alcohol 3 times and alcoholic beverages were portrayed an additional 15 times. After 14 and 33 minutes the clips were interrupted by a commercial break for 3.5 minutes, containing either exclusively neutral advertisements (e.g. promoting a car or a video camera) or neutral advertisements combined with alcohol advertisements. Each of the combined



breaks contained two alcohol commercials. The participants were randomly assigned to one of four conditions varying on type of film (many versus few alcohol portrayals) and commercials (alcohol commercials present or not). The results indicated that, independently, participants assigned to the conditions with substantial alcohol exposure in either the film ( $F = 4.44$ ;  $p < 0.05$ ) or commercials ( $F = 4.93$ ;  $p < 0.05$ ) consumed more alcohol than other participants, controlling for the participant's weekly alcohol consumption. Those in the condition with higher alcohol portrayal in the film and commercials drank on average three glasses within a period of one hour, compared to one and a half glasses drunk by those in the condition with little or no alcohol portrayal.

## **Econometric studies**

Although potentially very important, econometric studies, which look for correlations between the amount of alcohol advertising and the amount of drinking taking place in a particular jurisdiction, run into a number of methodological difficulties. First, measures of the amount of advertising, which typically use expenditure on advertising, vary in accuracy and inclusiveness. Second, analysis depends on the construction of a complex model that ascribes values for all the different variables – including price, drinking restrictions and disposable income – as well as any advertising that might be implicated. Third, variations in the amount of advertising tend to be minor (few comprehensive bans have been introduced) so researchers are looking for potentially small changes in drinking patterns. Fourth, measures of the overall amount of advertising do not necessarily give an accurate picture of exposure by young people.

Not surprisingly, only modest effects have been found in some studies, while others have found no effects (233). For example, looking at alcohol advertising expenditure data across states in the United States, it has been found that, when controlling for alcohol price, income and a number of sociodemographic variables, advertising expenditure had a modest and independent effect on adolescent monthly alcohol use and binge drinking. It could be estimated that a 28% reduction in alcohol advertising would reduce adolescent monthly alcohol use from 25% to between 24% and 21% (233) and binge drinking from 12% to between 11% and 8%. In a meta-analysis of 132 studies which provided 322 estimated advertising elasticities, a positive impact of advertising was found on consumption (co-efficient, 0.029) which, in a meta-regression procedure controlling for alcohol price and income, was significantly larger for spirits than for beer (234). On the other hand,

controlling for price, income and minimum legal drinking age across US states, another study found total alcohol consumption was negatively related to bans on price advertising (coefficient, -0.009), but positively related to bans on billboards (coefficient, 0.054) (235).

## **Cross-sectional studies**

Because they cannot show whether exposure preceded drinking uptake, cross-sectional studies, which take a snapshot of exposure to advertising (awareness and/or appreciation) and levels of drinking, leave open the possibility that any correlation is as likely to reflect drinking encouraging young people to take an interest in advertising as vice versa. Paying attention to advertising presupposes that the viewer is getting some benefit or reward from it – most fundamentally that they are doing the right thing by consuming the product advertised – and advertisers deliberately design their work to provide such rewards (236). Thus, cross-sectional data can shed a useful light on the role alcohol advertising plays in young people's drinking; and such studies have consistently reported correlations between increased exposure and greater likelihood of current drinking (237).

## **Longitudinal studies**

Thirteen longitudinal studies were identified from two systematic reviews that investigated the impact of marketing communications on young people beginning to drink and continuing to do so (237,238). The 13 studies, which followed up a total of over 38 000 young people, were drawn from the United States (9 studies), Belgium (1 study), Germany (1 study) and New Zealand (1 study). Three studies reported on the impact of overall alcohol advertising, one study on brand recall and receptivity, three studies on television advertisements, two studies on media exposure, three studies on alcohol use in films, one study on radio exposure, two studies on magazine exposure, two studies on beer concession stands, two studies on in-store displays, three studies on ownership of alcohol-branded merchandise, and one study on outdoor advertisements.

Twelve of the thirteen studies concluded that exposure did have an impact on subsequent alcohol use, including starting to drink and heavier drinking among existing drinkers, with a dose–response relationship in all studies that reported such exposure and analysis. There were variations in the strength of association and the degree to which potential confounders were controlled for. The thirteenth study, which tested the impact of outdoor advertising placed

near schools, failed to detect an impact on actual alcohol use but found an impact on intention to use.

There was no consistent evidence that the size of the impact varied across the countries. When controlling for exposure to all forms of advertising, the size of the impact appeared greater for television and media exposure, including exposure to alcohol use in films, and for ownership of alcohol-branded merchandise than for exposure to radio, magazines, beer concession stands and in-store displays. Based on the strength of the associations found, the consistency of findings across the studies, the confounders controlled for, the length of exposure, kind of drinking behaviour observed and dose–response relationships, as well as the theoretical plausibility regarding the impact of media exposure and commercial communications, it can be concluded that alcohol advertising and promotion increases the likelihood that adolescents will start to use alcohol, and to drink more if they are already using alcohol.

These findings of the impact that advertising can have on young people's behaviour are in keeping with research on young people's smoking (239) and children's food preferences (240).

## **Self-regulation**

In some jurisdictions, alcohol marketing relies on self-regulation by economic operators, including advertising, the media and alcohol producers. To be effective, however, self-regulation needs a clear legislative framework (241). Furthermore, a self-regulatory system needs sufficient incentive to be effective. There is no reason to believe that the industry will participate for selfless reasons just to improve public health (242). A threat of government adjudication can be a strong incentive (243). In general, a self-regulatory system works best when pressure from government and civil society and lawsuits are greatest and least well where there is little advocacy (244). Also, regulations should cover the entire range of marketing activities to which young people are exposed in order to avoid advertisers simply using the new media to avoid the regulations. Interpretations by the general public, and especially by vulnerable groups such as young people, should be included in evaluation of the advertisements (242), since evidence from a number of studies shows that these voluntary systems do not prevent the kind of marketing that has an impact on younger people (245). Self-regulation can only be effective as long as there is provision for third-party review of complaints concerning breaches. Otherwise the interested persons who create and agree to abide by a code are the same ones who monitor its application.

Sanctions and the threat of sanctions are needed to ensure compliance. An independent body or a government agency should be responsible for monitoring alcohol marketing practices and should carry it out systematically and routinely.

### **Summary of the evidence of addressing the marketing of alcohol**

#### *What we know*

- ✓ The content of commercial marketing of alcohol has an impact on the risk of young people consuming alcohol.
- ✓ The volume of commercial marketing of alcohol increases the risk of young people consuming alcohol, also in a risky way.
- ✓ There is some evidence and experience that the self-regulation of commercial marketing of alcohol does not prevent the kind of marketing that has an impact on younger people, particularly when it is not backed up by a legal framework and effective sanctions.

#### *What we do not know*

- ⊗ The full impact on public health of a ban on the commercial marketing of alcohol in Europe.

### **Policy implications of addressing the marketing of alcohol**

Consideration could be given to regulating and limiting the content and volume of commercial communications on alcohol, ranging from a Europe-wide roll-out of the principles of the French Evin Law to a ban on all forms of commercial communications that appeal to children and adolescents. Statutory regulation of commercial communications seems to be more effective than self-regulation in limiting inappropriate exposure of commercial communications to young people.

## **Pricing policies**

This section will show that drinkers respond to changes in the price of alcohol as they do to changes in the prices of other consumer products. When other factors are held constant, such as income and the price of other goods, a rise in alcohol prices leads to less alcohol consumption and less alcohol-related harm, and vice versa. Given that demand for alcohol is usually found to be relatively inelastic to price, increasing alcohol taxes not only reduces alcohol consumption and related harm but increases government revenue at the same time, noting that in general, alcohol taxes are well below their maximum revenue-producing potential and that the revenue collected is usually well below the social costs of alcohol. Beverage elasticities are generally lower for the preferred beverage in a particular market and tend to decrease with higher levels of consumption. Controlling for overall consumption, beverage preferences and time period, consumer responses to changes in the price of alcoholic beverages are found not to vary by country. Policies that increase alcohol prices delay the time when young people start to drink, slow their progression towards drinking larger amounts, and reduce their heavy drinking and the volume of alcohol drunk on each occasion. Price increases reduce the harm caused by alcohol, which is an indicator that heavier drinking has been reduced. Using data from the United Kingdom, this section will show that setting a minimum price per gram of alcohol can be as effective as an across-the-board tax increase, with both options increasing the cost to heavy consumers far in excess of the cost to light consumers. Natural experiments in Europe consequent to economic treaties have shown that as alcohol taxes and prices have been lowered, so sales and alcohol consumption have usually increased. This section will stress that cross-border issues are not solved by decreasing alcohol taxes.

## **Price and the use of alcohol**

Drinkers respond to changes in the price of alcohol as they do to changes in the prices of other consumer products. When other factors are held constant, such as income and the prices of other goods, a rise in alcohol prices leads to less alcohol consumption and less alcohol-related harm, and vice versa (246,247). A meta-analysis of 132 studies found a median price elasticity for all beverage types of -0.52 in the short term and -0.82 in the long term, elasticities being lower for beer than for wine or spirits (234). An elasticity of -0.52 means that for every 10% increase in price, consumption would fall by

5.2%. Another meta-analysis of 112 studies found mean price elasticities for beer of -0.46, for wine of -0.69, and for spirits of -0.80 (248).

The price elasticities for different beverages and over time are not uniform. Beverage elasticities are generally lower for the preferred beverage (beer, spirits or wine) in a particular market than for the less-preferred beverages, and tend to decrease with higher levels of consumption (249). Controlling for overall consumption, beverage preferences and time period, consumer responses to changes in the price of alcoholic beverages are found not to vary by country (249). Consumers tend to shift to more expensive beverages if relative prices decrease, either within the same beverage category or across beverage categories (250). If prices are raised, consumers reduce their overall consumption and tend to shift to cheaper beverages, with heavier drinkers tending to buy the cheaper products within their preferred beverage category. The impact of an increase in alcohol price tends to be stronger in the longer rather than the shorter term which, from a public health perspective, is more important (251).

Influencing the prices of the cheapest drinks on the market by raising floor prices has a larger impact on total consumption than does increasing the prices of more expensive drinks. Using the empirical results obtained in their study of the Swedish alcohol monopoly from 1984 to 1993, the study's authors predicted the impact of a 10% increase in average beverage prices on sales under three scenarios: a flat price increase across all beverages led to a 1.7% drop in sales, a price increase affecting mainly higher-quality beverages led to a 2.8% increase in sales, and a price increase affecting lower-quality beverages led to a 4.2% drop in alcohol sales (250).

A natural experiment occurred in Switzerland with its reform of spirits taxes, which came into effect on 1 July 1999 (252). Previously, the tax rate per litre of pure alcohol for domestic spirits was CHF 26.00 and for foreign spirits between CHF 32.00 and 58.00, according to the type of beverage and its alcohol content. The fiscal reform also liberalized the import of spirits. The result was a reduction of between 30% and 50% in the retail price of foreign spirits, while the prices of domestic spirits did not change. The consumption of spirits rose significantly (by 28.6%) in the total sample, especially among young males and individuals who were low-volume drinkers at baseline. The consumption of alcohol overall, or of wine or beer, did not change significantly. No indication of effects of substitution was found. Alcohol-related problems also increased significantly, an effect that disappeared when the consumption of spirits was controlled for. This suggests that the increase

in alcohol-related problems at follow-up was directly associated with increased consumption of spirits.

Increasing alcohol taxes not only reduces alcohol consumption and related harm, but increases government revenue at the same time, especially since in general, alcohol taxes are well below their maximum revenue-producing potential (253) and that the revenue collected is usually well below the social costs of alcohol (254). The existence of a substantial illicit market for alcohol complicates policy considerations regarding alcohol taxes; in such circumstances, tax changes require efforts to bring the illicit market under effective government control.

### **Price and younger drinkers**

Policies that increase alcohol prices delay the time when young people start to drink, slow their progression towards drinking larger amounts, and reduce their heavy drinking and the volume of alcohol drunk on each occasion (255). Although alcoholic beverages appear to behave in the market like most other consumer goods, the demand for alcoholic beverages among some consumers may differ from the demand for other products because of the addictive nature of alcohol. This addictive nature implies that an increase in past consumption of alcohol would raise current consumption, so that price elasticity in the short term, which holds past consumption constant, would be smaller in absolute value than price elasticity in the long term, which allows past consumption to vary. For example, a price increase in 2004 would reduce consumption in 2004, with consumption in previous years held constant. Because of the addictive nature of alcohol, it would be expected that consumption in 2005 and in all future years would also fall. Consequently, the reduction in consumption observed over several years (i.e. in the long term) after the price increase would exceed the reduction observed in 2004 (i.e. in the short term). A study of the relationship between price and alcohol consumption by young adults aged 17 to 29 years has found this to be the case (256). Ignoring previous years' consumption (and thus the addictive aspects of alcohol), the price elasticity of demand for alcohol was -0.29. When previous years' consumption (and thus the addictive aspects of alcohol) was taken into account, the estimated long-term price elasticity of demand was more than twice as high at -0.65, indicating that price had a much greater influence on alcohol consumption. This also means that about half of the reason that young adults who drink heavily do not reduce their consumption is the difficulty (costs) of overcoming the addictive nature of alcohol.

In the United States, binge drinking by young people is highly responsive to state taxes on alcohol. An increase in local alcohol price reduces the occasions when binge drinking occurs, and thus the individual is less likely to become a binge drinker (257). A 5% increase in the price of pure alcohol decreases an individual's probability of heavy binge drinking by 0.22. Further, the direct effect of a one-unit increase in the latent binge-drinking variable is a decrease in the individual's annual earnings by 4.7%.

Increases in the prices of alcohol and beer lead to a reduction in road traffic accidents and fatalities among people of all ages, particularly younger drivers. Increases in alcohol prices also reduce death rates from cirrhosis, intentional and unintentional injuries, workplace injuries and sexually transmitted disease rates. Higher beer prices have been shown to lead to reductions in rapes and robberies, homicides, crime, child abuse, wife abuse, violence at universities and violence-related injuries (255).

### **Price and heavier drinkers**

Price increases reduce the harm caused by alcohol, which also indicates that heavier drinking has been reduced (247). Cirrhosis mortality is responsive to small changes in price: in the United States, increases in taxes have been shown to lead to an immediate reduction, which doubles over the long run (258). More recent estimates found that a 10% increase in tax in the United States was associated with a 32% decrease in the death rate from cirrhosis (247).

Consistent with this, studies have reported that increases in the price of alcohol result in a reduction in heavy drinking and alcohol dependence. A study of survey data of 43 000 adults in the United States found a price elasticity for heavier drinking of -1.325 ( $p=0.027$ ), for physical and other consequences of drinking of -1.895 ( $p=0.003$ ), and for alcohol dependence of -1.487 ( $p=0.012$ ) (259). Studies in Alaska found statistically significant reductions in the numbers and rates of deaths caused by alcohol-related disease beginning immediately after alcohol tax increases in 1983 and 2002 (260).

### **Price and alcohol-related harm**

The United Kingdom has extended the work of cost-effectiveness analysis to model the impact of specified policy changes on a wider range of outcomes beyond the health service (261). For example, estimates suggested that a 10%



increase in the price of alcoholic beverages would lead to a reduction in consumption of 4.4% (a reduction of 5.5 g alcohol per week), and more for harmful drinkers (-25 g per week) than for moderate drinkers (-4 g per week). Deaths were estimated to fall by 232 per annum in the first year up to 1681 after 10 years. Hospital admissions were estimated to fall by 10 100 in the first year, up to 50 800 after 10 years. Crime was estimated to fall by 65 000 offences overall, and the direct costs of crime were estimated to fall by £70 million per year. Harm in the workplace was estimated to fall, with 12 800 fewer unemployed people and 310 000 fewer sick-days. The estimated social value of these reductions in harm was £7.8 billion in total (when discounted) over the 10-year period modelled. In the first year, they were estimated as follows: reductions in health service costs (£43 million), value of QALYs saved (£119 million), costs of crime avoided (£70 million), value of crime QALYs saved (£98 million) and employment-related harm avoided (£330 million). The cost impact of the policy on consumers varied substantially between different types of drinker. The overall estimate was £33 per drinker per annum, £116 per annum for harmful drinkers and £17 per annum for moderate drinkers. If drinkers did not change their alcohol consumption, the effect on their pockets would be £223 per annum for harmful drinkers and £26 per annum for moderate drinkers.

In the United Kingdom, in 59% of off-licence trade and 14% of trade on licensed premises, alcohol is currently sold at less than 5 pence per gram of alcohol. Setting this minimum price was estimated to reduce overall consumption by 2.6% (3.4 g per week), with harmful drinkers affected (25 g) much more than moderate drinkers (0.01 g/week). Deaths were estimated to fall by 157 in the first year, up to 1381 after 10 years. Hospital admissions were estimated to fall by 6300 in the first year up to 40 800 after 10 years. Crime was estimated to fall by 16 000 offences overall. Harm in the workplace was estimated to fall, with 12 400 fewer unemployed people and 100 000 fewer sick-days. The social value of these reductions in harm was estimated at £5.4 billion in total over the 10-year period modelled. In the first year, the estimated social value of the reduction in harm was as follows: reductions in health service cost (£25 million), value of QALYs saved (£63 million), crime costs avoided (£17 million), value of crime QALYs saved (£21 million) and employment-related harm avoided (£312 million). The cost impact of the policy on consumers varied substantially between types of drinkers. The overall estimate was £22 per drinker per annum, £106 per annum for harmful drinkers and £6 per annum for moderate drinkers. If drinkers did not change their alcohol consumption, the effect on their pockets would be £138 per annum for harmful drinkers and £6 per annum for moderate drinkers.

There is also evidence that people in low socioeconomic groups may be even more responsive than other groups to changes in the affordability of alcohol, most likely because alcohol would take up a greater proportion of their income. In other words, increases in the price of alcoholic beverages lead to greater decreases in consumption among these groups than among others (262).

### **Affordability of alcohol**

The real value of excise duty rates for most alcoholic beverages has gone down since 1996 in the vast majority of EU member states (263). Notable exceptions are Italy and the United Kingdom, which have seen an increase in the real value of excise duty rates for beer and, in the United Kingdom, an increase for wine. There has also been a decline in the EU minimum excise duty rates in real terms for alcoholic beverages since 1992 as they have not been adjusted for inflation.

The affordability of alcohol is a composite measure looking at the net effect of price and income. The affordability of alcoholic beverages has increased in all European countries examined, apart from Italy. In six countries (Estonia, Finland, Ireland, Latvia, Lithuania and Slovakia) the affordability of alcohol increased by 50% or more. Across the EU, 84% of the increase in alcohol affordability results from increases in income and only 16% to changes in alcohol prices. This is primarily because while incomes went up considerably across the EU, the relative price of alcoholic beverages has remained relatively stable or fallen more slowly than incomes have increased. There is a statistically significant positive relationship between alcohol affordability and consumption across the EU, with a short run elasticity of 0.22 and long-run elasticity of 0.32 (suggesting a total increase in consumption of 0.32% following a 1% increase in affordability).

### **Price and cross-border trade**

Effective alcohol policies can be eroded by international trade and trade agreements and cross-border issues. For example, there is substantive evidence that the introduction of a single market for alcohol in the EU resulted in significant tax competition between countries and thus lower tax rates than would have occurred without a single market (264). Natural experiments in Europe consequent to economic treaties have shown that as alcohol taxes and prices have been lowered, so sales and alcohol consumption

have usually increased (265,266), although this is not always reflected in survey and panel data (267).

Total alcohol consumption (recorded and unrecorded) in Sweden rose from 1989 until 2004; from then until 2007 there was a slight drop in consumption to an estimated 9.7 litres of pure alcohol per person aged 15 years or older per year (268). In 2007, cross-border purchases of alcoholic beverages were the source of almost a fifth of all alcohol consumption in Sweden. Starting from slightly below average consumption, the southern Swedish counties considerably increased their alcohol consumption until around 2003, while the northern counties experienced only a slight increase. Both the increase until 2004 and the subsequent slump in consumption in the southern counties in 2005 were largely due to the cross-border purchase (and smuggling) of alcohol from Denmark and Germany (269,270). In addition, it seems that the increased consumption of imported alcoholic beverages also resulted in increased alcohol-related morbidity and mortality (266). Further, the closer a hospital to the Danish border, the higher the costs for alcohol-related diagnosis were for inpatient treatment (271).

Finland, which joined the EU in 1995, was allowed to continue to restrict alcohol imports until 2003. After that, alcohol imports were expected to increase heavily, due not only to opening borders but also because neighbouring Estonia, well-known for its low alcohol prices, was scheduled to join the EU in 2004. The Finnish government therefore decided to lower alcohol taxes: on 1 March 2004, the alcohol excise duty rate was reduced by an average of 33% to prevent excessive imports and thereby losses in alcohol tax revenues (272). The reduction in tax was greatest on distilled spirits (-44%) and more moderate on wines (-10%) and beer (-32%). In 2004, both imports of alcohol from Estonia and retail sales of alcohol in Finland went up. The total consumption of alcohol per capita increased by 10% from 9.4 litres in 2003 to 10.3 litres in 2004, with recorded consumption increasing by 6.5% from 7.7 litres to 8.2 litres per capita, and unrecorded – and thus untaxed – consumption by an estimated 25% from 1.7 litres to 2.1 litres per capita. The recorded consumption of spirits increased by 18%, but the increase in sales did not cancel out the effects of the tax cuts on tax revenues. The impact on health associated with Estonia joining the EU was not statistically significant, but the impact of alcohol tax cuts in March 2004 was significant, resulting in an estimated eight additional alcohol-positive deaths per week, which was a 17% increase compared with the weekly average in 2003 (273). Overall alcohol-related mortality increased by 16% among men and by 31% among women; 82% of the increase was due to chronic causes, particularly liver diseases (272). The

increase in absolute terms was greatest among men aged 55–59 years and women aged 50–54 years. Among people aged 30–59 years, it was greatest among the unemployed or early pensioners and those with low education, social class or income. Those in employment and those aged over 35 years did not suffer from increased alcohol-related mortality during the two years after the change. In response to the worsening situation, alcohol taxes were raised in Finland at the beginning of 2008 by an average of 11.5%. The example of Finland illustrates (274), as with tobacco (275), that cross-border issues are not solved by lowering taxes.

### **Summary of the evidence of addressing pricing of alcohol**

#### *What we know*

- ✓ There is extensive and consistent evidence that raising the price of alcohol reduces alcohol-related harm.
- ✓ There is consistent evidence that, to be effective, rises in the price of alcohol need to account for changes in income and the prices of other commodities.
- ✓ There is consistent evidence that price has an impact on younger and heavier drinkers.
- ✓ There is some evidence from economic models that setting a minimum price of alcohol could reduce alcohol-related harm.
- ✓ There is some evidence from economic models that price increases and setting a minimum price affect the consumption and expenditure of heavier drinkers to a much greater extent than lighter drinkers.
- ✓ There is some evidence that the EU economic treaties have led to lower alcohol taxes.
- ✓ There is some evidence that lowering taxes to reduce cross-border trade can lead to increased alcohol-related harm

#### *What we do not know*

- ⊗ The most efficient way to obtain public and political support for raising taxes or introducing a minimum price.

**Policy implications of addressing pricing of alcohol**

Consideration should be given to ensuring that taxes set the price of alcohol at a level that reduces alcohol-related harm, accounting for changes in inflation, income and the prices of other commodities. Setting a minimum price per gram of alcohol can be considered as a policy option to reduce the availability of low- and cut-priced alcohol. Lowering taxes on alcohol to offset cross-border trade or an illicit market in alcohol can bring the risk of extra alcohol-related harm.

## **Drinking environments**

This section will review the evidence for the impact of policies and programmes that can reduce harm from drinking environments, including enforcement of existing laws governing licensing and alcohol-servers, server training programmes and bar design. The relationship between drinking and alcohol-related harm can be both affected and mediated by the physical and social context of drinking and by the succeeding contexts while the drinker is intoxicated. Interventions in drinking environments can be important, since the problems potentially averted commonly harm others than the drinker, including the consequences of drink-driving and violence. Unfortunately, the evidence shows that such interventions have limited impact unless they are backed up by adequate enforcement.

### **Design of premises**

Licensed drinking environments are associated with drunkenness, drink-driving and problem behaviours such as aggression and violence, with some licensed premises being associated with a disproportionate amount of harm (276). Aspects of the bar environment that increase the likelihood of alcohol-related problems include serving practices that promote intoxication, an aggressive approach taken to closing-time by bar staff and local police, the inability of bar staff to manage problem behaviour, general characteristics of the environment such as crowding and permissiveness on the part of bar staff, the general type of bar and physical comfort, the degree of overall permissiveness in the bar, the availability of public transport and aspects of the ethnic mix of customers (see 9).

### **Training of alcohol servers**

#### ***Responsible beverage service***

Nearly all evaluations of training bar staff in responsible beverage service, backed up with enforcement, have demonstrated improved knowledge and attitudes on the part of the participants (see 9). These studies have also shown some effects on serving practices, although not always. While servers are usually willing to intervene with customers who are visibly intoxicated, they will generally not intervene with individuals solely on the basis of the customer's estimated BAC or number of drinks consumed. In addition,

training tends to discourage bad serving practices such as pushing drinks, and encourage “soft” interventions such as suggesting food or slowing service. In terms of the effects on customer intoxication, several studies have found that training servers results in lower BAC levels among customers generally and fewer customers with high BAC levels. Moreover, time-series analyses of mandatory server training suggest that such training is associated with fewer visibly intoxicated customers and fewer single-vehicle night-time injury-producing crashes (277). Studies of the impact of adhering to bar policies for avoiding intoxication have also found modest effects in reducing heavy consumption and high-risk drinking, but these were not as successful as originally expected (276).

Responsible beverage service programmes are frequently included in broad-based interventions that have shown reductions in violence. For example, the Safer Bars programme developed in Canada includes a risk assessment and a training component for owners, managers and all staff (278). The programme was designed to increase early intervention by staff, improve teamwork and staff abilities in managing problem behaviour, and reduce the risk of injury to patrons. The Safer Bars training was shown to be highly valued by bar staff and managers and demonstrated a significant impact on knowledge and attitudes. There was also a significant effect in reducing both moderate aggression (e.g. pushing and holding) and severe aggression (e.g. punching and kicking). The effects were lessened when there was a high turnover of managers and door and security staff.

A systematic Cochrane review found no reliable evidence that interventions as regards alcohol servers are effective in reducing injury (279). One study that investigated server training estimated that there was a reduction of 23% in single-vehicle night-time crashes in the experimental area (controlled for crashes in the control area). Another study examined the impact of a drink-driving service and reported a reduction of 15% in road crashes resulting in injury in the experimental area, with no change in the control; no difference was found for fatal crashes. A study investigating the impact of a policy intervention reported that before the intervention the serious assault rate in the experimental area was 52% higher than in the control area; after the intervention, the serious assault rate in the experimental area was 37% lower than in the control. A study investigating the impact of an intervention aimed at reducing crime on drinking premises found a lower rate of all crime in the premises covered by the experiment (rate ratio 4.6, 95% CI 1.7–12,  $p = 0.01$ ); no difference was found for injury (rate ratio 1.1, 95% CI 0.1–10,  $p = 0.093$ ). Since compliance with interventions appears to be a problem, mandated interventions may be more likely to show an effect.

### **Active enforcement**

The impact of responsible beverage service is greatly enhanced when there is active and continuing enforcement of laws prohibiting the sale of alcohol to intoxicated customers (see 9). Increasing the perceived risk of apprehension for an offence can deter individuals from future violations of the law: a cost-effective intervention in which the benefits greatly exceed the costs. Enforcement also seems to be a necessary component if voluntary codes of responsible beverage service are to be successful. One study found that a programme combining stricter enforcement of alcohol sales laws and training in responsible beverage service had a significant effect in reducing the rate of violent crimes between 20:00 and 06:00 (144). There is some evidence from specific establishments, with limited diffusion to the whole community, that enforcement checks prevent alcohol sales to minors (280); most of the enforcement effect decayed within three months, however, suggesting that a regular schedule of enforcement is necessary to maintain deterrence. Further, there is some evidence that enforcement activity focuses more on breaches committed by patrons or minors, rather than on licensees or vendors who are in breach of the intoxication provisions of the liquor laws.

For example, the goal of the Surfers Paradise project was to reduce violence and disorder associated with the high concentration of licensed establishments in the resort town of Surfers Paradise in Queensland, Australia (281). The project involved three major strategies: (i) the creation of a community forum including the development of task groups and a safety audit; (ii) the implementation of risk assessments, model house policies, and a code of practice; and (iii) regulation of licensed premises by police and spirits licensing inspectors. This project and its replications in three North Queensland cities (Cairns, Townsville and Mackay) resulted in significant improvements in alcohol policy enforcement, in the bar environment, in bar staff practices and in the frequency of violence. Following the intervention, the number of incidents per 100 hours of observation dropped from 9.8 before the test to 4.7 in Surfers Paradise, and from 12.2 before the test to 3.0 in the replication sites. The initial impact of the project was, however, not sustained. Two years following the intervention in Surfers Paradise the rate had increased to 8.3, highlighting the need to find ways to maintain the gains achieved from community action projects.



### **Summary of the evidence of drinking environments**

#### *What we know*

- ✓ There is some evidence that increased enforcement on sales to intoxicated and underage drinkers can reduce alcohol-related harm.
- ✓ There is some evidence that responsible serving practices do not on their own consistently reduce alcohol-related harm.
- ✓ There is some evidence that interventions delivered in drinking environments do not consistently reduce alcohol-related harm.
- ✓ There is some evidence that interventions aimed at reducing underage access to alcohol do not on their own consistently reduce alcohol-related harm.

#### *What we do not know*

- ⊗ The most effective ways that drinking environments can reduce the harm done by alcohol.

### **Policy implications of drinking environments**

Interventions in drinking environments on their own are unlikely to have a substantial impact in reducing alcohol-related harm. Consideration can, however, be given to increased enforcement on restrictions of sales to intoxicated and under-age drinkers, perhaps as part of comprehensive community action, also to reduce the harm done by alcohol to people other than the drinker (see under Community Action).

## **Reducing the public health impact of unrecorded alcohol**

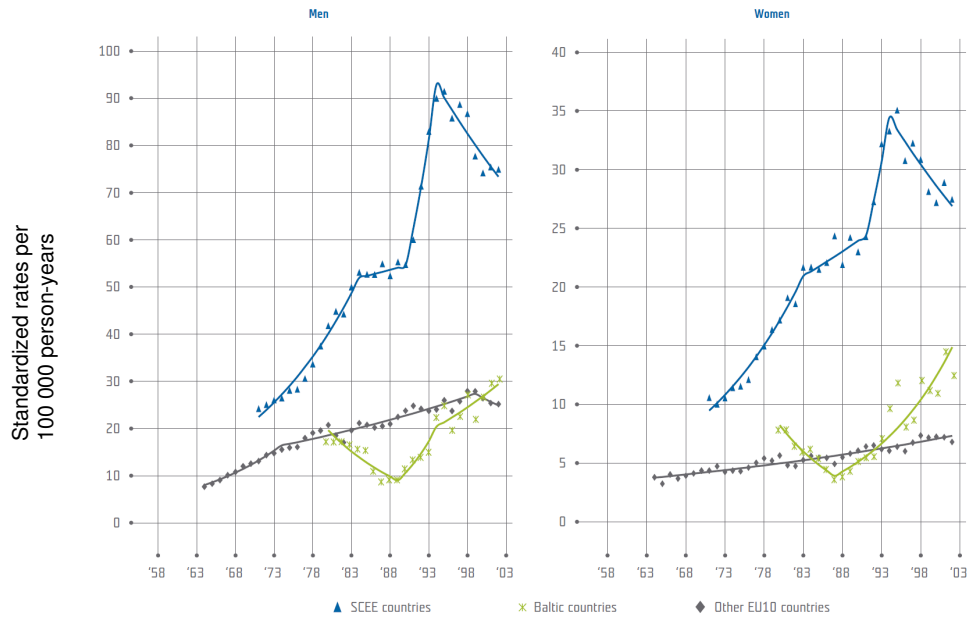
This section will note that unrecorded alcohol, defined as home-made, illegally produced or smuggled alcohol products as well as surrogate alcohol that is not officially intended for human consumption (mouthwash, perfumes and eau-de-colognes) could have health consequences due to a higher ethanol content and contamination with methanol and lead, for which many poisoning outbreaks and fatalities have been recorded internationally (282), and possibly also from some higher alcohols, which have been attributed to higher rates of alcoholic liver disease. For example, it has been suggested that the large differences in cirrhosis mortality rates between Hungary, Romania and Slovenia and the rest of Europe could be due to the composition of unrecorded alcohol products (283) rather than differences in the volume of consumption (284) (Fig. 4). Illegally traded alcohol can bring a health risk due either to contamination during the trading process or to a lower cost than legal alcohol leading to higher consumption. Little is known about the scale of smuggling in Europe, although an estimate made for the EU15 in 1996 suggested that fraud cost the equivalent of around 8% of total alcohol excise duty, similar to tobacco fraud for which, at the time, one third of cigarettes traded were estimated to be smuggled.

### **Unrecorded alcohol**

Despite concern about the potential harm to health from the chemical composition of unrecorded alcohol, there are surprisingly few data in Europe. A small study of samples collected from markets in Hungary and Lithuania only found problems with surrogate alcohols, which contained high levels of ethanol (60% by volume) and some of which contained hepatotoxic levels of coumarin (285). Although the stone fruit spirits (cherries, plums, mirabelles and apricots) from Hungary contained higher levels of methanol and ethyl carbamate, these were not found at levels toxic to human health.

For unrecorded and surrogate alcohols that can have a high methanol content, the complete removal of methanol from denatured spirits is probably the most significant measure to reduce methanol-attributable morbidity and mortality. Some countries, including Australia, have abolished the use of methanol to

Fig. 4. Trends in liver cirrhosis mortality in different parts of Europe in the group aged 20–64 years, 1958–2003



Notes: SCEE: southern central and eastern European countries (Hungary, Romania, Slovenia); Baltic countries: Estonia, Latvia, Lithuania; other EU10 countries: Bulgaria, Czech Republic, Poland, Slovakia.

Source: Zatonski et al (68).

denature alcohol, with a subsequent significant reduction in cases of toxicity (286). Many European countries also do not allow methanol (or methanol-containing wood alcohol) to be used as a denaturing agent (287). For cosmetics, the simplest way is to use the perfume oils that are part of the recipe as a denaturing agent. Other surrogate alcohols, for example those for automobile products, could also be treated with bittering agents to avoid consumption. Rigorous controls on the sale of medicinal alcohol and only permitting small container sizes have been shown to reduce potential harm from medicinal alcohols in the Nordic countries (288).

## Smuggled alcohol

By its nature, it is obviously difficult to obtain reliable statistics on the illicit trade in alcohol, which makes it difficult to estimate the scale of smuggling in Europe and monitor trends in the illegal trade. The only existing estimate for the EU15 comes from the European High Level Group on Fraud, which

estimated that €1.5 billion was lost due to fraud in 1996, equivalent to around 8% of total alcohol excise duty at the time (289). In comparison, for tobacco products member states estimated the loss in 1996 at approximately €3.3 billion (or 7.5% of total excise duty receipts on tobacco products). Although the single market and greater passenger movement may be expected to increase the possibilities for fraud, the indications are that there are different trends in Europe. France, Ireland and the United Kingdom, for example, believe that they have experienced increased diversion fraud, whereby goods moving from one member state to another under suspension of excise duty are diverted en route, often to member states applying relatively high levels of duty. Portugal, on the other hand, has seen more evasion of duty (290).

Although any heavily-taxed product will be susceptible to fraudulent activity, this does not mean that lower, uniform tax rates will reduce the level of smuggling. In fact, smuggling of tobacco (which has been analysed in more detail) was more likely to occur from the expensive north of Europe to the cheaper south (291), probably related to less transparent government in southern Europe (292). Price differentials do increase the incentive to smuggle goods (especially for small-scale smuggling by individuals in single vehicles), but any highly-taxed item such as alcohol is susceptible to smuggling. This makes the chances of being caught of key importance for the large-scale, organized smuggling operations that make up the bulk of the problem for alcohol. Improved enforcement is, therefore, an effective tool against smuggling (290).

Other member states have reported an increase in the smuggling of alcohol from third countries (as in Finland) or increases in home distilling and confiscation of alcoholic beverages brought into the country illicitly from other member states (as in Sweden) (290). As stated above, member states applying relatively low levels of duty (such as Portugal) have reported increasing fraud in the alcohol and alcoholic beverage sector, mainly evasion of duty. The Commission has also become aware of an increasing number of cases, signalled by individual companies in the alcohol sector, of non-clearance of movements within the European Community or from the Community towards third countries, whereby these companies are held liable for payment of the duty on goods which have not reached their destination. Following the recommendations of the High Level Group on Fraud, the Commission and member states have taken a number of initiatives in order to combat fraud. Examples are the adoption of a Commission Recommendation concerning warehouse-keepers, and the computerization of the movement and surveillance system of excisable

products. These initiatives will improve the efficiency of existing regulatory and control systems, and facilitate the fight against fraud and evasion.

### **Summary of the evidence of drinking environments**

#### *What is known*

- ✓ There very limited studies that have been undertaken suggest that the chemical composition of unrecorded alcohol is unlikely to pose a substantial health hazard; the exception to this is surrogate alcohols.

#### *What is not known*

- ⊗ The full extent of unrecorded and, in particular, smuggled alcohol.
- ⊗ The full extent to which the chemical composition of unrecorded alcohol presents a health risk.

### **Policy implications of unrecorded alcohol**

Consideration should be given to obtaining better estimates of the size of the unrecorded market, including smuggled products, and the size of the potential health risk from unrecorded alcohol. A range of measures listed in the chapter can be used to reduce the risk of surrogate alcohol. Electronic recording systems and tax stamps can be used to track traded alcohol, and licit alcohol producers can take a responsibility in supporting reduced illicit trade.

## **Overview of effectiveness and cost-effectiveness**

Summarizing the previous sections, this section will note that there is a substantial evidence base on the effectiveness of different policies in reducing the harm done by alcohol. Essentially, those policies that regulate the environment in which alcohol is marketed (economic and physical availability) are effective in reducing alcohol-related harm. Enforced legislative measures to reduce drinking and driving are effective, as are individually-directed interventions to already at-risk drinkers. On the contrary, the evidence shows that information and education-type programmes do not reduce alcohol-related harm, although they have a role in providing information, reframing alcohol-related problems, and increasing attention to and acceptance of alcohol on the political and public agendas.

Adding a cost component to the assessment of the health impact of alcohol policies creates an opportunity to identify those strategies that offer the greatest (or least) value for money. For example, devoting scarce resources to interventions that do not discernibly reduce the harm done by alcohol, as is the case for information and education aimed at changing behaviour, can be argued as an inefficient use of scarce resources. At the other end of the spectrum, changes in taxation cost relatively little to implement but lead to substantial health returns. In fact in all parts of the EU, all of the population-based interventions represent a cost-effective use of resources (against the international yardstick of per capita income), and compare favourably to treatment strategies for disease and injury that may result from harmful alcohol use. Brief interventions for the treatment of individual high-risk drinkers also compare favourably to such treatment strategies but are harder to scale up because of their associated training and personnel needs.

### **Summary of effectiveness**

Based on Anderson et al (293), the evidence for the impacts of the policy measures described in this report are summarized below in order of levels of evidence for, and potential for impact from, those interventions for which there is evidence that they reduce alcohol-related harm (Table 2). What is clear about the change in evidence over time is that there are now many more publications of systematic reviews and meta-analyses which have

strengthened the conclusions of previous reviews. Policies that limit the economic and physical availability of alcohol reduce harm, whereas educational-type policies do not. No-one can now dispute the impact of prices when a meta-analysis of 1003 estimates from 112 studies (248), and a meta-analysis of 1172 estimates from 132 studies (234) convincingly show an impact of price on consumption, with the effect greater in the longer than the shorter run. No-one can now argue that more school education or prevention among young people is the solution when a systematic review of 14 systematic reviews could only identify 6 out of 59 high-quality school programmes that were able to demonstrate any evidence for effectiveness (72), and a systematic review of 25 reviews could only identify 12 out of 127 high-quality interventions that showed promising evidence (77).

Table 2. Summary of the evidence of the effectiveness of alcohol policies

<b><i>Degree of evidence</i></b>	<b><i>Evidence of action that reduces alcohol-related harm</i></b>	<b><i>Evidence of action that does not reduce alcohol-related harm</i></b>
Convincing	Alcohol taxes Government monopolies for retail sale Restrictions on outlet density Restrictions on days and hours of sale Minimum purchase age Lower legal BAC levels for driving Random breath-testing Brief advice programmes Treatment for alcohol use disorders	School-based education and information
Probable	A minimum price per gram of alcohol Restrictions on the volume of commercial communications Enforcement of restrictions of sales to intoxicated and under-age people	Lower taxes to manage cross-border trade Training of alcohol servers Designated driver campaigns Consumer labelling and warning messages Public education campaigns
Limited-suggestive	Suspension of driving licences Alcohol locks Workplace programmes Community-based programmes	Campaigns funded by the alcohol industry

## **Cost-effectiveness of alcohol policies**

This section reports the results of WHO's CHOICE (CHOosing Interventions that are Cost-effective) model, which provides estimates of the impact and cost of implementing policies in reducing DALYs due to harmful alcohol use (123), re-calculated for the EU. The CHOICE model determines the effectiveness of an intervention via a state transition population model, taking into account births, deaths and the impact of alcohol. Two scenarios are modelled over a lifetime (100 years): (i) no interventions available to reduce hazardous and harmful alcohol use (defined in the CHOICE model as more than 20g alcohol a day for women and more than 40g alcohol a day for men); and (ii) the population-level impact of each specified intervention, implemented for a period of 10 years. The difference represents the population-level health gain resulting from the implementation of the intervention, discounted at 3% and age-weighted.

Population-level costs associated with the implementation of interventions – which include legislation, enforcement, administration and training costs, plus inpatient and outpatient services where indicated – have been updated from 2000 to 2005 international dollar price levels, and now include estimates for school-based education and mass media awareness campaigns. (An international dollar has the same purchasing power as the US dollar has in the United States and is used as a means of translating and comparing costs from one country to the other using the US dollar as a common reference point.) Intervention health effects expressed in DALYs saved, relative to an epidemiological situation of no alcohol control measures in the population, have also been updated in order to reflect underlying demographic changes in regional populations since 2000, and have been extended to include the impact of a sustained campaign of tax enforcement on reducing levels of unrecorded production and consumption. Non-health effects of alcohol policy measures, such as reduced damage to property or enhanced work productivity, are not considered in this analysis.

A summary of the estimated cost and impact of different interventions, compared to a Europe with none of these policies is shown in Table 3, with an estimate of the cost per DALY saved. For information and education, and community action, the costs of school-based education and mass-media awareness campaigns have been estimated respectively. Although these interventions are not expensive, they do not notably alter consumption levels or health outcomes. Such interventions are therefore not effective or cost-effective strategies to pursue in terms of reducing health-related harm due to



alcohol use (particularly since there exist other actionable strategies that are very cost-effective).

In relation to the health sector response, brief interventions have been studied extensively. The cost-effectiveness of such interventions is not as favourable as the population-level policy instruments summarized below because they require direct contact with health care professionals and services. Although brief interventions are the most expensive to implement, it should be noted that within health service expenditure, brief interventions for hazardous and harmful alcohol consumption are one of the most cost-effective of all health service interventions in leading to health gain. Where drink-driving policies and countermeasures are concerned, there is good evidence for the effectiveness of drink-driving laws and their enforcement via roadside breath-testing and checkpoints. The estimated cost-effectiveness of such countermeasures ranged from I\$ 781 (in Eur-C countries) to I\$ 4625 (in Eur-B countries).

The impact of reducing access to retail outlets for specified periods of the week and implementing a comprehensive advertising ban have the potential to be cost-effective countermeasures, but only if they are fully enforced (each healthy year of life restored costs between I\$ 567 and I\$ 2509).

Table 3. Costs, impact and cost-effectiveness of different policy options in Europe

Target area, specific intervention(s)	Coverage (%)	WHO subregion (exemplar countries)								
		Eur-A (e.g. Spain, Sweden)			Eur-B (e.g. Bulgaria, Poland)			Eur-C (e.g. Russian Federation, Ukraine)		
		Annual cost per million persons <sup>a</sup>	Annual effect per million persons (DALYs saved)	I\$ per DALY saved <sup>b</sup>	Annual cost per million persons <sup>a</sup>	Annual effect per million persons (DALYs saved)	I\$ per DALY saved <sup>b</sup>	Annual cost per million persons <sup>a</sup>	Annual effect per million persons (DALYs saved)	I\$ per DALY saved <sup>b</sup>
<i>Raising aware- ness and political commitment</i>										
School-based education	80	0.84	–	N/A <sup>c</sup>	0.70	–	N/A <sup>c</sup>	0.34	–	N/A <sup>c</sup>
<i>Health sector response</i>										
Brief interventions for heavy drinkers	30	4.20	672	6256	0.77	365	2100	1.78	667	2671

Target area, specific intervention(s)	Coverage (%)	WHO subregion (exemplar countries)								
		Eur-A (e.g. Spain, Sweden)			Eur-B (e.g. Bulgaria, Poland)			Eur-C (e.g. Russian Federation, Ukraine)		
		Annual cost per million persons <sup>a</sup>	Annual effect per million persons (DALYs saved)	I\$ per DALY saved <sup>b</sup>	Annual cost per million persons <sup>a</sup>	Annual effect per million persons (DALYs saved)	I\$ per DALY saved <sup>b</sup>	Annual cost per million persons <sup>a</sup>	Annual effect per million persons (DALYs saved)	I\$ per DALY saved <sup>b</sup>
<i>Community action</i>										
Mass media campaign	80	0.83	–	N/A <sup>c</sup>	0.95	–	N/A <sup>c</sup>	0.79	–	N/A <sup>c</sup>
<i>Drink-driving policies and countermeasure s</i>										
Drink-driving legislation and enforcement (via random breath-testing campaigns)	80	0.77	204	3762	0.74	160	4625	0.72	917	781
<i>Availability of alcohol</i>										
Reduced access to retail outlets	80	0.78	316	2475	0.56	414	1360	0.47	828	567
<i>Marketing of alcoholic beverages</i>										
Comprehensiv e advertising ban	95	0.78	351	2226	0.56	224	2509	0.47	488	961
<i>Pricing policies</i>										
Increased excise taxation (by 20%)	95	1.09	2301	472	0.92	726	1272	0.67	1759	380
Increased excise taxation (by 50%)	95	1.09	2692	404	0.92	852	1083	0.67	1995	335
Tax enforcement (20% less unrecorded)	95	1.94	2069	939	1.26	706	1780	0.87	1741	498
Tax enforcement (50% less unrecorded)	95	2.21	2137	1034	1.34	790	1692	0.93	1934	480

<sup>a</sup> Implementation cost in 2005 international dollars (millions); <sup>b</sup> cost-effectiveness ratio, expressed in terms of international dollars per DALY saved; <sup>c</sup> not applicable because the effect size is not significantly different from zero (the cost-effectiveness ratio would therefore approach infinity).

In the category of pricing policies, there is consistent evidence showing that the consumption of alcohol is responsive to an increase in final price, which can be effectuated via higher excise taxes on alcoholic beverages. Tax increases (of 20% or even 50%) are highly cost-effective throughout Europe. Even accounting for longer life, and thus potentially increased social welfare costs, taxation remains a highly cost-effective alcohol policy option (294). As discussed above, the effect of alcohol tax increases could be mitigated by illegal production, tax evasion and illegal trading, which accounts for approximately 12% of all consumption in Eur-A countries and 40% in Eur-B and Eur-C countries. Reducing this unrecorded consumption (by 20–50%) via concerted tax enforcement efforts is estimated to cost 50–100% more than a tax increase but produces similar levels of effect. In settings with higher levels of unrecorded production and consumption, increasing the proportion of consumption that is taxed (and therefore more costly to the price-sensitive consumer) may represent a more effective pricing policy than a simple increase in excise tax, which may only encourage further illegal production, smuggling and cross-border purchases.

Fig. 5. Expansion path of cost-effectiveness in Eur-A countries

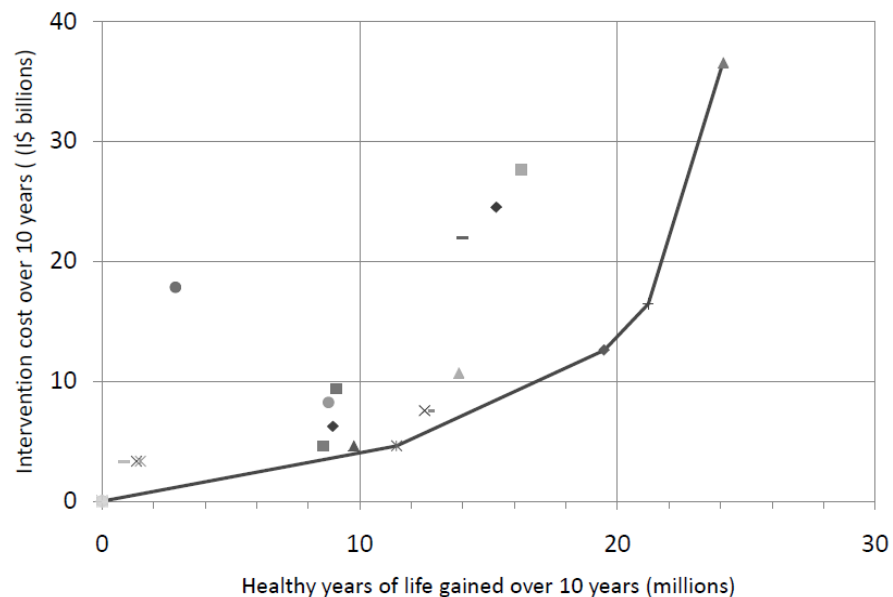
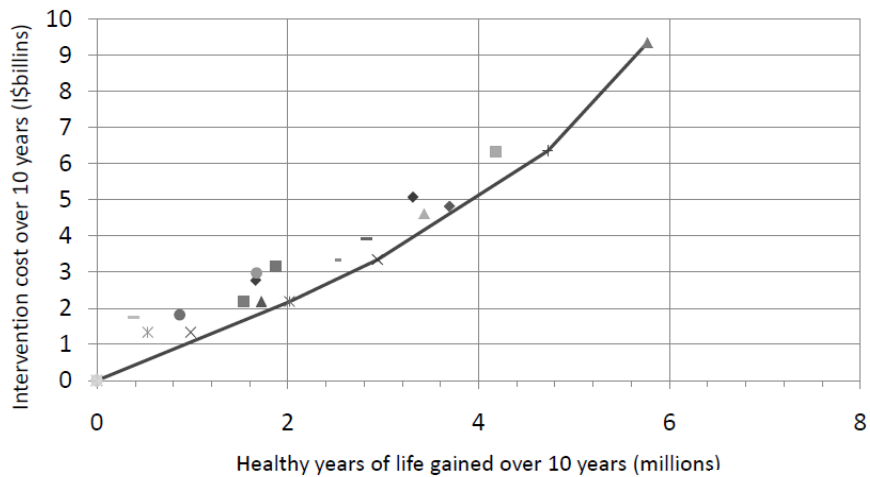


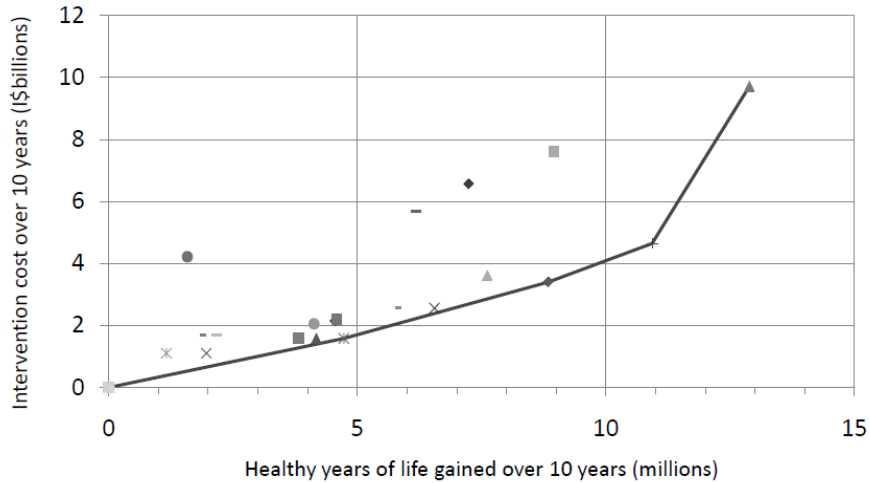
Fig. 6. Expansion path of cost-effectiveness in Eur-B countries



Legend for Figs. 5-7 plot the total costs and effects of each single and combined intervention on an expansion curve (the solid line)

- ◆ Current scenario (tax and random breath testing at current rates)
- Current taxation
- ▲ Increased taxation (current + 20%)
- × Increased taxation (current + 50%)
- Reduced untaxed consumption (current - 20%)
- Reduced untaxed consumption (current - 50%)
- × Reduced access to retail outlets
- × Comprehensive advertising ban
- Brief advice in primary care
- Roadside breath-testing (fatal injuries only)
- Roadside breath-testing (including non-fatal injuries)
- ◆ Combination 1: Increased tax and scaled-up tax enforcement
- × Combination 2: Increased tax and reduced access
- Combination 3: Increased tax and advertising ban
- Combination 4: Increased tax and brief advice
- ◆ Combination 5: Increased tax + advertising ban + brief advice
- ▲ Combination 6: Increased tax + advertising ban + reduced access
- + Combination 7: Increased tax + reduced access + tax enforcement
- Combination 8: Increased tax + brief advice + advertising ban + reduced access
- ▲ Combination 9: Increased tax + brief advice + advertising ban + reduced access + tax enforcement

Fig. 7. Expansion path of cost-effectiveness in Eur-C countries



Figs. 5–7 plot the total costs and effects of each single and combined intervention on an expansion curve. The lower right boundary of this plot represents the increasing incremental cost of saving one additional DALY and indicates the most efficient way of combining different strategies. Interventions to the north-west of this cost-effectiveness frontier or expansion path are “dominated”, i.e. they are less effective and/or more costly than (a combination of) other interventions. The most cost-effective options are those that occur on the inflections of the expansion path. In all three sub-regions of Europe, the most cost-effective option is increased taxation (current + 50%), followed by increased tax and scaled-up tax enforcement in Eur-A and Eur-C countries and increased tax and reduced access in Eur-B countries, followed by increased tax, scaled-up tax enforcement and reduced access in all three sub-regions, followed by increased tax, scaled-up tax enforcement, reduced access, an advertising ban and brief advice in all three sub-regions.

It is also important to note that country contextualization can change the cost-effectiveness ratios. For example, compared with Eur-C countries, costs per DALY averted in Estonia were cheaper for taxation, an advertising ban and roadside breath-testing, and more expensive for reduced access and brief advice in primary care (295). Thus, in Estonia, in contrast to Eur-C countries, an advertising ban became more cost-effective than reduced access, and roadside breath-testing than brief advice in primary care.

Finally, it should be noted that a comprehensive policy that combines individual elements can be far more cost-effective than the individual policy elements alone. For example, current taxation plus a 50% increase, which lies at the first inflexion of the expansions path in Eur-A countries, has an incremental and average cost-effectiveness of I\$ 404/DALY averted. The next inflexion (increased tax and scaled-up enforcement) has an incremental cost-effectiveness of I\$ 991 and an average cost-effectiveness of I\$ 647. The third inflexion (increased tax, scaled-up enforcement and reduced access) has an incremental cost-effectiveness of I\$ 2252 and an average cost-effectiveness of I\$ 776. The final point (increased tax, scaled-up enforcement, reduced access, advertising ban and brief advice) has an incremental cost-effectiveness of I\$ 6923 and an average cost-effectiveness of I\$ 1517.

Importantly for policy discussions, it should be noted that the current intervention mix does not appear on any of the expansion paths, indicating room for improvement from a cost-effectiveness point of view and that more DALYs could be saved by increasing the taxation level, improving coverage of interventions and better enforcement, possibly even in the current budgetary range using resource re-allocation.

### **Summary of the evidence of drinking environments**

#### *What is known*

- ✓ The most cost-effective policy option to reduce alcohol-related harm is taxation.
- ✓ The next most cost-effective policy option is taxation combined with scaled-up tax enforcement.
- ✓ The next most cost-effective policy option is increased tax, scaled-up tax enforcement and reduced access.
- ✓ The next most cost-effective policy option is increased tax, scaled-up tax enforcement, reduced access, an advertising ban and brief advice.
- ✓ Current intervention mixes could be more cost-effective.

#### *What is not known*

- ⊗ The specific expansion paths in individual member states, apart from Estonia.

- ⊗ The impact of policies in reducing the avoidable social cost burden of alcohol in Europe, although this has been done, for example in Australia (296) and Canada (297).

**Policy implications of the evidence related to cost-effectiveness**

Policy-makers would be advised to model expansion paths in their own countries. Consideration could be given to adjustment of policies towards those most favourable from a cost-effectiveness perspective in reducing alcohol-related harm.

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