Overview of effectiveness and cost–effectiveness

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Introduction[1]

The report *Alcohol in Europe. A public health perspective*, prepared in 2006 for the EC (Anderson & Baumberg, 2006), grouped alcohol policies under five headings: (i) policies that reduce drinking and driving; (ii) policies that support education, communication, training and public awareness; (iii) policies that regulate the alcohol market; (iv) policies that support the reduction of harm in drinking and surrounding environments; and (v) policies that support interventions for individuals. Based on the then available evidence, it concluded the following.

- The drink–driving policies that are highly effective include unrestricted (random) breath-testing, lowered BAC levels, administrative licence suspension and lower BAC levels for young drivers. The limited evidence did not find an impact from designated driver and safe drive programmes. Alcohol interlocks can be effective as a preventive measure, but as a measure with drink–driving offenders they only work as long as they are fitted to a vehicle. It was estimated that, compared with no testing, implementation of unrestricted breath-testing as a policy to prevent drink–driving would avert an estimated 111 000 years of disability and premature death throughout the EU at an estimated cost of €233 million each year.
- Policies that support education, communication, training and public awareness have a low impact. Although the reach of school-based educational programmes can be high because of the captive audiences in schools, the population impact of these programmes is small owing to their current limited or lack of effectiveness. Recommendations exist as to how the effectiveness of school-based programmes might be improved. On the other hand, mass media programmes have a particular role to play in reinforcing community awareness of the problems created by alcohol use and to prepare the ground for specific interventions.
- There is very strong evidence for the effectiveness of policies that regulate the alcohol market in reducing the harm done by alcohol, including taxation and managing the physical availability of alcohol (limiting times of sale and raising the minimum drinking age). Alcohol taxes are particularly important in targeting young people and the harm done by alcohol. The evidence shows that if opening hours for the sale of alcohol are extended, more violent harm results. Restricting the volume and content of commercial communication of alcohol products is likely to reduce harm. Advertisements have a particular impact in promoting a more positive attitude to drinking among young people. It was estimated that, compared with no tax on alcohol, the current level of tax with a 25% increase in the tax rate throughout the EU would avert an estimated 656 000 years of disability and premature death at an estimated cost of €159 million each year; reducing the availability of alcohol from retail outlets by a 24-hour period each week would avert an estimated 123 000 years of disability and premature death at an estimated implementation cost of €98 million each year; and banning the advertising of alcohol would avert an estimated 202 000 years of disability and premature death at an estimated implementation cost of €95 million each year.
- There is growing evidence for the impact of strategies that alter the drinking context in reducing the harm done by alcohol. These strategies are, however, primarily applicable to drinking in bars and restaurants, and their effectiveness relies on adequate enforcement. They are also more effective when backed up by community-based prevention programmes.

[1] Unless stated otherwise, Europe refers to the countries covered by the WHO European Region.

- There is extensive evidence for the impact of brief advice, particularly in primary care settings, in reducing harmful alcohol consumption. Providing such primary care-based brief advice to 25% of the at-risk population would avert an estimated 408 000 years of disability and premature death at an estimated cost of €740 million each year.
- Implementing a comprehensive EU-wide package of effective policies and programmes that included random breath-testing, taxation, restricted access, an advertising ban and brief advice from a doctor, was estimated to cost European governments €1.3 billion to implement (about 1% of the total tangible costs of alcohol to society and only about 10% of the estimated income gained from a 10% rise in the price of alcohol due to taxes in the countries belonging to the EU before May 2004), and was estimated to avoid 1.4 million years of disability and premature death a year, equivalent to 2.3% of all disability and premature death facing the EU.

Summary of recent evidence

Since 2006, considerable evidence has been gained on the effectiveness and cost–effectiveness of alcohol policies. This evidence has been summarized in a range of publications (Anderson, Chisholm & Fuhr, 2009; Anderson et al., 2011; Babor et al., 2010; WHO Regional Office for Europe, 2009a; 2009b; 2010). 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.

WHO's CHOosing Interventions that are Cost Effective (CHOICE) model provides estimates of the costs of implementing certain policies and estimates of the benefits likely to be accrued. Although based on the best available implementation costs at the country level and on the best available evidence for implementation effects, they are, of course, just models. However, they do give policy-oriented guidelines for the most likely cost–effective approaches for improving health. Full details and technical information can be found on the CHOICE website (WHO, 2012). A summary of the estimated implementation costs and impact of different alcohol policy interventions, compared to a Europe with none of these policies, is shown in Table 1, with an estimate of the cost per DALY saved summarized in Fig. 1 (WHO Regional Office for Europe, 2009a). It should be remembered in all economic analyses of alcohol policies that, although tax increases bring in extra revenue for governments, economists regard these revenues as revenue-neutral, since the money raised can be rebated to consumers by allowing an equal reduction in other taxes, such as income taxes.

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.

In relation to the health sector response, the estimated 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 improved health. Where drink–driving policies and countermeasures are concerned, the estimated cost–effectiveness ranged from I$ 781 (in Eur-C countries) to I$ 4625 (in Eur-B countries).

Table 1. Costs, impact and cost–effectiveness of different policy options in three subregions of the WHO European Region

Target area Specific intervention(s)	Coverage (%)	*Eur-A*[a]			*Eur-B*[b]			*Eur-C*[c]		
		Annual cost per million persons (I$ million)[d]	Annual effect per million persons (DALYs saved)	I$ per DALY saved[e]	Annual cost per million persons (I$ million)[d]	Effect per million persons per year (DALYs saved)	I$ per DALY saved[e]	Annual cost per million persons (I$ millions)[d]	Effect per million persons per year (DALYs saved)	I$ per DALY saved[e]
Awareness-raising and political commitment										
School-based education	80	0.84	–	N/A*	0.70	–	N/A*	0.34	–	N/A*
Health sector response										
Brief interventions for heavy drinkers	30	4.20	672	6256	0.77	365	2100	1.78	667	2671
Community action										
Mass media campaigns	80	0.83	–	N/A*	0.95	–	N/A*	0.79	–	N/A*
Drink–driving policies and countermeasures										
Drink–driving legislation and enforcement (via random breath-testing campaigns)	80	0.77	204	3762	0.74	160	4625	0.72	917	781
Availability of alcohol										
Reduced access to retail outlets	80	0.78	316	2475	0.56	414	1360	0.47	828	567
Marketing of alcoholic beverages										
Comprehensive advertising ban	95	0.78	351	2226	0.56	224	2509	0.47	488	961
Pricing policies										
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

* Not available.

[a] *Eur-A (very low adult mortality and 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.

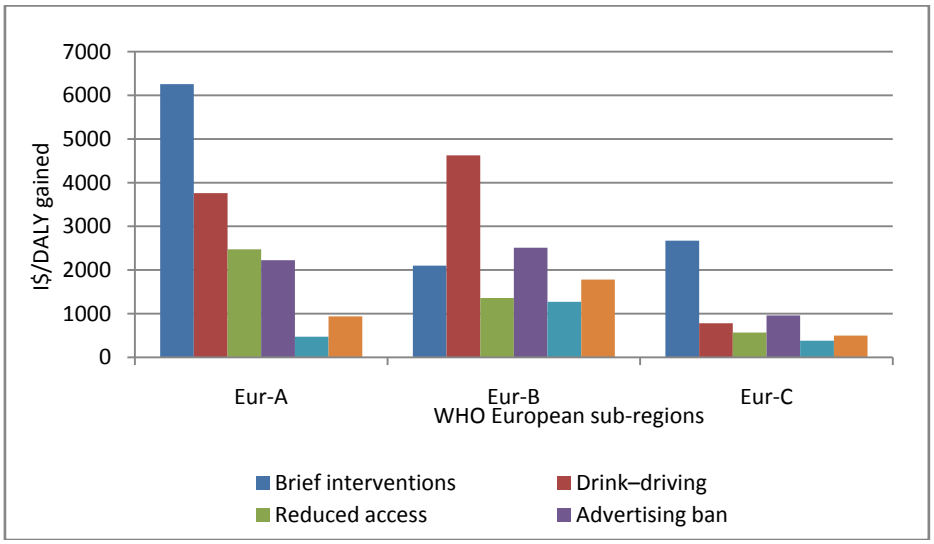
[b] *Eur-B (low adult mortality and low child mortality):* Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Bulgaria, Georgia, Kyrgyzstan, Montenegro, Poland, Romania, Serbia, Slovakia, Tajikistan, The former Yugoslav Republic of Macedonia, Turkey, Turkmenistan, Uzbekistan.

[c] *Eur-C (high adult mortality and low child mortality):* Belarus, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Republic of Moldova, Russian Federation, Ukraine.

[d] Implementation cost in 2005 international dollars (I$).

[e] Cost–effectiveness ratio, expressed in terms of international dollars per DALY saved.

Fig. 1. Cost–effectiveness estimates, in I$/DALY gained, for various forms of alcohol policy action in three subregions of the WHO European Region



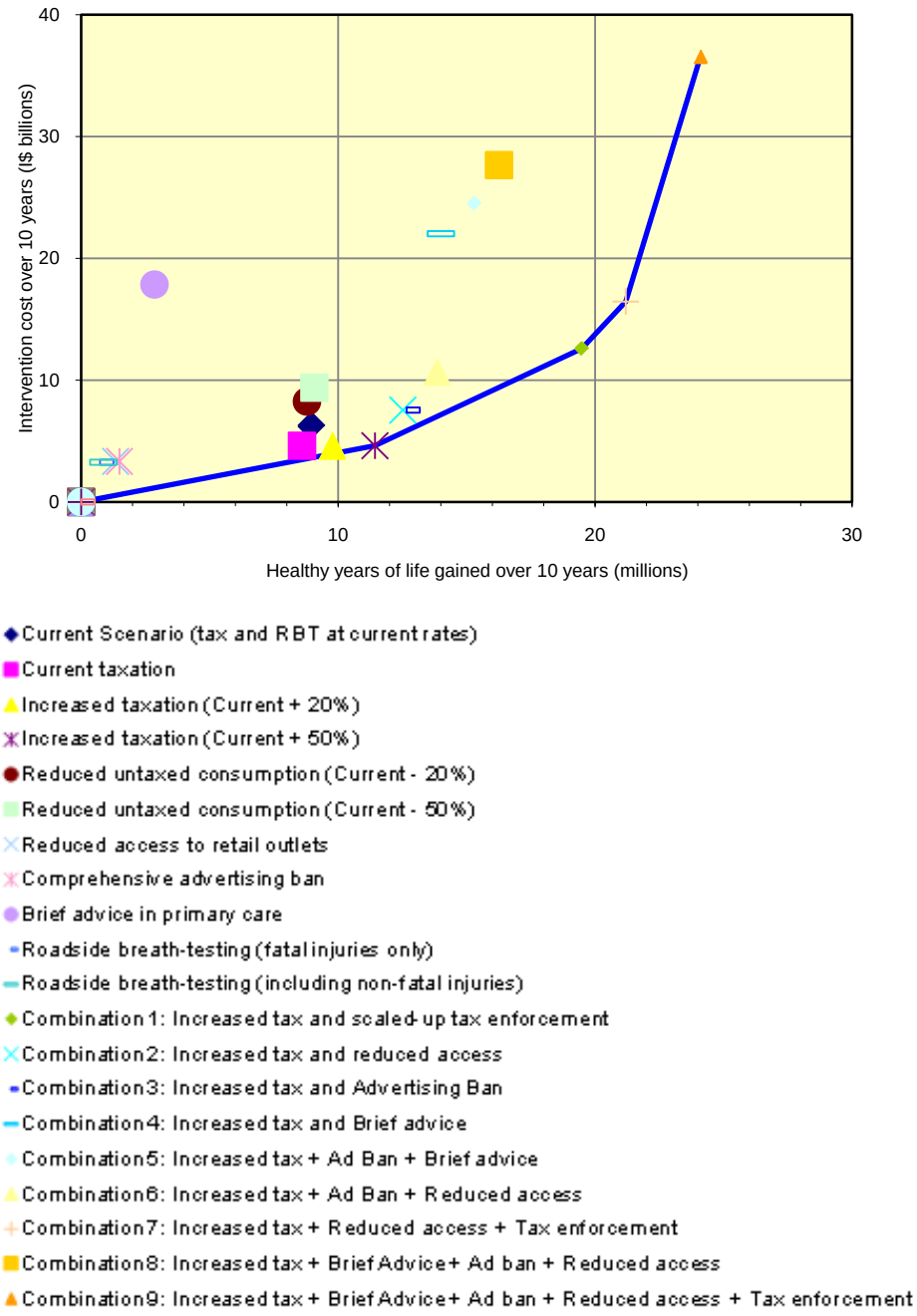
Note. Cost–effectiveness is inversely proportional to the height of the bars. For a description of each action used in the calculations, see Anderson, 2009b.

Reducing access to retail outlets for specified periods of the week and implementing a comprehensive advertising ban are estimated to 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).

Tax increases (of 20% or even 50%) are estimated to be 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. The effect of alcohol tax increases could be mitigated by illegal production, tax evasion and illegal trading, which account 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 to produce 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.

Figs. 2–4 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 subregions 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 subregions; followed by increased tax, scaled-up tax enforcement, reduced access, an advertising ban and brief advice in all three subregions.

Fig. 2. Expansion path of cost–effectiveness in Eur-A countries



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, therefore, be saved by increasing the taxation level, and improving coverage of interventions and enforcement, possibly even in the current budgetary range using resource re-allocation.

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 has an incremental and average cost–effectiveness of I$ 404/DALY averted. The next inflection (increased tax and scaled-up enforcement) has an incremental cost–effectiveness of I$ 991 and

Fig. 3. Expansion path of cost–effectiveness in Eur-B countries

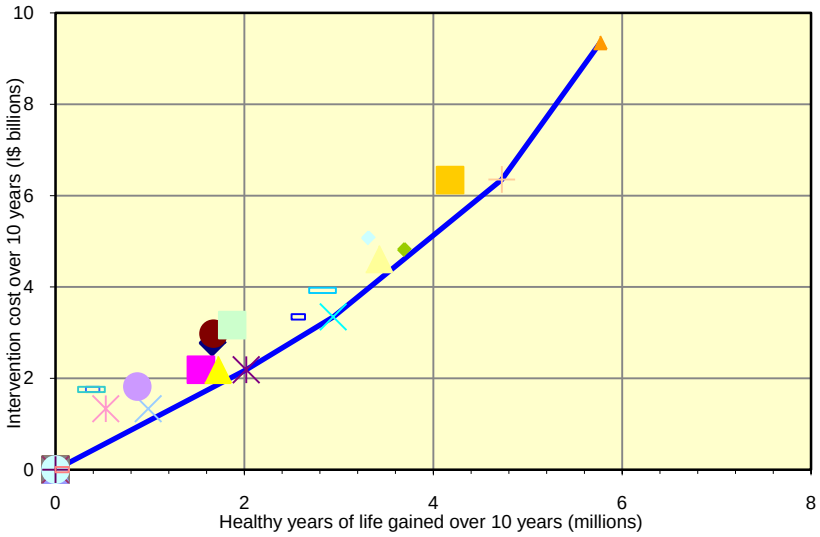
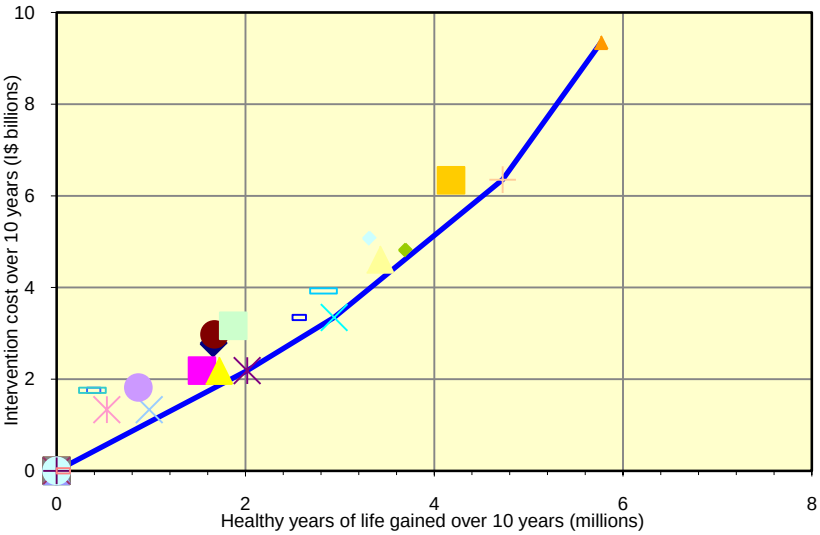


Fig. 4. Expansion path of cost–effectiveness in Eur-C countries



an average cost–effectiveness of I$ 647. The third inflection (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.

Avoidable-burden analyses

Recently initiatives have been started to undertake avoidable-burden studies, which estimate the existing health or economic burden due to alcohol that could be avoided through strengthened alcohol policy measures. In England, for example, research has been funded to extend a cost–effectiveness analysis to model the impact of specified policy changes on outcomes beyond just health (Purshouse et al., 2009). The model estimates suggest that a 10% increase in the price of alcoholic beverages would reduce alcohol consumption by 4.4%, an average reduction of 5.5 g alcohol per week, with a significantly greater reduction of 25 g per week for heavy drinkers (defined as men who drink more than 400 g alcohol per week and women who drink more than

280 g/week) than the 4 g/week reduction for moderate drinkers (men who drink up to 168 g alcohol per week and women who drink up to 112 g/week). The research estimated that in England (population 51 million), the annual number of deaths would fall by 232 within the first year and 1681 after 10 years. In addition, hospital admissions would decline by an estimated 10 100 in the initial year, reaching full effect after 10 years with 50 800 admissions avoided annually. The study also predicted that a 10% price increase would reduce the number of criminal offences by 65 000 over the course of a decade, with a savings in the direct costs of crime of £70 million (€80 million at the August 2009 exchange rate) per year. In the workplace, it was anticipated that the same intervention would mean 12 800 fewer unemployed people and 310 000 fewer sick days over 10 years. The estimated total value of this price increase is £7.8 billion (€8.9 billion) (when discounted[2]) over the 10 years modelled. The breakdown of the estimated value for the first year include National Health Service savings (£43 million, or €49 million), the value of quality-adjusted life years (QALYs)[1] gained through better health (£119 million/€136 million)), crime costs saved (£70 million/€80 million), the value of QALYs gained through crime reduction (£98 million/€112 million) and employment-related benefits (£330 million/€376 million). The direct cost to consumers would vary significantly among different types of drinker. The overall figure is £33 (€38) per drinker per annum, ranging from an estimated £116 (€132) annually for heavy drinkers to £17 (€19) for moderate drinkers.

Conclusions for policy and practice

There is now a substantial evidence base of systematic reviews and meta-analyses which show that policies that regulate the environment in which alcohol is marketed (particularly its price and availability) are effective in reducing alcohol-related harm. Enforced legislative measures to reduce drinking and driving and interventions directed individually towards at-risk drinkers are also effective. On the other hand, school-based education is found not to reduce alcohol-related harm, although public information and educational programmes have a role in providing information and in increasing attention to and acceptance of alcohol on the political and public agendas. Making alcohol more expensive and less available are highly cost–effective strategies to reduce harm. Banning alcohol advertising, introducing drink–driving countermeasures and directing individual interventions to at-risk drinkers are also cost–effective. In countries with relatively high levels of unrecorded production and consumption, an increase in the proportion of alcohol that is taxed may be a more effective pricing policy than a simple increase in tax.

Given that the benefits substantially exceed the costs, any remaining concerns over the distribution of benefits and costs must be concerns about equity and fairness, rather than efficiency and effectiveness. Here, it should be noted that gram for gram of alcohol consumed, individuals who are socially disadvantaged, whether by income, education or social capital, experience more harm from alcohol than those who are less socially disadvantaged. A price decrease in Finland in the early 2000s led to a 10% increase in per capita consumption and an increase in overall alcohol-related mortality of 16% among men and 31% among women (Herttua, Mäkelä & Martikainen, 2008). Among people aged 30–59 years, the increased overall alcohol-related mortality in absolute terms 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. Thus, a reciprocal relationship might be expected, with greater decreases in alcohol-related mortality among the disadvantaged following an increase in tax.

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[2] In the analysis, costs were discounted at 3.5% annually according to standard English Department of Health practice, which means that future values are worth less than current values.

[3] QALYs and DALYs are similar measures of disease burden.

Implementing alcohol policy in many EU countries is often a matter of recovering a lost policy tradition that was abandoned during the deregulatory phase of the past three or so decades. A coordinated approach to delivering comprehensive policy would also reveal how well the models presented in this paper behave, and therefore how to improve them.

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