



Australian Government
Department of Health and Ageing

The avoidable costs of alcohol
abuse in Australia and the potential
benefits of effective policies to
reduce the social costs of alcohol

*National
Drug Strategy*

The avoidable costs of alcohol abuse in Australia and the potential benefits of effective policies to reduce the social costs of alcohol

by

David J. Collins
Macquarie University

and

Helen M. Lapsley
University of Queensland
and
University of New South Wales

The avoidable costs of alcohol abuse in Australia and the potential benefits of effective policies to reduce the social costs of alcohol

ISBN: 1-74186-691-X

Online ISBN: 1-74186-692-8

Publications Number: P3-4246

Copyright Statements:

Paper-based publications

© Commonwealth of Australia 2008

This work is copyright. Apart from any use as permitted under the *Copyright Act 1968*, no part may be reproduced by any process without prior written permission from the Commonwealth. Requests and inquiries concerning reproduction and rights should be addressed to the Commonwealth Copyright Administration, Attorney-General's Department, Robert Garran Offices, National Circuit, Barton ACT 2600 or posted at <http://www.ag.gov.au/cca>

Internet sites

© Commonwealth of Australia 2008

This work is copyright. You may download, display, print and reproduce this material in unaltered form only (retaining this notice) for your personal, non-commercial use or use within your organisation. Apart from any use as permitted under the *Copyright Act 1968*, all other rights are reserved. Requests and inquiries concerning reproduction and rights should be addressed to Commonwealth Copyright Administration, Attorney-General's Department, Robert Garran Offices, National Circuit, Barton ACT 2600 or posted at <http://www.ag.gov.au/cca>

Table of Contents

List of tables	vi
List of abbreviations	viii
Executive summary	ix
Acknowledgments	xiii
1. Introduction	1
2. A brief summary of methodological issues	3
3. The aggregate social costs of alcohol	5
4. Estimating the Feasible Minimum in practice	7
4.1 The Arcadian Normal	7
4.2 Exposure-based comparators	9
4.3 The effectiveness of interventions	11
4.3.1 The basis for the choice of effective policies	11
4.3.2 Difficulties in aggregating the economic benefits of individual policies	13
4.3.3 Retaining the protective health benefits of moderate alcohol consumption	13
5. The intervention choices	14
5.1 Alcohol taxation	14
5.1.1 Potential reductions in social costs from the use of alcohol taxation	17
5.2 Bans on alcohol advertising	18
5.2.1 Potential reductions in social costs resulting from advertising bans	19
5.2.2 The impact of alcohol advertising bans on the overall social costs of alcohol abuse	20
5.2.3 The estimated impact of alcohol advertising bans on the social costs of alcohol-attributable road accidents	21
5.2.4 Maintaining advertising bans	22

5.3	Measures to reduce drink driving	22
5.3.1	Greater enforcement of random breath testing	23
5.3.2	Reducing the blood alcohol concentration level	24
5.3.3	Conclusions from the research evidence	24
5.3.4	Potential reductions in social costs from anti-drink-driving policies	25
5.4	Brief interventions for reducing hazardous alcohol consumption	26
5.4.1	The impact of brief interventions on the overall social costs of alcohol abuse	28
6.	Effective interventions whose benefits cannot be evaluated	30
6.1	Control of drinking environments	30
6.2	Alcohol ignition locks	31
6.3	Guidelines for low-risk drinking	31
6.4	Standard drinks labelling and health warnings on drinks containers	32
6.5	Other interventions	32
7.	Summary of results	33
8.	Conclusions	36
8.1	Policy implications	36
8.2	Methodological implications	37
9.	Research recommendations	39
9.1	Policy effectiveness	39
9.2	Alcohol demand elasticities	39
9.3	Time periods over which policy benefits accrue	39
9.4	The macroeconomic impact of alcohol interventions	39
9.5	Revision of the avoidable cost guidelines	39
Appendix A.	Methodological issues	40
A1.	The nature of avoidable costs	40
A2.	Reasons for estimating avoidable costs	41
	Priority for substance abuse expenditures	42
	Appropriate targeting of specific problems	42
	Identification of information gaps and research needs	43
	Provision of baseline measures to determine the efficiency of drug policies and programs	43

A3. Approaches to the estimation of avoidable costs	43
The distributional approach	45
The Arcadian Normal	45
Exposure-based comparators	46
Evidence on the effectiveness of interventions	46
Which method to adopt?	47
A4. Time lags associated with policies to reduce substance abuse	47
References	49

List of tables

Table 1.	Tangible social costs of alcohol abuse, 2004/05	5
Table 2.	Intangible social costs of alcohol abuse, 2004/05	6
Table 3.	Total social costs of alcohol abuse, 2004/05	6
Table 4.	Alcohol-attributable deaths, Australia, 2004/05, and estimated potential reductions in deaths	8
Table 5.	Alcohol consumption, litres per population aged 15 and above, selected OECD member countries	10
Table 6.	Criteria used for effectiveness ratings in Anderson and Baumberg	12
Table 7.	Effectiveness ratings for alcohol pricing and taxation	14
Table 8.	Potential reductions in social costs resulting from increased alcohol taxation (2004/05 prices)	17
Table 9.	Effectiveness ratings for advertising controls	19
Table 10.	Assumed percentage reductions if countries with no advertising bans implement partial bans	20
Table 11.	Assumed percentage reductions if countries with partial advertising bans implement full bans	20
Table 12.	Implied percentage reductions if countries with no advertising bans implement full bans	20
Table 13.	Reduction in total social costs of alcohol abuse resulting from a move from no advertising bans to a full ban (2004/05 prices), Australia	20
Table 14.	Reduction in total social costs resulting from a move from no advertising bans to partial bans (2004/05 prices), Australia	21
Table 15.	Reduction in total social costs resulting from a move from partial advertising bans to a full ban (2004/05 prices), Australia	21
Table 16.	Reduction in road accident costs resulting from a move from no advertising bans to a full ban (2004/05 prices), Australia	21
Table 17.	Reduction in road accident costs resulting from a move from no advertising bans to partial bans (2004/05 prices), Australia	21
Table 18.	Reduction in road accident costs resulting from a move from partial advertising bans to a full ban (2004/05 prices), Australia	22
Table 19.	Effectiveness ratings for drink driving countermeasures	24
Table 20.	Reduction in social costs resulting from increased RBT enforcement (2004/05 prices)	25
Table 21.	Reduction in social costs resulting from lowering BAC level to 0.02 (2004/05 prices)	25
Table 22.	Reduction in total social costs resulting from anti-drink-driving initiatives (2004/05 prices)	25

Table 23. Reduction in total social costs resulting from anti-drink-driving initiatives (2004/05 prices), tangible and intangible	26
Table 24. Average and marginal costs of three implementation strategies for the <i>Drink-less</i> program (1996 prices)	27
Table 25. Number of lives potentially saved by brief interventions	28
Table 26. Estimated reduction in social costs resulting from the implementation of a comprehensive program of brief interventions (2004/05 prices)	29
Table 27. Potential percentage reductions in per capita alcohol consumption and alcohol-attributable mortality	33
Table 28. Potential benefits of higher alcohol taxation in terms of reductions in social costs (expressed in 2004/05 prices), based on performance in Norway, United States and Italy	33
Table 29. Potential benefits of policy interventions in terms of reductions in social costs (expressed in 2004/05 prices)	34
Table 30. Substance abuse cost estimates and their policy uses	40

List of abbreviations

BAC	blood alcohol concentration
BMA	British Medical Association
EU	European Union
GP	general practitioner
GST	Goods and Services Tax
n.e.i.	not elsewhere included
NHMRC	National Health and Medical Research Council
OECD	Organisation for Economic Co-operation and Development
RBT	random breath testing
SMR	age-standardised mortality rate
WET	Wine Equalisation Tax
WHO	World Health Organization
YLL	years of life lost

Executive summary

Alcohol abuse in Australia is a serious problem whose social costs in 2004/05 have been estimated to be over \$15 billion. The present study estimates the extent to which these costs could be reduced by the implementation of appropriate public policy interventions. It indicates that it should be possible, over a period of time, to reduce these costs by approximately half.

The study arises from the participation of the authors as the lead authors in the development of *International Guidelines for the Estimation of the Avoidable Costs of Substance Abuse*, published by Health Canada. These guidelines represent the first major attempt to examine in detail the issues involved in estimating the avoidable costs of substance abuse—that is, those costs that would potentially be able to be eliminated or reduced if appropriate public policies were adopted.

The Health Canada avoidable cost guidelines identify four possible approaches to the estimation of avoidable costs. For the purposes of the present study it was decided to adopt two of these, the ‘Arcadian Normal’ and ‘exposure-based comparators’ approaches, to estimate the overall proportion of the social costs of alcohol which are potentially avoidable. However, neither of these approaches provide specific information on the interventions which would need to be implemented to achieve these cost reductions. Accordingly, the preferred approach in this study relates to the implementation of alcohol interventions which the research literature has shown to be effective.

This study identifies the interventions for which strong Australian or international evidence exists as to their potential benefits, and attempts to value these benefits in terms of the reduction in the social costs of alcohol abuse which it would be possible to achieve. In addition, a range of interventions is identified which the research literature has demonstrated to be effective but for which it did not prove possible to value the potential benefits.

The study estimates both the *proportion* of Australian social costs which are potentially avoidable and the *values* of the potential benefits of the identified interventions.

Interventions identified as being effective and whose benefits are quantifiable are:

- higher alcohol taxation, including differential tax rates on forms of alcohol which are particularly subject to abuse;
- partial or complete bans on the advertising and promotion of alcohol;
- measures to reduce drink driving—more intensive enforcement of random breath testing and lowering the legal blood alcohol concentration (BAC) level; and
- brief interventions by primary care physicians to reduce hazardous alcohol consumption.

Further interventions identified as being effective, but whose benefits could not be valued, were:

- control of drinking environments;
- alcohol ignition locks on vehicles driven by convicted drink-driving offenders;
- guidelines for low risk drinking; and
- standard drinks labelling and health warnings on drinks containers.

The table below presents estimates of potential percentage reductions in Australian alcohol consumption and alcohol-attributable mortality. It indicates that up to one-half of the social costs of alcohol abuse is potentially avoidable.

Potential percentage reductions in per capita alcohol consumption and alcohol-attributable mortality

Impact on	Potential percentage reduction
Alcohol consumption per capita	40%
Male alcohol-attributable deaths	47%
Female alcohol-attributable deaths	49%
Total alcohol-attributable deaths	48%

Estimates of the values of the potential benefits of the identified interventions are presented in the following two tables. The first of these provides estimates of the potential benefits of higher alcohol taxes, while the second presents estimates of the benefits of the other identified interventions. This presentation is adopted as a result of a major difference between taxation and the other forms of intervention.

It would in principle be possible by the use of tax instruments to achieve almost any level of reduction in per capita alcohol consumption, as long as tax rates were not so high as to encourage large-scale alcohol smuggling or illicit alcohol production. The performances of other countries having similar economic and social characteristics are, therefore, taken as a guide for target reductions in Australian per capita alcohol consumption. The estimates of social cost reductions are based on the performances of Norway, the comparable country with the lowest per capita alcohol consumption rate, the United States and Italy.

Potential benefits of higher alcohol taxation in terms of reductions in social costs (expressed in 2004/05 prices), based on performance in Norway, United States and Italy

	Based on per capita alcohol consumption in		
	Norway \$m	United States \$m	Italy \$m
Potential reduction in Australian social costs	5,940	2,190	2,810

Estimates of the potential benefits of the other identified interventions appear in the next table. Because, by the nature of these estimates, absolute precision is not possible, minimum and maximum estimates are presented, as well as ‘best’ estimates.

Potential benefits of policy interventions in terms of reductions in social costs (expressed in 2004/05 prices)

Intervention	Best estimate \$m	Minimum \$m	Maximum \$m
Individual-based interventions			
Brief interventions	5,830	3,490	8,160
Population-based interventions			
Greater BAC enforcement	940	780	1,090
Reduced BAC level	280	250	310
Partial advertising and marketing controls—overall impact	2,450	1,680	3,210
Complete advertising and marketing controls—overall impact	3,860	2,500	5,150
Partial advertising and marketing controls—impact on road accidents	310	160	470
Complete advertising and marketing controls—impact on road accidents	960	690	1,210

Interpretation of the results in a study of this type should, for a variety of reasons, be undertaken only with great caution.

The translation of research results into potential reductions in social costs is necessarily imprecise. The determination of the upper and lower boundaries of the estimates must usually be based on judgmental decisions by the researchers. However, even when the lower-bound estimates are chosen, estimates of the potential cost savings for the interventions analysed above are very high in absolute terms.

Although the potential cost savings are expressed in terms of constant price values (that is, in 2004/05 dollars), these savings would usually only accrue over a period of several years. Expression in constant price terms is the most sensible way to present the results given that, in the current state of knowledge, the time profile of the accrual of benefits is not known.

The above summary of results presents the estimated benefits of each of the recommended interventions. It is not possible to aggregate these results to produce an estimate of total savings because there is substantial overlap between the impacts of the various interventions. On the other hand, there is no reason to believe that the benefits of these individual interventions would be completely mutually exclusive. The estimated total benefits of a package of interventions, which were implemented simultaneously, would not be the sum of the benefits which would accrue to each of the interventions individually, but it would certainly exceed the benefits resulting from the highest yielding of these interventions.

In conclusion, the research indicates that it should be possible to reduce the social costs of alcohol by approximately half, if the interventions evaluated here are adopted.

The authors recognise that some of the policies evaluated may not prove to be currently politically feasible or acceptable. However, all of the policies considered have been implemented in one or more comparable jurisdictions and, therefore, have been proved to be politically feasible in some comparable overseas jurisdiction or Australian sub-jurisdiction. The objective of the present study is not to recommend the adoption of a particular set of alcohol policies. It is to consider from an economic perspective a range of policies which have been shown to be effective and to indicate, as far as the data allow, the economic benefits likely to flow from the implementation of these policies. The information is intended to assist in the development of evidence-based strategies for the reduction in the social costs of alcohol abuse in Australia.

Acknowledgments

We would like to express our gratitude to the following people who assisted us in this research project in various ways:

Gavin Andrews
James Codde
Suzanne Mobbs
Peter Sainsbury

We would also like to thank various people who are working, or have worked, in the drugs strategy area of the Commonwealth Department of Health and Ageing and who have helped us in the course of this project:

Emily Davis
George Phillips
Karen Price
Chrysanthe Psychogios
Gunjan Sharma
Patrick Smith

We should particularly like to thank Professor Jürgen Rehm of, *inter alia*, the Canadian Centre for Addiction and Mental Health, for permission to use some of the data developed by his research group in our calculations of the Arcadian Normal.

In our work we have drawn substantially upon the Health Canada avoidable cost guidelines and would like to acknowledge the valuable role of our co-authors of these guidelines:

Serge Brochu
Brain Easton,
Augusto Pérez-Gómez
Jürgen Rehm
Eric Single

We are greatly indebted to all who assisted us. If errors and omissions remain, despite all the information and assistance provided, they are entirely our responsibility.

1. Introduction

Alcohol is a psychoactive substance and its consumption in moderation can lead to feelings of relaxation and euphoria, causing it to be consumed widely in many social scenarios and across the socio-economic spectrum. Alcohol is also an addictive drug, however, and its misuse is associated with a wide range of dose-related adverse consequences that can lead to significant harm to the individual and society.

British Medical Association (2008)

Alcohol has been an integral part of the Australian way of life since the arrival of the First Fleet. The production and consumption of alcoholic products makes a substantial economic contribution to national output, employment, regional development, balance of payments and public budgets. Consumed in moderation, alcohol is a product which is widely enjoyed by the Australian community and, when consumed appropriately, can even have health benefits.

However, it also has a darker side. Its consumption is causally linked to an impressive range of problems, including health issues and lower life expectancy, reduced workplace productivity, accidents, drink driving, violence and other forms of crime. Collins and Lapsley (2008a) estimate that the social costs of alcohol abuse in Australia in 2004/05 were over \$15 billion.

In these circumstances there arises the difficult issue of how to minimise the social costs of alcohol abuse while maintaining, as far as possible, the undoubted benefits of alcohol to Australian society and the Australian economy. The object of the present study is the provision of economic information which will assist in the design of rational and effective public policies towards alcohol.

This research is an extension of the present authors' research project, funded by the Commonwealth Department of Health and Ageing, which estimated the social costs in 2004/05 of the abuse of alcohol, tobacco and illicit drugs (Collins & Lapsley, 2008a). It arises also from the participation of these authors as the lead authors in the development of *International Guidelines for the Estimation of the Avoidable Costs of Substance Abuse* (Collins et al., 2006). These guidelines, developed in a project funded by Health Canada, represent the first major attempt to examine in detail the issues involved in estimating the *avoidable* costs of substance abuse—that is, those costs that would potentially be able to be eliminated or reduced if appropriate public policies were adopted.

The present project, which is funded by the Commonwealth Department of Health and Ageing, represents the first attempt in Australia to apply these guidelines, in this case to estimate the avoidable social costs of alcohol abuse. It represents an extension of the earlier project which estimated the *aggregate* costs of substance abuse in Australia and it uses those aggregate estimates as the basis for the avoidable cost estimates presented here.

This is a new area of economic research and the Health Canada avoidable cost guidelines were developed in an attempt to stimulate research, rather than being based upon experience gained from prior research in the area. Much of the more detailed methodological background is explained in Appendix A, with only a brief introduction being provided in the main body of the report. The main report concentrates on specific issues involved in estimating the avoidable costs of alcohol abuse in the Australian context.

The structure of the rest of this report is as follows:

- Section 2 presents a brief summary of the methodological issues involved in estimating avoidable costs.
- Section 3 presents a brief summary of the aggregate costs of alcohol abuse in Australia in 2004/05, estimates which form the necessary basis for the calculation of avoidable costs.
- Section 4 examines practical issues involved in estimating avoidable costs in Australia.
- Section 5 reviews the intervention choices to reduce the costs of alcohol abuse which are quantifiable with currently available data.
- Section 6 details potential policy interventions indicated by the research evidence to be effective but whose benefits cannot, in the current state of research knowledge, be quantified.
- Section 7 summarises the research results presented in this report.
- Section 8 draws conclusions from the research results.
- Section 9 provides recommendations for future research.

The present study is essentially economic in nature, although it is informed and greatly strengthened by reference to research in other disciplines. There exists a great deal of published international research on the effectiveness of various interventions designed to counter alcohol abuse. There is, however, little information in the literature concerning the overall potential economic benefits of such interventions.

The results of the study indicate that it should be possible to reduce the social costs of alcohol by approximately half, if the interventions evaluated here are adopted. However, it should be stressed that it is not the intention of the report's authors to provide specific policy recommendations. The evidence presented here is essentially economic in nature and it is recognised that there will almost certainly be issues other than purely economic ones which will be relevant to the determination of public policies directed at reducing alcohol abuse. However, since there is inevitably competition for public resources among competing uses, the types of estimates presented here represent a very important input into the public policy-making process.

2. A brief summary of methodological issues

The aggregate social costs of alcohol abuse to the Australian community in 2004/05 are calculated to have been over \$15 billion (Collins & Lapsley, 2008a). Greater detail of this estimate is provided in Section 3 below. This estimate was produced by comparing the actual Australian situation (in relation to such issues as mortality, morbidity, health costs, workplace productivity, crime levels and road accidents) with a hypothetical alternative situation which would have prevailed had there been no alcohol abuse in the preceding 40 years. This alternative counterfactual situation is purely hypothetical in that it is almost universally recognised that it would be impossible to eliminate all alcohol abuse. Thus, the issue arises as to what proportion of aggregate abuse costs could potentially be avoided over time, if the appropriate public policies were implemented. In other words, the issue is to identify the proportion of the aggregate social costs of alcohol abuse which is avoidable. The minimum achievable level of alcohol abuse is known as the Feasible Minimum.

Single et al. (2003) make the following distinction between avoidable and unavoidable costs of substance abuse:

Unavoidable costs comprise the costs which are currently borne relating to drug abuse in the past, together with the costs incurred by the proportion of the population whose level of drug consumption will continue to involve costs. Avoidable costs are those costs which are amenable to public policy initiatives and behavioural changes.

Avoidable cost estimates indicate the benefits potentially available to the community as a result of directing public resources to the prevention or reduction of substance abuse. They provide valuable economic information on the basis of which a more efficient allocation of productive resources could be achieved.

Collins et al. (2006) identify four broad reasons for estimating avoidable costs (these reasons are discussed in detail in Appendix A):

- to provide an indication of priorities for substance abuse expenditures and programs;
- to assist in the appropriate targeting of specific problems;
- to identify information gaps and research needs;
- to provide baseline measures to determine the efficiency of substance abuse policies and programs.

The Health Canada avoidable cost guidelines address the following broad possible approaches towards the estimation of avoidable costs:

1. the distributional approach, an epidemiological technique which examines alternative counterfactual situations;
2. the Arcadian Normal, which identifies best performance (in terms of abuse-related mortality and morbidity outcomes) in countries which have similar relevant economic and demographic characteristics to the country under study;
3. exposure-based comparators, an approach similar to the Arcadian Normal approach, but based on risk exposure rather than mortality and morbidity outcomes; and
4. evidence on the effectiveness of anti-abuse policy interventions in other comparable jurisdictions.

The choice of which method(s) to adopt is very much a pragmatic one, depending on data availability and information on the effectiveness of relevant public policies. In this study, the first three methods are considered, but the most relevant focus of analysis has proved to be the fourth approach.

3. The aggregate social costs of alcohol

The avoidable cost estimates presented later in this report are based upon the estimated *aggregate* social costs of alcohol abuse which are presented in Collins and Lapsley (2008a). This section provides an overall summary of all estimated alcohol-attributable costs. The derivation and interpretation of the following three tables are explained in considerable detail in Collins and Lapsley (2008a).

Table 1. Tangible social costs of alcohol abuse, 2004/05

		\$m
Labour in the workforce		
	Reduction in workforce	3,210.7
	Absenteeism	367.9
Total		3,578.6
Labour in the household		
	Premature death	1,423.9
	Sickness	146.9
Total		1,570.8
Total paid and unpaid labour costs		5,149.4
Less consumption resources saved		1,611.3
Total net labour costs		3,538.0
Healthcare (net)		
	Medical	540.7
	Hospital	662.2
	Nursing homes	401.2
	Pharmaceuticals	297.6
	Ambulances	74.8
Total healthcare		1,976.7
Road accidents n.e.i.		2,202.0
Crime n.e.i.		
	Police	747.1
	Criminal courts	85.8
	Prisons	141.8
	Property	67.1
	Insurance administration	14.3
	Productivity of prisoners	368.0
Total crime		1,424.0
Resources used in abusive consumption		1,688.8
Total		10,829.5

Note: n.e.i. denotes not elsewhere included.

Source: Table 33, Collins and Lapsley (2008a).

Table 2. Intangible social costs of alcohol abuse, 2004/05

	\$m
Loss of life	4,135.0
Pain and suffering (road accidents)	353.6
Total intangible costs	4,488.7

Source: Table 34, Collins and Lapsley (2008a).

Table 3. Total social costs of alcohol abuse, 2004/05

	\$m
Tangible	10,829.5
Intangible	4,488.7
Total	15,318.2

Source: Table 35, Collins and Lapsley (2008a).

Collins and Lapsley also calculate the tangible social costs which are borne by the community as a result of alcohol and illicit drugs being consumed together, with these costs not being attributable solely to one or other of these drugs. These costs amounted to \$1,057.8m.

The total social costs of alcohol abuse (both tangible and intangible) in 2004/05 are estimated to be, at a minimum, \$15.3 billion, with a further \$1.1 billion attributable to the joint consumption of alcohol and illicit drugs.

4. Estimating the Feasible Minimum in practice

The following approaches to estimating Feasible Minimum levels of alcohol-attributable social costs were explored.

4.1 The Arcadian Normal

The Arcadian Normal approach, which is identified as a possible tool for analysis in the Health Canada avoidable cost guidelines, examines best outcomes in comparable countries as an indication of what potentially could be achieved in Australia.

We have been fortunate in this study to be able to use background research undertaken by Dr Jürgen Rehm and his team for a concurrent alcohol avoidable costs study in Canada (Rehm et al., forthcoming). The Canadian study makes a comparison between rates of mortality and years of life lost (YLL) for various causes of death which epidemiological evidence shows to be causally linked, in part or fully, to the consumption of alcohol. The countries chosen for comparison purposes were within plus or minus ten per cent of the Gross Domestic Product Purchasing Power Parity per capita 2002 of Canada. These countries were Australia, Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Italy, Japan, Netherlands, Sweden and the United Kingdom, together with the United States.

To correct for inter-national differences in population age structures, age-standardised mortality rates (SMR) were calculated. As the Rehm study includes Australia as one of the comparator countries, these data could be used in the Australian calculations.

Alcohol has characteristics not shared to any significant extent by tobacco or illicit drugs. Some of its attributable fractions are negative—that is for some health conditions alcohol, when consumed appropriately, can have protective effects. In relation to these conditions (in the Rehm et al. study, diabetes mellitus, ischaemic heart disease and cerebrovascular disease) alcohol consumption reduces mortality. A second important characteristic not shared by alcohol or illicit drugs is that the primary policy objective for alcohol is to reduce abusive consumption, not consumption *per se*.

For most alcohol-attributable health conditions the Arcadian Normal country is the country which has the minimum SMR. However, this approach does not sensibly translate into lives saved for conditions with negative attributable fractions, since countries having high overall mortality rates (that is, non Arcadian Normal countries) will, as a mathematical reality, usually also have relatively high rates of lives saved. Arcadian Normal countries tend to have relatively low rates of lives saved, simply because similar negative attributable fractions are being applied to lower overall mortality rates.

Thus, the approach adopted here is to use the Arcadian Normal approach in relation only to conditions for which the attributable fractions are positive. Where the fractions are negative, it is assumed that policies can be put in place to preserve the benefits of lives saved.

The Arcadian Normal countries are chosen as those which have the lowest SMRs for individual alcohol-attributable conditions. The difference is calculated between the Australian alcohol-attributable SMR and the relevant Arcadian Normal alcohol-attributable SMR for each of the conditions for which the attributable fraction is positive. In this way, the potential percentage reduction in SMR, and so in alcohol-attributable mortality, can be calculated. The results of this calculation appear in Table 4 below.

Table 4. Alcohol-attributable deaths, Australia, 2004/05, and estimated potential reductions in deaths

	Actual deaths	Potential reduction (number)	Arcadian Normal deaths	Potential reduction (per cent)
Male				
Positive	2,582	1,217	1,364	47.14%
Negative	-1,376	0	-1,376	0.00%
Total	1,206	1,217	-11	
Female				
Positive	913	451	461	49.46%
Negative	-1,061	0	-1,061	0.00%
Total	-149	451	-600	
Persons				
Positive	3,494	1,668	1,826	47.75%
Negative	-2,437	0	-2,437	0.00%
Total	1,057	1,668	-611	

The above table indicates that, according to Arcadian Normal calculations, 47 per cent of male deaths are potentially avoidable, 49 per cent of female deaths, and 48 per cent of total deaths.

The experience gained in these Arcadian Normal calculations has indicated some important conclusions:

1. Arcadian Normal countries for each condition should be determined by reference to the relevant *attributable* mortality rates (after the application of the relevant attributable fractions) rather than to *total* mortality for that condition. Countries with a low total mortality rate will not necessarily be experiencing low alcohol-attributable mortality. For example, countries with low *overall* road traffic accident death rates may have relatively high death rates from *alcohol-attributable* accidents. In fact, a case could be made out that the Arcadian Normal should be determined by the size of the country-specific attributable fraction, rather than the country-specific attributable mortality, though it is

in practice unlikely that such data would be available at the necessary level of country disaggregation.

2. The Arcadian Normal approach is, in the main, relevant only to the morbidity and mortality costs of alcohol abuse. It can be used only very indirectly, and so very imperfectly, for other significant alcohol abuse cost areas such as crime and workplace productivity.
3. If Arcadian Normal calculations are to include the benefits of the protective effects of alcohol, in terms of lives saved, the analysis should concentrate specifically upon countries' performance measured in terms of the size of the country-specific negative attributable fractions, rather than the negative mortality rate.
4. It has not proved possible in practice to translate Arcadian Normal data into potential cost savings, mainly as result of the issues discussed in points 2 and 3 above.
5. Without analyses of the interventions which have enabled the Arcadian Normal countries to achieve that status, the approach does not indicate which policies should be adopted to achieve Arcadian Normal outcomes in Australia.

In summary, the data and research input requirements of the Arcadian Normal approach suggest that it has limited usefulness in the study of the avoidable social costs of alcohol.

4.2 Exposure-based comparators

Exposure can, in principle, be measured by per capita consumption of alcohol or by some measure of hazardous and/or harmful consumption. International data on total alcohol consumption are readily available but this is not the case for measures of abusive consumption. Accordingly, for the purposes of the present study, a comparison is made between Australian per capita alcohol consumption and that measure in a range of Organisation for Economic Co-operation and Development (OECD) member countries deemed to be comparable to Australia. A comparison between Australian per capita consumption and the lowest level of per capita consumption of the comparator countries yields an estimate of the potential reduction in Australian consumption.

Table 5 below provides consumption information for Australia and a range of other OECD countries, for selected years from 1960.

Table 5. Alcohol consumption, litres per population aged 15 and above, selected OECD member countries

	1960	1970	1980	1990	2000	2001	2002	2003
Australia	9.4	11.6	12.9	10.5	9.8	9.6	10.0	9.8
Austria	10.9	13.9	13.8	12.6	11.1	10.8	11.0	11.1
Belgium	8.9	12.3	14.0	12.1	10.3	10.3	10.7	10.7
Canada	7.0	8.8	10.7	7.4	7.7	7.8	7.8	7.9
Denmark	5.5	8.6	11.7	11.7	11.5	11.4	11.2	11.5
Finland	2.7	5.8	7.9	9.5	8.6	9.0	9.2	9.3
France	..	20.4	19.5	16.0	14.2	14.5	14.7	14.0
Germany	7.5	13.4	14.2 ²	13.8	10.5	10.4	10.4	10.2
Ireland	4.9	7.0	9.6	11.2	14.2	14.5	14.3	13.5
Italy	16.6	18.2	13.2	10.9	9.0	8.6	8.6	8.0
Netherlands	3.7	7.7	11.3	9.9	10.1	10.0	9.8	9.7
New Zealand	5.3	9.8	11.8	10.1	8.9	8.8	9.2	8.9
Norway	3.4	4.7	5.3	5.0	5.7	5.5	5.9	6.0
Spain	14.6 ²	16.1	18.4	13.5	11.5	11.5	11.2	11.7
Sweden	4.8	7.2	6.7	6.4	6.2	6.5	6.9	7.0
Switzerland	12.1	14.2	13.5	12.9	11.2	11.1	10.8	10.8
United Kingdom	..	7.1	9.4	9.8	10.4	10.7	11.0	11.2
United States	7.8	9.5	10.5	9.3	8.3	8.3	8.3	8.4
Potential Australian reduction	63.8%	59.5%	58.9%	52.4%	41.8%	42.7%	41.0%	38.8%

Source: OECD.

Note: the superscript 2 indicates that the data refer to two years later.

The country with consistently the lowest level of consumption has been Norway, although in the period 1960 to 2003 per capita alcohol consumption in that country nearly doubled. On the other hand, Australian per capita consumption in 2003 was only slightly higher than in 1960, although there was some fluctuation in the intervening period. If the Norwegian level is taken to be the lowest level of exposure to which Australia could reasonably aspire, the potential percentage reduction in Australian per capita consumption has steadily declined. This percentage is presented in the bottom row of Table 5. It would appear that, in broad terms, there is the potential to reduce Australian per capita consumption by about 40 per cent.

This figure, in itself, gives no indication of how such a reduction could be achieved. However, it does indicate that a study of alcohol control policies in Norway, and in other countries having comparatively low levels of consumption (for example, Sweden and Canada), may well yield policy lessons for Australia.

The implications of such a reduction in exposure for potential reductions in the social costs of alcohol abuse are considered below in the section on alcohol taxation.

4.3 The effectiveness of interventions

4.3.1 The basis for the choice of effective policies

The policy interventions approach to estimating the avoidable costs of alcohol abuse requires the identification of policies which, when implemented in Australia, could produce a reduction in alcohol abuse. The policies identified in this study as being useable in estimating avoidable costs have three characteristics:

1. Convincing research evidence is available in the relevant literature to show that the policies have been, or would be, effective in all or part of Australia or in at least one other comparable country.
2. The resulting reduction in alcohol consumption and/or alcohol abuse is quantified in the research literature.
3. The quantification is in a form which is amenable to translation into a reduction of the Australian alcohol abuse costs, as calculated in Collins and Lapsley (2008a) for the financial year 2004/05.

A number of surveys of the literature reviewing alcohol policy effectiveness have been published in recent years (Loxley et al., 2004; Anderson & Baumberg, 2006; Ritter & Cameron, 2006; British Medical Association, 2008) and these provided the basis for our policy choices. Reference was also made to other survey papers (World Health Organization, 2002; Babor et al., 2003). References specifically dealing with policy cost-effectiveness analysis (Chisholm et al., 2002, Chisholm et al., 2006) were also consulted. Where appropriate, specific papers whose analysis is referred to in the above papers were also considered.

In summarising the conclusions of the research evidence on the effectiveness of specific policies, we have relied upon the most recent comprehensive literature review on the subject. This review (Anderson & Baumberg, 2006) was undertaken by the United Kingdom Institute of Alcohol Studies in a report produced for the European Commission. For each of the policy interventions which they study, they review the literature, provide a brief summary of their conclusions and provide effectiveness ratings based upon the criteria presented in Table 6 below.

Table 6. Criteria used for effectiveness ratings in Anderson and Baumberg

Rating	Effectiveness	Breadth of research support	Cost efficiency
+	Evidence for limited effectiveness	Only one well-designed study of effectiveness has been completed	Relatively high cost to implement and sustain
++	Evidence for moderate effectiveness	From two to four studies of effectiveness have been completed	Moderate cost to implement and sustain
+++	Evidence for high degree of effectiveness	Five or more studies of effectiveness have been completed	Low cost to implement and sustain

Source: Anderson and Baumberg (2006, Table 7.1).

For each of the categories of intervention for which estimates of the benefits are presented below, we provide both a brief summary of the conclusions of the literature and the ratings presented in the Anderson and Baumberg study.

In some cases the research literature demonstrates the effectiveness of individual policies but does not adequately quantify their benefits or does not quantify these benefits in a form which is amenable to translation into a reduction in abuse costs (that is, does not satisfy characteristic 3 above). The present study draws attention to these types of policies even when it is not possible to undertake estimation of their potential economic benefits.

The present authors recognise that some of the policies costed may not prove to be currently politically feasible or acceptable. However, all of the policies considered have been implemented in one or more comparable jurisdictions and, therefore, have been proved to be politically feasible in some comparable overseas jurisdiction or Australian sub-jurisdiction. Furthermore, what is perceived to be a 'political reality' at one period of time may well change significantly at a later time. Nowhere is this fact better illustrated than in the area of Australian tobacco policy where initiatives thought in earlier years to be politically impossible not only have now been successfully implemented but also have gained wide public acceptance.

The objective of the present study is not to recommend the adoption of a particular set of alcohol policies. It is to consider from an economic perspective a range of policies which have been shown to be effective and to indicate, as far as the data allow, the economic benefits likely to flow from the implementation of these policies. The information is intended to assist in the development of evidence-based strategies for the reduction in the social costs of alcohol abuse in Australia.

In choosing intervention policies and estimating their benefits, account should be taken of existing policies. It may well be that a particular Australian intervention policy is already close to world's best practice (for example, driver blood alcohol testing) and so the potential benefits of the adoption of such proven-effective interventions are lower than they would be in other countries. On the other hand, expansion or refinement of policies already implemented (for example, RBT or alcohol excise taxation) may be able to be implemented at very low marginal (that is, additional) cost, and so may be very cost-effective. It is important also to acknowledge that being already at world's best practice does not necessarily signify that no policy improvement is possible.

4.3.2 Difficulties in aggregating the economic benefits of individual policies

In presenting what might be considered to be a ‘menu’ of effective policies, with estimates of the value of benefits available from each policy, there is a difficulty involved in aggregating the effects of these individual policies to yield an estimate of the aggregate benefits. The problem here is that different policies may have an impact on the same problem. Techniques such as regression analysis could in the future be employed to address some of these issues.

For example, later in this report we examine two distinct policies designed to reduce hazardous and harmful alcohol consumption. The first is to increase the level of taxation on alcohol. The second is to ban alcohol advertising and other forms of alcohol promotion. Research studies of the impact of specific policies necessarily imply the standard economic assumption of *ceteris paribus* (all other things being equal)—that other relevant policies remain unchanged. This is necessary in order to identify the individual impact of the policy under study. Once the estimated benefits of different policies are aggregated, the *ceteris paribus* assumption no longer holds. These two types of interventions can to some extent be considered to be substitutes, with the result that aggregation of the estimated cost impacts of the individual policies would lead to overestimation, if the interventions were implemented at the same time. It will in general be difficult, in the aggregation process, to adjust for policy interactions. It would be problematic, for example, in analysing policies to reduce alcohol-attributable violence to adjust for the overlapping effects of reduced opening hours for licensed premises and an increase in alcohol taxation.

4.3.3 Retaining the protective health benefits of moderate alcohol consumption

It is generally agreed in the literature that the consumption of alcohol in moderation can provide protective effects against certain medical conditions, although in certain risk categories any level of alcohol consumption is hazardous or harmful. Recent studies (see, for example, Begg et al., 2007) suggest that the protective effects are less than previously estimated. In addition, new draft Australian guidelines for non-hazardous alcohol consumption (National Health and Medical Research Council, 2007) recommend significantly lower levels of consumption than did earlier guidelines. Nevertheless, there is good evidence for the existence of protective effects of moderate alcohol consumption.

It may well be possible to target alcohol interventions in a manner which reduces hazardous and harmful consumption while retaining (and perhaps even augmenting) the protective effects. This would be ideal, and specifically targeted interventions such as more intensive enforcement of random breath testing (RBT) will very probably achieve this objective. However, general, or population, interventions, such as excise tax increases, run the risk of reducing the benefits, as well as the costs, of alcohol consumption.

5. The intervention choices

5.1 Alcohol taxation

Strong evidence exists, both in Australia and internationally, that higher alcohol taxation, by raising alcohol prices, can be very effective in reducing alcohol consumption.

There has been no recent research on the responsiveness of Australian alcohol demand to price changes (which economists call the price elasticity of demand) since Clements and Selvanathan (1991) and Clements et al. (1997). There has, however, been a wealth of international research on elasticities in other countries. For comprehensive surveys of the relevant literature see Anderson and Baumberg (2006) and Loxley et al. (2004). The many studies of alcohol demand elasticities indicate variation from country to country and often over time, but universally indicate that higher prices will lead to lower demand.

Anderson and Baumberg (2006, p. 264) summarise the results of the international research as follows:

An increase in the price of alcohol reduces alcohol consumption, hazardous and harmful alcohol consumption, alcohol dependence, the harm done by alcohol, and the harm done by alcohol to others than the drinker. The exact size of the effect will vary from country to country and from beverage to beverage. There is strong evidence for the effectiveness of alcohol taxes in targeting young people and the harms done by alcohol.

Table 7 below presents Anderson and Baumberg's summary of the strength of the research evidence on alcohol taxation.

Table 7. Effectiveness ratings for alcohol pricing and taxation

	Effectiveness	Breadth of research support	Cost efficiency
Taxes	+++	+++	+++

Source: Anderson and Baumberg (2006, Table 7.7).

For the definitions of the ratings see Table 6 above.

In summary, there is strong research evidence that the Australian Government has, in its tax instruments, a very potent tool to influence alcohol prices, and therefore alcohol demand.

There are four types of tax instruments which are currently applied to alcohol in Australia:

- Goods and Services Tax (GST);
- customs duties;
- excise duties; and
- Wine Equalisation Tax (WET).

GST is imposed across-the-board on nearly all goods and services at a flat rate of 10 per cent. As a result of the federal–state inter-governmental agreement under which the GST was implemented in 2000, it is not, in practice, available as an instrument to change alcohol (or indeed any other) prices (see Collins & Warren, 2007).

Customs duties, by their nature, apply only to imported alcohol and so represent a narrowly based and poorly targeted instrument. The case for their use in any sophisticated regime of alcohol taxation is weak. Far better taxation alternatives exist.

Excise duties are levied per litre of alcohol content, with the rates varying according to the following categories:

- Draught beer
 - low strength
 - mid strength
 - high strength
- Other beer
 - low strength
 - mid strength
 - high strength
- Non-commercial beer
 - low strength
 - mid and high strength
- Other beverages not exceeding 10 per cent of alcohol content
- Potable spirits
 - brandy
 - other spirits, exceeding 10 per cent alcohol content.

The above details are provided in order to illustrate the fact that alcohol excise taxes are capable of being designed explicitly to target the types of alcohol known to be the subject of abuse (for example, high strength beer and alcopops) and to discriminate in favour of types of which abuse is known to be relatively low (for example, low strength beer).

The WET is levied at a rate of 29 per cent of wholesale price (that is, according to value rather than to alcohol content). A rebate is payable on the first \$500,000 in WET paid annually by one producer or producer group.

These latter two tax instruments provide scope for sophisticated targeting of tax increases on hazardous and harmful alcohol consumption. There is little doubt that a combination of carefully designed excise taxes and the WET could be used effectively to target hazardous and harmful alcohol consumption, without entailing a significant sacrifice of the protective benefits of moderate consumption. That the WET is an *ad valorem* tax (that is, based on value) rather than a *specific* tax (based on some physical characteristic such as alcohol content) means that this tax is less easily targeted on abusive consumption. However, there

appears to be no reason why wine could not also be subject to an excise tax component, with the possibility of some simultaneous reduction in the WET rate.

In an ideal situation of competitive neutrality, the case for uniform rates of tax across all forms of alcohol would be strong. However, such a neutral situation does not exist, with some forms of alcohol imposing much higher rates of social costs (that is, negative externalities) than others. In this situation, the case for a non-neutral alcohol tax regime, designed to discriminate against forms of alcohol consumption known to impose substantial social costs, is strong. By the same logic, the case for discriminating in favour of forms of consumption which impose comparatively low social costs is also strong.

For example, studies show that young people are more influenced by the price of alcohol so that increasing the tax rate on alcoholic drinks which are specifically targeted at the youth market (for example, alcopops) is likely to be effective. According to the British Medical Association (2008) study, 45 per cent of all individuals who consumed alcopops frequently were not aware of the number of units of alcohol in their drinks. There would appear to be strong justification for the April 2008 increase in the Australian tax on pre-mixed drinks (alcopops) by 70 per cent.

Reform of the tax system to achieve these objectives would require relatively recent research on the demand elasticities for the various types of alcoholic beverages (for example, those categories already targeted in excise taxation). There appears to be little or no recent Australian research in this area. It is not, however, necessary to have recent estimates of demand elasticities to be able to assert that an alcohol tax regime could be designed to achieve almost any reasonable reduction in the level, and change in the structure, of alcohol demand.

Such a sophisticated system of alcohol taxation would have both specific and general effects. It could target specific forms of alcohol abuse by raising the price of forms of alcohol subject to hazardous or harmful consumption. It would also have the effect of producing a decline in the overall level of alcohol consumption. Thus the approach here would be to determine the target rate of decline of alcohol consumption and then to design a tax system to achieve that target. For the purposes of the present paper, it will be sufficient to determine the target.

In the current economic environment, a proposal to increase alcohol taxation may well meet the objection that it is likely to add to inflationary pressures. This would be a short-term objection, perhaps even a short-sighted one, which could be countered by a variety of arguments.

- Since the tax is a tax on a final consumption good rather than on an input into the production of other goods and services, the inflationary effect is likely to be relatively short-term. There would be a one-off rise in alcohol price levels but a continuing higher inflation rate extending over more than one quarter would be unlikely. An alcohol tax increase would result in a rise in the 'headline' rate of inflation rather than in the longer-term underlying rate.

- The resulting reduced level of alcohol abuse, and associated social costs, would be likely to lead to increased efficiency in the Australian economy. For example, by reducing the effects of alcohol abuse on workplace productivity, it would assist in reducing current labour shortages.
- It would reduce the public expenditures of both federal and state governments, particularly in the areas of health services and crime.
- The increased alcohol tax revenue would, by offering the ability to increase federal government surpluses, provide the potential to reduce inflationary pressures.

There remains the issue of determining the target level of reduction in alcohol consumption and/or abuse. It would be possible by the use of tax instruments to achieve almost any level of reduction in per capita alcohol consumption, as long as tax rates were not so high as to encourage large-scale alcohol smuggling or illicit alcohol production. It is the view of the present authors that the performance of other countries having similar economic and social characteristics should be taken as a guide for target reductions in per capita alcohol consumption. Thus, we have selected estimates of social cost reductions based on the performances of Norway, the comparable country with the lowest per capita rate, together with United States and Italy. As the United States and Italy are both significant wine producers, it may be that one of these is the more appropriate comparator.

It is assumed that a given percentage reduction in per capita alcohol consumption would lead to a similar percentage reduction in the social costs of alcohol abuse. The percentage reductions applied in the estimates are derived from Table 5 above and shown in Table 8.

5.1.1 Potential reductions in social costs from the use of alcohol taxation

Estimates of the reductions in the social costs of alcohol abuse which could be achieved over time through appropriately increased levels of alcohol taxation are presented in the following table.

Table 8. Potential reductions in social costs resulting from increased alcohol taxation (2004/05 prices)

	Norway	United States	Italy
Reduction in other countries' per capita alcohol consumption	38.8 per cent	14.3 per cent	18.4 per cent
Reduction in Australian social costs	\$m	\$m	\$m
Total tangible costs	4,200	1,550	1,990
Total intangible costs	1,740	640	820
Reduction in total Australian social costs	5,940	2,190	2,810

On the basis of Norwegian performance in 2003 (measured by per capita alcohol consumption), it is estimated that it would be possible eventually to reduce total Australian alcohol abuse costs (measured at 2004/05 prices) by \$5.9 billion. United States performance would indicate a potential reduction of \$2.2 billion and Italian performance \$2.8 billion. Since it cannot be assumed that the individual components of these costs would all be reduced by the same percentages, we do not present here a disaggregation of these costs into their individual categories.

5.2 Bans on alcohol advertising

The appropriateness of bans on alcohol advertising has been the subject of public and political debate for many years, both internationally and within Australia. Indeed, in a recent development in February 2008 the Australian Senate set up an inquiry into aspects of this issue. The fundamental question has been whether alcohol advertising increases total alcohol consumption and/or abuse, or whether it simply affects brand choice, leaving alcohol consumption unchanged. Generally, public health advocates have argued that advertising increases total alcohol consumption and abuse. The industry's position has consistently been that advertising leaves total consumption unchanged, merely affecting the market shares of the various brands.

In terms of the design of public policy towards alcohol promotion, this is clearly a very important issue. Accordingly, there has been a considerable amount of international research on the impact of advertising and advertising bans on alcohol consumption. This is a research area which is fraught with methodological difficulties and data deficiencies, but over time the studies have tended to become more sophisticated.

Earlier studies, which largely concentrated on studying the relationship between alcohol advertising and consumption in individual jurisdictions, tend to suggest that the relationship is weak. Later studies, which tend to use international data across a range of jurisdictions, indicate that a positive relationship exists between advertising and consumption—that is, alcohol advertising leads to higher alcohol consumption.

Saffer and Dave (2002, p. 1326) analyse in considerable detail the reasons for this apparent conflict. They state:

Farley and Lehmann (1994) find that cross-national differences in the response to advertising are relatively small. The use of international data is an effective method for measuring the effect of a ban on alcohol advertising. Data from one country are not as useful since changes in alcohol advertising bans within countries are rare and the imposition of a ban may require an extended period for consumption to adjust. There is, however, considerable variation in the use of advertising bans across countries.

The most consistent recent body of published research work in this area has been undertaken by Saffer. Anderson and Baumberg (2006, p. 281) summarise the results of his work as follows:

Later studies have suggested significant effects of alcohol advertising on alcohol-related problems ... Countries with partial restrictions had 16 per cent lower alcohol consumption rates and ten per cent lower motor vehicle fatality rates than did countries with no restrictions, and countries with complete bans on television advertisements had 11 per cent lower consumption rates and 23 per cent lower motor vehicle fatalities than did countries with partial restrictions ... After accounting for regional price differences and population variables such as income and religion, increases in alcohol advertising were found to be significantly related to increases in total and night-time vehicle fatalities across US states ... It was estimated that a total ban on alcohol advertising might reduce motor vehicle fatalities by as much as 5,000 to 10,000 lives per year.

Anderson and Bamberg (2006, p. 287) summarise the results of the relevant international research as follows:

In conclusion, restricting the volume of commercial communications of alcohol products is likely to reduce harm.

Table 9 below presents the summary by Anderson and Baumberg (2006, Table 7.11) of the strength of the research evidence on alcohol taxation.

Table 9. Effectiveness ratings for advertising controls

	Effectiveness	Breadth of research support	Cost efficiency
Reducing the volume of advertising	+ / ++	++	+++

For the definitions of the ratings see Table 6 above.

5.2.1 Potential reductions in social costs resulting from advertising bans

The evidence presented above can be summarised as follows:

- If countries with no alcohol advertising restrictions implemented partial bans, they could reduce alcohol consumption by 16 per cent and motor vehicle fatality rates by ten per cent.
- If countries with partial advertising restrictions implemented full bans, they could reduce alcohol consumption by a *further* 11 per cent and motor vehicle fatality rates by a *further* 23 per cent.

The following two tables summarise these estimates and present the ranges within which it is assumed the 'true' values lie.

Table 10. Assumed percentage reductions if countries with no advertising bans implement partial bans

Reduction in	Best estimate	Minimum	Maximum
Alcohol consumption	16.0%	11.0%	21.0%
Motor vehicle fatality rate	10.0%	5.0%	15.0%

Table 11. Assumed percentage reductions if countries with partial advertising bans implement full bans

Reduction in	Best estimate	Minimum	Maximum
Alcohol consumption	11.0%	6.0%	16.0%
Motor vehicle fatality rate	23.0%	18.0%	28.0%

Table 12 presents the percentage reductions implied from the previous two tables if countries with no bans implemented full bans.

Table 12. Implied percentage reductions if countries with no advertising bans implement full bans

Reduction in	Best estimate	Minimum	Maximum
Alcohol consumption	25.2%	16.3%	33.6%
Motor vehicle fatality rate	30.7%	22.1%	38.8%

It is the view of the present authors that, for the purposes of this study, it can be assumed that Australia is a jurisdiction with effectively no advertising bans. However, for completeness of information, estimates are also provided for a move from no bans to partial bans and from partial bans to a full ban.

5.2.2 The impact of alcohol advertising bans on the overall social costs of alcohol abuse

The next three tables present estimates of the impact upon the aggregate social costs of alcohol abuse in Australia of moves to full or partial bans on alcohol advertising.

Table 13. Reduction in total social costs of alcohol abuse resulting from a move from no advertising bans to a full ban (2004/05 prices), Australia

	Best estimate \$m	Minimum \$m	Maximum \$m
Tangible costs	2,730	1,770	3,640
Intangible costs	1,130	730	1,510
Total costs	3,860	2500	5,150

Table 14. Reduction in total social costs resulting from a move from no advertising bans to partial bans (2004/05 prices), Australia

	Best estimate \$m	Minimum \$m	Maximum \$m
Tangible costs	1,730	1,190	2,270
Intangible costs	720	490	940
Total costs	2,450	1,680	3,210

Table 15. Reduction in total social costs resulting from a move from partial advertising bans to a full ban (2004/05 prices), Australia

	Best estimate \$m	Minimum \$m	Maximum \$m
Tangible costs	1,190	650	1,730
Intangible costs	490	270	720
Total costs	1,680	920	2,450

5.2.3 The estimated impact of alcohol advertising bans on the social costs of alcohol-attributable road accidents

The following three tables present estimates of the impact upon the social costs of road accidents in Australia of moves to full or partial bans on alcohol advertising.

Table 16. Reduction in road accident costs resulting from a move from no advertising bans to a full ban (2004/05 prices), Australia

	Best estimate \$m	Minimum \$m	Maximum \$m
Tangible costs	680	490	850
Intangible costs	280	200	360
Total costs	960	690	1,210

Table 17. Reduction in road accident costs resulting from a move from no advertising bans to partial bans (2004/05 prices), Australia

	Best estimate \$m	Minimum \$m	Maximum \$m
Tangible costs	220	110	330
Intangible costs	90	50	140
Total costs	310	160	470

Table 18. Reduction in road accident costs resulting from a move from partial advertising bans to a full ban (2004/05 prices), Australia

	Best estimate \$m	Minimum \$m	Maximum \$m
Tangible costs	510	400	610
Intangible costs	210	160	260
Total costs	720	560	870

5.2.4 Maintaining advertising bans

Saffer and Dave (2002, p. 1,333) produce a further conclusion which has potential implications for Australian public policy towards alcohol advertising.

There is also evidence that alcohol consumption has a positive effect on total advertising bans. That is, an increase in alcohol consumption can increase the probability of legislation of an advertising ban on all forms of alcohol in a particular media. However, alcohol consumption has been trending downward in a number of countries since around 1988. These decreases may reflect changes in exogenous factors such as increases in the demand for health. This downward trend in alcohol consumption could result in a decrease in the number of advertising bans. Canada, Denmark, New Zealand and Finland recently decreased the total number of advertising bans in effect. These decreases may be examples of the difficulty in maintaining alcohol advertising restrictions when alcohol consumption is on a downward trend. Alcohol consumption in these countries may increase, or decrease at a slower rate, than would have occurred had the advertising bans remained in place.

The Saffer and Dave research indicates that, if bans on alcohol advertising lead to a reduction in alcohol consumption, there is likely to be pressure for relaxation of these bans. It is the view of the present authors that, should this occur, such pressure should be resisted. If evidence exists that bans are effective in reducing alcohol consumption, this evidence should constitute strong justification for maintaining, rather than relaxing, these controls.

5.3 Measures to reduce drink driving

The current Australian drink-driving policy environment consists of a blood alcohol concentration (BAC) limit of 0.05, backed by an enforcement regime of random breath testing (RBT). The research literature indicates that there are two possible, evidence-based, approaches to the reduction of the social costs of alcohol-attributable road accidents:

- a more intensive enforcement regime of the BAC limit; and
- lowering the legal BAC level.

5.3.1 Greater enforcement of random breath testing

There is substantial evidence that random breath testing loses much of its effect if levels of enforcement are too low or if the enforcement effort is insufficiently well targeted. For example, a Federal Office of Road Safety paper by Henstridge et al. (1997) found that the New South Wales RBT, which was introduced in that state in 1982, 'almost ceased to have any impact on some series of accidents in the late 1980s due to the decay in the introduction effect and was "saved" only by increased levels of enforcement that had a substantial "residual deterrent" effect'. Residual deterrence represents the lagged effects of enforcement. Henstridge et al. (1997) point out that the population of NSW makes possible more detailed analysis than for the other states.

The model for all serious accidents suggests that an increase of 1,000 in the daily testing rate corresponds roughly to a decline of six per cent in accidents (within the range of observed data, which is 2,000 to 6,000 with a spike at 8,400) ... However, from the models the relationship between changes in daily testing rates and accident reductions is not linear, so that there is an element of "diminishing returns" as daily enforcement levels increase. (p. 50).

Because a log-linear model was the basis of the analysis, the relationship ... is not quite linear. For example, an increase in daily testing levels of 1,000 corresponds to a reduction of 5.9 per cent in serious accidents, but an increase of 3,000 corresponds not to a 17.7 per cent but to a 16.6 per cent reduction. The greater the increase in testing levels, the more the reduction in accidents falls below what would be predicted from a straight line relationship. (p. 40).

Henstridge et al. (1997, p. 115) include as one of their recommendations the following:

All States should increase highly visible stationary RBT to a level equivalent to one test per licence holder per year. This could be accomplished in a cost effective manner by using general duties police, and possibly also booze buses, and by utilising the management techniques embodied in the random roadwatch program.

On the information provided by Henstridge et al., the average number of tests per licence holder per year in the four states investigated (New South Wales, Tasmania, Western Australia and Queensland) in 1995 was 0.53. There appears to be no current published information on RBT in Australia, so the assumption is made for the purposes of this study that the 2004/05 rate was the same as that in 1995. Thus, adoption of the Henstridge et al. recommendation of increasing the rate to one test per licence holder per year would involve an increase of 90 per cent in the number of tests. This translates, on the basis of the relationship set out above, to a reduction of approximately 30 per cent in serious accidents. The present study adopts this recommendation as being an externally validated and feasible target. Estimates are also made for a range of assumed accident reduction, with the minimum being 25 per cent and the maximum 35 per cent.

5.3.2 Reducing the blood alcohol concentration level

There is little international experience of BAC levels below the current Australian level of 0.05. However, evidence from the Swedish experience indicates that a reduction of the BAC level in that country in 1990 from 0.05 to 0.02 led to a reduction in fatal alcohol-related accidents of between eight per cent and ten per cent (Anderson & Baumberg, 2006). For the purposes of the present study, it is assumed that a reduction in the Australian BAC limit to 0.02 would lead to a reduction of nine per cent in alcohol-attributable road accidents, with the lower and upper boundaries used in sensitivity testing being eight per cent and ten per cent.

5.3.3 Conclusions from the research evidence

Anderson and Baumberg (2006, p. 250) conclude that:

The drink-driving policies that are highly effective include lowered blood alcohol concentration (BAC) levels, unrestricted (random) breath testing, administrative license suspension, and lower BAC levels and graduated licenses for young drivers ... To be effective, drink driving laws must be publicized. If the public is unaware of a change in the law or an increase in its enforcement, it is unlikely that it will affect their drinking and driving. When incorporated as part of community programmes, drink driving measures appear to have increased effectiveness.

The table below presents their summary of the strength of the research evidence on drink driving countermeasures.

Table 19. Effectiveness ratings for drink driving countermeasures

	Effectiveness	Breadth of research support	Cost efficiency
Lowered BAC levels	+++	+++	+++
Random breath testing	+++	++	+
Licence suspension	+++	++	++
Lower BAC for youth	+++	++	+++
Graduated licensing	++	++	+++
Community programs	++	++	+

Source: Anderson and Baumberg (2006, Table 7.3).

For the definitions of the ratings see Table 6 above.

5.3.4 Potential reductions in social costs from anti-drink-driving policies

It is assumed that the above percentage reductions in attributable road accidents can be translated, over a period of time, into the same percentage reductions in the tangible and intangible social costs of these road accidents. Since enforcement levels are an important determinant of the effectiveness of BAC legislation, the benefits of the two approaches, in terms of cost reductions, are treated as being additive.

The next four tables below present estimates of the benefits which would result from the implementation of the two anti-drink-driving initiatives discussed above.

Table 20. Reduction in social costs resulting from increased RBT enforcement (2004/05 prices)

	Best estimate \$m	Minimum \$m	Maximum \$m
Tangible costs	660	550	770
Intangible costs	280	230	320
Total costs	940	780	1,090

Table 21. Reduction in social costs resulting from lowering BAC level to 0.02 (2004/05 prices)

	Best estimate \$m	Minimum \$m	Maximum \$m
Tangible costs	200	180	220
Intangible costs	80	70	90
Total costs	280	250	310

Table 22. Reduction in total social costs resulting from anti-drink-driving initiatives (2004/05 prices)

	Best estimate \$m	Minimum \$m	Maximum \$m
Increased RBT enforcement	940	780	1,090
Lowering BAC to 0.02	280	250	310
Total	1,220	1,030	1,400

Table 23. Reduction in total social costs resulting from anti-drink-driving initiatives (2004/05 prices), tangible and intangible

	Best estimate \$m	Minimum \$m	Maximum \$m
Tangible costs	860	730	990
Intangible costs	360	300	410
Total costs	1,220	1,030	1,400

Increased enforcement would yield benefits estimated to be in the range \$780m to \$1,090m, with the best estimate being \$940m. Lowering the BAC level to 0.02 would yield estimated benefits in the range \$250m to \$310m (at 2004/05 prices), with the best estimate being \$280m.

5.4 Brief interventions for reducing hazardous alcohol consumption

Studies have shown that brief interventions have proven effectiveness in reducing hazardous alcohol consumption (Bien et al., 1993). Brief interventions have also been shown to be cost-effective (Wutzke et al., 2001) and therefore clearly represent a useful strategy to reduce the rates of alcohol abuse.

Brief interventions usually, but not always, refer to advice and information provided to 'at risk' drinkers in the context of a consultation by a primary care physician. Such information is initially conveyed verbally, and usually in the context of a primary care consultation for a different purpose. The initial screening may be accompanied by a range of additional support, including the provision of printed information, follow-up telephone calls, and diaries to record and monitor alcohol consumption. Cost studies of brief interventions include the costs of recruitment and training of general practitioners, the provision of appropriate materials, and the expanded cost of the consultation to include counselling (Gomel et al., 1998).

In some countries, physicians receive program grants or practice-enhancement grants for such interventions. Some interventions may be undertaken by staff employed in primary care practices such as practice nurses. In the Australian context, screening and brief counselling by a general practitioner increases the consultation from Level B to Level C (lasting at least 20 minutes), thus incurring a small additional Medicare cost for every patient who is counselled.

Potential cost savings, including reduced alcohol-related morbidity and mortality, have been estimated to demonstrate the cost-effectiveness of well designed brief intervention programs if they were implemented nationally. Assumptions included that much of the impact of such interventions would not be realised for several years, and therefore studies have discounted the life years saved.

Within any brief intervention program undertaken by GPs, there is considerable flexibility regarding screening, intervention and screening intervals, which may be influenced by factors such as the type and busyness of the practice, numbers of new patients, and financial incentives. It is therefore difficult to calculate the costs of wide implementation.

As there are demonstrably effective interventions which have been developed and tested in Australia, it is evident that these brief interventions should be included in analysis of policies which if implemented would reduce the avoidable costs of alcohol consumption.

In an Australian context, Wutzke et al. (2001), following-on from a study by Gomel et al. (1998), estimate the cost-effectiveness of different general practitioner training and support strategies for reducing hazardous and harmful alcohol consumption, related to the *Drink-less* program. A comparison is made between a do-nothing scenario and three training and support strategies with general practitioners implementing the program.

- *control*—no initial training and no ongoing support on program implementation;
- *no support*— five minutes of initial training together with the provision of advice to receptionists on data collection offered on a fortnightly basis;
- *maximal support*—five minutes of initial training plus alternate telephone contact and personal visits every two weeks.

Their results are summarised in Table 24.

Table 24. Average and marginal costs of three implementation strategies for the *Drink-less* program (1996 prices)

Strategy	Average cost per life year saved \$	Marginal cost per life year saved \$
Control	645	645
No support	581	1,223
Maximal support	653	1,873

Source: Wutzke et al. (2001), Tables 2 and 3.

In the above table, average costs are calculated on the basis of a comparison with a do-nothing strategy. Marginal costs are calculated on the basis of a comparison with the previous strategy.

The possible outcomes of brief interventions have been considered in a range of papers. Chisholm et al. (2002, p. 785) report that:

Efficacy reviews of brief interventions reveal an estimated 22 per cent net reduction in consumption among hazardous drinkers ... which would have the effect of shifting the entire distribution of hazardous drinking downwards if applied to the total population at risk (a reduction in overall prevalence of 35–50 per cent, equivalent to a 14–18 per cent improvement in the rate of recovery over no treatment at all).

Wutzke et al. (2001, p. 866) report:

The estimation of post intervention alcohol consumption was based on the results of phase 2 of the Australian arm of the WHO collaboration (Saunders et al., 1991). This found that baseline alcohol consumption fell by 28 per cent on average in hazardous and harmful drinkers following exposure to the intervention. This result was consistently robust across international health-care settings and sociocultural groups ...

Wutzke et al. (2001) report, in relation to their own Australian study described above, that application of the program to the relevant Australian counselled 'at risk' population would have the following outcomes in terms of lives saved.

Table 25. Number of lives potentially saved by brief interventions

Strategy	Number of lives saved
Control	674
No support	1,285
Maximal support	1,972

To put these figures in context, the estimated number of alcohol-attributable deaths in 2004/05 was 3,494 (Collins & Lapsley, 2008a, Table 10).

5.4.1 The impact of brief interventions on the overall social costs of alcohol abuse

Few cost-effectiveness studies of brief interventions produce output in a form which is suitable for use in calculation of the potential benefits of this type of intervention in Australia. Those mentioned above, which are considered to have some suitability, produce estimates either of a reduction in hazardous/harmful alcohol consumption or of the number of deaths averted.

A complication in dealing with the social costs of alcohol is the problem of the treatment of the protective health benefits of non-hazardous consumption. As indicated above, the approach adopted in this study is to assume that it would be possible to reduce risky consumption without prejudicing any protective health benefits.

At one end of the spectrum of Australian estimates is a reduction of 28 per cent in the average consumption of hazardous and harmful drinkers. At the other end is a predicted reduction of approximately 56 per cent in the number of alcohol-attributable deaths. The 'best' estimate adopted here represents a midpoint between these two extremes. The estimates of savings in social costs are presented in Table 26.

Table 26. Estimated reduction in social costs resulting from the implementation of a comprehensive program of brief interventions (2004/05 prices)

	Best estimate \$m	Minimum \$m	Maximum \$m
Tangible	3,930	2,230	5,630
Intangible	1,900	1,260	2,530
Total cost savings	5,830	3,490	8,160
Percentage savings	38.0%	22.8%	53.3%

Given that the estimated social costs of alcohol in 2004/05 were over \$15 billion, this range of estimates represents a very substantial range of estimated potential reductions in the social costs of alcohol. However, it is very clear that, even on the most pessimistic assumption, the cost-effectiveness of brief interventions for reducing hazardous alcohol consumption is very high.

6. Effective interventions whose benefits cannot be evaluated

Section 5 above examines interventions whose potential effectiveness as instruments to reduce the social costs of alcohol abuse is reasonably conclusively demonstrated in the research literature. The interventions reviewed in that section have the additional characteristic that this literature provides the basis on which their benefits, in terms of social costs avoided, are able to be estimated.

The literature also identifies a series of interventions which are likely to be cost-effective, but whose economic benefits are not able to be valued. This section provides a review of several interventions which the literature indicates have clear, yet unquantifiable, benefits. Perhaps the most important objective of the present report is to provide an information input into the design of effective public policies towards alcohol. In this context, it would be unreasonable to ignore proven-effective policies even if currently available data do not allow their benefits to be valued in economic terms.

6.1 Control of drinking environments

Sales of alcohol are usually subject to some restriction, for both alcohol to be consumed on site (mostly through licences) and for alcohol to be consumed off the premises. All European Union countries prohibit the sale of alcohol to young people below a determined age in bars and hotels, while one-third of EU countries limit hours of sale (Anderson & Baumberg, 2006). Other forms of limiting access to alcohol include control of the number of alcohol outlets and the development, implementation and enforcement of responsible serving practices. Without enforcement, it is not clear that there would necessarily be responsible beverage service, preventing sales to intoxicated patrons and to minors. Responsible serving policies include training staff to delay or stop service to intoxicated patrons, and to promote low- and non-alcoholic beverages. Licensee codes of conduct, which are voluntary agreements between licensees, police and local councils, can contribute to reductions in alcohol-related violence, but also need to be accompanied by law enforcement.

Chikritzhs et al. (2007) report a robust finding that, from their review of the research literature on the impact of outlet density, assaults are highly correlated with outlet density. As density increases so does the level of assaults. However, the evidence for a link between outlet density and other forms of harm (for example, road crashes, drink driving, and alcohol-related mortality and morbidity) is less strong.

The reduction of opening hours of licensed premises is less problematic and more straightforward to enforce, and is usually related to the prevention or reduction of drunkenness and violence. A West Australian study has shown that an extension in opening hours from midnight to 1 am was accompanied by an increase of 70% in violent incidents (Chikritzhs et al., 1997). It is suggested that the increased problems associated with later

trading result from increased alcohol consumption. A New South Wales study reported that assaults at licensed premises were more likely to occur during extended trading periods, most frequently between midnight and 3 am (Briscoe & Donnelly 2003).

Anderson and Baumberg conclude that restricting availability through restrictions on the number and density of outlets as well as days and hours of sale all reduce alcohol-related harm.

While the evidence is strong, it is not possible to quantify and cost the effects of such policies, if implemented.

6.2 Alcohol ignition locks

An anti-drink-driving intervention which is being implemented in several European countries is the alcohol ignition lock. The purpose of this device is to prevent convicted drink driving offenders from driving while impaired, by the use of ignition interlocks. To be able to operate a vehicle fitted with the device, the driver must first provide a breath specimen below the maximum permissible BAC. Random retests are used to prevent circumvention of the device (for example, by other people blowing into the mouthpiece). Alcolock programs are being implemented in Belgium, Finland, Germany, the Netherlands, Norway, Spain and Sweden.

Anderson and Baumberg (2006) provide details of the practical implementation of the alcolock programs and of evaluation results.

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

It was not possible in the present study to place a social cost value on the benefits of alcolocks. Anderson and Baumberg (2006) categorise alcohol locks as being “relatively high cost to implement and maintain”, although their European estimates indicate benefits much higher than their costs. We conclude that there is a plausible case for further consideration of this intervention, even though we are not able to estimate the value of the social benefits which would accrue to the Australian community.

6.3 Guidelines for low-risk drinking

Guidelines which provide recommendations for low-risk drinking, supported by updated evidence, such as the draft *Australian alcohol guidelines for low-risk drinking* (NHMRC, 2008), continue to play a useful role in increasing public awareness of safe alcohol consumption, and also in support of brief interventions and clinician advice. While there are insufficient data to quantify and cost the effectiveness of such guidelines, it is reasonable to expect that the public should be provided with this information, reviewed and updated as appropriate.

With the publication of the latest NHMRC guidelines, there appears to be little scope for further improvement in this area of Australian alcohol policy.

6.4 Standard drinks labelling and health warnings on drinks containers

Standard drinks labelling is also within the category of provision of reasonable public information, as are health warnings on alcohol containers. There appears to be considerable public confusion regarding the size and strength of standard drinks and standard units of alcohol. Warning labels can also refer to dangers for specific groups, e.g. pregnant women, car drivers or operators of machinery. The existence of recently-revised low-risk drinking guidelines will enhance the effectiveness of drinks labelling and health warnings. As with drinking guidelines, there is insufficient quantified evidence of the effects of warning labels to be able to estimate potential cost reductions.

6.5 Other interventions

There are other interventions which have been demonstrated to be effective, or are still being developed, such as intensive alcohol detoxification programs, school-based alcohol education and workplace interventions. Further evaluation of these programs may provide data for the estimation of future reductions in costs of alcohol misuse, but currently these data are not available.

7. Summary of results

We proceed to summarise the results of the earlier analyses. Table 27 summarises the results of the exposure-based and Arcadian Normal approaches.

Table 27. Potential percentage reductions in per capita alcohol consumption and alcohol-attributable mortality

Impact on	Potential percentage reduction
Alcohol consumption per capita	40%
Male alcohol-attributable deaths	47%
Female alcohol-attributable deaths	49%
Total alcohol-attributable deaths	48%

Since the range of estimates of the impact of alcohol taxation is determined on a different basis than for the other interventions, the social cost estimates for alcohol taxation are presented in a separate table from those for the other interventions. Table 28 presents estimates of the impact of higher alcohol taxation, while Table 29 summarises the estimates of the potential benefits of the other interventions.

Table 28. Potential benefits of higher alcohol taxation in terms of reductions in social costs (expressed in 2004/05 prices), based on performance in Norway, United States and Italy

	Based on per capita alcohol consumption in		
	Norway \$m	United States \$m	Italy \$m
Potential reduction in Australian social costs	5,940	2,190	2,810

Table 29. Potential benefits of policy interventions in terms of reductions in social costs (expressed in 2004/05 prices)

Intervention	Best estimate \$m	Minimum \$m	Maximum \$m
Individual-based interventions			
Brief interventions	5,830	3,490	8,160
Population-based interventions			
Greater BAC enforcement	940	780	1,090
Reduced BAC level	280	250	310
Partial advertising and marketing controls—overall impact	2,450	1,680	3,210
Complete advertising and marketing controls—overall impact	3,860	2,500	5,150
Partial advertising and marketing controls— impact on road accidents	310	160	470
Complete advertising and marketing controls—impact on road accidents	960	690	1,210

To put the estimates in the above two tables in context, Collins and Lapsley (2008a) estimate that the total social costs of alcohol abuse in the financial year 2004/5 were \$15.3 billion.

Interpretation of the results in a study of this type should, for a variety of reasons, be undertaken only with great caution.

The translation of research results into potential reductions in social costs is necessarily imprecise. The determination of the upper and lower boundaries of the estimates is usually based on judgmental decisions by the researchers. Accordingly, in order to prevent a misleading impression of precision, the results presented here are rounded to the nearest \$10m.

It transpires, however, that this lack of precision is less significant than it might appear at first glance. Estimates of the potential cost savings for the interventions analysed above are very high in absolute terms even when the lower-bound estimates are chosen. All the interventions considered above have been shown in the literature to be cost-effective.

A second reason for interpretational caution is that, although the potential cost savings are expressed in terms of constant price values (for example, in the present study 2004/05 dollars), these savings would usually only accrue over a period of several years. The expression in constant price terms appears to be the most sensible way to present the results given that, in the current state of knowledge, the time profile of the accrual of benefits is almost always uncertain. Without knowledge of this time profile, it is not possible to estimate the discounted present value of the future time stream of benefits.

The above summary of results presents the estimated benefits of each of the recommended interventions. It is not, however, possible to aggregate these results since there is substantial overlap between the impacts of the various interventions. For example, an increase in alcohol tax rates designed to reduce overall alcohol consumption would almost certainly have the incidental impact of reducing the rate of drink driving. An implication of this interdependence is that a specific intervention, when implemented on its own, would yield a higher individual rate of return than it would if implemented as part of a package of interventions, when the relative rates of return would be disaggregated.

However, there is no reason to believe that the benefits of these individual interventions would be completely mutually exclusive. The estimated total benefits of a package of interventions which were implemented simultaneously would not be the sum of the benefits of the individual interventions but it would certainly exceed the benefits resulting from only the highest yielding of these interventions.

To explain this point, assume a theoretical situation in which both partial advertising bans and a program of brief interventions were introduced, with the best estimate benefits being applied. The total benefits of this program would certainly be less than \$8,280m (\$2,450m plus \$5,830m) but more than the benefits of brief interventions on their own (\$5,830m).

8. Conclusions

8.1 Policy implications

Alcohol abuse imposes serious social costs on the Australian community. Collins and Lapsley (2008a) estimate that these costs were, at a minimum, \$15.3 billion in 2004/05. However, there is no suggestion that public policy interventions could, or indeed should, eliminate the entirety of these social costs, even in the long run. Economists argue that public policy should attempt to achieve a situation in which the marginal cost of reducing alcohol abuse is exactly matched by the value of the marginal benefits of this reduction. If the marginal benefit is greater than the marginal cost, then the community could experience a further net benefit from a further reduction in alcohol abuse. On the other hand, if the marginal benefit were less than the marginal cost, alcohol abuse would be at a sub-optimal level.

Economists, including the present authors, would certainly not claim that the optimal level of alcohol abuse is zero. Below a certain level of alcohol abuse, the public resources devoted to producing a further reduction in abuse would be more efficiently devoted to alternative uses. This economic analysis puts public health policy in the broader context of the economy as a whole, rather than considering public health in isolation from other calls on public resources.

The present study does not attempt specifically to identify the optimal level of alcohol abuse. It does, however, attempt the less ambitious objective of identifying the proportion of the total social costs of alcohol abuse which could be reduced by the implementation of policies for which there is current evidence of cost effectiveness.

The nature of the underlying public health quantitative research upon which the current estimates are based is such that estimates of avoidable costs should be treated as being approximate. There are, nevertheless, some extremely useful policy conclusions to be drawn from the research described in this paper. These conclusions relate to the proportion of alcohol abuse costs which can be considered, in the real world policy environment, to be susceptible over a period of time to policies designed to reduce these costs. The conclusions also indicate the types of interventions which are likely to prove to be efficient in reducing these costs.

The Arcadian Normal and alcohol-exposure approaches, whose results are presented in Table 27, both indicate that in the order of 40–50 per cent of the social costs of alcohol abuse can be reasonably considered to be avoidable, given the adoption of appropriate policies. Since this estimated range is based on performance outcomes in other countries, it may well be conservative. It is unlikely that any single country has implemented the complete range of indicated interventions.

There is strong evidence that substantial reductions in social costs could be achieved by implementing, or improving the implementation of, a range of interventions which include:

- higher alcohol taxation, including differential tax rates on forms of alcohol which are particularly subject to abuse;
- partial or total bans on alcohol advertising and other forms of promotion;
- a lower BAC drink driving limit;
- greater enforcement of the BAC limit; and
- much greater investment in brief interventions to reduce alcohol abuse.

There is also strong, but less quantifiable, evidence that resources should also be devoted to:

- control of drinking environments;
- alcohol ignition locks;
- guidelines for low-risk drinking; and
- standard drinks labelling and health warnings.

It is reasonable to consider that there may be very strong support for initiatives to address those aspects of alcohol abuse which result in harm to others than those who consume the alcohol. (An obvious analogy would be the wide acceptance of the unfairness of involuntary, or passive smoking.) Those who bear involuntary costs of abusive alcohol consumption include the babies born with foetal alcohol syndrome, individuals who experience traffic injuries and deaths caused by alcohol-affected drivers, and the victims of other alcohol-attributable crime. It may be that policy strategists recommend that additional weighting should be given to allocate resources to interventions in these areas, even where there is not yet rigorous economic evaluation.

8.2 Methodological implications

This study is one of two international research projects (the second being in Canada) which are applying the *International Guidelines for the Estimation of the Avoidable Costs of Substance Abuse* (Collins et al., 2006) to the estimation of the avoidable costs of alcohol. The guidelines, which were written in advance of any specific avoidable cost research project, were designed to assist researchers in this area of study. It was always acknowledged by Health Canada, the funding body for the guidelines, that there would be a need for revision in the light of the practical experience gained in these projects. Indeed, one of the objectives of these initial studies was to provide the basis for revision and improvement of the guidelines. It is hoped that, when revised, the guidelines will provide incentive and guidance to other potential researchers, a function which the original WHO *International guidelines for estimating the costs of substance abuse* (Single et al., 2003) have certainly performed in relation to substance abuse cost studies in several countries.

The avoidable cost guidelines explored four different, but not mutually exclusive, approaches to the estimation of the avoidable costs of substance abuse:

- an epidemiological model;
- the Arcadian Normal approach;
- exposure-based comparators; and
- evidence as to the effectiveness of interventions.

Our general conclusions with regard to the four approaches are as follows:

- The epidemiological model makes rigorous data demands which are currently extremely difficult to meet in the Australian environment, and probably in most other environments.
- The Arcadian Normal approach gives some indication of the proportion of the social costs of alcohol abuse which might be avoided, given the adoption of appropriate public policies. However, in itself and without detailed studies of the policies of the Arcadian Normal countries (that is, those countries which performed best in terms of each of the social cost categories) it is not possible to draw any policy conclusions from this approach.
- The alcohol exposure-based approach, which is in a sense an Arcadian Normal approach based on exposure rather than outcomes, suffers from a similar disadvantage. Exposure may give a better indication of potential cost reductions than outcomes based on past and present policies of the Arcadian Normal countries but, in itself, it gives no indication of the policies which should be adopted in order to minimise exposure.
- The intervention effectiveness approach is clearly the most useful in terms of assisting in policy design. It relies on the results of national and international research, but this area of research seems to be expanding steadily and to be providing more definitive results.

9. Research recommendations

This study represents a new area of research in Australia. In the course of the study, areas of further research have been identified which would enable better future estimation of the avoidable costs of alcohol abuse and which would also assist in improving the design of public policies towards alcohol. The following are our recommendations for future research arising from this study.

9.1 Policy effectiveness

It is clear that future studies of avoidable costs should concentrate on policies which the literature has shown to be effective in countering alcohol abuse. There have been several extremely useful recent reviews of alcohol policy effectiveness (Babor et al., 2003; Loxley et al., 2004; Anderson & Baumberg, 2006; British Medical Association, 2008). New research studies are constantly appearing and there is a need for regular reviews of the recent literature (on the lines of, for example, Loxley et al., 2004), as an aid to alcohol policy design.

9.2 Alcohol demand elasticities

Fundamental information for the design of alcohol tax policies is data on alcohol demand elasticities, which measure the responsiveness of alcohol demand to changes in alcohol prices and in income. Australian data in this area are now largely outdated, so a need for new econometric research is indicated.

9.3 Time periods over which policy benefits accrue

Some benefits of alcohol interventions accrue quickly but other significant benefits, particularly in relation to health, may be subject to substantial lags. Without identification of these lags, it is not possible to undertake cost-benefit analysis of the interventions.

9.4 The macroeconomic impact of alcohol interventions

Proposals to tighten alcohol policies almost inevitably meet opposition on the grounds that they will have a negative impact on, among other things, employment and growth. These objections are usually based on naïve models which do not take account of the changes in consumer spending patterns which would result from the new alcohol policies. Sophisticated macroeconomic modelling, on the lines undertaken in relation to tobacco by Junor et al. (2004), is required to indicate the true impacts on employment, economic growth and the balance of payments.

9.5 Revision of the avoidable cost guidelines

Australian and Canadian experience in the current research projects, estimating alcohol avoidable costs in those two countries, will provide the basis for revision and improvement of the Health Canada avoidable cost guidelines.

Appendix A. Methodological issues

This appendix provides a more detailed consideration of the methodological issues involved in the estimation of the avoidable costs of substance abuse than is presented in the main body of this report. The exposition is largely based upon the *International Guidelines for the Estimation of the Avoidable Costs of Substance Abuse* (Collins et al., 2006).

A1. The nature of avoidable costs

As explained in the original *International guidelines for estimating the costs of substance abuse* published by the World Health Organization (Single et al., 2003), estimates of the costs of substance abuse constitute just one component in a range of potential economic information on substance abuse. The following table from this WHO publication presents a summary of the hierarchy of potential economic information on the costs of substance abuse, together with examples of their possible uses. This table puts avoidable costs in the context of the range of possible types of abuse cost studies.

Table 30. Substance abuse cost estimates and their policy uses

Type of estimate	Interpretation of results	Example of policy use
Aggregate costs	Total external costs of substance abuse compared with the alternative situation of no substance abuse	Indication of the size of the substance abuse problem
Avoidable costs	Potential economic benefits from substance abuse harm-minimisation strategies	Determination of the appropriate level of resources to be devoted to harm-minimisation strategies
Costs incidence	The distribution of the external costs of substance abuse among various community groupings	Mobilisation of support from various groups (for example, the business community) for anti-substance abuse programs
Disaggregated costs	External costs of substance abuse disaggregated by categories	Economic evaluation (cost-benefit or cost-effectiveness analysis) of harm-minimisation programs
Budgetary impact	The impact of substance abuse on government expenditures and revenues	Assessment of the case for industry compensation payments to government as a result of abusive use of substances which the industry produces

In estimating the *aggregate* costs of substance abuse, the actual substance abuse situation must be compared with some alternative hypothetical situation, known as the counterfactual situation. This counterfactual situation is usually a situation in which there has been no past or present abuse of the substance(s) in question. Thus the counterfactual situation is implicitly one in which the community would bear no substance abuse costs. A comparison of the actual situation with the counterfactual zero-abuse situation indicates the extra costs which abuse has imposed on the community.

However, the counterfactual situation is purely hypothetical and in almost all circumstances most unlikely to be realisable, even over long periods of time. Estimates of the *aggregate* costs of drug abuse comprise both avoidable and unavoidable costs. As Single et al. (2003) state:

Unavoidable costs comprise the costs which are currently borne relating to drug abuse in the past, together with the costs incurred by the proportion of the population whose level of drug consumption will continue to involve costs. Avoidable costs are those costs which are amenable to public policy initiatives and behavioural changes.

Avoidable cost estimates indicate the benefits potentially available to the community as a result of directing public resources to the prevention or reduction of substance abuse. They provide valuable economic information on the basis of which a more efficient allocation of productive resources could be achieved.

Avoidable cost estimates do not, in themselves, indicate the rates of return which the community might achieve. However, without knowledge of the avoidable component of substance abuse costs it is difficult to undertake meaningful cost-benefit or cost-effectiveness analysis of prospective expenditures on prevention and/or treatment.

The estimation of social costs involves, in principle, first the estimation of the relevant avoidable proportion of each of the cost categories and then applying these proportions to each of the relevant aggregate cost estimates. Since not all substance abuse costs fall on the government sector, governments are likely to show an interest in the proportions of *budgetary costs* which are avoidable. Information developed for estimating the avoidable proportions of aggregate costs can also be readily applied to the estimation of avoidable budgetary costs.

A2. Reasons for estimating avoidable costs

The Health Canada avoidable cost guidelines (Collins et al., 2006, section 1.3) identify the following four major reasons for estimating the avoidable costs of substance abuse.

Priority for substance abuse expenditures

In most countries, the allocation of public funds between competing programs is substantially influenced by public servants trained in economics or finance, who are looking to maximize the social rates of return on public expenditures. Accordingly, as part of the decision-making process, they utilize information on economic evaluation of the proposed expenditures. While aggregate cost estimates indicate the economic impact of substance abuse, they do not indicate what proportions of these costs are avoidable, and over what period of time. It is possible that some forms of substance abuse are much more susceptible to prevention measures than others, and so may yield higher gross benefits. Thus, avoidable cost estimates give a better indication of the potential benefits of anti-abuse programs and policies, though they still do not indicate the costs, and the rates of return, of appropriate programs.

Appropriate targeting of specific problems

Estimates of the avoidable costs of substance abuse, in conjunction with estimates of the aggregate costs, provide an extremely valuable information resource for policy analysis and design. This information is of two types:

- **Cost estimation data.** *In the process of developing cost estimates, researchers generate virtually all the information necessary to value the benefits (that is, the reduction in social costs) of programs, once their physical outputs (in terms of, say, improved health outcomes, lower work absenteeism and reduced crime rates) have been determined.*
- **Information about the physical outcomes potentially available to specific programs.** *Essentially, the estimation of avoidable costs involves an examination of the extent to which it is possible to reduce substance abuse and, in the process, what policy measures should be implemented in order to achieve this reduction. As will be seen, this effectively involves an examination of best practice in a range of comparable jurisdictions. Thus the development of avoidable cost estimates will involve an international survey of substance abuse policies and outcomes, and the provision of the resulting information on a systematic basis.*

Accordingly, avoidable cost estimation will facilitate both program analysis (through cost-benefit analysis) and design of appropriate programs likely to yield the best achievable social rates of return.

Identification of information gaps and research needs

Systematic analysis of avoidable costs is likely to highlight information gaps which, when rectified, will facilitate improved policy design. This information will include answering such questions as:

- *What substance abuse outcomes are potentially achievable?*
- *How best may these outcomes be achieved?*
- *Over what periods of time would these outcomes be achievable?*

Since this information, in terms of both scientific analysis and policy analysis, will inevitably not be static, it will be necessary to review and update information concerning potential best practice on a regular basis.

Provision of baseline measures to determine the efficiency of drug policies and programs

Once policy makers have at their disposal measures of best practice substance abuse outcomes, they will be able much more efficiently to evaluate their existing anti-abuse policies and their allocation of public expenditures to and between anti-abuse programs. There is every reason to believe that the provision of avoidable cost estimates should lead to better policy design.

A3. Approaches to the estimation of avoidable costs

Collins et al. (2006) provide an extensive discussion of possible approaches to the estimation of the avoidable social costs of substance abuse. The following exposition constitutes a brief summary of the discussion in that publication.

It is important, from a public policy perspective, to be able to identify the proportion of the estimated aggregate social costs of substance abuse which is potentially susceptible to reduction, and the period over which such reduction could be achieved. This information will yield estimates of the value of avoidable costs and, accordingly, of the potential benefits of policies to reduce these costs. These types of estimates for tobacco have been made by the present authors for various Australian states for targeted reductions in the rates of smoking prevalence (see Collins & Lapsley, 1999, 2001, 2004, 2005, 2006 and 2008c). The next stage would be to identify the nature of the programs necessary to achieve these reductions and the costs of these programs. It then becomes possible to estimate the social rate of return accruing to programs designed to achieve the elimination of avoidable costs.

This complete process can be summarised as consisting of the following stages:

1. estimate the aggregate social costs of the substance abuse under study;
2. estimate the proportion of these aggregate costs which are avoidable;
3. estimate the time period over which the potential reduction in aggregate costs could be achieved;
4. determine the nature of the programs which would achieve this reduction and the costs of these programs; and
5. calculate the social rate of return which would result from the elimination of the avoidable costs.

Stage 1 has been completed by the publication of Collins and Lapsley (2008a). The present study completes Stage 2 for alcohol abuse.

The avoidable cost concept explored here has been contrasted by Collins et al. (2006) with the economic concept of the optimal level of substance abuse.

Economists argue that the optimal level of drug consumption is reached when the incremental cost to the community as a whole of achieving a given reduction in consumption is exactly matched by the incremental benefit to the community of that reduction. If the incremental benefit is greater than the incremental cost, achieving optimality would require a further reduction in consumption. If the cost exceeds the benefit, then consumption has been reduced to sub-optimal levels.

The concepts of avoidability and optimality can lead to quite different outcomes. It is perfectly possible that optimal levels of consumption may not be achievable. For example, optimal levels of tobacco consumption may be well below the levels which are achievable in a real world in which severe constraints exist on the public resources available to achieve reductions in smoking prevalence. On the other hand, it may be technically possible to reduce tobacco consumption below levels which economists judge to be optimal.

In essence, the estimation of avoidable costs takes no account of the costs which would be incurred in achieving the required reduction in substance abuse and so, of itself, the concept yields no information on rates of return. The concept of the optimal level, on the other hand, takes explicit account of the costs involved in reducing substance abuse.

The estimation of the avoidable costs of substance abuse involves determination of the maximum reduction in substance abuse costs which effective policies can be expected to achieve. The lowest achievable level of substance abuse is termed the Feasible Minimum. The Health Canada avoidable cost guidelines identify four possible approaches to estimation of the Feasible Minimum. Which approach should be adopted for any particular type of cost is very much a pragmatic decision, taking into account data availability and the theoretical advantages and disadvantages of the various approaches.

The distributional approach

The Health Canada avoidable cost guidelines identify two different approaches to disease risk-factor attribution:

1. The classical epidemiological approach. In this approach disease risk is estimated with respect to exposure and non-exposure of various populations to a single specific risk factor. In effect the counterfactual scenario question asked is 'What would have happened if no exposure had occurred?'
2. The distributional approach. This not only looks at distributional shifts at one time but also considers the future time dimension, thus being able to predict future developments. This approach asks the question 'What would happen if factor distributions shifted to different counterfactual scenarios?' Thus this approach, which is explained fully in the guidelines, conceptualizes the avoidable burden by specifying alternative scenarios for risk-factor distributions, including potential future distributions.

The Arcadian Normal

The Health Canada avoidable cost guidelines (Section 3.6) describe this approach as follows:

A second type of approach to estimating the Feasible Minimum is by estimating what has become known as the Arcadian Normal. Pioneering work in this area was done by Armstrong (1990). His work was expressed in terms of preventable mortality and morbidity but it is reasonable to extend the concepts embodied in his work to other costs such as the property costs resulting from drug-attributable crime or smoking-attributable fires. He talks of assuming "the existence of some level of disease that might reasonably be achieved if only we knew all that might reasonably be known about the causes of the disease in question and could apply them in practical programmes in the community. There is no simple way of identifying this level of disease but it may be assumed to be less than the lowest level of disease that obtains in some group of genetically similar populations". Armstrong terms this level of disease the 'Arcadian Normal' "because it represents the nearest approach that we can make to harmony between humankind and its environment. Arcadia, in ancient Greece, was a region renowned for the contented pastoral simplicity of its people".

Armstrong's approach is to compare the most recently available age standardised mortality rates for a range of causes in a group of countries with genetically similar populations and with similar living standards. He takes the Arcadian Normal to be the lowest age-standardised mortality rate for each cause of death in the 20 European countries he studied and from these he estimates the proportions of potentially preventable mortality in Australia.

The Health Canada avoidable cost guidelines consider the potential issues with the use of the Arcadian Normal in some detail. Probably the major issue is that it is based upon disease outcomes and so is not exposure-specific. Disease rates will be closely related to the rates of exposure to relevant risk factors (for example, binge drinking) but exposure may only lead to disease after significant time lags. Thus, Arcadian Normals based on current disease outcomes are, at least partly, a function of past exposure levels. If current exposure levels are declining, the use of the Arcadian Normal will almost certainly overestimate the Feasible Minimum.

Exposure-based comparators

The two approaches discussed above impose substantial data requirements. In addition, the Arcadian Normal is based upon current disease outcomes rather than upon current or potential risk exposure. The latter approach is the preferred approach of the avoidable cost guidelines.

A considerable amount of information on alcohol consumption is available for Australia, both nationally and state-by-state, and internationally. In principle, these data can be used to estimate Feasible Minimum exposure rates and, by extension, avoidable costs.

Evidence on the effectiveness of interventions

The avoidable cost guidelines make the following points:

In estimating avoidable costs it may at times be useful also to utilise research evidence on the effectiveness of interventions designed to reduce or alleviate the effects of substance abuse. Where such evidence exists, comparison between existing substance abuse policies and available interventions shown to be quantifiably effective may indicate the extent to which aggregate costs are avoidable.

There will be circumstances in which exposure-based measures, while relevant, are insufficient on their own to indicate avoidable proportions. Drink-driving is a case in point. While reductions in overall levels of alcohol consumption are likely to lead to a lower prevalence of drink-driving, regulatory enforcement using, for example, low maximum blood alcohol levels, extensive random breath testing and severe penalties has been shown to significantly reduce the prevalence of drink-driving. The most effective interventions often require both reduced exposure and effective enforcement of a regulatory environment.

Reference to evidence on the effectiveness of policy interventions is, accordingly, a very useful addition to the tools of avoidable cost methodology in certain circumstances.

Which method to adopt?

Of the four methods discussed above, the issue of which method(s) to adopt in relation to a particular category of attributable cost is very much a pragmatic issue. It depends upon data availability and upon information on the effectiveness of relevant public policies.

A4. Time lags associated with policies to reduce substance abuse

Estimation of avoidable costs implies the calculation of a Feasible Minimum below which real costs cannot be reduced. However, this minimum may only be attainable after an extended period of time—that is, with an extended lead time. The lead times involved in reaching the Feasible Minimum are of three types:

1. policy implementation lead times, since policies cannot be instantly designed, legislated and implemented;
2. lead times between the reduction in exposure to risk and the consequent reduction in the adverse consequences of exposure; and
3. lead times between the reduction in exposure to risk and an adjustment in the population structure which fully reflects the reduction in premature mortality.

In general, the longer the period of analysis over which the estimates are undertaken, the higher will be the proportion of costs which will be avoidable, although there will certainly be a time period beyond which no further cost reductions are possible. In addition, lead times are likely to differ according to the type of cost under consideration.

The present study attempts, within the constraints imposed by the available data, to estimate the value of the potential reduction in the social costs of alcohol abuse in Australia (that is, the avoidable costs of alcohol). The estimates presented are expressed in 2004/05 dollars. This should not, however, be taken to imply that, had a set of appropriate policies been implemented prior to that year, all these benefits would actually have accrued in 2004/05. Some benefits (relating to acute problems such as drink-driving and alcohol-attributable violence) would accrue very quickly. Other benefits (relating to chronic conditions such as pancreatitis and liver cirrhosis) would be subject to substantial accrual lags. It has unfortunately proved difficult to estimate these lags (see Rehm et al., forthcoming, for a review of some of the relevant literature). Our estimates are expressed in 2004/05 dollars but these benefits could not have fully accrued in 2004/05.

The issue of the actual time profile of benefits becomes very important once attempts are made to undertake cost-benefit analysis of particular policies. In cost-benefit analysis, the future time streams of both policy benefits and implementation costs are, for the purposes of comparison, converted into dollar figures for a common single year, by use of an appropriate social discount rate. Cost-effectiveness analysis simplifies the process by comparing the discounted costs of policies all aimed at producing the same objective or output (for example, a given reduction in accidents resulting from drink-driving). However, this simplification inevitably results in a reduced usefulness for the research results, since only policies with the same output can be compared.

References

- Anderson, P. & Baumberg, B. (2006), *Alcohol in Europe: a public health perspective. A report for the European Commission*, Institute of Alcohol Studies, UK, June.
- Armstrong, B.K. (1990), "Morbidity and mortality in Australia: How much is preventable?", in John McNeill et al. (eds.), *A Handbook of Preventative Medicine*, Edward Arnold.
- Babor, T.F., Caetano, R., Casswell, S., Edwards, G., Giesbrecht, N., Graham, K., Grube, J.W., Gruenewald, P.J., Holder, H. D., Homel, R., Österberg, E., Rehm, J. & Room, R. (2003), *Alcohol: No ordinary commodity*, Research and Public Policy, Oxford University Press.
- Begg, S., Vos, T., Barker, B., Stevenson, C., Stanley, L. & Lopez, A. (2007), *The burden of disease and injury in Australia 2003*, Australian Institute of Health and Welfare PHE 82.
- Bien, T.H., Miller, W.R. & Tonigan, J.S. (1993), "Brief interventions for alcohol problems: a review", *Addiction*, 88, 315-336.
- Briscoe, S. & Donnelly, N. (2003), "Problematic licensed premises for assaults in inner Sydney, Newcastle and Wollongong", *Australian and New Zealand Journal of Criminology*, 36, 18-33.
- British Medical Association (2008), *Alcohol misuse: tackling the U.K epidemic*, BMA.
- Chikritzhs, T., Stockwell, T. & Masters, L. (1997), *Evaluation of the public health and safety impact of extended trading permits for Perth hotels and nightclubs*, National Centre for Research into the Prevention of Drug Abuse, Curtin University, Perth.
- Chikritzhs, T., Catalano, P., Pascal, R. & Henrickson, N. (2007), *Predicting alcohol-related harms from licensed outlet density: A feasibility study*, National Drug Law Enforcement Research Fund, Monograph Series No. 28.
- Chisholm, D., Rehm, J., Van Ommeren, M. & Monteiro, M. (2002), "Reducing the Global Burden of Hazardous Alcohol Use: A Comparative Cost-Effectiveness Analysis", *Journal of Studies on Alcohol*, November, 782-793.
- Chisholm, D., Doran, C., Shibuya, K., & Rehm, J. (2006), "Comparative cost-effectiveness of policy instruments for reducing the global burden of alcohol, tobacco and illicit drug use", *Drug and Alcohol Review*, November, 25, 553-565.
- Chisholm, D. (2006), *Dollars, DALYs and decisions: economic aspects of the mental health system*, Mental Health: Evidence and Research, Department of Mental Health and Substance Abuse, World Health Organization.
- Clements, K.W. & Selvanathan, S. (1991), "The economic determinants of alcohol consumption", *Australian Journal of Agricultural Economics*, 35.

- Clements, K.W., Yang, W. & Zheng, S.W. (1997), "Is utility additive? The case of alcohol", *Applied Economics*, 29(9).
- Collins, D.J. & Lapsley, H.M. (1997), *Tax Policy and Alcohol Consumption—Health Perspective*, Submission to the Senate Economics Legislation Committee on the Excise Tariff Amendment Bill (No. 1) 1997, May.
- Collins, D.J. & Lapsley, H.M. (1999), *The Social Costs of Tobacco in Victoria and the Social Benefits of Quit Victoria*, Victorian Smoking and Health Program, Melbourne.
- Collins, D.J. & Lapsley, H.M. (2001), *The Social Costs of Tobacco in Western Australia and the Social Benefits of Reducing Western Australian Smoking Prevalence*, Cancer Foundation of Western Australia, Monograph series No. 1 2001.
- Collins, D.J. & Lapsley, H.M. (2004), *Counting the costs of tobacco and the benefits of reducing smoking prevalence in Western Australia*, The Cancer Council Western Australia, Monograph series Number 4 2004.
- Collins, D.J. & Lapsley, H.M. (2005), *Counting the costs of tobacco and the benefits of reducing smoking prevalence in NSW*, Report prepared for the NSW Department of Health.
- Collins, D.J. & Lapsley, H.M. (2006), *Counting the costs of tobacco and the benefits of reducing smoking prevalence in Victoria*, Report prepared for the Victorian Department of Human Services.
- Collins, D.J. & Lapsley, H.M. (2008a), *The costs of tobacco, alcohol and illicit drug abuse to Australian society in 2004/05*, National Drug Strategy Monograph Series No. 64.
- Collins, D.J. & Lapsley, H.M. (2008b), *The costs of tobacco, alcohol and illicit drug abuse to Australian society in 2004/05. Summary version*, National Drug Strategy Monograph Series No. 66.
- Collins, D.J. & Lapsley, H.M. (2008c), *The social costs of smoking in Western Australia in 2004/05 and the social benefits of public policy measures to reduce smoking prevalence*, report prepared for the Cancer Council Western Australia, Cancer Council Western Australia, September.
- Collins, D., Lapsley, H., Brochu, S., Easton, B., Pérez-Gómez, A., Rehm, J. & Single, E. (2006), *International Guidelines for the Estimation of the Avoidable Costs of Substance Abuse*, Health Canada,
http://www.hc-sc.gc.ca/ahc-asc/alt_formats/hecs-sesc/pdf/activit/strateg/drugs-drogues/nat-res-rech/cost-cout-abus/costs-estimation-couts_e.pdf.
- Collins, D. & Warren, N. (2007), *The States and the GST. Demystifying Australian Federal/ State financial arrangements*, Australian Tax Research Foundation Information Series No. 4.
- Department for Culture, Media and Sport (2008), *Evaluation of the impact of the Licensing Act 2003*, March.

Farley, J.U. & Lehmann, D.R. (1994), "Cross-national 'laws' and differences in market response", *Management Science* 40(1), 112-122.

Gomel, M. K., Wutzke, S. E., Hardcastle, D. M., Lapsley, H. & Reznik, R. B. (1998), "Cost-effectiveness of strategies to market and train primary health care physicians in brief intervention techniques for hazardous alcohol use", *Social Science and Medicine*, 47, 203-211.

Henstridge, J., Homel, R. & Mackay, P. (1997), *The long-term effects of random breath testing in four Australian states: a time series analysis*, Federal Office of Road Safety, April.

Hough, M., Hunter, G., Jacobsen, J. & Cossalter, S. (2008), *The impact of the Licensing Act 2003 on levels of crime and disorder: an evaluation*, Research Report 04, UK Home Office.

Junor, W., Collins, D. & Lapsley, H. (2004), *The macroeconomic and distributional effects of reduced smoking prevalence in New South Wales*, The Cancer Council New South Wales, June.

Loxley, W., Toumbourou, J. W., Stockwell, T., Haines, B., Scott, K., Godfrey, C., Waters, E., Patton, G., Fordham, R., Gray, D., Marshall, J., Ryder, D., Saggars, S., Sanci, L. & Williams, J. (2004), *The Prevention of Substance Use, Risk and Harm in Australia: a review of the evidence*, Ministerial Council on Drug Strategy Monograph.

National Health and Medical Research Council (2007), *Australian alcohol guidelines for low-risk drinking. Draft for public consultation*, October.

Rehm, J., Gnam, W. H., Popova, S., Patra, J. & Sarnocinska-Hart, A. (forthcoming), *Avoidable cost of alcohol abuse in Canada 2002*, Centre for Addiction and Mental Health.

Ritter, A. & Cameron, J. (2006), "A review of the efficacy and effectiveness of harm reduction strategies for alcohol, tobacco and illicit drugs", *Drug and Alcohol Review*, November, 25, 611-624.

Room, R. (2004), "Disabling the public interest: alcohol strategies and policies for England", *Addiction*, 99, 1083-1089.

Saffer, H. & Dave, D. (2002), "Alcohol consumption and alcohol advertising bans", *Applied Economics*, 34, 1325-1334.

Single, E., Collins, D., Easton, B., Harwood, H., Lapsley, H., Kopp, P. & Wilson, E (2003), *International Guidelines for Estimating the Costs of Substance Abuse—Second Edition*, World Health Organisation.

World Health Organization (2002) , *Reducing risks, promoting healthy life*, World Health report 2002.

Wutzke, S., E., Shiell, A., Gomel, M., K. & Conigrave, K. M. (2001), "Cost effectiveness of brief interventions for reducing alcohol consumption", *Social Science and Medicine*, 52, 863-870.

