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Research Article

The Economic Benefit of Addressing Alcohol Harm in Rural Australian Communities Using A Multifaceted Approach

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Abstract

The aim of this research is to conduct a benefit-cost analysis of an Australian community-action approach to reducing risky alcohol consumption and harm: the Alcohol Action in Rural Communities (AARC) project. The trial comprised 20 communities in New South Wales, Australia, that had populations of 5,000-20,000, were at least 100km from an urban centre (population \geq 100,000) and were not involved in another community alcohol project. Communities were pair-matched and one randomly allocated to the experimental group. Thirteen interventions were implemented in the experimental communities from 2005 to 2009. The net economic benefit of AARC ranged from AUD \$1,658,429 to \$2,129,265. The cost of AARC was AUD\$1,214,012, comprising intervention costs (\$608,102) and additional hospital inpatient costs (\$605,910). Subtracting total costs from benefits showed a net benefit ranging from \$444,417 to \$915,253 for the lower and upper estimates of WTP respectively, equivalent to a BCA ratio between 1.37 and 1.75. For every \$1 invested in AARC, the value of benefits is estimated at \$1.37-\$1.75. Community-action to reduce risky alcohol consumption and harms provides a positive return for the investment.

Keywords: Alcohol; Alcohol Consumption; Alcohol Harm; Benefit Cost Analysis; Community; Intervention; Effectiveness; Economic Efficiency

Abbreviations

AARC: Alcohol Action in Rural Communities;

BCA: Benefit Cost Analysis;

WHO: World Health Organisation;

WTP: Willingness to pay

Introduction

In high- and middle-income countries the economic costs attributable to alcohol misuse have been estimated at more than 1% of gross domestic product [1]. Interventions that would effectively reduce these economic costs have been identified [2,3], some of which have been endorsed by the World Health Organisation (WHO) [4]. Economic evaluation of interventions is critical to ensure the efficient allocation of resources, that is, that the value of the social and personal gains achieved by an intervention (the benefit) outweigh the scarce resources required for its implementation [5,6].

The relative economic efficiency of individual interventions aimed at reducing alcohol harms has begun to be quantified internationally [2]. In addition, the likely impact of multiple interventions has begun to be modelled: one analysis estimated that the Australian Government could achieve a 10-fold improvement in health gains compared to current practice, by implementing a package of eight cost-effective interventions [3]. To date, however, there has been no prospective economic evaluation of the benefits and costs of implementing multiple interventions simultaneously in reducing alcohol-related harm, despite some evidence from retrospective analyses that the economic benefits of this approach outweigh its costs [7]. The Alcohol Action in Rural Communities (AARC) project, a cluster RCT, provided a unique opportunity to conduct the first benefit-cost analysis (BCA) internationally of the systematic implementation of 13 interventions aimed at reducing risky alcohol consumption and related harms [8,9]. The specific hypothesis is that the value of the benefits of the AARC interventions will outweigh their opportunity cost.

Methods

The AARC BCA used a social perspective involving three steps: costing the interventions; quantifying and valuing change in alcohol harm; and estimating the benefit-cost.

Step 1: Costing the AARC interventions

Table 1 provides a summary of the 13 AARC interventions, implemented in 2005-2009 [8,9], and their key cost-drivers. Resources used in each intervention were identified, measured and valued using international guidelines for costing [5,6]. Across all interventions, the opportunity cost of time spent by key stakeholders, health care practitioners and training experts were the major components of total cost.

Briefly, the thirteen interventions included: community engagement which included the process of inviting communities to participate in, and contribute to, the project; general practitioner (GP) training in alcohol screening and brief intervention which included clinical addiction specialists providing training sessions for local GPs in screening and brief intervention (SBI); feedback to key stakeholders in which

key community representatives took responsibility for implementing the locally agreed interventions and ensuring that data feedback was appropriate; media campaign which coincided with every new or updated data analysis and with the implementation and completion of interventions; workplace policies/practices training in which all major employers in each community were identified and offered a choice of workplace interventions of different levels of intensity that best met their need; school-based intervention in which students (16-17 year olds) were provided with an interactive session targeted at preventing alcohol harm; GP feedback on their prescribing of alcohol medications in which local GPs were sent a letter outlining the likely number of alcohol-dependent individuals in their community, current rates of prescribing and a summary of the evidence on their effectiveness; community pharmacy-based SBI in which pharmacists were provided with details of the ten-item AUDIT (an alcohol screening instrument) with instructions for completion and scoring; web-based SBI which also used the AUDIT, providing immediate personalised feedback to respondents on screen; Aboriginal Community Controlled Health Services support in which staff were given training in SBI; good sports program for sporting clubs which involved a program to reduce alcohol-related harm in sporting clubs; identifying and targeting high-risk weekends in which weekends were targeted with the co-ordinated implementation of multiple strategies to address alcohol-problems; and, hospital emergency department-based SBI in which presenting patients were asked to complete the AUDIT and were subsequently sent personalised feedback.

Step2: Quantifying and valuing change in alcohol-related harm

Quantifying change in harm from pre- to post-intervention

The combined impact of the interventions was measured using both routinely collected data (crime, traffic-crashes and hospital inpatient admissions) and self-reported data [8, 9]. For the routinely collected data, the extent of change from pre-intervention (2001-2004) to post-intervention (2006-2009) was determined by a counterfactual analysis [5, 10]. This method estimates the effect of the AARC interventions by applying the proportional pre- to post-intervention change in the control communities to the pre-intervention harm in the intervention communities, and then comparing that estimate to the observed changes in the intervention communities. Self-reported changes in consumption and harm were not included in this analysis to avoid double counting of benefits and costs, although the self-report data were used to quantify, in monetary terms, the value households in the AARC communities place on reducing alcohol-related harm in their communities [11].

Valuing the saved resources from reduced harm

Per incident resource costs of crime for assaults, sexual offenses and malicious damage were taken from the Australian Institute of Criminology [12], and a cost for street offences estimated as part of the AARC project [13]. These do not include intangible costs, including those imposed on victims, which avoids overlap with the willingness to pay estimates. The Australian Bureau of Transport Economics' estimates were used to cost traffic crashes that resulted in a fatality, an injury (serious and minor) and no injury (property damage): crashes resulting in a fatality or injury were computed on a per-person basis, while crashes that did not result in injury were computed on a per-crash basis [14]. Estimates of hospital costs for alcohol-related hospitalisations used Australian Diagnostic Related Groupings for alcohol abuse and alcohol dependence [15]. All costs were standardised to 2006 Australian dollars using the Consumer Price Index [16]. In 2006, one Australian dollar was the equivalent to US\$0.7526 (<http://www.oanda.com/currency/historical-rates>)

Valuing the community benefit from reduced harm

A willingness to pay (WTP) approach [17,18] was used to quantify, in monetary terms, the value households in the AARC communities place on reducing alcohol harms in their communities [11]. Details of the methods are available elsewhere [11] but, in brief, the pre-intervention community survey (sample size = 3,017; response rate 40% [8,9]) asked respondents to nominate the dollar amount their household would be willing to pay to reduce alcohol-related harm in their community by 10% and by 20%.

The implications of the 10% and 20% reductions were contextualised using a hypothetical community with characteristics (e.g. population size) comparable to the 20 AARC communities. Each respondent was randomly assigned to one of two different payment ranges (in order to assess payment range and mid-point bias): \$10 increments from \$0 to \$100 with an option for more than \$100; or \$25 increments from \$0 to \$250 with an option for more than \$250. Respondents were also given the choice of 'don't know' and 'prefer not to say'.

Step 3: Estimating the benefit-cost

The BCA compares the benefit of the interventions (the value of the changes from pre- to post-intervention in saved resources plus communities' WTP for fewer incidents) with the intervention costs. The results of the BCA are presented as both an absolute value (benefits - costs) and as a ratio (benefits / costs), where a ratio greater than one indicates that the benefits outweighed the costs.

Results

Cost of the AARC interventions

The total cost of the 13 interventions was estimated at \$608,102 (Table 1). Over 50% of all costs relate to engagement (\$55,517), media advocacy (\$195,393) and feedback of data and results to key stakeholders (\$81,718).

Table 1. Intervention description, key cost driver and cost.

Intervention	Intervention description	Key cost drivers	Cost \$
Engagement process	The process of inviting communities to participate in the AARC project, and obtaining their commitment to help design and implement the interventions, required both direct and indirect engagement. Direct engagement involved working with community stakeholders (such as the Mayor and police) to engage and promote the view that alcohol-related harm was a community-wide issue that required a community-wide response. Regular meetings were held to clarify the project and identify roles. Indirect engagement occurred with government departments that have administrative oversight for staff based in the communities to obtain support for their involvement.	Meeting-related expenses - time required to contact key stakeholders, arrange and prepare material for meetings; transport costs and opportunity cost of participants time.	55,517
Feedback of data and results to key stakeholders	During the engagement process, the communities nominated a group of key stakeholders who became a community coalition group with whom the researchers liaised as the project progressed. The coalition was responsible for assisting in implementing the locally agreed interventions and ensuring that data feedback was appropriate.	Meeting-related expenses - time required to contact key stakeholders, arrange and prepare material for meetings; transport costs and opportunity cost of participants' time.	81,718
Media advocacy (feedback to communities)	Media advocacy coincided with every new or updated data analysis and with the implementation and completion of interventions. The media campaign was restricted to local newspapers and radio to help prevent contamination of the control communities.	Media release expenses - generating and checking; cost of print and radio release.	195,393

Screening and brief intervention (SBI) by general practitioners (GP)	Clinical addiction specialists provided two two-hour training sessions for local GPs in SBI using the AUDIT. Feedback was based on the FLAGS process used as part of the adopted Drinkless kit which included: feedback to patients on their level of drinking relative to normative data; listening to patients' views on their own drinking patterns and behaviours; advising	Training-related expenses - trainer expenses; time to contact, arrange and prepare material for training; material expenses; transport costs and opportunity cost of GPs' time.	35,207
Tailored feedback to GPs on their prescribing of alcohol medications	A letter was sent to each GP in the experimental communities to attempt to increase the frequency with which they prescribe an appropriate pharmacotherapy to their alcohol-dependent patients. The letter provided information, specifically tailored to their community, on the likely number of alcohol dependent drinkers (estimated from data collected in the AARC pre-intervention survey), current rates of prescribing of these medications, and a summary of the current evidence on their effectiveness.	Costs for generating the feedback letters, tailoring them to each GP, mailing them and GPs' time to read it.	1,441
Workplace policies and training	All major employers in each community were identified and offered a choice of workplace interventions of different levels of intensity that best met their need. The simplest level comprised mailed information about the project and appropriate alcohol-related workplace policies and procedures, followed by a phone call to ensure the information had been received and to clarify any issues.	Meeting-related expenses - time required to contact workplaces, arrange and prepare material for meetings; transport costs and opportunity cost of business participants' time	27,655
High school-based interactive session on alcohol harms	An expert media liaison officer provided a one-hour interactive session on preventing alcohol harm among young people to senior secondary students.	Information session expenses: experts' expenses; time to contact, arrange and prepare material for information session	13,098
Pharmacy-based SBI	Pharmacists were provided with a coloured page comprising the 10-item AUDIT, with instructions for completion and scoring on the front and feedback for each level of risk on the back. These were made available on counters in pharmacies or placed in bags with other purchases.	Intervention-related expenses - materials required to develop and distribute self-assessments and feedback, time required to complete self-assessments	2,959
Aboriginal Community Controlled Health Services (ACCHS) based SBI	Three communities had Indigenous-specific medical services, generically called ACCHS. These ACCHS agreed to undergo alcohol SBI training similar to that provided to GPs and to trial a process of integrating SBI into their current IT systems, to examine whether this would assist clinicians and health workers to provide SBI routinely.	Meeting and training-related expenses - time required to arrange meetings; trainer expenses; time to contact, arrange and prepare material for training; material expenses; opportunity cost of participants' time	22,908
Identifying and targeting high-risk weekends	Alcohol-related crime data for previous seven year was collected to identify weekends with disproportionately high rates of crime. Those weekends were then targeted with the co-ordinated implementation of multiple strategies: the Mayor wrote to licensees in the week leading up to the problematic weekend; media advocacy; police visibility was increased on the weekend; and feedback of data immediately after the targeted weekend on the number of alcohol-related crimes that had occurred, compared to the same weekends in previous years.	Police-related expenses - time and resources required for extra patrols during high risk weekends; expenses related to preparing and distributing information letter to all licensees'	78,462
Good Sports	When AARC commenced, the Australian Drug Foundation (ADF) had begun to implement a program to reduce alcohol-related harm in sporting clubs across NSW, called the Good Sports program. Since six of the 10 intervention communities were involved in Good Sports, the AARC project provided funding to ensure that the additional four were also included in the Good Sports program.	Financial cost to ADF to subsidise cost of good sports program	66,000

Hospital emergency department (ED) based SBI	The five AARC communities that had EDs with electronic records agreed to provide screening and mailed brief intervention to all patients presenting to an ED for treatment for a 10-month period in 2009. As with the pharmacist- and GP-based SBI, this screening used the AUDIT questionnaire to screen all patients who presented to a participating ED. Personalised feedback was subsequently mailed to participants by the research team, providing them	Training and screening-related expenses - trainer expenses; time to contact, arrange and prepare material; material expenses; opportunity cost of nurses' time; nurse time required to recruit and screen patients	24,151
	with information about their level of drinking, relative to other people in their community, and with advice on low-risk levels of alcohol consumption.		
Web-based SBI	This intervention also used the 10 item AUDIT, providing immediate personalised feedback to respondents on-screen. This intervention was made available from January 2006 and was advertised widely when launched, but its use was very low and so it was stopped in 2008.	Website design and development	3,593
Total			608,102

Quantifying and valuing reductions in alcohol-related harm

Per incident costs

The per incident costs of alcohol-related crimes were estimated at \$5,015 for assaults, \$2,457 for malicious damage, \$13,307 for sexual assaults and \$934 for street offences [13]. The per incident cost of alcohol-related traffic crashes was estimated at \$1,789,386 for fatal crashes, \$103,966 for injury crashes and \$7,021 for crashes that did not result in injury. The average resource cost of hospitalisations was \$2,081 for alcohol abuse and \$2,260 for alcohol dependence.

Quantifying changes in harm from pre- to post-intervention

Benefits from reduced harms

Table 2 summarises the estimated change from pre- to post-intervention in the numbers and costs of alcohol-related crimes and traffic crashes, separately for the control and intervention communities. Absolute numbers and costs of harm are presented, together with the percentage change from pre- to post-intervention, adjusted by the counterfactual analysis.

Table 2. Alcohol-related crime and road traffic crashes in AARC communities.

Type of alcohol-related harm	Incidents		Costs		% change in harm
	Control	Intervention	Control	Intervention	
Alcohol-related crime					
Assaults					
Total pre-intervention period	3,003	2,452	\$15,058,653	\$12,295,644	
Total post-intervention period	3,608	2,718	\$18,092,448	\$13,629,510	
% change between periods	120.1%	110.8%	120.1%	110.8%	
Counterfactual total post-intervention period		2,946		\$14,772,788	
Net difference in harm (actual - counterfactual)		-228		-\$1,143,278	-7.7%
Malicious damage					
Total pre-intervention period	3,256	3,226	\$7,998,920	\$7,925,220	
Total post-intervention period	3,693	3,585	\$9,072,485	\$8,807,164	
% change between periods	113.4%	111.1%	113.4%	111.1%	
Counterfactual total post-intervention period		3,659		\$8,988,893	
Net difference in harm (actual - counterfactual)		-74		-\$181,729	-2.0%
Sexual assault					
Total pre-intervention period	345	321	4,590,918	\$4,271,550	
Total post-intervention period	252	238	3,353,366	\$3,167,068	
% change between periods	73.0%	74.1%	73.0%	74.1%	
Counterfactual total post-intervention period		234		\$3,120,089	
Net difference in harm (actual - counterfactual)		4		\$46,980	1.5%

			the control communities (N = 483 to 563) and 20% in the		
Street offences					
Total pre-intervention period	1,408	1,280	1,315,107	\$1,195,552	
Total post-intervention period	2,187	1,518	2,042,713	\$1,417,850	
% change between periods	155.3%	118.6%	155.3%	118.6%	
Counterfactual total post-intervention period		1,988		\$1,857,012	
Net difference in harm (actual - counterfactual)		-470		-\$439,162	-23.6%
Weighted average reduction in crime (weighted by counterfactual total cost)				-\$1,717,188	-6.0%
Alcohol-related traffic crashes					
RTA resulting in non-injury					
Total pre-intervention period	452	234	3,173,604	\$1,642,972	
Total post-intervention period	445	218	3,124,456	\$1,530,632	
% change between periods	98.5%	93.2%	98.5%	93.2%	
Counterfactual total post-intervention period		230		\$1,617,528	
Net difference in harm (actual - counterfactual)		-12		-\$86,896	-5.4%
RTA resulting in injury					
Total pre-intervention period	442	249	45,953,017	\$25,887,559	
Total post-intervention period	406	239	42,210,238	\$24,847,898	
% change between periods	91.9%	96.0%	91.9%	96.0%	
Counterfactual total post-intervention period		229		\$23,779,070	
Net difference in harm (actual - counterfactual)		10		\$1,068,828	4.5%
Weighted reduction in traffic crashes (weighted by counterfactual total cost)				\$981,932	3.9%
Sub-total / weighted average reduction				-\$735,256	-1.4%

For alcohol-related crime, the counterfactual adjusted reduction was equivalent to 6% fewer incidents at a cost saving of \$1,717,188. For alcohol-related traffic crashes, the counterfactual adjusted increase in crashes that resulted in an injury or no injury was equivalent to 3.9% more incidents at an additional cost of \$981,932. Fatal alcohol-related crashes were excluded from the analyses because numbers from 2001 to 2009 were too low to allow a stable estimate in both the intervention (N=31) and control (N=43) communities. In total, the counterfactual adjusted reduction in alcohol-related crime and crashes was equivalent to 1.4% fewer incidents at a cost saving of \$735,256.

Additional costs from increased harms

The costs of hospital inpatient admissions for alcohol dependence and abuse were calculated in the cost side of the BCA equation because they were hypothesised to increase as more people sought, or were referred to, treatment⁹. As anticipated, inpatient admissions for alcohol abuse increased from pre- to post-intervention by 27% in the control communities (N = 467 to 592) and 115% in the experimental communities (N = 321 to 689), equating to a 69.4% increase (N = 282) in the experimental communities from pre- to post-intervention, at an additional cost of \$586,866. Inpatient admissions for alcohol dependence increased 17% in

experimental communities (N=251 to 301), equating to a 2.9% increase (N = 8) in the experimental communities from pre- to post-intervention, at an additional cost of \$19,044.

Attaching a monetary value to changes in harm

Households' mean WTP to achieve a 10% reduction in community alcohol-related harm was \$35.43 using the \$10 interval scale and \$53.50 using the \$25 interval scale [11]. These dollar amounts are used to provide a lower and upper estimate of households' WTP.

Combining reduced harm with community WTP

A 1.4% reduction in alcohol-related crime and traffic crashes was equivalent to a monetary value of \$4.96 and \$7.49 for the lower and upper WTP estimates, respectively. Multiplying this estimate with the number of post-intervention years (N = 4) and the number of households in the intervention communities (N = 46,529) results in a total community WTP of \$923,173 and \$1,394,009 for the lower and upper estimates, respectively. These calculations are summarised in Table 3.

Table 3. Communities' WTP to reduce alcohol-related harm.

Community willingness to pay (WTP)	Lower estimate (0-\$100 payment scale)	Upper estimate (0-\$250 payment scale)
Community WTP for first 10% reduction in alcohol harm	\$35.43	\$53.50
Weighted average reduction in alcohol crime and crashes	-1.4%	-1.4%
Average community WTP for 1.4% reduction	\$4.96	\$7.49
Number of years post-intervention period	4	4
Number of households in intervention towns	46,529	46,529
Total value of community WTP	\$923,173	\$1,394,009

Estimating the benefit-cost

Table 4 shows the net economic benefit of the AARC interventions is estimated to range from AUD \$1,658,429 to \$2,129,265. These estimates combine the value of resource savings from reduced alcohol-related crime and traffic crashes (\$735,256) with the community WTP estimates (\$923,173 and \$1,394,009 for the lower and upper estimates, respectively). It also shows a net cost of AUD\$1,214,012, comprising the AARC intervention costs (\$608,102) and the additional hospital inpatient admissions (\$605,910). Subtracting costs from benefits results in a net benefit ranging from \$444,417 to \$915,253, for the lower and upper estimates of WTP, respectively. This is equivalent to a BCA ratio of between 1.37 and 1.75. For every \$1 invested in AARC, the value of benefits is estimated at between \$1.37 and \$1.75.

Table 4. Benefit cost analysis of AARC.

Estimate	Lower estimate (0-\$100 payment scale)*	Upper estimate (0-\$250 payment scale)*
Savings from fewer alcohol crimes and traffic crashes	\$735,256	\$735,256
Community WTP	\$923,173	\$1,394,009
Net benefit	\$1,658,429	\$2,129,265
Cost of AARC interventions	\$608,102	\$608,102
Cost of additional alcohol-related hospital admissions	\$605,910	\$605,910
Net costs	\$1,214,012	\$1,214,012
Benefit - cost	\$444,417	\$915,253
Benefit cost ratio	1.37	1.75
*Lower and upper estimates reflect variations in community WTP		

Discussion

The AARC project is both the largest and most methodologically rigorous (cluster RCT) evaluation of community-action aimed at reducing risky alcohol consumption and alcohol-related harm undertaken internationally. The results show

community-action significantly reduces average weekly consumption and rates of alcohol-related verbal abuse, has a marginally significant effect in reducing alcohol-related street offences, long-term risky drinking and single occasion high-risk drinking, and marginally significantly increases hospital inpatient admissions for alcohol abuse⁹.

This study is the first prospective analysis of the economic impact of community-action in reducing risky alcohol consumption and harm. The comprehensive BCA, which is rarely applied in public health research, showed that because its benefits outweigh its costs, community-action provides a positive return for the investment. However, it is likely that this analysis has under-estimated the true benefit-cost of the approach, primarily because the health gains accruing over time from greater utilisation of hospital inpatient treatment were not included, even though the costs of providing this additional health care were included. Indeed, this BCA did not capture any potential benefits beyond 2009, despite the likelihood that the apparent reductions in alcohol-related risky drinking in the intervention communities will reduce the incidence of future alcohol-related harms.

Methodological considerations

Although the detailed methodological issues relevant to estimating the economic benefits and costs of community-action have been articulated in AARC's economic publications [11,13,19-25], they are summarised as follows. First, there is a dearth of good quality literature on the value to society of a crime or road traffic crash. Current evidence represents a piecemeal approach to estimating resource use, relying on a top-down approach that derives an aggregate budget and then apports the aggregate to various cost-drivers, such as the probability that an accident is reported to police and the time police spend at a crime scene. This method of costing is inherently less accurate than one which adopts a bottom-up approach. Due to time and resource constraints, the top-down approach was also utilised in this study, but only after refining the method of estimating costs to improve their validity [5,13].

Second, to avoid double counting with objective indicators, this study did not value the self-reported 20% reduction in average weekly consumption, the 30% reduction in the proportion of single occasion high-risk drinkers, the 42% reduction in verbal abuse, nor the 33% reduction in alcohol-related street offences [9]. Given emerging evidence for the high economic cost of the harm imposed by drinkers on other people, such as third-party pain and suffering [26], and the lack of current evidence on measuring these costs, such as out of pocket expenses [27], it is most likely that this study has under-estimated the true economic and social benefits of community-action in reducing alcohol related harms.

Third, this analysis included the cost of additional inpatient hospitalisations in the experimental communities, even

though the value of the health gain from treatment, which would be expected to accrue over time, was not included. To this extent the estimated BCA ratio further under-estimates the true economic benefits of AARC.

Fourth, despite its limitations, the WTP method remains an important method for estimating the monetary value households place on a reduction in harms within their community, and not accounting for this value would represent a substantial omission from the economic analysis.

Conclusion

Alcohol misuse has deleterious health, social and economic consequences. The AARC project utilised rigorous evaluation methods to quantify both the effectiveness of a community-action approach to reducing risky alcohol consumption and harms (a cluster RCT) and its economic efficiency (a BCA). In combination with outcomes from nested intervention studies and economic analyses [19,21-23], results from the AARC project provide policy makers, governments and researchers with rigorous evidence that community-action limits some types of risky alcohol consumption and harms, and provides a positive return for the investment. The AARC descriptive analyses also highlight that the benefits of community-action are likely to be enhanced by the implementation of effective complementary legislation, such as pricing mechanisms and greater restrictions on alcohol availability [3,28,29], and more effective drink-driving laws targeting young people [20,30,31].

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References

1. Rehm J, Mathers C, Popova S, Thavorncharoensap M, Teerwattananon Y, Patra J. Alcohol and Global Health 1: Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. *Lancet*. 2009, 373: 2223-2233.
2. Anderson P, Chisholm D, Fuhr DC. Effectiveness and cost-effectiveness of policies and programmes to reduce the harm caused by alcohol. *Lancet*. 2009, 373(9682): 2234-2246.
3. Cobaic L, Vos T, Doran C, Wallace A. Cost-effectiveness of interventions to prevent alcohol-related disease and injury in Australia. *Addiction*. 2009, 104(10): 1646-1655.
4. World Health Organization. *Global Strategy to Reduce the Harmful Use of Alcohol*. Geneva: WHO, 2010.
5. Gold MR., Siegel J, Russell L, Weinstein M. *Cost-effectiveness in health and medicine*. New York: Oxford University Press; 1996.
6. Drummond MF, Sculpher MJ, Torrance GW, O'Brien BJ, Stoddart GL. *Methods for the economic evaluation of health care programmes* Oxford: Oxford University Press, 2005.
7. Holder H, Gruenewald P, Ponickie W, Treno AJ, Grube JW et al. Effect of community-based interventions on high risk drinking and alcohol-related injuries. *JAMA*. 2000, 284(18): 2341-2347.
8. Shakeshaft A, Doran C, Petrie D, Alys Havard, Ansari Abudeen et al. *The Alcohol Action in Rural Communities (AARC) Project*.
9. Shakeshaft A, Doran CM, Petrie DP, Breen C, Havard A et al. The effect of community-action in reducing risky alcohol consumption and harm: a cluster randomised controlled trial. *PLoS Med*. 2014, 11(3): e1001617.
10. Rubin D. Causal Inference Using Potential Outcomes: Design, Modeling, Decisions. *JAMA* 2005, 100(469): 322-331.
11. Petrie D, Doran C, Shakeshaft A. Willingness to pay to reduce alcohol-related harm in Australian rural communities. *Expt Rev Pharm Out Res*. 2011, 11: 351-363.
12. Rollings K. *Counting the costs of crime in Australia: a 2005 update*. ed. Canberra: Australian Institute of Criminology, 2008.
13. Byrnes J, Doran C, Shakeshaft A. Cost per incident of alcohol-related crime in New South Wales. *Drug Alcohol Rev*. 2012, 31 (7): 854-860.
14. Australian Government Bureau of Transport Economics. *Road Crash Costs in Australia (Report 102)*. Canberra: Bureau of Transport Economics, 2000.
15. Australian Institute of Health and Welfare. *Australian hospital statistics 2005-06*. Canberra: Australian Institute of Health and Welfare, 2007.
16. Australian Bureau of Statistics. *Consumer Price Index*. Canberra: Commonwealth of Australia, 2012.
17. Hirth R, Chernew ME, Miller E, Fendrick AM, Weissert WG. Willingness to pay for a quality-adjusted life year: in search of a standard. *Med Decis Making*. 1999, 20: 332-342.

18. Ryan M, Scott DA, Donaldson C. Valuing health care using willingness to pay: a comparison of the payment card and dichotomous choice methods. *J Health Econ.* 2004, 23: 237-258.
19. Breen CL, Shakeshaft AP, Doran CM, Sanson-Fisher RW, Mattick RP. Cost-effectiveness of follow-up contact for a postal survey: a randomised controlled trial. *Aust N Z J Public Health.* 2010, 34(5): 508-512.
20. Czech S, Shakeshaft A, Byrnes J, Doran C. Comparing the cost of alcohol-related traffic crashes in rural and urban environments. *Accid Anal Prev.* 2010, 42: 1195-1198.
21. Havard A, Shakeshaft A, Conigrave K, Doran C. Randomised controlled trial of mailed personalised feedback for problem drinkers in the emergency department: the short-term impact. *Alcoholism: Clinical and Experimental Research.* 2012, 36(3): 523-531.
22. Navarro H, Shakeshaft A, Doran C, Petrie D. The cost-effectiveness of tailored, postal feedback on general practitioners' prescribing of pharmacotherapies for alcohol dependence. *Drug Alcohol Depend.* 2012, 124(3): 207-215.
23. Navarro H, Shakeshaft A, Doran C, Sanson-Fisher R. The potential cost-effectiveness of general practitioner delivered brief intervention for alcohol misuse: evidence from rural Australia. *Addict Behav.* 2011, 36: 1191-1198.
24. Petrie D, Doran C, Shakeshaft A, Sanson-Fisher R. The relationship between risky alcohol consumption, crime and traffic accidents in rural Australia. *Addict Behav.* 2010, 35: 359-362.
25. Petrie D, Doran C, Shakeshaft A, Sanson-Fisher R. The relationship between alcohol consumption and self reported health status using the EQ5D. *Soc Sci Med.* 2008, 67: 1717-1726.
26. Anne-Marie Laslett¹, Paul Catalano, Tanya Chikritzhs, Caroline Dale, Christopher Doran et al. The range and magnitude of alcohol's harm to others. Fitzroy, Victoria: AER Centre for Alcohol Policy Research, Turning Point Alcohol and Drug Centre, 2010.
27. Navarro H., Doran C, Shakeshaft A. Measuring costs of alcohol harm to others: a review of the literature. *Drug Alcohol Depend.* 2011, 114: 87-99.
28. Ludbrook A, Petrie D, McKenzie L, Farrar S. Tackling Alcohol Misuse: Purchasing Patterns Affected by Minimum Pricing for Alcohol. *App Health Econ Hlth Pol.* 2012, 10(1): 51-63.
29. Breen C, Shakeshaft A, Slade T, Love S, D'Este C, Mattick RP. Do Community Characteristics Predict Alcohol-Related Crime? *Alcohol Alcohol.* 2011, 46(4): 464-470.
30. Hall W, Wallace A, Cobaic L, Doran C, Vos T. How can we reduce alcohol-related road crash deaths among young Australians? *MJA.* 2010, 192: 464-466.
31. Czech S, Shakeshaft A, Sanson-Fisher R, Breen C. The development and application of a proxy measure of alcohol-related traffic crashes for rural communities. *Accid Anal Prev.* 2011, 43: 2160-2165.