alcohol action in rural communities

Foundation for Alcohol Research & Education

The Alcohol Action in Rural Communities (AARC) Project

Working with communities to select, implement and measure the impact of strategies to reduce alcohol-related harm

November 2012

UNSW THE UNIVERSITY OF NEW SOUTH WALES

NDARC

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

About the Foundation for Alcohol Research and Education

The Foundation for Alcohol Research and Education (FARE) is an independent charitable organisation working to prevent the harmful use of alcohol in Australia.

Our mission is to help Australia change the way it drinks by:

- helping communities to prevent and reduce alcohol-related harms
- building the case for alcohol policy reform
- engaging Australians in conversations about our drinking culture

Over the last ten years we have invested more than $115 million, helped 800 organisations and funded over 1,500 projects tackling the harms caused by alcohol misuse.

We use population-based policy approaches to support change across Australia. We carefully invest our donated resources in research, community projects and policy development to drive this change.

We are guided by the World Health Organization's *Global Strategy to Reduce the Harmful Use of Alcohol* for tackling alcohol-related harms through population-based strategies, problem directed policies, and direct interventions. For further information about FARE visit the FARE website at www.fare.org.au.

If you would like to contribute to FARE's important work, call us on (02) 6122 8600 or email info@fare.org.au. All donations to FARE over $2 are tax deductible.

About the National Drug and Alcohol Research Centre

The National Drug and Alcohol Research Centre (NDARC) is a premier research institution in Australia and is recognised internationally as a research centre of excellence. NDARC was established at the University of New South Wales (UNSW) in May 1986 and officially opened in November 1987. It is funded by the Australian Government as part of its National Drug Strategy. NDARC's mission is to conduct high quality research and related activities that increase the effectiveness of the Australian and international treatment and other intervention responses to alcohol and other drug-related harm. The Centre is multidisciplinary and collaborates with medicine, psychology, social science and other schools at UNSW, as well as with a range of other institutions and individuals in Australia and overseas. NDARC engages in collaborative projects with other researchers throughout Australia to provide a national focus for research in the alcohol and other drugs field, and has links with researchers overseas. In addition to the research conducted at NDARC, other activities include an Annual Symposium and a range of special conferences and educational workshops. NDARC researchers have a strong record of contributions to scientific journals and other publications, and NDARC also produces its own Australian Drug Trend Series, Technical Report Series and occasional Research Monographs, and co-produces a free bimonthly newsletter, CentreLines, to increase communication between the national research centres, other researchers, and workers in the alcohol and other drugs field.

The Alcohol Action in Rural Communities (AARC) Project

Working with communities to select, implement and measure the impact of strategies to reduce alcohol-related harm

AARC is a partnership between local communities, local government, government agencies, the Foundation for Alcohol Research and Education (FARE), the Universities of New South Wales and Newcastle and the National Drug and Alcohol Research Centre (NDARC)

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Foreword

Since 2001 the Foundation for Alcohol Research and Education (FARE) has promoted healthier drinking cultures for Australian communities. One of the most important ways we do this is by supporting community-driven projects that seek to prevent or reduce alcohol related harm.

Over the last ten years FARE has invested more than $115 million, funded 1,500 community based projects and supported 800 organisations. Through this important work, FARE has enabled a wide range of organisations to implement programs that have made a real and positive difference to the lives of many Australians, their families and their communities.

FARE recognises the importance of evaluating the effectiveness of the programs it has funded so the lessons learnt can be confidently shared more widely. This is why, eight years ago when we were prioritising new investments in community-based responses to alcohol-related problems, we supported the Alcohol Action in Rural Communities (AARC) project. This was one of the largest evaluations of the community action approach to reducing risky alcohol consumption and related harm ever undertaken anywhere in the world. Prior to the AARC project, there had been very few rigorous evaluations of the benefits of community action and the factors that influence the effectiveness of local strategies.

The barriers to this kind of comprehensive community-based comparison study are very difficult to overcome. These studies are often quite large as they entail a number of different communities. They carry a high price tag, require a significant level of expertise, involve long-term commitments from researchers and their partners, and are built around the cooperation and assistance of entire communities including local government, state and federal agencies, not-for-profits, and business.

The AARC Project faced all these barriers and more, but FARE was committed to the fundamental value of learning more about what works at a community level. After several lengthy discussions with the researchers, their peers and the FARE Board, we agreed to back this ground-breaking research.

With almost $2.4 million in FARE funding, this ambitious study involved 10 experimental and 10 control rural communities in New South Wales and comprised 13 interventions implemented over five years.

A partnership between local communities, local government, government agencies, FARE, the Universities of New South Wales and Newcastle, and the National Drug and Alcohol Research Centre (NDARC); this complex project could not have succeeded without the cooperation and assistance of all involved.

The AARC findings clearly demonstrated that the benefits of implementing community action outweigh the associated costs of such action. The trial also proved the worth of the various interventions in the experimental communities; resulting in a 24 per cent reduction in alcohol-related street offences; an 8 per cent reduction in assaults and statistically significant lower proportions (31%) of short-term high-risk drinkers.

Of course the benefits go beyond the immediate reductions in alcohol-related harm for the communities involved. The AARC project is a living, breathing experiment; an investment over five years that allowed 10 NSW rural townships the opportunity to be more engaged and involved in the prevention and reduction of alcohol-related harms and improved the lives of those in their communities.

Beyond those communities, the valuable information and research gathered will be of further benefit to other communities and other Australians as facets of this project are adapted and adopted throughout the country in the years ahead.

For FARE, this real world research into what works is at the heart of our approach to research investment. The AARC project is a beacon, shining a light on what is possible when communities decide to accept responsibility for addressing the harms caused by alcohol misuse.

AARC has already made a real difference in some drinking cultures and the findings of this report will hopefully continue that work for many years to come.

David Crosbie
Chairman, FARE Research Committee

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Acknowledgements

This research project was funded by the Foundation for Alcohol Research and Education (FARE) and was conducted under a Service Agreement between FARE and the Universities of Newcastle and New South Wales. We are very grateful to the Board of FARE for the opportunity to conduct this challenging and ground-breaking research and to the staff of FARE for their continued support and encouragement over the life of the project.

We would like to highlight the outstanding contribution of the AARC communities to this research effort, especially the 10 experimental communities. The project would simply have been impossible without their willingness to engage with the research team, consider the merits of various interventions and implement the agreed strategies. We can only hope that the experience of being involved in rigorous and often difficult research, along with the knowledge we have gained as a result of the AARC project, will be a spring-board towards developing new partnerships with researchers, policy experts and governments, to the betterment of the lives of those who live and work in your communities.

At the substantial risk of omitting individuals who have provided valuable assistance, we are grateful for the expertise and encouragement provided by the Advisory Group and senior collaborators, from whom we sought advice and practical assistance at various stages of the project:

- Professor Richard Mattick, NDARC;
- Professor Ann Roche and Dr Ken Pidd, NCETA;
- Professor Kate Conigrave and Dr Elizabeth Proude, University of Sydney;
- Ms Robyn Considine, CONSAN Consulting;
- Mr Nathan Hawkins, University of Newcastle;
- Dr Marita Lynagh, University of Newcastle;
- Professor Ian Webster, Emeritus Professor, University of NSW;
- Professor John Wiggers, University of Newcastle;
- Conjoint Professor Bob Batey, University of Newcastle;
- Associate Professor Billie Bonevski, University of Newcastle;
- Professor Komla Tsey, and Professor Peter d'Abbs, James Cook University, Cairns;
- Professor Tanya Chikritzhs, National Drug Research Institute;
- Mr Paul Dillon, NDARC;
- Ms Tracey Cross and Ms Elizabeth Callister, NSW Department of Education and Training;
- Professor Lawrence W Green, University of California;
- Dr Michael Flynn, NSW Ambulance Service;
- Ms Yvonne Korn, Project Director, Community Drug Action Teams, NSW Health;
- Mr Richard Colbran, Good Sports, Australian Drug Foundation;
- Mr Luc Betbeder-Matibet, web-design consultant;
- Mr Peter Rubinstein, Director, RADD Australia;
- Ms Anne Ratu, Policy Branch, NSW Department of Gaming and Racing;
- Mr Geoff Troth and Ms Claudia Vecchiato, NSW Department of Juvenile Justice;
- Professor Virginia Schmied, NSW Department of Community Services;
- The addiction specialists who provided the GP training: Drs Gilbert Whitton, Adam Winstock, John Saunders; Professors Kate Conigrave, Greg Whelan, Paul Haber, Bob Batey; and Associate Professor Tony Gill; and
- Professor Wayne Hall, University of Queensland.

Particular thanks to those who provided data at various intervals during the project, especially:

- Dr Don Weatherburn, Ms Jackie Fitzgerald and Mr Craig Jones, Bureau of Crime Statistics and Research;
- Dr Lee Taylor and Ms Kim Lim, NSW Health;
- Associate Professor Soames Job and Mr Phil Sparkes, NSW Roads and Traffic Authority;
- Medicare Australia; and
- Mr Jim Baldwin, NSW Police.

We are also very grateful to the administrative staff of the University of Newcastle and the University of NSW who provided enormous assistance with the ethical and financial logistics of the AARC project, most notably:

- Ms Ruth Gibbins and Ms Sue O'Connor, Human Research Ethics Committee, University of Newcastle;
- Mr Damien Ryan and Ms Jane Gibson, Finance Department, University of Newcastle; and
- Ms Cris Corpus, Ms Heli Wolk and Mr Tony Gardner, University of NSW;

Last but not least, our most heartfelt thanks to our research colleagues at NDARC who worked tirelessly on the day-to-day implementation and evaluation of the project, providing the energy, enthusiasm and skills to ensure the extraordinarily high quality of the project:

- Ms Bianca Calabria;
- Dr Suzanne Czech;
- Ms Catherine Deans;
- Ms Rox DeLuca;
- Ms Pota Hatzopolous;
- Ms Stephanie Love;
- Associate Professor Tim Slade; and
- Ms Barbara Toson.

Acronyms

AA	Alcoholics Anonymous
AAF	Alcohol Aetiological Fractions
AARC	Alcohol Action in Rural Communities
ABS	Australian Bureau of Statistics
ACCHS	Aboriginal Community Controlled Health Services
ADF	Australian Drug Foundation
AEC	Australian Electoral Commission
AIC	Australian Institute of Criminology
AIHW	Australian Institute of Health and Welfare
AIS	Association of Independent Schools (NSW)
APSAD	Australasian Professional Society on Alcohol and Other Drugs
AR-DRGs	Australian Refined Diagnosis Related Groups
ARIA	Accessibility/Remoteness Index of Australia
AUDIT	Alcohol Use Disorders Identification Test
AUDIT-C	Alcohol Use Disorders Identification Test - Consumption
BAC	Blood Alcohol Concentration
BCA	Benefit-Cost Analysis
BEACH	Bettering the Evaluation and Care of Health
BI	Brief Intervention
BOCSAR	Bureau of Crime Statistics and Research (NSW)
CDAT	Community Drug Action Teams
CEO	Catholic Education Office (NSW)
CI	Confidence Intervals
CTP	Community Trials Project
CV	Contingent Valuation
D&A	Drug and Alcohol
DET	Department of Education and Training (NSW)
DRG	Diagnosis Related Group
ED	Emergency Department
FARE	Foundation for Alcohol Research and Education
GEE	Generalised Estimating Equation
GP	General Practitioner
ICD	International Classification of Diseases
ICER	Incremental Cost Effectiveness Ratio
NCETA	National Centre for Education and Training on Addiction
NDARC	National Drug and Alcohol Research Centre
NDSHS	National Drug Strategy Household Survey
NHMRC	National Health and Medical Research Council
NSW	New South Wales
OR	Odds Ratio
RACGP	Royal Australian College of General Practitioners
RBT	Random Breath Testing
RCT	Randomised Controlled Trial
RN	Registered Nurse
RTA	Roads and Traffic Authority (NSW), now known as the Roads and Maritime Services
SBI	Screening and Brief Intervention
SE	Standard Error
SEIFA	Socio-Economic Indexes For Areas
UCL	Urban-Centre Locality
UNSW	University of New South Wales
WA	Western Australia
WHO	World Health Organization
WTP	Willingness to Pay

Executive summary

Overview

This report presents the results of the largest and most rigorous evaluation of a community-action approach to reducing risky alcohol consumption and related harm that has ever been undertaken world-wide. It is also the first time community-action has been evaluated using the most comprehensive economic approach available: a benefit-cost analysis. The detailed methods and results will appear in the 35 papers to be peer-reviewed and published in the scientific literature, 25 of which are already published and two are under review (see Chapter Five). To optimise the extent to which the results are accessible to a wide-range of stakeholders, community members and policy-makers, this report summarises the approach taken, identifies the major outcomes and provides practical recommendations for communities, policy makers and researchers.

The AARC approach

Governments, the World Health Organization, policy experts, researchers and community members all support the idea of greater co-ordination of efforts aimed at reducing alcohol-related harm. In a media release dated 6 August 2011, for example, the then Australian Minister for Health and Ageing, the Honourable Nicola Roxon, said: "Binge drinking among young people is a community-wide problem that demands a community-wide response..."

Despite this support, a rigorous evaluation of co-ordinated community-action had not been done, making it difficult to weigh its value relative to other strategies, such as legislative approaches (e.g. alcohol taxation policy), and individual public health and clinical interventions. The AARC project addresses this knowledge gap. It is the first evaluation of community-action for alcohol harm that uses a prospective randomised controlled trial design, the most scientifically rigorous evaluation design available, and a benefit-cost analysis, the most comprehensive method of economic evaluation appropriate for a community-action intervention.

The AARC project had four primary aims:

1. identify the extent to which alcohol harms differ between otherwise similar communities;
2. estimate the effectiveness of a community-action approach in reducing alcohol-related harm using a cluster RCT as the most stringent evaluation design;
3. conduct a benefit-cost analysis as the most comprehensive economic evaluation; and
4. contribute to the current research effort in the alcohol field and help build capacity for future community-based alcohol intervention research in Australia.

The study involved 10 experimental and 10 control rural communities in New South Wales. Data on alcohol consumption and alcohol-related harms were obtained from pre- and post- intervention surveys of the control and experimental communities, and routinely collected data:

- alcohol-related crime;
- alcohol-related road traffic accidents; and
- alcohol-related hospitalisations.

The community-action approach involved coordination and implementation of the following 13 interventions across each of the experimental communities over five years:

- community engagement;
- feedback of data and results to key stakeholders;
- media advocacy (feedback to communities);
- GPs: provision of tools and training for screening and brief intervention;
- GPs: tailored feedback to increase their alcohol prescribing;
- workplace policies and training;

- high school-based interactive session on alcohol harms;
- pharmacy-based screening and brief intervention;
- Aboriginal Community Controlled Health Service screening and brief intervention;
- identifying and targeting high risk weekends;
- Good Sports program (promoting safer drinking in sports clubs);
- hospital Emergency Department-based screening and brief intervention; and
- web-based screening and brief intervention.

These ranged in cost from $2,959 for pharmacy-based screening and brief intervention to $195,393 for media advocacy. The total cost of this package of interventions was $61,000 per community.

Major outcomes

1. Exploratory analyses across the 20 communities involved in the AARC project showed:
    - communities have significantly different patterns of risky drinking and different types of alcohol harms that are most problematic for them. This highlights the importance of tailoring interventions to the specific circumstances of individual communities, within the broader legislative framework set by the Australian and State/Territory Governments.
2. The statistical analyses showed that the experimental communities at post-intervention, relative to the controls, had:
    - statistically significant lower proportions of short-term high-risk drinkers (31% reduction, ≤ 3% likelihood that this result occurred by chance) and less experience of alcohol-related verbal abuse (40% reduction, ≤ 1%).
    - marginally statistically significant lower proportions of long-term risky drinkers (33% reduction, ≤ 7%), fewer alcohol-related street offences (32% reduction, ≤ 6%), more hospital inpatient admissions for alcohol abuse (43% increase, ≤ 6%) and fewer total alcohol-related crimes (17% reduction, ≤ 11%).
    - no change in alcohol-related traffic crashes, assaults, malicious damage, short-term risky drinking, hazardous/harmful consumption or inpatient admissions for alcohol dependence.
3. The Benefit-Cost Analysis showed:
    - for every $1 invested in AARC, the value of benefits returned to communities was estimated at between $1.37 and $1.75.
    - the experimental communities saved $735,256 in reduced alcohol-related crime and traffic crash costs from a: 24% reduction in alcohol-related street offences; 8% reduction in assaults; 2% reduction in malicious damage incidents; and 1% reduction in traffic crashes (excluding fatalities which occurred too infrequently to be reliably estimated).
    - there was an increase in hospitalisation costs in the experimental communities from more problem drinkers seeking, or being referred to, hospital treatment for an alcohol-related condition, costing an estimated $605,910. These additional costs were less than the savings, yielding a net benefit.
4. AARC's contribution to the current research effort, and building future research capacity, is shown by:
    - publication of more than 30 papers in the international, peer-review scientific literature.
    - successfully training 5 PhD students and 2 Masters students in community-based research, all of whom continue to work in the alcohol research field both nationally and internationally.

Recommendations

The most practical question for communities, researchers and policy makers is what should happen next as a consequence of AARC. The simplest answer is that communities should focus on reducing those harms that are most problematic in their community. This means that community-action is not a prescriptive set of intervention strategies but a standardised approach, which can be defined by the recommendations that there be:

- *data-based decision making and evaluation.* This requires obtaining and analysing community-specific data to inform decisions about which alcohol-related harms to target in which communities, and also to measure the impact of implemented strategies;
- *co-ordinated implementation of multiple strategies.* This requires the availability of multiple, evidence-based intervention options from which communities can choose, and a process to assist communities to adapt their preferred interventions to their own specific circumstances (e.g. the resources available in their community); and
- *partnering between communities, and with researchers, to facilitate more frequent and more rigorous evaluation.* This requires communities with similar rates of a targeted harm to work together to rigorously establish the benefit of an intervention, which is not possible for communities to achieve individually.

Implementing these recommendations will require integrated effort. Since it is unreasonable to expect communities by themselves to have the knowledge and expertise to obtain and analyse data, distil reasonably compelling evidence from the scientific literature about which strategies are likely to be effective, and devise practical but adequately rigorous evaluation designs, communities will need access to practical research and evaluation skills to facilitate community-action in 'real time'. Governments and policy makers can play a critical role in creating the environment for these community/researcher partnerships to develop. AARC has shown that communities and researchers can successfully work together to help communities take responsibility for, and reduce, their levels of alcohol harm, which represents a highly valued outcome for communities, governments and researchers.

This report proposes a practical model that, if implemented, would promote greater integration between communities, researchers, policy experts and governments (see Chapter Six). The next phase of community-action effort ought to focus on making integrated partnerships routine.

1 Context, aims and method of the AARC project

KEY FINDINGS

1. Although governments, policy makers, researchers and communities all agree on the potential for more co-ordinated community-level action to reduce alcohol-related harm, there have been few rigorous evaluations of whether the benefits of community-action outweigh its costs.
2. The Foundation for Alcohol Research and Education (FARE) funded the Alcohol Action in Rural Communities (AARC) project. AARC is the first randomised controlled trial of community-action in Australia and only the fifth of its kind internationally.
3. AARC partnered with 10 experimental communities to devise and implement a community-action strategy aimed at reducing alcohol misuse and alcohol-related harm. It used the most stringent evaluation design available (a cluster randomised controlled trial) and the most comprehensive economic analysis (benefit-cost).
4. The AARC approach comprised 13 interventions implemented over five years, ranging in cost from $195,393 for media advocacy to $2,959 for pharmacy-based screening and brief intervention.
5. The total cost of the interventions across all AARC communities was $608,102, or $61,000 per community, ensuring that community-action would be feasible to implement in other communities in Australia if the benefits were shown to outweigh the costs.

Context of the AARC project

Burden of harm imposed by alcohol misuse in Australia

An estimated 4% of the global burden of disease is attributable to alcohol, which is comparable to the death and disability associated with tobacco and hypertension [1, 2]. In Australia, 3.3% of the total disease burden was attributable to alcohol use in 2003 [3]. The annual social cost of alcohol in Australia is over $15 billion with lost productivity in the workplace and home costing $3.5 billion and $1.5 billion, respectively, with the cost of alcohol-related road crashes and crime estimated at $2 billion and $1.6 billion, respectively [4]. A recent Australian study that more comprehensively accounted for costs imposed on people other than drinkers themselves, funded by the Foundation for Alcohol Research and Education (FARE), added in excess of $13 billion for out-of-pocket costs and forgone wages and productivity, approximately $0.8 billion for hospital and child protection costs and $6 billion for intangible costs [5].

The Australian approach to reducing the alcohol-related burden of harm

Reducing the alcohol-related burden of harm most efficiently in Australia requires, in addition to cost-effective clinical treatment options for those who are highly alcohol dependent [6], a range of population-level strategies that aim to reduce weekly or average levels of consumption, risky drinking on single occasions and drinking in high-risk situations, such as during pregnancy and in workplaces [7]. In terms of clinical treatment, for example, the Royal Australian College of General Practitioners' (RACGP) current guidelines recommend acamprosate to support abstinence from drinking and naltrexone for the maintenance of abstinence and prevention of heavy drinking [8]. In relation to population-level strategies, the most recent National Health and Medical Research Council (NHMRC) guidelines recommend that healthy men and women drink no more than two standard drinks on any one day to reduce lifetime risk of alcohol-related harm, consume no more than four standard drinks sequentially (without blood alcohol concentration reaching zero between drinks) to reduce the risk of injury on a single occasion of drinking, and that children, young people (under 18 years of age) and women who are pregnant or breastfeeding not drink at all [9].

The Australian National Drug Strategy for 2010-2015, approved by the Ministerial Council on Drug Strategy in February 2011, categorises the range of intervention options required in terms of three pillars: demand reduction; supply reduction; and harm reduction [10]. Demand reduction strategies aim to prevent the uptake and/or delay the onset of alcohol use, reduce the misuse of alcohol in the community and support people to recover from dependence and reintegrate with the community. Supply reduction aims to control, manage and/or regulate the availability of alcohol. Harm reduction aims to reduce the adverse health, social and economic consequences of alcohol use. These categories of demand, supply and harm reduction are complementary to the RACGP's and NHMRC's conceptualisations, as shown in Table 1.1, which is an illustrative, rather than an exhaustive, depiction of possible alcohol harm-reduction strategies.

Table 1.1: Classification of selected interventions in the Australian context

	Demand reduction	Supply reduction	Harm reduction
Clinical treatment	• Withdrawal management • Psycho-social interventions • Pharmacotherapies • Self-help groups (e.g. AA)		
Population strategies	• Pricing/tax • Minimum age laws • Advertising controls • School-based education	• Closing hours • Alcohol outlet density • Dry communities	• Brief interventions • Media advocacy • Workplace policies • Mass media campaigns • Use of plastic containers • RBT • Licensing controls

Australian research funded by FARE analysed the cost-effectiveness of some of these individual strategies and strongly recommended the implementation of a range of interventions to optimally minimise alcohol-related harm [11]. This analysis also emphasised that increasing the number of population-level strategies, or improving their effectiveness, could be achieved at relatively low cost, because their successful implementation would reduce demand for clinical treatment services for alcohol-related diseases and injuries.

Implementation of individual interventions to reduce alcohol-related harm

Historically, specific intervention strategies to reduce alcohol-related harm have been targeted at defined groups or settings considered to have the highest rates of alcohol-related harm, or the greatest potential to prevent the occurrence of alcohol-related harm. General Practitioners (GPs), for example, have been encouraged to provide Screening and Brief Intervention (SBI) to reduce their patients' risk of significant adverse effects from alcohol use. This is because GPs have good access to the whole population (an estimated 88% of the population visit their GP at least once each year [12], patients regard GPs as a credible source of health information and advice [12], and such advice is effective (achieving an estimated mean reduction of 3.8 standard drinks per week [13, 14]. Consequently, the current RACGP guidelines recommend that GPs use the Alcohol Use Disorders Identification Test-Consumption questionnaire (AUDIT-C) to identify the alcohol consumption of all their patients aged at least 15 years, followed by an appropriate level of intervention [8].

Similarly, schools have provided drug and alcohol education to young people, the Australian Government sets alcohol taxation/pricing policy and alcohol advertising is governed by a voluntary code of conduct, monitored by representatives from the alcohol industry, advocacy groups and the general community. There continues to be debate about, and research into, which methods are most cost-effective in implementing interventions in these settings. For example, will GPs be more likely to implement SBI routinely in response to financial incentives or computerised reminder systems [15]? What are the most efficient and acceptable forms of alcohol taxation [16]? Should advertising codes of practice be mandatory rather than voluntary?

Co-ordinated implementation of interventions to reduce alcohol-related harm

Policy experts and researchers have begun to explore the potential of strategically co-ordinating intervention efforts across different settings. Both the Australian Ministerial Council on Drug Strategy and, more recently, the World Health Organization (WHO), have argued that because the burden of alcohol harm is spread across multiple settings, including health services, police and workplaces, all members of a community have a joint responsibility to work together to reduce alcohol-related harm, rather than relying on efforts within the health care sector [17-19]. Indeed, in a media release dated 6 August 2011, the then Australian Minister for Health and Ageing, the Honourable Nicola Roxon, said: "Binge drinking among young people is a community-wide problem that demands a community-wide response ..." [20]. Researchers have supported the view that a more systematically co-ordinated combination of these strategies is required to maximise their impact at a community level, even accepting that the effect of more co-ordinated effort within communities will be influenced by the broader legislative framework in which it occurs, such as government policies on taxation, pricing and trading hours. In addition to policy makers and researchers, community-action is highly acceptable to communities themselves: 86% of a sample of 3,017 individuals randomly selected from across the 20 AARC communities agreed or strongly agreed that communities should work together more effectively to reduce alcohol-related harm [21].

A community-action approach that improves co-ordination of activity across settings is also likely to be highly cost-beneficial for a number of reasons. First, it minimises duplication of effort and wasting of resources. Second, the effect of each individual intervention can be synergistically enhanced: an intervention implemented in one setting is more likely to be influential in changing behaviour if it is complemented by related interventions implemented elsewhere. GP-delivered SBI, for example, is more likely to significantly reduce an individual's drinking if a floor price is also legislated by government to ensure alcohol cannot be obtained too cheaply. Third, intervention efforts can be more effectively tailored to the alcohol-harms that are specific to individual communities, which is important given communities have different rates of alcohol-related harm, such as crime, traffic crashes and hospital inpatient admissions (see Chapter 2). Fourth, different communities will have different levels of resources with which to implement alcohol interventions, such as rates of GPs per capita. This, in turn, will influence how services will most effectively be co-ordinated in different communities. Fifth, greater public recognition that alcohol imposes substantial harms across a range of services, settings and individuals can increase the motivation of all community members to reduce them, a principle that underpins the apparent effectiveness of media advocacy [22].

The contribution of the AARC project

Despite the high level of support for community-action from policy makers, researchers and communities for reducing alcohol-related harm, and the likely benefits of more co-ordinated interventions in communities, the empirical evidence required to support the routine implementation of community-action has been inadequate. This is not to argue that the lack of supportive evidence is the sole, or even necessarily the most important, factor inhibiting the implementation of community-action: clearly there are broader organisational and logistical issues that would also need to be addressed for its successful and widespread implementation. Rather, establishing the extent to which the costs of implementing community-action would be off-set by its benefits is a logical step that would, depending on the outcome, either increase or decrease the strength of the argument for community-action, even if such evidence by itself is insufficient to achieve wide-spread adoption of community-action. Improving this evidence base in both the short- and long-term, therefore, required generating new data to inform community-action in three areas:

- information on the extent to which consumption and harms differ between communities;
- quantifying the costs versus the benefits of community-action; and
- increasing alcohol intervention research output and building capacity for future research.

Information on the extent to which consumption and harms differ between communities

The importance of tailoring interventions to communities is predicated on the idea that alcohol-related harms differ between communities. To date, however, the extent to which this is the case has not been demonstrated in Australia. Existing data are limited to national and state/territory levels [23, 24], provide generic comparisons between rural, remote and urban areas [25], or are specific to certain types of alcohol-related harm, such as assaults, using measures of uncertain accuracy [26]. The lack of comparative community-level data makes it difficult for communities to tailor intervention efforts to their specific harms or to evaluate the effects of those interventions. Consequently, AARC first set out to use the most accurate available measures to assess the extent to which otherwise similar communities may experience different types of alcohol-related harms.

Quantifying the costs versus the benefits of community-action

There have been very few rigorous attempts to quantify the effect of greater co-ordination of activity across communities. The results of only 26 alcohol community-action trials have been published in the peer-review international literature since 1980, one of which was conducted in Australia. These studies have been very limited in their scope and rigour: they have only implemented a small number of community activities; they have not used the most scientifically rigorous evaluation designs and measures; and they have not reported on the costs versus the benefits of the approach. The most rigorous evidence about what works comes from randomised trials. Despite this, there have been only four randomised trials of the effectiveness of alcohol community-action to date, all of which were US-based, focused on young people (the unit of randomisation in three trials was schools, rather than the community) and limited to self-report or alcohol purchase attempt outcomes.

Arguably the best known non-randomised trial that used community-level measures has been the Community Trials Project (CTP) in the US, the results of which were published in 2000 [22]. It utilised three pairs of matched experimental and control communities and reported a 10% reduction in night-time injury road crashes, a 6% reduction in road crashes where the driver had been drinking and a 43% reduction in assault injuries observed in accident and emergency hospital facilities that resulted in at least a one-night hospital stay [22]. The CTP study, however, had a number of critical limitations. First, it was limited to six communities, meaning it had limited statistical power and generalisability to other communities. Second, it was not a randomised trial, meaning the results were susceptible to unintended biases, such as selection bias (which artificially increases the likelihood of obtaining a positive result). Third, it only performed a basic cost-effectiveness analysis, meaning it did not compare the full range of costs and benefits for participating communities [22].

AARC aimed to utilise the strongest evaluation design possible (a cluster Randomised Controlled Trial [RCT]) to more accurately quantify whether the costs of community-action were more or less than its benefits. AARC represents a next iteration of research effort in determining the effectiveness, costs and benefits of community-action in reducing alcohol-related harm.

Increasing intervention research output in this field and building capacity for future research

The only Australian community-action alcohol intervention trial published in the international peer-review literature since 1980 is based on a study of two communities in WA [27]. The AARC project aimed to increase research capacity for conducting methodologically rigorous community-action alcohol research in Australia, including economic analyses. This contribution occurred in three ways: using the opportunity of the AARC RCT design and the initial work of engaging with communities to conduct five additional studies embedded within the project; emphasising the publication of results from various AARC analyses and activities in international, peer-review journals; and ensuring a longer-term contribution of the research by recruiting and training higher degree students in research, namely, four PhD and two Masters students.

Aims

The AARC project had four primary aims:

1. identify the extent to which alcohol harms differ between otherwise similar communities;
2. estimate the effectiveness of a community-action approach in reducing alcohol-related harm using a cluster RCT as the most stringent evaluation design;
3. conduct a benefit-cost analysis as the most comprehensive economic evaluation; and
4. contribute to the current research effort in the alcohol field and help build capacity for future community-based alcohol intervention research in Australia.

Method

Study design

The AARC project used a prospective RCT evaluation design, with whole communities as the unit of randomisation and analyses. An RCT is widely accepted as the most scientifically rigorous evaluation design available for controlling baseline differences between communities [28]. A benefit-cost analysis also represents the most comprehensive method of economic evaluation that is most appropriate for a community-action intervention, where the benefits and costs will be dispersed across a range of settings and sub-populations within the community [29]. This project is the first undertaken internationally to evaluate a community-action approach using both an RCT evaluation design and a benefit-cost economic analysis.

Selection of communities

Communities in New South Wales (NSW) were invited to participate if they: had an Urban-Centre Locality (UCL) population between approximately 5,000 and 20,000 (N=27 communities) [30]; were at least 100 kilometres away from a major urban centre, defined as a population of at least 100,000 (n=24 communities); and were not known to be currently involved in any other large scale project aimed to assess or reduce alcohol-related harm (n=20 communities). Communities with a UCL population between 5,000 and 20,000 were selected because that has been identified as the optimal size for effective activation of community-action studies: they represent a balance between being large enough to have sufficient resources to implement multiple interventions and being small enough to allow observation of alcohol-related harms and intervention effects across different settings within the community [31, 32]. Specifying a substantial minimum distance to an urban centre and ensuring communities were not part of an existing alcohol project maximised the likelihood that any changes in alcohol-related harm were due to the AARC interventions, rather than spill-over effects of activities in a larger urban centre or undertaken as part of another project. A substantial distance to a larger community also minimised the likelihood that the interventions would simply shift alcohol-related harm to a larger centre and provided a reasonably precise and contained definition of a community.

AARC was limited to communities in NSW to avoid confounding based on legislative differences between states/territories. The measures and interventions, however, were designed to be applicable to any defined community or population within Australia. Involving regional communities also has a number of equity, pragmatic and methodological advantages. First, alcohol-related high-risk behaviours and harms are disproportionately greater in rural, as opposed to metropolitan, locations. The per capita rate of convictions associated with drink-driving in rural communities, for example, is approximately double that of metropolitan areas (302 versus 577 per 100,000 population) [26]. Initial analyses conducted as part of AARC indicate that these higher rates of drink-driving convictions are reflected in greater drink-driving harms: the rate per 10,000 population of alcohol-related crashes is 1.5 times higher in rural communities than in urban communities, and the attributable cost is four times higher. The disproportionately high cost, relative to crashes, is largely because rural alcohol-fatalities are seven to eight times more prevalent and costly [33]. Second, dissemination of information through informal networks in regional communities is likely to be superior to that in metropolitan ones. Third, working with communities that are geographically distant from one another minimises the risk of cross-contamination of the interventions and, therefore, enhances the methodological rigour of the study. Fourth, the size of rural communities makes it easier to examine intervention outcomes and to observe changes across different sectors of the community, such as the impact on rates of alcohol-related hospitalisations from improved GP prescribing (see the summary of the trial aimed at improving GPs' prescribing for alcohol dependence in Chapter 5).

Allocation of communities to the control and experimental conditions

The proportions of males, people aged 15-24 and Aboriginal and Torres Strait Islander peoples was obtained for each of the 20 communities, using the Australian Bureau of Statistics (ABS) 2001 Census of Population and Housing data [30], because of disproportionately higher levels of alcohol-related harm among males [34], young people [35] and in Indigenous communities [34]. The proportion of males and people aged 15-24 was similar so communities were ranked, in decreasing order, according to the percentage of the population defined as Aboriginal Australians.[1] Contiguous communities were provisionally classified as matched pairs. Each matched pair was checked to ensure that they were at least 100 kilometres apart, to minimise the cross-contamination of intervention effects between experimental and control communities. One community within each pair was then randomly allocated to the experimental group using a customised computer program.

Community characteristics

Given the focus of AARC was on working with whole communities, rather than individuals, community-level characteristics were obtained that either reflected factors known to be associated with higher rates of risky drinking (e.g. youth, remoteness, numbers of licensed venues) or represented a resource that communities could use in interventions to reduce alcohol-related harm (e.g. police, GPs). In addition to the information obtained to select and match communities, the geographical remoteness of each community was defined according to Accessibility/Remoteness Index of Australia (ARIA) scores (where higher scores indicate that a community is more remote) [36]. The socio-economic status of each community was defined by the Socio-Economic Indexes For Areas (SEIFA) disadvantage deciles (where higher scores indicate greater socio-economic advantage) [37]. The number of licensed premises was extracted by postcode from information published by the NSW Office of Gaming and Racing in 2004 [38]. Given evidence of differential harm associated with license type [39], the number of hotels and clubs, the number of wholesalers and retailers, and the number of other licensed premises (e.g. airport, function centres, motels, restaurants, theatres and cellar-doors) were obtained as distinct variables. The number of full-time police officers and highway patrol officers was collated from information provided by the NSW Police Local Area Command. The number of GPs was obtained from the relevant Divisions of General Practice. Table 1.2 summarises these characteristics, separately for the 10 experimental and 10 control AARC communities. There were no statistically significant differences ($p \leq 0.05$) between the experimental and control communities, providing some face validity for the effectiveness of the randomisation process.

[1] In NSW, the term 'Aboriginal Australians' is generally used in preference to 'Aboriginal and Torres Strait Islander people' in recognition that Aboriginal people are the original inhabitants of NSW. Refer: *Communicating positively A guide to appropriate Aboriginal terminology.* NSW Health, 2004: At: http://www.health.nsw.gov.au/pubs/2004/pdf/aboriginal_terms.pdf. Accessed 20 June 2012.

Table 1.2: Community-level summary statistics, separately for experimental and control communities

Community characteristics	Experimental (n=10) Mean (SD)	Control (n=10) Mean (SD)
% young males (15-24 years)	6.1 (0.5)	5.9 (0.4)
% Aboriginal or Torres Strait Islander	4.9 (2.6)	4.9 (4.5)
ARIA score	2.9 (0.6)	2.9 (2.0)
SEIFA score	957.8 (23.0)	955.9 (25.5)
Licensed premises[a]	28.4 (7.7)	27.1 (7.1)
Hotels/clubs[a]	11.1 (4.0)	9.9 (3.8)
Alcohol wholesalers/retailers[a]	3.8 (2.4)	2.8 (1.7)
Other liquor licensed premises[a]	13.4 (5.0)	14.3 (5.6)
Full-time police[a]	14.3 (4.7)	21.0 (11.7)
Full-time highway patrol[a]	4 (1.1)	3.4 (2.3)
General practitioners (GPs)[a]	9.6 (3.8)	12.4 (7.8)

[a]Per 10,000 population

Measures

AARC measures comprised a pre- and post-intervention survey of communities, and routinely collected data on: alcohol-related crime; traffic crashes; and inpatient hospitalisations. Survey data were designed to identify harms that are substantial, although not severe enough to be reported to police or to require hospitalisation. Routinely collected data were used because they provided a potential retrospective baseline of alcohol harms over a number of years. The latter measures have been used relatively infrequently to evaluate intervention effects: of the 26 alcohol community-action trials published in the peer-review international literature since 1980, only four used crime or police statistics as an outcome, four used traffic crash data and only one used hospital admissions [40]. Given that these routinely collected data have rarely been used to evaluate alcohol community-action interventions, AARC conducted analyses to identify the most appropriate methods for comparing communities at baseline and for evaluating any intervention effects [41-44]. Table 1.3 summarises the measures used, the source of the data and the type of outcome each measure represents.

Table 1.3: Summary of measures, data sources and types of outcomes

Alcohol-related measure	Source	Type of outcome		
		Harm (objective)	Harm (self-report)	Consumption (self report)
Community incidents recorded by surveys	AARC community survey *(pre- and post-intervention)*		x	x
Criminal incidents recorded by police	NSW Bureau Of Crime Statistics and Research	x		
Traffic crashes recorded by the NSW Road Traffic Authority	NSW Road Traffic Authority	x		
Hospital inpatient admissions recorded by hospitals	NSW Health	x		

Community alcohol incidents recorded by surveys

The sampling methods and sample characteristics

A community survey was devised and distributed to randomly selected residents of the AARC communities, both pre- and post-intervention. For the pre-intervention survey, conducted in 2005, potential participants were randomly selected from the electoral roll of the Australian Electoral Commission (AEC). For the post-intervention survey, conducted in 2010, the AEC had changed its guidelines for access to the electoral roll so participants were randomly selected from the electoral roll of the NSW Electoral Commission. Although it may have been methodologically preferable to survey the same people at both time points, this was not possible because a condition of receiving the AEC data was that all identifying information had to be destroyed within three months of mailing out the surveys. Both the pre- and post-intervention survey samples were stratified by age and gender to reflect the specific characteristics of each community, as defined by the ABS census data [30]. The age range was restricted to 18-62 years, reflecting the legal age for enrolling to vote in Australia at the lower end and the limited contribution to community-level alcohol harms from those above the upper end [45].

To obtain sufficient power to detect statistically significant differences of at least 25% between pre- and post-intervention survey scores, 4,000 responses from the pre-intervention survey were required (200 completed surveys per community). A response rate of 40-50% was expected, based on national surveys, so 7,985 surveys were mailed to potential respondents, comprising samples that ranged from 394 to 401 in each community (the survey size differs slightly from 8,000 due to rounding of numbers in each age and gender category) [46, 47]. Of the 7,985 surveys mailed, 405 were marked returned to sender or the respondent was no longer at the address supplied. The number of potential participants was therefore 7,580. Although 3,017 completed surveys were returned (response rate of 40%), a further 40 were excluded from the analyses because age, gender and postcode responses, which were required to weight the sample to more accurately reflect the community population characteristics, were not provided. The final sample size, therefore, was 2,977, a response rate of 39%.

For the post-intervention survey, the same random selection procedures were used, except that the sample size of potential participants was increased to 9,984, because the pre-intervention response rate of 39% was lower than the expected rate of 40-50%. Of the 9,984 surveys mailed, the potential number of participants was 9,529. Of the 2,278 completed surveys returned, a further 23 were excluded from the analyses because the age, gender and postcode responses required for weighting were not provided. The final sample size, therefore, was 2,255, a response rate of 24%.

Although the survey samples were stratified by age and gender to reflect the specific characteristics of each community, the response rates of 39% and 24% introduce the possibility of bias in the survey results. It is unlikely that those who responded were representative of all those who were asked to complete a

survey. Indeed, more completed surveys were returned by older people and females [48]. Consequently, the survey data were weighted so that they would reflect the specific age and gender characteristics of each community. The weights were calculated as the proportion of the population in each age and gender strata divided by the proportion of the survey respondents in each stratum. All statistical analyses of survey responses used these weighted data. Table 1.4 compares the demographic characteristics of survey respondents in the experimental and control communities, separately for the pre- and post-intervention surveys, as well as comparing the demographic characteristics of survey respondents for the pre- and post-intervention surveys, separately for the experimental and control communities. The only statistically significant differences ($p \leq 0.05$) were that the post-intervention survey samples, for both the experimental and control communities, had a greater proportion of respondents with a gross household weekly income of at least AUD$700, compared to the pre-intervention survey samples. This increase in household income reflects inflation between 2005 and 2010. The comparability of the samples, both pre- and post-intervention and for experimental and control communities, provides some evidence that differences in reported alcohol consumption and harms were not simply due to demographic differences between the pre- and post-intervention samples.

Table 1.4: Demographic characteristics of the experimental and control groups for the pre- (2005) and post-intervention (2010) surveys

Characteristics	Pre-intervention survey N = 2,977 Mean or % (95% CI)	Post-intervention survey N = 2,255 Mean or % (95% CI)
Age (mean years)		
Experimental	40.0 (39.4-40.6)	41.3 (40.4–42.3)
Control	40.3 (39.7–40.9)	41.7 (40.8–42.5)
Gender (% male)		
Experimental	49.7 (46.6–52.8)	50.0 (46.3–53.6)
Control	50.8 (47.8–53.8)	41.7 (40.8–42.5)
Aboriginal or Torres Strait Islander (%)		
Experimental	2.6 (1.6-3.6)	2.5 (1.3-3.7)
Control	2.0 (0.9-3.1)	2.7 (1.1-4.2)
Unemployment (%)		
Experimental	2.4 (1.4-3.4)	2.1 (1.1-3.1)
Control	2.4 (1.5-3.3)	3.3 (1.9-4.6)
Post-school qualification (%)		
Experimental	53.9 (50.8-56.9)	54.0 (50.3-57.7)
Control	51.9 (48.8-54.8)	52.0 (48.2-55.8)
Married or defacto (%)		
Experimental	68.8 (65.9–71.6)	70.9 (67.4-74.4)
Control	69.0 (66.1–71.8)	65.8 (62.3-69.3)
Income ≥ A$700 (%)a		
Experimental	55.5 (52.5–58.6)	72.1 (68.9-75.2)*
Control	59.4 (56.5-62.4)	66.9 (63.2-70.5)*

[a]Gross weekly household income ≥ AUD$700 per week

*Statistically significant difference – confidence intervals (CIs) for the post-intervention survey do not overlap with CIs for the pre-intervention survey.

Survey development

Both the pre- and post-intervention surveys were designed to be completed within 15 minutes. They had Flesch reading scores of 65, meaning that an average 13 to 15 year old could easily understand the text. Although the number of items in the pre- (N=52 items) and post- (N=63 items) intervention surveys differed, they both included questions about demographics, personal alcohol use and experiences of alcohol-related harm. Demographic items asked about age, sex, Aboriginal or Torres Strait Islander origin, highest education level, current employment status, country of birth, current marital status, and gross annual household income. Questions on experience of alcohol harm from personal or other people's drinking, the results of which are reported elsewhere [21, 48], were adapted from other major Australian community surveys available in 2005: the National Drug Strategy Household Survey [47], Bettering the Evaluation and Care of Health (BEACH) [49] and the Australian Longitudinal Study on Women's Health [50].

Personal alcohol use was measured with the 10-item AUDIT, which included a standard drink chart to aid accuracy [51-54]. Although the AUDIT was designed for clinical populations, it was used in AARC because: it assesses the dimensions of alcohol consumption, problems and dependence in one brief measure; its test/retest reliability in community samples is high [53]; and, at the recommended cut-off score of at least eight, it has high concurrent validity against four criteria in general population samples (high-volume drinking, alcohol-related social problems, alcohol-related health problems and alcohol dependence) [54]. Epidemiologic studies have also used AUDIT [52], including an Australian study aimed at estimating rates of problem drinking among police [55].

Respondents' alcohol consumption was classified according the NHMRC's 2001 drinking guidelines [9]. Although these guidelines were updated in 2009 [56], the 2001 guidelines were used because these were current at the time of the pre-intervention survey. Increased risk of harm in the long-term was defined as the consumption of at least 29 (men) or 15 (women) standard drinks per week. Replicating a previously used method, each respondent's answer to the first question ('In the last 12 months how often did you have an alcoholic drink of any kind?') was multiplied by their answer to the second question ('On a day that you have an alcoholic drink, how many standard drinks do you usually have?') to calculate the average number of standard drinks consumed per week [57]. Increased risk of harm in the short-term was defined as the consumption of more than six (males) or four (females) standard drinks on one occasion. For the intervention effectiveness analysis, the high risk of harm in the short-term classification was also used (in order to examine whether the interventions reduced the number of high-risk drinkers as well as risky drinkers). High risk of harm in the short term drinking was defined as the consumption of more than 10 (males) or six (females) standard drinks on one occasion [9]. Finally, as per the established risk categories based on total AUDIT scores [51], respondents who scored at least eight were classified as hazardous or harmful drinkers.

Individuals' general health status was measured using the EQ-5D, a validated five-item questionnaire encompassing the domains of mobility, self-care, usual activities, pain/discomfort and anxiety/depression [58]. Respondents indicated whether they had no problems, some problems, or major problems on each of the five items, which were scored as 1, 2 and 3, respectively. In order to produce a combined utility health score, where 1 is full health and 0 is equivalent to being dead, individuals' EQ-5D answers were weighted using a large-scale UK study on population preferences for each health domain (there are no Australian weights available) [58]. The weights reflect different levels of morbidity associated with different health domains. For example, reporting some mobility problems only (i.e. reporting no problems in other domains) equates to a health utility score of 0.85, compared to 0.80 for some pain problems only, indicating that the general population perceives some pain problems as a greater burden on their health than some mobility problems.

Criminal incidents recorded by police

De-identified unit record data on criminal incidents reported by police were obtained from the NSW Bureau of Crime Statistics and Research (BOCSAR) from 1 January 2001 to 31 December 2009. Data comprised unit records for all criminal incidents in all 20 AARC communities. Incidents were selected on the basis of the postcode in, and the date on, which they occurred. A criminal incident was defined as an activity detected by, or reported to, police which: involves the same offender(s); involves the same victim(s); occurred at one location; occurred during one uninterrupted period of time; and falls into one offence category/incident type (e.g. 'actual', 'attempted', 'conspiracy') [26]. While reported crime is not necessarily reflective of actual crime, it is assumed that this will remain true for both pre- and post- intervention.

One method of identifying those criminal incidents that involve alcohol would be to only include those 'flagged' as alcohol-related, which is a reporting requirement for NSW Police. The accuracy of using this flag to examine alcohol-related crime differences between communities or over time, however, is known to be problematic because the decision to flag an incident as alcohol-related is a subjective judgement made by individual officers at a particular time, and is strongly influenced by policing practices [59]. Consequently, surrogate or proxy measures have been developed and have been widely used to examine alcohol-related harms [60-62], including examining national and state trends in alcohol-related violence in Australia [23]. Proxy measures do not accurately estimate the magnitude of alcohol-related harm, but they do facilitate reasonable comparisons between jurisdictions or over time. Since proxy measures had not previously been used at the level of individual communities in Australia, AARC identified a reliable community-level proxy measure for alcohol-related crime that incorporates specific types of offences occurring at times highly likely to involve alcohol [41, 42].

The alcohol-related crime types used in AARC were: assaults (actual bodily harm, grievous bodily harm and *common assault*); sexual assaults (*sexual assault, aggravated sexual assault, indecent assault or act of indecency, aggravated indecent assault or act of indecency); malicious damage (malicious damage to property*); and street offences (*offensive conduct, offensive language and wilful and obscene exposure*). The italicised crimes are those included in AARC because they are relevant to individual communities, but are additional to those used in previous research.

The alcohol-related time periods are the same as those that have been used previously in Australia [23], namely: Sunday 10pm – Monday 6am; Monday 10pm – Tuesday 2am; Wednesday 10pm – Thursday 2am; Friday 10pm – Saturday 6am; and Saturday 6pm – Sunday 6am. Non alcohol-related times are: Monday 6am – Monday 6pm; Tuesday 6am – Tuesday 2pm; Wednesday 10am – Wednesday 2pm; Thursday 6am – Thursday 2pm; and Friday 6am – Friday 10am. The number of hours in each time period is equivalent (10 hours), with the remaining four hours classified as neither alcohol-related nor non-alcohol-related.

For the purposes of this study, it is worth noting that some incidents that occur in alcohol-related times will be classified as alcohol-related, even though they are not alcohol-related. Conversely, some alcohol-related incidents that occur in non-alcohol times will be misclassified as not being alcohol-related. Applying the same measure to all communities, and both pre- and post-intervention, however, optimises the reliability and validity of the relative differences between communities and over time, even if it does not provide a wholly accurate measure of the magnitude of alcohol-related crime at any specific point in time.

Traffic crashes recorded by the then NSW Roads and Traffic Authority (RTA)

De-identified road traffic-crash-incident unit-record data were obtained from the then NSW Roads and Traffic Authority (RTA) from 1 January 2001 to 31 December 2009. Variables obtained were: the maximum degree of injury (fatal, injury [hospital-treated or admitted], and non-injury); the degree of alcohol involvement; the Blood Alcohol Concentration (BAC) of the driver; the number of persons injured (fatal and non-fatal); and the location of the incident. The degree-of-injury variable refers to any person involved in the incident, not necessarily the driver(s). An incident refers to either one non-injury crash, or one injured person (fatal or non-fatal).

Given BAC data recorded in routinely collected data systems are known to lack reliability and validity [63], AARC did not rely solely on BAC data in the RTA database. A community-level proxy measure was devised [44] based on a method used to identify alcohol-related traffic crashes across NSW (the NSW measure was not used because of uncertainty about the extent to which it would be applicable to the AARC communities) [64]. Similarly to crime, the proxy measure includes crashes that occur at times that are highly likely to involve alcohol. To determine these alcohol-related times, crashes that met three criteria were identified: there was a fatality (non-fatal crashes were excluded because the recording of BACs in non-fatal crashes is known to be too unreliable) [6, 8]; the BAC of all drivers was recorded (if only the BAC of the person who died was known, then the crash is not defined as alcohol-related); and the BAC was over the Australian legal limit of 0.05 mg/ml. Although these criteria are conservative, they optimise validity by only including fatal crashes where the BAC of all drivers is known and, moreover, applying this same definition to all 20 AARC communities optimises the reliability of comparisons between them, and between pre- and post-intervention [44].

The mean proportion of crashes that met these three criteria was calculated for each AARC community, as well as for each of six, four-hour time periods for each day of the week (a total of 42 time categories): 6am-10am; 10am-2pm; 2pm-6pm; 6pm-10pm; 10pm-2am; and 2am-6am. The time categories where the proportion of crashes was at least one standard deviation above the mean for all categories were classified as alcohol-related, and the remainder as non-alcohol-related [44]. The specific alcohol-related times for AARC communities, which did differ from those calculated for NSW [44], were: Friday 10pm - Saturday 6am; Saturday 6pm - Sunday 10am; and Sunday 6pm - Sunday 10pm [33, 44]. All crashes that occurred in these times were classified as alcohol-related. Although single-vehicle crashes have been used previously [13, 14, 65], both single and multiple vehicle crashes were used in AARC because of the low base-rates of single vehicle traffic crashes in the AARC communities.

Costs were readily available for alcohol-related traffic crashes from the RTA's Economic Analysis Manual, Version 2 (2006) [20]. Including costs in estimating the total impact of alcohol-related traffic crashes is one way of taking account of the severity, as well as the number, of crashes (more severe crases result in higher costs). These costs derive from the Australian Government Bureau of Transport Economics (2000) [27] and comprise human costs, vehicle costs and general costs attributable to four levels of crash severity: fatal; serious injury; minor injury; and property damage. The RTA collapses these four severity categories into three: fatal; injury (comprising serious and minor); and non-injury (property damage). Thus, estimated costs for alcohol-related incidents that occur in rural areas resulting in a fatality ($1,733,000) or injury ($100,690) were computed on a per-person basis, and those resulting in no injury ($6,800) were computed on a per-crash basis. For the outcome analyses (see Chapter Three), the effect of the intervention was measured on: total alcohol-related crashes; the number of persons injured in an alcohol-related crash; and alcohol-related crashes that resulted in no injuries/fatalities.

Hospital inpatient admissions

De-identified unit record data were obtained from NSW Health's Inpatient Statistics Collection from 1 January 1999 to 31 December 2009. Data comprised unit records for all inpatient admissions to hospitals in all 20 AARC communities. Hospital Emergency Department (ED) data were excluded because only five communities had sufficient ED data available electronically. Each inpatient admission is allocated at least a principal diagnosis, and may also be allocated a secondary diagnosis, based on the International Classification of Diseases (ICD), version 10. Specific variables obtained included: hospital code; patients' sex and age; date and time of presentation; principal diagnosis based on ICD-10 codes; triage code; departure status; and residential postcode.

Both internationally and in Australia, it is recommended that identifying alcohol-attributable hospitalisations and deaths should only use the principal diagnosis because the frequency with which secondary diagnoses are used varies substantially over time, and it is impossible to precisely define the extent to which a secondary diagnosis contributed to the hospital inpatient admission [3, 66]. Unlike crime and traffic crashes, the extent to which a principal diagnosis for an inpatient admission is likely to be alcohol-related cannot be estimated by using alcohol-related times, because the timing of an inpatient admission may simply reflect hospital admission or transfer procedures. An alternative is to use the Alcohol Aetiological Fractions (AAFs) that have been generated for Australia to determine the likelihood that an admission is alcohol-related [67-69]. In order to be conservative in the AARC project, inpatient admissions were only identified as alcohol-related if the principal diagnosis was wholly attributable to alcohol (AAF=1).

The decision about which wholly alcohol-attributable inpatient principal diagnosis to include depends upon the likely impact of the interventions. Since a specific AARC intervention aimed to improve use of pharmacotherapies by GPs to treat alcohol dependent patients, it is possible that GP management of an alcohol problem would include initial hospitalisation for withdrawal management. In the short-term, this might be expected to increase alcohol-related hospital inpatient admissions. One outcome selected, therefore, was inpatient admissions with a primary diagnosis of alcohol dependence (code F10.2). Since the remainder of the AARC interventions might be expected to reduce more acute alcohol-related injury or illness, a second outcome selected was inpatient admissions with a primary diagnosis of alcohol abuse (codes F10.0 and F10.1). Other wholly alcohol-attributable inpatient admissions were excluded because there were too few of them in rural communities to allow reliable analyses.

Interventions

Overview of community-action

Community-action can be defined as an approach in which a range of intervention strategies are systematically coordinated and simultaneously implemented across a whole community [70]. The simultaneous and sustained implementation of a number of complementary interventions aims to maximise their combined impact, even if the individual interventions may be of variable effectiveness. The approach also demonstrates principles of equity and access, since community-wide interventions are complemented by those targeted specifically at defined at-risk sub-groups. The effectiveness of the community-action approach can also be enhanced by collaboration with existing community support networks, such as Community Drug Action Teams, youth workers and liquor accords. This collaboration engenders greater community participation and ownership, since it allows for more effective incorporation of knowledge, expertise and community resources.

Selection of the intervention strategies for implementation

To date, only nine types of interventions have been examined in community-action alcohol trials [40]. The four RCTs of community-action alcohol intervention, which represent the most methodologically rigorous evidence, have shown small decreases in only two outcomes: adolescent alcohol use [71-73], and availability of alcohol to youth [74]. Despite pragmatic restrictions on the types of interventions which can be implemented within the constraints of an RCT (e.g. changing alcohol taxation rates is unlikely to be feasible), there is clear capacity to test the effectiveness of a wider range of community-based interventions.

Although augmenting inadequate research evidence with the views of consumers and professionals is regarded as best-evidence practice [75], this process has been inadequately used in alcohol community-action approaches to date [76]. More effective alignment between these three components is likely to improve the acceptability, uptake and cost-effectiveness of community-action [77, 78]. Consequently, AARC sought the views of alcohol professionals and communities, and combined those with the results of systematic reviews of research evidence, to select a suite of individual interventions for coordinated implementation [79].

Alcohol professionals' views

Professionals were selected from the approximately 350 members of the Australasian Professional Society on Alcohol and Other Drugs (APSAD). APSAD members comprise drug and alcohol counsellors, clinicians, policy professionals and researchers with a professional interest in the drug and alcohol field. In order to elicit their intervention preferences, professionals were asked to allocate $100,000 over three years (the maximum amount of time likely to be available to implement interventions in the AARC project) to a combination of 23 possible interventions identified in the literature as potentially cost-effective in reducing alcohol harm in a community, excluding those not feasible in an RCT (e.g. increasing alcohol tax in Australia) [79].

Community views

As part of the pre-intervention survey, respondents were asked to allocate a budget of $1,000 across eight possible interventions ($1,000 was selected because it was judged to be a reasonable household contribution over a lifespan and because it could be easily divided). The specific question was: *"Think about all problems related to alcohol in your community. These may include relationship difficulties, health issues, car crashes and crime. The next 3 questions ask you to consider what you would be prepared to do to reduce these problems. Your community is given $1,000 to spend on programs to reduce alcohol problems. It is your job to allocate this money. You can spend it all on one program (100%) or a combination of programs. Please enter answers in percentages and make sure it adds up to 100%."* Intervention options were: promotion of safer drinking through media and licensed venues (promote safer drinking); policies to reduce work-related drinking (workplace); information on alcohol harms provided by pharmacists (chemists); community-wide strategies to help local communities work together more effectively (community); advice from GPs; school-based information (school); legal strategies, such as random breath testing and enforcing licensing laws (police); and advice from hospital staff (hospital). These broad intervention areas were chosen because it was unlikely that the majority of the public would have knowledge about specific strategies [79].

Combined views of professionals and communities with research evidence

The current research evidence-base for community-level alcohol interventions provides limited support for media advocacy [22], enforced point-of-sale legislation [61, 80, 81] and police visibility [82, 83]. The four interventions selected most commonly by the AARC communities were: school-based interventions; promotion of safer drinking (codes of practice and training for the staff of licensed premises and media advocacy); community-wide activity (better integration between groups, more social work and counselling services and community development programs); and police activity (enforcement of liquor licensing laws and greater visibility) [79]. Professionals working in the alcohol and other drugs field rated two of those in their four most commonly selected interventions (community-wide activity and promotion of safer drinking), but also included training and support for GPs and hospital/ED staff [79]. Consequently, the final combination of interventions selected for implementation in the AARC project, summarised by the classifications used in the 2010-2015 Australian National Drug Strategy [84], are presented in Table 1.5. These interventions represent harm and demand reduction strategies, reflecting the difficulty of testing supply reduction interventions using RCT evaluation designs.

Table 1.5: The individual AARC interventions implemented, summarised by the classifications used in the 2010-2015 Australian National Drug Strategy

List of interventions[a]	Harm reduction	Demand reduction	Supply reduction
1. Engagement process	n/a	n/a	n/a
2. Feedback of data and results to key stakeholders		3	
3. Media advocacy (feedback to communities)		3	
4. GPs: provision of tools and training for screening and brief intervention	3		
5. GPs: tailored feedback to increase their alcohol prescribing		3	
6. Workplace policies and training[b]	3		
7. High school-based interactive session on alcohol harms		3	
8. Pharmacy-based screening and brief intervention	3		
9. Aboriginal Community Controlled Health Service screening and brief intervention[c]	3		
10. Identifying and targeting high risk weekends	3		
11. Good Sports program (promoting safer drinking in sports clubs)[b]	3		
12. Hospital Emergency Department-based screening and brief intervention	3		
13. Web-based screening and brief intervention	3		
Totals	**8**	**4**	**0**

[a]A number of other ideas were raised by communities and pilot tested or explored by the research team, but these did not progress to interventions implemented systematically.

[b]These interventions were implemented opportunistically to align with other programs being implemented.

[c]This intervention was restricted to the three communities with an active Aboriginal Community Controlled Health Service who agreed to participate in this component of AARC.

Description and costs of the intervention strategies for implementation

This section provides a summary description of each intervention strategy, along with a summary of their costs. The costs represent opportunity costs, rather than actual costs to the AARC project, in order to better reflect the cost of implementing these interventions if they had to be paid for in full by a community. Using opportunity costs is conservative in that it tends to over-estimate the actual cost of implementation since, in practice, it is likely key stakeholders would be willing to contribute to intervention efforts. The estimated media advocacy cost of $195,393, for example, reflects the cost of paying media to print or broadcast stories, even though they agreed to do this for free as their contribution to the AARC intervention efforts. All 13 interventions involved two broad, simultaneously implemented, processes for engaging with communities: first, direct engagement with the communities in order to obtain support from the key stakeholders and community members (ground-up approach); and second, indirect engagement, via state or regional-level offices, to ensure key stakeholders in the communities had either the explicit or implicit consent of their managers to participate (top-down).

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 initially asking the Mayor of each community to auspice the project in order to promote the view that alcohol-related harm was a community-wide issue, rather than the responsibility of law-enforcement agencies, health services or alcohol licensees. This was followed by a series of meetings with key stakeholders and community members together, and separate meetings with key stakeholders, to define their roles. Follow-up letters and phone calls then clarified what had been agreed at each stage of the process. Indirect engagement occurred with NSW state-based government departments that have administrative or regulatory oversight for staff based in the communities. This was to recognise that most key stakeholders in a community would either be required, or would prefer, to obtain support for their involvement from their organisations (e.g. Area Health Services for hospitals and EDs and the NSW Department of Education and Training for high-school principals). The estimated cost of this intervention is summarised in Table 1.6.

Table 1.6: Cost of the engagement process intervention

Resource identification and measurement	Resource value $
Direct engagement with communities	
Phone call & follow-up to Mayor	
Time spent to identify Mayors (2 hours x junior staff salary)	85
Time spent by senior staff talking to Mayor (20 minutes x senior staff salary)	230
Actual phone call (20 minutes x Mayor salary)	48
Time spent to generate generic follow-up letter for Mayor (4 hours x junior staff salary)	169
Adapt letter for each community (5 minutes x 10 communities x admin. staff salary)	27
Material for mailing (stamps/printing/envelope [$0.69] x 10 communities)	7
Sub-total	*567*
Inviting key stakeholders	
Time spent identifying key stakeholders (1 hour x admin staff salary x 10 communities)	330
Adapt letter for each community (5 minutes x 10 communities x admin staff salary)	27
Material for mailing (stamps/printing/envelope [$0.69] x 10 communities x 20 stakeholders)	138
Sub-total	495
Initial community meeting	
Time spent to organise meeting (4 hours x 10 communities x admin staff salary)	1,320
Time required to prepare materials for meetings and coordinate with communities (1 hour senior staff and 1 hour junior staff x 10 communities)	1,115
Cost of handout ($0.28c per page x 20 people x 10 communities)	56
Venue related costs ($100 room hire x 10 communities)	1,000
Costs for senior staff (2 staff x ($290 travel/$130 meals/accommodation) x 10 communities)	8,400
Costs for community attendance (30 mins return trip x junior salary x 20 people x 10 towns)	4,237
Opportunity cost of senior staff presenting meetings (2 senior staff x 1 hour x 10 communities)	1,383
Opportunity cost of community people attending (20 people x 1 hour x junior salary x 10 towns)	8,473
Sub-total	*25,983*

Table 1.6: Cost of the engagement process intervention (continued)

Initial meetings with key stakeholders	
Time required to prepare materials for meetings and coordinate with communities (1 hour senior staff and 1 hour junior staff x 10 communities)	1,115
Cost of handout ($0.28c per page x 20 people x 10 communities x 4 meetings/ community)	224
Venue related costs (meeting held at stakeholder workplace)	0
Transport costs for senior staff (2 senior staff x ($290 travel + $130 meals and accommodation) x 10 communities x 4 meetings/community)	8,400
Opportunity cost of senior staff presenting (2 senior staff x 1 hour x 10 towns x 4 meetings/town)	5,531
Opportunity cost of key stakeholder meeting time (2 people x 1 hour x senior salary x 10 towns)	5,531
Sub-total	*20,801*
Media release (captured as part of intervention 3)	0
Sub-total	*0*
Follow up letters to attendees	
Generating generic feedback letter template (4 hours x senior staff salary)	277
Adapt letter for each community (5 minutes x 10 communities x admin staff salary)	27
Material for mailing (stamps/printing/envelope [$0.69] x 10 communities x 50 attendees	345
Sub-total	*649*
Indirect engagement with communities	
Time to draft letter to Minister (2 hours x senior staff salary)	138
Opportunity cost of Meeting with Minister (2 hours x 2 senior staff salary and Minister salary)	423
Transport costs to attend meeting with Minister (travel by car $100 total)	100
Time to draft letter for Minister to send to senior bureaucrats (2 hours x admin staff salary)	66
Material for mailing (stamps/printing/envelope [$0.69] x 15 departments)	10
Sub-total	*738*
Meeting with senior government officials	
Time required to prepare materials for meetings and coordinate with government official departments ((1 hour senior and 1 hour junior staff) x 15 departments)	1,673
Transport costs to attend meeting with senior govt officials (travel by car $100 x 15 departments)	1,500
Opportunity cost of senior staff presenting meetings (2 senior staff x 1 hour x 15 departments)	2,074
Opportunity cost of govt official meeting time (1 person x 1 hour x senior staff salary x 15 departments)	1,037
Sub-total	*6,284*
TOTAL	**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. In all communities, this group was chaired by the Mayor or his/her representative from local government to emphasise the inter-sectorial approach of AARC. The coalition was responsible for assisting in implementing the locally agreed interventions. A coalition member, for example, agreed to comment on the alcohol-related crime data that was fed back to their community, as part of the media advocacy intervention, to ensure that the data were couched in a relevant local context and were endorsed by community stakeholders. During 2005, however, the NSW Government began to actively require all local government areas to establish a liquor accord to monitor alcohol harm. Given the significant overlap in their respective memberships, the community coalition group was merged into the liquor accord group. The new group agreed to continue to liaise between AARC researchers and their community. The estimated cost of this intervention is summarised in Table 1.7.

Table 1.7: Cost of the feedback of data and results to key stakeholders intervention

Resource identification and measurement	Resource value $
Preparation and holding feedback meetings	
Time spent to organise meeting (Conducted as part of usual liquor accord meeting)	0
Time required to prepare materials for meetings and coordinate with communities ([1 hour senior staff and 1 hour junior staff] x 10 communities x 3 meetings each year x 4 years)	13,381
Transport costs for senior staff (1 senior staff x [$290 travel + $130 meals and accommodation] x 10 communities x 3 meetings each year x 4 years)	50,400
Transport cost of community people to attend meeting (conducted as part of usual liquor accord)	0
Opportunity cost of senior staff presenting meetings (1 senior staff x 1 hour x 10 communities x 3 meetings each year x 4 years)	8,297
Opportunity cost of community people meeting time (Conducted as part of usual liquor accord)	0
Cost of handout ($0.28c/page x 4 pages x 10 people x 10 communities x 3 meetings each year x 4 years)	1,344
Venue related costs (Conducted as part of usual liquor accord meeting)	0
Time of community representative to review media release related to data / intervention (1 hour senior staff equivalent x 10 communities x 3 times per year x 4 years)	8,297
TOTAL	**81,718**

NB: expenses for year 1 captured in intervention 1

Media advocacy (feedback to communities)

Media advocacy coincided with every new or updated data analysis and with the implementation and completion of interventions. The local media campaign was restricted to local newspapers and radio to help prevent contamination of the control communities, which would be much more probable if regional or state-wide television news and other programs had been used. The estimated cost of this intervention is summarised in Table 1.8.

Table 1.8: Cost of the media advocacy (feedback to communities) intervention

Resource identification and measurement	Resource value $
Identify media outlets and meetings	
Time spent to identifying media, meeting with them (captured in intervention 1)	0
Specific intervention meetings with media	0
Specific meetings were organised and held between senior staff and newspaper editors and radio station managers (at their offices) to agree to the best method to inform them about opportunities for them to publish relevant data (captured in intervention 1)	0
Sub-total	*0*
Media release	
Generating and distributing media release (2 hours of time x junior staff salary x 4 releases per year x 10 communities x 4 years)	13,557
Time spent by senior staff to review each media release (30 minutes per release x senior staff salary x 4 releases per year x 10 communities x 4 years)	5,531
Media release (print x 1/3 page x 4 releases per community each year x 10 communities x 4 years)	112,961
Media release (radio message x 4 releases x 10 communities x 4 years)	63,344
Sub-total	*195,393*
TOTAL	**195,393**

GPs: screening and brief intervention

Clinical addiction specialists from Sydney and Melbourne provided two two-hour training sessions for local GPs in SBI using the AUDIT as a standardised, valid and reliable screening instrument [51, 54]. Feedback was based on the process summarised by the FLAGS acronym in the Drinkless framework, a screening and brief intervention kit readily available at the time this intervention was implemented. It included:

- **F**eedback to patients on their level of drinking relative to normative data;
- **L**istening to patients' views on their own drinking patterns and behaviours;
- **A**dvising patients on lower risk levels of drinking and the benefits they would obtain from drinking less;
- **G**oal setting; and
- identifying practical **S**trategies to help patients achieve their goals.

In line with AARC's community-action approach, a range of key stakeholders were invited to participate in this training, including hospital staff, drug and alcohol counsellors, school counsellors, ambulance officers and pharmacists. The estimated cost of this intervention is summarised in Table 1.9.

Table 1.9: Cost of GP screening and brief intervention

Resource identification and measurement	Resource value $
Planning the training program	
Time spent to identify D&A specialists, contact them and arrange 1st training sessions and arrange in community (5 days x junior staff salary)	1,483
Time spent to contact GPs for 2nd session (1 day x junior staff salary)	297
Sub-total	*1,779*
1st community training session	
Trainer expenses ([$290 travel + $130 meals and accommodation] x 8 venues)	3,360
Venue related costs, including room hire, catering and equipment hire ($100 venue hire x 8 venues + $40 per person x 40 people [39 participants + trainer])	2,400
Training materials, including provision of a Drinkless kit to all attendees ($30/kit x 39 participants)	1,170
Opportunity cost of expert time (2 hours x $150 per hour x 8 venues)	3,200
Opportunity cost of GPs to attend training (2 hours x 39 participants x GP hourly wage)	7,359
Travel time for GP to attend training (15 minutes round trip x 39 participants x GP wage)	920
Sub-total	*18,409*
Follow up letters to attendees	
Generating generic feedback letter template (4 hours x admin staff salary)	132
Material for mailing (stamp, printing and envelope [$0.69] x 39 participants)	27
Sub-total	*159*
Media release (captured as part of intervention 3)	*0*
Sub-total	*0*
2nd community training session	
Trainer expenses ([$225 travel + $113 meals and accommodation] x 8 venues)	3,360
Venue related costs, including room hire, catering and equipment hire ($100 venue hire x 8 venues + $40 per person x 30 people [29 participants + trainer])	2,000
Opportunity cost of expert time (2 hours x $150 per hour x 8 venues)	3,200
Opportunity cost of GPs to attend training (2 hours x 30 participants x GP wage)	5,472
Travel time for GPs' to attend training (15 minutes round trip x 29 participants x GP wage)	684
Sub-total	*14,716*
Follow up letters to attendees	
Generating feedback letter (5 minutes x 29 participants x admin staff salary)	123
Material for mailing (stamp, printing and envelope [$0.69] x 30 participants)	20
Sub-total	*143*
Media release (captured as part of intervention 3)	*0*
Sub-total	*0*
TOTAL	**35,207**

GPs: tailored feedback and training on alcohol prescribing

In an attempt to increase rates of prescribing of an appropriate pharmacotherapy (either acamprosate or naltrexone) to highly alcohol-dependent patients, a letter was sent to each GP in the intervention communities. 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. The estimated cost of this intervention is summarised in Table 1.10.

Table 1.10: Cost of tailored feedback to GPs to increase their alcohol prescribing

Resource identification and measurement	Resource value $
Development and posting of the tailored feedback letter	
Generating generic feedback letter template (4 hours x senior staff salary)	277
Adapt letter for each GP (5 minutes x admin staff salary x 115 GPs)	316
Material for mailing (stamp, printing and envelope [$0.69] x 115 GPs)	79
Cost of GP reading letter (5 minutes x GP salary x 85% read)	769
Sub-total	*1,441*
TOTAL	**1,441**

Workplace policies and training

All major employers in each AARC intervention 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 AARC 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. For interested workplaces, the second level of intervention involved the provision of a resources kit in the mail. The third option was to participate in a face-to-face, six-hour training workshop with representatives from other major employers in their community. The estimated cost of this intervention is summarised in Table 1.11.

Table 1.11: Cost of the workplace policies and training intervention

Resource identification and measurement	Resource value $
Identifying workplaces	
Initial email to local council to assist in identifying major workplaces (20 minutes x admin staff salary x 10 communities)	110
Time spent by the business development officer to identify workplaces and respond to request for information (2 hours x junior staff salary x 10 communities)	847
Sub-total	*957*
Mailing out of information package and follow-up	
Phone call to major employers (15 minutes per call x $0.40 per call x 46 workplaces)	18
Opportunity cost of time for business development officer to call (15 minutes x junior staff salary x 46 workplaces)	487
Opportunity cost of time for workplaces (15 minutes x senior staff salary x 46 workplaces)	795
Time spent to generate and send letter for each workplace (4 hours x junior staff salary)	169
Cost of materials ($20 per package x 44 workplaces)	880
Material for mailing (stamp, resource kit and envelope = $5.00 per package x 44 workplaces)	220
Time required to follow-up unresponsive workplaces (10 mins x admin staff salary x 34 workplaces)	187
Time spent by personnel at 44 workplaces to respond (seeking approval from the management) (1 hour x junior staff salary x 44 workplaces)	1,864
Sub-total	*4,621*
Implementing the intervention	
Time spent coordinating training session (1 hour x admin staff salary x 22 workplaces)	726
Trainer expenses ([$290 travel; $130 meals and accommodation] x 6 workshops)	2,520
Venue related costs, including room hire, catering and equipment hire ($100 venue hire x 6 venues + $40 per person x 36 people [35 participants + trainer])	2,040
Opportunity cost of expert time (4 hours x $150 per hour x 6 workshops)	3,600
Opportunity cost of participants time to attend (4 hours x senior staff salary x 35 participants)	9,659
Travel time for participants (30 minutes x senior staff time x 35 participants)	1,210
Sub-total	*19,755*
Pre- and post-test surveys	
Generating pre-and post test surveys (4 hours per survey x 2 surveys x senior staff salary)	553
Material for mailing surveys (printing 5 pages @ 28c per page) x envelope + posting ($0.41) x 35 participants' x 2 surveys	127
Opportunity cost of participants time to complete surveys (20 minutes x senior staff time x 2 surveys)	1,613
Material for mailing surveys back ([stamp and envelope = $0.41] x 35 participants x 2 surveys)	29
Sub-total	*2,322*
TOTAL	**27,655**

High school-based interactive session on alcohol harms

Year 11 students were provided with a one-hour interactive session carefully targeted at preventing alcohol harm among young people. Year 12 students were excluded because of their final year school and study commitments. The session was developed and presented by the Media Liaison/Information Manager of Australia's National Drug and Alcohol Research Centre (NDARC). The estimated cost of this intervention is summarised in Table 1.12.

Table 1.12: Cost of the high school-based interactive session on alcohol harms intervention

Resource identification and measurement	Resource value $
Intervention planning and liaison with boards	
Time spent to arrange meetings with NSW Department of Education and Training (DET), Association of Independent Schools and the Catholic Education Office (captured in intervention 1)	0
Opportunity cost of expert time spent meeting with DET, AIS and CEO (captured in intervention 1)	0
Opportunity cost of participants from DET, AIS and CEO (captured in intervention 1)	0
Sub-total	*0*
Liaison and planning with individual schools	
Time spent identifying schools and generating letters (1 hour x admin staff salary x 10 communities)	330
Material for mailing (stamp, printing and envelope [$0.69] x 35 schools)	24
Time spent following up schools (1 day admin staff salary)	231
Sub-total	*585*
Liaison and planning with AIS and CEO	
Time spent identifying AIS and CEO and generating letters (2 hours x admin staff salary)	66
Material for mailing (stamp, printing and envelope [$0.69] x 5 letters)	3
Sub-total	*69*
School responsibility	
Time spent developing consent form, children survey and teacher survey (8 hours junior staff salary + 2 hour senior staff salary + 2 hour department of education [assuming senior staff time])	615
Finalising the timing of the presentation with a member of the AARC research team (30 minutes x 35 teacher salary)	752
Distribution of consent form to, and collection from, students (5 mins x teacher salary x 35 schools)	125
The coordinating teacher to complete a survey about drug education in their school and his/her perceptions of this interactive session (20 minutes x teacher salary x 35 schools)	501
The attending students completed a pre-intervention survey immediately prior to the presentation, and a second survey a week after the presentation - not valuing students time	0
The attending staff / teachers completed a pre-intervention survey immediately prior to and after the presentation (20 minutes x 2 teachers x teacher salary x 2 surveys x 35 schools)	1,002
Coordinating teacher to mail all completed surveys to DET (30 mins x teacher salary x 35 schools)	752
Material for mailing (stamp, printing and envelope [$0.69] x 35 schools)	24
Sub-total	*3,772*
Intervention implementation	
Time spent by expert developing intervention (2 days x senior staff salary)	968
Trainer expenses ([$290 travel + $130 meals and accommodation] x 10 communities)	4,200
Opportunity cost of trainer time (1 hour x $200 per hour x 10 communities)	2,000
Opportunity cost of teachers time (1 hour x teacher salary x 35 schools)	1,504
Sub-total	*8,671*
TOTAL	**13,098**

Pharmacy-based screening and brief intervention

A self-assessment and feedback form, modelled on examples from diabetes and asthma, was developed. Pharmacists were provided with paper forms comprising the 10-item AUDIT questionnaire, 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. The estimated cost of this intervention is summarised in Table 1.13.

Table 1.13: Cost of the pharmacy-based screening and brief intervention

Resource identification and measurement	Resource value $
Planning the intervention	
Time spent to arrange meetings with pharmacists (captured in intervention 1)	0
Opportunity cost of expert time spent meeting with pharmacists (captured in intervention 1)	0
Opportunity cost of pharmacists (captured in intervention 1)	*0*
Sub-total	*0*
Designing the intervention, including the self-assessments and feedback	
Time spent developing self report survey and feedback based on survey scores (8 hours x junior staff salary + 2 hours x senior staff salary)	477
Printing cost (screening pads of 100 at $580)	580
Sub-total	*1,057*
Mailing of self-assessment, intervention, pharmacy liaison and media release	
Mailing cost ($9.72 x 35 pharmacies)	340
Mailing cost for those that didn't receive first pack ($9.72 x 10 pharmacies)	97
Generating generic media release (4 hours x senior staff salary)	277
Media release (captured in intervention 3)	0
Time spent by pharmacists delivering intervention (2 minutes x pharmacist salary + 5 minutes x pharmacist salary)	21
Sub-total	*735*
Post-intervention feedback, including the number of self-assessments completed	
Cost of time and phone calls to ring pharmacists about intervention (10 minutes x admin staff salary x 35 pharmacists x $0.40 per phone call)	206
Time spent developing post test survey for pharmacist (2 hours x junior staff salary + 30 minutes x senior staff salary)	154
Time spent completing post test survey (20 minutes x 35 x pharmacists salary)	807
Sub-total	*1,167*
TOTAL	**2,959**

Aboriginal Community Controlled Health Services based screening and brief intervention

Three AARC intervention communities had Indigenous-specific medical services, generically called Aboriginal Community Controlled Health Services (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. The estimated cost of this intervention is summarised in Table 1.14.

Table 1.14: Cost of the ACCHS screening and brief intervention

Resource identification and measurement	Resource value $
Initial preparation time and first meeting	
Time spent to arrange meetings with Aboriginal Community Controlled Health Care Services (ACCHS) (2 hours x admin staff salary x 2 communities)	132
Opportunity cost of expert time spent meeting with ACCHS (4 hours x 2 senior staff salary x 2 communities)	277
Opportunity cost of CEO + manager in initial meeting (4 hours x senior staff salary x 2 communities x 2 people)	277
Travel expenses ([$290 travel + $130 meals and accommodation] x 2 communities)	840
Sub-total	*1,525*
Follow-up meetings	
Time spent to arrange meetings with ACCHS (2 hours x admin staff salary x 2 communities)	132
Opportunity cost of expert time spent meeting with ACCHS (4 hours x 2 senior staff salary x 2 communities)	277
Opportunity cost of D&A services team leader in follow-up meeting (4 hours x 2 senior staff x 2 communities)	277
Travel expenses ([$290 travel + $130 meals and accommodation] x 2 communities)	840
Sub-total	*1,525*
Focus groups	
Time required to prepare materials for focus groups and coordinate with communities ([2 hour x senior staff salary + 2 hour x junior staff salary] x 2 communities)	446
Travel expenses ([$290 travel + $130 meals and accommodation] x 2 communities x 2 people)	1,680
Opportunity cost of expert time (4 hours x $200 per hour x 2 communities)	1,600
Time spent by coordinator to arrange focus groups, convene focus group and transcribe and send results back to AMS (1 day x senior staff salary x 2 communities)	968
Opportunity cost of health and management time (4 hours per meeting x ([community 1 = 6 people (CEO, GP, RN, Aboriginal health worker and 2 admin.)] + [community 2 = 8 people (practice manager, RN, 2 GPs, child health worker, D&A team leader, 2 D&A workers])	3,149
Sub-total	*7,843*
Training	
Time required to prepare materials for focus groups and coordinate with communities ((2 hour x senior staff salary + 2 hour x junior staff salary) x 2 communities)	446
Travel expenses ([$290 travel + $130 meals and accommodation] x 2 communities x 2 people)	1,680
Opportunity cost of expert time (6 hours x $200 per hour x 2 communities x 2 people)	4,800
Opportunity cost of health and management time (community 1&2 = 8 people [2x GP, 2x RN, 2x Aboriginal health worker, 2 x admin] x 6 hours per meeting [2 junior staff salary and 2 senior staff])	1,338
Training materials, including provision of a Drinkless kit to all attendees ($30 per kit x 8 participants)	240
Sub-total	*8,504*
Outreach support	
Time spent by coordinator and D&A leader to provide onsite support (integrate evidence based alcohol screening and BI into existing clinical processes [health assessments, care plans, general consultation] and working with them to resolve barriers to routine alcohol screening and BI x 4 hours x 1 expert x 11 meetings x senior staff salary)	3,042
Time spent by coordinator providing phone and email support (15 minutes per call x 20 times x senior staff salary)	461
Cost of calls by coordinator ($0.40 per call x 20 calls)	8
Sub-total	*3,511*
TOTAL	**22,908**

Identifying and targeting high-risk weekends

In each AARC experimental community, the research team used alcohol-related crime data from the previous seven years to identify those weekends with disproportionately high rates of alcohol-related 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 where possible on the Friday and Saturday night of the problem 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. The estimated cost of this intervention is summarised in Table 1.15.

Table 1.15: Cost of identifying and targeting high-risk weekends

Resource identification and measurement	Resource value $
Identification of the weekends	
Time spent to collect data and arrange meetings (captured in intervention 1)	0
Opportunity cost of expert time meeting (captured in intervention 1)	0
Opportunity cost of stakeholders (captured in intervention 1)	0
Sub-total	*0*
Mayor costs	
Time spent to generate generic letter, identify clubs and pubs and other licensees (4 hours x junior staff salary)	169
Adapt template for each licensee (5 minutes x admin staff salary x 380 licenses)	1,045
Material for mailing (stamp, printing and envelope [$0.69] x 380 licenses)	262
Time spent to generate generic hot spot map (2 hours x junior staff salary x 10 communities)	847
Adapt map for each community (10 minutes x junior staff salary x 114 weekends)	805
Hot spot map dissemination - additional printing of hot spot map (cost of envelope and stamp [$0.41] x 114 weekends)	32
Sub-total	*3,161*
Media	
Generating generic media release (captured in intervention 3)	0
Tailoring media release to each community (captured in intervention 3)	0
Media release (captured in intervention 3)	0
Sub-total	*0*
Police time	
Police time filling out forms (1 hour x constable salary x 115 weekends)	3,805
Police visibility - extra vigilance, more time patrolling (from pre-designed timesheet)	71,496
Sub-total	*75,301*
TOTAL	**78,462**

Good Sports program

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 AARC experimental communities were involved in Good Sports, the AARC project provided funding to the ADF to ensure that the additional four experimental communities were also included in the Good Sports program. The additional cost to AARC for these four communities to be involved in the Good Sports program was $26,400. This equates to a cost of $6,600 per community (or $66,000) to implement it in all 10 AARC experimental communities.

Hospital ED-based screening and brief intervention

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. It occurred when patients presented to the ED and was followed by personalised normative feedback to participants in a letter from the AARC project team, along with advice on low-risk levels of alcohol consumption. The estimated cost of this intervention is summarised in Table 1.16.

Table 1.16: Cost of the ED-based screening and brief intervention

Resource identification and measurement	Resource value $
Planning and recruitment co-ordination	
Time spent to identify hospital EDs in each community and draft letters (2 days x admin staff salary)	462
Expert expenses to meet with Emergency Departments ($290 travel + $130 meals and accommodation) x 5 communities x 2 visits	4,200
Opportunity cost of expert time (30 minute x senior staff salary x 2 visits x 5 communities)	346
Opportunity cost of ED coordinator time (30 minute senior staff salary x 2 visits x 5 communities)	346
Sub-total	*5,353*
Screening	
Time spent by coordinator liaising with ED staff (4 hours x junior staff salary x 2 visits x 5 communities)	1,320
Time required to design screening questionnaire (3 hours x senior staff salary + 6 hours x junior staff salary)	462
Expert expenses to meet with Emergency Departments ($290 travel + $130 meals and accommodation) x 5 communities x 2 visits	4,200
Opportunity cost of expert time (4 hours x senior staff salary x 4 visits per community x 5 communities)	5,531
Time spent recruiting/screening patients (20 minutes x junior staff salary x 1,416 patients)	4,999
Participant time spent filling out screening instrument (no costs given it was opportunistic)	0
Materials (1 page x $0.28 per page x 1,416 copies)	396
Sub-total	*16,908*
Mailed personalised feedback	
Time spent by coordinator generating generic feedback letter (4 hours x senior staff salary)	277
Time spent by coordinator generating mailed feedback (8 minutes x senior staff salary x 150 letters)	1,383
Materials (2 pages x $0.28 per page + stamp and envelope [$0.41] x 150)	146
Cost of phone calls to follow-up with participants ($0.55 per call x 150 people)	85
Sub-total	*1,890*
Media release	
Generating generic media release (captured in intervention 3)	0
Tailoring media release to each community (captured in intervention 3)	0
Media release (captured in intervention 3)	0
Sub-total	*0*
TOTAL	**24,151**

Web-based screening and brief intervention

This intervention also used the 10 item AUDIT questionnaire, 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. The estimated cost of this intervention is summarised in Table 1.17.

Table 1.17: Cost of web-based screening and brief intervention

Resource identification and measurement	Resource value $
Design and planning	
Time spent to develop materials (20 hours x junior staff salary + 5 hours x senior staff salary)	1,193
Sub-total	*1,193*
Developing website	
Cost of developing website	2,400
Sub-total	*2,400*
TOTAL	**3,593**

Timing of the implementation of, and exposure to, the AARC interventions

The interventions were implemented according to the timeline summarised in Table 1.18. The timing of two interventions (GP SBI and Good Sports) was dictated by opportunities to expand existing programs to include the AARC communities. The timing of two others was dictated by having access to the expertise needed to develop and implement the interventions relatively quickly (schools and workplaces). The timing for the remaining interventions followed a logical sequence of activity (e.g. engagement, feedback to stakeholders and media advocacy began early, while interventions such as the high-risk weekends and hospital ED interventions took some time to develop and implement). The grey highlighted cells indicate those interventions where some ongoing effect would be expected over the intervention phase of AARC (2005-2009), even though the actual intervention component had been completed before 31 December 2009.

The extent to which the individual interventions were applied in each community varied. Seven interventions, and those most under the control of the community coalition, were fully implemented in all of the 10 experimental communities, namely: engagement; feedback to key stakeholders; media advocacy; school-based intervention; web-based SBI; Good Sports; and targeting high-risk weekends. The level of each community's exposure to the remaining six interventions was either partial or unknown. The SBI delivered in Aboriginal Community Controlled Health Services, for example, was implemented in three communities [85], while the ED-based SBI was implemented in five [86]. Similarly, the number of GPs who read and acted on the feedback of their prescribing of pharmacotherapies for alcohol dependence is unknown (Medicare Australia would only provide data that were aggregated for the GPs in the experimental and control communities separately). Finally, for the workplace policies and practices training, 44 of the 46 eligible workplaces (at least 10 full-time employees) agreed to be mailed a resource kit, but only 22 attended a workshop on policy/practice development and implementation. Two declined to participate.

Table 1.18: Timing of the implementation of the interventions (and community surveys)

Intervention	Intervention period						
	Pre	Initiation	Post				
	2001-2004	2005	2006	2007	2008	2009	2010
1. Engagement[a]	x*	x					
Pre-intervention community survey		x					
2. GP SBI training[b]	x**	x					
3. Feedback to key stakeholders		x	x	x	x	x	
4. Media advocacy		x	x	x	x	x	
5. Workplace policies/practices[a,c]		x					
6. School-based intervention[c]		x	x				
7. GP feedback on prescribing[a]			x				
8. Pharmacy-based SBI			x	x			
9. Web-based SBI			x	x			
10. Aboriginal Community Controlled Health Services SBI				x	x	x	
11. Good Sports program[b]				x	x	x	
12. Targeting high-risk weekends				x	x	x	
13. Hospital ED SBI						x	
Post-intervention community survey							x

[a]The grey highlighted cells indicate those interventions where some ongoing effect was expected over the post-intervention period (2006-2009).

[b]The timing of these interventions was dictated by opportunities to expand existing programs to include the AARC communities

[c]The timing of these interventions was dictated by having access to the expertise needed to develop and implement the interventions relatively quickly

*Commenced March 2004

**Commenced October 2004

Statistical analyses

Three primary sets of analyses were conducted: one comparing rates of alcohol consumption and harms across the 20 AARC communities to identify the extent to which these differ between otherwise similar communities (Chapter Two); one to examine the effect of the interventions on the 10 experimental communities, relative to the 10 controls (Chapter Three); and one to estimate the benefit-cost of the interventions, that is, whether the benefits of implementing these interventions outweigh their costs (Chapter Four). The statistical analyses specific to these aims are presented in Chapters Two, Three and Four respectively.

Summary

Alcohol misuse imposes a substantial burden of harm on communities both in Australia and internationally. Australia has adopted a wide-ranging approach to reducing the deleterious impacts of alcohol misuse that comprises a spectrum of interventions from clinical treatment to population-level strategies. Despite this wide-range of activity, there have been only 26 attempts since 1980 at quantifying the effectiveness of improved co-ordination, or systematic implementation, of a range of interventions aimed at reducing alcohol-related harm, either in Australia or internationally. Moreover, these attempts have not been evaluated with sufficient rigour, either in terms of assessing the likely effectiveness of a more co-ordinated approach or in terms of the extent to which its benefits are likely to outweigh its costs.

The AARC project was designed by researchers at NDARC (University of NSW) and the University of Newcastle, and funded by FARE, to begin to address this clear knowledge gap. Obtaining empirical evidence on the costs and benefits of a co-ordinated, community-action approach allows policy makers to more easily weigh up its value, relative to other strategies, such as legislative approaches (e.g. alcohol taxation policy, minimum pricing policies, minimum drinking age, drink driving legislation) and relative to other population-level and clinical treatment interventions that are implemented independently of each other.

AARC is easily the most scientifically rigorous community-action evaluation ever undertaken internationally, being a cluster RCT involving 20 rural communities (10 experimental and 10 control) in NSW, Australia. It is also easily the most comprehensive economic evaluation of a community-action approach, being a benefit-cost analysis that measures its economic impact from a societal point of view, taking into account the costs and benefits to a range of services and settings, including police, health services, schools and local governments. AARC partnered with the 10 experimental communities in particular to devise, implement and evaluate the 13 interventions listed in Table 1.5, the total cost of which was $608,102, or approximately $61,000 per community. This relatively low cost ensured that the interventions, if effective, would be feasible for non-AARC communities across Australia to implement.

Some interventions were highly tailored to each individual community, such as targeting high-risk weekends, given tailoring interventions to specific patients or groups has been shown to improve the effectiveness of interventions. This tailored approach, however, would only be appropriate at the whole-of-community level if it can be shown that types and rates of alcohol misuse and harms differ between communities. Despite evidence that alcohol consumption and harms differ between countries internationally, and between states/territories in Australia, the extent to which they differ between communities was unknown prior to AARC. An early phase of the AARC project, therefore, was to devise a series of accurate measures applicable to multiple communities and apply them to gauge the extent of differences between communities. If the communities have similar rates of alcohol misuse and harms, then the benefits of tailored interventions are likely to be less than if there are significant differences between them. Chapter Two summarises the results of those analyses for the AARC communities.

2 Rates of alcohol consumption and harm between AARC communities

KEY FINDINGS

1. The 20 AARC communities have significantly different patterns of risky drinking and different types of alcohol-related harms that are most problematic for them.
2. The proportion of long-term risky drinkers was higher in communities with fewer police and more GPs.
3. The proportion of short-term risky drinkers was higher in communities with more hotels/clubs and a smaller proportion of Aboriginal Australians.
4. Alcohol-related crime was more prevalent in communities with more hotels/clubs, greater socio-economic advantage and more GPs.
5. Alcohol-related traffic crashes were more prevalent in communities with higher proportions of young males.
6. The cost of hospital inpatient admissions for alcohol dependence was higher in communities with more GPs, more police officers and fewer hotels/clubs, while the cost of inpatient admissions for alcohol abuse was higher in communities with greater socio-economic advantage and more 'other' licensed premises (e.g. motels, restaurants, theatres).

Introduction

As outlined in Chapter One, the importance of tailoring interventions to specific communities is predicated on the idea that rates and types of alcohol-related harms differ between communities. When AARC commenced, there was a lack of knowledge about community differences in alcohol-related harm that would otherwise guide and shape the selection of appropriate interventions for each community. Specifically, there were no data on community-level differences in alcohol consumption and related harms, despite evidence from the National Drug Strategy Household Survey (NDSHS) data of differences between metropolitan, rural and remote areas of Australia [25, 46, 47].

Aim

This chapter has two aims:

- First, to compare the 20 AARC communities on rates of self-reported alcohol consumption and harms, and rates of alcohol-related crime, traffic crashes and hospital inpatient admissions.
- Second, to identify individual- and community-level predictors of communities that have higher proportions of risky drinkers and alcohol-related harm.

Method

The AARC project design, the selection and allocation of communities to the experimental or control condition, the measures, and the interventions are all described in Chapter One. This section reports statistical comparisons of communities on these measures.

Statistical analyses

Since the AARC communities that are geographically close may be similar to each other (a phenomenon known as spatial autocorrelation), the statistical independence of data from the communities was assessed before comparing the AARC communities on each of the alcohol-related outcomes. Spatial autocorrelation was investigated using CrimStat III [87]. The latitude and longitude of each community was applied and tested with each outcome variable, and autocorrelation was tested using Moran's I statistic, which did not show any significant autocorrelation between communities (I = 0.0007; z = 0.44). The Geary's C statistic of 0.93 is close to one, which confirms community locations represent a random spatial pattern.

Differences between AARC communities

Self-reported consumption and alcohol-related harms

Responses to the pre-intervention survey were used to classify respondents' according to their level of risk of experiencing harm in the long-term, the short-term (past 12 months) and on the AUDIT questionnaire, as defined in Chapter One.

Alcohol-related criminal incidents

As outlined in Chapter One, AARC uses a proxy measure of alcohol-related crime, comprising specific types of crimes that occur in alcohol-related times. The proxy measure was developed and tested specifically for AARC, given no community-level measure was available [41, 42]. Costs can be used to take into account incident severity as well as the number of crime incidents and, although not included in this ratio, subsequent inclusion of costs found the same results [43]. For the purpose of comparison between communities, alcohol-related crime was estimated as the ratio of the number of incidents occurring during alcohol-related times to the number of the same types of incidents occurring during non-alcohol-related times. This ratio method minimises the impact of differences between communities in population size and in underlying rates of all crime. For each community, and for each year from 2001-2005, a ratio of the crimes occurring during alcohol-related times to the crimes during non-alcohol-related times was estimated. The mean crime ratio for this time period was then calculated for each community and graphed in Figure 2.2.

Alcohol-related traffic crashes

The proxy measure of alcohol-related traffic crashes, described in Chapter One, comprised an aggregate of crashes of different severity (fatal, injury, non-injury), multiplied by their respective costs, to derive a traffic crash cost estimate. This proxy measure was developed and tested for the AARC communities in the absence of an existing community-level measure [44]. For each community and for each year from 2001-2007, a ratio of traffic crash costs in alcohol-related times to traffic crash costs in non-alcohol-related times was estimated. The mean traffic crash cost ratio for this time period was calculated for each community and graphed in Figure 2.3.

Alcohol-related hospital inpatient admissions

As outlined in Chapter One, AARC used two measures of alcohol-related hospital inpatient admissions: alcohol dependence, and alcohol abuse. Only those admissions with a primary diagnosis relating to one of those conditions were included. Costs were taken from the allocated Diagnosis Related Group (DRG) and, as such, they represent the average cost of the resources required to treat patients with alcohol dependence or abuse on an inpatient basis. Separately for each community, and for each year from 1999-2005, two ratios were calculated (one for each measure) for alcohol-related inpatient admissions compared to all-cause admissions. The mean ratios for this time period were then calculated for each community and graphed in Figures 2.4 and 2.5.

Regression analyses

Self-reported consumption and alcohol-related harms

Three regression models were estimated (using SAS version 9.2 software) to identify the characteristics of communities that were associated with higher proportions of long-term risky drinkers, short-term risky drinkers and hazardous/harmful drinkers (based on AUDIT scores). The modelling process involved three steps.

First, the predictor variables for inclusion in each model were determined. All the community characteristics summarised in Table 1.2 in Chapter One were included, as well as a range of individual-level variables (age, gender, marital status, income, general health, country of birth and Aboriginal or Torres Strait Islander). Age and gender were included in all three models because of their robust association with risky drinking. For the other predictor variables, those that showed some association with the predicted variable (the outcome) in univariate analyses (where $p \leq 0.25$) were included [88].

Second, the regression models were estimated. Given there are two levels of predictor variables (community characteristics and individual survey responses) and given the survey responses are clustered within communities, rather than being truly independent of each other, the appropriate regression model is a hierarchical linear mixed model. For each of the three outcomes, the first model estimated included all the predictor variables identified in step one. A backward stepwise procedure was then applied in which the least significant variable was removed and the model re-estimated until the only remaining variables were those that were statistically significant at the 10% level (p-value ≤ 0.1). Although the 5% level (p-value ≤ 0.05) is the more usual level for statistical significance, the 10% level was chosen because the coefficients needed to be adjusted downwards (i.e. made less significant) in step three, so retaining predictors significant at the 10% level provides an indication of the effect of step three on the final model.

The third step applied a weighting variable to the co-efficients estimated in step two, which adjusts the survey responses returned to the actual age and gender distribution of the AARC communities. Table 2.1 shows the adjusted beta co-efficient (β), the adjusted standard error (SE), the adjusted p-values, the odds ratios (OR) and the 95% confidence intervals (95% CI). The statistically significant predictors of each outcome, after all three steps of the regression analyses are completed) are those where the 95% CI excludes the value of 1.00.

Alcohol-related criminal incidents, traffic crashes and hospital inpatient admissions

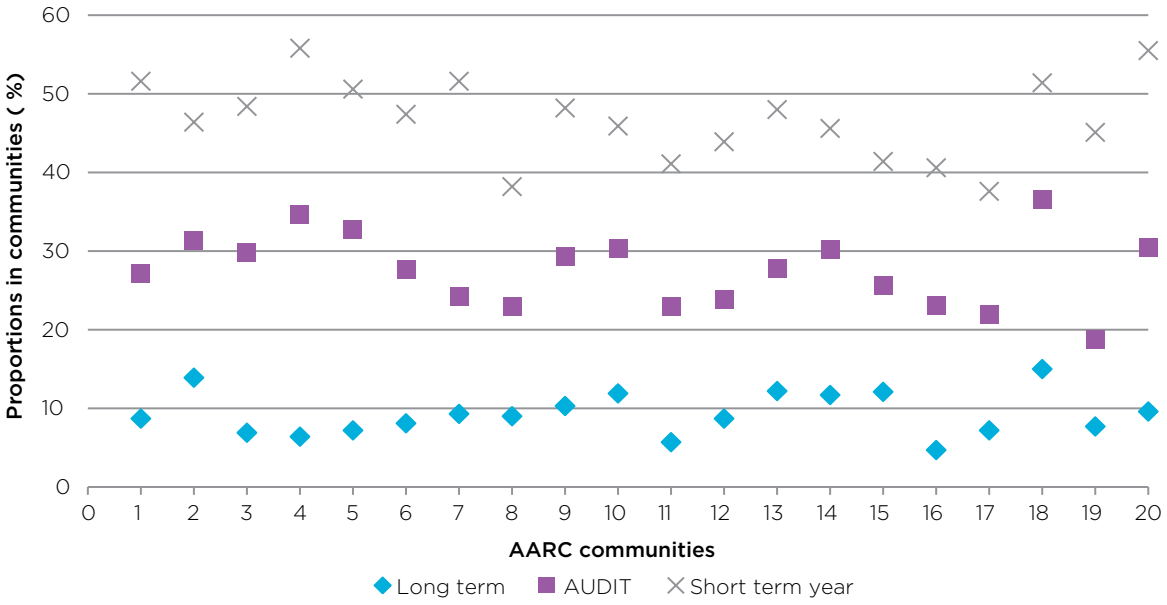
Three multivariate linear regression models were also estimated to identify the community characteristics associated with higher rates of alcohol-related crime, traffic crashes and hospital inpatient admissions (one model per outcome). The predictor variables were identified using exactly the same methods as for the self-reported consumption and harm regression analyses. Exploratory analyses were undertaken to ensure data were normally distributed and there was minimal correlation between predictor variables.

Differences between AARC communities

Self-reported consumption and alcohol-related harms

The proportions of respondents in each community identified as being at increased risk of harm in the long-term, the short-term (past year) and as hazardous/harmful drinkers (AUDIT score ≥ 8), are summarised in Figure 2.1. Across all communities, the proportion of those at increased risk of harm in the short-term is much higher than the proportion of those at increased risk in the long term. The largest difference was for community 4 (56% in the short-term and 6% in the long-term) and the smallest differences were for communities 8 (38% and 9%, respectively) and 15 (41% and 12%, respectively).

Figure 2.1: Proportion of residents drinking at risky levels of harm, by community



The proportion of respondents identified as being at increased risk of harm in the long-term ranged from 5% (community 16) to 15% (community 18) and these differences between communities were statistically significant (z=-38.9, p< 0.00), indicating that they are unlikely to be due to chance.

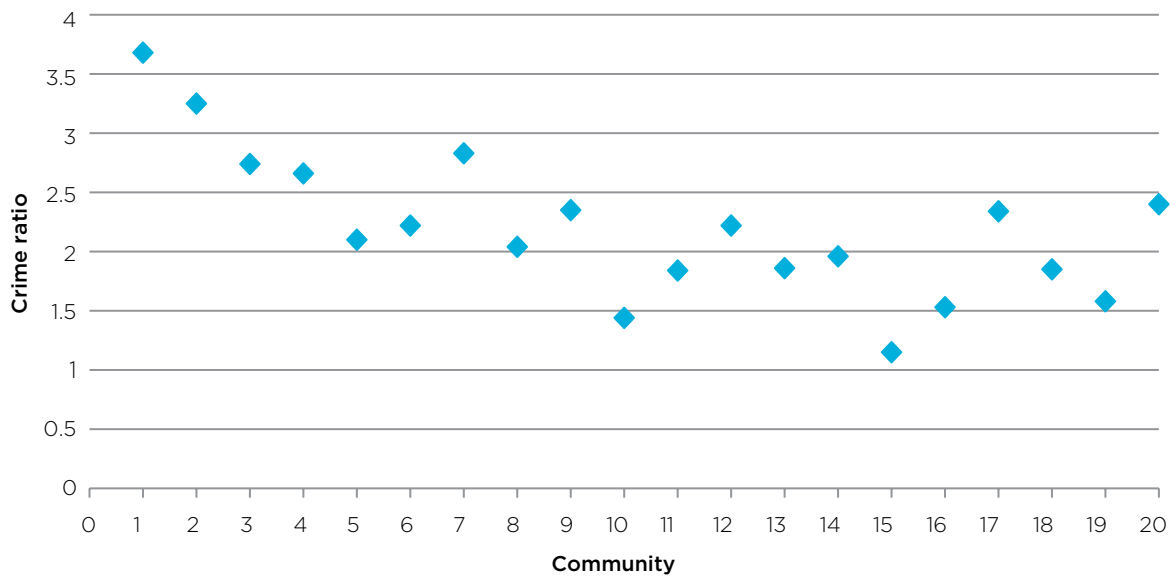
The proportion of respondents identified as being at increased risk of harm in the short-term ranged from 38% (communities 8 and 17) to 56% (communities 4 and 20). These differences between communities were also statistically significant (z=-5.7, p< 0.00).

The proportion of each community identified as hazardous/harmful drinkers (AUDIT score ≥ 8) ranged from 19% (community 19) to 37% (community 18). Again, these differences were statistically significant (z=-16.01, p< 0.00).

Alcohol-related criminal incidents

The ratios of alcohol-related criminal incidents, separately for each community, are shown in Figure 2.2. Alcohol-related crime ratios for the 20 communities ranged from a high of 3.7 (community 1) to a low of 1.2 (community 15). The mean of 2.2 indicates that, on average, 2.2 crimes occurred in an alcohol-related time period for every one crime in a non-alcohol-related time period.

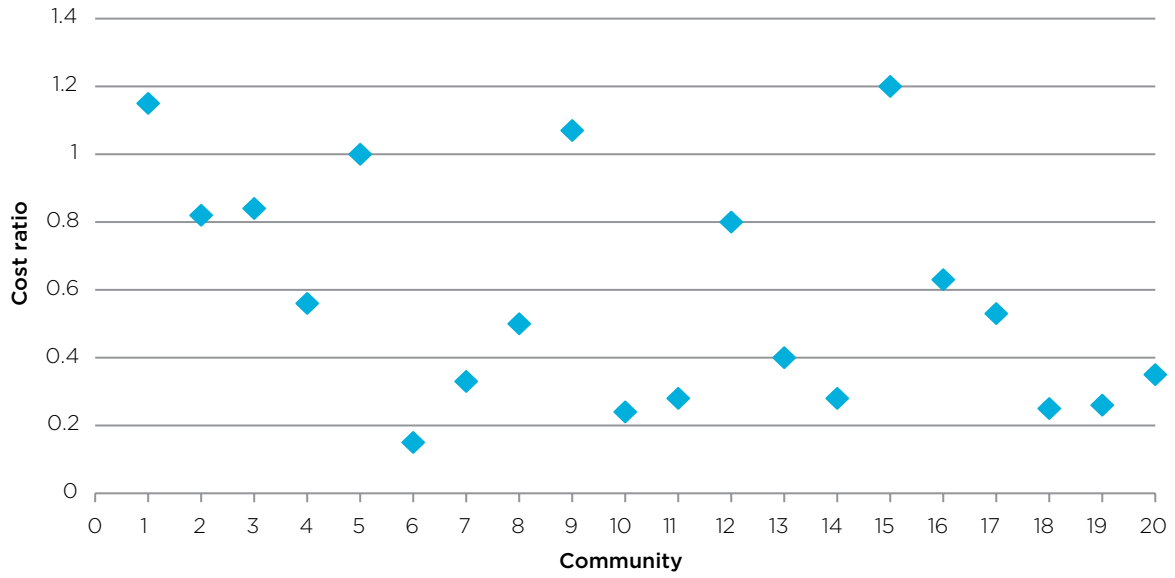
Figure 2.2: Ratios of alcohol-related criminal incidents, by community



Alcohol-related traffic crashes

The alcohol-related traffic crash cost ratios, separately for each community, are shown in Figure 2.3. The highest alcohol-related traffic crash cost ratio was 1.20 (community 15), meaning that alcohol-related traffic crashes cost $120 for every $100 spent on non-alcohol-related crashes. The ratios ranged from 1.20 to 0.15 (community 6). The four highest cost-ratios were all at least 1 (communities 15, 1, 9, and 5), indicating that the alcohol-related crash costs were greater than the non-alcohol-related crash costs.

Figure 2.3: Ratios of alcohol-related traffic crash costs, by community



Alcohol-related hospital inpatient admissions

The cost ratios for alcohol-related inpatient hospital admissions for alcohol dependence and alcohol abuse, separately for each community, are shown in Figures 2.4 and 2.5 respectively. The costs of hospital inpatient admissions that have a primary diagnosis for alcohol dependence (Figure 2.4) are typically greater than for alcohol abuse (Figure 2.5), as is the extent of variability between communities. For alcohol dependence, the highest cost ratio is 0.0086 (community 13), meaning that every $1,000 spent on inpatient hospital care comprised an estimated $8.60 specifically for treating patients with a primary diagnosis of alcohol dependence. The cost ratios for alcohol dependence ranged from 0.0086 to 0.0004 (community 4). For alcohol abuse, the cost ratios ranged from a high of 0.003 (community 12) to a low of 0.0006 (community 3).

Figure 2.4: Ratios of hospital inpatient admission costs for alcohol dependence, by community

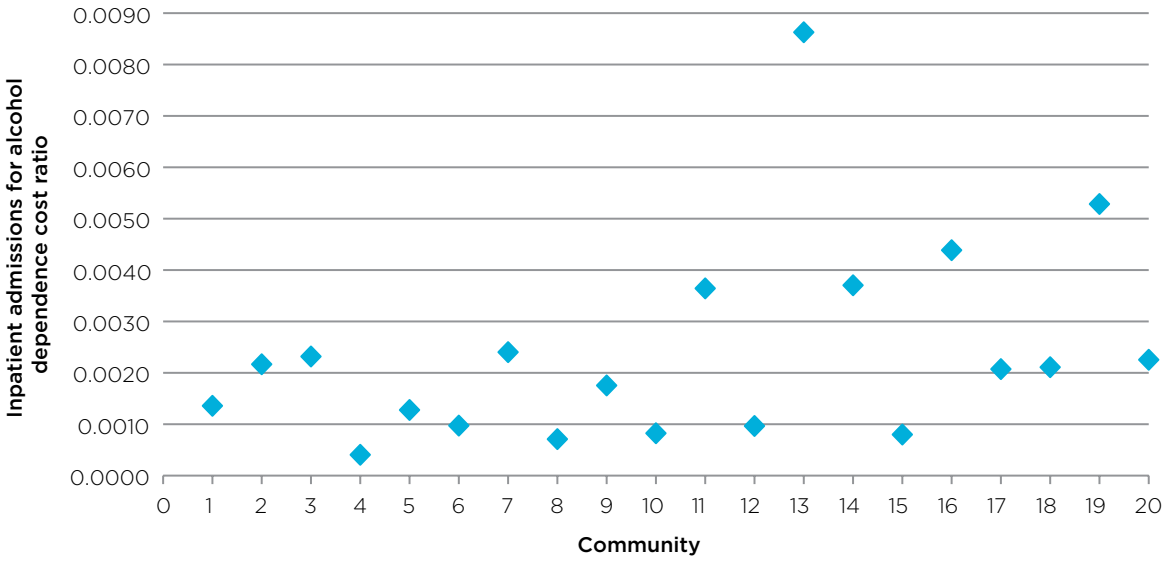
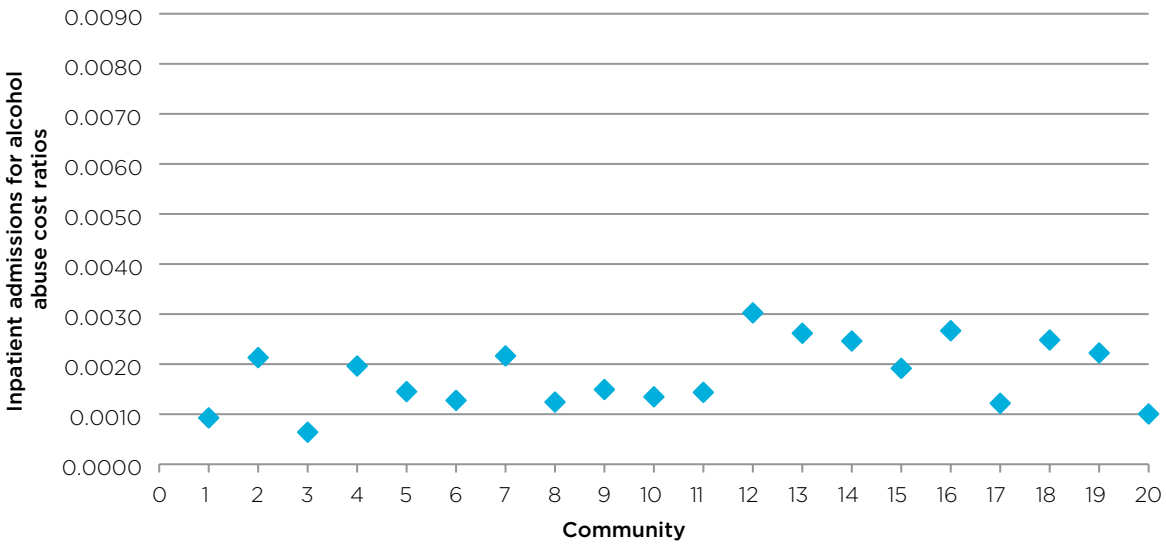


Figure 2.5: Ratios of hospital inpatient admission costs for alcohol abuse, by community



Regression analyses

Self-reported consumption and alcohol-related harms

The results of the regression analyses are shown in Table 2.1. All predictors are statistically significantly related to the outcome in each model, except those marked a in the 95% CI column.

Table 2.1: Individual- and community-level characteristics significantly associated with risky alcohol consumption

Community characteristic		Adjusted β	Adjusted SE	Adjusted p	Odds ratio	95% CI[a]
Model 1: risk of long-term harm						
Youth	*≤ 25 years*	0.17	0.24	0.50	1.19	0.75 – 1.90[a]
Gender	*female*	-0.39	0.15	0.01	0.68	0.51 – 0.90
Marital status	*not married*	0.39	0.17	0.02	1.48	1.06 – 2.07
General health[b]		-0.85	0.28	0.00	0.43	0.25 – 0.74
GPs[c]		0.02	0.01	0.01	1.02	1.00 – 1.03[d]
Police[c]		-0.02	0.01	0.02	0.98	0.97 – 1.00[d]
Model 2: risk of short-term harm						
Youth	*≤ 25 years*	1.23	0.20	0.00	3.41	2.30 – 5.06
Gender	*female*	-0.10	0.10	0.30	0.91	0.74 – 1.11[a]
Marital status	*not married*	0.46	0.11	0.00	1.58	1.28 – 1.94
Country of birth	*not Australia*	-0.53	0.24	0.03	0.59	0.37 – 0.95
Income[e]	*≥ $700/week*	0.57	0.10	0.00	1.77	1.46 – 2.14
Aboriginal	*yes*	-0.51	0.30	0.09	0.60	0.33 – 1.08[a]
Hotels/clubs[c]		0.04	0.01	0.00	1.04	1.02 – 1.06
% Aboriginal		-0.02	0.01	0.00	0.98	0.96 – 0.99
Model 3: risk of hazardous/harmful use (AUDIT)						
Youth	*≤ 25 years*	1.16	0.21	0.00	3.19	2.09 – 4.86
Gender	*female*	-1.38	0.14	0.00	0.25	0.19 – 0.33
Marital status	*not married*	0.54	0.15	0.00	1.72	1.27 – 2.32
General health[b]		-0.67	0.37	0.04	0.51	0.24 – 1.08[a]
Country of birth	*not Australia*	-0.59	0.32	0.04	0.56	0.29 – 1.06[a]
Income[e]	*≥ $700/week*	0.54	0.12	0.00	1.72	1.34 – 2.22

[a]The only variables NOT statistically significant (p > 0.05) and the 95% confidence interval (95% CI) includes 1. The apparent exceptions in model 3, where the p-values = 0.04, are due to rounding errors.

[b]Measured using the EQ-5D.

[c]Per 10,000 population.

[d]The apparent anomaly between the 95% CI (includes 1) and the p-value being < 0.05 is because these are rates/10,000 population and so increasing GPs or police by a small number will have little effect, even though the relationship is significant.

[e]Combined gross household income.

Model 1 shows that the odds of being at increased risk of alcohol harm in the long-term were statistically significantly lower for females (OR=0.68) and for those who report better general health (OR=0.43), and higher for those who were not married (OR=1.48). The grey shaded cells represent community-level predictors: communities with more GPs per and fewer police per 10,000 population had a higher proportion of drinkers at risk of harm in the long-term (ORs=1.02 and 0.98, respectively). The apparent difference between the p-values for these two predictors (which suggest strong effects) and the 95% CIs (which indicate marginal effects) reflect that the outcome is a rate per 10,000 population. This means that increasing the number of either GPs or police by a small number is unlikely to have a substantial impact on the proportion of long-term risky drinkers in a community, even though the relationship is robust.

Model 2 shows that the odds of being at increased risk of alcohol harm in the short-term are statistically significantly higher for young people (OR=3.41), those who are not married (OR=1.58) and those with a gross household income of at least $700 per week (OR=1.77). Conversely, the odds of being at increased risk of alcohol harm in the short-term are statistically significantly lower for females (OR=0.91), those not born in Australia (OR=0.59) and Aboriginal Australians (OR=0.60). Communities with more hotels/clubs per 10,000 population and a smaller proportion of Aboriginal Australians have a higher proportion of drinkers at risk of harm in the short-term (ORs=1.04 and 0.98).

The individual-level risk factors significantly associated with drinking excessively on one occasion have generally been identified in previous studies (i.e. young people, unmarried, higher incomes, males and being born in Australia) [89-92]. The finding that Aboriginal Australians, both individually and as a proportion of their broader communities, are less likely to drink excessively on one occasion may seem unexpected. It is most likely that this finding is accurate given the other predictor variables are consistent with previous literature. At the individual-level, the most plausible explanation is that Aboriginal Australians are less likely to drink excessively on one occasion because the majority of them will have lower disposable incomes and it is those with higher incomes that are more likely to be at increased risk of alcohol harm in the short-term. At the community-level, there are two plausible explanations. First, Aboriginal communities typically comprise a small proportion of rural communities (a mean of 4.9% for the AARC communities) such that they are unlikely to contribute substantially to harms at the whole-of-community level, even if they do experience disproportionately high rates of harm relative to their population size. Second, this observation is consistent with the findings from the 1994 NDSHS Indigenous supplement, still regarded as the most reliable estimate of Aboriginal-specific drinking patterns, which showed that a greater proportion of Indigenous Australians do not consume alcohol at all, relative to non-Indigenous Australians, even though a higher proportion of those who drink do so at harmful levels [93].

Model 3 shows that the odds of being at increased risk of hazardous/harmful alcohol use, based on the total AUDIT score, are statistically significantly higher for young people (OR=1.16), those not married (OR=0.54) and those with a gross household income of at least $700 per week. (OR=0.54). Females (OR=1.38), those who report better general health (OR=0.67) and those not born in Australia (OR=0.59) were at lower risk of hazardous/harmful alcohol use. None of the community-level factors assessed were significantly associated with the proportion of a community that reported hazardous/harmful alcohol use.

Alcohol-related criminal incidents

Table 2.2 summarises the results of the univariate regressions (each predictor compared to the outcome individually) and multivariate regressions (each predictor compared to the outcome taking into account the effect of the other predictors). The regression model indicates that 74% of the variance in the crime ratios was accounted for by: socioeconomic disadvantage (SEIFA disadvantage index); the rate of GPs per 10,000 population; and the rate of hotels/clubs per 10,000 population ($F=14.98$, $p<0.00$). Specifically, the final model suggests that an increase in SEIFA (greater socioeconomic advantage), and increases in the number of hotels/clubs and GPs, were all associated with more alcohol-related crime.

Alcohol-related traffic crashes

Of the predictors listed in Table 2.2, only the proportion of males under the age of 25 years was a statistically significant predictor of higher alcohol-related traffic crash costs ($p \leq 0.05$).

Alcohol-related hospital inpatient admissions

Of the predictors listed in Table 2.2, those associated with higher costs of hospital inpatient admissions for alcohol dependence were fewer hotels/clubs, more police officers and more GPs per 10,000 population. Variables associated with higher costs of hospital inpatient admissions for alcohol abuse were greater socio-economic advantage and more 'other' licensed premises (e.g. airport, function centres, motels, restaurants, theatres and cellar-doors) per 10,000 population.

Table 2.2: Univariate and multivariate regression models: community predictors of alcohol-related crime

Predictors	Univariate						Multivariate				
	Parameter estimate β	SE	95% CI	t	p	% variance explained by model	Parameter estimate β	SE	95% CI	t	p
Proportion young males	-14.9	26.12	-69.77- -39.97	-0.57	0.58	0.02					
Proportion Indigenous	-9.46	3.36	-16.52- -2.41	0.01	0.01*	0.31					
Remoteness score (ARIA)	-0.05	0.10	-0.25 – 0.16	-0.47	0.65	0.01					
SEIFA disadvantage score	0.32	0.08	0.16 - 0.49	4.10	<0.01*	0.48	0.27	0.06	0.13 - 0.40	4.25	0.00
Hotels/clubs[a]	0.06	0.03	-0.009 - 0.14	1.85	0.08*	0.16	0.05	0.02	0.00 - 0.09	2.22	0.04
Wholesalers/retailers[a]	0.07	0.07	-0.07 - 0.21	1.12	0.28	0.07					
Other licensed premises[a]	0.07	0.02	0.03 - 0.12	3.68	<0.01*	0.43					
Police officers[a]	0.0001	0.01	-0.03 - 0.03	0.01	0.99	0.00					
Highway patrol officers[a]	-0.08	0.08	-0.25 - 0.08	-1.10	0.29	0.06					
Number of GPs[a]	0.05	0.02	0.01 - 0.09	2.64	0.02*	0.28	0.04	0.01	0.01 - 0.07	3.34	0.00
% short-term risk	0.05	0.03	0.00 - 0.11	2.07	0.05*	0.19					
% long-term risk	-0.02	0.05	-0.13 - 0.10	-0.30	0.77	0.01					
% harmful (AUDIT)	0.03	0.03	-0.04 - 0.09	0.96	0.35	0.05					

[a]Per 10,000 population; * p<0.25 and therefore were included in the initial multi-variate model

Summary and methodological considerations

Differences between AARC communities

There were statistically significant differences between the 20 AARC communities in rates of self-reported alcohol consumption and harms, alcohol-related criminal incidents, alcohol-related traffic crashes and alcohol-related hospital inpatient admissions. This is an important finding because it suggests that, in order to optimise the cost-effectiveness of their efforts, communities should focus on the risky consumption patterns and harms that are highest in their community. This is not to suggest that communities should solely focus on the consumption patterns and harms that are highest in their community; merely that focusing on those patterns has greater potential to produce significant reductions in alcohol-related harm, at least in the short-term. For example:

- Figure 2.1 indicates that implementing an effective intervention to reduce the proportion of a community that is at increased risk of harm in the short-term is likely to be relatively more cost-beneficial in community 20 (the highest proportion of short-term risky drinking) than in community 17 (the lowest proportion of short-term risky drinking).
- Figure 2.2 suggests that a greater reduction in alcohol-related crime is likely to be achieved by a relevant intervention implemented in community 1 (crime ratio of 3.7) than in community 15 (crime ratio of 1.2).
- Figure 2.3 indicates that implementing an effective intervention to reduce alcohol-related traffic crashes in community 15 (the highest alcohol-related crash cost ratio of 1.20) is likely to be more cost-beneficial than implementing the same intervention in community 6 (the lowest alcohol-related crash cost ratio of 0.15).

Characteristics associated with higher rates of alcohol consumption and harm

The analyses in this chapter could help communities to tailor interventions to focus on individual- and community-level characteristics that are significantly associated with higher rates of alcohol consumption and harms. Table 2.1, for example, identifies a number of characteristics that are associated with higher rates of risky consumption: being young, male and unmarried are associated with increased risks of harm in the long-term, in the short-term and with hazardous/harmful consumption (AUDIT) [51]. Given there is currently a lack of evidence for the effectiveness of community-based interventions that specifically target young people [94], more generic strategies for which there is some evidence may be required, such as enforced point-of-sale legislation [61, 80, 81] and police visibility, especially at high-risk times and locations [82, 83].

Effective interventions targeting drink-driving are also likely to be cost-beneficial given alcohol-related crash cost-ratios were statistically significantly higher in communities with a higher proportion of males under the age of 25 years (Table 2.3). Although impractical for individual communities to implement, extending the requirement for drivers to have zero blood alcohol concentration up to the age of 22 years, as is the case in Victoria, would be a cost-effective intervention: if such a policy had been implemented nationally in 2003 for drivers up to age 21 years, it would have saved an estimated 17 lives among 18-21 year olds [95].

Table 2.1 also shows that those who report higher household incomes (≥ AUD$700/week) are statistically significantly more likely to report drinking at levels that increase their risk of harm in the short-term and hazardous/harmful consumption (AUDIT). A similar pattern of results is evident from the regression analyses using routinely collected data: communities with greater socio-economic advantage are more likely to have higher rates of alcohol crime (Table 2.2) and are more likely to have higher rates of inpatient hospital admissions for alcohol abuse. These findings suggest patterns of alcohol consumption are closely related to wealth: individuals with higher incomes and communities with greater socio-economic status consume significantly more alcohol and have higher rates of alcohol harm. This may also partly explain the finding that Aboriginal Australians were at significantly *lower risk* of short-term harm, because they have lower average household incomes.

Communities with more GPs and fewer police per 10,000 population have higher proportions of drinkers at increased risk of long-term alcohol-related harm (Table 2.1). It is probable that communities with a higher proportion of GPs also have a higher average income (both because GPs increase the average income in a community and because more GPs are likely to be willing to live and work in communities where incomes are higher). If so, it is the higher average income (as opposed to the income of individual households) that is related to a greater proportion of the community drinking at increased risk of long-term harm. This may also explain the finding in Table 2.2 that communities with more GPs also had higher rates of alcohol-related crime. Although SEIFA scores might also be expected to predict a higher proportion of long-term risky drinkers, they assess a much wider range of indicators than income, such as unemployment rates, car ownership, house sizes and education level, all of which are not necessarily aligned to income. Similarly, that a higher rate of GPs per 10,000 population is associated with higher costs of hospital inpatient admissions for alcohol dependence most likely reflects that there are more GPs to refer patients to hospital for treatment and that there are more long-term risky drinkers in their communities.

From an intervention point of view, this finding raises the possibility that communities with more GPs may be able to increase the rate with which GPs provide effective treatment to patients whose drinking places them at increased risk of long-term alcohol harm. To explore this idea, an RCT was conducted, nested in the overall experimental design of AARC, to quantify the cost-effectiveness of an intervention specifically designed to improve the treatment GPs provide to their alcohol dependent patients. In response to receiving tailored, mailed feedback on the number of alcohol dependent patients in their community and their rates of prescribing an alcohol pharmacotherapy (acamprosate or naltrexone), the GPs in the experimental AARC communities, relative to the GPs in the control communities, increased their prescribing of acamprosate which, in turn, decreased rates of alcohol-related inpatient admissions for alcohol dependence in their local hospitals. Critically, the increased cost to the health care system from the additional prescribing was outweighed by the reduced cost of fewer inpatient hospitalisations, resulting in net-savings to the health care system. Specifically, the average cost saving per quarter per hospitalisation for inpatient admissions for alcohol dependence averted was $5,420, or $21,680 per annum [96]. This finding suggests a simple, low-cost intervention can cost-effectively reduce hospital admissions for alcohol dependence.

The likely reasons for the relationship between fewer police and a higher proportion of drinkers at increased risk of long-term alcohol harm are less apparent. It is possible that the availability of more police allows more frequent, or more visible, random breath testing which, in turn, could reduce average levels of alcohol consumption. It was beyond the scope of the AARC project to further examine this relationship.

It is unsurprising that communities with a higher rate of hotels/clubs per capita are more likely to have higher proportions of their population drinking at levels that increase their risk of short-term alcohol harm (Table 2.1). This is reinforced by the finding that these communities also have higher rates of alcohol-related crime (Table 2.2). Greater availability of alcohol, including the number and type of alcohol outlets [97, 98] and the hours and days available for purchasing alcohol [99, 100], are known to increase alcohol harms. These analyses also provide further evidence that different types of alcohol outlets produce different types of harm. Only a higher rate per 10,000 population of hotels/clubs was associated with a *higher* proportion of short-term risky drinkers and *lower* costs of hospital inpatient admissions for alcohol dependence, while a *greater* number of 'other' licensed premises (e.g. airport, function centres, motels, restaurants, theatres and cellar-doors) was associated with *higher* costs of hospital inpatient admissions for alcohol abuse. Reducing, or at least capping, the number of hotels/clubs in a community is most likely to reduce the short-term negative consequences of alcohol misuse, such as alcohol-related crime [101], as has been shown with mandatory earlier closing in high-risk locations [102], while restricting the number of other types of alcohol outlets may reduce the longer-term negative consequences of alcohol misuse.

Table 2.1 also shows communities with a higher proportion of Aboriginal Australians also have a *lower* proportion of short-term risky drinkers. This observation is consistent with the findings from the 1994 NDSHS Indigenous supplement, which showed that a greater proportion of Indigenous Australians do not consume alcohol compared to non-Indigenous Australians, even though a higher proportion of those who do drink do so at harmful levels [93].

The methods and results of this chapter provide an evidence-based approach communities could use to identify the specific types of alcohol harm that impact on them the most and, as a consequence, prioritise their efforts to reduce those harms. Two specific examples illustrate the point:

- Community 15 has the highest burden of alcohol-related traffic crashes (Figure 2.3) and the lowest burden of alcohol-related crime (Figure 2.2). This indicates that community 15 might reasonably prioritise their efforts on reducing alcohol-related traffic crashes, relative to other communities, and, more specifically, design interventions that target young males, since they are associated with disproportionately high alcohol-related traffic crash costs (Table 2.3).
- Community one has the highest rate of alcohol-related crime (Figure 2.2) and a relatively high proportion of residents whose consumption places them at increased risk of alcohol-related harm in the short-term (Figure 2.1). Community one might reasonably prioritise their efforts on reducing their rates of alcohol-related crime, relative to other communities, and, more specifically, design interventions that target the number, or density, or operating hours of hotels and clubs, since they are associated with disproportionately high rates of alcohol-related crime (Table 2.2) and short-term risky drinkers (Table 2.1).

Data considerations

This chapter examined individual- and community-level associations with alcohol consumption and alcohol-related harm using cross-sectional analyses, which means causal pathways cannot be directly established between the characteristics of survey respondents and communities, and between rates of alcohol consumption and alcohol-related harms. Although there was sufficient statistical power for the individual-level analyses, given the relatively large survey sample sizes, the response rate of 39% may have introduced bias. Nevertheless, this is unlikely to have had a substantial impact on the outcomes because the responses were weighted to ensure they were representative of the sampling frame. Given the survey data rely on self-report, it is possible that levels of alcohol consumption and harms have been under-reported. Despite attempts to minimise the rate of under-reporting by using reliable and valid measures, any under-reporting is likely to have had the effect of restricting the number of associations between individual-level characteristics and community-level outcomes detected as statistically significant [103-105].

The statistical power for the community-level analysis was restricted by the sample size of 20 communities which increases the potential for Type II error (i.e. the failure to find a relationship between a community characteristic and alcohol-related crime when a relationship exists). Despite this limitation, statistically significant relationships were detected between community-level predictors and the outcomes, and it is possible that others would have been significant with more communities. In the alcohol-related traffic crash analyses, for example, both the proportion of males ($p \leq 0.07$) and the rate of hotels/clubs per 10,000 population ($p \leq 0.09$) were less than a 10% likelihood of occurring by chance and may have been statistically significant at the 5% level if there were more than 20 communities involved in AARC (Table 2.3). Similarly, it is possible that including a greater range of community characteristics would have identified more associations: levels of alcohol consumption and related harms may vary, for example, by the extent of social capital in a community, a variable not included in AARC because the components of social capital are unavailable at a postcode level [106].

Finally, the reliability and validity of the routinely collected data for assessing actual rates of alcohol-related harms may also be questioned, although AARC tested the reliability of the crime measure and used highly conservative measures for alcohol-related traffic crashes and inpatient hospitalisations. Furthermore, given the purpose of this chapter was to assess relative differences between AARC communities, rather than establish accurate absolute levels of alcohol-related consumption or harm within them, the same measures and methods are applied to all communities such that any inaccuracies in the measures used will be common to each community.

3 The impact of the AARC interventions

KEY FINDINGS

1. The combined impact of the AARC interventions at post-test, compared to the controls, showed statistically significantly:
   - lower proportions of short-term risky drinkers; and
   - less self-reported experience of alcohol-related verbal abuse.
2. Outcomes that showed marginally statistically significant differences between intervention and control communities were:
   - fewer alcohol-related street offences;
   - fewer long-term risky drinkers;
   - less alcohol-related crime; and
   - more alcohol-related hospital inpatient admissions for alcohol abuse.
3. Outcomes that showed no improvement in the experimental communities were:
   - alcohol-related traffic crashes; and
   - alcohol-related hospital inpatient admissions for alcohol dependence.

Introduction

As outlined in Chapter One, there have been very few rigorous attempts to quantify the effect of greater co-ordination of interventions across communities. The 26 alcohol community-action trials that have been published in the peer-review international literature since 1980 and these have been very limited in their scope and rigour: they have only implemented a small number of community activities; they have not used the most scientifically rigorous evaluation designs and measures; and they have not reported on the costs versus the benefits of the approach at all [40]. The only Australian trial published since 1980 was a study of two communities in WA [107]. Given this lack of intervention effort, the costs and benefits of a community-action approach to reducing alcohol consumption and related harms are not clear. Consequently, AARC aimed to utilise the strongest evaluation design possible (a cluster RCT) to more accurately quantify whether the costs of community-action were more or less than its benefits, as the next iteration in alcohol focused community-action research.

Aim

This chapter quantifies the impact of a community-action, multi-component alcohol intervention (as defined in Chapter One) on self-reported alcohol consumption and harms, as well as on routinely collected alcohol-related crime, traffic crash and hospital inpatient admission data. The mix of interventions included specific strategies that focused on high-risk times (e.g. targeting high-risk weekends and encouraging young people to seek treatment for highly intoxicated friends as soon as possible) and risky drinkers (e.g. improving GPs treatment of highly alcohol dependent patients). If the interventions were successful, it was anticipated that they would reduce rates of risky alcohol consumption and crime and potentially *increase* hospital inpatient admissions as more people in the experimental communities were referred to, or sought, treatment for alcohol dependence and abuse.

Method

The AARC project design, the selection and allocation of communities to the experimental or control condition, the measures, and the interventions are described in Chapter One. Consequently, this section of the report focuses on the evaluation of intervention outcomes.

Overview

The major emphasis of the evaluation was to assess changes in alcohol-related harm over time between intervention and control communities rather than to accurately measure absolute levels of alcohol-related harm. The evaluation provides a reasonable assessment of the impact of the interventions, both within and between communities, if the same measures are applied in the same way to each of the communities at each of the data collection points over time.

Pre- and post-intervention periods

Routinely collected data relevant to the total project period were provided by the various agencies in 2010, to ensure data uniformity across the pre- and post-intervention periods. Although intervention activity commenced in 2005, it was anticipated that there would be a lag between intervention implementation and its effect, and that the duration of this unknown lag would vary for different intervention components. Consequently, 2001-2004 was defined as the pre-intervention period, 2005 as the intervention initiation period and 2006-2009 as the post-intervention period (Table 1.18). All routinely collected data were categorised into quarterly data points to allow investigation of seasonal variation and trends over time using a reasonable number of data points (36 per cluster), while minimising the number of zero-count data points.

Unmatched analysis of a matched design

Although the AARC project design used a pair-matched randomisation method, an unmatched analysis of a matched design can be more powerful than a matched analysis if the number of communities is not large and the correlation between the matching variable and the outcome is small (≤ 0.2) [108, 109]. For this study, both these criteria were met: there were only 10 matched pairs of communities; and the correlation between the matching variable (the proportion of each community that was Aboriginal) and the outcome was expected to be small.

Self-report data

The self-report survey data were analysed using a multi-level model, with individual respondents and communities categorised as nested random effects. In other words, the responses of individuals are treated as nested within communities which, in turn, are nested within intervention group (experimental or control communities). Survey data from 2005 and 2010 were combined into a single data set. Since survey data were drawn from samples and not everybody who received a survey responded, the samples were weighted to reflect the age and gender characteristics of the communities. The sample weights could not be combined across years, so they were calculated separately for 2005 and 2010. To be conservative, the largest weight was used. Square roots of the weights are shown for each variable in Table 3.1. They are generally small. The primary outcome of interest was the effect of the intervention on self-reported alcohol consumption and self-reported experience of alcohol-related harm.

Table 3.1: Sample weights applied to self-reported data

Variable	Design Effect
Long-term risky drinking	1.051648
Short-term risky drinking in the past year	1.169845
Short-term high-risk drinking in the past year	1.171437
Hazardous/harmful drinking (AUDIT)	1.198508
Experienced verbal incident	1.066093

A series of separate regression models were estimated to assess the effect of the AARC intervention on the proportion of respondents who self-reported:

- long-term high-risk or risky drinking, relative to low-risk (this is the only long-term risky drinking outcome, due to small numbers);
- short-term high-risk or risky drinking in the past year, relative to low-risk;
- short-term high-risk drinking in the past year, relative to risky or low-risk;
- hazardous/harmful drinking on AUDIT (score ≥ 8); and
- experiencing an alcohol-related verbal incident (included because it had a sufficient number of positive responses to enable the regression model to be estimated).

The intervention effect was assessed using a difference-in-difference method, in which the community's intervention status (experimental or control), the survey period (before- or after-intervention) and their interaction term (intervention effect) were entered into a logistic regression model. The 2005 survey data were pre-intervention and the 2010 data were post-intervention. The interaction term measures the effect of the intervention after adjusting for any extraneous trends (e.g. national trends in consumption or harms). Since data collected at an individual level were clustered by community and analysed in conjunction with community-level variables, a random effects model was used. Community-level and individual-level variables were only included in the model if they had been shown to have an association with the outcome (Chapter Two). For community-level variables, these were the rate of hotels/clubs, police and GPs per 10,000 population. For individual-level outcomes, these were youth (aged < 28 years) and gender. All models were built using backwards stepwise model-building and in all cases the intervention term (the interaction) is labelled *intervention effect*. The intervention effect was retained in the model regardless of its significance, as were some near-significant covariates, for descriptive purposes.

Routinely collected data

For crime, traffic crash and hospital inpatient data, the primary analysis compared the mean change from pre- to post-intervention for the 10 experimental communities with the mean change from pre- to post-intervention for the 10 control communities. A separate Generalised Estimating Equation (GEE) model was estimated for crimes, traffic crashes and hospital inpatient admissions, using the number of incidents as the outcome[2]. All GEE models included variables to control for the seasonal variation in alcohol-related incidents, a variable to control for pre-intervention differences between the experimental and control communities, pre/post intervention (the change over time for the 10 control communities) and the intervention effect (the variable that relates to the change from pre- to post-intervention in the experimental communities, relative to the control communities).

[2] For each GEE model, negative binominal distributions were used to account for over-dispersion, the population estimate was used as the exposure variable to account for different community populations and an exchangeable correlation structure (to adjust for correlation within communities) was used. Given the number of clusters is small (< n=50), the variance of parameters were estimated using the jackknife method (118-121).

Self-reported levels of alcohol consumption and harms

The results of the five regression models for self-reported alcohol consumption and harms are presented in Table 3.2.

For all models, the experimental and control communities were not significantly different from each other prior to the implementation of the intervention. The survey period variable was statistically significant for all models except for hazardous/harmful drinking on AUDIT (model 4). This means that there were statistically significant increases in all alcohol consumption outcomes from pre- to post-intervention in the 10 control communities. These increases were: about a 50% increase in the proportion of individuals in communities who reported risky long-term drinking; about a 30% increase in the proportion of individuals in communities who reported risky short-term drinking; about a 180% increase in the proportion of individuals in communities who reported high-risk short-term drinking; and about a 10% increase in the proportion of individuals in communities who experienced alcohol-related verbal harm. After controlling for the different covariates in each model, the intervention achieved the following outcomes:

- statistically significantly fewer short-term high-risk drinkers in the experimental communities at post-test compared to the control communities (an estimated 31% fewer; $p \leq 0.03$);
- statistically significantly fewer people in the experimental communities experiencing alcohol-related verbal abuse at post-test compared to the control communities (an estimated 40% fewer; $p \leq 0.00$);
- marginally statistically significantly fewer long-term risky drinkers in the experimental communities at post-test compared to the control communities (an estimated 33% fewer; $p \leq 0.07$); and
- no statistically significant effect on the proportion of short-term risky drinkers or the proportion of hazardous/harmful drinkers (AUDIT).

Table 3.2: Results of regression analyses for self-reported alcohol-risk factors (the intervention effect variable shows the impact of the intervention)

Model and variable	Odds ratio	z-statistic	p-value (≤)
Model 1: long-term risky drinking in the past 12 months			
Intercept	0.12	-15.01	0.00
Gender	0.66	-4.11	0.00
GPs per 10,000 population	1.02	2.49	0.01
Intervention status (experimental or control)	1.06	0.42	0.70
Survey period	1.52	2.84	0.04
Intervention effect	***0.67***	***-1.84***	***0.07 ****
Model 2: short-term risky drinking in the past 12 months			
Intercept	0.40	-6.52	0.00
Youth	3.48	12.20	0.00
Hotels/clubs per 10,000 population	1.05	4.18	0.00
Intervention status (experimental or control)	1.11	1.05	0.30
Survey period	1.31	2.58	0.01
Intervention effect	***0.84***	***-1.06***	***0.30***
Model 3: short-term high risk drinking in the past 12 months			
Intercept	0.14	-12.28	0.00
Gender	0.67	-5.00	0.00
Youth	4.12	14.08	0.00
Hotels/clubs per 10,000 population	1.04	3.35	0.00
Intervention status (experimental or control)	1.24	1.82	0.07
Survey period	2.80	8.78	0.00
Intervention effect	***0.69***	***-2.14***	***0.03 ** ***
Model 4: hazardous or harmful drinking (AUDIT score ≥ 8)			
Intercept	0.44	-7.50	0.00
Gender	0.24	-16.36	0.00
Youth	2.98	10.10	0.00
Intervention status (experimental or control)	1.16	1.02	0.30
Survey period	1.13	0.81	0.40
Intervention effect	***0.78***	***-0.99***	***0.30***
Model 5: experience of alcohol-related verbal abuse			
Intercept	0.17	1.04	0.30
Gender	1.09	9.19	0.00
Intervention status (experimental or control)	1.13	0.66	0.50
Survey period	1.10	-1.96	0.05
Intervention effect	***0.60***	***-15.36***	***0.00 ** ***

**Statistically significant effect in favour of the experimental communities.

*Marginally statistically significant effect in favour of the experimental communities.

Routinely collected data: crime, traffic crashes and hospital inpatient admissions

Alcohol-related crime

Table 3.3 shows the results of four GEE models for the primary outcome of total alcohol-related crime and the sub-analyses for alcohol-related assaults, malicious damage and street offences. All models show seasonal effects across the pre- and post-intervention periods (with more alcohol-related crime in summer). For the 10 control communities combined, there was a statistically significant increase in all crime types from pre- to post-test (Incident Rate Ratios ranged from 1.70 to 1.21). The intervention effects showed that total crime (95%CI 0.66-1.05) and alcohol-related street offences (0.45 - 1.02) were marginally statistically significant (statistical significance is indicated when the 95% CI excludes the value 1.0). Specifically, the increase from pre- to post-intervention in the experimental communities was estimated to be 17% less than in the control communities for total alcohol-related crime and 32% less for alcohol-related street offences.

Given the likelihood that the interventions had some effect on total alcohol-related crime and alcohol-related street offences, rates of these two outcomes per 1,000 population were graphed in Figures 3.1 and 3.2. For both figures, the increases in alcohol-related crime in both the experimental and control communities over the whole study period (2001-2009) are consistent with apparent increases in alcohol consumption in Australia [110] and alcohol-related harms in Victoria [111]. The increases in the experimental communities, however, were clearly less than in the control communities, with the gap between the experimental and control communities widening in the post-intervention period, relative to the pre-intervention period. This shows the primary intervention effect was to reduce the extent to which alcohol crimes increased over time, rather than engendering a decrease. The marginal statistical significance, particularly for alcohol-related street offences (32% difference, $p \leq 6\%$), is most likely due to variation in the average impact of the intervention on all experimental communities over time, and variation in the extent to which the intervention impacted on each experimental community separately. The statistical power of the study was also limited by the involvement of only 20 communities (despite being the largest community RCT ever undertaken internationally, more than 20 communities would be required in a study to minimise the likelihood of obtaining a non-significant result even when a relationship exists). The similarity between the experimental and control communities in their rates of non-alcohol-related crime over time provides evidence that alcohol-related crimes did not simply shift from alcohol-related times to non-alcohol-related times.

Table 3.3: GEE results for the effect of the intervention on alcohol crime

Outcomes	Incidence-Rate Ratio	Standard error	95% CI	
			Lower	Upper
Model 1: total alcohol-related crime				
Time (quarterly)[a]				
April-June	0.81 **	0.02	0.77	0.85
July-September	0.83 **	0.01	0.80	0.86
October-December	1.02	0.04	0.94	1.10
Pre-test difference: experimental vs control communities	0.88	0.13	0.65	1.20
Pre- to post-test difference: control communities[b]	1.32 **	0.13	1.07	1.63
Intervention effect[c]	***0.83 ****	***0.09***	***0.66***	***1.05***
Model 2: alcohol-related assaults				
Time (quarterly)[a]				
April-June	0.78 **	0.02	0.74	0.83
July-September	0.77 **	0.02	0.73	0.82
October-December	0.96	0.03	0.90	1.03
Pre-test difference: experimental vs control communities	0.78	0.12	0.56	1.09
Pre- to post-test difference: control communities[b]	1.30 **	0.14	1.04	1.64
Intervention effect[c]	***0.87***	***0.11***	***0.67***	***1.13***
Model 3: alcohol-related malicious damage				
Estimated autocorrelation parameter (Rho)	0.09	-	-	-
Time (quarterly)[a]				
April-June	0.86 **	0.04	0.79	0.94
July-September	0.94	0.04	0.86	1.02
October-December	1.07	0.05	0.98	1.17
Pre-test difference: experimental vs control communities	0.98	0.16	0.70	1.37
Pre- to post-test difference: control communities[b]	1.21 **	0.09	1.04	1.40
Intervention effect[c]	***0.91***	***0.09***	***0.74***	***1.13***
Model 4: alcohol-related street offences				
Time (quarterly)[a]				
April-June	0.81 **	0.04	0.73	0.90
July-September	0.82 **	0.04	0.74	0.91
October-December	1.09	0.09	0.92	1.29
Pre-test difference: experimental vs control communities	0.87	0.26	0.47	1.62
Pre- to post-test difference: control communities[b]	1.70 **	0.28	1.21	2.40
Intervention effect[c]	***0.68 ****	***0.13***	***0.45***	***1.02***

[a]Alcohol-related crimes (each quarter relative to January-March), pre- and post-intervention.

[b]Difference in alcohol-related crimes for control communities from pre- to post-test

[c]Intervention effect: the number of alcohol-related crimes for the experimental communities at post-test, relative to pre-test AND the control communities.

**Significant at the 5% level – indicated where the CI excludes 1. Though not reported, fixed effects are also included in all models to control for baseline levels of alcohol-related crime in each community. Standard errors are adjusted for clustering in communities. To allow for within-community correlation across time, first order autocorrelation is estimated within the model.

*Marginally statistically significant effect in favour of the experimental communities.

Figure 3.1: Rates of alcohol-related crime per 1,000 population

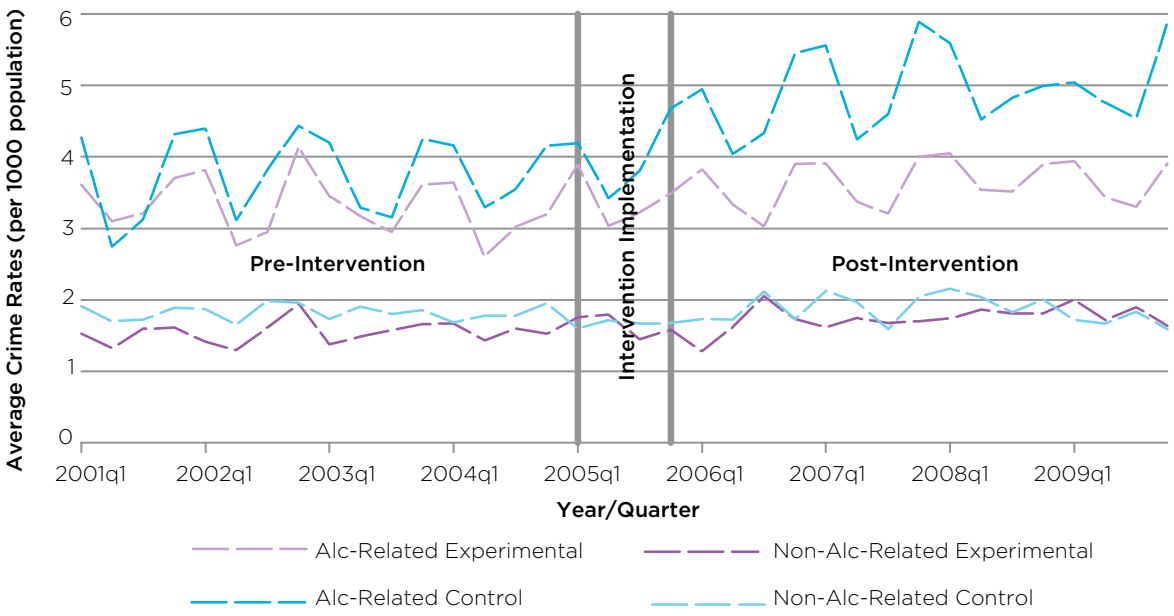
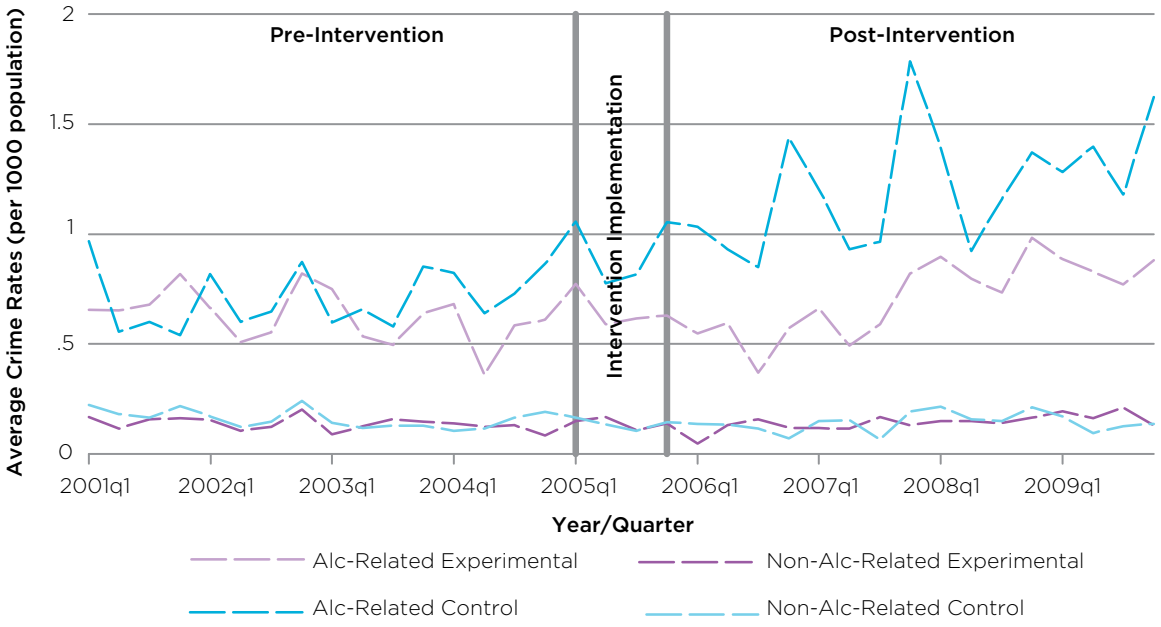


Figure 3.2: Rates of alcohol-related street offences per 1,000 population



Alcohol-related traffic crashes

Table 3.4 shows the results of three GEE models: total alcohol-related traffic crashes (model 1); alcohol-related crashes that resulted in no injuries/fatalities (model 2); and the number of persons injured in an alcohol-related crash (model 3). Only the model for no injuries/fatalities showed any significant seasonal effect: there were more alcohol-related traffic crashes in October-December than in the first quarter of the year. None of the models show any statistically significant changes between pre- and post-test for the 10 control communities and there was no evidence of an intervention effect.

Table 3.4: GEE results for the effect of the intervention on alcohol-related traffic crashes

Outcomes	Incidence-Rate Ratio	Standard error	95% CI	
			Lower	Upper
Model 1: total alcohol-related crashes				
Time (quarterly)[a]				
April-June	1.01	0.07	0.89	1.16
July-September	1.08	0.08	0.93	1.26
October-December	1.09	0.07	0.95	1.25
Pre-test difference: experimental vs control communities	0.51	0.18	0.24	1.08
Pre- to post-test difference: control communities[b]	0.92	0.05	0.82	1.04
Intervention effect[c]	***1.00***	***0.15***	***0.74***	***1.36***
Model 2: alcohol-related crashes with no injuries/fatalities				
Time (quarterly)[a]				
April-June	1.02	0.10	0.84	1.25
July-September	1.08	0.0	0.89	1.30
October-December	1.12 **	0.06	1.00	1.26
Pre-test difference: experimental vs control communities	0.55	0.17	0.29	1.06
Pre- to post-test difference: control communities[b]	0.99	0.06	0.87	1.12
Intervention effect[c]	***0.94***	***0.12***	***0.71***	***1.23***
Model 3: alcohol-related crashes with injured persons				
Time (quarterly)[a]				
April-June	1.01	0.14	0.75	1.34
July-September	1.06	0.13	0.82	1.37
October-December	1.00	0.10	0.81	1.23
Pre-test difference: experimental vs control communities	0.48	0.19	0.21	1.09
Pre- to post-test difference: control communities[b]	0.95	0.15	0.68	1.32
Intervention effect[c]	***0.96***	***0.24***	***0.57***	***1.61***

[a]Alcohol-related crashes (each quarter relative to January-March), pre- and post-intervention.

[b]Difference in alcohol-related crashes for control communities from pre- to post-test.

[c]Intervention effect: the number of alcohol-related crashes for the experimental communities at post-test, relative to pre-test AND the control communities.

**Significant at the 5% level – indicated where the CI excludes 1. Though not reported, fixed effects are also included in all models to control for baseline levels of alcohol-related crashes in each community. Standard errors are adjusted for clustering in communities. To allow for within-community correlation across time, first order autocorrelation is estimated within the model.

Alcohol-related hospital inpatient admissions

Table 3.5 shows the results of two GEE models: inpatient admissions for alcohol dependence (model 1); and inpatient admissions for alcohol abuse (model 2). Neither model showed significant seasonal effects. For all 20 communities combined, there was a statistically significant increase in hospital inpatient admissions for alcohol abuse from pre- to post-test (Incident Rate Ratio=1.40). There was no evidence of a statistically significant intervention effect for hospital inpatient admissions for alcohol dependence (model 1), but there was a marginally statistically significant increase in admissions for alcohol abuse in the experimental communities, relative to the controls (model 2), as shown by the 95%CI being close to excluding the value 1.0 (95%CI 0.98 – 2.52).

Table 3.5: GEE results for the effect of the intervention on alcohol-related hospital inpatient admissions

Outcomes	Incidence-Rate Ratio	Standard error	95% CI	
			Lower	Upper
Model 1: inpatient admissions for alcohol dependence				
Time (quarterly)[a]				
April-June	0.84	0.10	0.65	1.07
July-September	0.86	0.09	0.70	1.07
October-December	0.89	0.09	0.71	1.11
Pre-test difference: experimental vs control communities	0.50**	0.13	0.29	0.86
Pre- to post-test difference: control communities[b]	1.32	0.40	0.70	2.49
Intervention effect[c]	***1.00***	***0.35***	***0.48***	***2.10***
Model 2: inpatient admissions for alcohol abuse				
Time (quarterly)[a]				
April-June	0.87	0.08	0.72	1.04
July-September	0.90	0.10	0.72	1.13
October-December	0.97	0.08	0.81	1.15
Pre-test difference: experimental vs control communities	0.72	0.15	0.46	1.12
Pre- to post-test difference: control communities[b]	1.40 **	0.22	1.01	1.95
Intervention effect[c]	***1.57 ****	***0.35***	***0.98***	***2.52***

[a]Alcohol-related inpatient admissions (each quarter relative to January-March), pre- and post-intervention.

[b]Difference in alcohol-related inpatient admissions for control communities from pre- to post-test.

[c]Intervention effect: the number of alcohol-related inpatient admissions for the experimental communities at post-test, relative to pre-test AND the control communities.

**Significant at the 5% level – indicated where the CI excludes 1. Though not reported, fixed effects are also included in all models to control for baseline levels of alcohol-related crashes in each community. Standard errors are adjusted for clustering in communities. To allow for within-community correlation across time, first order autocorrelation is estimated within the model.

*Marginally statistically significant effect in favour of the control communities.

Given the likely intervention effect on hospital inpatient admissions for alcohol abuse, and given the anticipated impact on admissions for alcohol dependence, rates of these two outcomes per 1,000 population were graphed in Figures 3.3 and 3.4 to examine patterns of change over time. As for alcohol-related crime, alcohol-related hospital inpatient admissions for abuse and dependence generally increased in both the experimental and control communities over the whole study period (2001-2009), except for alcohol-dependence in the experimental communities, which was generally flat. In the experimental communities relative to the control communities, however, there was a marked increase in hospital inpatient admissions for both abuse and dependence early in the post-intervention phase, followed by a decline after 2007.

This pattern of results generally reflected an increase in demand for hospital inpatient services following the AARC intervention that dissipated over time. Specifically, the pattern of results for alcohol-related hospital inpatient admissions for alcohol abuse may reflect that the high school-based interactive session on alcohol harms had an explicit harm reduction focus, encouraging young people to seek treatment for highly intoxicated friends as soon as possible. Such admissions would most likely be coded as alcohol abuse. Similarly, the pattern of results for alcohol-related hospital inpatient admissions for alcohol dependence may reflect more effective treatment by GPs, which was the focus of an RCT nested within the AARC project [96]. It is likely that GPs being prompted to increase their prescribing of alcohol pharmacotherapies would also increase the number of their referrals for short-term inpatient withdrawal management, which would be coded as admissions for alcohol dependence.

Figure 3.3: Rates of alcohol-related inpatient admissions for alcohol abuse per 1,000 population

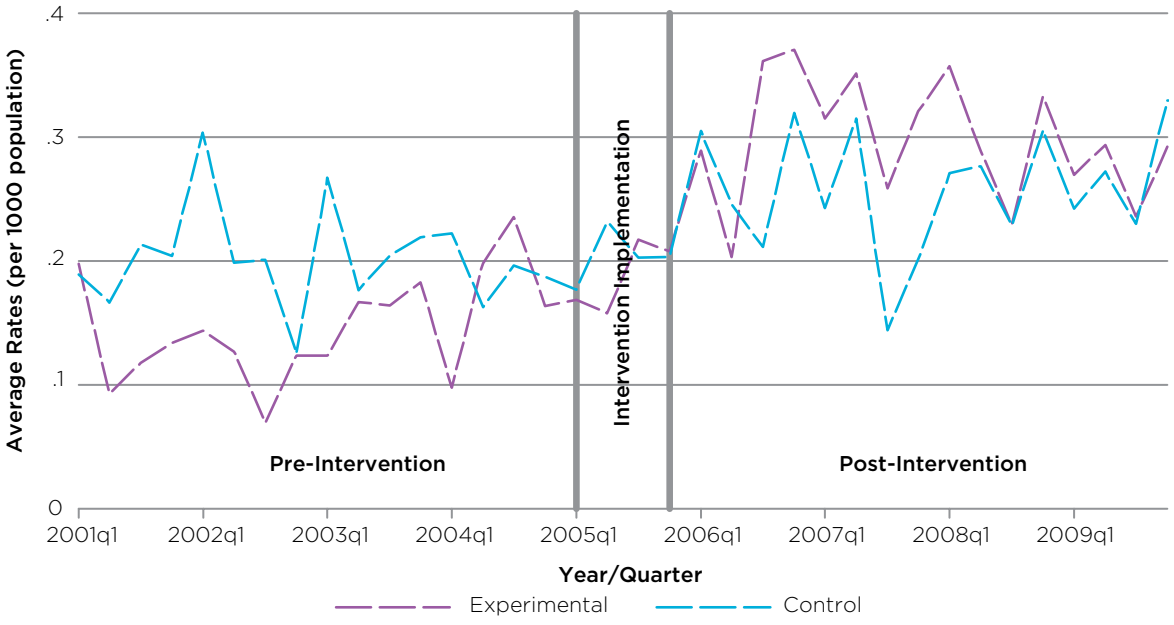
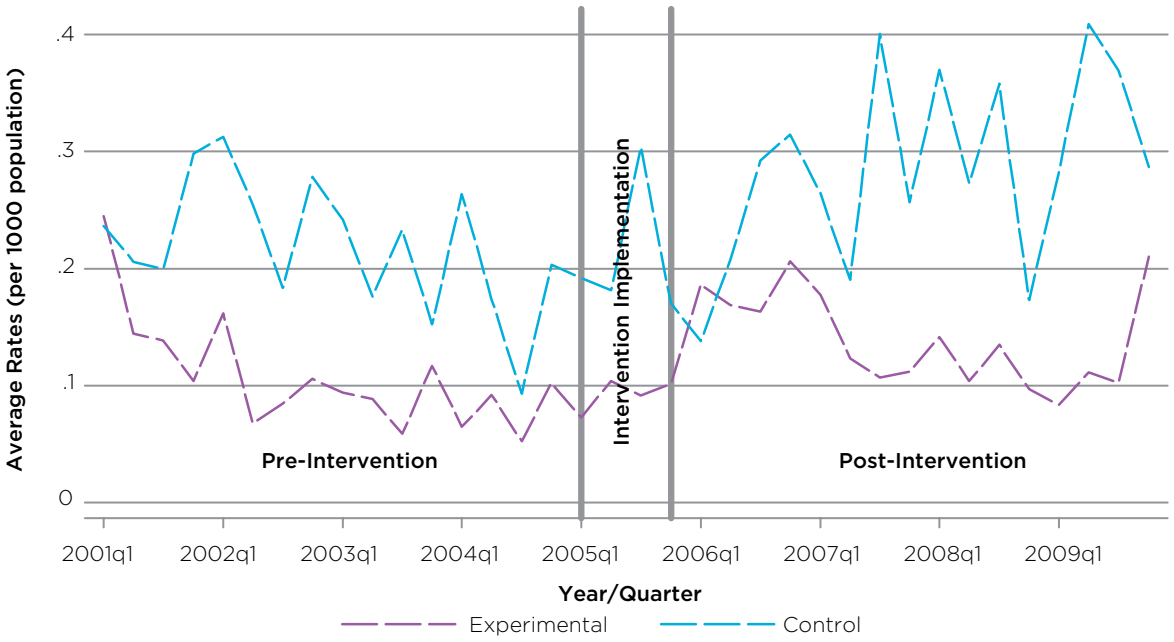


Figure 3.4: Rates of alcohol-related inpatient admissions for alcohol dependence per 1,000 population



Summary and methodological considerations

Overview

AARC is the largest alcohol community-based trial undertaken internationally. The study design and methods are the most rigorous ever undertaken to evaluate a community-based approach to reducing risky alcohol consumption and harm. It estimates the effect of 13 co-ordinated interventions on alcohol-related crime after adjusting for correlation within communities over time, individual community effects and seasonal variation. As a prospective, clustered RCT, this evaluation design has minimal susceptibility to selection bias or historical changes: it is most likely that any observed effects are due to the intervention, rather than pre-existing differences between interventions and controls, or to some other extraneous factor or time trends, such as a decline in population alcohol consumption. In general, the results of the AARC project support the conclusion of the previously most rigorous trial conducted in the US, namely, that community-action can reduce alcohol-related harms [22]. More specifically, the analyses presented in this chapter show four primary outcomes:

- Increased alcohol consumption and harm over time in all 20 communities. The trend for increased alcohol consumption reflects the national trend for increased alcohol consumption over the last decade [110].
- As a consequence of the intervention, the experimental communities had fewer short-term high-risk drinkers and less experience of alcohol-related verbal incidents. In addition, there were substantial reductions in alcohol-related crime, particularly for street offences, that approached statistical significance.
- There was no statistically significant effect observed for alcohol-related traffic crashes.
- There was no statistically significant effect observed for hospital inpatient admissions for alcohol dependence and a marginally significant increase in admissions for alcohol abuse. For both alcohol dependence and abuse, inpatient admissions appear to increase in the early phase of the post-intervention period and then dissipate.

Survey data outcomes

The intervention achieved significant and large reductions in the proportion of individuals in the communities drinking at high-risk of harm in the short-term. The effect on short-term drinking was limited to those drinking at high-risk levels (more than 10 [males] or six [females] standard drinks on one occasion), rather than risky levels (more than six [males] or 4 [females] standard drinks on one occasion). It also achieved a substantial reduction in the proportion of individuals in the communities who experienced alcohol-related verbal abuse. Given excessive drinking on one occasion is the predominant form of problem drinking in Australia [25] and the AARC communities (Figure 2.1), these are highly desirable outcomes. These findings suggest that, in response to community-action, short-term high-risk drinkers may modify their behaviour more than lower-risk drinkers. This may reflect that higher-risk drinkers are more sensitive to increased general awareness about alcohol risk consumption levels, or that these drinkers are more likely to have received SBI through one of the settings where it was promoted (e.g. GPs, pharmacists or Aboriginal Community Controlled Health Services), or that their drinking was moderated by interventions that focused on high-risk drinking occasions, such as the high-risk weekends or the Good Sports program.

There was marginal evidence of a statistically significant relationship between the intervention and the proportion of individuals in communities drinking at levels that increase the risk of long-term harm ($p \leq 0.07$), although the relatively large estimated size of the effect (OR = 0.67), combined with the clustered nature of the data and the small number of communities, suggests that this finding reflects the limits of the statistical power in AARC, rather than no intervention effect.

Survey data considerations

An alternative explanation for these results is that the observed reductions in consumption and harms are artefacts, rather than real effects, related to the self-reported nature of the data. Indeed, the strongest evidence of the benefit of the intervention is on self-reported measures of alcohol consumption and alcohol-related harm. The observed effects could reflect sampling bias from two possible sources: the samples were not representative of the populations from which they were drawn; and the declining response rate between the pre- and post-intervention surveys, both of which were more likely to be completed by lower risk drinkers (females and older people). That the results simply reflect sampling bias is unlikely: responses from both surveys were weighted to ensure they were representative of the sampling frame; and there was a high degree of comparability between the pre- and post-intervention samples, and between experimental and control samples, on a range of characteristics (Table 1.4).

Nevertheless, it is possible that unobserved variables created sampling bias, that the results reflect a regression to mean effect, or that they represent a socially desirable response bias, given those in experimental communities were more exposed to information about alcohol consumption and harms than those in control communities. In such situations of uncertainty, one strategy to increase confidence in the scientific rigour of the results is to apply basic rules of causality to the survey data [112]. First, as outlined in Chapter One, the results stem from measures with adequate reliability and validity. Second, the results are consistent with the previously largest community-action trial which found the greatest reductions in consumption were related to amounts consumed per drinking occasion [22]. Third, the reasonable size of the self-reported effects (approximately 30%) seems consistent with the complexity and level of the intervention effort. Fourth, the effects are consistent with existing knowledge about community-action prevention efforts in that these studies typically report effects of variable size on different outcomes, as opposed to uniform improvements or no change across multiple outcomes [40]. There are also apparent consistencies between the self-report and routinely collected data: self-reported reductions in high-risk short term drinking and verbal abuse are consistent with reductions in street offences based on routinely collected police incident data, and no effect on alcohol-related traffic crashes. This is not to claim that these outcomes are causally related, just that they are consistent with each other. Fifth, the magnitude of these findings reflect those from community prevention efforts aimed at achieving other health outcomes, such as reducing heart-disease risk factors [113]. On balance, therefore, it is most likely that these self-reported outcomes reflect real, rather than artefactual, reductions in alcohol consumption and harm.

Routinely collected data outcomes: crime, traffic crashes and inpatient hospitalisations

Alcohol-related crime

Of the routinely collected measures, the AARC interventions impacted most positively on alcohol-related crime, an outcome that is largely the result of an estimated 32% reduction in alcohol-related street offences (Table 3.3). The lack of a statistical effect on other crime outcomes (assaults and malicious damage) may reflect their relatively small numbers and/or a smaller intervention effect on more serious crimes. It is possible that these observed effects could be increased with greater tailoring of the interventions to the specific types of alcohol-related crime that are the most problematic in different communities. Although AARC tailored some of the interventions, particularly those implemented later in the intervention period such as the targeting high-risk weekends strategy, the extent of tailoring was necessarily limited by the practical constraints of a time-limited research trial. The requirement to initially engage with communities and regulatory departments, obtaining and improving the routinely collected data, designing and implementing the pre-intervention survey, and allowing enough time for the interventions to be implemented and gain traction, all limited the opportunities to maximise the tailoring of interventions prior to their implementation. Where a greater level of tailoring was possible in the strategy that targeted high-risk weekends, a multi-component intervention achieved statistically significant reductions in reported alcohol-related sexual offences on the targeted weekends and assaults on non-targeted weekends, equating to a cost saving to communities of $133,975 on targeted weekends and $81,128 on non-targeted weekends for every $10,000 invested in the intervention [114].

Alcohol-related traffic crashes

The lack of a statistically significant effect of the AARC intervention on alcohol-related traffic crashes reflects two possibilities. It may be that there was insufficient exposure to the interventions. Alternatively, it may be that the interventions were not appropriate for positively impacting on these outcomes. The first possibility is unlikely because the statistical analysis of intervention effects relates to the average effect of the interventions in all 10 experimental communities compared to the average effect of no intervention in the controls, rather than the intervention effect on any specific community or sub-set of communities. This is always the case for the results of RCT trials. The second possibility is more plausible. The AARC interventions were selected on the basis that they could be devised and implemented relatively quickly, a pragmatic imperative given the constraints of a time-limited intervention trial. Consequently, the interventions selected (Table 1.5) were unlikely to impact on traffic crashes.

There is little evidence about the types of community-action interventions that are likely to reduce alcohol-related traffic crashes. Although the largest most recent US community-action trial achieved reductions in traffic crashes [70], that trial implemented traffic crash-specific interventions, such as breath testing (sobriety check-points) that are unlikely to have an effect in Australia over and above random breath testing. It may be that reducing these types of harms requires legislative approaches. One possibility that may reduce the impact of alcohol-related traffic crashes is increasing the minimum legal drinking age in Australia to 21 years, a strategy that has been shown in the US and New Zealand to reduce traffic crash deaths by about 10% [95]. A recent analysis on the cost-effectiveness of interventions to prevent alcohol harm identified that raising the minimum legal drinking age in Australia to 21 years would be more cost-effective than both drink drive mass media campaigns and random breath testing [11]. Given this policy change is highly unlikely to be supported by enough of the Australian population to be successfully implemented, however, an alternative would be to extend the requirement for zero blood alcohol concentration (BAC) to 22 years nationally (it is currently in place only in Victoria): it has been estimated that if a national policy requiring a zero BAC in drivers until the age of 21 had been implemented in 2003, 17 traffic crash deaths could have been averted among 18-21 year olds [95]. An alternative would be to increase or modify drink drive mass media campaigns and random breath testing. Although these approaches are likely to be cost-effective, economic modelling of the costs and consequences of a range of interventions suggests that more than 10-times the current health gain from random breath testing alone could be achieved by investing in a more cost-effective combination of interventions [11].

Alcohol-related hospital inpatient admissions

The AARC interventions appear to have had the statistically significant effect of marginally *increasing* alcohol-related hospital inpatient admissions for alcohol abuse, at least in the short-term. The pattern of an increase early in the post-intervention period followed by a decrease is replicated for inpatient admissions for alcohol dependence, even though the latter is not a statistically significant effect. It is probable that this outcome reflects the types of interventions implemented. The training provided to GPs in treating alcohol problems, including tailored feedback on alcohol prescribing, did increase their rates of prescribing acamprosate and is, therefore, also likely to have increased the number of patients GPs referred to hospital for inpatient withdrawal [96]. Similarly, the high-school-based interactive session specifically encouraged young people to seek help from the ambulance service or their hospital ED if they were concerned about themselves or friends while drinking, which may have increased rates of inpatient admissions for alcohol abuse. In addition, it is possible that an increase in awareness about alcohol misuse and harms in the experimental communities encouraged higher risk drinkers to seek treatment, a possibility supported by the finding that there were statistically significantly fewer short-term high-risk drinkers in the experimental communities at post-test compared to the control communities (Table 3.2). This pattern of results may have increased the costs of alcohol harm in the experimental communities in the post-intervention period, which is addressed in the benefit-cost analysis in Chapter Four. Given the time constraints of the AARC project, however, the potential health gain achieved by inpatient alcohol treatment, and the impact of this on hospitalisations over a longer period of time, have not been taken into account.

Routinely collected data considerations

It is most likely that the marginally statistically significant outcomes assessed by routinely collected data (alcohol-related street offences, total crime and hospital inpatient admissions for alcohol abuse) are due to the AARC intervention for a number of reasons. First, although it is possible that there is substantial noise in the routinely collected data, due to the real world nature of the evaluation, all measures were modified in line with accepted practice to optimise their reliability or validity and thereby minimise this noise, particularly for the alcohol-related crime measure [42]. Second, face-validity for the routinely collected data is provided by the clear seasonal effects apparent in the routinely collected outcome measures which are known to occur (Tables 3.3, 3.4 and 3.5). Moreover, these seasonal effects suggest future community-action approaches could optimise their cost-effectiveness by targeting the time of year when these harms increase. Table 3.3, for example, shows alcohol-related crimes are statistically significantly more likely to occur predominantly in summer (January-March). Third, a reduction in alcohol-related street offences is consistent with the reductions in the proportion of survey respondents who reported high-risk short-term drinking and who reported having experienced alcohol-related verbal abuse (Table 3.2). Fourth, all the interventions had a harm or demand reduction focus (Table 1.5) which, if successful, would be likely to produce the types of results observed: reductions in alcohol-related crime and an increase in the demand for alcohol-related health care services. The greater statistical significance of the street offences outcome, particularly relative to assaults, most likely reflects both that the interventions impacted more on less severe incidents and that there were more of them. Fifth, the pattern of results delineated in Figures 3.1 to 3.4 indicate that pre-intervention differences between the experimental and control communities are most likely to have limited the statistical significance of the intervention effect, rather than there being no intervention effect. Sixth, stringently controlled RCT trials, such as AARC, increase confidence that results that are of marginal statistical significance are a consequence of the intervention being trialled, rather than systematic biases.

4 The benefit-cost of AARC

KEY FINDINGS

1. For every $1 invested in AARC, the value of benefits returned to the experimental communities, relative to the control communities, was estimated at between $1.37 and $1.75.
2. The AARC project saved the experimental communities $735,256 in reduced alcohol-related crime and traffic crash costs from a: 24% reduction in alcohol-related street offences; 8% reduction in alcohol assaults; 2% reduction in alcohol-related malicious damage incidents; and 1% reduction in alcohol-related traffic crashes.
3. There was an increase in hospitalisation costs from problem drinkers seeking, or being referred to, treatment for alcohol dependence and abuse, which cost an estimated $605,910.
4. The value communities place on reducing alcohol harm was estimated in dollar terms using a willingness-to-pay (WTP) exercise. On average, households in the AARC communities were WTP $35.43 per annum to reduce alcohol harm by 10% (using a $10 payment scale) and $53.50 (using a $25 payment scale).
5. Taking into account savings, increased costs and WTP estimates, there was a net economic benefit as a result of the AARC interventions, valued at between $444,417 and $915,253.

Introduction

Overview

Benefit-Cost Analysis (BCA) is considered the gold standard in economic appraisal as it quantifies both costs and consequences in monetary terms [115]. The goal of analysis is to identify whether the benefits of an intervention exceed its costs: a positive net social benefit indicating that the intervention is worthwhile. For the AARC project, a social perspective was adopted comprising costs and benefits to individuals, the health care system, police and the community in general.

The BCA for AARC required three steps. First, the interventions were costed (Chapter One). Second, the extent of change from pre- to post-intervention was quantified (Chapter Three) and the value of that change in economic (dollar) terms was estimated. This step involved estimating both the dollar value of the reduced incidents and the dollar value that households are willing-to-pay (WTP) to reduce alcohol-related harm in their community. Third, the benefits (measured from step 2) are compared to the intervention costs (measured from step 1).

Aim

This chapter aims to conduct a BCA of the observed impact of a community-action, multi-component alcohol intervention (as defined in Chapter One) on self-reported alcohol consumption and harms, as well as on routinely collected alcohol-related crime, traffic crash and hospital inpatient admission data (as presented in Chapter Three).

Method

Step one: costing the interventions

Chapter One reports the cost of each of the AARC interventions in detail.

Step two: quantifying and valuing the extent of change from pre- to post-intervention, including household's willingness to pay to reduce harm

As part of the statistical analyses in Chapter Three, the change in the mean number of alcohol-related crimes, traffic crashes and hospital inpatient admissions, from pre- to post-intervention, was calculated separately for the 10 experimental communities and the 10 control communities. This step also comprises estimating both the dollar value of the reduced incidents and the dollar value that households place on having less alcohol-related harm in their community. Both these values are estimated in dollar terms, as a common metric.

Estimating the dollar value of the reduced number of incidents

There are two methods that could be used to estimate the value of alcohol crime: an aggregate approach or on a per incident basis. The aggregate approach applies an estimate of the proportion of crime that is related to alcohol to the total costs of police, court and prison expenditures. This approach estimated that alcohol-related crime cost $1.6 billion in Australia in 2004/05 [4]. The per incident method was used in AARC, however, because it has a number of advantages compared to the aggregate approach. First, policy makers can establish the dollar value saved from a specific intervention, identifying those that most cost-effectively reduce alcohol-related crimes. Second, it facilitates tailoring of interventions to those that are most costly, rather than those that are simply more prevalent. Third, it allows costs to be separately assigned to those borne by society, as opposed to those borne by the perpetrator of the crime. Since current per incident cost estimates in Australia have only included costs related to the act of committing the crime, such as injury and malicious damage, and have exclude subsequent costs, such as police, court and incarceration expenditure [116], the AARC project provided an opportunity to improve Australian per incident cost estimates for alcohol-related crime by incorporating both the cost of the criminal act itself and its consequences.

Per incident costs of alcohol-related crime

The actual cost of committing the crime and its consequences

Given Australian costs related to the act of committing alcohol crimes have already been estimated, they were taken directly from Mayhew (2003) ($1,700 for assaults; $2,500 for sexual offenses; and $700 for malicious damage to property) [116], and then inflated to 2006 dollars using the consumer price index. As these estimates exclude subsequent costs [116], these were estimated for the first time in Australia as part of the AARC project. The detailed methods used to estimate subsequent costs are reported elsewhere [117]. In summary, however, eight possible outcomes from committing a crime were considered: being sentenced to prison or another facility from either the magistrates' court or a higher court (n=4), found not guilty in either the magistrates' court or a higher court (n=2), reported to police only (n=1) and not reported to police (n=1). The costs relevant to each of those outcomes were estimated for police, court and prison expenditure. The actual cost estimated is the average cost of crime across all eight outcomes, such that the estimate includes both crimes reported and not reported to police.

The costs of lost output and intangibles

The Australian Institute of Criminology (AIC) recently updated their crime costs estimates [118]. A key feature of this update was that it provided estimates of medical ($680), lost output ($3,650) and intangible ($5,700) costs for the types of crimes that are specifically included in the AARC analyses (assaults, malicious property damage and sexual offences). The lost output and intangible cost estimates were included after updating them to 2006 dollars. Medical costs were excluded to avoid double counting, since they are already included in the cost of committing crime estimates.

Street offences

Lost output and intangible costs were also estimated for street offences. Since there was no cost for street offences, AARC calculated a cost per incident of street offences of $501 (for police, court and prison costs) [117]. To estimate the cost per lost output for street offences, the cost per incident of street offences ($501) was multiplied by the average proportion of lost output for police related to assaults, malicious damage and sexual assaults (0.34), then updated to 2006 dollars ($501 x 0.34 x 1.03 = $177). The same method was used to calculate the intangible cost for street offences: the cost per incident of street offences ($501) was multiplied by the average proportion of intangible costs for assault, malicious damage and sexual assault (0.50), then updated to 2006 dollars ($501 x 0.50 x 1.03 = $256).

Per incident costs of alcohol-related traffic crashes

Crash-cost estimates were taken from the RTA's Economic Analysis Manual, Version 2 (2006). These costs derive from the Australian Government Bureau of Transport Economics (2000) and comprise human costs, vehicle costs and general costs attributable to four crash severities: 1) fatal; 2) serious injury; 3) minor injury; and 4) non-injury (property damage). The RTA collapses these four severity categories into three: 1) fatal; 2) injury (comprising serious and minor); and 3) non-injury (property damage). Thus, RTA (2005) estimated costs for alcohol-related incidents that occur in rural areas resulting in a fatality ($1,733,000) or injury ($100,690) were computed on a per-person basis, and those resulting in no injury ($6,800) were computed on a per-crash basis.

Costs of alcohol-related inpatient hospital admissions

Hospital costs for alcohol dependence and alcohol abuse are taken from the Australian Institute of Health and Welfare's (AIHW) Australian Hospital Statistics 2005-06 [119]. Table S12.1 in this report provides information related to: separation; same day separation; patient day; average length of stay; and cost statistics for all Australian Refined Diagnosis Related Groups (AR-DRGs) version 5.0. For alcohol abuse the relevant codes and costs are: V60A at $2,957 per separation; and V60B at $1,204 per separation. The average cost of these two codes related to alcohol abuse is $2,081. For alcohol dependence the relevant codes and costs are: V62A at $3,624 per separation; and V62B at $896 per separation. The average cost of these two codes related to alcohol dependence is $2,260. It is important to note that hospitalisation costs incurred as a consequence of AARC are added to the cost side of the equation, even though the likely benefits from treatment are not included.

Quantifying and valuing the extent of change from pre- to post-intervention

The extent of change from pre- to post-intervention in the 10 experimental communities, relative to the control communities, is calculated using a counterfactual analysis [120]. The counterfactual analysis provides an estimate of the extent of change on each outcome (crime, traffic crashes, hospital inpatient admissions) in the experimental communities that is equivalent to the change (growth or decline) in the control communities (that did not receive the intervention). The intervention effect is, therefore, quantified as the difference in the estimated number of incidents that would have occurred in the post-intervention period had the intervention not been implemented (based on the outcomes in the control communities) less the actual number of incidents recorded in the post-intervention period. Once this difference is established for each outcome, the next step is to value those changes in dollar terms, by combining them with their per incident costs.

Estimating the dollar value of communities' willingness to pay to reduce harm

There are a number of methods of valuing, in dollar terms, the occurrence (or avoidance) of alcohol-related incidents: human capital, demographic and WTP. The human capital approach considers the impact of current alcohol use on the discounted future earnings of individuals [121], while the demographic approach considers the loss in current economic output from all previous drinking [4]. These approaches, however, are criticised because it seems unreasonable that the goal of society should be to simply maximise output (as opposed to consumption or utility) [122]. The WTP is arguably the most relevant for policy. WTP estimates provide information that can be used as a guide for governments as to the value the community places on reductions in alcohol-related harm. WTP takes into consideration the ex-ante dollar amount that individuals are willing to forego from their budgets in order to reduce the risk to them, or others around them, of experiencing alcohol-related harm [123, 124]. These estimates can then be used to value reductions in alcohol-related harm which, in turn, can be compared to the cost of implementing interventions, to estimate the net benefit of an intervention.

A method which is commonly used to measure the WTP of individuals with regard to some defined product is the Contingent Valuation (CV) method. CV is a method of assigning a monetary value to goods that are not traded, such as health care products or the environment, and do not, therefore, have a 'value' from revealed preferences [125]. CVs have been widely used in environmental economics and are becoming a more popular tool in the economic evaluations of health care products [125]. Measuring WTP through CV is, however, a difficult and rarely undertaken task because they are based on hypothetical scenarios rather than real choices made by individuals [126-128]. Psychological effects implicit in valuation tasks also need to be considered when designing appropriate methods [127, 129]. For the first time in Australia, the AARC project provided the opportunity to explore the WTP of households in rural communities for a percentage reduction in alcohol-related harm in their community.

The detailed methodology for estimating communities' WTP are published elsewhere and a summary is provided here [130]. As part of the AARC pre-intervention community survey, respondents were asked the maximum amount per annum their household would be WTP to reduce alcohol-related harm in their community by 10% and by 20%. The 10% and 20% reductions were used because the results of the previously largest alcohol community-action trial (CTP) suggested that reductions in harm of this size were realistic for a community-action intervention to achieve [22]. The practical outcomes to which 10% and 20% reductions in alcohol-related harm would correspond were contextualised for respondents by using a hypothetical scenario consistent with the profile of their own community. Both 10% and 20% reductions were used to examine whether respondents' WTP would change as a function of the size of the reduction in alcohol-related harm achieved.

Each respondent was randomly assigned one of two different payment ranges for the WTP question: one increased in $10 increments up to $100, with an option for more than $100; and the other increased in $25 increments up to $250, with an option for more than $250. This allowed the any payment range and mid-point biases to be quantified [131, 132]. Respondents were also given the choice of 'don't know' and 'prefer not to say' in order to minimise the likelihood that they would randomly choose amounts when they were unsure about what the question was asking. Further, since respondents typically have a dislike for responding in the 'more than $100' (or 'more than $250') category, presumably because they think this may give governments an option to spend an unlimited amount, a 'more than $100' category plus a '$100' category were included.

Combining reduced harm with community WTP

The counterfactual analyses provide estimates of the potential savings (or additions) in alcohol-related harms and costs for the post-intervention period (i.e. 2006-2009) in the experimental communities, as if their growth (or reduction) in alcohol-related harms mirrored that of the control communities. These changes are adjusted to reflect the relative costs of different harms. The result is an average, adjusted reduction in alcohol-related harm that is combined with communities' WTP to estimate the changes in alcohol-related harm.

Step three: conducting the BCA

The benefit-cost of AARC is estimated in terms of whether the benefit of the interventions (expressed as the value of the changes from pre- to post-intervention [in dollar terms] combined with WTP estimates) is greater than their costs (in dollar terms).

Step one: costing the interventions

Table 4.1 provides a summary of each intervention and its opportunity cost. The total cost of the AARC interventions is estimated at $608,102 in 2006 dollars.

Table 4.1: Summary of the AARC interventions and their costs

Intervention	Resource value ($)
1. Engagement process	55,517
2. Feedback of data and results to key stakeholders	81,718
3. Media advocacy (feedback to communities)	195,393
4. GPs: screening and brief intervention	35,207
5. GPs: tailored feedback and training on alcohol prescribing	1,441
6. Workplace policies and training	27,655
7. High school-based interactive session on alcohol harms	13,098
8. Pharmacy-based screening and brief intervention	2,959
9. Aboriginal Community Controlled Health Service screening and brief intervention	22,908
10. Identifying and targeting high risk weekends	78,462
11. Good Sports	66,000
12. Hospital Accident and Emergency based screening and brief intervention	24,151
13. Web-based screening and brief intervention	3,593
TOTAL	**608,102**

Step two: quantifying and valuing the extent of change from pre- to post-intervention

The per incident cost of alcohol-related crime

Table 4.2 reports the cost per incident of alcohol-related crime (2006 constant dollars). The per incident cost of committing crime is $5,015 for an assault, $2,457 for malicious damage, $13,307 for sexual assault and $934 for street offences.

Table 4.2: Cost per incident of alcohol-related crime (2006 constant dollars)

Cost	Type of crime ($)			
	Assaults	Malicious damage	Sexual offences	Street offences
Cost of crime and consequences	3,982	1,166	5,976	501
Lost output (AIC)	413	568	2,788	177
Intangibles (AIC)	620	723	4,543	256
Total	***5,015***	***2,457***	***13,307***	***934***

Actual and counterfactual numbers and costs of alcohol-related assaults

Table 4.3 summarises alcohol-related assaults in the experimental and control communities in the pre-intervention period (2001-2004) and post-intervention period (2006-2009). A comparison between the two time periods shows the number of alcohol-related assaults increased on average 20% and 11% in the control communities and experimental communities, respectively. The total cost of alcohol-related assaults in the control communities increased from $15,058,653 over the period 2001-2004 to $18,092,448 over the period 2006-2009. For the experimental communities, the total cost of alcohol-related assaults increased from $12,295,644 over the period 2001-2004 to $13,629,510 over the period 2006-2009.

Table 4.3: Number and cost of alcohol-related assaults, pre- / post- intervention

Alcohol-related assaults	Control		Experimental	
	Incidents	Costs ($)	Incidents	Costs ($)
Total 2001-2004	3,003	15,058,653	2,452	12,295,644
Total 2006-2009	3,608	18,092,448	2,718	13,629,510
% change 2006-2009 / 2001-2004	***20.1%***	***20.1%***	***10.8%***	***10.8%***

Table 4.4 provides an overview of the counterfactual intervention scenario for alcohol assaults in the post-intervention period. The counterfactual represents the change in alcohol assaults in the experimental communities had their growth rate mirrored that of the control communities (i.e. 20%). A 20% increase in alcohol assaults equates to a counterfactual total of 2,946 assaults, which is 228 more alcohol-related assaults than were actually recorded in the experimental communities (2,946 to 2,718). This is equivalent to a cost saving of $1,143,278 (7.7% reduction).

Table 4.4: Counterfactual analysis for alcohol-related assaults

Alcohol-related assaults	Experimental communities	
	Incidents	Costs ($)
Actual total 2001-2004	2,452	2,295,644
Actual total 2006-2009	2,718	3,629,510
Counterfactual total 2006-2009	2,946	14,772,788
Net difference in totals 2006-2009	*- 228*	*- 1,143,278*
% reduction 2006-2009	***-7.7%***	***-7.7%***

Actual and counterfactual numbers and costs of alcohol-related malicious damage

Table 4.5 summarises alcohol-related malicious damage in the experimental and control communities in the pre-intervention period (2001-2004) and post-intervention period (2006-2009). A comparison between the two time periods shows the number of alcohol-related malicious damage incidents increased on average 13% and 11% in the control and experimental communities, respectively. The total cost of alcohol-related malicious damage in the control communities increased from $7,998,920 over the period 2001-2004 to $9,072,485 over the period 2006-2009. For the experimental communities, the total cost of alcohol-related malicious damage increased from $7,925,220 over the period 2001-2004 to $8,807,164 over the period 2006-2009.

Table 4.5: Number and cost of alcohol-related malicious damage, pre- / post- intervention

Alcohol-related malicious damage	Control		Experimental	
	Incidents	Costs ($)	Incidents	Costs ($)
Total 2001-2004	3,256	7,998,920	3,226	7,925,220
Total 2006-2009	3,693	9,072,485	3,585	8,807,164
% change 2006-2009 / 2001-2004	***13.4%***	***13.4%***	***11.1%***	***11.1%***

Table 4.6 provides an overview of the counterfactual intervention scenario for alcohol-related malicious damage in the post-intervention period. The counterfactual represents the change in alcohol-related malicious damage in the experimental communities had their growth rate mirrored that of the control communities (i.e. 13%). A 13% increase in alcohol-related malicious damage equates to a counterfactual total of 3,659 incidents, which is 74 more incidents of alcohol-related malicious damage than were actually recorded in the experimental communities (3,659 to 3,585). This is equivalent to a cost saving of $181,729 (2.0% reduction).

Table 4.6: Counterfactual analysis for alcohol-related malicious damage

Alcohol-related malicious damage	Experimental communities	
	Incidents	Costs ($)
Actual total 2001-2004	3,226	7,925,220
Actual total 2006-2009	3,585	8,807,164
Counterfactual total 2006-2009	3,659	8,988,893
Net difference in totals 2006-2009	*-74*	*- 181,729*
% reduction 2006-2009	***-2.0%***	***-2.0%***

Actual and counterfactual numbers and costs of alcohol-related sexual assault

Table 4.7 summarises alcohol-related sexual assaults in the experimental and control communities in the pre-intervention period (2001-2004) and post-intervention period (2006-2009). A comparison between the two time periods shows the number of alcohol-related sexual assaults decreased on average 27% and 26% in the control and experimental communities, respectively. The total cost of alcohol-related sexual assaults in the control communities decreased from $4,590,918 over the period 2001-2004 to $3,353,366 over the period 2006-2009. For the experimental communities, the total cost of alcohol-related sexual assaults decreased from $4,271,550 over the period 2001-2004 to $3,167,068 over the period 2006-2009.

Table 4.7: Number and cost of alcohol-related sexual assaults, pre- / post- intervention

Alcohol-related sexual assault	Control		Experimental	
	Incidents	Costs ($)	Incidents	Costs ($)
Total 2001-2004	345	4,590,918	321	4,271,550
Total 2006-2009	252	3,353,366	238	3,167,068
% change 2006-2009 / 2001-2004	***27.0%***	***27.0%***	***25.9%***	***25.9%***

Table 4.8 provides an overview of the counterfactual intervention scenario for alcohol-related sexual assaults in the post-intervention period. The counterfactual represents the change in alcohol-related sexual assaults in the experimental communities had their rate of decline mirrored that of the control communities (i.e. 27%). A 27% reduction in alcohol-related sexual assaults equates to a counterfactual total of 234 incidents of sexual assaults, which is four fewer alcohol-related sexual assaults than were actually recorded in the experimental communities (234 to 238). This is equivalent to a cost increase of $46,980 (1.5% increase).

Table 4.8: Counterfactual analysis for alcohol-related sexual assaults

Alcohol-related sexual assault	Experimental communities	
	Incidents	Costs ($)
Actual total 2001-2004	321	4,271,550
Actual total 2006-2009	238	3,167,068
Counterfactual total 2006-2009	234	3,120,089
Net difference in totals 2006-2009	*4*	*46,980*
% increase 2006-2009	***1.5%***	***1.5%***

Actual and counterfactual numbers and costs of alcohol-related street offences

Table 4.9 summarises alcohol-related street offences in the experimental and control communities in the pre-intervention period (2001-2004) and post-intervention period (2006-2009). A comparison between the two time periods shows the number of alcohol-related street offences increased on average 55% and 19% in the control and experimental communities, respectively. The total cost of alcohol-related street offences in the control communities increased from $1,315,107 over the period 2001-2004 to $2,042,713 over the period 2006-2009. For the experimental communities, the total cost of alcohol-related street offences increased from $1,195,552 over the period 2001-2004 to $1,417,850 over the period 2006-2009.

Table 4.9: Number and cost of alcohol-related street offences, pre- / post-intervention

Alcohol-related street offences	Control		Experimental	
	Incidents	Costs ($)	Incidents	Costs ($)
Total 2001-2004	1,408	1,315,107	1,280	1,195,552
Total 2006-2009	2,187	2,042,713	1,518	1,417,850
% change 2006-2009 / 2001-2004	***55.3%***	***55.3%***	***18.6%***	***18.6%***

Table 4.10 provides an overview of the counterfactual intervention scenario for alcohol-related street offences in the post-intervention period. The counterfactual represents the change in alcohol-related street offences in the experimental communities had their growth rate mirrored that of the control communities (i.e. 55%). A 55% increase in alcohol-related street offences equates to a counterfactual total of 1,988 street offences, which is 470 more street offences than were actually recorded in the experimental communities (1,988 to 1,518). This is equivalent to a cost saving of $439,162 (24% reduction).

Table 4.10: Counterfactual analysis for alcohol-related street offences

Alcohol-related street offences	Experimental communities	
	Incidents	Costs ($)
Actual total 2001-2004	1,280	1,195,552
Actual total 2006-2009	1,518	1,417,850
Counterfactual total 2006-2009	1,988	1,857,012
Net difference in totals 2006-2009	*-470*	*-439,162*
% reduction 2006-2009	***-23.6%***	***-23.6%***

Actual and counterfactual numbers and costs of alcohol-related non-injury traffic crashes

Table 4.11 summarises alcohol-related traffic crashes that did not result in injury in the experimental and control communities in the pre-intervention period (2001-2004) and post-intervention period (2006-2009). A comparison between the two time periods shows the number of alcohol-related traffic crashes that did not result in injury decreased on average 1.5% and 6.8% in the control and experimental communities, respectively. The total cost of alcohol-related traffic crashes that did not result in injury in the control communities decreased from $3,173,604 over the period 2001-2004 to $3,124,456 over the period 2006-2009. For the experimental communities, the total cost of alcohol-related traffic crashes that did not result in injury decreased from $1,642,972 over the period 2001-2004 to $1,530,632 over the period 2006-2009.

Table 4.11: Number and cost of alcohol-related traffic crashes resulting in non-injury, pre- / post- intervention

Alcohol-related traffic crashes resulting in non-injury	Control		Experimental	
	Incidents	Costs ($)	Incidents	Costs ($)
Total 2001-2004	452	3,173,604	234	1,642,972
Total 2006-2009	445	3,124,456	218	1,530,632
% change 2006-2009 / 2001-2004	***1.5%***	***1.5%***	***6.8%***	***6.8%***

Table 4.12 provides an overview of the counterfactual intervention scenario for alcohol-related traffic crashes that do not result in injury in the post-intervention period. The counterfactual represents the change in alcohol-related traffic crashes that do not result in injury in the experimental communities had their rate of decline mirrored that of the control communities (i.e. 1.5%). A 1.5% reduction in alcohol-related traffic crashes that do not result in injury equates to a counterfactual total of 230 crashes, which is 12 more than were actually recorded in the experimental communities (230 to 218). This is equivalent to a cost saving of $86,896 (5.4% reduction).

Table 4.12: Counterfactual analysis for alcohol-related crashes resulting in non-injury

Alcohol-related traffic crashes resulting in non-injury	Experimental communities	
	Incidents	Costs ($)
Actual total 2001-2004	234	1,642,972
Actual total 2006-2009	218	1,530,632
Counterfactual total 2006-2009	230	1,617,528
Net difference in totals 2006-2009	*-12*	*-86,896*
% reduction 2006-2009	***-5.4%***	***-5.4%***

Actual and counterfactual numbers and costs of alcohol-related injury traffic crashes

Table 4.13 summarises alcohol-related traffic crashes that did result in injury in the experimental and control communities in the pre-intervention period (2001-2004) and post-intervention period (2006-2009). A comparison between the two time periods shows the number of alcohol-related traffic crashes that did result in injury decreased on average 8.1% and 4.0% in the control and experimental communities, respectively. The total cost of alcohol-related traffic crashes that did result in injury in the control communities decreased from $45,953,017 over the period 2001-2004 to $42,210,238 over the period 2006-2009. For the experimental communities, the total cost of alcohol-related traffic crashes that did result in injury decreased from $25,887,559 over the period 2001-2004 to $24,847,898 over the period 2006-2009.

Table 4.13: Number and cost of alcohol-related traffic crashes resulting in injury, pre- / post-intervention

Alcohol-related traffic crashes resulting in injury	Control		Experimental	
	Incidents	Costs ($)	Incidents	Costs ($)
Total 2001-2004	442	45,953,017	249	25,887,559
Total 2006-2009	406	42,210,238	239	24,847,898
% change 2006-2009 / 2001-2004	***8.1%***	***8.1%***	***4.0%***	***4.0%***

Table 4.14 provides an overview of the counterfactual intervention scenario for alcohol-related traffic crashes that did result in injury. The counterfactual represents the change in alcohol-related traffic crashes that did result in injury in the experimental communities had their rate of decline mirrored that of the control communities (i.e. 8.1%). An 8.1% reduction in alcohol-related traffic crashes that do result in injury equates to a counterfactual total of 229 crashes, which is 10 fewer than were actually recorded in the experimental communities (229 to 239). This is equivalent to an increased cost of $1,068,828 (4.5% increase).

Table 4.14: Counterfactual analysis for alcohol-related crashes resulting in injury

Alcohol-related traffic crashes resulting in injury	Experimental communities	
	Incidents	Costs ($)
Actual total 2001-2004	249	5,887,559
Actual total 2006-2009	239	24,847,898
Counterfactual total 2006-2009	229	23,779,070
Net difference in totals 2006-2009	*10*	*1,068,828*
% increase 2006-2009	***4.5%***	***4.5%***

Actual numbers and costs of alcohol-related fatal traffic crashes

Table 4.15 summarises alcohol-related traffic crashes that resulted in a fatality in the experimental and control communities in the pre-intervention period (2001-2004) and post-intervention period (2006-2009). A comparison between the two time periods shows the number of alcohol-related traffic crashes that resulted in a fatality decreased on average 46.4% and 6.2% in the control and experimental communities, respectively. The total cost of alcohol-related traffic crashes that resulted in a fatality in the control communities decreased from $50,102,802 over the period 2001-2004 to $26,840,787 over the period 2006-2009. For the experimental communities, the total cost of alcohol-related traffic crashes that resulted in a fatality decreased from $28,630,173 over the period 2001-2004 to $26,840,787 over the period 2006-2009. Given the instability in these estimates due to the small numbers of incidents, it is inappropriate to consider them in a counterfactual analysis.

Table 4.15: Number and cost of alcohol-related traffic crashes resulting in fatality, pre- / post-intervention

Alcohol-related traffic crashes resulting in fatality	Control		Experimental	
	Incidents	Costs ($)	Incidents	Costs ($)
Total 2001-2004	28	50,102,802	16	28,630,173
Total 2006-2009	15	26,840,787	15	26,840,787
% change 2006-2009 / 2001-2004	***46.4%***	***46.4%***	***6.2%***	***6.2%***

Actual and counterfactual numbers and costs of hospital inpatient admissions for alcohol dependence

Table 4.16 summarises hospital inpatient admissions for alcohol dependence in the experimental and control communities in the pre-intervention period (2001-2004) and post-intervention period (2006-2009). A comparison between the two time periods shows the number of admissions for alcohol dependence increased 17% and 20% in the control and experimental communities, respectively. The total cost of hospital inpatient admissions for alcohol dependence in the control communities increased from $1,091,580 over the period 2001-2004 to $1,272,380 over the period 2006-2009. For the experimental communities, the total cost of hospital inpatient admissions for alcohol dependence increased from $567,260 over the period 2001-2004 to $680,260 over the period 2006-2009.

Table 4.16: Number and cost of hospital inpatient admissions for alcohol dependence, pre- / post-intervention

Hospital inpatient admissions for alcohol dependence	Control		Experimental	
	Incidents	Costs ($)	Incidents	Costs ($)
Total 2001-2004	483	1,091,580	251	567,260
Total 2006-2009	563	1,272,380	301	680,260
% change 2006-2009 / 2001-2004	**16.6%**	**16.6%**	**19.9%**	**19.9%**

Table 4.17 provides an overview of the counterfactual intervention scenario for hospital inpatient admissions for alcohol dependence. The counterfactual represents the change in hospital inpatient admissions for alcohol dependence in the experimental communities had their growth rate mirrored that of the control communities (i.e. 17%). A 17% increase in hospital inpatient admissions for alcohol dependence equates to a counterfactual total of 293 hospital inpatient admissions, which is eight fewer than were actually recorded in the experimental communities (293 to 301). This is equivalent to an increased cost of $19,044 (2.9% increase).

Table 4.17: Counterfactual analysis for hospital inpatient admissions for alcohol dependence

Hospital inpatient admissions for alcohol dependence	Experimental communities	
	Incidents	Costs ($)
Actual total 2001-2004	251	567,260
Actual total 2006-2009	301	680,260
Counterfactual total 2006-2009	293	661,216
Net difference in totals 2006-2009	*8*	*19,044*
% increase 2006-2009	**2.9%**	**2.9%**

Actual and counterfactual numbers and costs of hospital inpatient admissions for alcohol abuse

Table 4.18 summarises hospital inpatient admissions for alcohol abuse in the experimental and control communities in the pre-intervention period (2001-2004) and post-intervention period (2006-2009). A comparison between the two time periods shows the number of admissions for alcohol abuse increased 27% and 115% in the control and experimental communities, respectively. The total cost of hospital inpatient admissions for alcohol abuse in the control communities increased from $971,594 over the period 2001-2004 to $1,231,656 over the period 2006-2009. For the experimental communities, the total cost of hospital inpatient admissions for alcohol abuse increased from $667,841 over the period 2001-2004 to $1,433,465 over the period 2006-2009.

Table 4.18: Number and cost of hospital inpatient admissions for alcohol abuse, pre- / post-intervention period

Hospital inpatient admissions for alcohol abuse	Control		Experimental	
	Incidents	Costs ($)	Incidents	Costs ($)
Total 2001-2004	467	971,594	321	667,841
Total 2006-2009	592	1,231,656	689	1,433,465
% change 2006-2009 / 2001-2004	***26.8%***	***26.8%***	***114.6%***	***114.6%***

Table 4.19 provides an overview of the counterfactual intervention scenario for hospital inpatient admissions for alcohol abuse. The counterfactual represents the change in hospital inpatient admissions for alcohol abuse in the experimental communities had their growth rate mirrored that of the control communities (i.e. 27%). A 27% increase in hospital inpatient admissions for alcohol dependence equates to a counterfactual total of 407 hospital inpatient admissions, which is 282 fewer than were actually recorded in the experimental communities (689 to 407). This is equivalent to an increased cost of $586,866 (69% increase).

Table 4.19: Counterfactual analysis for hospital inpatient admissions for alcohol abuse

Hospital inpatient admissions for alcohol abuse	Experimental communities	
	Incidents	Costs ($)
Actual total 2001-2004	321	667,841
Actual total 2006-2009	689	1,433,465
Counterfactual total 2006-2009	407	846,599
Net difference in totals 2006-2009	*282*	*586,866*
% increase 2006-2009	***69.3%***	***69.3%***

Estimating the dollar value of community WTP to reduce harm

Detailed results of the WTP exercise are published elsewhere and a summary is provided here [130]. Of the 2,899 individuals who responded to the WTP question for a 10% reduction in alcohol harm, 769 (27%) and 289 (10%) individuals stated that they did not know or preferred not to state their maximum WTP. Of the 2,885 individuals who responded to the WTP question for a 20% reduction in alcohol harm, 757 (26%) and 396 (14%) individuals stated that they did not know or preferred not to state their maximum WTP. Of the remaining 1,741 individuals who stated an amount they were willing to pay for a 10% reduction, a further four (0.2%) were excluded because they indicated that they would be WTP less for a 20% reduction in alcohol harm than for a 10% reduction, which suggests they did not sufficiently understand the question [136].

The data indicated that people were willing to pay more when:

- the household income was higher; and/or
- the respondent was experiencing higher levels of alcohol-related harm (i.e. whose partners or family members drank too much rather than due to their own drinking).

Figure 4.1 ($10 payment scale) and Figure 4.2 ($25 payment scale) show the percentage of respondents' maximum WTP for 10% and 20% reductions in alcohol-related harm.

Figure 4.1: Percentage of respondents' maximum WTP for 10% and 20% reductions in alcohol harm, using a $10 payment scale

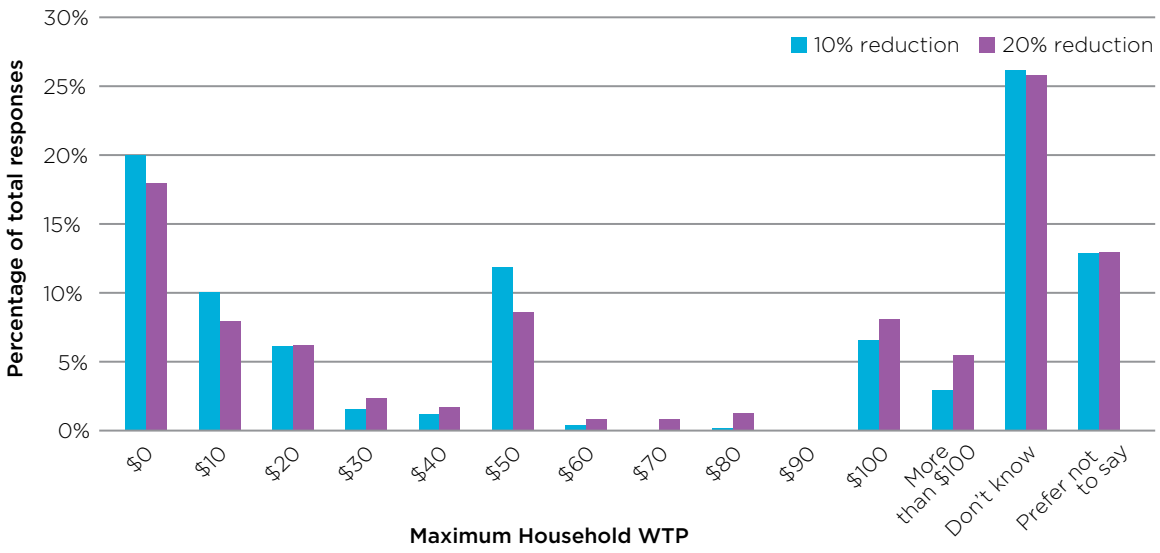
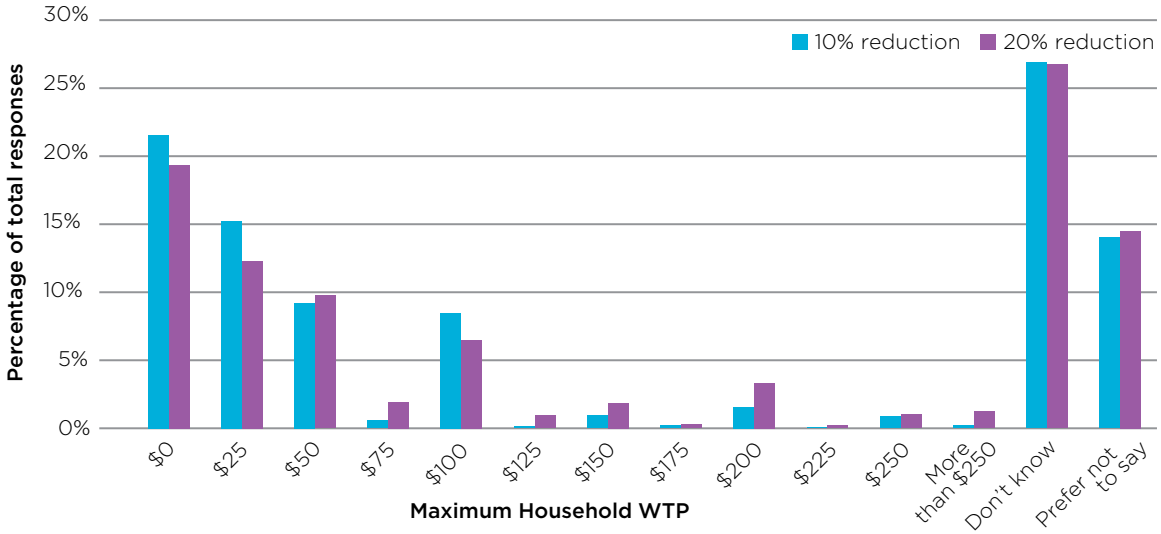


Figure 4.2: Percentage of respondents' maximum WTP for 10% and 20% reductions in alcohol harm, using a $25 payment scale



For the BCA, the amount households were WTP to achieve a 10% reduction in alcohol-related harm was used, rather than a 20% reduction in harm, for two reasons: a 10% reduction in harm is consistent with two of the three outcomes for which reductions in harm were achieved in the largest alcohol community-action trial previous to AARC [22]; and most respondents (70%) provided the same WTP estimate for both a 10% and 20% reduction in alcohol-related harm. The mean household WTP to achieve a 10% reduction in alcohol-related harm was $35.43 using the $10 payment scale and $53.50 using the $25 payment scale. Both were used to provide a lower and upper estimate of households' WTP to reduce alcohol-related harm.

Combining estimates of harm and WTP

Table 4.20 summarises average reductions in alcohol-related crime and traffic crashes, adjusted for the counterfactual analysis. The average reduction in total crime, adjusted for the counterfactual cost for each incident (as identified in Tables 4.4, 4.6, 4.8, 4.10) is equivalent to 6% with a cost saving of $1,717,188. The average reduction in total traffic crashes, adjusted for the counterfactual cost for both incidents (as identified in Tables 4.12 and 4.14), is equivalent to 3.9% with an increased cost of $981,932 (reduced costs from fewer non-injury crashes are offset by increased costs from injury crashes). The adjusted average reduction in alcohol-related crime and crashes combined is equivalent to 1.4%, with a cost saving of $735,256.

Table 4.20: Adjusted average reduction in alcohol-related crime and road traffic crashes

Alcohol-related harm	Change in incident	Change in cost ($)	Percent change
Crimes			
Alcohol-related assaults	-228	-1,143,278	-7.7%
Alcohol-related malicious damage	-74	-181,729	-2.0%
Alcohol-related sexual assault	4	46,980	1.5%
Alcohol-related street offences	-470	-439,162	-23.6%
Average reduction in crime, adjusted by the counterfactual total cost	*-768*	*-1,717,188*	*- 6.0%*
Traffic crashes			
Alcohol-related traffic crashes resulting in non-injury	-12	-86,896	-5.4%
Alcohol-related traffic crashes resulting in injury	10	1,068,828	4.5%
Average increase in crime, adjusted by the counterfactual total cost	*-2*	*981,932*	*3.9%*
Sub-total / adjusted average reduction		**-735,256**	**-1.4%**

In terms of WTP, a 1.4% reduction in alcohol crime and traffic crashes is equivalent to a monetary value of $4.96 and $7.49 per annum, for the lower and upper estimates. Multiplying these by the number of intervention years (N=4) and the number of households in the experimental communities (N=46,529) results in a total community WTP of $923,173 and $1,394,009 for the lower and upper estimates. These calculations are summarised in Table 4.21.

Table 4.21: 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 traffic 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 experimental communities	46,529	46,529
Total value of community WTP	**$923,173**	**$1,394,009**

Step three: conducting the BCA

The results of the BCA are presented in Table 4.22 as the difference in benefits and costs, and as a ratio of benefits to costs. The net benefit is estimated to range from $1,658,429 to $2,129,265 using the lower and upper estimates of WTP. These are derived by combining the savings from reduced alcohol-related crime and traffic crashes ($735,256) with the household WTP estimates ($923,173 and $1,394,009 for the lower and upper estimates).

The cost side of the equation is estimated at $1,214,012 which is comprised of cost of AARC interventions ($608,102) and the additional hospital costs related to dependence and abuse ($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, which is equivalent to a BCA ratio of between 1.37 and 1.75, depending on which WTP estimate is used. For every $1 invested in AARC, the value of benefits is estimated at between $1.37 and $1.75.

Table 4.22: Benefit-cost analysis of AARC

Parameter	Lower estimate*	Upper estimate*
Savings from reduced alcohol crimes and traffic crashes	$ 735,256	$ 735,256
Community willingness to pay	$ 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

Summary and methodological considerations

Overview

This chapter shows that the cost of implementing a community-action intervention is outweighed by the benefits achieved in reduced alcohol-related harm. In other words, AARC is a cost-beneficial intervention that demonstrated a positive return for the investment. The analyses presented in this chapter represent the most comprehensive form of economic assessment of a community-action approach to reducing alcohol harm ever undertaken internationally: indeed AARC is the only BCA of a community-action approach to reducing alcohol-related harm. This means a high-degree of confidence can be placed in the accuracy of the results. The specific findings are:

- For every $1 invested in AARC, the value of benefits returned to the experimental communities, relative to the control communities, was estimated at between $1.37 and $1.75.
- The savings achieved by the AARC project included $735,256 in reduced alcohol-related crime and traffic crash costs. Adding the communities' WTP for this saving means that the estimated benefit of AARC in dollar terms is between $1,658,429 and $2,129,265. The costs related to the AARC project comprised the cost of implementing the interventions ($608,102) and the additional hospital costs ($605,910). These additional hospital costs were most likely the result of problem drinkers seeking, or being referred to, treatment for alcohol dependence and abuse. Despite the increase in hospital costs, there was a net benefit as a result of the AARC interventions, valued at between $444,417 and $915,253.
- It is most likely community action is even more cost-beneficial than this estimate because, even though the costs of providing additional health care were included, it was not possible to estimate and value the health gains from this treatment, which are expected to accrue over time.
- Relative to the control communities, the AARC experimental communities achieved a 24% reduction in alcohol-related street offences, an 8% reduction in alcohol assaults, a 2% reduction in alcohol-related malicious damage incidents and a 1% reduction in alcohol-related traffic crashes (excluding alcohol-related fatalities where the number of incidents was too small to be reliable). The increased demand for health care services was primarily recorded as an increase in hospital presentations for alcohol abuse (69%), rather than alcohol dependence (3%).

Data limitations

The methodological issues relevant to deriving the cost and benefits of AARC have been clearly outlined in AARC's economic publications [117, 130], but can be summarised as follows. First, there is a dearth of good quality literature on the value to society of an alcohol-related crime or traffic crash. The evidence that is available essentially represents a piecemeal approach to estimating resource use. Most studies rely on a top-down approach that initially derives an aggregate budget and then apportions the aggregate to various cost-drivers, such as the time police spend at a crime scene and the probability that a traffic crash is reported to police. This method of costing is inherently less accurate than one which adopts a bottom-up approach. Due to data constraints, this study relied on the top-down approach, which used existing estimates with particular refinements to improve their rigour and reliability. Second, a base year of 2006 was adopted for the BCA. Costs associated with alcohol-related crime and crashes may fluctuate over time for a number of reasons including inflation. However, due to data constraints, it would be an impossible task to estimate the value of crime or crashes each year. Hence, a reference year was adopted and figures used reflect constant dollars. Third, to avoid double counting with objective indicators, this study has not attempted to value self-reported harm identified through the survey. It is likely that the actual cost attached to an alcohol-related crime or road crash is underestimated given it does not include the full spectrum of external costs, such as third party pain and suffering, or out of pocket expenses. To some extent, however, the WTP estimate takes this into account by asking the community to attach a dollar value to the reduction of alcohol-related harm in their communities. Moreover, the same economic methods were applied to both the experimental and control communities, such that they will have little impact on the relative differences between experimental and control communities. Fourth, this

analysis considered the cost of additional hospitalisations in the experimental communities, but the value of the health gain from treatment that would be expected over time was excluded, due to the time constraints of the project. By not taking into account the value of self-reported gains (e.g. fewer short-term risky drinkers) and the gains likely to accrue over time from increased utilisation of hospital care, this estimate of the benefit-cost of AARC is conservative.

Estimating the dollar value of households' WTP to reduce harm also has methodological challenges. Although the strengths and limitations of WTP as a technique to elicit community values has been discussed in detail elsewhere [130], a number of aspects are particularly relevant to AARC. First, the large non-response rate for the postal questionnaire (61%) is problematic, especially if those individuals who were less likely to respond had significantly different preferences in terms of WTP for reductions in alcohol-related harm, since that would introduce systematic bias into the results. Second, the fact that a large number of individuals either did not know or were not willing to state how much they were willing to pay, creates some concern about the validity of the results. In order to minimise this problem, however, an opt-out option was provided and the few significant differences in mean demographic characteristics between those who provided a WTP answer and those who did not were small in magnitude [130]. Third, the large percentage of individuals who stated the same household WTP for both a 10% and 20% reduction in alcohol-related harm creates some concern about the construct validity of the results. This result may be due to two reasons: individuals might consider the WTP question a vote for or against such interventions and do not consider the size of the outcome; or individuals have large diminishing returns to reductions in alcohol-related harm, such that their increased WTP for the 20% reduction in alcohol-related harm is too small to take them to the next payment level on the scale.

Additional caution regarding the WTP estimates needs to be made since 111 (6%) and 136 (8%) individuals for the 10% and 20% reduction in alcohol-related harm, respectively, chose the $100 and $250 category even though, theoretically at least, very few should have chosen these categories. This may infer that the WTP responses are downwardly biased because the payment scale does not go up to a large enough amount, with respondents unwilling to answer in the 'more than' category. Finally, in terms of convergent validity, 43% of respondents to a face-to-face questionnaire provided inconsistent answers to the WTP and ranking of programs questions. This suggests that either individuals may have changed their WTP during the questionnaire for some programs (there may be substantial measurement error involved, such that if individuals were re-asked the WTP questionnaires then their answers may change), or they simply did not understand the questions.

5 AARC's contribution to current research efforts and capacity building in alcohol community-action research

KEY FINDINGS

1. The RCT design of AARC and the long process of community engagement provided an opportunity to conduct another six trials and innovative analyses nested in the AARC framework. One nested RCT, which tested data collection methods, is of little practical value to communities and policy makers. The other five studies showed:
   - The most cost-effective strategy for GPs in reducing the proportion of their community who drink at risky levels is to increase their rates of screening;
   - The most cost-effective strategy for pharmacists in reducing the proportion of their community who drink at risky levels is to increase their rates of screening;
   - Hospital Emergency Department-based screening and mailed feedback is cost-effective;
   - Identifying and targeting weekends that have historically been risky for each community is cost beneficial in reducing alcohol-related violent crime; and
   - Tailored letters to GPs cost-effectively increases rates of prescribing alcohol medications and may reduce inpatient admissions for alcohol dependence.
2. AARC will publish approximately 35 papers in the international peer-review literature, which represents an uncommon, significant and high quality contribution to the alcohol research field from one project.
3. AARC has built capacity in the alcohol field for new and rigorous intervention research by successfully training four PhD students and two Masters students, each of whom has continued to work in drug and alcohol research.

Introduction

Only one community-action alcohol intervention trial conducted in Australia has been published in the international peer-review literature since 1980, based on a study with two communities in Western Australia. The AARC project set out to increase research capacity for conducting methodologically rigorous community-action alcohol research in Australia, including economic analyses. This contribution occurred in three ways:

- *using the opportunity of the AARC RCT design and the initial work of engaging with communities to conduct six trials and innovative analyses nested in the AARC framework.* One nested RCT aimed to improve research methodology. It showed that follow-up phone calls to potential research participants who are mailed a survey but do not return it, or respond to a mailed reminder, does not increase response rates sufficiently to be worth the additional cost. The results of the other five nested studies are summarised below.
- *emphasising the publication of results from AARC analyses in international, peer-review journals.* The primary purpose of this principle was to provide reassurance, through the international, peer-review process, that the methods used in all the AARC-related analyses were sufficiently rigorous and that the interpretation of the results of these analyses was reasonable. Approximately 35 AARC-related papers will be published in the international peer-review literature, of which 27 are already published or currently under review.
- *building research capacity in the alcohol field for new and rigorous intervention research.* This contribution is reflected in the four PhD and two Masters students who were recruited and trained in the AARC project. The clear potential for AARC's contribution to building research capacity to endure over the longer term is evidenced by each of these students having obtained post-graduate positions in the drug and alcohol research field.

Additional studies embedded within the AARC project

GP-based Screening and Brief Intervention (SBI)

For GP-based SBI, the most cost-effective strategy for improving patient outcomes across a whole community is to increase the rate with which GPs screen their patients for risky drinking, relative to either increasing the rate at which they provide brief intervention, or increasing GPs' rates of both screening and brief intervention. If GPs screened all their patients, an incremental cost effectiveness ratio (ICER) of AUD$197 per risky drinker who reduced his/her drinking would be achieved. Although this outcome is cost-effective, further analysis showed that, at baseline, 19% of risky drinkers in AARC communities visited a GP and reduced their drinking, a proportion that would only increase to 36%, even if all GP patients received SBI [29].

Pharmacy-based SBI

For pharmacy-based SBI, the most cost-effective strategy for improving patient outcomes across a whole community is also to increase the rate of screening for risky drinking, relative to either increasing the rate at which they provide brief intervention, or both screening and brief intervention. If all pharmacy customers were screened, an incremental cost effectiveness ratio (ICER) of AUD$29 per risky drinker who reduced his/her drinking would be achieved. At baseline, 23% of risky drinkers in a community visited a pharmacy and reduced their drinking, a proportion that would only increase to 34% if they all received SBI [31].

Hospital ED-based SBI: a Randomised Controlled Trial (RCT)

Despite evidence for the effectiveness of hospital ED-based alcohol interventions, their routine use has been stymied by time, financial and staff attitudinal constraints. Mailed personalised feedback, which is likely to be more feasible, has been associated with reduced alcohol consumption in other settings, but its cost-effectiveness in the ED had not been examined prior to AARC. The AARC ED RCT followed-up 244 patients (80% of those enrolled in the trial), six weeks after providing tailored, mailed feedback to the 122 ED patients in the experimental arm of the study. Patients who had an alcohol-involved ED presentation reported a significant reduction of 12.2 standard drinks per week compared to ED patients in the control arm of the study, after controlling for baseline consumption and other covariates. The AARC ED intervention was also highly acceptable to participants: 77% thought the hospital should provide this information to ED patients on an ongoing basis [86].

The economic analysis showed this intervention is a good economic investment, especially relative to face-to-face ED-based SBI. The direct cost of providing mailed feedback was AUD$5.83 per patient, a fraction of the equivalent per-patient cost of US$135.35 associated with the face-to-face intervention evaluated in the only comparable trial conducted to date [133]. The AARC ED intervention also demonstrated excellent cost-efficacy among those in whom it was clinically effective: for patients with an alcohol-involved ED presentation, each unit reduction in average weekly consumption was associated with a treatment cost of only AUD$0.48.

Targeting weekends at high-risk of alcohol-related harm: an RCT

The aim of this intervention was to reduce alcohol-related assaults on weekends that have historically been problematic for each community. This highly tailored approach meant that the weekends targeted differed in each community. The intervention was a multi-component community strategy involving coordinated effort among local councils, local media, alcohol licensees and local police. There were two primary statistically significant effects. First was a 64% reduction in alcohol-related sexual offence incidents (IRR: 0.36, 95% CI: 0.14-0.96; $p < 0.05$) on the high-risk weekends in the experimental communities, relative to the high-risk weekends in the control communities. Second was a potential dispersion effect to non-problematic weekends that resulted in a 19% reduction in alcohol-related assaults in the experimental, relative to control, communities (IRR: 0.81, 95% CI: 0.71-0.93; $p < 0.01$). The benefit-cost analysis quantified a reduction in costs to communities of $133,975 for targeted weekends and $81,128 for diffusion of benefits to non-targeted weekends for every $10,000 invested in this community-based intervention.

Improving GPs' prescribing for alcohol dependence: an RCT

Since increasing the use of pharmacotherapies for alcohol dependence has the potential to improve patient outcomes and reduce health care costs through fewer hospital admissions, an AARC-based RCT was designed to evaluate the cost effectiveness of tailored, postal feedback on GPs' prescribing for alcohol dependence and alcohol hospital admissions. A critical benefit of the community-based approach of AARC is the capacity to see effects across settings. GPs (n=115) in the 10 communities randomised to the experimental arm of the AARC project received tailored, mailed feedback on their prescribing of acamprosate and naltrexone. GPs in the experimental communities significantly increased their prescribing of acamprosate ($\beta = 0.24$, 95% CI: 0.13 to 0.35) and significantly decreased their prescribing of naltrexone ($\beta = 0.12$, 95% CI: 0.13 to 0.35), relative to GPs in the control communities. Rates of alcohol-related inpatient admissions for alcohol dependence decreased significantly in the experimental, relative to control, communities ($\beta = 0.98$, 95% CI: 1.80 to 0.16). Critically, the increased cost to the health care system from the additional prescribing was outweighed by the reduced cost of fewer inpatient hospitalisations, resulting in net-savings to the health care system. Specifically, the average cost saving per quarter per hospitalisation for inpatient admissions for alcohol dependence averted was $5,420, or $21,680 per annum [96]. This finding suggests a simple, low-cost intervention can cost-effectively reduce hospital admissions for alcohol dependence.

Publication of AARC results in international, peer-review journals

AARC will publish approximately 35 papers in the international peer-review literature, which represents an uncommon, significant and high quality contribution to the alcohol research field from one project. This section provides details of the AARC-related papers that have already been published in the international peer-review literature (n=24), or are currently under review (n=3).

Systematic literature reviews

1. Wood E, Shakeshaft A, Gilmour S, Sanson-Fisher R. A systematic review of school-based studies involving alcohol and the community. *Australian and New Zealand Journal of Public Health* 2006; 30: 541-549.
2. Calabria B, Shakeshaft A, Havard A. A systematic review of interventions for young people experiencing alcohol-related harm. *Addiction*, in press (accepted 16 January, 2012).
3. Webb G, Shakeshaft A, Sanson-Fisher R, Havard A. A systematic review of workplace interventions for alcohol-related problems. *Addiction* 2009; 104, 365-377.
4. Havard A, Shakeshaft A, Sanson-Fisher R. Systematic review and meta-analyses of strategies targeting alcohol problems in emergency departments: interventions reduce alcohol-related injuries. *Addiction* 2008; 103: 368-376.
5. Navarro H, Doran C, Shakeshaft A. Measuring costs of alcohol harm to others: a review of the literature. *Drug and Alcohol Dependence* 2011; 114: 87-99.

Measures and methods

6. Breen C, Shakeshaft A, Slade T, D'Este C, Mattick RP. The reliability of three population-level measures of alcohol-related crime. *Alcohol and Alcoholism* 2011; 46: 501-502.
7. Breen C, Shakeshaft A, Doran CM, Sanson-Fisher R, Mattick RP. The cost-effectiveness of postal surveys in improving survey response rates: a randomised controlled trial. *Australia and New Zealand Journal of Public Health* 2010; 34: 508-12.
8. Shakeshaft A, Petrie D, Doran C, Breen C, Sanson-Fisher R. An empirical approach to selecting community-based alcohol interventions: combining research evidence, community views and professional opinion. *BMC Public Health* 2012; 12:25.
9. Byrnes J, Doran C, Shakeshaft A. Cost per incident of alcohol related crime in New South Wales. *Drug and Alcohol Review* 2012 (accepted 12 April).

Descriptive analyses

10. Petrie D, Doran C, Shakeshaft A, Sanson-Fisher R. The relationship between risky alcohol consumption, crime and traffic accidents in rural Australia. *Addictive Behaviors* 2010: 35, 359-62.
11. Petrie D, Doran C, Shakeshaft A. Willingness to pay to reduce alcohol-related harm in Australian rural communities. *Expert Review of Pharmacoeconomics and Outcomes Research* 2011; 11: 351-363.
12. Petrie D, Doran C, Shakeshaft A, Sanson-Fisher R. The relationship between alcohol consumption and self reported health status using the EQ5D. *Social Science and Medicine* 2008: 67, 1717-26.
13. Czech S, Shakeshaft A, Byrnes J, Doran C. Counting the cost of alcohol-related traffic crashes: is the public health burden of harm greater in rural or urban environments? *Accident Analyses and Prevention* 2010; 42, 1195-1198.
14. Lynagh M, Sanson-Fisher R, Shakeshaft A. Reducing alcohol-related harm: the untapped potential of pre-hospital care workers. *International Journal of Emergency Medicine* 2009; 2, 237-40.

15. Clifford A, Shakeshaft A, Deans C. Evidence-based alcohol screening and brief intervention in Aboriginal Community Controlled Health Services: experiences of health-care providers. *Drug and Alcohol Review* 2011; 30: 55-62.

16. Lynagh M, Sanson-Fisher R, Shakeshaft A. Alcohol-related harm: perceptions of ambulance officers and health promotion actions they do and would do. *Health Promotion Journal of Australia 2010*; 21, 19-25.

17. Czech S, Shakeshaft A, Breen C, Sanson-Fisher R. Whole-of-community approaches to reducing alcohol-related harm: What do communities think? *Journal of Public Health* 2010; 18, 543-51.

18. Clifford A, Shakeshaft A, Deans C. How and when healthcare practitioners in Aboriginal Community Controlled Health Services deliver alcohol screening and brief intervention. *Drug and Alcohol Review* 2012; 31: 13-19.

19. Havard A, Shakeshaft A, Conigrave K, Sanson-Fisher R. The prevalence and characteristics of alcohol-related presentations to emergency departments in rural Australia. *Emergency Medicine Journal* 2011; 28: 290-295.

20. Havard A, Shakeshaft A, Conigrave K. The prevalence and characteristics of patients with risky alcohol consumption presenting to emergency departments in rural Australia. *Emergency Medicine Australasia* 2012 (published 14 February).

21. Breen C, Shakeshaft A, Slade T, Love S, D'Este C, Mattick RP. Do community characteristics predict levels of alcohol-related crime? *Alcohol and Alcoholism* 2011; 46: 464-70.

22. Czech S, Shakeshaft A, Breen C, Sanson-Fisher R. The development and application of a proxy measure of alcohol-related traffic crashes for rural communities. *Accident Analyses and Prevention* 2011; 43: 2160-2165.

Intervention effects

23. Navarro H, Shakeshaft A, Doran C, Sanson-Fisher R. The cost-effectiveness of GP screening and brief intervention, *Addictive Behaviors* 2011; 36: 1191-1198.

24. Navarro H, Shakeshaft A, Doran C, Sanson-Fisher R. The cost-effectiveness of screening and brief intervention delivered in community-based pharmacies. Under editorial review.

25. Havard A, Shakeshaft A, Conigrave K, Doran CM. Randomised controlled trial of mailed personalised feedback for problem drinkers in the emergency department: the short-term impact. *Alcoholism: Clinical and Experimental Research* 2012; DOI: 10.1111/j.1530-0277.2011.01632.x

26. Navarro HJ, Shakeshaft A, Doran CM, Petrie DJ. The cost-effectiveness of tailored, postal feedback on general practitioners' prescribing of pharmacotherapies for alcohol dependence. *Drug and Alcohol Dependence* 2012 (accepted 14 January).

27. Navarro HJ, Shakeshaft A, Doran CM, Petrie DJ. A multi-strategy community approach to reduce alcohol-related violent crime incidents: a cost-benefit analysis. Under editorial review.

Building research capacity in the alcohol field

The AARC project recruited and successfully trained four PhD and two Masters students, each of whom has continued to work in drug and alcohol research in a post-doctoral or post-graduate capacity. Two are now conducting alcohol-related research in the UK (one of whom has secured a lecturing position at a UK University), one was awarded an NHMRC Post-Doctoral Training Fellowship based in the public health department of a major Australian university, one is likely to secure a position with WHO in Geneva or Washington DC commencing in 2012, and one successfully applied for a post-doctoral position at NDARC, University of NSW. The specific topics of their research within the AARC project were as follows:

- Dr Dennis Petrie. *The economic impact of alcohol misuse in rural Australia.* School of Population Health, University of Queensland.
- Dr Alys Havard. *Targeting alcohol problems among rural Australian emergency departments: establishing an evidence base.* National Drug and Alcohol Research Centre, School of Public Health and Community Medicine, University of NSW.
- Dr Courtney Breen. *Alcohol consumption and related harms in regional communities: exploring individual and community factors.* National Drug and Alcohol Research Centre, School of Public Health and Community Medicine, University of NSW.
- Dr Hector Navarro. *Economic evaluations of interventions aimed at reducing alcohol misuse, dependence and alcohol-related violent crime at a community level in rural Australia.* National Drug and Alcohol Research Centre, School of Public Health and Community Medicine, University of NSW.
- Dr Alys Havard. *Measuring alcohol-related presentations to rural emergency departments.* Master of Public Health, University of NSW.
- Ms Elissa Wood. *Understanding underage drinking in Corowa.* Master of Applied Anthropology, Macquarie University.

6 Primary outcomes, recommendations and conclusion

KEY FINDINGS

1. AARC has demonstrated that the value of the benefits gained by community-action outweighs the cost of implementing it. The rigour of AARC's evaluation design provides a high level of reassurance that the effects are due to the interventions.
2. For future community-action efforts, increasing the extent to which the interventions are tailored to the specific types of risky consumption and harms in each community will most likely further improve effectiveness.
3. Having established that community-action is both effective and cost-beneficial, the next phase of community-action research ought to focus on identifying the combination of interventions that achieves reductions in alcohol-related harm most efficiently. A model that improves the level of integration between communities, governments and researchers to facilitate 'real time' evaluation of future community-action interventions is described.

Introduction

This final chapter considers critical issues in interpreting the results of the AARC project: the primary outcomes, including the extent to which they are likely to be due to the AARC intervention; improving the effectiveness of community-action; recommendations for future evaluation of community-action interventions; and conclusions.

Primary outcomes

The primary outcomes from AARC can be summarised as follows.

The benefits of community-action outweigh its costs

In the AARC version of community-action, the value of the benefits returned to the communities from the interventions was estimated at between $1.37 and $1.75 for every $1 invested.

The main effects of community-action are mixed

The AARC intervention achieved mixed outcomes. The statistical analyses showed that the experimental communities at post-intervention, relative to the controls, had:

- statistically significantly lower proportions of short-term high-risk drinkers (31% reduction) and significantly less alcohol-related verbal abuse (40% reduction);
- marginally significantly lower proportions of long-term risky drinkers (33% reduction), fewer alcohol-related street offences (32% reduction) and all types of alcohol-related crime (17% reduction), and more hospital inpatient admissions for alcohol abuse (69% increase); and
- no significant change in alcohol-related traffic crashes, assaults, malicious damage, short-term risky drinking, or hazardous/harmful consumption (measured using the AUDIT questionnaire).

The effects observed are most likely due to the intervention

It is most likely that the observed effects are due to the AARC interventions for a number of reasons. First, the effects of variables known to influence rates of alcohol harm, such as different population sizes, seasonal variation, and correlated data over time were controlled for by the highly rigorous and conservative statistical analyses used. Second, the effects of unknown or unmeasured variables that may also have influenced rates of alcohol-related harm were minimised by using an RCT evaluation design, which optimises the likelihood that such variables are randomly allocated between the experimental and control communities. Third, the pattern of results for the outcomes that used longitudinal data and showed some effect (street offences, total crime, and inpatient admissions for alcohol abuse and dependence) are consistent with the types and intensity of the interventions (Figures 3.1 – 3.4). Fourth, the five outcomes where the likelihood that they occurred by chance is less than or equal to 7% represent a mix of self-reported (n=3) and routinely collected data (n=2), as do the outcomes that are not statistically significant (n=2 and n=6, respectively), meaning it is unlikely that the results simply reflect the types of measures used.

This is not to argue that there is no effect from the measures: three of the five significant or marginally significant outcomes were self-reported measures, as were the two effects less than or equal to 5%. Rather, the most reasonable conclusion is that the interventions did impact positively on the AARC experimental communities and that using routinely collected data, relative to self-report, increases the difficulty of achieving a greater level of statistical significance. This increased difficulty is primarily due to the routinely collected data being available over a longer time period (2001 to 2009), rather than just pre- and post-survey data, which allows analyses to take into account patterns in the data over time which, in turn, increases the difficulty of separating specific intervention effects from general patterns over time. Since routinely collected data also represent harms of greater severity, since formal reporting of the incident or presentation was required, it may also be the case that community-action tends to impacts more on lower levels of harm, which were only able to be identified through self-report from randomly selected members of the AARC communities.

The relative potential of different interventions for use in community-action

The principal aim of AARC was to establish the benefit-cost of the combined effect of co-ordinated interventions, rather than the effect of any single intervention. Having achieved that aim, communities and policy makers are now likely to be interested in which combination of single interventions will be most effective and how these might be implemented most efficiently. The answers to those questions depend upon which specific types of harm are being targeted and the strength of the evidence supporting different intervention strategies relevant to those harms. This suggests the importance of establishing a catalogue of interventions specific to different types of alcohol harm from which communities are able to choose (see step two of the proposed integrated community action and evaluation model in this chapter). Although peripheral to its principal aim, the AARC project has provided evidence for a number of specific interventions (see Chapter 5), including: targeting high-risk weekends appears to be cost-beneficial in reducing violent crime; tailored feedback to GPs appears to be cost-effective in increasing their prescribing for highly alcohol dependent patients; and ED-based mailed feedback appears to be cost-effective in reducing consumption among risky drinkers. There is evidence from previous trials for the effectiveness of media advocacy, enforced

point-of-sale legislation, and police visibility, strategies that were fully or partially used in AARC to reduce rates of risky drinking and most likely alcohol-related crime. Systematic reviews of the research evidence conducted by AARC found little evidence for the following: school-based interventions as an effective community-level strategy; effective interventions that target high-risk young people; workplace-based strategies; and ED-based interventions. This is not to argue that no intervention relevant to these sub-populations or settings can be effective, merely that relevant, effective interventions are yet to be identified.

Taken together, the most reasonable interpretation of the AARC results is that community-action reduces rates of risky drinking in a defined community and some alcohol-related harms, and that the value of these outcomes outweighs the cost of implementing community-action. Nevertheless, there is clear potential to achieve further reductions in both risky consumption and harms by improving the effectiveness of the AARC version of community action.

Improving the effectiveness of community-action

It is likely that the AARC version of community-action could be improved in at least three ways: increasing the number of interventions implemented in a co-ordinated community-action approach; improving the extent to which interventions are tailored to specific drinking patterns or harms in a community; and the simultaneous implementation of complementary and effective policy initiatives beyond community action, especially regarding greater controls on alcohol availability.

Increasing the number of interventions in a community-action strategy

One possible way to improve the effectiveness of community-action would be to include a wider range of interventions than those implemented as part of the AARC project, although great care is required to ensure any additional interventions have some evidence for their likely effectiveness, or another clear rationale to justify their implementation. Implementing interventions that have insufficient evidence is likely to expend resources and effort without further reducing alcohol-related harm. In AARC, for example, communities ranked high-school interventions as their most preferred strategy, despite the relative lack of evidence for its effectiveness in reducing alcohol-related harm among young people. As a balance between its popularity and current evidence status, a high-school intervention was implemented as part of AARC, but it represented a very focused approach (providing young people with skills and strategies to use in high-risk situations when they are drinking) and was limited to a one-off interactive session to limit the resources required for its implementation. Current evidence published after the cessation of the AARC interventions suggests computer-based alcohol interventions delivered in secondary schools may be effective in reducing risky alcohol consumption among students [134].

A second option that communities could implement to potentially improve on the effectiveness of AARC would be to use the planning laws available to local governments to cap, or where possible reduce, the number and density of alcohol-outlets, given there is some evidence that more alcohol-related harm is associated with greater numbers and density of liquor outlets [98, 135-140]. Although care needs to be taken about the likely effect of this strategy – given this evidence typically derives from cross-sectional analyses and Chapter Two suggests mixed results for rural communities (e.g. more hotels/pubs is associated with more short-term risky drinkers and more crime, but fewer inpatient admissions for alcohol dependence) – there is unlikely to be a deleterious effect from capping or reducing the number or density of alcohol outlets in a defined community.

Relatively little rigorous evidence is currently available about which other types of interventions are likely to be both cost effective and able to be implemented by communities. The AARC project responded to this lack of evidence in four ways. First, systematic reviews of the existing literature were conducted in an effort to inform the AARC interventions, including reviews in the areas of school-based interventions [94], high-risk young people [141], workplaces [142] and hospital EDs [143]. Second, interventions that were popular with communities despite limited evidence for their effectiveness, such as the high-school intervention, were implemented using as few resources as possible. Third, some interventions were designed to allow their specific cost-effectiveness to be measured, such as the hospital ED-based intervention [86], in order to help increase the range of evidence-based interventions available for communities to use in the future. Fourth, detailed

analyses were undertaken of interventions that are known to be cost-effective in their own settings, such as SBI delivered by GPs, in order to establish their likely cost-effectiveness in improving community-level outcomes [29]. Again, the purpose of this process was to increase knowledge for future community-action efforts about which interventions are likely to be most effective in achieving specific outcomes and should, therefore, be prioritised.

Improving the level of tailoring of community-action interventions

An alternative method of improving the effectiveness with which community-action is implemented would be to increase the extent to which the interventions are tailored to the specific harms in each community. This is likely to improve the benefit-cost ratio of community-action given Chapter Two shows that rates of risky consumption and harm differ across communities. Although the effectiveness of interventions does not change with greater tailoring, focusing efforts on implementing interventions likely to achieve the greatest benefit optimises the return for effort and saves utilising resources on alternative interventions unlikely to achieve significant reductions in harm. This is not an absolute argument, in the sense that interventions unlikely to achieve optimally cost-effective returns should not be implemented at all, but a relative argument that encourages more data based, rational decision making about the appropriate mix of interventions. For example, although tertiary-stage clinical treatment for alcohol dependence is less cost-effective than more preventative interventions [11], it is an important component of the mix of interventions to ensure those who are highly alcohol-dependent have access to appropriate clinical services. Although AARC tailored interventions as much as was practicable, such as the high-risk weekend intervention that differed in each community, it was not possible to optimise tailoring of all interventions given the pragmatic time constraints of a research trial.

Implementation of policy initiatives beyond community-action

As well as more effective implementation of community-action interventions, the AARC project clearly highlights the potential for interventions beyond the scope of communities to implement themselves. It is possible that such interventions would actually reduce rates of risky alcohol consumption and harms, rather than simply preventing them from increasing. In other words, community-action by itself is largely able to limit increases in alcohol consumption and harms, but actually reducing those requires the implementation of broader cost-effective strategies. Evidence suggests the most cost-effective strategies are legislative, relating to taxation/price, advertising and greater controls on alcohol availability.

The critical argument here is that both community-action and broader legislative approaches are required. Community-action is cost-beneficial and allows communities to take ownership of the specific harms and risky patterns of drinking in their own communities. Legislative approaches are required because the effectiveness of community-action is limited by the broader legislative framework in which it operates: it would be unlikely that communities could achieve sustained reductions in alcohol-related harms, for example, if government legislation had the effect of making alcohol more affordable, more widely marketed, or more available over time. It would be self-evidently unreasonable to expect community-action alone to be optimally effective in the absence of adequate controls on pricing, advertising and availability. The specific types of controls and policies that governments could implement are clearly beyond the scope of this report and have been analysed in detail elsewhere, but are likely to include volumetric taxation, advertising bans, supporting the uptake of SBI in primary care settings, stronger licensing controls (particularly for closing times) and strategies aimed at reducing drink driving deaths, such as mass media campaigns, random breath testing and zero alcohol content for younger drivers [11, 95, 102, 144].

Future evaluation of community-action interventions

AARC is one model of evaluating community-action. It was a highly appropriate evaluation model because the primary aim was to establish if the benefits of community-action outweigh its costs. Having now established that evidence, the next iterations of community-action evaluation ought to focus on questions about which combination of community-action interventions is most cost-effective and how these can be most efficiently implemented. For this subsequent phase of effort, the AARC evaluation model is limited for a number of reasons: clustered RCTs are time and resource intensive; it is arguable whether the highest possible level of evidence is necessary to inform all alcohol policies and practice; and no matter how evidence-based the interventions that are evaluated might be, they are of marginal practical relevance if they do not align with current community or policy objectives. An alternative model is to achieve greater integration between policy makers, community-action and evaluation. A possible model is outlined as follows.

An integrated community action and evaluation model

Given that AARC provides the most rigorous and compelling evidence to date that the benefits of community-action outweigh its costs, a next critical iteration of research effort is to design a model for ongoing implementation and evaluation of community action. The following model comprising five key components is proposed. This model allows ideas and information to flow-up from communities, as well as being provided to them from experts and governments, which is an important consideration given the relative lack of evidence about effective interventions to date.

1. Make data on alcohol-related harms, based on routinely collected data, available to all communities via the internet, as well as costs data. This achieves two purposes: it allows communities to identify the greatest harms in their community (given AARC has shown these vary); and builds the capacity of communities to evaluate the effects of the community-action initiatives they implement. There are models for this type of data provision from Canada and the US, and examples of more basic data provision in Australia (e.g. BOCSAR reports in NSW [26]). The data made available to communities could readily be based on the measures developed in AARC.
2. Establish a regularly updated and easily searchable catalogue of 'what works' in reducing alcohol-related consumption and harms, so that communities have the capacity to adapt effective interventions to their own communities. A catalogue of options is important because the combination of individual interventions selected will depend on what harm is being targeted and the level of resources communities have to activate their own intervention efforts. This catalogue would be populated and updated over time by reviews of evidence (of which AARC completed five) and/or evidence from individual trials (AARC, for example, has provided clear evidence in a number of areas, as summarised in Chapters Three, Four and Five). This process of summarising research evidence is relatively straightforward for research centres such as NDARC. The catalogue could include generic domains (e.g. the importance of media advocacy and feedback to key stakeholders) and specific domains, including: improving treatment for problem drinkers; improving treatment for alcohol-dependent patients; strategies for high-risk young people; school-based interventions; reducing average levels of alcohol consumption; reducing occasions of intoxication; increasing workplace safety; increasing street/night-time safety; and reducing domestic violence.
3. Build 'hubs' of expertise in regions so that communities have ready access to the skills to utilise the infrastructure provided in components one and two. This could comprise a series of expert-run workshops with regional universities, rural medical schools and police Local Area Commands to build adequate skills in statistical analysis and evaluation design that communities can access. Alternatively, it could be project specific, such that a hub is established in conjunction with the design and implementation of an intervention selected by communities. These hubs would be feasible to establish given there are sufficient people in communities who either have these types of skills already or have the capacity to learn

them. These local experts would then work with communities to conduct relatively basic but adequate evaluations, with access to high-level expertise when required at critical stages of the evaluation process. Practical evaluation designs have been described in detail in the peer-review literature, including by the authors of this report [145]. The implementation of interventions, and their evaluation, could be funded through competitive government community grant schemes. The formation of hubs would provide a mechanism for communities to access the requisite skills to write competitive grant applications.

4. The most promising of these routinely implemented intervention strategies, evaluated by local hubs of expertise, could then be subjected to larger-scale, more rigorous evaluation by research experts. In this sense, the routinely evaluated interventions could become a series of pilot-type trials that provide practical benefits to both communities and the scientific research community. The approach would provide a filter mechanism, so that only the most promising ideas are evaluated more rigorously in expensive and time-consuming RCTs.
5. The most cost-beneficial interventions, or combinations of interventions, the potential of which would have been identified by local hubs of expertise and confirmed by independent public health researchers, could then become routinely supported and funded by governments. This would ensure the programs and clinical services that become entrenched into routine practice have an adequate level of research evidence for their benefits and costs.

Conclusion

Communities represent complex systems in which individuals' decisions about their average weekly drinking, consumption on one occasion and drinking in high-risk situations (such as drink-driving and during pregnancy) are all determined by a number of complicated inter-related influences. As demonstrated in Chapter Two, these influences include demographic variables, such as age and gender, and community-level characteristics, such as per capita rates of hotels/clubs and the level of socio-economic advantage, as well as a range of other potential influences that are difficult to measure, such as retail and industry marketing strategies, and genetic, familial and cultural factors.

Despite this complexity, the results from the previously largest community-based alcohol trial conducted in the US concluded that community prevention efforts can reduce alcohol-related injury and accidents, although the authors noted that their non-random selection of communities meant that assessing whether this conclusion would be true in other communities beyond their study would require a much bigger community-action trial [22]. AARC is now the largest and most methodologically rigorous alcohol community-based trial undertaken internationally, and it has clearly shown, for the first time, that the costs of implementing community-action is outweighed by its benefits. That the combination of AARC interventions impacted more on some outcomes than others reflects both the specific types of interventions implemented as part of AARC and highlights the importance of adopting a comprehensive approach to reducing alcohol harms: local governments and their communities, either regional or urban, are able to produce some outcomes but they need to be supported by commitments from the Australian and State/Territory Governments to achieve complementary reductions in hospital admissions and traffic crashes. Given the high cost of both crashes and inpatient treatment, governments ought to be very interested in the cost-savings that reducing these would achieve.

Finally, whatever combination of community-action interventions and government policies is formulated in future, it is critical that it be evaluated in real time to minimise wasted resources and effort. One possible model for achieving this outcome is proposed.

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ISBN: 978-0-9874003-3-8

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