Australian Alcohol Indicators, 1990-2001

Patterns of alcohol use and related harms for Australian states and territories

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by

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Executive Summary

National Alcohol Indicators for Australia, 1990 to 2001

- This report presents health, road safety, industry and survey data to describe trends in risky alcohol use and serious alcohol-related harms for all Australian states and territories. It has been guided by principles set out in the World Health Organization's *International Guide for Monitoring Alcohol Consumption and Related Harm* (WHO, 2000).

- Trends in alcohol-caused deaths and hospitalisations for all states and territories have not previously been reported using consistent and comparable methods. A comparison between levels of risky alcohol use reported in the 1998 and 2001 National Drug Strategy Household (NDSH) surveys is also presented for the first time.

- The present report builds on and updates five earlier Statistical Bulletins from the National Alcohol Indicators Project (NAIP) concerning alcohol-caused deaths and hospitalisations, road crashes, alcohol-related violence and levels and patterns of drinking in Australia.

National trends and patterns of alcohol use

- The average Australian aged 15 and over consumed 9.32 litres of pure ethanol in the financial year 2000/01. Australia is ranked 23rd for its per capita alcohol consumption among the 58 countries included in *World Drink Trends* (2003).

- Per capita alcohol consumption has remained stable for the past 10 years, following a significant decline in the early 1990s. While wine and spirit consumption has increased in the last decade, full strength beer consumption has declined. Slightly more than half of all alcohol consumed in Australia is still some form of beer, mostly beer with more than 4.5% alcohol by volume.

- As shown in Figure 1, of all the alcohol use reported to the 2001 NDSH Survey, 61% was drunk on days when the NHMRC Australian Alcohol Guidelines for minimising *acute* harm were exceeded (i.e. men drank more than six standard drinks and women more than four). Spirits (both neat and premixed), *regular* strength beer and fortified wine were the beverages most likely to be drunk on such days.

- Eighty five percent of total consumption by females aged 14 to 17 years and 18 to 24 years was drunk at a risky or high risk level for *acute* harm, for males aged 14 to 17 years the estimate of such drinking was also high at 80%.

- Furthermore, 44% of all alcohol reported to the 2001 NDSH Survey was drunk by people who exceeded NHMRC guidelines for avoiding problems from the *chronic* effects of alcohol (i.e. an average of no more than four drinks per day for men and two for women).

- The different survey methods used to provide these estimates only accounted for between a half and three-quarters of known alcohol sales i.e. there was considerable under-reporting. A conservative estimate is that at least 80% of all alcohol consumed in Australia in 2001 put the health and safety of drinkers at risk of acute and/or chronic harm.

- It was estimated that 23% of all males and 18% of all females aged 14 years or more drank at risk levels for *acute* harm at least once a month. Persons aged less than 25 years, especially females, were most likely to drink this way. A smaller proportion of Australians aged 14 years and over put themselves a risk from the long-term or *chronic* effects of alcohol: 10% of males and 9% of females.

- While not previously reported, some comparable data were collected on patterns of alcohol use in the 1998 and 2001 NDSH surveys. Overall levels of risky/high risk use were similar between these years. For both men and women aged 14 and over, about 9% consistently drank in excess of NHMRC guidelines for harm from the *chronic* effects of alcohol.

- A striking increase was observed in the percentage of girls aged 14 to 17 years drinking at risky or high risk levels for long-term harm (i.e. an average of more than 2 drinks per day): a rise from 1% in 1998 to 9% in 2001. By contrast, males aged 18 to 24 years were less likely to drink at risky or high risk levels: dropping from 9% in 1998 to 6% in 2001.

- Alcohol-caused hospitalisation rates for these age groups confirmed these observed changes in drinking patterns. From 1998/99 to 2000/01 rates of these for females aged 15-19 years and 20-24 years also increased by about 4% and 7% respectively. Conversely, male rates of hospitalisation from 1998/99 to 2000/01 fell for both 15-19 (9%) and 20-24 year olds (10%).

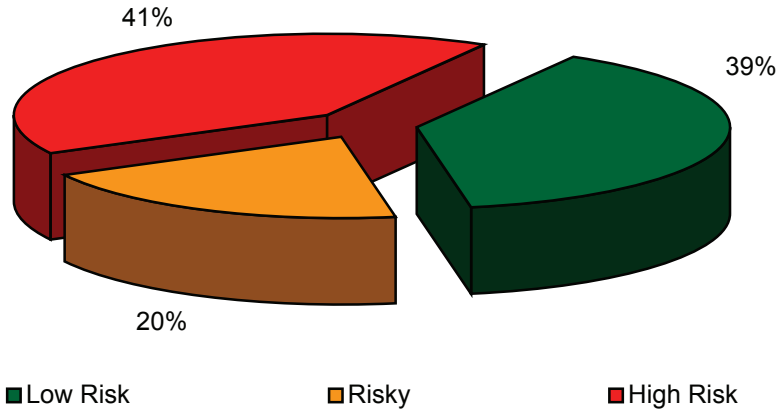


Figure 1:
Percentage of alcohol consumed at low, risky and high risk levels for acute (e.g. injury) harm in Australia, 2001

National trends in alcohol-caused deaths

- At least 40 potentially fatal conditions are caused in whole or in part by alcohol. These include various cancers, liver disease, falls, road injuries and child abuse. Alcohol consumption, mostly at low levels, is also thought to have a protective effect against four conditions (ischaemic heart disease, hypertension, stroke and cholelithiasis). For each condition the extent of alcohol causation (or 'alcohol aetiologic fraction') was calculated separately for each state and territory and for each year considered using the 2001 NDSH Survey, estimates of per capita alcohol consumption and other epidemiological data (see Chikritzhs *et al*., 2001; Chikritzhs *et al*., 2002a).

- In the ten year period between 1992 and 2001, an estimated 31,133 Australians died from risky and high risk alcohol use. Of these, 23,430 (75%) were male and 7,702 female (25%).

- The leading causes of death were alcoholic liver cirrhosis (6,825), road crash injury (5,489), cancer (2,874) and suicide (2,495). More people died from the acute (16,756) than long term or chronic effects of alcohol (14,377), reflecting the more common pattern of drinking to intoxication.

- As shown in Figure 2, the trend in total alcohol-caused deaths between 1990 and 2001 was similar to that for adult per capita consumption with a marked fall in the early 1990's followed by only a slight decline after 1992. This pattern of decline over the study period was evident for all age groups.

- Trends for wholly alcohol-caused deaths (e.g. alcoholic liver cirrhosis) as well as in alcohol-caused road fatalities also closely followed adult per capita consumption of alcohol between 1990 and 2001.

- Deaths from acute causes were more common among young people, particularly those aged between 15 and 29 years, while deaths from chronic effects of alcohol were more common among those aged over 45 years.

- Rates of alcohol-caused deaths were consistently higher for residents of non-metropolitan than metropolitan areas (2.24 versus 1.67 per 10,000 persons aged 15 or over).

National balance of lives lost and lives saved

- Against the estimated 31,133 deaths, alcohol consumption *above* levels recommended by NHMRC was also estimated to have prevented 3,576 deaths between 1992 and 2001. This was mostly due to the assumed protective effects of alcohol against cardiovascular disease.

- Cardiovascular protection is thought to be greatest at *light* consumption levels - up to one drink a day for women and 2 for men being optimal (NHMRC, 2001). Many more deaths would have been prevented if all Australians drank within the NHMRC guidelines for low risk drinking.

- It was estimated that in 2001 alone, 6,193 premature deaths were *prevented* due to the protective effects of *low-risk* alcohol consumption. Low risk consumption was also estimated to *cause* 2,050 deaths, mainly from cancers. The net benefit of low-risk consumption was therefore estimated to have been 4,143 deaths prevented (917 male, 3,226 female) with an average of 7 years of life saved per person.

- In marked contrast, risky and high risk drinking was estimated to cause 3,004 premature deaths (2,272 male, 732 female) and prevent only 319 deaths (185 male, 134 female) in 2001. This amounts to a net loss of 2,685 lives at an average of 18.1 years of life lost per person

- The overall net benefit from low-risk alcohol use was estimated to be 29,138 years of life *saved* compared with 48,703 net years of life *lost* from risky or high risk drinking, an overall net loss from all alcohol consumption of 19,565 years of life.

- It can be concluded that low-risk drinking appears to chiefly benefit women aged over 45 years of age while risky and high risk drinking mostly takes the lives of men, both young and old. Furthermore, the markedly different outcomes between low risk and riskier consumption levels are more significant than the final *net* balance sheet for all drinking patterns combined.

National trends in alcohol-caused hospitalisations

- As with alcohol-caused deaths, the aetiologic fraction approach was used to estimate the extent of alcohol-caused hospitalisations with adjustments being made for each state and territory and for each year to reflect variations in the extent of risky and high risk alcohol use.

- Reliable data on completed hospital episodes were only available nationally from the financial year 1993/94 onwards.

- Over half a million completed hospital episodes (577,269) were estimated to have been caused by risky or high risk drinking in Australia in the eight years between 1993/94 and 2000/01.

- Nearly 70% of all alcohol-caused hospital episodes were for acute conditions, mostly injuries, caused by occasions of intoxication. The most common specific diagnoses were alcohol dependence (87,186), injuries caused by violence (76,115), road crash injuries (47,167) and alcoholic liver cirrhosis (26,592).

- Rates of alcohol-caused hospitalisations were consistently higher for residents of non-metropolitan (48.4 per 10,000) than metropolitan areas (37.0 per 10,000).

- As shown in Figure 2, unlike trends observed for per capita consumption and alcohol-caused deaths during this time period, rates of alcohol-caused hospitalisations steadily increased in Australia between 1993/94 and 2000/01.

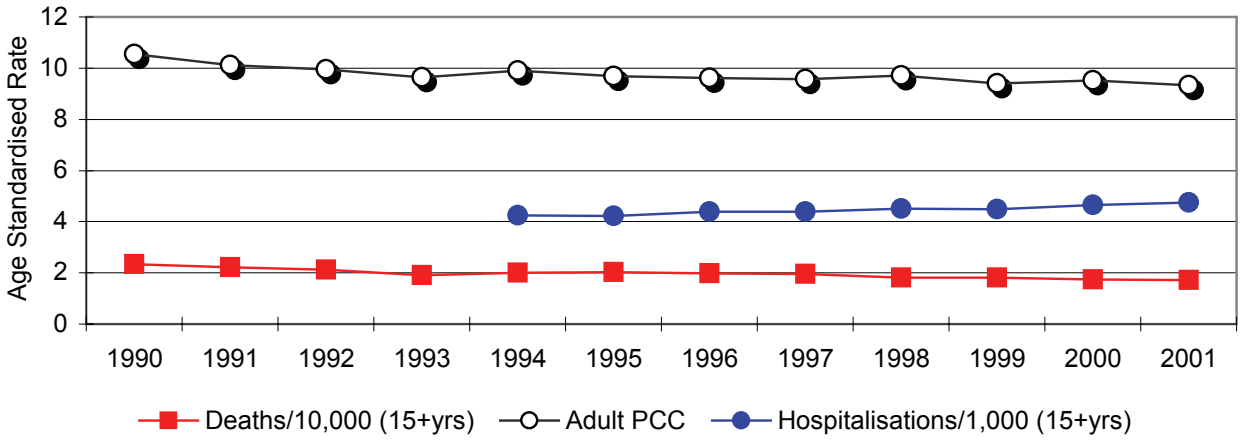


Figure 2:
Trends in age standardised rates of alcohol-caused deaths (per 10,000 adults) and alcohol-caused hospitalisations (per 1,000 adults) due to risky and high risk drinking and adult per capita alcohol consumption (PCC) in Australia, 1990-2001

State and Territory variations in alcohol use and related harms

- Between 1991/92 and 1995/96, the Northern Territory had the highest level of per capita alcohol consumption estimated from liquor licensing returns while Victoria and Tasmania had the lowest.

- Only Western Australia, Northern Territory and Queensland have collected wholesale alcohol purchases data since 1995/96 due to a 1997 High Court ruling disallowing the collection of state tobacco and alcohol taxes.

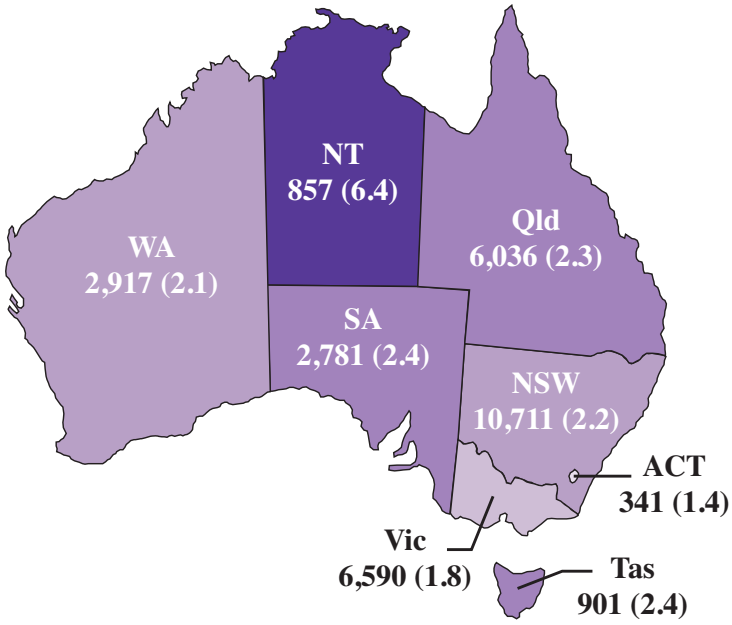
- Western Australia was the only state to show an overall increase in per capita consumption between 1991/92 and 2000/01.

- The Northern Territory had the highest percentages of people aged 15 years or older who drank at risky or high risk levels for acute harm (30% at least monthly) and also chronic harm (17.7%) in 2001. Consistent with the above per capita consumption data, Western Australia and Queensland were ranked in the top four jurisdictions on these measures.

- In all states and territories between a half and two-thirds of all the alcohol use reported to the 2001 NDSH Survey occurred on days when men drank more than six standard drinks and women more than four standard drinks i.e. above low risk guidelines for avoiding acute harm. This figure ranged from 53.4% for the Australian Capital Territory up to 69.1% for Tasmania.

- The Northern Territory consistently had the highest alcohol-caused death and hospitalisation rates of all jurisdictions. Western Australia and Queensland also had high rates of alcohol-caused deaths and hospitalisations compared to other states.

- As shown in Map 1, in terms of numbers of estimated alcohol-caused deaths from 1992 to 2001 (10 years), New South Wales had 10,711, Victoria 6,590, Queensland 6,036, Western Australia 2,917, South Australia 2,781, Tasmania 901, Northern Territory 857 and the Australian Capital Territory 341.



Map 1:
Estimated number of alcohol-caused deaths and crude rates/10,000 (15+yrs) due to risky and high risk drinking in Australian states and territories over ten years, 1992-2001

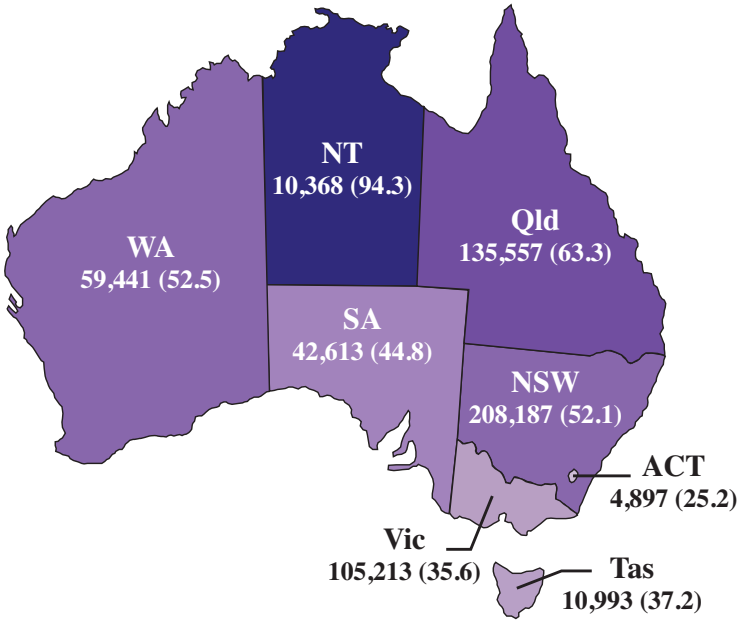
- For most jurisdictions, the trend in total alcohol-caused deaths followed the trend in per capita consumption.

- For most jurisdictions, there was a swift decline in both per capita consumption and alcohol-caused deaths in the early 1990's, followed by continued but slower declines.

- Western Australia and Queensland showed evidence of both increasing consumption and limited evidence of decline in alcohol-caused deaths until the mid 1990's.

- Trends in hospitalisation rates between 1993/94 and 2000/01 showed gradual increases for all jurisdictions with the exception of Queensland where rates were stable.

- Map 2 shows that in terms of numbers of estimated alcohol-caused hospitalisations between 1993/94 and 2000/01 (8 years), New South Wales had 208,187, Queensland 135,557, Victoria 105,213, Western Australia 59,441, South Australia 42,613 Tasmania 10,993, Northern Territory 10,368 and the ACT 4,897.



Map 2:
Estimated number of alcohol-caused hospitalisations and crude rates/10,000 (15+yrs) due to risky and high risk drinking in Australian states and territories over eight years, 1993/94-2001/02

- Tasmania showed the largest percentage increase in alcohol-caused hospitalisations between 1993/94 and 2000/01.

Conclusions and Recommendations

- Alcohol consumption in excess of the NHMRC Australian Alcohol Guidelines is the norm in Australia with the great majority (at least 80%) of all alcohol being consumed in ways that put the drinker at risk of acute and/or chronic alcohol-related harm.

- While per capita alcohol consumption has been relatively stable since 1993, there have been recent fluctuations in drinking patterns among younger Australians with teenage girls aged 14 to 17 greatly increasing their consumption and men aged 18 to 24 decreasing their consumption.

- Levels and trends in per capita consumption are unknown for New South Wales, Victoria, South Australia, Tasmania and the ACT after 1995/6 as these jurisdictions opted to cease collecting the necessary wholesale alcohol sales data after that year. Per capita consumption was increasing in Western Australia, stable in the Northern Territory and decreasing in Queensland between 1995/96 and 2000/01.

- The toll in Australia from risky and high risk alcohol use has been substantial with an estimated 31,133 deaths from 1992 to 2001 and 577,269 hospitalisations between 1993/94 and 2000/01. By contrast, *low risk* alcohol use was estimated to have prevented at least 6,000 premature deaths per year during this period, mostly among elderly Australians.

- Rates of alcohol-caused death and hospitalisation were higher in non-metropolitan than metropolitan areas, in the Northern Territory and, though to a lesser extent, also in Western Australia and Queensland. The bulk of this alcohol-attributable harm was associated with the effects of intoxication.

- Nationally, there was a gradual downward trend in alcohol-caused deaths for all age groups between 1990 and 2001, most evident among men. By contrast there was an overall increase nationally in recorded alcohol-caused hospitalisations which was most pronounced in Tasmania.

- In most comparisons made across different places and times, trends and levels in per capita alcohol consumption were closely associated with those for alcohol-caused deaths.

- It is recommended that consistent and comparable monitoring of indicators of serious alcohol-attributable harms continue to occur. This will enable states and territories to better target harm reduction and prevention programs and also to evaluate their effectiveness. It is recommended that methods previously established by the NAIP group for applying these indicators for policy evaluation purposes be applied (e.g. Stockwell *et al*, 2001).

- It is also recommended that future epidemiological and economic studies of alcohol-caused harm report the costs and benefits associated with different patterns of alcohol use *separately* and do not report *net* effects. In particular, estimated lives saved and lost should be reported separately *both* for low risk and for risky/high risk drinking patterns as defined by NHMRC (2001).

- The National Alcohol Indicators Project is currently investigating the feasibility of extending the indicators of alcohol-related harm so that they are applicable to Indigenous Australians.

Part I: Introduction and methods for measuring alcohol-related harms and consumption

1. Introduction

The following introductory section provides an overview of the contents of this 6th National Alcohol Indicators Project (NAIP) report and gives a brief summary of the project aims and previous NAIP reports. Definitions of the terminology used and the rational for a focus on problem drinking (risky and high risk drinking) in this report have also been provided.

1.1 About this report

In this report Australian health statistics and data from a survey of Australian drug use have been used to describe trends in alcohol consumption and related harm for all states, territories and the nation as a whole from 1990 to 2001. This is the first time this has been achieved for an Australian population. The methods employed build partly on the strong tradition of Australian alcohol epidemiology developed by Holman and Armstrong (1990), continued by English and colleagues (1995) and updated most recently by Ridolfo and Stevenson (2001). These previous studies have provided snapshot estimates of alcohol-caused mortality and morbidity in Australia at different points in time. Unfortunately these various estimates were each based on different sets of assumptions and methods thus precluding meaningful comparison between them. The present report provides not only a snapshot of recent Australian drinking patterns and associated harms in 2001 but also describes trends in these over a 12 year period for all Australian jurisdictions. In order to report trends over time a refined set of methods were applied following principles set out in the World Health Organization's *International Guide for Monitoring Alcohol Consumption and Related Harm* (WHO, 2000).

This is the sixth statistical summary report produced by the National Alcohol Indicators Project, a collaboration between the National Drug Research Institute, Perth and the Epi-Centre, Turning Point Alcohol and Drug Centre Incorporated, Melbourne. Previous bulletins and technical reports

have developed methodologies and estimates for specific indicators of serious alcohol-related harm and risky drinking practices: alcohol-caused deaths and hospitalisations to 1997 (Chikritzhs *et al*., 1999), alcohol-related road trauma to 1997 (Chikritzhs *et al*., 2000), patterns of risky alcohol use in 1998 (Heale *et al*., 2000), trends in per capita alcohol consumption to 1998/99 (Catalano *et al*., 2001) and trends in alcohol-related violence up to 2000/01 (Matthews *et al*., 2002). The rationale for the application of health statistics to the development of indicators of alcohol-related harm was developed in close consultation with other researchers who have conducted rigorous epidemiological estimates of alcohol-caused death, injury and illness both in Australia and overseas and is described more fully both in the WHO *International Guide* mentioned above (WHO, 2000) and in Chikritzhs *et al*. (2002a).

1.2 The National Alcohol Indicators Project (NAIP)

The main aims of the National Alcohol Indicators Project (NAIP) have been to (i) develop a set of core indicators of serious alcohol-related harm applicable to all Australian jurisdictions, (ii) use these to monitor levels of harm over time, and (iii) apply these indicators to the evaluation of the impact of policies with the potential to improve or worsen the levels of these harms. Future directions for the project will involve the development of indicators that focus on trends in alcohol-related harm among Indigenous Australians, their application to economic cost estimates for individual jurisdictions as well as for further evaluations of major policy initiatives. To date, the NAIP indicator methodology has been applied in an estimate of the health and economic benefits of the Northern Territory's *Living With Alcohol* program (Chikritzhs *et al*., 1999; Stockwell *et al*., 2001).

An optimal national monitoring system is one in which the main data sets have synergies and complementary features (WHO, 2000). The NAIP group has been fortunate to be able to develop these to some degree by contributing to the design of questions on alcohol consumption utilised in the 2001 National Drug Strategy Household Survey (AIHW, 2002). This has resulted, for example, in improved estimates of self-reported alcohol consumption. The efficacy of these improved methods can be measured by their ability to account for known per capita alcohol consumption levels – the new self-report method used in 2001 accounted for over 78% of per capita alcohol sales in that year, compared with only 46.5% in 1998 (Stockwell *et al*., in press). It has also resulted in improved estimates of the proportions of different age and sex groups who drink in excess of the NHMRC Australian Alcohol Guidelines (NHMRC, 2001). These estimates have been used in calculating rates of alcohol-caused death, injury and illness from health data. Another synergy developed between data sets by NAIP has been the use of per capita alcohol consumption estimates from liquor licensing data to estimate state- and territory-specific alcohol aetiologic fractions i.e. the proportions of key causes of death (such as road injury) that are themselves caused by excess alcohol consumption.

1.3 Terminology

The terms 'low risk, risky and high risk' drinking are used throughout this report as defined by the new NHMRC drinking guidelines (NHMRC, 2001) both in estimates of alcohol-caused mortality and morbidity and also estimates of the extent of risky drinking patterns. These replace the earlier

terms 'low risk, hazardous and harmful' drinking previously used by the NHMRC (e.g. NHMRC, 1992) and employed in previous epidemiological studies (e.g. English *et al*., 1995).

Data obtained from the AIHW on hospital admissions are in fact records of 'hospital separations', that is, numbers of people discharged or transferred from hospitals. However, for this report, hospital separations have for brevity been referred to as 'hospitalisations'.

1.4 Focus on 'risky' and 'high risk' drinking

A controversial aspect of alcohol epidemiology concerns estimations of the purported benefits of alcohol consumption at low risk levels, mainly thought to protect against cardiovascular disease. In this report estimates will be made of the number of premature deaths and illnesses attributable to low risk drinking using current assumptions about protective effects (see Ridolfo and Stevenson, 2001). Separate estimates will be provided of the costs and benefits associated with a) low risk drinking and b) risky/high risk drinking, each compared with abstinence from alcohol (see Section 2.2). The benefits of low risk drinking can be largely seen as the converse of the costs of risky and high risk drinking. There are, however, lives lost due to 'low risk' alcohol consumption as well as a few lives saved by risky consumption. These complexities will be fully reported at the national level here as an aid to balanced national alcohol policy development. Otherwise, the main focus of the present report is on trends in *net* levels of death, injury and illness caused by risky and/or high risk patterns of alcohol use.

The rest of this report provides brief summaries of how the various indicators were derived from the source data. National levels of risky consumption and related harms are then reported as well as trends from the early 1990s. This is followed by an examination of the costs and benefits of alcohol consumption over recent years. Levels of risk and harm are then reported for individual states and territories in addition to recent trends. Finally, conclusions are presented regarding the overall extent of risky alcohol use and harm, variations in this over time and for different jurisdictions.

2. Methodology

The following is a set of descriptions of the methodologies applied to derive the various measures used in this report. Full methodological details can be found in earlier technical reports (Chikritzhs *et al*., 2000a), the World Health Organisation guide for monitoring alcohol consumption and related harms (2000) and various published papers (e.g. Chikritzhs et al., 2001; Chikritzhs et al., 2002a) and can be obtained from the National Drug Research Institute at GPO Box U1987, Perth, WA 6845 or email requests to: enquiries@ndri.curtin.edu.au

2.1 Data sources

The main data sets used in this report were as follows:

- The 1998 and 2001 National Drug Strategy Household Surveys (AIHW, 1999; AIHW, 2002)
- Mortality data from the Australian Bureau of Statistics, 1990 to 2001
- Hospitalisation data for all states and territories from the Australian Institute of Health and Welfare from 1993/1994 to 2000/01, with the exception of Victoria where morbidity records were not available for 2000/01

- Data on alcoholic beverage consumption from the Australian Bureau of Statistics (ABS) and the Distilled Spirits Industry Council of Australia (DSICA)

- Wholesale alcohol sales data from individual Liquor Licensing Departments for all jurisdictions from 1990/91 until 1995/96 and for Western Australia, Northern Territory and Queensland for some of the intervening years up to 2001/02

Unfortunately, the unique Australian data on wholesale alcohol sales which enable local and regionally specific information on per capita consumption of various alcoholic beverages is no longer complete. Interestingly, those jurisdictions with the highest levels of alcohol consumption (and related harms) are the only ones to continue their collection. These data have been essential for the evaluation of licensing restrictions in Indigenous communities (e.g. Gray, 2000) as well as for numerous local, regional and jurisdiction-wide monitoring exercises (e.g. Stockwell *et al*., 1998; Catalano *et al*., 2001). In the present study, accurate trends in population levels of alcohol consumption after the financial year 1995/1996 were only possible for Western Australia and the Northern Territory (Queensland has only recently re-started data collection).

2.2 Estimating alcohol-caused deaths and hospitalisations

This report relies on the 'aetiologic fraction' method for calculating alcohol-caused deaths and hospitalisations. This report also follows current methodological recommendations and guidelines for reporting on estimates of alcohol-caused mortality and morbidity recently described in a consensus paper by a consortium of Australian alcohol-researchers (Chikritzhs *et al*., 2002).

The population aetiologic fraction for a particular illness or injury caused by low, risky or high risk drinking is the proportion of cases with that condition in the population that can be attributed to such drinking. Since routinely collected morbidity and mortality data provide no information about each individual's alcohol consumption, the only way to calculate the total number of alcohol-caused illnesses or injuries in a population is to multiply the number of people with each particular condition by the alcohol population aetiologic fraction specific to that condition, then to sum the results. For some conditions (such as alcoholic liver cirrhosis and alcohol dependence), the alcohol population aetiologic fractions are 1, because such conditions are - by definition - wholly attributable to alcohol. For other conditions (e.g. assault, road crashes and stroke) the alcohol population aetiologic fractions are less than 1, because they are only partially attributable to alcohol. In these instances, the population aetiologic fraction is a function of both the strength of the causal relationship between a particular level of drinking and the condition (measured as a 'relative risk') and the prevalence of 'at risk' drinking levels in the population. Since a relative risk represents the ratio of the incidence rates for a particular condition in 'exposed' compared to 'unexposed' persons, its actual value and the interpretation applied to it, depends on which alcohol consumption levels are chosen as 'exposed' (e.g. low, risky and high risk drinkers or all drinkers) and 'unexposed' (e.g. abstainers). In keeping with recommendations by Chikritzhs and colleagues (2002a), this report uses non-drinkers (i.e. abstainers) as the 'unexposed' or 'reference' group. The aetiologic fractions applied are therefore based on different relative risk estimates than those presented in previous reports where low risk drinkers have provided the reference group (e.g. English *et al*., 1995, Chikritzhs *et al*., 2000).

English *et al*. (1995) and more recently, Ridolfo and Stevenson (2001) provided estimates of alcohol aetiologic fractions for Australia using national levels of drinking prevalence. They identified about 40 conditions for which there was sufficient research evidence to support a causal relationship with alcohol consumption. However, their reports show snap shots of estimated numbers of alcohol-caused deaths and hospitalisations for selected years at a national level only. For this report, one of the main aims was to present trends in rates of harm over time and to present that information in such a way as to allow comparisons between states and territories. It was therefore essential that aetiologic fractions were based on both state and year specific levels of drinking prevalence. This is especially important as there have been significant changes in drinking patterns in Australia during the period in question (Heale *et al*., 2002) and because there are substantial differences in levels of consumption between Australian jurisdictions (Catalano *et al*., 2001).

Estimates of the state-wide prevalence of drinking in 2001 were derived from the 2001 National Drug Strategy Household Survey (AIHW, 2002) (specifically from Graduated Frequency questions). The prevalence of drinking levels for the remaining years were then estimated using jurisdictional information on adult per capita alcohol consumption presented in Catalano *et al* (2001) and where no data was available, national adult per capita consumption estimates supplied by the Distilled Spirits Industry Council of Australia were used (DSICA, 2002).

Alcohol aetiologic fractions specific to each condition, state, year, sex and age group were then applied to mortality and morbidity data. However, a major complication was the introduction of the 10th Revision of the *International Classification of Diseases and Related Health Problems* (ICD-10) to Australian mortality and morbidity records in the late 1990's. The structure of the ICD-10 coding system is dramatically different to the ICD-9 version that had been in place for many years. This has lead to problems with compatibility between the two versions, particularly where the aim is to track trends or compare changes over time. Unfortunately, concordance between the two systems is not straight-forward and considerable time was spent in developing optimal translation strategies (see Chikritzhs *et al*., 2002) so that estimates throughout the period under consideration were comparable.

Alcohol-caused road crashes

Alcohol population aetiologic fractions for road crashes have been most recently updated by Ridolfo and Stevenson (2001) where they provide separate estimates for hospitalisations and deaths as well as for pedestrians and non-pedestrians involved in road traffic accidents. The development of individual aetiologic fractions for these different categories was a significant development. However, the alcohol aetiologic fractions provided by Ridolfo and Stevenson (2001) were based on prevalence estimates derived from breath and blood alcohol levels (BACs) of seriously injured persons in 1996 at a national level. These data were obtained from the Australian Transport and Safety Bureau (ATSB). These estimates of population alcohol aetiologic fractions for traffic injuries were therefore not jurisdiction or year specific.

Observing the Ridolfo and Stevenson (2001) method for providing separate fractions for the four categories of traffic injuries, estimates of alcohol-caused road deaths and hospitalisations in this report were based on year and state/territory specific alcohol aetiologic fractions. This was achieved by deriving jurisdiction specific levels of driver and pedestrian drinking prevalences from

BACs recorded for serious road injuries (obtained from the ATSB) and then adjusting each year by changes in per capita alcohol consumption.

However, unlike Ridolfo and Stevenson (2001) where low risk drinkers were identified as the reference group (i.e. BACs >0-0.05), for this report, and in keeping with all other alcohol-related conditions examined here, only road crashes where the driver or pedestrian registered a '0' BAC were considered to be 'unexposed'.

Distinctions between Acute and Chronic conditions

This report distinguishes between 'acute' and 'chronic' alcohol-related conditions. Chronic conditions are those that tend to develop over many years of alcohol misuse (e.g. oropharyngeal cancer, chronic gastritis) and reflect degenerative disease states. Acute conditions are generally those that result from episodes of drinking to intoxication (e.g. assault, road injury, drowning). These distinctions also relate to NHMRC drinking guidelines that provide separate recommendations for regular drinking and single drinking occasions (NHMRC, 2000) and were recommended by the WHO *International Guide* (WHO, 2000) and Chikritzhs *et al*. (2002a). While it is acknowledged that some causes of death (e.g. suicide, stroke) can be attributed both to acute and chronic risky/high risk drinking patterns, in the main the conditions used in these estimates can be broadly classified into those in which alcohol contributes causally by virtue (mainly) of episodes of intoxication (acute) and those in which alcohol consumption contributes to disease as a consequence (mainly) of long-term alcohol misuse (chronic). In some areas of this report further sub-categories have also been used, such as; cancer, cardiovascular disease, road crash injury and assault. Condition lists for all categories can be found in Appendix A.

Deaths and hospitalisations are registered by the individual state or territory where the event occurred and collated at a later date by the ABS and the AIHW according to the registering jurisdiction. However, occasionally, individuals require hospitalisation or indeed die while they are away from their usual residence. Thus, for these people, the place of their death or hospitalisation is not the same as their place of usual residence. In this report, since conditions have been grouped according to whether they are predominantly acute or chronic in nature (so as to distinguish between two different drinking patterns), it is important that place of death attributed to any one event concurs with the location of the contributing alcohol consumption. In the case of chronic conditions which tend to arise from many years of alcohol misuse, it is reasonable to attribute any contributing alcohol consumption to an individual's place of usual residence – rather than their place of death. In the case of acute conditions which tend to arise from single problematic drinking sessions the reverse is true and the place where the event occurred is most likely where any contributing alcohol was consumed. To this end, all deaths and hospitalisations due to chronic conditions where the individual died away from home were attributed to their usual residence, events due to acute conditions remained with the place where they were registered.

Age Standardised Rates (ASRs)

When comparing rates across populations or over time, it is necessary to control for underlying differences that might be due to different age or sex distributions. For this report, the 'direct' method of age standardisation has been applied using the age structure of the 2001 national

population as the reference year. This involved the application of weights depending on the degree and direction of disparity between these distributions. In this way, differences in age structure between defined populations are removed, allowing direct comparisons between regions such as states and territories and metropolitan/non-metropolitan areas.

Metropolitan and non-metropolitan regions

Comparisons between metropolitan and non-metropolitan regions within each state/territory were generated on the basis of the Statistical Division (SD) to which cases were assigned according to the Australian Standard Geographical Classification (ASGC). Specifically, cases with an SD code of '05' in all states except Queensland were classified as metropolitan, all other areas were considered non-metropolitan. As Queensland did not supply ASGC statistical division information for the hospitalisation data, Rural Remote Metropolitan Area classifications included in the dataset, which also allow the identification of SD code '05', were used. As only a very small number of persons live in non-metropolitan ACT, only metropolitan rates have been provided.

2.3 Adult per capita alcohol consumption

The average amount of alcohol consumed per person aged 15 and over (hereafter *adult per capita consumption or APCC*) is generally a good approximation of the level of actual alcohol-related harm in a population. This has been found to be the case in Australia at the local area level (e.g. Stockwell *et al*., 1998; Stevenson *et al*., 1999), at the state and territory level (e.g. Chikritzhs *et al*., 1999, 2000; Catalano *et al*., 2001; Matthews *et al*., 2002), at the national level (e.g. Chikritzhs *et al*., 1999, 2000) as well as in other countries (e.g. Edwards *et al*., 1994; Nörström and Skög, 2001). The national estimates of APCC used here were calculated from estimates of total population per capita alcohol consumption reported by the Australian Bureau of Statistics (ABS catalogue no: 4306.0; 4315.0; 8365.0) as well as from recent data supplied by the Distilled Spirits Industry Council of Australia (DSICA, 2002).

State and territory estimates of APCC were available for the financial years 1990/91 to 1995/96 based on volumes of wholesale alcohol sales data supplied by liquor licensing authorities in each jurisdiction. The Northern Territory and Western Australia were the only jurisdictions to continue collection of these data, in each case to support public health and safety initiatives. Queensland recommenced collection of these data for the year 2001/02 in order to assist with monitoring trends in consumption. Each liquor licensing authority collected data on wholesale alcohol sales to retail outlets. Mostly, jurisdictions distinguish between wholesale sales of regular strength beer, low strength beer, wine and spirits and report volumes of these in aggregate terms for each financial year. There were some variations in the definitions of low alcohol products. Queensland (latterly) and Northern Territory were the only jurisdictions to distinguish between premixed and neat spirits. In order to convert these data on volumes of different alcoholic beverages to volumes of absolute alcohol, it was necessary to estimate typical alcohol content for each beverage category. Due to changing patterns in the alcohol market over time and place, as determined by a variety of industry and ABS data (Catalano *et al*., 2001), different assumptions about typical alcohol content were required for each jurisdiction for each year.

Estimated Service Population for each jurisdiction of persons aged 15 years or over was used to estimate APCC in each case. Estimated Service Population (ESP) is an estimate of the average

number of persons present in a geographical area as opposed to the number of people who are counted as residents. Calculations of ESP take account of incoming and outgoing tourists and visitors as well as persons incarcerated for various reasons and thus (usually) unable to consume alcohol (Catalano *et al*., 2001). Thus, final estimates of APCC were made by first estimating the total volume of absolute alcohol sold to retailers and dividing this by ESP of persons aged 15 years and over, for each jurisdiction and for each year considered.

2.4 The 1998 and 2001 National Drug Strategy Household (NDSH) surveys

The Australian Government Department of Health and Ageing has commissioned a national survey of alcohol, tobacco and drug use patterns in Australia about every three years since the early 1980s. Data from the 1998 and 2001 NDSH surveys contributed to the development of Australian drinking pattern indicators discussed in this report. The NDSH surveys cover beliefs, attitudes, knowledge and behaviours relating to the use of alcohol, tobacco and other drugs. Households are selected by a multi-stage, stratified area sample design. Minimum sample sizes sufficient to return reliable strata estimates were allocated to states and territories, and the remainder distributed in proportion to population size. People aged 14 years and over were selected from households according to the nearest birthday (persons aged 14 and 15 years completed the survey with the consent of a parent or guardian). The final response rate for the 2001 survey was only 51%, with a final sample size of 26,744 - despite a number of strategies to increase it from the 56% reported in 1998 (n=10,030). In the 2001 survey, the majority were sampled using drop and collect self-completion booklets (n=22,649), the remainder were either face-to-face or computer assisted telephone interviews. Excluded from sampling in both surveys were non-private dwellings, institutional settings and homeless persons. Further details of the methodologies employed can be found in AIHW, 1999 (pp. 39-53) and AIHW, 2002 (pp. 43-47).

2.5 The proportion of *alcohol* consumed when National Health and Medical Research Council (NHMRC) guidelines for low risk drinking were exceeded

This is a relatively new way of describing potentially harmful drinking patterns distributed across a whole population and is recommended by the WHO *International Guide* (WHO, 2000) as being of special relevance for alcohol policy considerations. The underlying concept involves identifying what proportion of all alcohol consumed by a population was done in accordance with health guidelines on low risk drinking. Representative survey data on self-reported alcohol consumption are used in these calculations. In this case, the reference guidelines were the NHMRC Australian Alcohol Guidelines (2001) and the national survey was the 2001 National Drug Strategy Household Survey (AIHW, 2002). Any alcohol consumed on a day when low risk guidelines for acute harm were reported to have been exceeded was considered to be risky or high risk consumption. All alcohol consumed by persons who reported exceeding NHMRC guidelines for avoiding harm from long term excessive drinking was also considered to be risky or high risk consumption. It was not feasible, however, to apply stricter criteria for teenage drinkers, pregnant women and the elderly, as recommended by NHMRC (2001). These estimates of the proportion of all alcohol consumed that is risky or high risk are also highly conservative since self-reported alcohol consumption substantially underestimates the amount of alcohol known to have been sold (and presumably consumed) as calculated from official sales statistics. The 2001 NDSH Survey yielded self-reported alcohol

consumption of between 53% (for estimates of usual drinking patterns) and 78% (for estimates of recent alcohol consumption) of adult per capita consumption calculated from official sales data.

Two main types of survey questions were used in the above calculations. The 'Yesterday' method comprised a set of detailed questions about consumption the day before responding to the survey which enabled respondents to describe beverage types, serve sizes and numbers of serves for each of a range of popular alcoholic beverages. All days of the week were reported on by a proportion of respondents. Along with the usual weighting of responses by respondent's age and sex, for these items responses were also weighted by day of week. This method was used for estimates of the proportion of all alcohol consumed on risky or high risk drinking days as defined with reference to NHMRC guidelines on avoiding short-term or acute harm from drinking. See Stockwell *et al*. (in press) for further details.

The second method was the Graduated Frequency approach which involved respondents reporting how often in the past 12 months they had consumed different predetermined amounts of alcohol in one-day. For men these amounts varied from more than twenty drinks to 'one or two' drinks in one day. For women the amounts varied from more than 12 drinks down to 'one or two' drinks in one-day. This method was used for estimates of the proportion of all alcohol consumed on risky or high risk drinking days as defined with reference to NHMRC guidelines on avoiding harm from a long term or chronic pattern of excessive drinking.

The drop and collect methods of data collection were utilised for the present analyses since only these included all questions required on patterns of alcohol consumption.

2.6 The proportion of the *population* exceeding NHMRC guidelines for low risk consumption

Calculations of this more traditional way of describing drinking patterns were all based on the Graduated Frequency questions used in the 2001 NDSH Survey briefly described above. These questions were designed to include levels of consumption that distinguished low risk from risky and high risk drinking patterns as defined by NHMRC (2001) for acute and chronic harms both for men and women. Estimates of these proportions were all based on data weighted for age and sex of respondents so as to be broadly representative of the Australian population and included persons aged 14 years and older. See WHO (2000), Stockwell *et al*. (in press) and Chikritzhs *et al*. (in preparation) for further details.

Part II: Alcohol-related use and related harms in Australia

1. Per capita alcohol consumption in Australia of persons aged 15 years and older

It can be seen from Figure 3 that adult per capita alcohol (i.e. pure ethanol) consumption in Australia decreased markedly in the early 1990s but has since only exhibited minor fluctuations and a slight decline. However, there have been marked shifts in beverage preferences during that time with wine, low alcohol content beer and spirits consumption increasing while medium and full strength beer consumption has decreased. These data do not take account of the ageing of Australia's population (ABS, 2002). A higher proportion of elderly people would tend to reduce per capita alcohol consumption, other factors remaining constant. Trends in alcohol-caused mortality for different age and sex groups will be examined later in this report. In 2000/01 adult per capita consumption was estimated to be 9.32 litres, of which 42.1% was medium and full strength beer, 10.2% low alcohol content beer, 28.7% wine and 18.8% spirits (neat and pre-mixed).

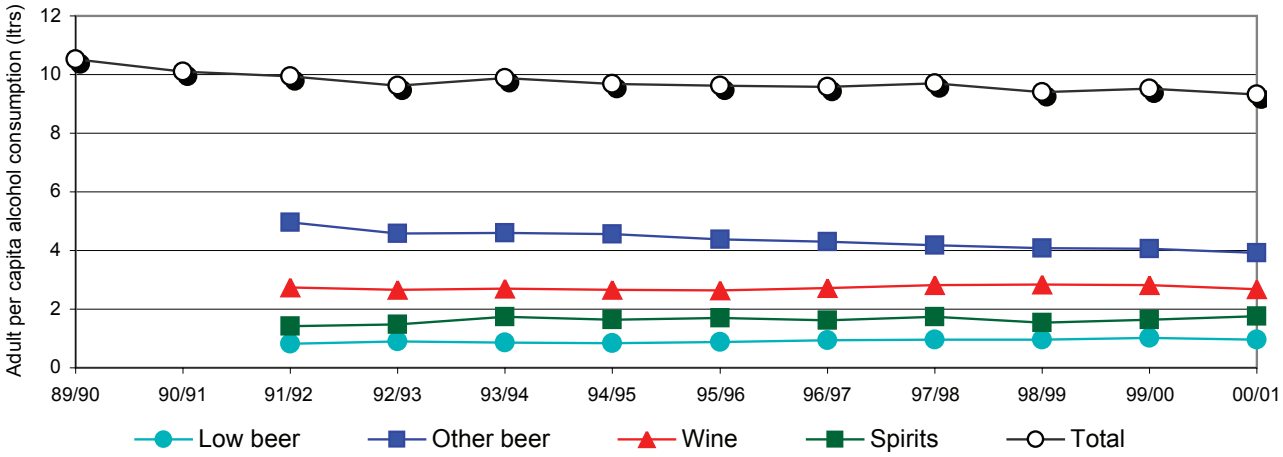


Figure 3:
Adult per capita alcohol consumption in Australia, 1989/90 – 2000/01

(Source: ABS and DSICA)

2. Risky and high risk patterns of drinking in 2001

2.1 The proportion of alcohol consumed when NHMRC guidelines for low risk drinking were exceeded

Substantial amounts of alcohol were reported as consumed on days when the NHMRC guidelines for ***acute*** harm were exceeded by respondents to the 2001 NDSH Survey. Table 1 shows that 62.3% of all the alcohol consumed as reported by respondents aged 14 and over was on risky or high risk drinking days. For the younger age groups, both males and females, this proportion was between 78% and 85%. These estimates were based on responses to the question about what respondents had consumed the day before completing the drinking questionnaire, weighted by day of week plus age and gender of respondents.

Table 1:
Proportion (%) of alcohol consumed at risky or high risk levels for ***acute*** harm by age group in Australia, males and females, 2001

Age	Males (%)	Females (%)	Total (%)
14-17	79.6	84.6	81.5
18-24	77.8	84.7	80.3
25-39	68.2	66.8	67.7
40-64	57.6	51.4	55.8
65+	38.6	33.6	37.1
All Ages	**62.5**	**61.9**	**62.3**

Table 2 provides a breakdown of which alcoholic beverages were most likely to have been reported as consumed on risky or high risk drinking days for ***acute*** harm (first and second columns).

Regular strength beer and spirits (neat and pre-mixed) were most likely to have been drunk in a risky/high risk manner while wine (bottled and cask, though not fortified) was less likely to be consumed in this way. Low strength beer was least likely to be consumed in a risky or high risk way. Table 2 also provides a comparison of the estimates of the total market share of different alcoholic beverages estimated from survey data in 2001 compared to the 'gold standard' of industry and government sources based on sales and taxation data (DSICA, 2002). This comparison shows that while the two estimates are broadly comparable, regular strength beer, cask wine and fortified wine were underestimated by the survey method, probably reflecting the difficulty of sampling high risk drinkers in household surveys. Previous research has demonstrated that high local per capita consumption of these beverages is most likely to be associated with high local rates of serious alcohol-related harm (Stockwell *et al*., 1998; Gray *et al*., 2000). The comparison also suggests that spirit consumption tends to be slightly underestimated by the survey method employed.

Table 2:
Contribution of various alcoholic beverages to risky and high risk alcohol consumption for ***acute*** harm as estimated from the 2001 NDSHS including comparisons between survey and industry market share data for all drinking in 2001, (persons aged 14+ years)

			All drinking	
	% contribution to total risky/high risk consumption	**% beverage consumed on risky/high risk drinking days**	**% contribution to total consumption**	
Alcoholic beverage			**2001 NDSHS**	**2001 DSICA***
Regular beer	38.8	70.1	34.4	40.5
Spirits	18.3	77.0	14.8	13.0
Bottled wine	15.8	51.5	19.0	15.1
Cask wine	7.5	47.2	9.9	11.8
Premixed spirits	7.3	68.8	6.7	5.1
Mid-strength beer	5.6	57.3	6.1	5.5
Homebrew beer	2.5	72.1	2.2	1.9
Low beer	1.8	27.8	4.1	4.4
Cider	1.2	44.0	1.6	0.4
Fortified wine	0.7	63.8	0.6	2.7
Other	0.6	70.1	0.5	0.4
Total	**100.0**	**62.3**	**100.0**	**100.0**

**Calculated with the assumption that home brew beer has 1.9% of market share as indicated by 2001 NDSHS results.*

A substantial proportion of alcohol (overlapping with that estimated above) was also reported to be consumed by persons whose pattern of consumption placed them at risk of ***chronic*** harm according to NHMRC drinking guidelines. Based on weighted data from the Graduated Frequency section of the 2001 NDSHS questionnaire, 44.2% of all the alcohol reported to have been drunk was by people who were at risk or higher risk of harm from the long-term effects of drinking alcohol (see Table 3). Again this figure was substantially higher for the younger age groups. It was also higher for females than males, reflecting the lower thresholds defined as risky or high risk by NHMRC. It is important to note that these estimates exclude the significant amount of alcohol consumed by people at a risk level for long term harm but just below the daily cut-offs for short term harm, i.e. at an average of 5 or 6 standard drinks a day.

Table 3:
Proportion (%) of alcohol consumed at risky or high risk levels for ***chronic*** harm by age group in Australia, males and females, 2001 (Graduated Frequency Method)

Age	Males (%)	Females (%)	Total (%)
14-17	31.6	63.7	46.3
18-24	52.2	64.4	56.5
25-39	37.4	50.1	41.4
40-64	42.6	45.2	43.4
65+	34.7	31.3	33.7
All Ages	**41.5**	**50.1**	**44.2**

In a previous NAIP Bulletin (Heale *et al*, 2001) relying only on Quantity-Frequency data from the 1998 NDSH Survey, it was estimated that 67% of all alcohol consumed that year was drunk in a manner inconsistent with NHMRC Guidelines for acute and/or chronic harm. The estimates for proportions consumed in excess of guidelines for acute alone (51%) and chronic alone (39%) were both lower than the estimates above made using the improved methodology in the 2001 NDSH Survey. Noting the under-reporting of actual alcohol sales in both surveys, a conservative estimate is that at least 80% of the proportion of all alcohol consumed in 2001 put the drinker at risk of acute and/or chronic harm.

2.2 The proportion of the population exceeding NHMRC guidelines for low risk drinking

One in five respondents aged 14 years and older reported having exceeded NHMRC guidelines for ***acute*** harm at least once a month. As shown in Table 4, despite the higher thresholds defined as risky for males 23.8% reported this drinking pattern compared with only 16.9% for females. Again, there was a clear age effect with younger drinkers - especially the 18 to 24-year-olds - the most likely to report this pattern, while those over 65 years of age did so only rarely.

Table 4:
Proportion (%) of the population drinking at risky or high risk levels for ***acute*** harm at least monthly in Australia, males and females, 2001 (Graduated Frequency Method)

Age	Males (%)	Females (%)	Total (%)
14-17	20.8	25.2	22.9
18-24	45.3	45.3	45.3
25-39	32.0	20.9	26.4
40-64	17.8	9.8	13.8
65+	6.1	2.0	3.9
All Ages	**23.8**	**16.9**	**20.3**

A smaller but still significant weighted percentage of the population described their drinking pattern consistently in excess of NHMRC low risk levels for avoiding problems from the long term or ***chronic*** effects of alcohol consumption. As shown in Table 5, for males this figure was 10.2% and for females 9.4%. This drinking pattern was most prevalent among 18 to 24 year olds being 17.3% for males and 19.7% for females.

Table 5:
Proportion (%) of the population drinking at risky or high risk levels for ***chronic*** harm by age, males and females, 2001 (Graduated Frequency Method)

	Males (%)			Females (%)			Total (%)		
	Pattern of consumption			Pattern of consumption			Pattern of consumption		
Age	Risky	High risk	Risky + High Risk	Risky	High risk	Risky + High Risk	Risky	High risk	Risky + High Risk
14-17yrs	2.6	1.3	3.9	7.6	3.3	10.9	5.0	2.3	7.3
18-24yrs	11.3	6.0	17.3	13.9	5.7	19.7	12.6	5.9	18.5
25-39yrs	6.6	3.3	9.9	7.2	2.3	9.5	6.9	2.8	9.7
40-64yrs	6.9	3.7	10.6	6.5	1.6	8.2	6.7	2.6	9.4
65+yrs	4.4	2.3	6.7	3.3	0.6	3.9	3.8	1.4	5.2
All Ages	**6.7**	**3.5**	**10.2**	**7.2**	**2.2**	**9.4**	**7.0**	**2.9**	**9.8**

2.3 Risky and high risk drinking for chronic harm in 1998 and 2001

In 2001, 10% of all males and 8% of all females drank in excess of NHMRC guidelines for avoiding chronic alcohol-caused problems, compared with 9% for both males and females in 1998. However, as shown in Figures 2 and 3, there were some variations for particular age-sex groups, notably the proportion of 14 to 17 year old girls who drank at risky and high risk levels markedly increased from 1% in 1998 to 9% in 2001. Concurrently, males aged 14-17 years who drank at risky levels decreased from 4% to 1%. There was also a tendency for 18 to 24 year old males to be less likely to drink at high risk levels in 2001 (a drop from 9% to 6%). These estimates were made using the Quantity-Frequency methodology as this was the only constant method used to assess alcohol consumption across the two surveys. Such comparisons have not been previously reported.

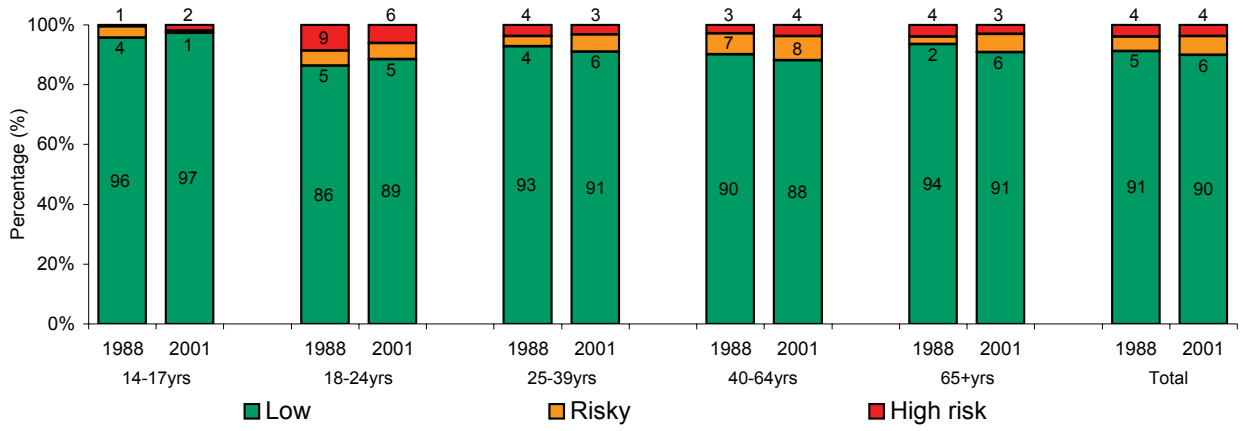


Figure 4:
Proportion of current male drinkers consuming at low, risky and high risk levels for ***chronic*** harm in Australia, 1998 and 2001 (Quantity-Frequency Method)

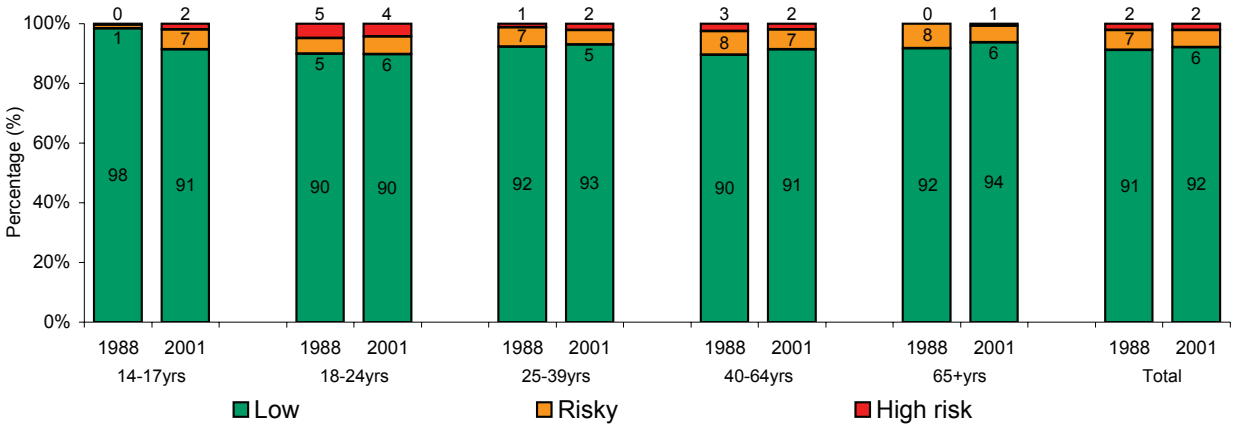


Figure 5:
Proportion of current female drinkers consuming at low, risky and high risk levels for ***chronic*** harm in Australia, 1998 and 2001 (Quantity-Frequency Method)

3. Alcohol-caused deaths in Australia, 1990-2001

During the ten years between 1992 and 2001, 31,133 Australians died from alcohol-caused disease and injury (Table 6). The largest single causes of death were alcoholic liver cirrhosis (6,825), road crash injury (5,489), suicide (2,495) and alcohol dependence (1,598). In total, more people died from acute conditions than chronic. It was also estimated that 3,576 premature deaths were prevented due to the protective effect that alcohol consumption imparts (largely) on cardiovascular diseases (e.g. ischaemic stroke and heart disease). The proportion of cases contributed to the total number of alcohol-caused deaths by each of the sub-categories remained relatively unchanged between 1990 and 2001.

Table 6:
Estimated number of lives lost and saved for acute and chronic conditions due to risky and high risk drinking over ten years in Australia, males and females, 1992-2001

	Males	Females	Total
Lives lost			
Acute			
Road crash injury	4,559	931	5,489
Suicide	2,021	474	2,495
Homicide	888	475	1,363
Other injury	1,421	448	1,870
Alcohol overdose[1]	628	342	970
Alcohol abuse and psychosis	784	178	962
Other acute medical	2,161	1,445	3,607
Total Acute	**12,463**	**4,293**	**16,756**
Chronic			
Alcoholic liver cirrhosis	5,269	1,556	6,825
Alcohol dependence	1,271	327	1,598
Cardiovascular disease	715	0	715
Cancer	1,901	974	2,874
Other chronic medical	1,812	552	2,364
Total Chronic	**10,968**	**3,409**	**14,377**

[1] Alcohol overdose includes cases of alcohol poisoning and aspiration.

	Males	Females	Total
Total lives lost	**23,430**	**7,702**	**31,133**
Lives saved			
Acute	0	0	0
Total Acute	0	0	0
Chronic			
Cardiovascular disease	-2,212	-1,346	-3,558
Cholelithiasis	-11	-6	-17
Total Chronic	**-2,223**	**-1,352**	**-3,576**
Total lives saved	**-2,223**	**-1,352**	**-3,576**
Net alcohol-caused deaths	**21,207**	**6,350**	**27,557**

As shown in Figure 6, the trend in adult per capita consumption was closely followed by the trend in total alcohol-caused deaths. Similarly, acute deaths declined markedly between 1990 and 1993 and then continued to decline at a slower rate. Although there was also an overall decline, chronic rates of alcohol-caused death did not appear to track per capita consumption levels as strongly as did acute conditions.

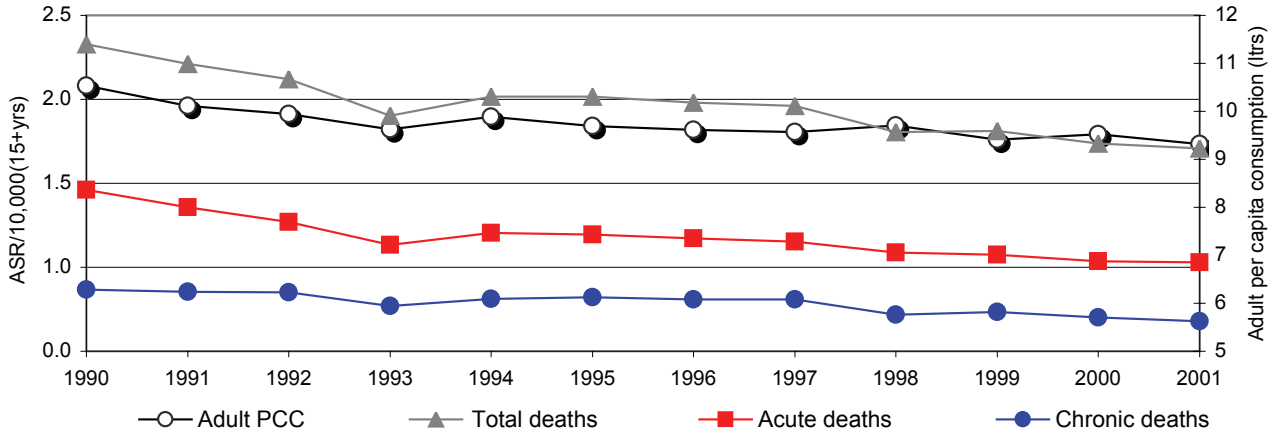


Figure 6:
Trends in age standardised rates/10,000 (15+yrs) of acute and chronic alcohol-caused deaths due to risky and high risk drinking and adult per capita alcohol consumption (PCC) in Australia, 1990-2001

Figure 7 shows trends in all wholly alcohol-caused deaths (e.g. alcoholic liver cirrhosis, alcohol dependence) compared to alcohol-caused road deaths (which are partially attributed to alcohol and the most common acute cause of death) and per capita alcohol consumption. Wholly alcohol attributable cases are, by definition, entirely caused by alcohol and therefore have a population alcohol aetiologic fraction of 1. For such conditions, the level of alcohol attributed to each individual death or hospitalisation does not change (i.e. it remains at 1) – even when the prevalence of drinking in the population changes. Wholly alcohol attributable conditions are therefore independent of any statistical adjustments based on changes in population consumption levels that

are otherwise applied to partially alcohol attributable conditions (such as road injury) . Notably, the national trend in wholly alcohol-caused deaths (which were not adjusted by changes in drinking prevalence or per capita consumption) was similar to the trend in per capita consumption. This is important since it shows that trends in wholly alcohol attributable deaths and therefore total alcohol-caused deaths are not simply a function of statistical adjustments made to partially alcohol attributable conditions in order to take into account fluctuations in the prevalence of drinking (see Section 2.2 for an explanation of aetiologic fractions methodology).

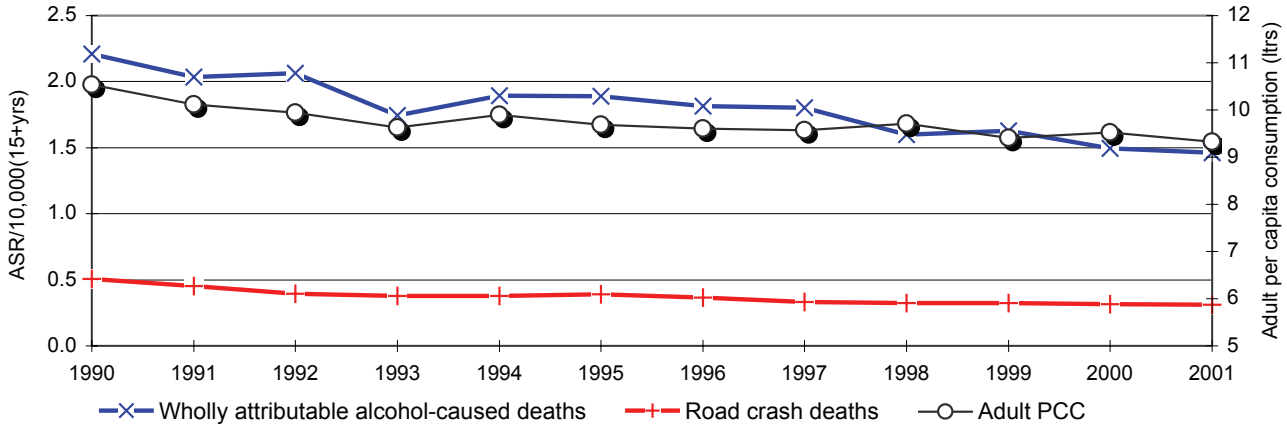


Figure 7:
Trends in age standardised rates/10,000 (15+yrs) of wholly attributable alcohol-caused deaths and road crash deaths due to risky and high risk drinking and adult per capita alcohol consumption (PCC) in Australia, 1990-2001

Over the twelve years observed, acute rates of alcohol-caused deaths were higher than chronic for both males and females (Figure 8). Similarly, in keeping with the national trend in per capita alcohol consumption there was a notable fall in alcohol-caused death rates for all ages between 1990 and 1993 (Figure 9). Due to the high prevalence of chronic conditions such as alcoholic liver cirrhosis and the relatively small population size among older age groups, the highest age specific rates were found among those aged 60 years and older.

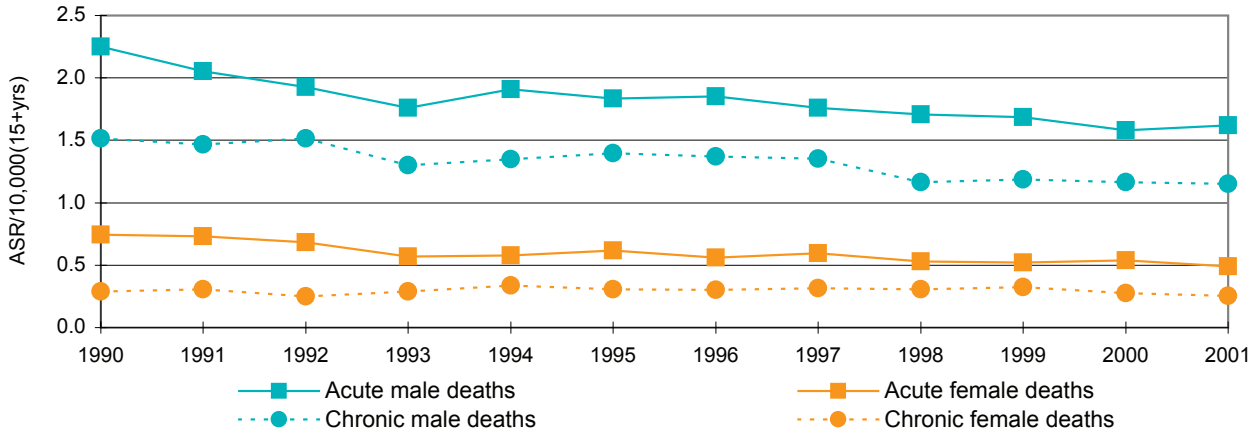


Figure 8:
Trends in age standardised rates/10,000 (15+yrs) of acute and chronic deaths due to risky and high risk drinking and adult per capita alcohol consumption (PCC) in Australia, males and females, 1990-2001

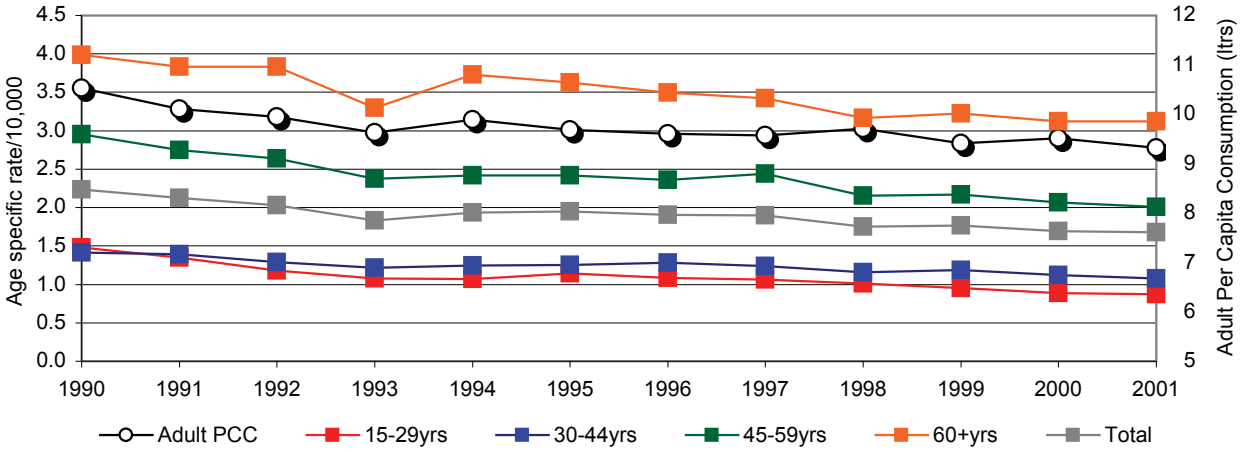


Figure 9:
Trends in age specific crude rates/10,000 of alcohol-caused deaths due to risky and high risk drinking and adult per capita alcohol consumption (PCC), Australia, 1990-2001

As shown in Table 7, a larger number of acute deaths occurred among young people, particularly those aged between 15 and 29 years. Conversely, chronic deaths were more common among those aged over 45 years. This is largely a reflection of different drinking styles - where harmful drinking

among younger people tends to occur more frequently in a 'binge drinking' fashion resulting in acute harm, while chronic alcohol-caused disease results from an accumulation of years of harmful drinking. Additionally, overall death rates were higher for residents of non-metropolitan than metropolitan areas (Table 8), this was also true for both acute and chronic conditions.

Table 7:

Estimated *net* number of acute and chronic alcohol-caused deaths due to risky and high risk drinking over ten years in Australia, by age group, males and females, 1992-2001

Age at death	Males	Females	Total
Acute deaths			
Age 0-14	336	127	463
Age 15-29	3,394	789	4,183
Age 30-44	2,707	789	3,496
Age 45-59	2,161	952	3,113
Age 60-74	2,253	1,028	3,281
Age 75+	1,611	608	2,220
Total Acute	**12,463**	**4,293**	**16,756**
Chronic deaths (net lost/saved)			
Age 0-14	0	1	1
Age 15-29	125	57	182
Age 30-44	1,232	520	1,753
Age 45-59	3,224	1,051	4,275
Age 60-74	3,480	751	4,231
Age 75+	683	-323	360
Total Chronic	**8,744**	**2,057**	**10,801**
Net alcohol-caused deaths	**21,207**	**6,350**	**27,557**

Note: rounding error may affect totals

Table 8:

Estimated age standardised rates (ASR/10,000 adults) of *net* acute and chronic alcohol-caused deaths due to risky and high risk drinking over ten years in Australia, metropolitan and non-metropolitan areas, males and females, 1992-2001[2]

	Metro		Non-metro		Total	
	N	ASR	N	ASR	N	ASR
Acute						
Males (15+yrs)	6,668	1.48	5,256	2.05	11,924	1.68
Females (15+yrs)	2,438	0.52	1,660	0.65	4,097	0.56
Total Acute	**9,106**	**0.98**	**6,916**	**1.35**	**16,021**	**1.11**
Chronic (net lost/saved)						
Males (15+yrs)	5,103	1.15	3,576	1.45	8,678	1.26
Females (15+yrs)	1,196	0.25	853	0.34	2,050	0.28
Total Chronic	**6,299**	**0.69**	**4,429**	**0.89**	**10,728**	**0.76**
Total (net lost/saved)						
Males (15+yrs)	11,771	2.63	8,832	3.50	20,602	2.94
Females (15+yrs)	3,634	0.77	2,513	0.99	6,147	0.84
Total net deaths	**15,405**	**1.67**	**11,345**	**2.24**	**26,749**	**1.87**

[2] Excludes cases where area was unknown. All totals include lives saved and lives lost.

Overall, about 19 years of life were prematurely lost for every death caused by risky and high risk drinking in Australia (Table 9). The number of years lost per death was greater for females than for males - this was largely due to the fact that females tend to live longer than males and so potentially lose more years of life. In addition, due to the young age of the majority of victims of acute alcohol-caused injuries, an overall greater number of years were lost due to acute conditions than for chronic.

Table 9:
Estimated *net* Person-Years of Life Lost (PYLL) due to risky and high risk drinking in Australia, acute and chronic, males and females, 1992-2001

	Males	Females	Total
Total Acute	245,488	84,270	329,758
Years lost per death - Acute	20	20	20
Total Chronic	139,385	44,698	184,083
Years lost per death - Chronic	16	22	17
Total PYLLs	384,873	128,968	513,841
Years lost per death - Total	18	20	19

4. Alcohol-caused hospitalisations in Australia, 1993/94-2000/01

Over half a million hospitalisations were caused by risky and high risk drinking in Australia in the eight years between 1993/94 and 2000/01. The most numerous conditions among these were for alcohol dependence (87,186), injuries caused by assault (76,115), road crash injuries (47,167) and attempted suicide (20,374). As many as 10,094 hospitalisations were attributed to some form of 'alcoholic overdose' from very high blood alcohol levels, including alcohol poisoning and aspiration vomitus. Overall, the majority of hospitalisations were for acute conditions (67.8%). Of the 39,070 hospitalisations prevented, the majority were for cardiovascular diseases such as stroke (mostly ischaemic) and ischaemic heart disease (59.8%) although a large number of hospitalisations for cholelithiasis (gall stones) were also prevented (40.2%). Overall, many more hospitalisations were caused by risky and high risk drinking than were prevented – for every 1 hospitalisation prevented, 15 were caused.

Table 10:
Estimated number of hospitalisations caused and prevented for acute and chronic conditions due to risky and high risk drinking over eight years in Australia, males and females, 1993/94–2000/01[3]

	Males	Females	Total
Hospitalisations caused			
Acute			
Road crash injury	38,682	8,485	47,167
Attempted suicide	8,443	11,931	20,374
Assault	54,628	21,487	76,115
Other injury	78,632	37,545	116,177
Alcohol overdose	5,799	4,295	10,094
Alcohol abuse and psychosis	59,621	25,735	85,355
Other acute medical	20,035	15,967	36,002
Total Acute	**265,839**	**125,444**	**391,283**

[3] 2000/01 hospitalisation data for Victoria was unavailable and has been estimated using linear extrapolation for this table. In addition, due to incomplete coding information, all hospitalisation records for NSW in 94/95 and acute hospitalisations records for NT for 98/99 were unreliable. These points have been replaced by estimated values (average of previous and subsequent years).

	Males	Females	Total
Chronic			
Alcoholic liver cirrhosis	20,248	6,344	26,592
Alcohol dependence	59,709	27,477	87,186
Cardiovascular disease	6,106	3	6,109
Cancer	7,048	5,461	12,509
Other chronic medical	34,826	18,764	53,590
Total Chronic	**127,938**	**58,048**	**185,986**
Total hospitalisations caused	**393,777**	**183,492**	**577,269**
Hospitalisations prevented			
Acute			
Total Acute	**0**	**0**	**0**
Chronic			
Cardiovascular disease	-15,835	-7,548	-23,383
Cholelithiasis	-4,980	-10,707	-15,687
Total Chronic	**-20,815**	**-18,254**	**-39,070**
Total hospitalisations prevented	**-20,815**	**-18,254**	**-39,070**
Net alcohol-caused hospitalisations	**372,962**	**165,238**	**538,200**

Note: rounding error may affect totals

Despite declining levels of per capita alcohol consumption, and in marked contrast to the trends in alcohol-caused deaths, the national rate of all alcohol-caused hospitalisations appeared to increase gradually between 1993/94 and 2000/01 (Figure 10). This increasing trend was due to increases in rates of conditions of acute causation rather than from the effects of long-term alcohol consumption. Trends in the latter dipped in the mid to late 1990s and then rose slightly back to 1993/94 levels.

Although not shown here, the proportion of all hospitalisations contributed by each of the diagnostic categories shown in Table 10 remained relatively stable between 1993/94 and 2000/01.

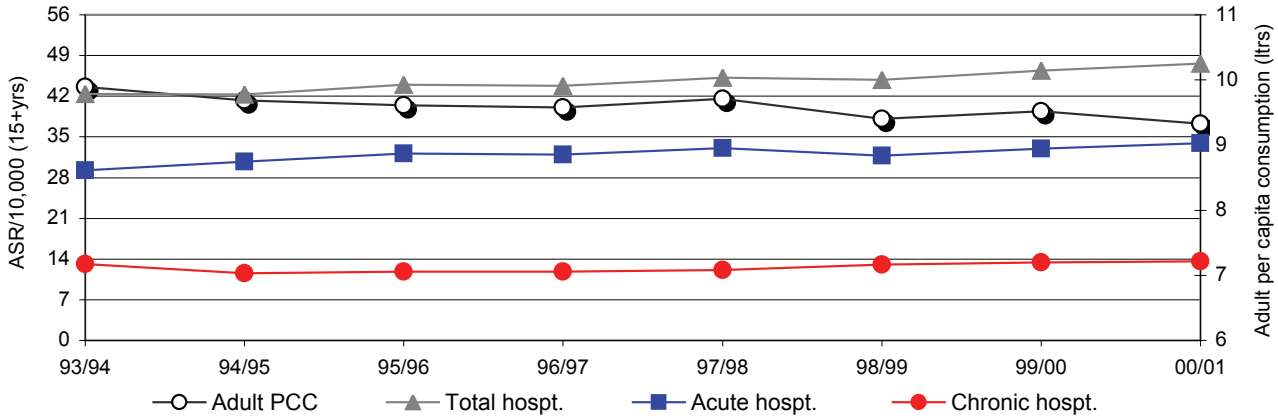


Figure 10:
Trends in age standardised rates/10,000 (15+yrs) of acute and chronic alcohol-caused hospitalisations due to risky and high risk drinking and adult PCC,1993/94-2000/01

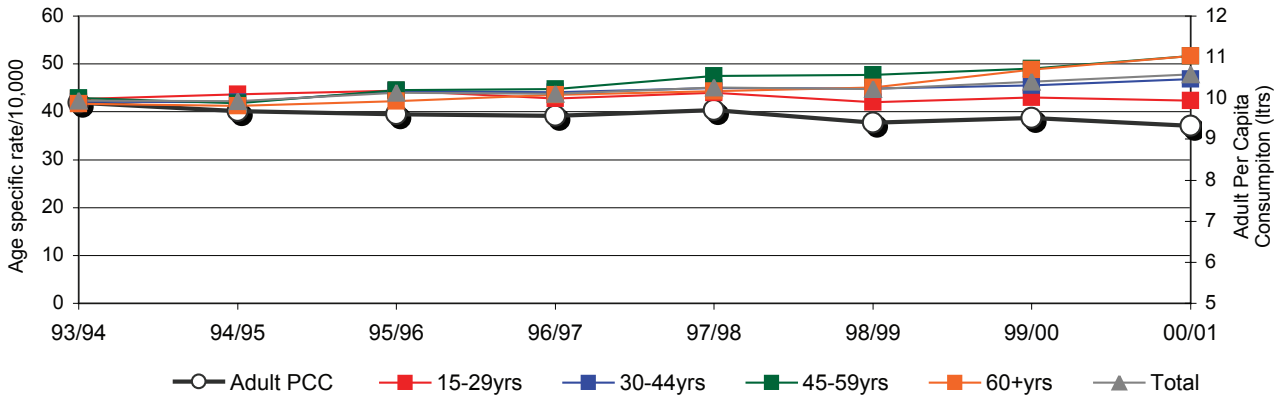


Figure 11:

Trends in age specific crude rates/10,000 (15+yrs) of alcohol-caused hospitalisations due to risky and high risk drinking and adult per capita alcohol consumption (PCC), Australia, 1993/94-2000/01[4]

Trends in age specific groups shown in Figure 11 indicate that the upward trend in rates of alcohol-caused hospitalisations only applied to persons aged 30 and over. Furthermore, increasing trends in the late 1990s were most pronounced for persons aged 65 and over. It should be noted that hospitalisation rates are to a large degree, influenced by hospital admittance procedures and recording practices and are closely tied to "Case-mix" funding principles which were introduced in the late 1990s – at different times in different jurisdictions. Case-mix refers to the principle of funds being apportioned by States and Territories in accordance with the number of completed hospital episodes recorded, by groups of conditions related to each other diagnostically. It is likely that this policy has encouraged a decrease in lengths of stay and an increase in discharges leading to an artificial increase in recorded hospitalisations (Cameron and Campbell, 2003).

In addition, young people aged between 15 and 19 years and between 20 and 24 years were specifically examined for changes in hospitalisation rates between 1998/99 and 2000/01 (unfortunately Victoria data was unavailable and was not able to be included in comparisons). For 15-19 year old females hospitalisation rates increased by 4% - an increase of about 90 admissions a year. Conversely, hospitalisation rates for males decreased by about 9%. Moreover, a similar pattern was evident for 20-24 year olds as female rates increased by almost 7% (about 110 admissions a year) and males rates fell by about 10%. Interestingly, these trends were largely in keeping with the apparent changes in levels of risky and high risk alcohol consumption found for young men and women in the 1998 to the 20001 NDSH surveys (see Section 2.3).

As shown in Table 11, younger drinkers, and males in particular, were more likely to be hospitalised for acute alcohol-caused conditions than their more senior counterparts. Conversely, older drinkers were more likely to require hospitalisation for chronic conditions.

Table 11:
Estimated *net* number of acute and chronic alcohol-caused hospitalisations due to risky and high risk drinking over eight years in Australia, males and females, by age group, 1993/94-2000/01[4]

Age at hospitalisation	Males	Females	Total
Acute hospitalisations			
Age 0-14	7,625	3,544	11,169
Age 15-29	92,278	38,158	130,436
Age 30-44	74,279	32,870	107,149
Age 45-59	47,856	21,255	69,110
Age 60-74	26,529	14,145	40,674
Age 75+	17,894	15,474	33,369
Total Acute	**266,460**	**125,447**	**391,908**
Chronic hospitalisations (net lost/saved)			
Age 0-14	25	17	41
Age 15-29	10,208	2,763	12,972
Age 30-44	32,411	13,916	46,326
Age 45-59	38,005	15,058	53,063
Age 60-74	21,391	5,836	27,225
Age 75+	5,089	1,575	6,664
Total Chronic	**107,128**	**39,165**	**146,292**
Total net alcohol-caused hospitalisations	**373,589**	**164,611**	**538,200**

Note: rounding error may affect totals

Table 12 indicates that for both acute and chronic alcohol-caused conditions and for females as well as males, rates of hospitalisation were higher in non-metropolitan than metropolitan areas. The only exception being non-metropolitan females hospitalised for chronic conditions – they had lower rates than their metropolitan counterparts. It should be noted that Table 12 does not include those years or states/territories where area of residence was unknown, this includes: all 1993/94 and 1994/95 hospitalisation records, Queensland hospital records for 1995/96 and Victorian records for 2000/01.

[4] Does not include 2000/01 hospitalisation data for Victoria

Table 12:
Estimated age standardised rates (ASR/10,000 adults) of *net* acute and chronic alcohol-caused hospitalisations due to risky and high risk drinking over six years in Australia, metropolitan and non-metropolitan areas, 1995/96-2000/01[5]

	Metro		Non-metro		Total	
	N	**ASR**	**N**	**ASR**	**N**	**ASR**
Acute						
Males (15+yrs)	100,172	35.39	78,696	49.13	178,868	40.37
Females (15+yrs)	49,130	16.71	37,935	23.67	87,065	19.18
Total Acute	**149,302**	**25.85**	**116,631**	**36.37**	**265,933**	**29.62**
Chronic (net lost/saved)						
Males (15+yrs)	44,077	15.84	28,820	18.39	72,897	16.77
Females (15+yrs)	19,394	6.69	8,962	5.70	28,356	6.35
Total Chronic	**63,471**	**11.16**	**37,782**	**12.03**	**101,253**	**11.48**
Total (net lost/saved)						
Male (15+yrs)	144,249	51.23	107,516	67.52	251,765	57.14
Females (15+yrs)	68,524	23.4	46,897	29.37	115,421	25.53
Total net alcohol-caused hospitalisations	**212,773**	**37.01**	**154,413**	**48.40**	**367,186**	**41.10**

5. The balance of benefits and costs of low risk versus risky/high risk drinking patterns for Australia

Alcohol consumption caused the deaths of 5,054 Australians in 2001 (Table 13). The majority of these deaths were due to risky or high risk drinking often resulting from acute injury (e.g. road injury deaths) but a substantial number were also lost due to low risk drinking (e.g. cancers). Even so, low risk drinking also prevented a large number of deaths – mostly due to the protective effect of low levels of alcohol consumption on cardiovascular disease in older people.

Table 13:
Estimated numbers of Australian lives lost and saved due to different drinking patterns, males and females, 2001 (negative values indicate lives saved)

	Low risk drinking	**Risky/High risk drinking**	**All drinking levels**
Lives lost			
Males	1,446	2,272	3,718
Females	604	732	1,335
Total lost	**2,050**	**3,004**	**5,054**
Lives saved			
Males	-2,363	-185	-2,548
Females	-3,830	-134	-3,964
Total saved	**-6,193**	**-319**	**-6,513**
Total lives saved and lost			
Males	-917	2,087	1,170
Females	-3,226	598	-2,629
Total saved/lost	**-4,143**	**2,685**	**-1,459**

[5] Excludes cases where state of residence or area was unknown; area of residence was unknown for (a) all 1993/94 and 1994/95 morbidity records (b) Qld morbidity records for 1995/96 and (c) Vic morbidity records for 2000/01

Despite numbers of lives saved outweighing numbers of deaths caused in 2001 (Table 13), in terms of premature loss of years of live, the net outcome was markedly negative (Table 14). This was because, as shown in Table 15, the lives lost involved many younger people with long life expectancies (an average 16 years lost) while those deaths prevented almost always involved persons aged over 45 with fewer years of life remaining (an average 9 years saved). Evidently, the benefits of low risk drinking are largely limited to older people (mostly women), for whom the potential for years of life saved due to premature death are fewer. Few young lives are ever saved by alcohol consumption. In terms of years of life lost prematurely, between 1.4 and 4.4 older lives (from ages 45 years) need to be saved in order to balance out one youthful death (aged 15-34 years) from alcohol use.

Table 14:
Estimated numbers of Australian person-years of life lost and saved due to different drinking patterns, males and females, 2001 (negative values indicate years of life saved)

	Low risk drinking	Risky/High risk drinking	All drinking levels
Years lost			
Males	20,310	38,809	59,119
Females	8,256	13,221	21,477
Total lost	**28,566**	**52,030**	**80,596**
Years saved			
Males	-22,564	-2,053	-24,617
Females	-35,140	-1,274	-36,414
Total saved	**-57,704**	**-3,327**	**-61,031**
Total years saved and lost			
Males	-2,255	36,756	34,501
Females	-26,884	11,947	-14,937
Total saved/lost	**-29,138**	**48,703**	**19,565**

Table 15:
Estimated average number of Australian Person-Years of Life lost and saved due to different drinking patterns, males and females, 2001(negative values indicate years of life saved)

	Low risk drinking	Risky/High risk drinking	All drinking levels
Average years lost			
Males	14	17	16
Females	14	18	16
Total	14	17	16
Average years saved			
Males	-10	-11	-10
Females	-9	-9	-9
Total	-9	-10	-9

Trends show that the estimated number of lives saved due to low risk drinking diminished markedly between 1990 and 2001. In fact, while the total number of lives saved fell by about 25%, the number of lives lost decreased by only 4% – having the overall impact of drawing the net balance toward zero (Figure 12). Conversely however, the total number of years of life lost

prematurely between 1990 and 2001 increased (Figure 13). This increasing trend in the 'balance of PYL saved and lost' was due to a combination of three main effects;

a) declining numbers of estimated lives saved from cardiovascular diseases due to low risk drinking and therefore declining numbers of years of life saved due to low risk drinking (30%). (This was directly related to a marked fall in the number of unadjusted deaths due to cardiovascular disease – i.e. real declines in rates of cardiovascular deaths without alcohol aetiologic fractions applied.);
b) increasing numbers of deaths from chronic diseases such as breast cancer due to low risk alcohol consumption and therefore increasing years of life lost due to low risk drinking (7%) (This was also directly related to a real increase in the number of unadjusted deaths due to cancers);
c) *slower* relative decline in years *lost* due to low and risky/high risk drinking (11% decline) than years *saved* due to low and risk/high risk drinking (30% decline).

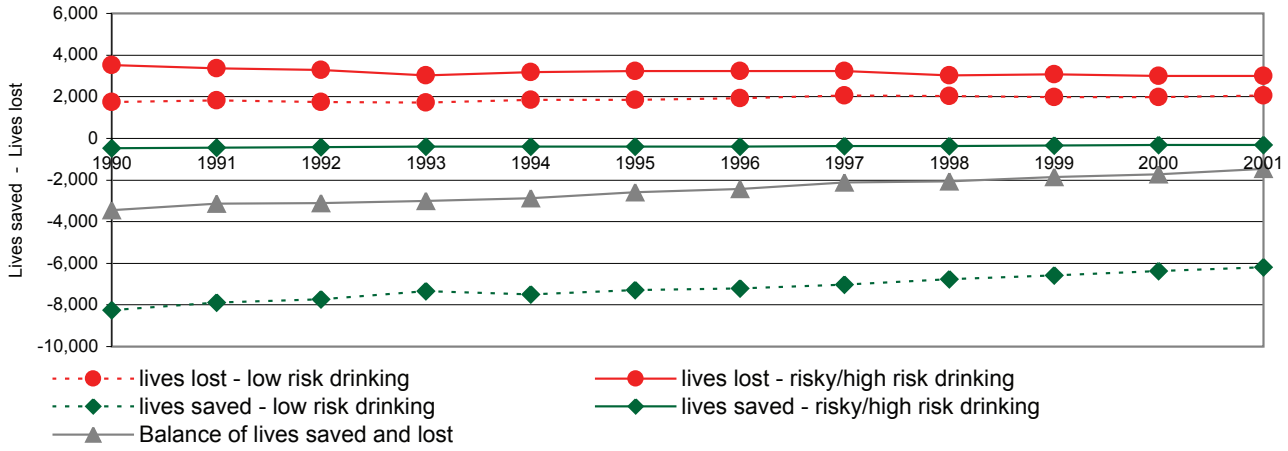


Figure 12:
Estimated number of lives lost and saved due to low and risky/high risk drinking in Australia, 1990-2001

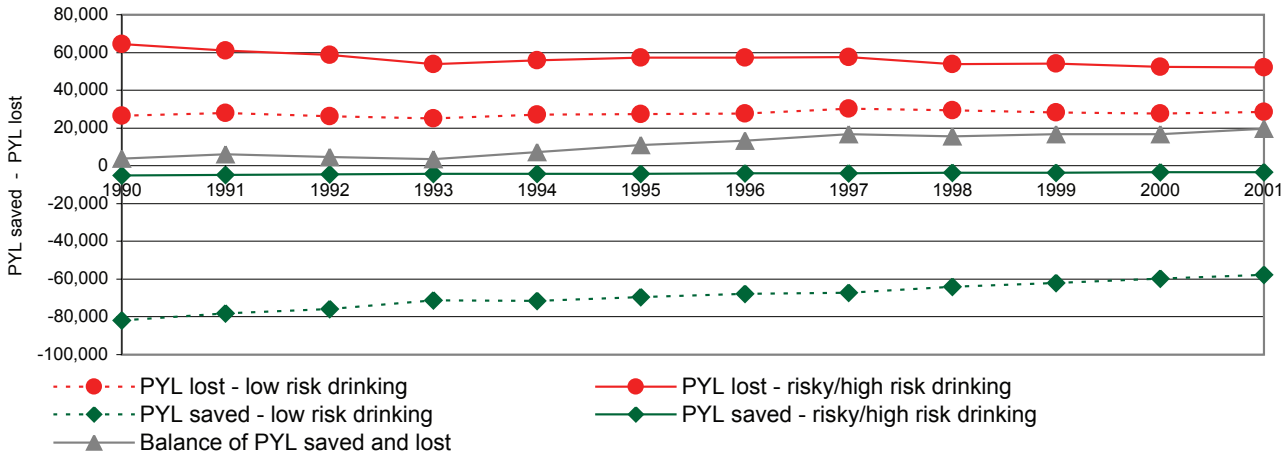


Figure 13:
Estimated number of person-years of life lost (PYL lost) and saved (PYL saved) from premature death due to low and risky/high risk drinking in Australia, 1990-2001

6. Alcohol consumption and alcohol-caused death, injury and disease in Australian states and territories: comparisons

6.1 Per capita alcohol consumption for Australian states and territories

Current levels of actual per capita alcohol consumption in Australia are unknown for most jurisdictions. Perhaps curiously, those jurisdictions that have maintained systems for recording wholesale purchases of alcohol were also those with the highest levels of alcohol consumption. Between 1991/92 and 1995/96, the Northern Territory had the highest level of consumption while Victoria and Tasmania had the lowest. Western Australia appeared to be the only state that went against the national downward trend, indicating an overall increase in alcohol consumption (Table 16).

Table 16:
Adult per capita alcohol consumption (APCC) (ltrs) for Australian states and territories, average, actual and estimated

State/Territory	Average APCC (1991/92 - 1995/96)	Actual APCC 2000/01	Estimated APCC 2000/01
New South Wales	10.30	-	9.59
Victoria	8.17	-	7.80
Queensland	10.31	9.67	-
South Australia	9.64	-	8.75
Western Australia	10.67	11.12	-
Tasmania	8.80	-	8.59
Northern Territory	14.63	13.82	-
ACT	10.55	-	9.75
Australia	**9.75**	**9.32**	**-**

6.2 Risky patterns of alcohol use in Australian states and territories

The Northern Territory had the highest proportions of the population drinking at risky and high risk levels for acute (30.3 % at least monthly) and chronic (17.7%) harm in 2001. Western Australia had the second highest proportion of persons aged 14 and over drinking at risk of acute harm at least once a month at 24.0%, followed by Queensland with 21.8%. New South Wales recorded the lowest levels of such consumption patterns with 18.4%. In relation to drinking at levels putting the drinker at risk from the long term effects of alcohol, after the Northern Territory and from highest to lowest, jurisdictions fell into the following order; Tasmania, Western Australia, Queensland, Australian Capital Territory, New South Wales, Victoria and South Australia. For most states and territories, around one person in ten reported drinking at levels that NHMRC define as risky or high risk for health problems caused by chronic effects of drinking.

Using the recent recall or 'Yesterday' method to estimate consumption, Tasmania had the highest proportion of all alcohol reported to have been consumed (69.1%) on risky/high risk drinking days for acute harm. Again, the Northern Territory had higher than average risky/high risk consumption as did Queensland and South Australia. The Australian Capital Territory, Victoria, New South Wales and Western Australia had below average risky/high risk consumption on this measure (Table 17).

Table 17:
Extent of compliance with NHMRC Australian Alcohol Guidelines (2001) in Australian states and territories, 2001

	Percentage of population (15+yrs) that drank above low risk levels		**Percentage of alcohol consumed on risky/high risk drinking days for acute harm**		
State/Territory	**Acute harm (> monthly)**	**Chronic harm**	**Males**	**Females**	**Total**
New South Wales	18.4	9.6	61.9	60.5	61.5
Victoria	20.6	9.3	59.6	62.5	60.6
Queensland	21.8	10.6	65.3	65.2	65.3
South Australia	20.8	9.1	66.0	60.5	64.6
Western Australia	24.0	11.0	62.4	56.9	60.9
Tasmania	21.1	11.5	68.8	69.9	69.1
Northern Territory	30.3	17.7	65.5	74.6	68.6
ACT	20.8	9.7	53.3	53.8	53.4
Australia	**20.5**	**9.9**	**61.9**	**62.5**	**62.3**

Source: these data were derived from the National Drug Strategy Household Survey, 2001

6.3 Alcohol-caused deaths, states and territories

New South Wales and Victoria had the largest number of estimated alcohol-caused deaths between 1992 and 2001 (10,711 and 6,590 respectively, see Table 18) reflecting their relatively high populations, however they also had the lowest age-sex standardised rates of such deaths per 10,000 persons aged 15 or over (0.90 and 0.82 respectively, see Table 19). The Northern Territory had by far the highest rate of such deaths in Australia (3.26) followed by Tasmania (1.05), Queensland (1.02) and South Australia (1.01).

Table 18:
Summary of estimated numbers of lives lost and saved due to risky and high risk drinking in Australian states and territories, males and females, 1992-2001

	Lives lost			Lives saved		
	Males	**Females**	**Total**	**Males**	**Females**	**Total**
New South Wales	8,211	2,500	10,711	-919	-701	-1,620
Victoria	4,952	1,638	6,590	-405	-193	-598
Queensland	4,550	1,486	6,036	-502	-97	-600
South Australia	1,937	843	2,781	-150	-176	-326
Western Australia	2,214	703	2,917	-149	-126	-276
Tasmania	638	262	901	-60	-36	-96
Northern Territory	675	181	857	-17	-5	-23
ACT	253	88	341	-21	-17	-38
Australia	**23,430**	**7,702**	**31,133**	**-2,223**	**-1,352**	**-3,576**

Note: rounding error may affect totals

For all states and territories, non-metropolitan rates of alcohol-caused deaths were higher than metropolitan rates – particularly in Western Australia, the Northern Territory and South Australia (the difference in Tasmania was small). In addition, in all jurisdictions bar New South Wales and Queensland, acute rates of harm were higher than chronic overall, a difference that was even more pronounced in non-metropolitan areas (Table 19).

Table 19:
Estimated age standardised rates (ASR/10,000 adults) of *net* acute and chronic alcohol-caused deaths due to risky and high risk drinking over ten years in Australian states and territories, metropolitan and non-metropolitan areas, 1992-2001

	Metro		Non-metro		Total	
	N	**ASR**	**N**	**ASR**	**N**	**ASR**
Acute						
New South Wales	2,966	0.48	2,111	0.58	5,076	0.52
Victoria	2,212	0.42	1,095	0.55	3,308	0.45
Queensland	1,373	0.58	1,964	0.71	3,337	0.65
South Australia	1,038	0.57	470	0.77	1,508	0.63
Western Australia	982	0.48	594	0.83	1,576	0.58
Tasmania	208	0.66	308	0.72	516	0.69
Northern Territory	149	1.22	343	2.52	493	1.88
ACT	176	0.42	-	-	176	0.41
Chronic (net lost/saved)						
New South Wales	2,161	0.35	1,618	0.45	3,779	0.39
Victoria	1,789	0.34	776	0.40	2,565	0.36
Queensland	748	0.33	1,116	0.42	1,864	0.37
South Australia	623	0.35	267	0.44	890	0.38
Western Australia	635	0.32	330	0.51	965	0.37
Tasmania	118	0.38	150	0.36	267	0.36
Northern Territory	106	1.20	171	1.55	278	1.38
ACT	120	0.32	3,779	-	120	0.30
Total (net lost/saved)						
New South Wales	5,126	0.83	3,729	1.03	8,856	0.90
Victoria	4,001	0.76	1,871	0.95	5,872	0.82
Queensland	2,121	0.91	3,079	1.13	5,200	1.02

	Metro		Non-metro		Total	
	N	**ASR**	**N**	**ASR**	**N**	**ASR**
South Australia	1,662	0.92	737	1.21	2,399	1.01
Western Australia	1,617	0.80	924	1.34	2,540	0.95
Tasmania	326	1.04	457	1.09	783	1.05
Northern Territory	256	2.42	515	4.07	770	3.26
ACT	296	0.74	-	-	296	0.71

Note: rounding error may affect totals

A breakdown of estimated numbers of lives lost and lives saved due to risky and/or high risk drinking from different conditions is provided for each state and territory and for males and females in Tables 20 and 21. The distributions of these follow those for the country as a whole.

Table 20: Estimated number of lives lost and saved for acute and chronic conditions due to risky and high risk drinking over ten years in Australian states and territories, males, 1992-2001

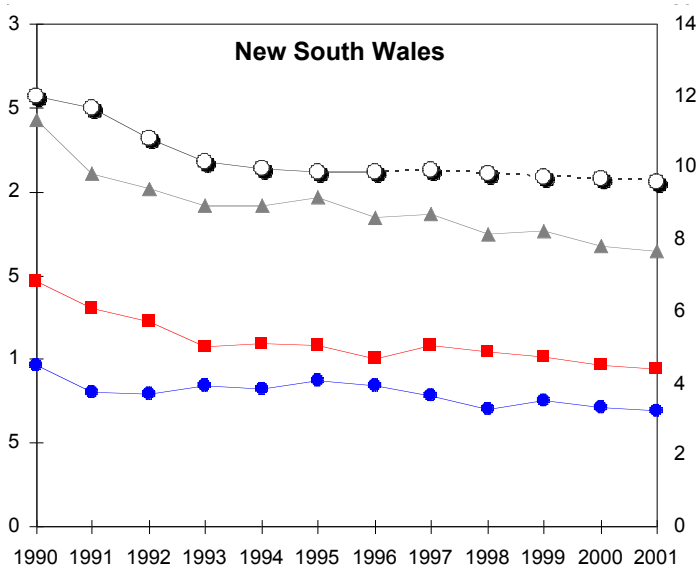
Males	NSW	Vic	Qld	SA	WA	Tas	NT	ACT
Lives lost								
Acute								
Road crash injury	1,314	906	945	409	560	122	258	45
Suicide	655	415	433	171	222	65	38	23
Homicide	341	137	177	68	81	21	59	4
Other injury	542	243	293	106	141	40	40	16
Alcohol poisoning	154	143	182	49	48	20	8	24
Alcohol abuse and psychosis	277	191	130	65	73	26	21	1
Other acute medical	807	455	462	152	166	75	22	22
Total Acute	**4,089**	**2,490**	**2,622**	**1,020**	**1,291**	**370**	**446**	**135**
Chronic								
Alcoholic liver cirrhosis	1,921	1,246	864	510	443	114	102	69
Alcohol dependence	486	236	212	129	129	20	52	7
Cardiovascular disease	335	121	139	43	44	23	3	7
Cancer	684	445	407	103	160	59	28	16
Other chronic medical	696	414	307	132	147	52	44	19
Total Chronic	**4,122**	**2,462**	**1,929**	**917**	**923**	**268**	**229**	**118**
Total lives lost	**8,211**	**4,952**	**4,550**	**1,937**	**2,214**	**638**	**675**	**253**
Lives saved								
Acute								
Total Acute	0	0	0	0	0	0	0	0
Chronic								
Cardiovascular disease	-914	-402	-499	-150	-148	-60	-17	-21
Cholelithiasis	-5	-2	-3	0	-1	0	0	0
Total Chronic	**-919**	**-405**	**-502**	**-150**	**-149**	**-60**	**-17**	**-21**
Total lives saved	**-919**	**-405**	**-502**	**-150**	**-149**	**-60**	**-17**	**-21**
Net alcohol-caused deaths	**7,292**	**4,547**	**4,048**	**1,787**	**2,065**	**578**	**658**	**231**

Note: rounding error may affect totals

Table 21: Estimated number of lives lost and saved for acute and chronic conditions due to risky and high risk drinking over ten years in Australian states and territories, females, 1992-2001

Females	NSW	Vic	Qld	SA	WA	Tas	NT	ACT
Lives lost								
Acute								
Road crash injury	265	209	209	84	100	28	27	9
Suicide	155	111	104	33	45	11	8	9
Homicide	162	75	95	35	56	16	33	3
Other injury	161	77	95	37	46	16	11	6
Alcohol poisoning	89	75	72	45	39	10	3	9
Alcohol abuse and psychosis	58	47	24	8	27	8	4	2
Other acute medical	314	331	331	296	68	78	19	9
Total Acute	**1,202**	**925**	**930**	**537**	**380**	**167**	**104**	**47**
Chronic								
Alcoholic liver cirrhosis	571	304	287	124	174	42	41	13
Alcohol dependence	140	60	48	23	31	6	16	3
Cardiovascular disease	0	0	0	0	0	0	0	0
Cancer	365	235	157	94	68	30	9	15
Other chronic medical	222	114	63	65	49	17	12	9
Total Chronic	**1,298**	**713**	**556**	**307**	**323**	**95**	**77**	**40**
Total lives lost	**2,500**	**1,638**	**1,486**	**843**	**703**	**262**	**181**	**88**
Lives saved								
Acute								
Total Acute	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Chronic								
Cardiovascular disease	-698	-192	-97	-175	-126	-36	-5	-17
Cholelithiasis	-3	-1	-1	-1	-1	0	0	0
Total Chronic	**-701**	**-193**	**-97**	**-176**	**-126**	**-36**	**-5**	**-17**
Total lives saved	**-701**	**-193**	**-97**	**-176**	**-126**	**-36**	**-5**	**-17**
Net alcohol-caused deaths	**1,799**	**1,445**	**1,388**	**668**	**577**	**226**	**176**	**71**

Note: rounding error may affect totals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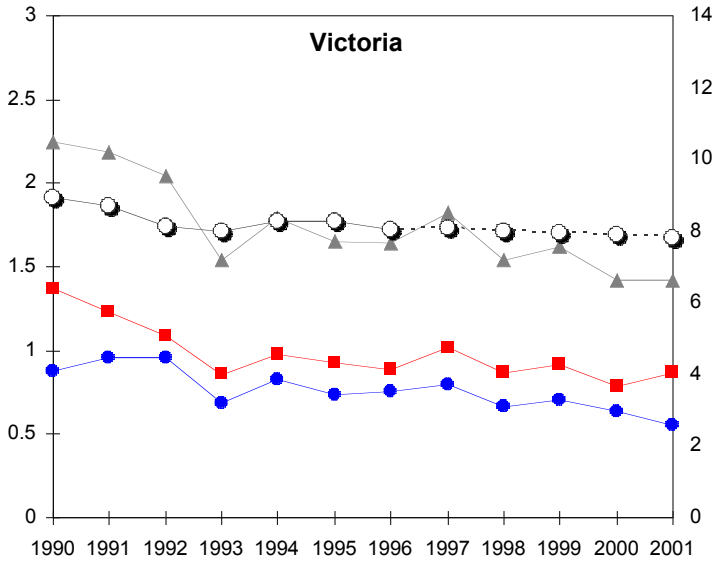
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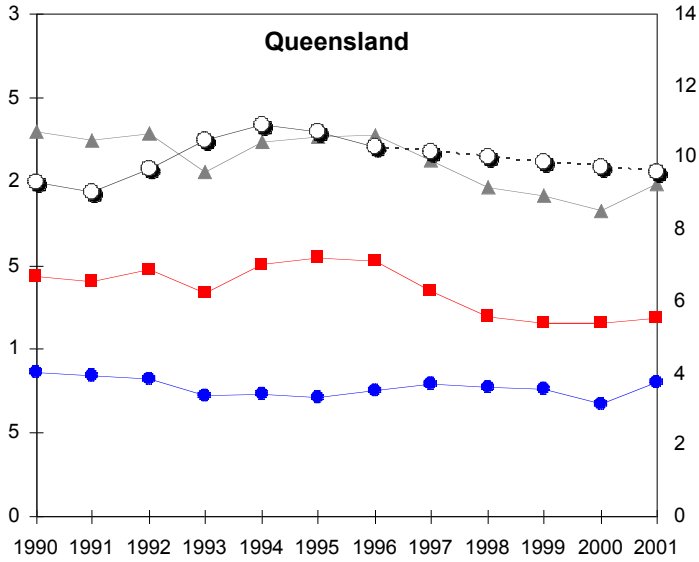
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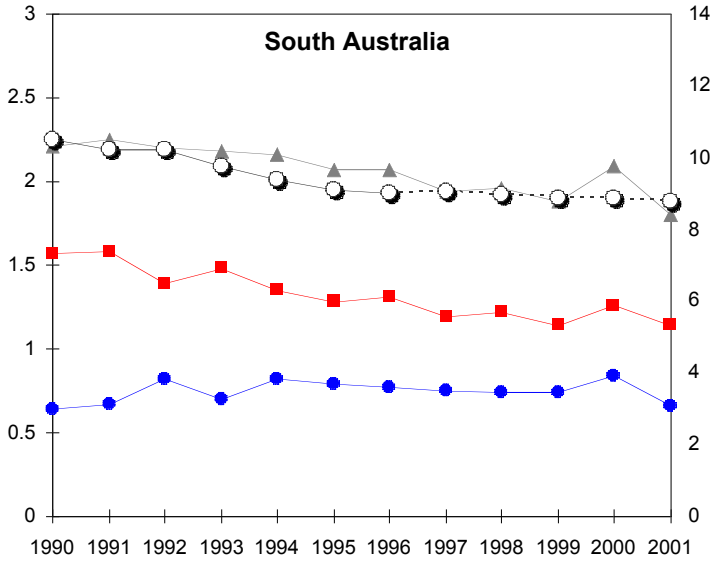
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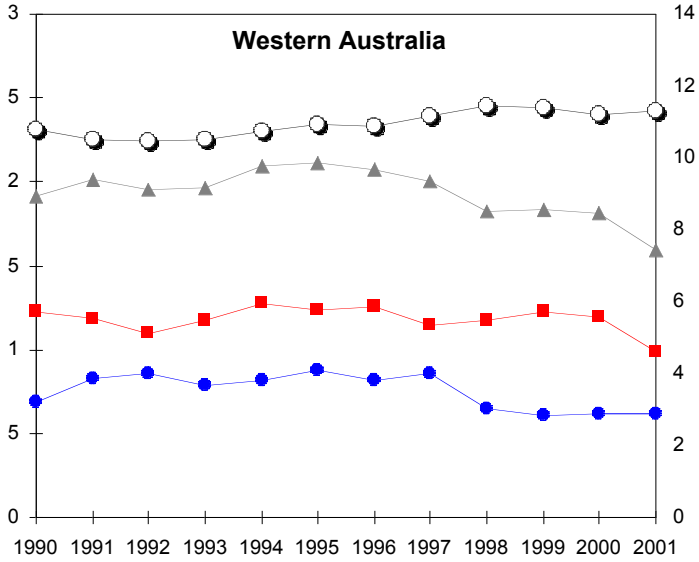
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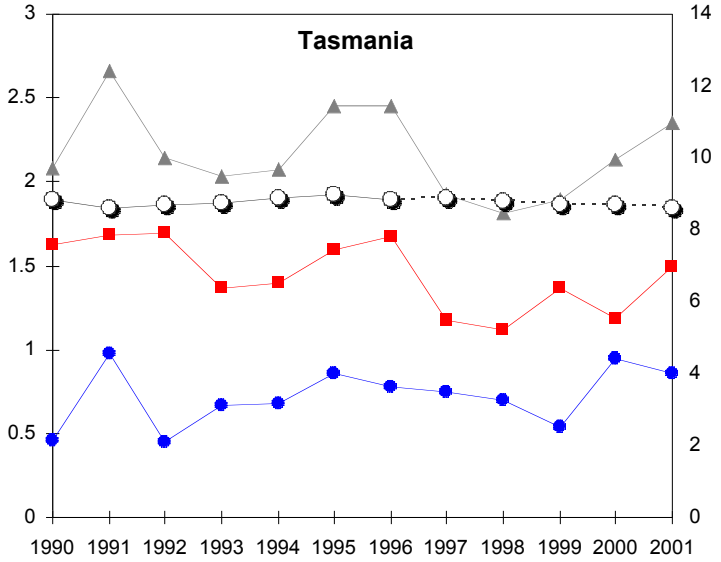
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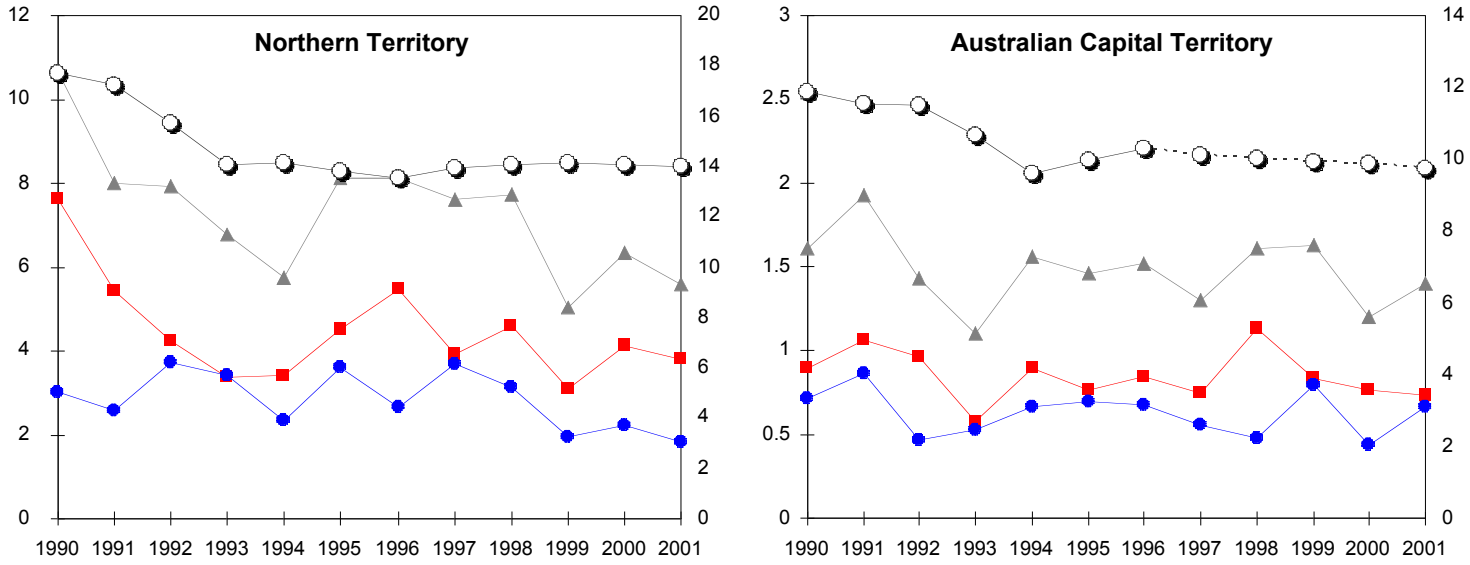


Figure 14:
Trends in age standardised rates/10,000 (15+yrs) of *net* acute and chronic alcohol-caused deaths due to risky and high risk drinking and per capita consumption for Australian states and territories, 1990-2001

Key to symbols:
X axis: Year
Y axis (left): ASR/10,000 (15+yrs)
Y axis (right): Adult Per Capita Consumption in litres (PCC)

- Adult per capita alcohol consumption
- Total alcohol-caused deaths
- Acute alcohol-caused deaths
- Chronic alcohol-caused deaths

*broken lines indicate state APCC modelled on National APCC due to missing jurisdiction specific data

Figure 14 shows trends in alcohol-caused deaths for both acute and chronic conditions and adult per capita alcohol consumption (APCC) between 1990 and 2001, for all states and territories. (Where data was unavailable APCC has been estimated using the national trend). For most jurisdictions, the trend in total alcohol-caused deaths resembled the trend in APCC. New South Wales and Victoria clearly contribute significantly to the national trend reported earlier, i.e. a rapid decline in the early 1990s and a more gradual decline since 1993. The middle-sized jurisdictions show a variety of trends over time. South Australia showed a gradual decline in net alcohol-caused deaths, while Queensland and Western Australia decrease at the end of the 1990s. The smaller jurisdictions showed a great deal of variability reflecting perhaps the smaller numbers of deaths in each year. The NT had an overall decreasing trend while Tasmania evidenced an increase in alcohol-caused deaths in the late 1990s.

6.4 Alcohol-caused hospitalisations, states and territories

Table 22 shows that the largest number of alcohol-caused hospitalisations were recorded in New South Wales (208,187) followed at some distance by Queensland (135,557). Data for Victoria were unavailable for 2000/01 and were estimated based on earlier years and overall national trends.

Table 22:
Summary of estimated numbers of hospitalisations caused and prevented due to risky and high risk drinking in Australian states and territories, males and females, 1993/94-2000/01

	Hospitalisations caused			Hospitalisations prevented		
	Males	**Females**	**Total**	**Males**	**Females**	**Total**
New South Wales	143,543	64,643	208,187	-7,583	-6,837	-14,420
Victoria[6]	70,548	34,665	105,213	-4,656	-4,015	-8,671
Queensland	94,483	41,074	135,557	-4,598	-3,560	-8,157
South Australia	28,724	13,889	42,613	-1,466	-1,564	-3,030
Western Australia	39,457	19,985	59,441	-1,669	-1,389	-3,058
Tasmania	7,424	3,568	10,993	-486	-412	-898
Northern Territory	6,376	3,992	10,368	-116	-162	-279
ACT	3,222	1,675	4,897	-241	-314	-555
Australia	**393,777**	**183,492**	**577,269**	**-20,815**	**-18,254**	**-39,070**

Note: rounding error may affect totals

Rates of alcohol-caused hospitalisations per 10,000 persons were highest for the Northern Territory (79.34), followed by Western Australia (47.98), Queensland (47.37), New South Wales (47.07) and South Australia (40.33). The Australian Capital Territory had the lowest rates of alcohol-caused hospitalisations (21.97), followed by Victoria (31.92) and Tasmania (35.11) As for alcohol-caused deaths, rates of hospitalisations were higher in non-metropolitan than metropolitan areas for all jurisdictions. This was particularly striking in the Northern Territory, Western Australia and South Australia (Table 23).

Table 23:
Estimated age standardised rates (ASR/10,000 adults) of *net* acute and chronic alcohol-caused hospitalisations due to risky and high risk drinking over six years in Australian states and territories, metropolitan and non-metropolitan areas, 1995/96-2000/01[7]

	Metro		Non-metro		Total	
	N	**ASR**	**N**	**ASR**	**N**	**ASR**
Acute						
New South Wales	59,595	30.93	40,122	36.18	99,717	32.80
Victoria[8]	29,609	21.85	11,150	22.18	40,760	21.91
Queensland	20,970	27.69	34,205	38.01	55,175	33.42
South Australia	13,824	25.89	8,664	46.78	22,488	31.34
Western Australia	18,863	29.40	15,069	64.85	33,931	38.87
Tasmania	2,657	28.66	2,942	22.64	5,599	25.24
Northern Territory[9]	1,192	35.35	4,138	102.24	5,330	70.49
ACT	2,388	16.75	-	-	2,388	16.78

[6] Victorian hospitalisation records were unavailable for 2000/01 and have been estimated using linear extrapolation for this table.
[7] Excludes cases where state of residence or area was unknown, area of residence was unknown for (a) all 1993/94 and 1994/95 morbidity records (b) Qld morbidity records for 1995/96.
[8] Victorian estimates for both acute and chronic conditions are for 1995/96 to 1999/00, Victoria Health was unable to release 2000/01 data.
[9] Due to incomplete data records for Ecoded admissions in 1998/99, acute estimates for the NT do not include 1998/99.

	Metro		Non-metro		Total	
	N	**ASR**	**N**	**ASR**	**N**	**ASR**
Chronic (net caused/prevented)						
New South Wales	28,585	15.04	14,268	13.00	42,853	14.27
Victoria[8]	12,854	9.68	5,331	10.78	18,185	10.01
Queensland	11,317	15.42	11,128	12.86	22,445	13.95
South Australia	4,174	7.80	2,283	12.17	6,457	9.00
Western Australia	4,473	7.07	3,258	14.75	7,731	9.11
Tasmania	1,173	12.51	1,040	8.16	2,213	9.87
Northern Territory	213	5.57	473	12.22	686	8.84
ACT	683	5.07	-	-	683	5.19
Total (net caused/prevented)						
New South Wales	88,180	45.97	54,390	49.19	142,570	47.07
Victoria[8]	42,463	31.53	16,481	32.96	58,944	31.92
Queensland	32,287	43.11	45,333	50.87	77,620	47.37
South Australia	17,997	33.69	10,947	58.94	28,945	40.33
Western Australia	23,336	36.47	18,327	79.60	41,663	47.98
Tasmania	3,830	41.17	3,982	30.80	7,812	35.11
Northern Territory	1,405	40.92	4,611	114.46	6,016	79.34
ACT	3,070	21.82	-	-	3,070	21.97

Note: rounding error may affect totals

Tables 24 and 25 show further details of estimated numbers of alcohol-caused hospitalisations for each state and territory over the eight years between 1993/94 and 2000/01 for various groups of conditions.

Table 24: Estimated number of hospitalisations caused and prevented for acute and chronic conditions due to risky and high risk drinking over eight years in Australian states and territories, males, 1993/94–2000/01

Males	NSW	Vic[10]	Qld	SA	WA	Tas	NT	ACT
Hospitalisations caused								
Acute								
Road crash injury	12,115	7,384	9,288	3,730	4,043	879	871	371
Suicide	2,802	1,652	1,723	688	1,171	192	123	92
Assault	17,679	8,139	14,622	3,879	6,941	907	2,095	366
Other injury	29,273	12,726	18,762	6,038	8,326	1,515	1,128	864
Alcohol poisoning	1,621	1,374	1,426	715	427	144	55	37
Alcohol abuse and psychosis	21,929	10,799	13,511	4,228	7,127	998	743	287
Other acute medical	6,863	3,422	4,708	1,682	2,219	374	516	252
Total Acute	**92,282**	**45,495**	**64,040**	**20,960**	**30,254**	**5,009**	**5,529**	**2,269**
Chronic								
Alcoholic liver cirrhosis	7,135	5,245	3,504	1,916	1,587	331	227	303
Alcohol dependence	26,838	9,760	16,571	2,482	2,985	908	88	77
Cardiovascular disease	2,190	1,425	1,362	415	460	172	33	51
Cancer	2,204	1,683	1,764	474	599	202	55	68
Other chronic medical	12,895	6,939	7,242	2,476	3,571	803	445	455
Total Chronic	**51,262**	**25,052**	**30,442**	**7,763**	**9,202**	**2,416**	**847**	**953**
Total hospitalisations caused	**143,543**	**70,548**	**94,483**	**28,724**	**39,457**	**7,424**	**6,376**	**3,222**
Hospitalisations prevented								
Acute								
Total Acute	0	0	0	0	0	0	0	0
Chronic								
Cardiovascular disease	-5,799	-3,525	-3,523	-1,110	-1,254	-358	-87	-178
Cholelithiasis	-1,784	-1,132	-1,074	-356	-415	-128	-29	-63
Total Chronic	**-7,583**	**-4,656**	**-4,598**	**-1,466**	**-1,669**	**-486**	**-116**	**-241**
Total hospitalisations saved	**-7,583**	**-4,656**	**-4,598**	**-1,466**	**-1,669**	**-486**	**-116**	**-241**
Net alcohol-caused hospitalisations	**135,960**	**65,891**	**89,885**	**27,258**	**37,788**	**6,938**	**6,260**	**2,981**

Note: rounding error may affect totals

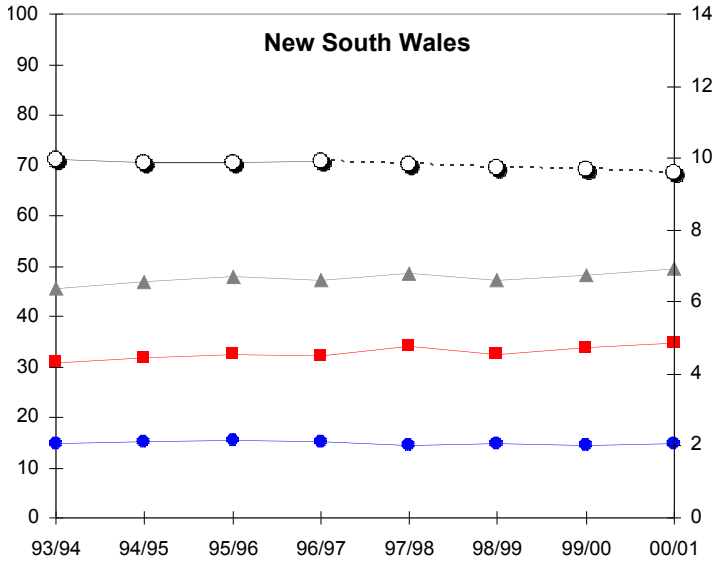
[10] Victorian hospitalisation records were unavailable for 2000/01 and have been estimated using linear extrapolation for this table.

Table 25: Estimated number of hospitalisations caused and prevented for acute and chronic conditions due to risky and high risk drinking over eight years in Australian states and territories, females, 1993/94–2000/01

Females	NSW	Vic[11]	Qld	SA	WA	Tas	NT	ACT
Hospitalisations caused								
Acute								
Road crash injury	2,950	1,313	1,935	943	912	211	164	57
Suicide	3,547	2,817	2,484	803	1,664	236	148	233
Assault	5,761	1,785	5,373	1,556	4,409	213	2,304	85
Other injury	14,496	6,473	7,895	3,111	3,965	762	450	391
Alcohol poisoning	1,216	1,007	1,069	520	292	113	33	45
Alcohol abuse and psychosis	9,289	5,420	5,271	1,717	3,194	507	207	129
Other acute medical	5,718	2,915	3,524	1,370	1,503	376	312	249
Total Acute	**42,978**	**21,730**	**27,551**	**10,019**	**15,939**	**2,418**	**3,619**	**1,190**
Chronic								
Alcoholic liver cirrhosis	2,079	1,392	1,318	569	650	134	116	86
Alcohol dependence	10,688	6,219	7,582	1,161	1,322	435	31	40
Cardiovascular disease	1	1	0	0	0	0	1	0
Cancer	1,735	1,594	1,059	482	327	137	24	103
Other chronic medical	7,164	3,730	3,564	1,658	1,747	444	200	257
Total Chronic	**21,665**	**12,935**	**13,523**	**3,870**	**4,046**	**1,150**	**372**	**486**
Total hospitalisations caused	**64,643**	**34,665**	**41,074**	**13,889**	**19,985**	**3,568**	**3,992**	**1,675**
Hospitalisations prevented								
Acute								
Total Acute	0	0	0	0	0	0	0	0
Chronic								
Cardiovascular disease	-3,202	-1,570	-1,223	-728	-501	-150	-56	-117
Cholelithiasis	-3,635	-2,445	-2,337	-836	-888	-262	-106	-197
Total Chronic	**-6,837**	**-4,015**	**-3,560**	**-1,564**	**-1,389**	**-412**	**-162**	**-314**
Total hospitalisations saved	**-6,837**	**-4,015**	**-3,560**	**-1,564**	**-1,389**	**-412**	**-162**	**-314**
Net alcohol-caused hospitalisations	**57,805**	**30,649**	**37,514**	**12,325**	**18,595**	**3,157**	**3,828**	**1,361**

Note: rounding error may affect totals

[11] Victorian hospitalisation records were unavailable for 2000/01 and have been estimated using linear extrapolation for this table.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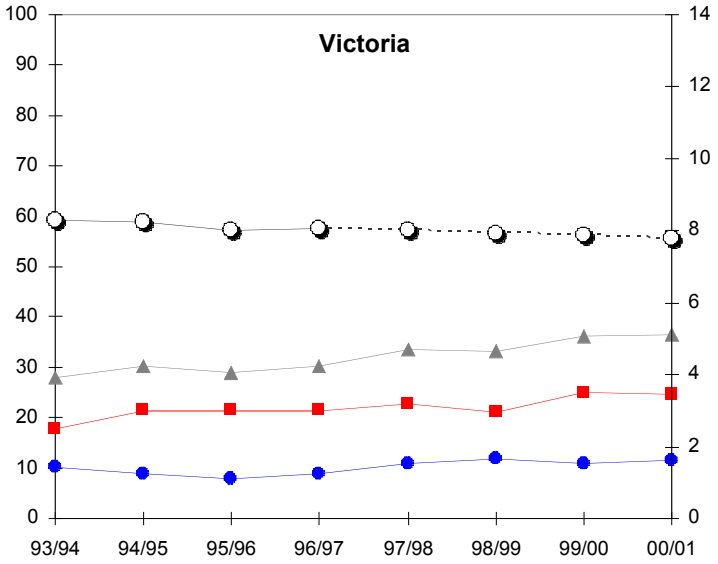
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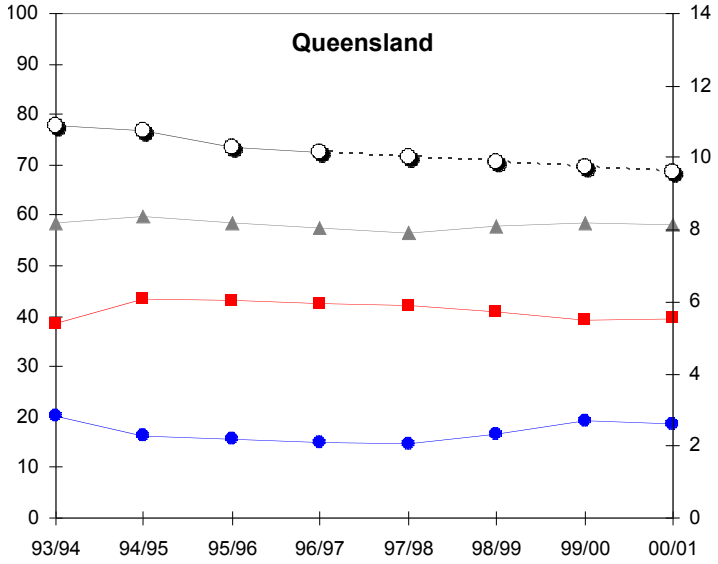
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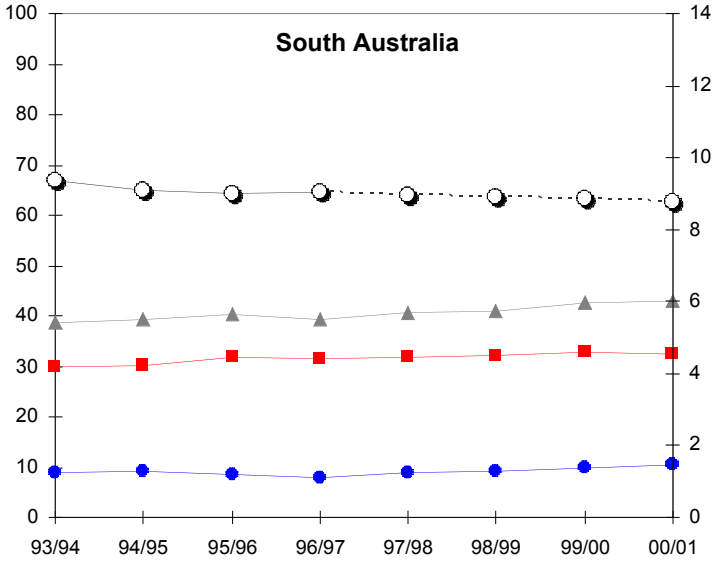
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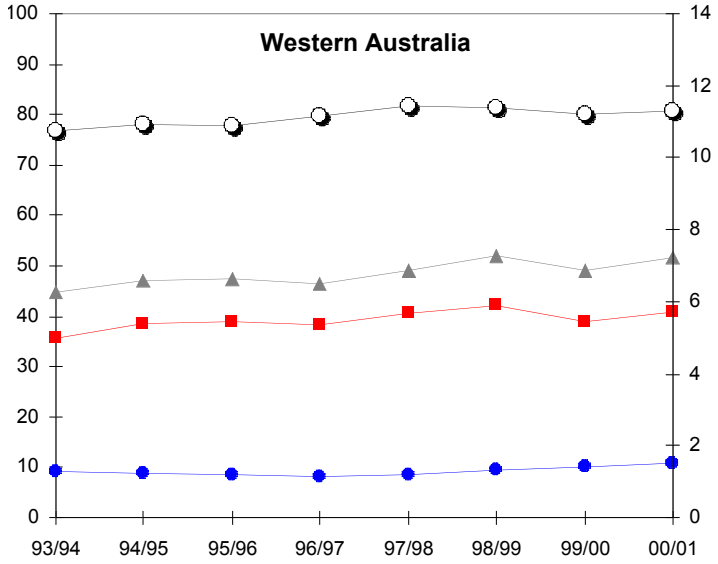
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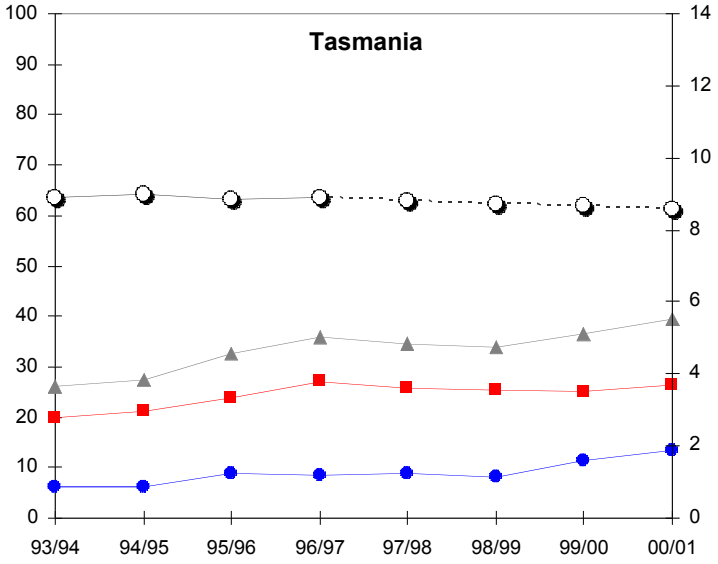
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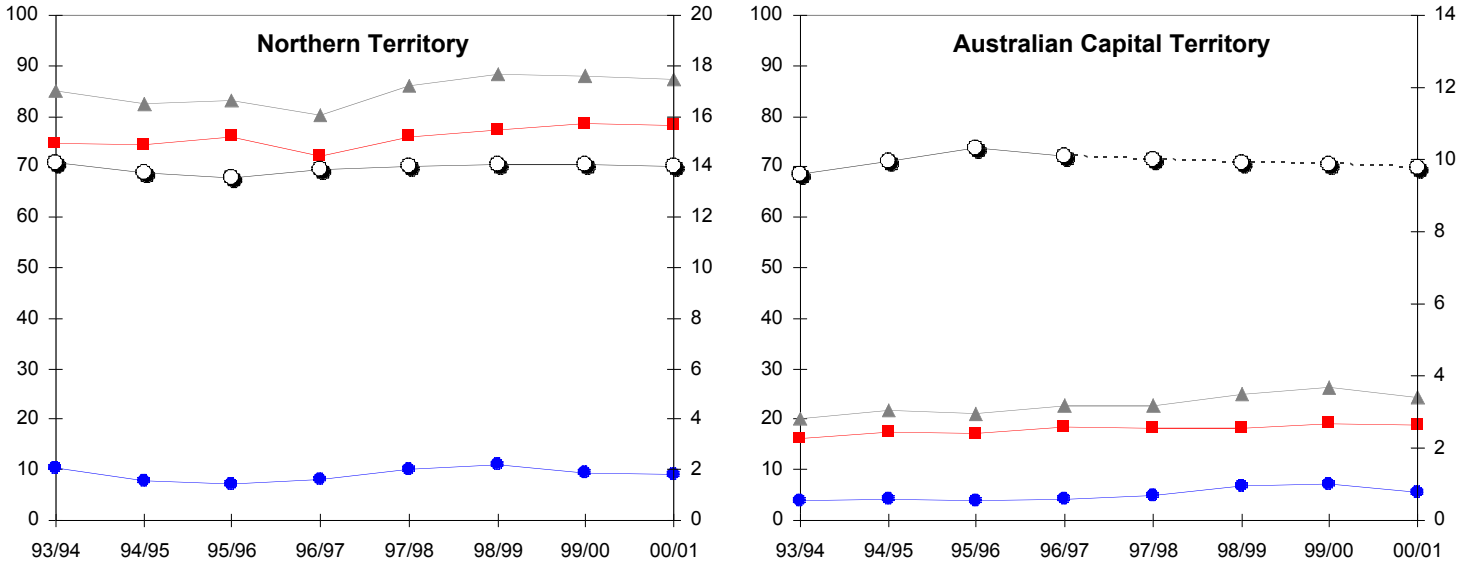

Figure 15:
Trends in age standardised rates/10,000 (15+yrs) of *net* acute and chronic alcohol-caused hospitalisations due to risky and high risk drinking and per capita consumption for Australian states and territories, 1990-2001[12]

Key to symbols:
X axis: Year
Y axis (left): ASR/10,000 (15+yrs)
Y axis (right): Adult Per Capita Consumption in litres (PCC)

- Adult per capita alcohol consumption
- Total alcohol-caused hospitalisations
- Acute alcohol-caused hospitalisations
- Chronic alcohol-caused hospitalisations

*broken lines indicate state APCC modelled on National APCC due to missing jurisdiction specific data

As shown in Figure 15, trends in hospitalisation rates between 1993/94 and 2000/01 mostly increased, contrary to trends in alcohol-caused deaths and per capita consumption. The increase was most pronounced for Victoria, Tasmania and Western Australia. Queensland was the only state to show no increase while in the Northern Territory there was a marked increase in rates of alcohol-caused hospitalisations but only from the year 1997/98.

[12] Victorian hospitalisation records were unavailable for 2000/01 and have been modelled using linear extrapolation.

7. Conclusions

In this report, recent trends in risky/high risk alcohol use and related harm for all Australian jurisdictions have been presented for the first time. Methodological improvements developed by the National Alcohol Indicators Project (NAIP) underlie all the estimates provided and build upon previous NAIP reports. Some of the innovations in methodology included in this report are the application of recent recall methods for improved self-reported estimates of alcohol consumption (Stockwell *et al*. in press), the calculation of state/territory and year specific alcohol aetiologic fractions for calculating alcohol-caused deaths and hospitalisations (Chikritzhs *et al*., 2002a) and the calculation and use of 'Estimated Service Populations' for calculating per capita alcohol consumption (Catalano *et al*., 2001).

While there was an encouraging, if mostly gradual, decline in alcohol-caused deaths from 1990 to 2001, the overall burden of death, injury and disease from alcohol in this period was substantial. Between 1992 and 2001, it was estimated that 31,133 Australians died from risky or high risk alcohol use. Of these, 23,430 (75.3%) were male and 7,702 female (24.7%). Over half a million hospitalisations (577, 269) were estimated to have been caused by risky or high risk drinking in Australia between 1993/94 and 2000/01. Nearly 70% of all alcohol-caused hospitalisations were for acute conditions, mostly injuries, caused by occasions of intoxication. Over two-thirds of hospitalisations (68%) involved males. The burden was most pronounced in Australia's north (the Northern Territory in particular) and in non-metropolitan areas.

These findings are consistent with data from recent national surveys of alcohol consumption. For example, a conservative estimate based upon the 2001 NDSH Survey is that at least 80% of all alcohol consumed in that year was done so in a way which placed the drinkers health and/or safety at risk. This amount is contributed to by a) the 1 in 10 Australians aged 14 or over drinking above low risk levels for chronic adverse effects of alcohol, and b) the 1 in 5 Australians 14 years and older who put themselves at risk of the short term acute effects of alcohol at least once a month.

The observed decline in the rate of alcohol-caused deaths in Australia followed the trend for per capita consumption of alcohol, with both declining most markedly in the early 1990s. The overall decline in alcohol-caused mortality was observed for all age groups and was most for males. Rates of death from the chronic effects of alcohol among women were quite stable between 1990 and 2001, though there were declines in rates of acute alcohol-caused deaths among women during that time.

Trends in per capita consumption and of alcohol-caused mortality rates followed each other quite closely in most of the individual jurisdictions. There were some exceptions such as Western Australia, where for the last half of the 1990s per capita consumption was increasing while rates of death, especially for those caused by the chronic effects of alcohol, appeared to be in decline.

Trends in rates of alcohol-caused hospitalisation, however, showed a different trend to deaths in most jurisdictions. From the late 1990s in particular, these rates were mostly increasing. This may reflect changes in financing of most state health care services which came to be based largely on completed episodes of hospital care in the 1990s – hospital budgets being "determined primarily on performance or output, rather than negotiation, history or politics."

(Duckett, 1998, pp.18). It has been suggested that this policy has led to shorter hospital stays, increased admissions and also increased discharges (Cameron and Campbell, 2003). The increasing trend in alcohol-caused hospitalisations in most Australian jurisdictions represents probable increasing economic costs if not necessarily increasing levels of actual harm in the population.

Alcohol consumption in total has caused over 5,000 deaths each year in Australia and for each death, about 19 years of life are lost prematurely. These deaths confer a considerable cost to society in both human and economic terms. Although over 6,500 lives are also saved each year – mainly due to low risk drinking and the protection it provides from cardiovascular disease in older people – in economic terms, the overall outcome is negative. Productivity losses due to premature death and health costs constitute the bulk of the economic burden on society as a result of alcohol use and according to Collins and Lapsley (2002) at an estimated $5.5 billion in 1998/99, alcohol remains one of the most costly of all preventible external risk factors, second only to tobacco.

The burden of alcohol-caused deaths is distributed unevenly across the population. Males are over-represented in mortality and morbidity statistics compared to females, as are those living in non-metropolitan regions compared to metropolitan regions – particularly in Western Australia, South Australia and the Northern Territory. Although not presented in this report, previous NAIP bulletins have also highlighted the fact that Indigenous populations suffer from far greater levels of alcohol-caused injury and disease than non-Indigenous populations (Chikritzhs *et al*., 1999; Chikritzhs *et al*., 2000a). The uneven distribution of alcohol-caused harms across the community has implications for the allocation of resources for the prevention of alcohol-caused harm. Under the National Drug Strategy, the Australian Government Department of Health and Ageing has recently funded the early investigative stages into the efficacy of expanding NAIP to specifically identify and document indicators of alcohol-related harms in Indigenous populations.

Problems associated with drinking to intoxication (acute conditions) versus long term alcohol misuse (chronic conditions) were also unevenly distributed. Chronic diseases occurred almost entirely among people aged over 30 years where as deaths and hospitalisations largely caused by drinking to intoxication such as road injury and violent assault were much more common among younger people. This was largely a reflection of the different drinking styles between younger and older populations - where risky drinking among young people tends to occur more frequently in a 'binge drinking' fashion resulting in acute harm, while chronic disease results from an accumulation of years of problem drinking (Chikritzhs *et al*., 2001).

Data presented in this report also contribute to the ongoing debate about trends in alcohol consumption of younger people in recent years (e.g. McAllister, 2003). Rates of alcohol-caused mortality for 15 to 29-year-olds decreased between 1990 and 2001, while rates of alcohol-caused hospitalisations for the same age group were relatively stable. Analyses presented here using Quantity-Frequency estimates of alcohol consumption from both the 1998 and 2001 NDSH Surveys found evidence of *increased* risky/high risk alcohol use by 14 to 17 year old females, along with evidence of *reduced* high risk consumption by 18 to 24 year old men. Further analyses focusing on teenagers and young adults found evidence of greater levels of increased rates of alcohol-caused hospitalisations for females than for males.

Alcohol-caused death, injury and disease remains a major public health problem in Australia. The harms caused by problematic drinking are unequally spread among the community but are strongly related to overall levels of alcohol consumption. There is no doubt that the cost of alcohol-related harm in Australia is high, while health resources are finite. It is recommended, therefore, that indicators of alcohol-related harm be used to inform and guide public health policy regarding the distribution of resources for both treatment and prevention of alcohol-related problems.

The importance of reporting both estimated costs and benefits of different patterns of drinking rather than focusing on the net consequences of all patterns of alcohol use combined is underlined by the findings of this report. Any other approach risks overlooking both the massive costs and the substantial estimated benefits by allowing these to cancel each other out in the calculation of a *net* effect. It was estimated in 2001 that a) risky and high risk alcohol use lead to 2,685 deaths and 48,703 person-years of life lost, while b) low-risk alcohol use prevented 4,143 premature deaths and 29,138 lost years of life. Both of these sets of figures underline the importance to health and safety of adherence to the NHMRC Australian Alcohol Guidelines (NHMRC, 2001) – and do so more clearly than *net* figures do alone.

Focusing on both costs and benefits also raises questions about the relative merits of *abstinence* from alcohol as opposed to drinking at *low risk* levels (defined by NHMRC) for different population groups. Even at a *low risk* level of consumption, a substantial number of cancers (2,050) were attributed to alcohol in 2001 - mostly among males. On the other hand, the estimated 6,193 deaths *prevented* by the protective effects of *low-risk* alcohol consumption were predominantly among the elderly - with more than half of these deaths involving persons aged over 75 years. For some individuals therefore, particularly those under 45 years of age, it may be the case that their risk of cancer is somewhat greater than their risk of heart disease and that, therefore, abstinence from alcohol might be recommended - at least where health considerations are a determining factor.

References

Australian Bureau of Statistics (2002). *Australian Social Trends.* Canberra: ABS.

Australian Institute of Health and Welfare (1999). *1998 National Drug Strategy Household Survey: first results. Canberra: AIHW.*

Australian Institute of Health and Welfare (2002). *2001 National Drug Strategy Household Survey: first results*. Canberra: AIHW.

Cameron, P.A. and Campbell, D.A. (2003). Access block: problems and progress. *Medical Journal of Australia*, 178(3), pp. 99-100.

Catalano, P., Chikritzhs, T., Stockwell, T.R., Webb, M., Rohlin, C.-J. and Dietze, P. (2001). *Trends in per capita alcohol consumption in Australia, 1990/91 - 1998/99. National Alcohol Indicators Bulletin No. 4*. Perth, Western Australia: National Drug Research Institute, Curtin University of Technology.

Catalano, P., Chikritzhs, T., Stockwell, T.R., Webb, M., Dietze, P. and Rohlin, C.-J. (2001). *Trends in per capita alcohol consumption in Australia, 1990/91-1998/99, Monograph No. 4. NDRI Monograph No. 4*. Perth, Western Australia: National Drug Research Institute, Curtin University of Technology.

Chikritzhs, T., Jonas H., Heale P., Dietze P., Hanlin K. and Stockwell T. (1999). *Alcohol-caused deaths and hospitalisations in Australia. National Indicators Project, Bulletin No. 1.* Perth, Western Australia: National Drug Research Institute, Curtin University of Technology.

Chikritzhs, T., Stockwell, T.R., Hendrie, D., Ying, F., Fordham, R.J., Cronin, J., Olermann, K. and Phillips, M. (1999). *The public health, safety and economic benefits of the Northern Territory's Living With Alcohol Program 1992/2 to 1995/6. Monograph No. 2*. Perth, Western Australia: National Drug Research Institute, Curtin University of Technology.

Chikritzhs, T., Jonas H., Heale P., Dietze P., Hanlin K. and Stockwell T. (2000a). *Alcohol-caused deaths and hospitalisations in Australia. National Indicators Project, Technical Report No. 1.* Perth, Western Australia: National Drug Research Institute, Curtin University of Technology.

Chikritzhs, T., Stockwell, T.R., Heale, P., Dietze, P. and Webb, M. (2000b). *Trends in alcohol-related road injury in Australia, 1990-1997. National Alcohol Indicator Project, Bulletin No. 2*. Perth, Western Australia: National Drug Research Institute, Curtin University of Technology.

Chikritzhs, T., Jonas, H., Stockwell, T., Heale, P., and Dietze, P. (2001). Mortality and life years lost due to alcohol: a comparison of acute and chronic causes. *Medical Journal of Australia,* 19 (174), pp. 281-284.

Chikritzhs, T., Stockwell, T.R., Jonas, H., Stevenson, C., Cooper-Stanbury, M., Donath, S., Single, E. and Catalano, P. (2002a). Towards a standardised methodology for estimating alcohol-caused death, injury and illness in Australia. *Australian and New Zealand Journal of Public Health*, *26* (5), pp. 443-450.

Chikritzhs, T., Unwin, L., Codde, J., Catalano, P. & Stockwell, T. (2002b) *Alcohol-related codes: Mapping ICD-9 to ICD-10*. Perth, Western Australia: National Drug Research Institute, Curtin University of Technology.

Collins, D. J. and Lapsley H. M. (2002). *Counting the cost: Estimates of the social costs of drug abuse in Australia in 1998-9.* National Drug Strategy Monograph Series No. 49. Canberra: Commonwealth Department of Health and Ageing.

Distilled Spirits Industry Council of Australia Inc. (2002). *Attachments for DSICA submission to the Senate Economics Legislation Committee,* Melbourne, Australia: DSICA.

Donath, S. (1999). Estimated alcohol consumption in the 1995 National Health Survey: some methodological issues. *Australian and New Zealand Journal of Public Health*, 23:131-4.

Duckett, S.J. (1998). Casemix funding for acute hospital inpatient services in Australia. *Medical Journal of Australia,* 169, pp. s17-s21

Edwards, G. A. P., Babor T. F., Casswell S., Ferrence R., Giesbrecht N., Godfrey C., Holder H.D., Lemmens P., Mäkelä K., Midanik L. T., Norström T., Österberg E., Romelsjö A., Room R., Simpura J. and Skög O.-J. (1994). *Alcohol Policy and the Public Good.* New York: Oxford University Press.

English, D. R., Holman C. D. J., *et al*. (1995). *The Quantification of drug caused morbidity and mortality in Australia*, 1995 edition. Canberra: Commonwealth Department of Human Services and Health.

Gray, D. (2000). Indigenous Australians and liquor licensing restrictions. Invited and refereed editorial. *Addiction*, *95*(10), pp. 1469-1472.

Heale, P., Chikritzhs, T., Jonas, H., Stockwell, T.R. and Dietze, P. (2002). Estimated alcohol-caused deaths in Australia, 1990-1997. *Drug and Alcohol Review*, *21* (2), pp. 121-129.

Heale, P., Stockwell, T.R., Dietze, P., Chikritzhs, T. and Catalano, P. (2000). *Patterns of alcohol consumption in Australia, 1998. National Alcohol Indicators Project, Bulletin No. 3*. Perth, Western Australia: National Drug Research Institute, Curtin University of Technology,

Holman, C.D.J., Armstrong, B.K., Arias, L.N., Martin, C.A., Hatton, W.M., Hayward, L.D., Salmon, M.A., Shean, R.E. and Waddell, V.P. (1990). *The quantification of drug caused morbidity and mortality in Australia 1988, Parts 1 and 2*. Canberra: Commonwealth Department of Health, Housing, Local Government and Community Services, AGPS.

Holman, C.D.J., Armstrong, B.K. (1990). *The quantification of drug caused mortality in Australia 1989*. A report prepared for the Department of Community Services and Health. Canberra: AGPS.

McAllister, I. (2003). *Alcohol consumption among adolescents and young adults.* Report commissioned by the Distilled Spirits Industries Council of Australia.

Matthews, S., Chikritzhs, T., Catalano, P., Stockwell, T.R. and Donath, S. (2002). *Trends in alcohol-related violence in Australia, 1991/92-1999/00. Bulletin No. 5*. Perth, Western Australia: National Drug Research Institute, Curtin University of Technology,

National Health and Medical Research Council (1992). *Is there a safe level of daily consumption of alcohol for men and women? Recommendations regarding responsible drinking behaviour.* Canberra: NHMRC.

National Health and Medical Research Council (2001). *National Alcohol Guidelines: risks and benefits of consumption*. Commonwealth Department of Health and Aged Care. Canberra: AGPS.

Norström, T. and Skög, O.-J. (2001). Alcohol and mortality: Methodological and analytical issues in aggregate analyses. *Addiction,* 96 (S1), pp. S5-S17.

Ridolfo, B. and Stevenson, C. (2001). *The quantification of drug-caused mortality and morbidity in Australia, 1998*. Canberra: Australian Institute of Health and Welfare.

Stevenson, R.J., Lind, B. and Weatherburn, D. (1999). The relationship between alcohol sales and assault in New South Wales, Australia. *Addiction* 94 (3), pp. 397-410.

Stockwell, T.R., Donath, S., Cooper-Stanbury, M., Chikritzhs, T., Catalano, P. and Mateo, C. (2002). Under-reporting of alcohol consumption in household surveys: a comparison of quantity-frequency, graduated-frequency and recent recall. *Addiction*. (In Press)

Stockwell, T.R., Masters, L., Phillips, M., Daly, A., Gahegan, M., Midford, R. and Philp, A. (1998). Consumption of different alcoholic beverages as predictors of local rates of night-time assault and acute alcohol-related morbidity. *Australian and New Zealand Journal of Public Health*, *22*(2), pp. 237-242.

Stockwell, T.R., Chikritzhs, T., Hendrie, D., Fordham, R.J., Ying, F., Phillips, M., Cronin, J. and O'Reilly, B. (2001). The public health and safety benefits of the Northern Territory's Living With Alcohol program. *Drug and Alcohol Review*, *20* (2), pp. 167-180.

World Drink Trends (2003). *International beverage alcohol consumption and production trends*. Henley-on-Thames: NTC Publications.

World Health Organization (2000). *International guide for monitoring alcohol consumption and related harm*. Geneva, Substance Abuse Department, WHO.

Appendix A

Table 26:
Alcohol-related conditions by sub-category including ICD-9 and ICD-10 codes

***Group* - Condition**	**ICD-9 Codes**	**ICD-10 Codes**
Acute		
Road crash Injury		
Non-pedestrian	E810-E819 (excluding .7)	V12-V14 (.3 -.9), V19.4-V19.6, V19.9, V20-V28 (.3 -.9), V29-V79 (.4 -.9), V80.3-V80.5, V81.1, V82.1, V82.9, V83.0-V86 (.0 -.3), V87.0-V87.9, V89.2, V89.3, V89.9
Pedestrian	E810-E819 (.7 only)	V02-V04 (.1, .9), V06.1, V09.2, V09.3
Suicide	E950-E959	X60-X84, Y87.0
Assault/homicide		
Assault	E960- E969, E904.0 (age >14)	X85-Y09, Y87.1 (age >14)
Child abuse	E960- E969, E904.0 (age <15)	X85-Y09, Y87.1 (age <15)
Other injury		
Fall injuries	E880-E888, E848	W00-W19
Fire injuries	E890-E899	X00-X09
Drowning	E910	W65-W74
Occp. & machine injuries	E919, E920, E928.8	W24-W31, W45, W60
Alcohol poisoning	980.0, 980.1, E860.0, E860.1, E860.2, E860.9	X45, Y15, T51.0, T51.1, T51.9
Aspiration	E911	W78-W79
Alcohol abuse and psychosis		
Alcoholic psychosis	291	F10.3-F10.9
Alcohol abuse	305.0, 303.0	F10.0, F10.1
Other acute medical		
Stroke – haemorrhagic	430-432	I60-I62, I69.0-I69.2
Stroke – unspecified (part)	436, 438	I64, I69.4, I69.8
Gastro-oesophageal haemorrhage	530.7	K22.6
Alcoholic gastritis	535.3	K29.2
Acute pancreatitis	577.0	K85

Group - Condition	ICD-9 Codes	ICD-10 Codes
Spontaneous abortion	634	O03
Low birth weight	656.5, 764, 765	O36.5, P05, P07
Chronic		
Alcoholic liver cirrhosis	571.0-571.3	K70
Alcohol dependence	303.9	F10.2
Cardiovascular disease		
Ischaemic heart disease	410-414	I20-I25
Heart failure	428-429	I50, I51, I97.1
Stroke – ischaemic	433-435, 437, 362.34	G45, I63, I65-I67, I69.3
Stroke – unspecified (part)	436, 438	I64, I69.4, I69.8
Cancer		
Oropharyngeal cancer	141,143-146,148,149	C01-C06, C09- C10, C12-C14
Oesophageal cancer	150	C15
Liver cancer	155	C22
Laryngeal cancer	161	C32
Female breast cancer	174	C50 (females only)
Other chronic medical		
Epilepsy	345	G40, G41
Alcoholic poly neuropathy	357.5	G62.1
Hypertension	401-405	I10-I15
Alcoholic cardiomyopathy	425.5	I42.6
Supraventricular cardiac dysrhythmias	427.0, 427.2, 427.3	I47.1, I47.9, I48
Oesophageal varices	456.0-456.2	I85, I98.20, I98.21
Unspecified liver cirrhosis	571.5-571.9	K74.3-K74.6, K76.0, K76.9
Cholelithiasis	574	K80
Chronic pancreatitis	577.1	K86.1
Alcohol-induced chronic pancreatitis	Not available	K86.0
Psoriasis	696.1	L40.0-L40.4, L40.8, L40.9

Source: Adapted from Chikritzhs et al (2002b)

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