National Drug Research Institute

Pouring practices of 65 to 74 year old current drinkers: implications for drinking guidelines and estimates of risk.

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Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

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Acknowledgments

This thesis involved interviews with 32 key informants across Australia and over 800 men and women in Perth. Without the generosity of these men and women the research would not have been possible. I take this opportunity to thank all those people who volunteered to participate in the research. I also thank Julie, Kerry, Maggie, Gillian, Pip, Denise and Vic who worked as interviewers. They were always extremely professional, and great fun to work with. Thank you very much.

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Abstract

Aims: This research involved three studies. The aim of Study 1 was to conduct a national key informant survey to investigate appropriate alcohol guidelines for 65 to 74 year old Australian men and women. The aim of Study 2 was to assess the accuracy of self-reported alcohol consumption amongst a sample of 65 to 74 year old men and women based upon an examination of their alcohol pouring practices. The aim of Study 3 was to assess the prevalence of at-risk alcohol consumption amongst an Australian national sample of 65 to 74 year old current drinkers based upon the recommended alcohol guidelines from Study 1 and the results from investigation of the pouring practices of participants from Study 2.

Methods: ***Study 1*** involved telephone interviews with 32 key informants from across Australia to investigate potential alcohol guidelines for older Australians. ***Study 2*** involved face-to-face interviews with 844 men and women aged 65 to 74 years of age from Perth, Western Australia. All participants had consumed at least one full serve of alcohol in the prior twelve months. Participants were required to pour their "usual" amount of alcohol and were then interviewed about their alcohol consumption and the relationship between the amount of alcohol they poured and a standard drink. Participants were also invited to recommend alcohol guidelines for other older men and women. ***Study 3*** involved secondary analysis of the 2004 National Drug Strategy Household Survey (NDSHS) data set. Data from 2,300 Australian men and women aged 65 to 74 years were analyzed to determine the prevalence of at-risk consumption of alcohol based upon the results from Studies 1 and 2.

Results: Key informants recommended that older men should consume no more than 2 (mean=2.35) standard drinks per day to avoid the risk of long-term alcohol-related harm and no more than 3 (mean=3.55) standard drinks per day to avoid the risk of short-term alcohol-related harm. They also recommended that older women should consume no more than 1 (mean=1.45) standard drink per day to avoid the risk of long-term alcohol-related harm and no more than 2 (mean=2.45) standard drinks per day to avoid the risk of short-term alcohol-related harm. These levels were significantly less than the National Health and Medical Research Council's (2001) Australian Alcohol Guidelines, which have been used in national

studies to assess the prevalence of alcohol-related risk amongst 65 to 74 year old Australians.

Results from Study 2 indicated that based upon amounts of alcohol poured by older men and women, men under-estimated alcohol consumption by 32% and women by 16%. However, following investigation of how individuals converted the amounts of alcohol that they poured into standard drinks, older Australian men underestimated their alcohol consumption by 23% and older women by 16%.

Data from the 2004 National Drug Strategy Household Survey (NDSHS), indicated that 2.9% of older Australian men were at-risk of short-term alcohol-related harm (based upon the NHMRC, 2001) alcohol drinking guidelines. However, when results from Studies 1 and 2 were used to re-eanalyze the data, the percentage of older Australian men at-risk of short-term alcohol-related harm increased to 12.6% (based upon key informant guidelines combined with the degree of under-reporting of consumption from Study 2). Similarly, the figures for older Australian women rose from 1.3% at-risk of short-term alcohol-related harm to 5.1%. For long-term harm, the percentage of older Australian men at-risk of harm rose from 10.2% to 35.2% and for older Australian women the figures increased from 8.0% to 30.9%.

Conclusions: Existing alcohol guidelines are not appropriate for older Australians. When used as a benchmark to ascertain the prevalence of at-risk drinking, they are likely to underestimate the extent of risk. As older people under-report their consumption of alcohol, doubt exists about the accuracy of present prevalence estimates of at-risk consumption amongst older people. Future research investigating prevalence of at-risk alcohol consumption should be based upon age appropriate alcohol guidelines and be adjusted to account for an under estimation in self-report. While younger age groups also over-pour standard drinks, without assessing' whether or not they convert these amounts to standard drinks in self-report surveys, it is not possible to ascertain whether the degree of under-reporting of consumption is larger or smaller with different age groups. Answering these questions is important from an epidemiological and public health perspective to provide accurate estimates of the prevalence of at-risk consumption across the population.

Chapter One: Introduction

1.1 Rationale for the study

Australia, like other developed countries, has a rapidly ageing population. The August 2006 national census identified 19,855,288 persons resident in Australia (Australian Bureau of Statistics 2007). The number of Australians aged 65 years and older was 2,644,374 representing 13.3% of the total population (Australian Bureau of Statistics 2007). Over the next 50 years the number of older people in Australia is expected to increase to 6.5 million, representing approximately 25% of the total population (Australian Bureau of Statistics 2000). As well as increasing in absolute numbers, and as a proportion of the total population, the age distribution within this older cohort is also changing. In the decade 2011 to 2021, the rates of increase in the numbers of older people are projected to be 28% for those aged 65 to 74 years, 17% for people aged 75 to 84 years and 50% for those aged 85 years and older (Australian Bureau of Statistics 2000, 2002a). It is also anticipated that the proportion of women in the 65 years and older age group will decrease from 56% in 2001 to 53% in 2021 (Australian Bureau of Statistics 2000). Moreover, according to the Australian Institute of Health and Welfare (2002c), rural and remote populations are expected to age at a greater rate than metropolitan populations.

The term older-person has been defined by the United Nations (2003) as any person over 60 years of age. However, in many countries, including Australia, the United Kingdom and the United States, the term older-person has been used to refer to anyone aged 65 years and older. As this definition can encompass people whose ages vary by many decades, the term older-person has been further divided into three age groups (Australian Association of Gerontology 2005, Broe 2004, Maddox 1985, Selvanathan & Selvanathan 2004). The oldest of the three groups, described as the very-old or oldest-old are people aged 85 years and older. The older-old group includes those people 75 to 84 years of age and the young-old, are aged 65 to 74 years. The young-old group is the largest, and by far the healthiest of the three age groups (Broe 2004).

The population shift evident in Australia and elsewhere is due to a reduction in birth rates and a simultaneous increase in life expectancy. In 2001-02, the median age of Australia's population was 35.9 years. By 2050-51 this is expected to increase to between 46.0 and 49.9 years (Australian Bureau of Statistics 2005). The declining mortality rates and increased life expectancy amongst Australians has led to an extended period of life spent in what has been traditionally referred to as "old age". In the year 2000, the average life expectancy for Australians was, 81.6 years for males and 87.2 years for females (Australian Institute of Health and Welfare 2002b). By 2060, the Australian Association of Gerontology (2005) predict that the average life span will reach 100 years for women with men slowly closing the gap.

Since the latter part of the twentieth century, population ageing has been a defining characteristic of all developed and many developing nations (Evans 2000, Lynskey, Day & Hall 2003, United Nations Department of Economic and Social Affairs Population Division 1998). In 1995, there were 566 million people aged 60 years or older constituting 10% of the world's population (United Nations Department of Economic and Social Affairs Population Division 1998). By 2050, the proportion of people aged 60 years or older is expected to triple, increasing to 2.8 billion, representing 30% of the world's population (United Nations Department of Economic and Social Affairs Population Division 1998). The global ageing phenomenon prompted the Director General of the World Health Organization (WHO) to conclude: "ageing of the global population is one of the biggest challenges facing the world in the next century" p.1 (Brundtland 1999).

As people reach old age they are at higher risk of developing chronic diseases, which may result in disability and death. The WHO (1999) have predicted that by 2020, cardiovascular diseases, diabetes and cancer will be the main contributors to the burden of disease in developed countries. Not surprisingly these diseases are most prevalent amongst older men and women (World Health Organization 2003). Although most of these diseases are diagnosed in old age, they are often caused by behaviours engaged in over many years. For example, long-term alcohol use has been linked to many of the conditions common to older populations such as mouth, pharyngeal, liver, colorectal and breast cancer (English, Holman, Milne, Winter, Hulse, Codde, Corti, Dawes, de Klerk, Knuiman,

Kurinczuk, Lewin & Ryan 1995, Hamajima, Hirose & Tajima 2002, Ridolfo & Stevenson 2001, Smith-Warner, Spiegelman, Yaun, van den Brandt, Folsom, Goldbohm, Graham, Homberg, Howe, Marshall, Miller, Potter, Speizer, Willett, Wolk & Hunter 1998, The World Cancer Research Fund and American Institute for Cancer Research 1997, Thun, Peto, Lopez, Monaco, Henley, Heath & Doll 1997, World Cancer Research FundI American Institute for Cancer Research 2007, World Health Organization 2003).

Apart from caffeine, alcohol is the most widely used psychoactive recreational drug in Australia (Australian Institute of Health and Welfare 1999, 2002a, 2005b, 2007). In the financial year 2000/01, the average Australian aged 15 years or older consumed 9.32 litres of pure ethanol (Chikritzhs, Catalano, Stockwell, Donath, Ngo, Young & Matthews 2003). The net government revenue from alcohol taxation increased from $3.6 billion in the period 1995-96 to $5.1 billion in 2004-05 (Australian Institute of Health and Welfare 2007). Based upon results from the 2004 National Drug Strategy Household Survey (NDSHS), 84% of the Australian population aged 14 years and over had consumed at least one full serve of alcohol in the past 12 months, and 9% drank alcohol on a daily basis. Amongst Australians aged 60 years and older, 17% reported drinking alcohol on a daily basis (Australian Institute of Health and Welfare 2005a).

For many people alcohol forms part of an enjoyable and healthy lifestyle (National Health and Medical Research Council 2001). According to Chikritzhs et· al.(2003), 6,193 premature deaths were prevented in Australia in 2001, due to the protective effects of low-risk alcohol consumption. Conversely, in the same year, alcohol consumption caused the deaths of 5,054 Australians. Despite the numbers of lives saved outweighing the number of deaths caused by alcohol, in terms of premature loss of years of life, the net outcome was negative (Chikritzhs *et al.* 2003). Those deaths prevented by alcohol invariability involved people aged 45 years and older with fewer years of life remaining (nine years on average saved), while the lives lost from alcohol primarily involved younger people with long life expectancies (16 years on average lost) (Chikritzhs *et al.* 2003). Between 1992 and 2001, over 31,000 Australians died from alcohol-caused injury and disease, and in the eight years between 1993/94 and 2000101 over half a million hospitalisations in Australia were caused by alcohol (Chikritzhs *et al.* 2003). In 2004-05, Collins,

Lapsley and University of New South Wales (2008) concluded that based upon crime, violence, treatment costs, loss of productivity and premature death, alcohol cost the Australian community $15.3 billion.

To provide Australians with knowledge that would enable them to enjoy alcohol while minimising harmful consequences, the National Health and Medical Research Council (NHMRC) developed the *Australian Alcohol Guidelines: Health Risks and Benefits* with recommendations for low-risk drinking (National Health and Medical Research Council 2001). The NHMRC use the term standard drink when making recommendations about drinking limits. In Australia, one standard drink refers to a beverage containing 1 grams (equivalent to 12.5 millilitres) of alcohol (National Health and Medical Research Council 2001). The Australian Alcohol Guidelines contain twelve specific guidelines targeting different subsections of the population. According to the NHMRC's Australian Alcohol Guideline 1 (for the whole population), to minimise risks in the short and long-term, and gain any longer-term benefits from alcohol, males should consume: i) an average of no more than four standard drinks a day; ii) no more than 28 standard drinks over a week; iii) not more than six standard drinks in anyone day; and iv) have one or two alcohol-free days per week.

According to the NHMRC (2001) alcohol guidelines women should: i) consume an average of no more than two standard drinks a day; ii) no more than 14 standard drinks over a week; iii) not more than four standard drinks in anyone day; and iv) have one or two alcohol-free days per week.

Guideline 1 forms the basis for the majority of drinking prevalence estimates in Australia (Australian Bureau of Statistics 2006, 2007, Australian Institute of Health and Welfare 2002a, 2004, 2005b). Using these guidelines, it was estimated that in 2004, one in ten Australians consumed alcohol at levels that placed them at-risk for alcohol related harm in the long-term. For males, the peak occurred in the 20 to 29 year age group, where 6% drank at high-risk levels (defined as drinking seven or more standard drinks per day) and 9% drank at risky levels (defined as five to six standard drinks per day). For females, the peak was also in the 20 to 29 year age group, where 3% drank at high-risk levels (defined as drinking five or more standard drinks per day) and 12% drank at risky levels (defined as drinking three

to four standard drinks per day) (Australian Institute of Health and Welfare 2004, National Health and Medical Research Council 2001).

While more younger males and females drank at high-risk levels than other age groups, alcohol-related deaths among Australian males peaked in the 65 to 69 year age group, and among women the peak was in the 70 to 74 year age group (Chikritzhs, Jonas, Heale, Stockwell, Dietze, Hanlin & Webb 2000, English *et al.* 1995). These deaths were primarily caused from degenerative conditions such as alcoholic liver disease, alcohol dependence, cardiovascular disease, and cancer (Chikritzhs *et al.* 2003).

Although the NHMRC's (2001) Guideline 1 is used to estimate the prevalence of at-risk alcohol consumption amongst older Australians, Guideline 8, which refers to older people, states: "*older people are advised, if they drink, to consider drinking less than the levels set in Guideline 1*." p.13 (National Health and Medical-Research Council 2001).

How much less older people should drink is speculative, as there are gaps in the evidence base from which the Australian Alcohol Guidelines were derived (National Health and Medical Research Council 2001). Accordingly, the NHMRC Working Party recommended that further research was required on alcohol use amongst older people.

With the significant ageing of the Australian population, the NHMRC Working Party's recommendation is timely. Even if current patterns of alcohol consumption in Australia remain stable it is likely that there will be an increase in the number of older Australians at-risk of alcohol related problems simply because of the increased numbers of older adults. However, if, as some researchers have suggested, there is an increase in drinking rates amongst future generations of older people (Degenhardt, Lynskey & Hall 2000) there may well be a concomitant increase in the prevalence of alcohol-related problems.

In addition, as estimates of the prevalence of at-risk drinking among older Australians are based upon the alcohol consumption levels dictated by the NHMRC's Australian Alcohol Guideline 1, it is probable that estimates of at-risk

consumption amongst older people are an underestimation. Furthermore, prevalence estimates of at-risk drinking have primarily been based on evidence drawn from self-reported consumption. In 2001, the self-reported alcohol consumption data from the NDSHS accounted for between 53% (usual drinking) and 78% (drinking on day before the survey) of per capita alcohol sales (Chikritzhs *et al.* 2003). The validity of self-report data may be influenced by a range of factors. Three of these factors include i) how well an individual understands what is meant by the term a "standard drink"; ii) how accurately this compares to the amount of alcohol a person pours each time they have a drink of alcohol; and iii) a persons ability to convert their own drinking quantities into standard drinks.

A handful of studies have examined the pouring of alcoholic beverages in relation to- standard drinks. Lemmens (1994), reported that wine drinkers in the Netherlands poured amounts 4% above a standard drink. From a sample of pregnant women in the U.S., Kaskutas and Graves (2000) found that wine drinkers underestimated the amount of alcohol they consumed by 30%. More recently, Kerr, Tujague, Greenfield and Brown (2004b) examined wine consumption and pouring amongst a general population sample in the U.S., and found that young women, middle aged males, white women, and black (sic) and Hispanic males drank 70% to over 100% more pure alcohol than reported in self-report drink measures. Women aged 55 years and older were found to consume 12% more than estimated from self-report (Kerr *et al.* 2004b). In an Australian study, of people aged 18 years of age or older, Stockwell, Blaze-Temple and Walker (1991) examined ability to correctly pour a standard drink of beer and/or wine, and reported that even when standard drink labels were included on wine and beer bottles, wine drinkers had greater difficulty in correctly estimating a standard drink, than beer drinkers.

None of these aforementioned studies focused on results for participants aged 65 years or older, nor were any participants asked to compare the volume of alcohol poured to a standard drink. Considering the discrepancy between self-reported consumption and per capita alcohol sales (Chikritzhs *et al.* 2003) research that investigates the accuracy of self reported alcohol consumption is important. In light of estimates by the Australian Bureau of Statistics (2000) that within 50 years,

older people will represent 25% of the population, specific research that investigates the drinking practices of older people is warranted.

Despite an ageing population, and the high prevalence of alcohol use in society, little research on alcohol use amongst older people has been conducted in Australia (Lynskey *et al.* 2003). The paucity of research has lead Gilhooly (2005) to conclude, "Data on alcohol use amongst elderly people is of relatively poor quality and even lower quantity" (p.269).

One important area is the validity of prevalence estimates of at-risk alcohol consumption amongst older people.' Two factors that will improve the validity of prevalence estimates are: i) appropriate alcohol guidelines for older Australians; and ii) the availability of data on the accuracy of self-reported alcohol consumption as it relates to pouring practices. Research that is able to combine both of these elements is likely to produce more valid prevalence estimates of at-risk consumption. To that end, this thesis focused on simultaneously addressing these issues. The young-old constitute the core research population of this thesis, as they currently represented the largest group of older Australians (Australian Bureau of Statistics 2007, Australian Institute of Health and Welfare 2002c, Broe 2004) and have the higher prevalence of alcohol use (O'Halloran, Britt, Valenti, Harrison, Pan & Knox 2003).

1.2 Design overview

This thesis consisted of three studies. **Study 1** entailed telephone interviews with 32 key informants from across Australia who worked within the ageing, geriatric, addiction and general medical services. Two of the key informants had also been members of the 2001 NHMRC Working Party responsible for developing the Australian Alcohol Guidelines. Key informants were asked questions on alcohol prevention and treatment issues and alcohol guidelines. This information was used to develop a set of alcohol guidelines for older Australians against which at-risk consumption might be assessed.

Study 2 included face-to-face interviews with 359 men and 485 women. Eligible participants were aged between 65 to 74 years, resided in Perth, Western Australia, and had consumed alcohol in the past 12 months. Participants were asked to:

- pour their normal serving of alcohol;
- complete an alcohol assessment instrument;
- estimate how their poured serving compared to standard drink measurements;
- answer questions concerning definitions of standard drinks and the current NHMRC Australian Alcohol Guidelines; and
- recommend appropriate alcohol guidelines for other 65 to 74 year old Australians.

This information was used to estimate the degree of under-reporting of alcohol consumption amongst the sample.

Study 3 involved a secondary analysis of alcohol data from the 2004 National Drug Strategy Household Survey for 65 to 74 year olds. In this final study, the alcohol guidelines developed in Study 1 and the results on under-reporting from Study 2 were used to produce revised estimates of the prevalence of short-term and long-term at-risk drinking for Australian 65 to 74 year old current drinkers.

Chapter Two: Literature review

This literature review covers a range of areas. The review commences with a discussion about why people use alcohol and includes reference to psychosocial explanations for alcohol use. After reviewing general explanations for alcohol use in the wider community, the focus narrows to review the reasons for alcohol use amongst older people. To contextualize the review, an historical perspective on alcohol use patterns in Australia and internationally over the past 74 years is provided. This part of the review helps to explain some of the reasons for the patterns and levels of alcohol consumption amongst the current generation of older Australians. In exploring alcohol consumption, the review then investigates alcohol screening instruments and their appropriateness for use with older people. This review is seminal in understanding national variations in alcohol use and highlights some of the difficulties inherent to research investigating alcohol use amongst older people. Looking to the future, the literature review explores how alcohol use amongst older people may change with future generations.

The second section of the literature review discusses Australian and international alcohol guidelines and explores their relevance for older populations. As most national alcohol guidelines have been based upon assessment of the balance between accrued harm and potential benefits, the next section of the literature review appraises some of the recent literature on alcohol harm and benefits with a particular focus on older people.

The final section of the literature review critiques the published literature on pouring practices. This includes a review of research that has examined people's knowledge of standard drinks, how accurately people pour alcoholic drinks in relation to a standard serve of alcohol and differences noted between beverage types and populations.

The publications included in the literature review came from searching the following data-bases: ProQuest, Science Direct, Medline, Psych Lit and AgeLine. In the initial review of the literature, the terms: alcohol, old, elderly, seniors, people, alcohol, alcohol consumption, drinking, pouring, alcohol related problems, cancer, epidemiology, falls, cognition, dementia, trauma, guidelines, drinking

recommendations, health, total body water, prevalence, screening, demography etc. were used as keywords. Following this initial scanning process, ScienceDirect and ProQuest were identified as the most productive search engines. As such, electronic alerts were set up on specific strings in both these databases. For example, in Science Direct, alerts were established using the terms: alcohol and elderly-substance abuse; public health; aging; alcohol and elderly. In ProQuest, an alert was established using the terms: older people or senior citizen or elderly people and alcohol use or alcohol consumption. Electronic alerts were received from these sources via email once per week. Searches of the National Institute of Alcoholism and Alcohol Abuse (NIAAA) database, Cochrane Collaboration and the internet (Google and Google scholar) were also undertaken.

During the first 12 months of research, the ProQuest, Science Direct, Medline, PsychLit and AgeLine search engines were scanned for new relevant publications every month. The review of the literature commenced in February 2004 and closed in November 2007. All publications that were printed in English and related to the research were reviewed. In addition, articles were sourced from the reference lists of accessed articles and organisations such as the Australian Institute of Health and Welfare, Government of Australia, Australian Bureau of Statistics, WHO, United Nations, NIAAA. This process resulted in 740 publications being included in a bibliography. This bibliography formed the basis for the literature review. As research has demonstrated that period and cohort effects (Glynn, Bouchard, LoCastro & Laird 1985, Levenson, Aldwin & Spiro 1998, Neve, Diederiks, Knibbe & Drop 1993) are likely to impact on alcohol consumption, the discussion on the current prevalence of alcohol use amongst people aged 60 years and older was limited to research available from the past 12 years. Only· studies that specifically included results for Australians aged 60 years and older were included. Similarly, the review of international literature assessing current alcohol consumption amongst older people, was limited to publications available since 2000. However, because of the large number of publications sourced from the U.S., only research published since 2003 was reported.

2.1 Why older people drink alcohol

With the exception of caffeine, alcohol is the most widely used drug in Australia (Australian Bureau of Statistics 2006, Australian Institute of Health and Welfare

2004, 2005b, Makkai & McAllister 1998), with over 80% of people aged 14 years and over consuming alcohol in the prior 12 months (Australian Institute of Health and Welfare 2005a). This equates to over 13.7 million Australians aged 14 years and over consuming alcohol in the last 12 months (Australian Institute of Health and Welfare 2005a). According to the Australian Institute of Health and Welfare (2005a) in 2004, almost 1.5 million Australians drank alcohol each day, 6.8 million on a weekly basis and a further 5.5 million on a less than weekly basis. There were 150,000 more daily drinkers in 2004 than in 2001 (Australian Institute of Health and Welfare 2005a). Australia's long history with alcohol consumption, has given alcohol "a unique place in Australian culture as a drug that plays a well accepted role in social interactions" p.1 (McBride 2002).

This status and acceptance of alcohol may be explained by a range of environmental factors, such as advertising, family and peer influences, sanctions; drug factors, such as pricing, availability, effects; and individual factors such as beliefs, and. expectations. Consideration of these three factors is a feature of both the public health (Miller & Hester 1995) and Zinberg's (1984) model of drug use. People use alcohol, or any other drug, because they perceive its use to have beneficial pharmacological effects, because its provides membership of a social group and/or because its use is reinforced through participation in social rituals (Moore 1996). As described by Room (1977) who wrote of the two worlds of alcohol, understanding alcohol use amongst individuals in the community and explaining the alcohol problems of individuals who present for treatment are different propositions.

People's beliefs about the effects of alcohol on mood, behaviour and emotion have been shown to play a significant role in the initiation and maintenance of drinking (Bauman & Bryan 1980, Goldman, Brown & Christiansen 1987, Hasking & Oei 2007, Leigh & Stacy 2004, Maisto, Connors & Sachs 1981). According to Heath (1999) and Peele and Brodsky (2000) sociability, leisure, relaxation and celebration are common reasons for alcohol consumption. Other research (Cooper, Frone, Russell & Mundar 1995, Cooper, Russell, Skinner & Windle 1992) has highlighted mood enhancement and stress reduction as prominent reasons for alcohol consumption.

These explanations for drinking also resonate with older people. When Eliany, Giesbrecht, Nelson, Wellman and Wortley (1992) asked 8,760 people of varying ages in Canada what their reasons were for drinking, 73% of people aged 65 years and older replied that they drank to be sociable, 44% reported drinking to add to the enjoyment of meals, 33% to relax and 24% to feel good.

Later research by Graham, Clarke, Bois, Carver, Dolinki, Smythe and Harrison (1996) using a sample of 826 people aged 65 years and older, found a positive linear relationship between frequency of alcohol consumption (specific beverages were not investigated) and the degree to which individuals liked the taste. Drinking to relax, to feel good and to relieve tension and anxiety were also positively associated with frequency of drinking. Volume of drinking per drinking day was significantly associated with personal effects reasons for consumption (i.e. to relax, feel good, pass the time, forget worries, and block out loneliness). In research conducted by Khan, Wilkinson and Keeling (2006) social reasons were also nominated as the most common reasons for drinking amongst a sample of 100 current drinkers aged 65 years and older in New Zealand.

Illness and pain, stress, boredom, to replace meals, to keep warm, bereavement and loneliness have also been cited as reasons for drinking amongst older people (Alcohol Concern 2002, Brown & Chiang 1984, Clough, Hart, Nugent, Fox & Watkins 2004, Glynn et at. 1985, Patterson & Jeste 1999, Zimberg 1978). Graham and Schmidt (1999) also reported that poorer psychological well-being, especially depression was correlated with heavier drinking amongst older people.

Retirement can also have an impact on drinking. Some authors (Alexander & Duff 1988, Ekerdt, DeLabry, Glynn & Davis 1989, Perreira & Sloan 2001) have argued that retirement can increase alcohol consumption as it is associated with a loss of status, a sense of role-lessness (sic) and feelings of social marginalisation. Secondly, retirement may provide greater opportunities for alcohol consumption because people are subject to fewer restrictions (e.g. work commitments) and thus experience fewer adverse social consequences when they drink. Finally, retirees may become involved in subcultures such as retirement communities in which permissive drinking norms may be encouraged.

Conversely, other researchers (Adams 1996, Gomberg 1980, Gurnack & Thomas 1989) argued that being in the workplace and exposed to work stress and permissive job-based drinking cultures represent a greater threat to workers' drinking behaviour than does retirement. To examine this issue, Bacharach, Bamberger, Sonnen and Vashdi (2004) interviewed 1,279 workers from nine national local unions representing three blue collar sectors in the U.S. and then re-interviewed participants one year later. Subjects ranged in age from 43 to 70 years. In relation to drinking patterns, there was no significant difference between participants who were fully retired or continued working, although the former were twice as likely as those still employed to engage in periodic binge drinking. Unfortunately, as participants were only followed up for 12 months, conclusions about longer-term drinking patterns were not possible.

In relation to gender, research has consistently shown that men consume larger volumes of alcohol than women (Adlaf, Begin & Sawka 2005, Anderson & Baumberg 2006, Australian Bureau of Statistics 2006, Australian Institute of Health and Welfare 2002a, 2005a, Barnes 1979, Bjork, Vinther-Larsen, Thygesen, Johansen & Gronbaek 2006, O'Halloran et 81. 2003).

Demographic factors such as marital status, level of education and income also influence consumption. For example, amongst married couples aged 65 years and older, Graham and Braun (1999) found that patterns of alcohol consumption converged. That is, if the partner of an individual was a drinker then that individual had a tendency to drink more frequently and consume more alcohol overall than those individuals with abstinent partners. Graham and Braun hypothesised that wives had a moderating effect on the volume of alcohol consumed by their husbands but tended to increase their own drinking frequency to similar levels as their husbands. Widowed, divorced and separated men, no longer exposed to this moderating effect saw their drinking levels once again increase. Graham and Braun (1999) also reported that those who had higher levels of education were more likely to drink alcohol.

In contrast, Moos, Brennan, Olsen, Tjonneland and Groenbaek (2005) who interviewed 1,291 people aged 55 to 65 years over a ten-year period, found that married individuals were less likely to abstain and to drink more heavily than those

who were not married. Similarly, research by Khan, Davis, Wilkinson, Sellman and Graham (2002) with a community dwelling study of people aged 70 years and over also found that those who were married were significantly more likely to be classified as hazardous drinkers (based upon the AUDIT) than those men and women who were not married. Other research conducted in Denmark (Bjork *et al.* 2006) and the U.S (Breslow, Faden & Smothers 2003, Moore, Giuli, Gould, Hu, Zhou, Greendale & Karlamangla 2006) also reported heavier alcohol consumption amongst elderly people who were married rather than single.

Psychosocial factors are also useful in helping to understand alcohol use amongst older people. For example, research by Graham (1998) demonstrated that older lifetime abstainers and infrequent drinkers gave the following reasons for not drinking: no interest in drinking, brought up not to drink and religious reasons.

Deterioration in health is also important in explaining why many older people reduce or stop drinking alcohol. The view that people will reduce their alcohol consumption if their health deteriorates was originally proposed by Stall (1987) who developed the morbidity hypothesis to explain the reduction in alcohol consumption with increasing age. According to the hypothesis, as the prevalence of chronic disease increases amongst older people, fewer individuals consume alcohol because of the fear that to do so would aggravate their medical conditions. There is now a considerable body of literature reporting that health is an important predictor of declining alcohol use (Graham 1998, Green & Polen 2001, Khan *et al.* 2006, Moos *et al.* 2005, Paganini-Hill, Kawas & Corrada 2007a, Poikolainen, Vartiainen & Korhonen 1996, Rice, Connell, Weisner, Hunkeler, Fieman & Hu 2000, Straus 1984, Vahtera, Poikolainen, Kivimaki, Ala-Mursula & Pentti 2002, Vogel-Sprott & Barrett 1984).

In research by Moos and colleagues (2005) who interviewed 1,291 community residents (aged 55-65 years at baseline) and reinterviewed participants one year, four years and ten years later, individuals who developed adverse medical conditions or physical symptoms and were required to take medication, were more likely to reduce their frequency of drinking or abstain from alcohol. However, at the ten-year follow up, life history and health burden only explained an average of

4.5% of the variance in alcohol consumption, indicating that alcohol use is not likely to be explained by anyone or two factors.

As with younger populations, older people drink for a variety of reasons. According to Peele (1997) and Poikolainen and Vartiaiene (1999) people who continue to drink alcohol over time, do so because they perceive a greater number of psychosocial incentives for drinking than disincentives. The longer a person drinks alcohol the greater the fluctuation that may occur in the relative balance between reinforcement and disincentive. Changes in the cultural acceptance of alcohol and altered regulations and controls are also likely to affect how individuals perceive the costs and benefits of alcohol use. Although alcohol now holds a unique status and level of acceptance in Australian culture, this was not always the case. The present cohort of young-old drinkers grew up at a time when the policies and community attitudes to alcohol were very different. As this may influence current patterns of consumption, the following section will explore alcohol use in Australia and internationally over the past seventy four years.

2.2 An historical perspective on alcohol use over the past 74 years

The current cohort of young-old Australians was born during the years 1931 to 1940. This was a period of tremendous social upheaval, which included the repeal of prohibition in the United States, the Great Depression and the beginning of the Second World War.

During the 1930's the temperance movement was very influential in many countries, including Australia, and there were strict restrictions in Australia on both the opening hours of licensed premises and the numbers of liquor licenses issued (McAllister, Moore & Makkai 1991). Such restrictions, coupled with the reduction in disposable income as a result of the economic effects of the Depression, meant that the consumption of alcohol in Australia was at an all time national low (McAllister *et al.* 1991, Norton 1983). Consequently, in comparison to later generations, Australians who grew up during this time had fewer opportunities to drink heavily during their young adult lives (Hall & Degenhardt 1998).

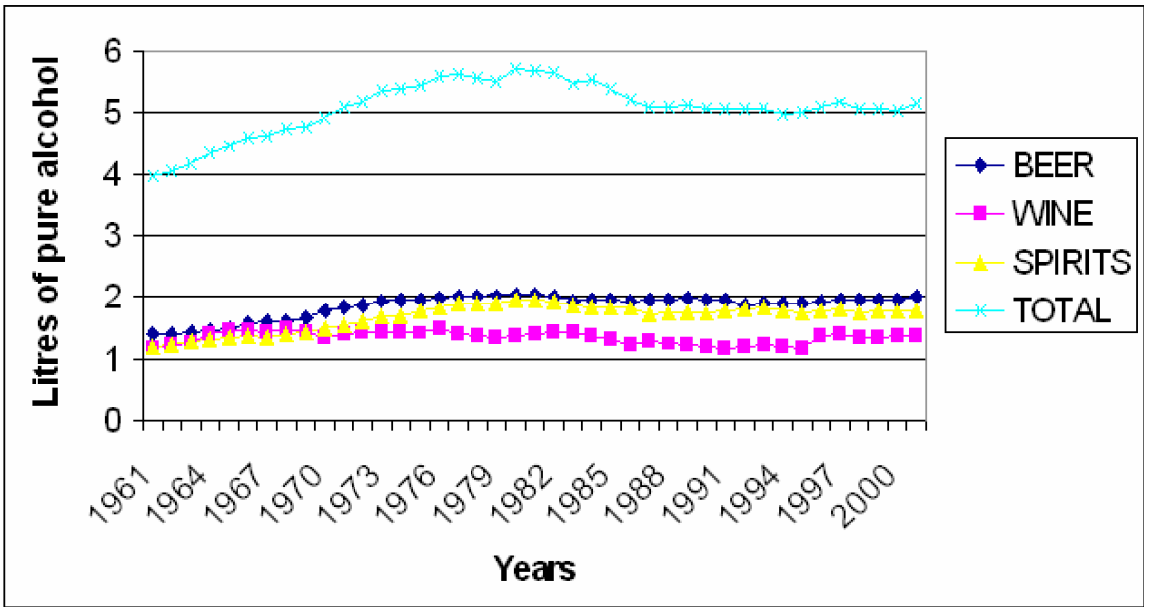
From 1930 until 1982, there was a steady increase in the apparent consumption of alcohol in Australia. This peaked in 1982 at 9.8 litres of alcohol per capita (World

Drink Trends 2004). Since 1982 however, there was a decline in alcohol consumption to 7.3 litres of pure alcohol per capita in 2001/02 (World Drink Trends 2004). From 1970 to 2002, consumption of beer in Australia decreased by 22.6%, consumption of wine increased by 131.2% and the consumption of spirits increased by 15.7% (World Drink Trends 2004). In 2002, Australia was ranked 23rd in the world in terms of per capita alcohol consumption, with the third highest consumption of all English speaking countries (World Drink Trends 2004). Apparent consumption of alcohol by Australians aged 15 years and older in the last ten years has remained relatively stable at approximately 10 litres per person per year (Australian Institute of Health and Welfare 2005b).

These patterns of alcohol consumption in Australia have generally reflected international trends. According to the WHO Department of Mental Health and Substance Abuse (2004), over the past 40 years the European Region, the African Region and the Region of the Americas all reached their highest consumption in the early 1980s. Regional data also indicated that for these regions (excluding Muslim countries) there was a trend towards convergence of consumption levels. In those regions with the highest consumption, levels were decreasing while in those areas with the lowest, their consumption was increasing.

Globally, across the past 40 years the mean adult per capita consumption of alcohol was 5.1 litres of pure alcohol, of which beer accounted for 1.9 litres, wine 1.3 litres, spirits 1.7 litres and other beverages 0.2 litres (World Health Organization Department of Mental Health and Substance Abuse 2004) (See Figure 1). According to Anderson and Baumberg (2006a) the European Union is the heaviest drinking region of the world. In 2003, the cost of alcohol to the European Union was estimated at 125 billion Euros (Anderson and Baumberg 2006a) which is in excess of $200 billion Australian dollars.

Figure 1: Un-weighted means of adult per capita consumption across all countries for total consumption, and beer, wine and spirits separately.



Source: World Health Organization, Department of Mental Health and Substance Abuse (2004).

Results from the 1988 National Campaign Against Drug Abuse Survey, indicated that 21% of men and 6% of women over 40 years of age were moderate to heavy drinkers, while 29% of men and 55% of women in this age group were abstainers or drank rarely (Commonwealth Department of Community Services and Health 1989).

Ten years later, Australian data from 1998 (when the present cohort of young-old were aged between 58 and 67 years) showed that amongst people aged 50 to 59 years, 61.6% of men and 37.1% of women were regular drinkers (Higgins, Cooper-Stanbury & Williams 2000). Data from the 2004 National Drug Strategy Household Survey (Australian Institute of Health and Welfare 2005b) indicated that 62% of men and 39.7% of women aged 60 and older, drank alcohol at least weekly. Although the National Campaign Against Drug Abuse surveys provide useful information on alcohol consumption in Australia, because of methodological differences (i.e. different samples selected, interview techniques, times of the year that interviews took place and different questions) the data can only be suggestive of changes in drinking patterns among different age groups over time (Clemens, Matthews, Young & Powers 2007).

A frequent result from Australian national surveys has been the relatively high prevalence of daily consumption amongst older age groups. In 2001, 16.1% of people aged 60 years and over drank alcohol on a daily basis compared to 8.3% of the population aged 14 years and older. In the same year, of the 13 million Australians who consumed alcohol in the prior 12 months, 2.5 million or 19% were aged 60 years and older (Australian Institute of Health and Welfare 2002a). Moreover, some 8% of older Australian men drank at levels that put them at-risk of harm in the long-term and 13.2% drank at levels that placed them at-risk of short-term harm. For women, these figures were 4.4% and 4.6% respectively (Australian Institute of Health and Welfare 2002a).

Data gathered in 2004 were similar. For those people aged 60 years and older, 7.9% of men and 5.2% of women reportedly drank at levels that put them at-risk of harm in the long-term, and 14.6% of men and 7.1% of women drank at levels that put them at-risk of short-term harm. This compared to 35.4% of persons aged 14 years and over who drank at levels that placed them at-risk for short-term harm and 7.8% who drank at levels that placed them at-risk of long-term harm (Australian Institute of Health and Welfare 2005a).

As all data from people 60 years and older were aggregated, it was not possible to determine the prevalence of risky consumption amongst different age groups of older people. If, as suggested by Saunders, Copeland, Dewey, Davidson, McWilliams, Sharma, Sullivan and Voruganti (1989), Temple and Leino (1989) Adams, Garry, Rhyne, Hunt and Goodwin (1990) and Moos, Schutte, Brennan and Moos (2004b) people drink less as they age then it is possible that the drinking levels of the young-old were minimised by aggregating their data with that from older age groups.

Although the prevalence of at-risk levels of consumption amongst older Australians have been perceived as low in comparison to younger age groups (Australian Institute of Health and Welfare 2005b) their use has not been harm free. For example, English, *et al.*(1995) reported that alcohol related deaths among all age groups of Australian males peaked in the 60 to 69 year age range, while for women the peak occurred in the 80 years and older group followed by those aged 60 to 69 years of age.

Similarly, Chikritzhs and Pascal reported that from 1994 to 2003, over 10,000 Australians aged 65 years and older died from alcohol attributable injury and disease caused by risky and high-risk drinking. More than half of these deaths (5,746) were among the 65 to 74 years age group (Chikritzhs & Pascal 2005a).

Of equal concern is evidence indicating that over the past decade the prevalence of alcohol related harm amongst older people has increased in some Australian jurisdictions. For example, Chikritzhs and Pascal (2005a) reported that based upon available data between 1993/94 to 2001/2 there was an increase in alcohol attributable hospitalisations among people aged 65 to 74 years in Victoria, Tasmania and Western Australia. During this time over 61,000 Australians aged 65 to 74 years were hospitalised for an alcohol attributable injury or disease. The most common causes of alcohol attributable hospitalisations were: falls, supraventricular cardiac dysrhythmias and alcohol dependence (Chikritzhs & Pascal 2005a).

The past seventy-four years have witnessed considerable changes in Australian alcohol beverage preferences, regulations and the social norms concerning the acceptability of alcohol consumption. In the 1930s, 1940s and 1950s the social norms concerning alcohol use were relatively conservative and this was reflected in low levels of consumption. Over the next thirty years consumption increased markedly along with the rise of corporate promotion of alcohol and the social acceptability of alcohol use (Sorocco & Ferrell 2006). Over the past two decades apparent per capita alcohol consumption has been relatively stable, however, beverage preferences appear to have changed substantially (World Drink Trends 2004). In an economic and demographic review of changes in alcohol consumption patterns over the past fifty years Selvanathan and Selvanathan (2004) concluded that while income and price have significantly influenced the consumption patterns of alcohol, the shift in consumer preferences as well as the increasing ageing of the Australian population have also played an important role.

2.3 Alcohol screening instruments

In recognition that people who use alcohol may experience problems, a range of screening and diagnostic instruments have been developed (Dawe, Loxton, Hides, Kavanagh & Mattick 2002). According to Dawe *et al.* (2002) screening instruments

need to be short, easily understood, simply scored and provide reliable information that will enable a clinical to decide whether further assessment and intervention is required. Although some screening and diagnostic instruments have been used to identify alcohol-related problems amongst older people, some questions have been raised about their appropriateness for this age group (Dawe *et al.* 2002).

According to Conigliaro, Kraemer and McNeil (2000) using generic alcohol screening for alcohol-related problems amongst older people was problematic as self-report may be unreliable due to cognitive impairment, and according to Dawe *et al.* (2002) the diagnostic criteria used in screening instruments may be inappropriate (e.g. employment) for use with older people. Subsequently, Dawe *et al.* (2002) concluded that, "the prevalence of alcohol and drug misuse is greatly underestimated in older persons" (p.48).

In this section, some of the more commonly used screening instruments will be reviewed to assess their appropriateness for use with older people. These instruments include:

- the Alcohol Use Disorders Identification test (AUDIT) (Saunders, Aasland, Babor, de le Fuente & Grant 1993). The AUDIT is a ten-item screening instrument developed by a WHO collaboration and is designed to screen for a range of drinking problems and in particular for hazardous and harmful consequences. A shortened version of the AUDIT is the AUDIT-C which contains five of the AUDIT questions;
- the Michigan Alcoholism Screening test (MAST) (Selzer 1971). The MAST is a 24-item screening tool designed to identify and assess alcohol abuse and dependence. Shortened versions of the MAST include the 13-item SMAST and 10-item BMAST;
- the CAGE (Ewing 1984) is a four-item screening instrument designed to identify and assess potential alcohol abuse and dependence;
- the T-ACE (Sokol, Martier & Ager 1989) is a four-item screening instrument that was originally developed to specifically identify at-risk drinking in pregnant women, but has also been used for men and non-pregnant women;

- TWEAK (Russell 1994), is a five-item screening tool. It was also originally developed to detect at-risk drinking amongst pregnant women, but has been shown to perform well in the general population (Cherpitel 1999);
- Severity of Alcohol Dependence Questionnaire (SADQ) (Stockwell, Hodgson, Edwards, Taylor & Rankin 1979), is a 20-item questionnaire designed to measure the severity of dependence on alcohol. A more recent version is the 16-item SADQ-C (Stockwell, Sithartan, McGrath & Lang 1994);
- Short Alcohol Dependence Data Questionnaire (SADD) (Raistrick, Dunbar & Davidson 1983), is a 15-item self-report questionnaire designed to assess the severity of alcohol dependence.; and,
- Alcohol Dependence Scale (ADS) (Skinner & Horn 1984), is a 25- item self-report questionnaire used to identify and assess alcohol dependence.

All of the three preceding instruments were based upon Edwards and Gross's (1976) alcohol dependence syndrome.

The other predominant diagnostic system for identifying alcohol related problems are those criteria set out in the Diagnostics and Statistical Manual of Mental Disorders- 4th edition, known as the DSM-IV (American Psychiatric Association 1994) and the International Classification of Disease or ICD-1 0 (World Health Organization 1992). According to Detels, McEwen, Beaglehole and Tanaka (2002) both the ICD-10 and DSM-IV classify substance "misuse" in terms of intoxication, dependence, withdraw; or psychosis. The criteria for alcohol dependence according to the DSM-IV include: the presence of tolerance; withdrawal from alcohol; a persistent desire or unsuccessful efforts to reduce use; time spent in activities to obtain/use or recover from alcohol; important social, occupational or recreational activities are given up or reduced because of alcohol use; alcohol use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused ort exacerbated by alcohol (American Psychiatric Association, 1994).

Over recent years, the ICD and DSM taxonomies have had greater convergence in terms of their criteria for diagnosing a disorder. For example the ICD-10 criteria

for alcohol dependence includes a cluster of physiological, behavioural, and cognitive phenomena in which the use of alcohol takes on a much higher priority for a given individual than other ¸behaviours that once had greater value. A central descriptive characteristic of the dependence syndrome is the desire (often strong, sometimes overpowering) to take alcohol. There may be evidence that return to alcohol use after a period of abstinence leads to a more rapid reappearance of other features of the syndrome than occurs with nondependent individuals. According to Dawe *et al.* (2002) both ICD and DSM diagnostic criteria have been used throughout Australia's hospital system.

There has been widespread debate regarding the sensitivity of these instruments with older populations (Gfoerer, Penne, Pemberton & Folsom 2003, Graham 1986, King, Van Hasselt, Segal & Hersen 1994, O'Connell, Chin, Cunningham & Lawlor 2003, Schofield & Tolson 2001). This has centred around concerns that older people may not exhibit the same adverse social, legal and occupational consequences of alcohol use as younger age groups (Fink & Beck 2005, Lakhani 1997, Luttrell, Watkin, Livingston, Walker, D'Ath, Patel, Shergill, Dain, Bielawska & Katona 1997, O'Connell *et al.* 2003).

The DSM-IV and the ICD-10 have been criticised as being deficient on precisely these grounds (Beckett, Kouimtsidis, Reynolds & Ghodse 2002, Dawe *et al.* 2002, O'Connell *et al.* 2003, Patterson & Jeste 1999). Similarly, Powell and Mcinnes (1994), Morton, Jones and Manganaro (1996) and Dawe *et al.* (2002) reported that the AUDIT had low sensitivity to alcohol use amongst older people in Australia and the U.S.

Dawe *et al.* (2002) have also criticised the MAST as being insensitive to alcohol use amongst older people, and concluded that the T-ACE and TWEAK were inappropriate because tolerance (a significant component of the T-ACE and TWEAK) were poor indicators of alcohol problems for this age group. Bush, Kivlahan, McDonnell, Fihn and Bradley (2003) also reported poor sensitivity of the TWEAK with a sample of older female veterans.

To overcome some of the sensitivity and specificity difficulties encountered in using general population screening instruments with older people, Blow, Brower,

Schulenberg, Demo-Dananberg, Young and Beresford (1992) developed the MAST-G. However, while the instrument had good sensitivity in the original U.S. sample it had poor sensitivity with older people in the U.K. (Luttrell *et al.* 1997). Similarly, the CAGE, while as sensitive as the MAST-G in the U.S., showed extremely low sensitivity in British emergency room patients (0.15 and 0.13) suggesting that U.S. instruments may need to be further tested and modified for other populations based upon cultural differences. Apart from cultural impediments, the CAGE is also renowned for the high incidence of false positives, as it assesses problems over a person's lifetime, rather than a discrete retrospective time period. For example, in a study with male veterans, Bridevaux, Bradley, Bryson, McDonnell and Fihn (2004b) reported that amongst a sample of 8,785 men who had not consumed any alcohol in the prior 12 months, 4,390 (26%) still screened positive on the CAGE as having an alcohol problem.

To ascertain which instrument may be the most appropriate to use with older samples, researchers have investigated the concordance of a number of screening instruments. For example, in a U.S. study with older veterans, Reid, Tinetti, O'Connor, Kosten and Concato (2003) assessed the concordance between Quantity/Frequency, a binge drinking question, the AUDIT, CAGE and questions on lifetime consumption. Only modest levels of agreement and concordance were found between any of the measures. When comparing the concordance between excessive alcohol consumption, the CAGE and a liver function test with a sample of 377 drinkers aged 65 years and older, Bari, Silvestrini, Chiarlone, Alfieri, Patussi, Timpanelli, Pini, Masotti and Marchioni (2002) reported that while 19% of the sample was deemed at-risk (average intake 40g/day for men and 20g/day for women) only 14% gave an affirmative response on the CAGE and only 6% had a positive liver function test.

Another screening tool which has been developed specifically for older people is the Alcohol-Related Problems Survey (ARPS) (Fink, Beck & Wittrock 2001 a, Fink, Beck & Wittrock 2001 b, Fink, Hays, Moore & Beck 1996, Fink, Morton, Beck, Hays, Spritzer, Oishi & Moore 2002a, Fink, Tsai, Hays, Moore, Morton, Spritzer & Beck 2002c). When the ARPS was compared to the CAGE, SMAST and AUDIT using a sample of 574 current drinkers aged 65 years and older, Fink, Tsai, Hays, Moore, Morton, Spritzer and Beck (2002b) reported that drinkers who screened

positive on the CAGE, SMAST or AUDIT were correctly classified by the ARPS 91%, 75% and 100% of the time respectively. Additionally, the majority of ARPS-identified hazardous or harmful drinkers did not screen positive on the CAGE, SMAST or AUDIT. Similarly, Moore, Beck, Babor, Hays and Reuben (2002) in comparing the ARPS and the shortened Alcohol Related Problems Survey (shARPS) with the AUDIT and the SMAST-G reported that both the ARPS and the shARPS were more sensitive than the AUDIT and the SMAST-G (Blow, Gillespie & Barry 1998) in identifying older people who may be at-risk of experiencing alcohol-related harm.

In a systematic review of the effectiveness of self-report alcohol screening instruments, O'Connell, Chin, Hamilton, Cunningham, Walsh, Coakley and Lawlor (2004) reviewed the CAGE, MAST, SMAST-G (Blow *et al.* 1998), the AUDIT, the ARPS/shARPS (Fink *et al.* 2002a), and the Cyr-Wartman questionnaire (Cyr & Wartman 1988). O'Connell and colleagues (2004) concluded that the CAGE and Cyr-Wartman questionnaires were the briefest instruments to administer; the AUDIT-5 was more useful in older people with a psychiatric illness; and that the ARPS and shARPS were more useful in older people with medical co-morbidity. The authors also endorsed the need for screening instruments to include age appropriate drinking limits.

Until appropriate levels are established that represent low-risk drinking for older people, Conigliaro *et al.* (2000) argue that "quantity and frequency" of alcohol use may not be the top priority of assessment tools but rather the presence of negative consequences. Indicators of problematic alcohol use that may be more appropriate for screening instruments tailored to older people include: housing problems, falls or accidents, poor nutrition, inadequate self care, lack of exercise and social isolation (Graham 1986).

In summary, most alcohol screening and diagnostic instruments have been developed for use with younger age groups and do not include adequate provision for the influence that advanced age has on responses. Consequently, these instruments have reduced sensitivity and specificity in identifying alcohol related problems among older people. Additionally, most screening instruments rely on recall of events. According to Graham (1986) some older people may have

difficulty recalling recent alcohol consumption as they are less likely to have the same level of structure in their lives that can be provided by being in a workplace. Recall difficulties may also be exacerbated by medication use which is more frequent amongst older people (Graham 1986). As a result, estimates of at-risk alcohol consumption amongst older people are likely to be much less reliable than for younger age groups.

Despite the recognition of these problems, future research is still needed in this domain to develop tools which are psychometrically sound, clinically useful and capable of compensating for factors that are specific to older drinkers to enable more effective identification (Fink *et al.* 1996). Until such instruments are developed, results on prevalence estimates will be questionable. In the interim, a number of authors (Atkinson 2002, Buschsbaum, Buchanan, Welsh, Centor & Schnoll 1992, Conigliaro *et al.* 2000, Dawe *et al.* 2002, Fingerhood 2000, Hinkin, Castellon, Dickson-Fuhrman, Daum, Jaffe & Jan 2001, Johnson 2000, Jones, Lindsey, Yount, Solty & Farani-Enayat 1993, Widlitz & Marin 2002) have recommend the CAGE as the screening instrument of choice with older people.

2.4 Current national levels of alcohol use amongst older Australians

Despite variations in the use of particular screening and assessment tools, national surveys suggest that the prevalence of at-risk consumption amongst older people has remained stable and has been low compared to the general population (Australian Institute of Health and Welfare 1999, 2002a, 2005b). However, estimates of the prevalence of drinking at risky/high risk levels have varied from 1% to 26% across individual studies. It is probable that this variation is a result not only of consumption differences but methodological differences in the research undertaken. Table 1 summarises studies published in Australia since 1996 that have specifically reported on alcohol use amongst Australians aged 60 years or more.

In the 1996, national study by Fleming the AUDIT, (Saunders *et al.* 1993) was used to identify hazardous or harmful drinking. Using the AUDIT, 26% of women were identified as hazardous drinkers and 1% were classified as drinking at harmful levels. Later research by O'Halloran *et al.* (2003), who used the AUDIT-C amongst a national sample of 18,469 patients aged 65 years and older, found that

16.3% of the sample were classified as at-risk from their alcohol consumption. Those aged 65 to 74 years were more likely to drink alcohol (45.5%) than those aged 75 years and older (36.6%). The younger cohort was also more likely to be classified as at-risk drinkers (19.4%) than those aged 75 years and older (13.4%). Amongst women aged 65 to 74 years, 15.8% were classified as at-risk drinkers and 12.8% of women aged 75 years and older were classified as at-risk drinkers.

Although versions of AUDIT were used in the research by Fleming (1996) and O'Halloran *et al.* (2003), the results were quite different. This difference may be due to changes in the drinking patterns over time, but may also be explained by the methodological differences between the two studies. In the study by Fleming (1996) the ten-item AUDIT was used, and a cut-off score of 8 was used to identify hazardous drinking. However, there have been concerns raised about the use of the AUDIT with adult women and older 'women in particular. According to Bradley, Boyd-Wickizer, Powell and Burman (1998) a score of 4 may enhance the sensitivity of the AUDIT in adult women, and Powell and McInnes (1994) found that the AUDIT had a sensitivity of 57% to alcohol "abuse" in a sample of hospitalized Australian inpatients over 65 years of age. Similarly, in the research by O'Halloran *et al.* (2003), the questions from the AUDIT-C were modified, as were the possible responses to each of the questions. These modifications may have affected the sensitivity of the instrument and hence may explain the discrepancy in results.

The study by Byrne, Raphael and Arnold (1999) used a quantity/frequency measure to assess consumption. However, the authors used ordinal rather than discrete intervals to asses both quantity and frequency of consumption. This may have reduced the accuracy of responses. The publication by Simons, McCallum, Friedlander, Ortiz and Simons (2000) is one of a series that form part of The Dubbo Study of the Health of the Elderly. This is an ongoing longitudinal study of the elderly in Dubbo, a major metropolitan centre in rural NSW. In this publication, (the focus of which was on alcohol and mortality), the authors also used a quantity/frequency measure to assess consumption. On a day when alcohol was consumed, 15% of men drank five or more drinks, 23% drank three or four drinks and 40% drank one or two drinks. Amongst women, 1% drank five or more drinks, 7% drank three or four drinks and 45% drank one or two drinks. As no other data

were presented and because consumption was coded using zero, 1-7, 8-14, 15-28 or more than 28 drinks per week, comparisons to other studies is difficult.

Dent, Grayson, Waite, Cullen, Creasey and Broe (2000) examined alcohol use amongst a community-based sample of 647 people aged 75 years and older. Of the sample, 6.5% of men reported drinking more than 60 grams of alcohol per day and 1.1% of women reported drinking more than 40 grams of alcohol per day. The study, which involved face-to-face interviews, used the quantity/frequency measure to assess consumption and asked participants about the specific type of beverages consumed, and then used the ethanol content of each beverage to estimate consumption. This detail should have increased the validity of data. However, although participants were asked how many standard drinks they consumed of each beverage, the authors do not report whether or not they showed pictures of typical standard drink containers or whether participants understood what the term standard drink meant. In light of the difficulties people have in estimating standard drinks (Carruthers & Binns 1992, Gill & O'May 2007, Kaskutas & Graves 2000, Lemmens 1994) this procedural oversight may have reduced the validity of the data.

In a study investigating the association between alcohol, tobacco, physical activity, nutrition, education and mental health amongst a community sample of women aged 70 years, Cassidy, Kotynia-English, Acres, Flicker, Lautenschlager and Almeida (2004) reported that 3% of the sample drank at harmful levels. However, harmful drinking was defined as the consumption of three or more standard drinks per day over a typical two-week period, an unorthodox method that precludes a comparison of results with most other studies.

From 1996 to 2003, data were collected from over 40,000 women across Australia as part of the Australian Government funded, Australian Longitudinal Study on Women's Health, (Young & Powers 2005). Data were collected from three separate cohorts of women aged 18 to 23 years, 45 to 50 years and 70 to 75 years, in 1996. Three percent of the sample of 70 to 75 year old women were classified as risky or high-risk drinkers for risk of harm in the long-term, based upon NHMRC Australian Alcohol Guidelines (National Health and Medical Research Council 2001). Of the sample, 2% drank more than 5 standard drinks

per day at least once per week. Based on results, married women were more likely to be heavier drinkers than widowed, separated/divorced and those who had never married. In a follow-up publication by Clemens *et al.* (2007) 4% of older women were classified as at-risk of long-term alcohol-related harm. These results were similar to the findings from the 2004 NDSHS that also used the 2001 NHMRC alcohol guidelines to assess prevalence of at-risk levels of consumption.

In summary, estimates of the prevalence of women potentially at risk from alcohol have varied from 1% to 26%. Amongst men, these figures vary from 7.9% to 23.8%. The low estimates of at-risk alcohol consumption have typically arisen from studies based upon NHMRC alcohol guidelines, whereas the higher estimates have been based upon screening tools such as the AUDIT (Saunders *et al.* 1993). However, in many of the studies, data from different age groups have been aggregated making comparisons difficult.

Table 1: Australian research on the prevalence of alcohol use amongst older people.

Author	Year	No. of cases	Sample population	Age range	Method used to assess risk	Percentages of men and women who met criteria of risk	
						Men	Women
Fleming	1996	351	National sample	65-94	AUDIT	n/a	26% hazardous drinking 1% harmful drinking
Byrne *et al*	1999	114	Community sample	65+	5 or more std drinks per day	18.9% (widowers) 8.3% (married men)	n/a
Simons *et al*	2000	2,805	Dubbo - in rural NSW	60+	Five or more drinks on anyone day	15%	1%
Dent *et al*	2000	449	Community sample- Sydney	75+	NHMRC 2001 guidelines	11.1%	6.4%
O'Halloran *et al*	2003	18,469	National sample	65+	Modified AUDIT-C. Risk: men a score of 5+ and women a score of 4+	23.8 (65-74 years) 14.0 (75+ years)	15.8 (65-74 years) 12.8 (75+ years)
Cassidy *et al*	2004	270	Community based	70+	>3 std drinks per day over two or more weeks	n/a	3%
Young and Powers	2005	12,432	National	70-75	NHMRC 2001 guidelines- 5 or more drinks per week	n/a	3%
AIHW	2005	Approx 7,300	National	60+	NHMRC 2001 guidelines	7.9% long-term harm	5.2% long-term harm
Clemens *et al*	2007	Approx 7,990	National	76-81	NHMRC 2001 guidelines	n/a	2% long-term harm

2.5 Current international levels of alcohol use amongst older people

In Australia, various methodologies have been used to assess alcohol use, alcohol-related harm, hazardous use and the harmful use of alcohol. This has also been the case in other countries. Harm or risk has been defined using a range of criteria including: DSM (American Psychiatric Association, 1994); ICD (World Health Organization, 1992); the CAGE (Ewing, 1984); clinician interviews and levels of alcohol consumption. The specific levels of consumption that have represented risk have also varied. The absence of a universal definition of how many grams of alcohol are in a standard drink has made it difficult to compare results between international studies. Table 2 summarises the available research assessing alcohol use published from 2000.

In the U.S., it has been estimated that between 1% and 29% of men and women aged 60 years and older were at-risk of alcohol-related harm (Cawthon, Fink, Barrett-Connor, Cauley, Dam, Lewis, Marshall, Orwoll & Cummings 2007, Kirchner, Zubritsky, Cody, Coakley, Chen, Ware, Oslin, Sanchez, Dural, Miles, Llorente, Costantino & Levkoff 2007, Moos *et al.* 2004b, Saleh & Szebenyi 2005). As with research conducted in Australia, the variability in results from the U.S. may partly be explained by the variability in definitions of alcohol-related problems, geographic variations and the sample populations interviewed. In residential populations it has been estimated that between 0.7% and 28.9% of older people have alcohol-related problems (Bailey, Habermn & Alksne 1965, Barnes 1979, Fink *et al.* 1996, Kramer, German, Anthony, Von Korff & Skinner 1985). In health care settings, the prevalence of alcohol "abuse" and dependence have ranged from 5% to 10% amongst primary care outpatients, 7% to 22% of medical inpatients and 10% to 15% of older adults presenting at hospital emergency departments (Conigliaro *et al.* 2000).

Using different versions of the DSM (American Psychiatric Association, 1994) criteria for alcohol abuse and dependence over the prior 12 months, prevalence estimates were 7.4% in Chile (Vicente, Kohn, Rioseco, Saldivia, Leveav & Torres 2006) and 8.9% in Canada (Thomas & Rockwood 2001). Khan *et al.*

(2002) used the DSM to assess lifetime prevalence of alcohol abuse or dependence amongst older people in New Zealand and found that 38.7% met the criteria.

Using consumption of more than 30 grams of alcohol per day as a measure of harm, prevalence varied from 43.8% of men and 1.6% of women in Brazil (da Costa, Silveira, Gazelle, Oliveira, Hallal, Menezes, Gigante, Olinto & Macedo 2004); 20% of men and 1% of women in France (Ganry, Joly, Queval & Dubreuil 2000); to 11.7% of men and 2.9% of women in Finland (Aira, Hartikainen & Sulkava 2005). The estimates for women from Finland were similar to the 3% prevalence found among older Australian women reported by Cassidy *et al.* (2004). Unfortunately, it is difficult to make any other comparison to Australian data as all other research conducted in Australia used different methods or time parameters to assess risk. Notwithstanding the difficulty in making international comparisons, one consistent finding that has recurred in all of the national and international published research has been that women drink less than men.

Table 2: International literature on the prevalence of alcohol use amongst older people.

Author	Country	Sample population	Year	No. of Cases	Age range	Method used to assess risk	Percentage of men and women who met criteria of risk	
							Men	Women
Saleh and Szebenyi	US	ED Hospital	(2005)	2,309,872	65+	ICD-9-CM	0.3% of admissions(data not available for gender)	
Kirchner *et al*	US	Primary Care	(2007)	27,714	65+	NIAAA guidelines> 7 drinks per week for women>14 drinks per week for men	1.3%	1.5%
Moos *et al*	US	Community based sample of older people who had ever consumed alcohol	(2004a)	1,290	65+	NIAA guidelines >7 drinks per week women, >14 drinks per week men	26.3%	28.9%
Cawthon *et al*	US	Community based	(2007)	5,995 (men only)	65+	>14 drinks per week	11.6%	n/a
Bridevaux *et al*	US	Primary care veterans affairs clinics	(2004b)	16,958 (men only)	65+	CAGE	23% (of current drinkers)	n/a
Satre *et al.*	US	National members of a private health plan	(2007)	6,662	65+	>1 drink per day for women and >2 drinks per day for men	12.1%	16.6%
Fleming *et al*	US	Population based comparing "workers" with "non-workers")	(2007)	43,259	65+	>=10 drinks per week for men and >=7 drinks per week for women	20.7%	25.8%
Lang *et al*	US	Population based	(2007)	10,712	65+	> 2 drinks per day	5.1%	0.7%
Moore *et al.*	US	Population based	(2006)	4,691	60+	3 drinks per day 4 or more times per week or drinking 4 or more drinks in anyone day	5.3%	0.9%
Breslow *et al*	US	Population based(compared three national surveys)	(2003)	49,036	65+	>1 drink per day	9.2-10.1%	2.2-2.6%
McGuire *et al*	US	Population based	(2007)	2,716	70+	>1 drink per day	13.1%	3.4%

Clausen *et al.*	Botswana	Population based	(2006)	393	60 +	Alcohol use	Findings not reported by gender in abstract (unable to source original). 34% used alcohol.	
Da Costa *et al*	Brazil	Population based	(2004)	229	60-69	>30g per day	43.8%	1.6%
Thomas & Rockwood	Canada	Population and institution based	(2001)	2,873	65+	Clinician interview using DSM and measurement of red cell mean corpuscular volume	Findings not reported by gender. 8.9% definite alcohol abuse, 3.7% questionable alcohol abuse	
Vicente *et al*	Chile	Population based	(2006)	2,978 (351)	15+ 65+	DSM-1I1 R substance use disorder	Findings not reported by gender. 7.4% diagnosed with a substance use disorder in prior 12 months	
Bjork *et al*	Denmark	Population based	(2006)	11,754	50+	Sensible drinking limits	20.4%	13.6%
Aira *et al*	Finland	Population based- home dwellers	(2005)	523	75+	>33g of alcohol per day	11.7%	2.9%
Sulander *et al*	Finland	Population based	(2004)	11,793	65-79	88g of alcohol per week for men and 55g of alcohol per week for women	15%	5%
Ganry *et al*	France	General hospital	(2000)	370	65+	Positive CAGE score >30g alcohol per day	17% 20%	2.5% 1%
Ganry *et al*	France	Population based- women only	(2001)	7,575	75+	>30g alcohol per day	n/a	2.5%
Onen *et al*	France	Emergency Department Hospital based	(2005)	2,405	60+	DSM-IV criteria for alcohol abuse or dependence	As no. of men versus women admitted to hospital were not provided a gender breakdown is not possible. 5.3% across sample	
Kim and Baik	Korea	Community dwelling	(2004)	164	60+	>2 drinks per day (authors did not disclose how many grams this equated to)	28.7%	n/a
Gee *et al*	Japan	Population based	(2007)	2,566	60-96	Measured average consumption(no info on prevalence of drinking)	Average alcohol consumption 34g of alcohol per week.	
Aguilar-Navarro *et al*	Mexico	Population based	(2007)	4872	65+	CAGE	2.8% across genders	

Khan *et al*	New Zealand	Population based	(2002)	141	65+	DSM-IV (alcohol dependence during lifetime) AUDIT-hazardous consumption over prior 12 months	38.7% 20.9%	13.9% 1.3%
Lang *et al*	UK	Population based	(2007)	2,623	65+	>2 drinks per day	14.2%	2.95%
Johnson *et al*	UK	Psycho-geriatric admissions	(2001)	Approx 150 (specific no. not stated)	Not stated	ICD 10 criteria and/or previous referral for alcohol treatment and/or previous alcohol misuse	10.1% (no info available by gender)	
Berggren and Nystedt	Sweden	Population- based	(2006)	13,304	16-84	Investigated changes overtime and did not report consumption figures.	n/a	n/a

2.6 Alcohol use amongst future generations of older people

Although Ekerdt *et al.* (1989) reported that alcohol consumption remained stable across the life span and Gordon and Kannel (1983) noted that alcohol use can increase with age, the majority of available research indicates that people consume less alcohol as they get older (Adams *et al.* 1990, Clemens *et al.* 2007, Moore, Gould, Reuben, Greendale, Carter, Zhou & Karlamangla 2005, Moos *et al.* 2004b, O'Halloran *et al.* 2003, Ruchlin 1997, Saunders *et al.* 1989, Temple & Leino 1989, Thundal, Spak & Ailebeck 2000). Despite the fact that volume may decrease with advancing age, older people do not necessarily drink less frequently (Australian Institute of Health and Welfare 2005b, Gilhooly 2005, Joint Health Surveys Unit 2000, Wilsnack, Vogeltanz, Wilsnack & Harris 2000, Wilsnack & Wilsnack 2002).

Some authors have predicted that with the improved health of recent generations of older people and the greater social acceptability of alcohol use there may be an increase in the prevalence rates of alcohol use amongst future generations of older people (Oslin 2000a, b, Patterson & Jeste 1999).

A long held observation in the drug field has been that declining health and frailty are strong motivators for a reduction or cessation of alcohol and other drug use (Graham 1998, Khan *et al.* 2006, Moos *et al.* 2005, Oslin 2000a, Stall 1987). Conversely, with increased life expectancy and advances in medical science which have lead to improved health, older people may no longer reduce their alcohol consumption to the same degree as their predecessors. This, argues Oslin (2000a), may lead to longer drinking careers amongst older people.

In addition, while the current cohort of 65 to 74 year olds grew up at a time in which there were significant negative moral attitudes towards alcohol consumption (McAllister *et al.* 1991, Oslin 2000b), the coming generation of older people (the 'baby boomer' generation) lived through a period in history in which there was considerable experimentation with a range of drugs (Huber & Skidmore 2003, Oslin 2000b): This has led to concerns that higher levels of

alcohol use may occur amongst older people in the future (Gfoerer et at. 2003, Gilhooly 2005, Moore et at. 2005).

According to Whitmore, Stinson, and Dufour (1999) between 1988 and 1997 there was a 50% increase in the number of alcohol-related hospitalisations amongst older people in the U.S. Similarly, over the period 1994 to 2001 data from emergency room admissions in the U.S. showed a 58% increase in alcohol mentions for patients aged 55 years or older (Substance Abuse Mental Health Services Administration 2002). Grant, Dawson and Stinson (2004) reported prevalence rates for "alcohol abuse" (derived from DSM-IV) at 0.25% in 1991-92 increasing to 1.21% in 2000-02 amongst Americans aged 65 years and older. This represents an increase of 500%.

In Finland, Sulander, Helakorpi, Rankonen, Nissinen and Uutela (2004) reported that in 1985, 8% of older men were drinking more than 88 grams of alcohol per week and 2% of women were drinking more than 55 grams of alcohol per week. In 2001, these figures increased to 15% and 5% respectively.

In Denmark, Bjork *et al.* (2006) reported that between 1987 and 2003, alcohol consumption amongst people aged 50 years and older increased from 1.5 drinks to 2.1 drinks per day for men and from 0.5 to 1.0 drink per day for women. The corresponding risk of harm increased from 15.2% to 20.4% amongst men and 10.7% to 13.6% amongst women.

The research literature in this domain does not provide a clear consensus as to the likely cause or causes of these changes but the following have been postulated: a direct result of ageing; period, defined as the historical influences at the time of measurement; and effects specific to cohort or birth year grouping (Levenson *et al.* 1998). For example, Glynn *et al.* (1985) reported that age-related declines in alcohol consumption were due to cohort effects, with older cohorts drinking consistently less than younger ones, irrespective of age. However, Glynn and colleagues did not control for period effects. Conversely, Fillmore, Harka, Johnstone, Leino, Motoyishi and Temple (1991) who conducted a meta-analysis on longitudinal data sets found that alcohol use declined with

age. But, Fillmore *et al.* (1991) did not account for cohort or period effects. As identified some 30 years ago, to unravel the complexity surrounding alcohol and ageing, studies need to simultaneously examine age, cohort and period effects (Shaie 1977).

In one of the handful of studies that have examined age, cohort and period effects, Neve *et al.* (1993) reported an increase in consumption across 30 years and five 10-year cohorts of Dutch men and women. Although abstinence was positively associated with age, age and cohort had no relationship to consumption among those who did drink. Instead, consumption was associated with period effects.

Later research by Levenson *et al.* (1998) who interviewed 1,267 men from five, 9-year birth cohorts in the Boston area in 1973, 1982, and 1991 found that only one cohort (those born between 1919-1927) showed a consistent decline in their alcohol consumption. Those men who were born between 1928 and 1936 showed nonlinear patterns of stability and decline in their alcohol consumption. Men born between 1910 and 1918, increased their consumption of alcohol from age 50 until 60 years. The authors concluded that age-related changes in both consumption and problems varied depending on which cohort or time-period was assessed.

More recently, Kerr, Greenfield, Bond, Ye and Rehm (2004a) developed linear age-period-cohort models controlling for demographic change using data from five U.S. national alcohol surveys from 1979 through to 2000. The authors found that among those who continued to drink, the effects of age on spirit consumption were not linear with individuals consuming as much or more of these beverages as they aged. However, the overall volume of alcohol consumption among drinkers decreased with age, mainly due to reductions in the consumption of beer. As with the results for spirits, the age effects on wine consumption did not follow a negative trend across the life course. For men, consumption of wine was high in younger age groups, but declined through the early 40's, before rising and reaching their highest level amongst men in the 65 to 69 year age group. For women, wine consumption was high at ages 20 and

30 and dropped to a lower level by age 70. Only the 35-39 and 55-59 age groups were significantly different in their wine consumption. Kerr *et al.* (2004a) concluded that the strongest cohort effects were found for spirits, with cohorts born before 1940 having a significantly higher consumption than those born after 1946. Significant age effects were found for beer and spirits but not for wine.

Both Moore *et al.* (2005) and Karlamangla, Zhou, Reuben, Greendale and Moore (2006) reviewed data from the National Health and Nutrition Examination Survey (NHANES) and the NHANES follow up survey in the U.S., and reported that across the twenty years of data, 74% of respondents were either consistent drinkers or abstinent, but that consumption did decline with age. However, neither study assessed beverage choice or how this may have influenced alcohol consumption.

In light of the preceding research and previous studies supporting the morbidity hypothesis (e.g. Stall, 1987), it is probable that older people whose health suffers, will refrain from alcohol. Others may continue to drink alcohol, but may also alter their drinking preferences. Subsequently, as abstinence is more common amongst older people, this could reduce the aggregate prevalence level of at-risk consumption amongst older people. In other words, the great numbers of abstinent older people could mask relatively high levels of use and related problems amongst those peers who continue to drink.

Another factor that may have influenced consumption levels, independent of cohort or age effects, is the apparent increase in beverage glass sizes over the past forty years in -the U.S. (Levenson *et al.* 1998). Although this may not affect national consumption levels, which have only increased by 0.9% in the U.S. from 1970 to 2002 (World Drink Trends 2004), it may confound self-report data on numbers of drinks consumed.

In addition to changes in glass sizes over time, Kerr and Greenfield (2003) reported that the average alcohol content of beer sold in the U.S. varied across individual states. Similar variability across regions and across time has been reported by other authors (Catalano, Chikritzhs, Stockwell, Webb, Dietze &

Rohlin 2001, Finnish Foundation for Alcohol Studies 1977, Single & Giesbrecht 1979). These variations make it difficult to compare trends in consumption over time and between surveys that vary by design, sample and measure used.

In summary, it is difficult to predict levels of alcohol consumption amongst future generations. For the period 1980 to 2002, total alcohol consumption increased by 31.3% in the U.K. and by 47.1% in Ireland (World Drink Trends, 2004). Conversely, consumption decreased by 9.3% in Australia and by 18.3% in the U.S. (World Drink Trends, 2004). This international variation, also suggests that consumption may be different amongst populations of older people. More research is required that investigates ageing, cohort and period effects on alcohol consumption in different countries and which accounts for variations in surveys and separates people who have never consumed alcohol from those who are ex-drinkers. Such research is needed to ascertain whether reductions in consumption are likely to occur in future generations of older people. Or, whether, as Gilhooly (2005) suggested, baby boomers - who were socialised into drinking during a period of rapidly increasing consumption, and who are likely to have higher retirement incomes than previous generations - will carry their current levels of alcohol consumption into old age.

To provide advice to people that will enable them to enjoy alcohol while avoiding or minimising harmful consequences, a number of countries have developed national alcohol guidelines' (National Health and' Medical Research Council, 2001). Alcohol guidelines from Australia and elsewhere will be the focus of the next two sections of the literature review.

2.7 Australian alcohol guidelines

The current NHMRC (2001) Australian Alcohol Guidelines were developed by a 12 member expert working party representing the fields of drug and alcohol studies, public health, mental health, and consumers. The guidelines were primarily based upon a systematic review of the literature conducted by international experts and were endorsed by the National Health and Medical Research Council (NHMRC) in 2001 (National Health and Medical Research Council 2001). As previously stated, the Australian Alcohol Guidelines include

12 specific guidelines. Guideline 1 (for the whole population) is reproduced below:

> Guideline 1 recommends:
> Males should: consume an average of no more than four standard drinks a day, no more than 28 standard drinks over a week, not more than six standard drinks in anyone day, have one or two alcohol-free days per week.
> Women should: consume an average of no more than two standard drinks a day, no more than 14 standard drinks over a week, not more than four standard drinks in anyone day, have one or two alcohol-free days per week.

Guideline 8, which was written specifically for older Australians states: "older people are advised, if they drink, to consider drinking less than the levels set in Guideline 1" (National Health and Medical Research Council 2001) p.13.

How much less older people should drink was not specified. The NHMRC have also developed the Dietary Guidelines for Australia in which, because of the high kilojoule content of alcohol, men are advised to drink no more than two standard drinks per-day and women no more than one drink per-day (National Health and Medical Research Council 2003). While the Dietary Guidelines were developed to provide advice to people about healthy eating, the fact that they include information on alcohol, and recommend a different amount to that stated in the Australian Alcohol Guidelines could lead to some confusion amongst consumers.

2.8 International alcohol guidelines

Many countries have now developed alcohol guidelines. However, there has been no universal consistency about what levels of alcohol consumption represent least risk and maximum benefit. Nor has there been a universal definition of a standard drink. For example, in Australia, one standard drink equates to ten grams of pure alcohol. In the U.K., one standard drink or "unit" equals eight grams of alcohol. In the U.S. a standard drink contains 13.75 grams of alcohol and in Japan a standard drink or "go" is equivalent to 19.75 grams of alcohol (Department of Health UK 2008, Dufour 1999, National Health and

Medical Research Council 2001, National Institute on Alcohol Abuse and Alcoholism 2008, Turner 1990). As most countries' alcohol guidelines have been based upon their own national definition of a standard drinks, substantial variability has arisen.

A review of international drinking guidelines highlights how diverse national alcohol guidelines are (see Table 3). For instance, in Portugal excessive drinking was defined as drinking on more than three to four days per week, while in the Netherlands excessive drinking was defined as drinking more than 77 grams of alcohol per day (Rehn, Room & Edwards 2001).

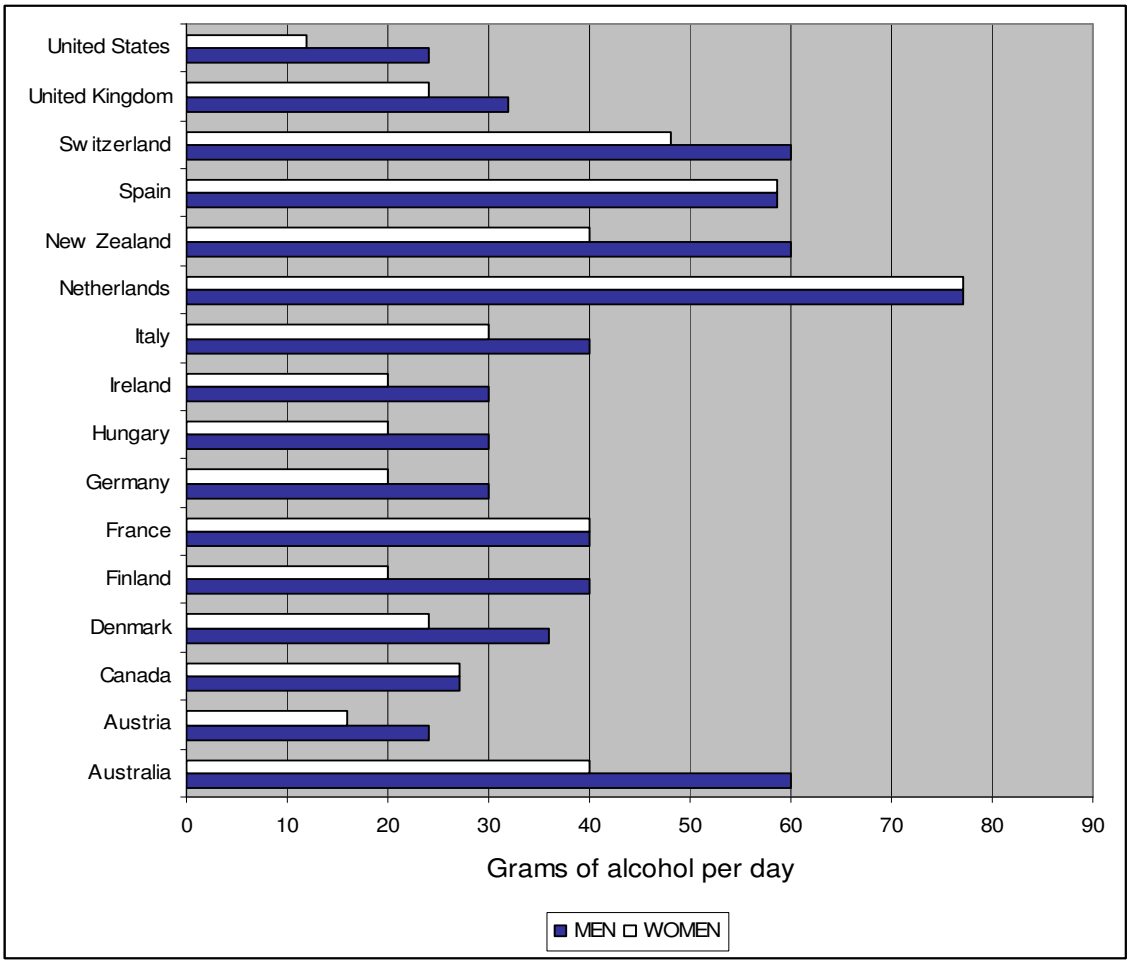
Table 3: International alcohol guidelines.

Country	Source	Recommendations				
		Men	Women	Std drink (grams)	Other	Maximum recommended grams per day/week
Australia	(National Health and Medical Research Council 2001)	Not to exceed 4 Std drinks per day. Not to exceed 28 Std drinks per week. Not more than 6 in any one day	Not to exceed 2 std drinks per day and no more than 14 std drinks per week. Not more than 4 in anyone day	10	Recommend 1-2 alcohol free days per week	60g per day men 40g per day women 280g per week men 140g per week women
Austria	(Uhl 2006)	24g per day	16g per day	8	Hazardous limit defined as 60g per day for men and 40g per day for women.	168g per week men 112g per week women
Canada	(Centre for Addiction and Mental Health 2005)	Not to exceed 2 std drinks per day. Not to exceed 14 std drinks per week	Not to exceed 2 std drinks per day. Not to exceed 9 std drinks per week	13.6		27.2g per day men 27.2g per day women 190.4g per week men 122.4g per week women
Denmark	(Gronbaek. Stroger, Strunge, Moller, Graff & Iversen 2001, March. Becker, Olsen, Tjonneland & Gronbaek 2005, Rehn *et al.* 2001, Sabroe 2006)	21 std drinks per week. Not to exceed 36g per day	Not to exceed 14 std drinks per week. Not to exceed 24g per day.	12		252g per week men 168g per week women
Finland	(Makela 2006)	40g per day, 24 units per week	20g per day, 16 units per week	12		280/288g per week men 140/192g per week women
France	(Beck 2006)	Not to exceed 5 standard glasses	Not to exceed 5 standard glasses	8		168g per week men 112g per week women
Germany	(Kraus 2002, 2006)	30g per day men	20g per day women			40g per day max moderate men and women. Under review.
Greece	(Terzidou 2006)					No guidelines
Hungary	(Rehn et at. 2001)			10		+ 210g per week men +140g per week women=heavy drinkers

Ireland	(Rehn et at. 2001)	21 std drinks per week	14 std drinks per week	10	Advises "less is better"	210g per week men 140g per week women
Italy	(Denoth 2006)	40g per day for men	30g per day women			40g per day men 30g per day women
Luxembourg	(Rehn et at. 2001)				No limits specified; refrain from drinking and driving	3-4 drinks per week is frequent drinking
Netherlands	(Rehn et at. 2001)					540g per week excessive drinking
New Zealand	(Alcohol Advisory Council 2005)	Not to exceed 21 std drinks per week. No more than 6 std drinks on any drinking occasion	Not to exceed 14 std drinks per week. Not to exceed 4 std drinks per drinking occasion	10	Have at least two alcohol free days a week	60g per day men 40g per day women 210g per week men 140g per week women
Portugal	(Rehn et at. 2001)					3-4 days per week excessive
Spain	(Rehn et at. 2001)					410-550g per week high. +550g excessive consumption
Switzerland	(Gmel 2006, Rehn *et al.* 2001)			12		60g per day men 48g per day women=binge +560g per week=high risk
United Kingdom	(Cabinet Office England 2004)	3-4 std drinks per day. Not to exceed 21 std drinks per week	2-3 std drinks per day, not to exceed 14 std drinks per week	8		32g per day men 24g per day women 168g per week men 112g per week women
United States	(United States Dietary Association 2005)	2 std drinks per day	1 std drink per day	14	Consume in moderation and only when use does not put you or others at risk	28g per day men 14g per day women
	(United States Department of Agriculture / United States Department of Health and Human Services 1990)	No more than 2 std drinks per day	No more than 1 std drink per day	12		24g per day men 12g per day women

There are no risk-free limits for drinking alcohol. According to WHO (2006), drinking above one standard drink (10 grams) for men and half a standard drink for women is associated with increased risk. As indicated in Figure 2, the alcohol guidelines from each country listed in Table 3 exceed these levels.

Figure 2: A comparison of international alcohol guidelines (maximum number of grams of alcohol per day).



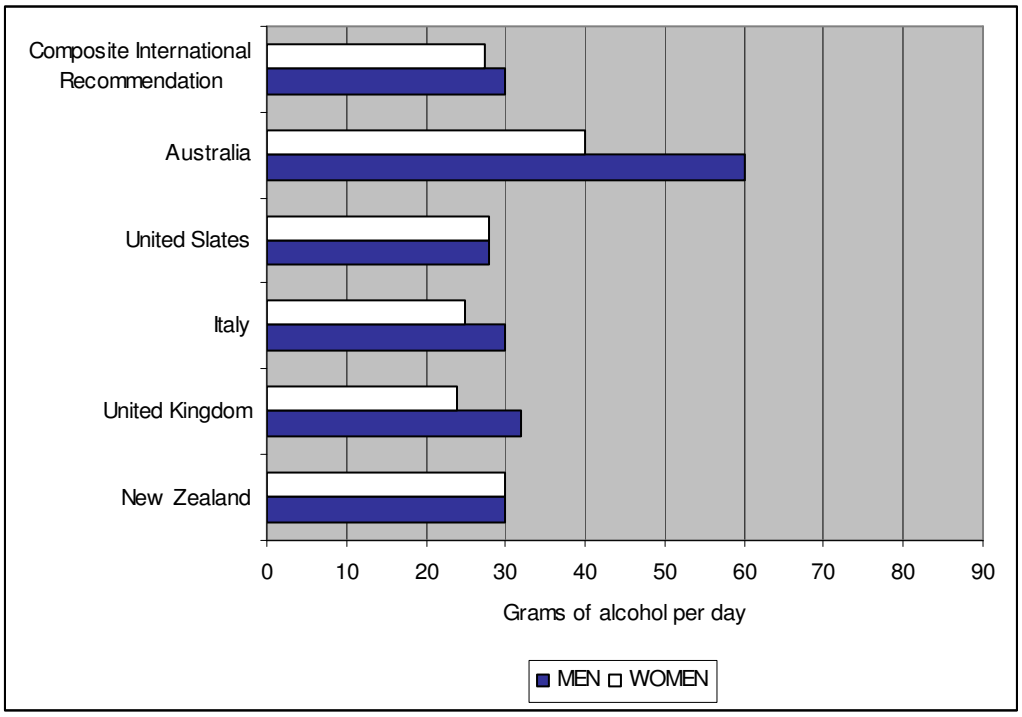
2.9 Alcohol guidelines for older people

Some countries have also developed alcohol guidelines for specific populations that may be at specific or heightened risk of alcohol related harm e.g. pregnant women. However, from the available evidence it appeared that few countries provide specific advice for older people. The guidelines from Australia (including advice given to older people) and from those countries with specific recommendations for older people are included in Table 4. Data from each country are then contrasted in Figure 3.

Table 4: International alcohol guidelines for older people.

Country	Source	Recommendations			
		Men	**Women**	**Std drink (grams)**	**Maximum recommended grams per day/week**
Australia	(National Health and Medical Research Council 2001)	Not to exceed 28 Std drinks per week. Not more than 6 in anyone day. Older people if they drink should consider drinking less than these levels The potential benefits of alcohol in preventing heart disease can be achieved with as little as one to two std drinks/day for men	Not to exceed 2 std drinks per day and no more than 14 std drinks per week. Not more than 4 in anyone day. Older people if they drink should consider drinking less than these levels Recommend 1-2 alcohol free days per week. The potential benefits of alcohol in preventing heart disease can be achieved with less than one drink! day for women.	10	280g per week men 140g per week women Acute: 60g per day men 40g per day women Chronic: 40g per day men 20g per day women
U.S.	(National Institute on Alcohol Abuse and Alcoholism 1998)	People over 65 years should consume no more than 1 drink per day. No more than 2 drinks at anyone time.	People over 65 years should consume no more than 1 drink per day. No more than 2 drinks at anyone time.	14	98g per week men 98g per week women Acute: 28g per day men & women Chronic: 14g per day men & women
Italy	(Denoth 2006)	Men over 65 years Should not consume more than 30g per day. Must not exceed 10% of the total calories per day	Women over 65 years should not consume more than 25g per day. Must not exceed 10% of the total calories per day.		210g per week men 175g per week women Acute & chronic: 30g per day men 25g per day women
United Kingdom	(Cabinet Office England 2004, The Department of Health UK 2006}	Intake of up to two std drinks a day can have a protective effect against heart disease for men over 40. Maximum of 21 std drinks per week & 4 per day	Intake of up to two std drinks a day can have a protective effect against heart disease for postmenopausal women. Maximum of 14 std drinks per week and 3 per day.	8	112g per week men-protective effect-168g per week maximum. 112g per week women- protective effect and weekly maximum. Acute: 32g per day men & 24g per day women Chronic: 24g per day men & 16g per day women
New Zealand	(Alcohol Advisory Council 2005)	For older people do not have more than 2 or 3 drinks on anyone day. Have at least 2 alcohol free days per week.	For older people do not have more than 2 or 3 drinks on anyone day. Have at least 2 alcohol free days per week.	10	100-150g per week men & 100-150g per week women Acute: 30g per day men & women Chronic: approx 159 per day men & women

Figure 3: A comparison of international alcohol guidelines for older people to avoid risk of short-term harm.



While, in Guideline 8 of the Australian Alcohol Guidelines, older people were advised to consider drinking less than the amounts specified in recommendations for the general adult population, these higher levels have been used by the Australian Institute of Health (2005b) for national prevalence estimates of at-risk consumption amongst older people. These at-risk levels of consumption for short-term harm are higher than the levels recommended for older people in the United Kingdom, the United States, Italy and New Zealand. The at-risk levels of consumption used to estimate prevalence of long-term harm amongst older men in Australia are also higher than the levels recommended in the U.S., New Zealand, and Italy. In the U.K., Clough *et al.* (2004), after using a composite methodology which included a review of the literature, focus groups and individual interviews with service providers and older people, concluded that the guidelines in the U.K. were too high and should be reduced to 8 grams a day for older women and 12 grams a day for older men.

The composite recommendations from the United Kingdom, the United States, Italy and New Zealand are contrasted to the NHMRC (2001) recommendations in Table 5.

Table 5: Composite alcohol guidelines from other countries compared to Australian alcohol guidelines.

	Maximum number of grams of alcohol per day recommended to avoid risk			
	Short-term harm		Long-term harm	
	Other countries	Australia	Other countries	Australia
Older men	30	60	21	40
Older women	27	40	18	20

The above information highlights how disparate Australia's alcohol guidelines for older people are to those of other countries. This comparison supports the conclusion of Single, Ashley, Bony, Rankin and Rehm (2000) that in Australia the "definition of moderate drinking needs to be revised downward for older individuals" (p.57).

The NHMRC (2001) Australian Alcohol Guidelines, were based upon an evidence-based medicine approach (Sackett, Rosenberg, Muir Gray, Haynes & Richardson 1996) that included a review of the scientific literature available at the time that weighed up risk of potential harm versus perceived potential benefits. As stated by the NHMRC (2001) the guidelines were based "upon the best evidence available at the time of writing" (p.25). However, since the publication of the Australian Alcohol Guidelines, there has been a further six years of research on alcohol associated morbidity and mortality. During that time, Fillmore, Kerr, Stockwell, Chikritzhs and Bostrom (2006) have also published research that has contested the foundations underpinning the widely accepted view that alcohol has a significant cardio-protective effect.

Although some authors (Dunne 1994, Lakhani 1997, O'Connell *et al.* 2003) have recommended that consumption limits for older people should be less than those recommended for the general population, a view that has been reflected in some countries' alcohol guidelines, the appropriate levels for older Australians remains speculative.

Complicating the development of age-appropriate guidelines, the WHO (World Health Organization 2006) recommends that the message "less is better" is more appropriate than specific alcohol guidelines, which "are difficult to interpret and may be perceived as a "safe" baseline from which to range upward in setting personal limits" (p. 23). The WHO concludes that health professionals are best suited to deliver individual alcohol guidelines for problem drinkers. While this is no doubt true on an individual level, national alcohol guidelines remain an important public health strategy as they provide a benchmark against which aggregate consumption can be assessed and therefore help identify populations for whom primary or secondary prevention strategies may be required. Alcohol guidelines also feature prominently in many self-help and brief intervention alcohol resources (Australian Drug Foundation 2000, Commonwealth of Australia 2006).

2.10 Alcohol related harm and benefits

Alcohol is "no ordinary commodity" (World Health Organization Department of Mental Health and Substance Abuse 2004). Globally, the WHO estimate that 2 billion people consume alcohol and 76.3 million people have a diagnosable alcohol use disorder (World Health Organization Department of Mental Health and Substance Abuse 2004). Research now indicates that there is a causal relationship between alcohol consumption and more than 60 types of disease and injury (English *et al.* 1995, Gutjahr, Gmel & Rehm 2001, Ridolfo & Stevenson 2001, Single, Robson, Rehm, Xie & Xi 1999). Subsequently, the global burden of alcohol-related morbidity and mortality is considerable.

The WHO estimated that in the year 2002, alcohol caused 3.7% of deaths (2.1 million) worldwide, and 4.4% of the total burden of disease (World Health Organization 2007b). According to the WHO, the greatest proportion of alcohol-related deaths occurred amongst men and women aged 45 to 59 years of age. Women and men in the 60 to 69 year age bracket were the second and third largest age groups respectively for alcohol-related deaths (World Health Organization, Department of Mental Health and Substance Abuse 2004).

Conversely, moderate alcohol use (often defined as up to 20 grams of alcohol per day) has been considered to have a protective effect on alllcause mortality (Bridevaux *et al.* 2004b, Dawson 2000, Doll, Peto, Boreham & Sutherland 2005, Greenfield, Rehm & Rogers 1999, Gronbaek, Deis, Becker, Hein, Schnohr, Jensen, Borch-Johnsen & Sorensen 1998, Holman, English, Milne & Winter 1996, Lin, Kikuchi, Tamakoshi, Wakai, Kawamura, Iso, Ogimoto, Yagyu, Obata & Ishibashi 2005, Nielsen, Schnohr, Jensen & Gronbaek 2004, Noale, Minicuci, Bardage, Gindin, Nikula, Pluijm, Rodriguez-Laso & Maggi 2005, Paganini-Hill, Kawas & Corrada 2007b, Renaud, Gueguen, Siest & Salamon 1999, Simons *et al.* 2000, White 1999) and to reduce the incidence of coronary heart disease (00111997, 1998, Ellison, Rothman, Zhang & Djousse 2005, Emerson, Shaper, Wannamethee, Morris & Whincup 2005, Fuchs, Stampfer, Colditiz, Giovannucci, Manson, Kawachi, Hunter, Hankinson, Hennekens, Rosner, Speizer & Willett 1995, Goldberg, Hahn & Parkes 1995, Gronbaek 2002, Hillbom 1998, Holman & English 1996, Jackson 1994, Klatsky 2002, Single *et al.* 1999, Svardsudd 1998, van Trijp, Bos, van der Schouw, Muller, Grobbee & Bots 2005). Because of this presumed protective effect, the WHO concluded that moderate alcohol use prevented 71,000 deaths in men and 277,000 deaths in women in 2001 (Rehm, Room, Monteiro, Gmel, Graham, Rehn, Sempos, Frick & Jernigan 2004). Research confirming that alcohol in low doses confers health benefits, has been instrumental in shaping national alcohol guidelines.

However, a few individual-level studies had failed to substantiate this protective effect in men (Hart, Smith, Hole & Hawthorne 1999) and women (Fillmore, Golding, Graves, Kniep, Leino, Romelsjo, Shoemaker, Ager, Allebeck & Ferrer 1998, Maskarinec, Meng & Kolonel 1998). After conducting a meta-analysis of 54 published prospective mortality studies, Fillmore *et al.* (2006) concluded that the evidence for a J-shaped risk curve for alcohol use and all-cause mortality was the result of systematic misclassification error whereby participants who had reduced or stopped drinking due to ill-health or ageing were categorised as abstainers. These findings have challenged the assumption that alcohol protects against cardiovascular disease.

As previous research (e.g. Graham 1998, Khan *et al.* 2002, Moos *et al.* 2004a, Paganini-Hill *et al.* 2007b, Rice *et al.* 2000, Stall 1987, Straus 1984, Vogel-Sprott & Barrett 1984) has indicated, poor health is often a reason for older people reducing or abstaining from alcohol. In research where prior drinkers were combined with lifelong abstainers, it was highly likely that as a group they would have poorer health outcomes. This view was supported by Shaper, Wannamathee and Walker (1988) who suggested that the higher abstainer risk for coronary heart disease was created by the reduction or termination of drinking in older people due to increased illness, disability, frailty and lor medication use. This suggestion was supported by Fillmore and colleagues (2006), who reported that among studies that classified ex-drinkers and occasional drinkers appropriately, there was no evidence of a significant cardio-protective effect from alcohol. Subsequently, Fillmore and colleagues concluded, "estimates of the extent of the impact of cardiac benefits from light alcohol consumption on mortality risk may have been greatly over-estimated" (p.111). Although Fillmore *et al.* (2006) reported that their results were only suggestive, as they were unable to meet the precise operational specifications required to settle the matter of the potential existence of a cardiac protective effect, the findings have implications for the global estimates of the numbers of deaths caused and prevented from moderate alcohol consumption. The Fillmore etal. (2006) findings have since been supported by Harriss, English, Hopper, Powles, Simpson, O'Dea, Giles and Tonkin (2007) who investigated the relationship between usual daily alcohol intake, beverage type and drinking frequency on cardiovascular and coronary heart disease, accounting for systematic misclassification of intake. The authors found no evidence of a protective effect for men and only weak protection for females from wine only.

While there had been almost universal support for an association between moderate alcohol use and reduced mortality, a number of earlier studies had also reported that regular light drinking might have been marker of good health among middle aged and older people and not a cause of it. For example, Bridevaux *et al.* (2004a) examined the association between alcohol screening results and health status or mortality with a sample of over 16,000 male veterans in the U.S. In this research the sample was broken down into four

groups: drinkers who screened negative for problem drinking (defined by the AUDIT-C (Saunders *et al.* 1993) and the CAGE (Mayfield, McLeod & Hall 1974); drinkers who screened positive for problem drinking; non drinkers who screened negative for problem drinking; and non-drinkers who screened positive for problem drinking. The authors reported that non-drinkers who screened positive for problem drinking had the poorest health status and survival and drinkers who screened negative for problem drinking had the best health status and survival. In addition, non-drinkers who screened positive for problem drinking in this study had the highest scores on the Seattle Index of Co morbidity, suggesting they may have had greater co-morbidity, consistent with a sick-quitter effect (Moos *et al.* 2005, Stall 1987).

Research by Bradley, Maynard, Kivlahan, McDonnell and Fihn (2001) again with male veterans in the U.S. reported that the risk of mortality was increased among drinkers who reported drinking as little as three or more drinks daily. Fifteen years earlier, a Lancet editorial had recommended caution concluding that the higher mortality found among abstainers may have been a spurious finding (Editor 1987). Research by Fuchs, Chambless, Folsom, Eigenbrodt,' Duncan, Gilbert and Szklo (2004) supported this conclusion.

The work of Fillmore and colleagues (2006) has significant implications for national alcohol guidelines. If the cardio-protective effect of alcohol has been overstated then there may well be no practical level at which the 'benefits' may be maximised and the 'costs' minimised. According to Demos and McLean (2005) one of the problems in recommending alcohol guidelines for older people was the difficulty of determining the level at which alcohol benefits occur. If the current consensus regarding the cardio-protective effects of alcohol should prove ill founded, development of alcohol guidelines might be simplified by focusing exclusively on levels of use and associated harm. Shifting the focus of research away from attempts to prove or disprove the J-shaped association between alcohol and mortality and moving back towards the issue of alcohol and morbidity, according to Rehm (2000), is the important issue.

Alcohol-related burden is linked to two dimensions of consumption: average volume of consumption and patterns of drinking (World Health Organization Department of Mental Health and Substance Abuse 2004). There have been a number of authoritative reviews of the literature on alcohol use and harm (Anderson & Baumberg 2006, Rehm, Room, Graham, Monteiro, Gmel & Sempos 2003, Single et at. 2000, World Health Organization Department of Mental Health and Substance Abuse 2004). In the following section, these and more recent publications will be reviewed, with emphasis given to the implications of the findings for older people.

2.10.1 Alcohol and cancer

Alcohol use and cancer is an important population health issue (Single et at. 1999). As far back as 1981, Doll and Peto (1981) estimated that alcohol accounted for 3% of cancers. A review by the World Cancer Research Fund and the American Institute of Cancer Research in 1997, concluded that there was convincing evidence that alcohol increased the risk of mouth, pharyngeal, laryngeal, oesophageal and liver cancers (The World Cancer Research Fund and American Institute for Cancer Research 1997). In Australia in 2001, it was estimated that 2,791 (3.2%) of all new cases of cancer and 1,291 cancer deaths were attributed to alcohol consumption (Australian Institute of Health and Welfare & Australasian Association of Cancer Registries 2004). Between 1991 and 2001, the incidence rate for cancer that was attributable to alcohol increased by 1.2% per annum amongst women, while among men the rate decreased by 0.3% per annum (Australian Institute of Health and Welfare & Australasian Association of Cancer Registries 2004).

The World Cancer Research Fund and the American Institute of Cancer Research found probable evidence that alcohol increased the risk of colorectal and breast cancer even at very low levels of consumption (The World Cancer Research Fund and American Institute for Cancer Research 1997). Since this time, a number of authors have concurred that there is strong evidence of a linear relationship between breast cancer and alcohol (Corrao, Bagnardi, Zambon & Arico 1999, Hamajima *et al.* 2002, Lew 2008, Oslin 2000a, Smith-

Warner *et al.* 1998). Oslin (2000a) concluded that the risk of breast cancer was 35% higher in women who drank 36 grams to 48 grams of alcohol per day and 67% higher in women who drank more than 48 grams of alcohol per day compared to those women who did not drink or drank very little. In an assessment of 53 epidemiological studies Hamajima *et al.* (2002) reported an increased cancer risk of 7.1% for every additional ten grams a day increase in alcohol intake.

Conversely, a Danish study of 473 women with breast cancer, found that two standard drinks or less appeared safe (Petri, Tjonneland, Gamborg, Johansen, Hoidrup, Sorensen & Gronbaek 2004) . Research by McDonald and colleagues reported that less than seven standard drinks per week was safe (McDonald, Mandel, Marchbanks, Folger, Daling, Ursin, Simon, Bernstein, Strom, Norman, Malone, Weiss, Burkman, Weber & Spirtas 2004). Additionally, Vachon, Sellers, Janney, Brandt, Carlson, Pankratz, Fang-fang, Thernau and Cerhan (2005) reported no association between adolescent alcohol use and increased mammographic density (a strong risk factor for breast cancer). However, the research by Vachon and colleagues does not dispute the body of evidence on the association between alcohol use and cancer, but rather questions whether drinking from adolescence is positively associated with breast cancer. Additionally, only 11% of the sample of women drank regularly (>six times a year) before age 18.

The 30-40% higher risk of breast cancer in women consuming more than 30 grams of alcohol per day vs non-drinkers is similar to the association observed between breast cancer and a positive family history of breast cancer. The evidence on alcohol and cancer has important ramifications for older women, particularly in light of research that has shown that recent drinking and drinking later in life are also predictive of breast cancer risk (Swanson, Coates, Malone, Gammon, Schoenberg, Brogan, McAdams, Potischman, Hoover & Brinton 1997, Tjonneland, Christensen, Thomsen, Olsen, Stripp, Overvad & Olsen 2004). In their most recent publication, the World Cancer Research Fund and American Institute of Cancer Research (2007) expert panel concluded that since the mid-1990's the evidence that alcohol is a cause of cancer has become stronger and

that there is ample evidence from case-control and cohort studies of a dose-response relationship between alcohol and breast cancer. The panel also stated that "the evidence that alcoholic drinks are a cause of pre-menopausal and post-menopausal breast cancer is convincing" (p.168) (World Cancer Research Fundi American Institute for Cancer Research 2007). Such research has particular relevance to developed countries like Australia where breast cancer accounts for more than 50% of alcohol-related cancers amongst women (Ridolfo & Stevenson 2001).

Alcohol has also been estimated to be the leading cause of liver cirrhosis in developed countries (Corrao, Arico, Zambon, Torchio & DiOrio 1997, Corrao, Bagnardi, Zambon & Torchio 1998, English *et al.* 1995) and in Australia, the majority of all alcohol-related deaths among men are due to liver cirrhosis and alcoholism (Ridolfo & Stevenson 2001). English *et al.* (1995) estimated that 18% of liver cancer cases in men and 12% in women were attributable to alcohol. Using a different methodology, Ridolfo and Stevenson reported that 39% of liver cancer cases in men and 35% in women were attributable to alcohol (Ridolfo & Stevenson 2001). Based upon the plethora of available evidence, The World Cancer Research Fund and American Institute for Cancer Research (2007) have now concluded that alcohol causes cirrhosis and is a probable cause of liver cancer.

Less conclusive has been the link between alcohol and cancer of the stomach, pancreas, colon and rectum (Bode & Bode 1997, Boutron, Faivre, Dop, Quipourt & Senesse 1995, DeStefani, Boffetta, Carzoglio, Mendilaharsus & Deneo-Pellegrini 1998, Gapstur, Potter & Folsom 1994, Harnack, Anderson, Zheng, Folsom, Sellers & Kushi 1997, Ji, Dai, Gao, Hsing, McLaughlin, Fraumeni & Chow 2002, Ji 1996, Longnecker & Enger 1996, Lundberg & Passik 1997, Piett, Barnett & Moos 1998, Sarles, Bernard & Johnson 1996, Seitz, Posch I & Simanowski 1998, Soler, Chatenaud, LaVecchia, Franceschi & Negri 1998). However, after conducting a meta-analysis Bagnardi, Blangiardo, LaVecchia and Corrao (2001) concluded that there was a significant link between alcohol and increased risk of cancer of the stomach, colon, rectum and ovaries. Bagnardi and colleagues conclusions on ovarian and endometrium cancer are

also borne out by work by Bradley, Badrinath, Bush, Boyd-Wickizer and Anawalt (1998); Longnecker and Enger (1996); and Newcombe, Trentham-Dietz and Storer (1997). The panel of the World Cancer Research Fund and American Institute for Cancer Research have concluded that consumption of more than 30g per day of pure alcohol is a cause of colorectal cancer in men and is probably also a cause of colorectal cancer in women (World Cancer Research FundI American Institute for Cancer Research 2007). The positive association between alcohol and colon cancer has particularly important public health implications in Australia, as colorectal cancer is the most common cancer in the nation (Cancer Council of New South Wales 2003).

The evidence supporting an association between alcohol consumption and lung cancer has generally been equivocal (e.g. Bandera, Freudenheim & Vena 2001, Korte, Brennan, Henley & Boffetta 2002). However, Freudenheim, Ritz, Smith-Warner, Albanes, Bandera, van den Brandt, Colditz, Feskanich, Goldbohm, Harnack, Miller, Rimm, Rohan, Sellers, Virtamo, Willett and Hunter (2005) who analysed seven prospective studies with 399,767 participants including 3,137 patients with lung cancer concluded that alcohol use equal to or greater than 30 grams of alcohol per day compared to no drinking significantly increased the risk of lung cancer with a relative risk factor of 1.21. Of particular interest were their findings that amongst men who had never smoked the relative risk for lung cancer for consumption of 15 grams alcohol per day rather than zero alcohol were 6.38. Unfortunately, there were fewer non-smoking cases amongst women, which may explain why the authors found no greater evidence of risk amongst non-smoking women. These findings are interesting, particularly in light of reductions in smoking prevalence in Australia and elsewhere, as reductions in lung cancer due to reductions in smoking could be somewhat offset by lung cancer related to alcohol use. More research on the link between alcohol and lung cancer and in particular the synergism with smoking is required.

A number of authors have also theorized that alcohol may be a risk factor for cancer of the major salivary glands (Horn-ross, Ljung & Morrow 1997, Muscat & Wynder 1998) and the bladder (Donato, Bofetta, Faziolli, Aulenti, Gelatti & Porru 1997, Longnecker & Enger 1996, Yu, Hu, Wang, Zou, Oi, Zhao & Xe 1997).

Research by Zeegers, Volovics, Dorant, Goldbohm and van den Brandt (2001) failed to find an association between alcohol and bladder cancer- but their research only involved a follow up period of 6 years. The regular consumption of moderate quantities of alcohol (12 to 24 grams of alcohol per day) has also been linked with reduced bone mass and alcohol induced bone disease (Kamel 2005, Klein 1997). However, the results on bone disease for women have been mixed e.g. Bradley *et al.* (1998).

The majority of studies have reported no increased risk of prostate cancer (Breslow & Weed 1998, Crispo, Talamini, Gallus, Negri, Gallo, Bosetti, LaVecchia, Dal Maso & Montella 2004, Ellison, Stokes, Gibbons, Lindsay, Levy & Morrison 1998, Hiatt, Armstrong, Klatsky & Sidney 1994, Tavani, Negri, Franceschi, Talamini & LaVecchia 1994). However, one case-control study (Hayes, Brown, Schoenberg, Greenberg, Silverman, Schwartz, Swanson, Benichou, Liff, Hoover & Pottern 1996) reported a small increased risk of cancer in men who consumed even moderate amounts of alcohol, and Platz, Leitzmann, Rimm, Willett and Giovannucci (2004) reported an increase in the risk of prostate cancer in association with heavy episodic drinking.

Conversely, in two more recent studies (Nieters, Deeg & Becker 2006, Rashidkhami, Akesson, Lindblad & Wolk 2005) a lower risk for renal cell carcinoma and lymphoma were linked to low levels of alcohol use. However, in the research by Rashidkhami *et al.* (2005), instead of excluding participants who had only partially completed responses related to alcohol consumption, these participants were categorised as never/seldom-consumed alcohol. This methodology may have led to some misclassification of participants and hence the results are somewhat questionable.

The majority of research does seem to indicate an almost linear dose-response relationship between volume of drinking and the relative-risk of cancer (World Cancer Research Fund / American Institute for Cancer Research 2007, World Health Organization Department of Mental Health and Substance Abuse 2004). This body of evidence has particular relevance to older people, who are more at-risk of cancer than younger people (Australian Institute of Health and Welfare &

Australasian Association of Cancer Registries 2004). For a review of the relative risks of cancer associated with alcohol consumption see Table 6. For more information see the review by the World Cancer Research Fund and American Institute for Cancer Research (2007).

Table 6: Relative risk of cancer for selected doses of alcohol intake.

Condition	Studies	Cases	Study Design		RR for selected doses of alcohol intake		
			Case control	Cohort	25g per day	50g per day	100g per day
Oral cavity and pharynx	15	4,507	14	1	1.86	3.11	6.54
Esophagus	14	3,233	13	1	1.39	1.93	3.59
Larynx	38	3,789	20	0	1.43	2.02	3.86
Colon	16	5,360	12	4	1.05	1.1	1.21
Rectum	6	1,420	4	2	1.09	1.19	1.42
Liver	10	1,321	8	2	1.19	1.40	1.81
Breast	29	32,175	24	5	1.25	1.55	2.41

(Corrao, Baqnardi, Zambon & La Vecchla 2004)

2.10.2 Alcohol and cardiovascular disorders

Most studies have suggested that low-level alcohol consumption offered some protection against ischaemic stroke (which occurs from a blockage of an artery supplying blood to the brain) (Beilen, Puddy & Burke 1996, Hillbom 1998, Keil, Chambless, Doring, Filipiak & Stieber 1997, Kitamura, Iso, Sankai, Naito, Sato, Kiyama, Okamura, Nakagawa, lida, Shimamoto & Komachi 1998, Knuiman & Vu 1996, Sacco, Elkind, Boden-Albala, Lin, Kargman, Hauser, Shea & Paik 1999, Thun et el. 1997, Wannamethee & Shaper 1996); with consumption levels of up to 24 grams per day reducing the risk, whereas consumption of 60 or more grams per day increased the risk (Reynolds, Lewis, Nolen, Kinney, Sathya & He 2003)

For haemorrhagic stroke (which follows bleeding from a blood vessel within the brain), the weight of evidence suggests an increase in risk for males even at low-levels of consumption (Berger, Ajani, Kase, Gaziano, Burning, Glynn & Hennekens 1999, Hart *et al.* 1999, Jackson 1994, Sacco *et al.* 1999); while for

females the meta-analyses of Ridolfoand Stevenson (2001) indicated a protective effect for drinking below 40 grams of alcohol per day, but an eight-fold increased risk for drinking above these limits.

Additionally, hypertension and other cardiovascular disorders such as cardiac arrhythmias or heart failure appear to be adversely affected by alcohol (Friedman 1998, Klatsky 1995, Puddey, Rakic, Dimmitt & Beilin 1999, Rosenqvist 1998, U.S. Department of Health and Human Services 1997, Wood 1998)

Although there have now been more than 100 epidemiological studies suggesting that moderate alcohol consumption is cardio protective (Gulbransen & McCormick 2007), as previously discussed, some recent critical literature has found that people who never drink were at no greater risk than light drinkers (Fillmore, Kerr & Bostrom 2003, Fillmore et el. 2006). Because of the systematic error of misclassification that has occurred in much research (Fillmore *et al.* 2006), the contention surrounding alcohol's cardio protective effects is likely to continue (e.g. Ellison, Harding, Klatsky, Smallwood, Stuttaford & Tiger 2007, Ellison, Wannamethee, Rimm, Mukamal, Gronbaek, Fillmore, Booyse, Leighton & Mittleman 2007, Rimm, Booyse, Fillmore, Gronbaek, Mukamal, Rehm & Wannamethee 2007). While research continues, the comment by Goldberg (2003) is particularly relevant: "If alcohol were a newly discovered drug (instead of one dating back to the dawn of human history) we can be sure that no pharmaceutical company would develop it to prevent cardiovascular disease" (p.164).

2.10.3 Alcohol and cognitive function

The issue of alcohol and cognitive function is complex. Several longitudinal studies have shown an association of light drinking (up to 20/10 grams of alcohol per day for men and women respectively) with a reduced risk of cognitive impairment and dementia (Bryan & Ward 2002, Cassidy, Kotynia-Enqlish, Acres, Flicker, Lautenschlager & Almeida 2004, DeCarli, Miller, Swan, Reed, Wolf & Carmelli 2001, Deng, Zhou, Li, W.Y, Gao & Chen 2006, Ganguli,

Bilt, Saxton, Shen & Dodge 2005, Lyndsay, Laurin, Verreault, Hebert, Helliwell, Hill & McDowell 2002, McGuire *et al.* 2007, Rodgers, Windsor, Anstey, Dear, Jorm & Christensen 2005, Ruitenberg, van Swieten, Witteman, Mehta, van Duijin, Hofman & Breteler 2002, Zimmerman, McDougall & Becker 2004). Conversely, other research shows no association (Truelsen, Thudium & Gronbaek 2002, Tyas, Manfreda, Strain & Montgomery 2001) or an acceleration in cognitive deterioration (Anttila, Helkala, Viitanen, Kareholt, Fratiglioni, Winblad, Soinen, Tuomilehto, Nissinen & Kivipelto 2004) and the development of early onset dementia (McMurtray, Clark, Christine & Mendez 2006). A paper by Jarvenpaa, Rinne, Koskenvou, Raiha and Kapiro (2005) reported that among participants aged 65 years and older, episodes of binge drinking (exceeding the consumption of one bottle of wine or equivalent on one occasion at least monthly) over the prior 25 years was associated with a relative risk of 3.2 for dementia. In addition, the authors reported that consumption of more than one drink per day for women and two drinks per day for men was associated with a relative risk of dementia of 2.4.

Much of the published research studies demonstrating a protective effect in relation to cognitive impairment has methodological anomalies that may reduce their validity. For example, in the research by Cassidy *et al.* (2004) the female drinkers who took part in the study had higher (not significant at p=0.06) levels of education than non-drinkers and because of the small numbers, the heaviest alcohol consumers were excluded from the research. Similarly, when assessing alcohol consumption, Bryan and Ward (2002) used a five-point Likert scale, which was not time specific, hence people who had recently stopped drinking may well have been classified as non-drinkers or light drinkers. In the research by Rodgers and colleagues (Rodgers *et al.* 2005) non-drinkers included people who had not consumed alcohol in the past 12 months and may have included ex-drinkers. In the research by Thomas and Rockwood. (2001) a diagnosis of alcohol abuse was based upon a combination of semi-structured interview and physical examination but did not include information on participants' level of alcohol consumption. In research by Jarvenpaa *et al.* (2005), heavy drinking was defined as more than one drink per day for women and two drinks per day for men, but no definition was provided on how many grams of alcohol one drink

equalled. As stated by Fillmore *et al.* (2006) such varied methodological practices can result in divergent findings.

Complementing the psychometric testing on cognitive function has been research examining the association between alcohol use and brain atrophy. Anstey, Jorm, Meslin, Maller, Christensen, Kumar, von Sanden, Windsor, Rodgers, Wen and Sachdev (2006) conducted MRI brain scans on a sample of 478 persons aged 60 to 64 years and found evidence of a positive association between brain atrophy and alcohol consumption. Alcohol also lead to reductions in left hippocampal volume and increased ventricular size and cortical cerebro spinal fluid. The authors found no evidence of any protective effect of alcohol on the brain. Conversely, earlier Australian research by Dent, Sulway, Brae, Creasey, Kos, Tennant and Fairley (1997) with a sample of 209 Australian veterans, using non-contrast computed tomography, failed to find any association between alcohol consumption and reduced cognitive performance or brain atrophy.

Methodological differences may explain the discrepancies between findings. For instance, the participants in the Dent study were, on average, ten years older, all were veterans, and as the study was conducted ten years earlier than the research by Anstey *et al.* (2005), the technology was not likely to be as sophisticated. Additionally, in the Dent *et al.* study (1997) only 31 of the sample were non drinkers and it was unclear whether the participants had been lifetime abstainers or had recently stopped drinking. Such issues may have confounded results.

Future research on alcohol and cognitive function should also control for patterns of drinking, head injuries and concomitant tobacco use. For example, binge drinking, places people at risk of trauma, including head injury. Such injuries early in adulthood have been shown to be a risk-factor for dementia (Jarvenpaa *et al.* 2005, Plassman, Havlik, Steffens, Helms, Newman, Drosdick, Phillips, Gau, Welsh-Bohmer, Burke, Guralnik & Breitner 2000) and could complicate causal links. Although some evidence suggest that alcohol increases the risk of dementia, it has been hypothesized that tobacco may decrease the

risk of developing some forms of dementia i.e. Alzheimer's disease (Leigh 1998). As one drug may negate the effect of the other, tobacco use should be controlled for as an independent variable.

Table 7: Relative risk of cognitive impairment for selected doses of alcohol.

Author	Year	Cases	Study Design		RR for selected doses of alcohol intake		
			Age	Included	25g per day	50g per day	100g per day
Anttila *et al*	2005	1,464	65-74	No: Did not assess volume			
Deng *et al*	2005	2,632	60 years +	dementia	<24g per day men=0.37 <16g per day women=0.76	>24g per day men=1.45 <16g per day women=1.22	

2.10.4 Alcohol and depression

Depression and alcohol use disorders are strongly linked across the lifespan, and this co-morbid association persists into later life (Atkinson 1999, Grant & Harford 1995). Research has shown that higher levels of alcohol consumption were associated with more symptoms of depression (Graham & Schmidt 1999, Rodgers, Korten, Jorm, Christensen & Henderson 2000). Not only has the prevalence of major depression been higher amongst patients in treatment for 'alcohol abuse' and dependence than in the general population (Lynskey 1998, Schuckit, Tipp, Bergman, Reich, Hesselbrock & Smith 1997) but a higher prevalence of alcohol use disorders has been documented for patients in treatment for depression (Alpert, Fava, Uebelacker, Nierenberg, Pava, Worthington & Rosenbaumm 1999).

The prevalence of 12-month and lifetime DSM-IV (American Psychiatric Association, 1994) Major depressive disorder and alcohol use were assessed by Hassin, Goodwin, Stinson and Grant (2005) in a face-to-face survey with 43,000 adults in the U.S. Any alcohol use disorder was associated with relative risk of 1.8 (1.6-2.2) for the presence of a major depressive disorder in the past 12

months and 1.7 (1.5-1.8) risk of a major depressive disorder across a person's lifetime (Hassin *et al.* 2005). After surveying 14,063 Canadians, Graham and Massak (2007), reported that depressed respondents (as based upon the WHO Composite International Diagnostic Interview) drank more alcohol than non-depressed individuals. For women, a positive relationship between alcohol use and depression held true, independent of the use of anti-depressant medication. In great Britain, after interviewing 2,413 participants from the Psychiatric Morbidity Among Adults Living in Private Households 2000 survey, Haynes, Farrell, Singleton, Meltzer, Araya, Lewis and Wiles (2005) concluded that hazardous and dependent drinking were not associated with incident anxiety or depression (OR=1.36, 95% CI, 0.74-2.50). The relationship between alcohol and depression is complex, and more research is needed that attempts to identify whether alcohol use leads to depression, or whether depression leads to alcohol use.

'Alcoholism' and suicide have also been linked in late middle age and older (Grabbe, Demi, Camann & Potter 1997, Osgood & Manetta 1998, Shah & Ganesvaran 1997). In the U.S., So rock, Chen, Gonzalgo and Baker (2006) reported that amongst people aged 55 years and over, having 12 or more drinks a year was associated with a 50-70% increase in the risk of suicide. However, as Blow, Brockmann and Barry (2004) highlight, most research on alcohol use and geriatric suicide has focused on older adults who have met DSM criteria for abuse or dependence. As there have been questions raised about the appropriateness of DSM criteria when applied to older people (Dawe *et al.* 2002, DeHart & Hoffman 1995), Blow *et al.*(2004) concluded that the role of at-risk problem drinking in geriatric suicide may well be underestimated. It was not possible from the above research to determine relative-risk and an associated cut-off level of daily alcohol consumption.

2.10.5 Other chronic conditions

Alcohol consumption has also been liked to epilepsy and seizures from alcohol withdrawal (Bartolomei, Suchet, Barrie & Gastaut 1997, Leone, Bottacchi, Beghi, Morgando, Mutani, Cremo, Ceroni & Floriani 2002, Scorza, Arida, Cysneiros,

Priel, De& Cavalheiro 2003). However, because there has been no general classification and nomenclature of seizures related to alcohol it has not been possible to determine relative-risk of daily alcohol consumption and epilepsy or seizures (Christoffersen 2007). However, Leone, Tonini, Boglium, Monaco, Mutani, Bottachi, Gambaro, Rocci, Tassinari, Cavestro and Beghi (2002) did not find any difference between drinkers and non-drinkers relative risk of seizures. See Table 8.

Table 8: Relative risk of seizures for selected doses of alcohol.

Author	Year	Cases	Study Design		RR of seizure for selected doses of alcohol intake		
			Age	Included	<259 per day	26-50g per day	51-100g per day
Leone *et al.*	2002	293	>15 years	Case control	1.2	0.9	1.6

Alcohol use also alters the body's inflammatory cell responses and has a direct effect on pancreatic cells (Szabo, Mandrekar, Oak & Mayerle 2007). However, research by Szabo *et al.* (2007) indicated that moderate acute alcohol consumption may attenuate inflammatory responses (when there are no necrotic cells present) while chronic or increased levels of use may contribute to increased inflammation of the pancreas. However, Feick, Gerloff and Singer (2007) have presented data indicating that some of the impact of alcohol on the pancreas may be caused by the -non-alcoholic constituents of alcoholic beverages.

Alcohol may also be linked to psoriasis (English *et al.* 1995, Raychaudhuri & Gross 2000) however due to the limitations of many of the study designs (Chaput, Poynard, Naveau, Penso, Durrmeyer & Suplisson 1985, Naldi, Parazzini, Brevi, Peserico, Veller Fornasa, Grosso, Rossi, Marinaro, Polenghi, Finzi, Galbiati, Recchia, Cri-stofolini, Schena & Cainelli 1992, Poikolainen, Reunala, Karvonen, Lauharanta & Karkkainen 1990) the correct temporal sequence and relative risk of alcohol consumption can not be assessed (Shafer 2006). Considering the prevalence of psoriasis amongst older people and the link between psoriasis and hypertension, cardiovascular disease, liver cirrhosis

and cancer (Henseler & Christophers 1995, Stern & Lange 1988) more research is warranted.

In relation to diabetes, after conducting a meta-analysis of published research on alcohol and diabetes, Koppes, Dekker, Hendriks, Boutter and Heine (2005) concluded that alcohol consumption was associated with Type 2 diabetes in a U-shaped fashion. In the Nurse's Health Study with approximately 85,000 nurses who were followed up for 16 years, Hu, Manson, Stampfer, Colditz, Liu, Solomon and Willett (2001) reported a protective effect of low levels of alcohol consumption (see Table 9). Kenkre, Lindeman, Yau, Baumgarterner and Garry (2003) reported that amongst a group of 883 men and women aged over 65 years in New Mexico that daily alcohol consumption had significantly lower serum insulin concentrations compared to those who abstained from alcohol. However no assessment of amount of alcohol occurred, limiting the results of the study. Secondly, Beulens, Stolk, van der Schouw, Grobbee, Hendricks and Botts (2005) in a study with 16,330 women aged 49 to 70 years found that the hazard ratio for Type 2 diabetes was 0.86 for women consuming 5-30 grams of alcohol per week. This changed to 0.66 for 30-70 grams per week, 0.91 for 70-140 grams per week, 0.64 for 140-210 grams per week and 0.69 for women consuming more than 210 grams per week.

Table 9: Relative risk of diabetes for selected does of alcohol.

Author	Year	Cases	Study Design		RR for diabetes at selected doses of alcohol intake		
			Age	Included	<5g per day	5-10g per day	>10g per day
Hu *et al*	2001	85,000	adults	longitudinal	0.78	0.56	0.59

2.10.6 Alcohol and trauma

There is increasing evidence of a positive link between alcohol consumption and trauma (Chikritzhs *et al.* 2003, Deutch, Christian, Hoyer, Christensen, Dragsholt, Hansen, Carsten, Kristensen & Hougaard 2004, O'Connell *et al.* 2003, World Health Organization 2007a). According to the WHO (2007), half of all deaths attributable to alcohol are from injuries and 20.4% of injury cases at emergency

departments involve alcohol. According to Chikritzhs and Pascali (2005a) alcohol related falls were the most common condition leading to hospitalization among 65 to 74 year old Australians. In the U.K., Mulinga (1999) reported that amongst patients aged 65 years and older who had an ICD-9 diagnosis of alcohol dependence or abuse, 50% were admitted to hospital due to a fall.

Research from the U.S. (Zautcke, Coker, Morris & Stein-Spencer 2002) found that of older patients who screened positive for alcohol at the Emergency Department, 50% presented for a fall related injury, while 37% presented as a result of a motor vehicle related injury. Similarly, 14% of all drivers aged 60 years or older who were admitted to an urban hospital in Nashville had a positive Blood Alcohol Concentration (BAC). Amongst the older men this figure rose to 21% (Higgins, Wright & Wrenn 1996). While So rock *et al.* (2006) reported that amongst people aged 55 years and over, having 12 or more drinks a year was associated with a 50-70% increase in the risk of motor vehicle crashes and falls.

Mukamal, Mittleman, Longstreth, Newman, Fried and Siscovick (2004) concluded that 168 grams or more per week of alcohol was associated with an increased risk of falls in people aged 65 years and over. This equates to 2.4 standard drinks a day, which is considerably less than the six standard drinks per day for men and four standard drinks per day maximum levels recommended in Australia (National Health and Medical Research Council 2001). In Australia, Peel, McCLure and Hendrikz (2006) reported that consumption of less than two standard drinks per day for older men and one standard drink per day for older women had a significant protective effect on the risk of hip fracture, but above these levels, this disappeared. While the authors do not explain alcohol's protective effect, it is possible that the use of alcohol amongst the group was a marker of general good health. The fact that never smoking, playing sport in older age and practicing a greater number of preventive medical care behaviours was also predictive of a reduced risk of hip fracture strengthens the plausibility of this explanation.

Similarly, Cawthon, Harrison, Barrett-Connor, Fink, Cauley, Lewsi, Orwoll and Cummings (2006), reported that older men in the U.S. who consumed less than 13 standard drinks per week were less likely to report two or more falls than men who did not consume alcohol, but above these level, this protective effect disappeared. Finally, Mukamal, Robbins, Cauley, Kern and Siscovick (2006) reported that compared with long term abstainers, the adjusted hazards ratio for hip fracture amongst a sample of 5,865 adults aged 65 years and older in the U.S. was 0.78 among consumers of up to 14 drinks per week and 1.18 among people who consumed 14 or more drinks per week.

All three of the above studies indicated that drinking above two standard drinks per-day placed an individual at risk of a fall or hip fracture.

In research on pedestrian deaths in South Australia, Holubowycz (1995) reported that for men aged 65 years and older 32.6% of fatalities screened positive for alcohol. In research at the Royal Prince Albert Hospital, NSW, of all 65 to 74 year olds admitted to the emergency department because of a fall, alcohol was a mitigating factor in 18% of cases. This figure dropped to 10% for 75 to 84 year olds and was not a factor for those older than 85 years (Bell, Talbot-Stern & Hennessy 2000).

Similarly, Kaukonen, Nurmi-Luthje, Luthje, Naboulsi, Tanninen, Kataja, Kallio and Leppilampi (2006) reported that among older men and women admitted to two Finnish hospitals with an acute hip fracture, 29% of those aged 65 to 74 years had used alcohol in the past 24 hours, compared to 5.9% in the 75 to 84 years age group and 2.6% amongst those aged 85 years and over.

These two studies highlight the importance of separating data from different cohorts of older people. Had data been aggregated in the research by Bell *et al.* (2000) or Kaukonen *et al.* (2006) the high incidence of alcohol-related falls amongst 65-74 year olds may not have been apparent.

In an Austrian study of alcohol and benzodiazepine use Kurzthaler, Wambacher, Golzer, Sperner, Sperner-Unterwegger, Haidekker, Pavlic, Kemmler and

Fleischhacker (2005) reported that 22% of the total sample admitted to hospital due to a fall, tested positive (blood tests) for alcohol and 55% tested positive for benzodiazepine use. In those patients aged over 70 years, their BAC (1.3 gIl) was lower (but not significantly) in comparison to the BAC reported for people less than 50 years of age (1.77g/l). This could indicate that a smaller amount alcohol is required for older people to cause impairment leading to a fall.

2.10.7 Alcohol and concomitant medication use

Another concern related to alcohol use and older people is the use of contraindicated medications. People over the age of 65 years are the greatest consumers of prescription drugs. While older people comprise between 12% and 15% of the population of most developed nations, it has been estimated that they consume approximately 33% of all prescription medicines (Evans 2000). They also have a high use of over-the-counter medications, the most common of which are analgesics, vitamins, antacids and laxatives (Evans 2000). Generally, with ageing, the percentage of water and lean tissue (mainly muscle) in the body decreases, while the percentage of fat tissue increases (Korrapati & Vestal, 1995). These changes can effect the distribution and the length of time that a drug stays in the body as well as the amount that is absorbed by body tissues (Vestal, McGuire, Tobin, Andres, Norris & Mezey 1977). Although the intrinsic activity of drug-metabolizing enzymes in general does not decline with age, liver mass as a percentage of body weight and liver blood flow, do decrease with ageing (Montamat, Cusack & Vestal 1989). As a result, the overall capacity of the liver to convert some drugs (e.g. diazepam) to their inactive metabolites decreases with age (Lamy 1982).

Problems can result from the concomitant use of many prescription drugs commonly used by older people and alcohol (Korrapati & Vestal 1995, Tanaka 2003, Weathermon & Crabb 1999). See Table 10 for details about different commonly used medications. For example, alcohol increases the sedative effects of antidepressants, antihistamines, muscle relaxants, benzodiazepines and opioids (National Institute on Alcohol Abuse and Alcoholism 1995). This interaction can have serious consequences such as increasing the risk of falls,

motor vehicle accidents and overdose (Tanaka 2003, Weathermon & Crabb 1999). Alcohol use in combination with non-steroidal anti-inflammatory drugs (NSAIDS) can result in stomach bleeding, gastric inflammation and liver damage (Bush, Shlotzhauer & Imai 1991, Dart 2001, Kaufman, Kelly, Wiholm, Laszlo, Sheehan, Koff & Shapiro 1999, Korrapati & Vestal 1995, Newgreen 2005, Tanaka 2003).

Alcohol related adverse drug reactions (ADR) are an important health concern for all individuals but especially so for older people who have higher medication use. The Australian Council for Safety and Quality in Health care (2002) have estimated that more than 140,000 Australians are hospitalized each year as a result of medication-related problems and that in the community setting there are up to 400,000 adverse drug events managed by General Practitioners each year. According to Kurfees and Dotson (1987), alcohol was involved in one third of all fatal drug interactions in older people. Subsequent international evidence indicates that the prevalence of alcohol and contraindicated medication use remains problematic. For example research by Forster, Pollow and Stoller (1993) indicated that 25% of community dwelling older people were at-risk for contraindicated alcohol and medication use. Two years later Adams (1995) reported that 38% of older people reported using both alcohol and one or more high-risk medications.

Onder, Landi, Vedova, Atkinson, Pedone, Cesari, Bernabai and Gambassi (2002) studied 22,000 patients admitted to 81 medical centres in Italy and concluded that consumption of up to 40 grams per day was associated with a 24% increased risk of an adverse drug reaction.

In a study by Fink, Elliott, Tsai and Beck (2005) 70% of the study's participants (665 patients attending general practice in the U.S.), reported having at least one medical condition that was potentially worsened by alcohol. In the research, 15% of participants reported taking non-steroidal analgesics, 12% sedatives, 30% antihypertensive medications and 11% antihistamines, each of which has the potential to interact adversely with alcohol (Adams 1995). Similarly Pringle, Ahern, Heller, Gold and Brown (2005) reported that 20.2% of a sample of older

people (also in the U.S.) used alcohol with non-steroidal anti-inflammatory medication, 20.1% with prescription antihistamines and 19.8% with anti-hypertensive medication. In a subsequent study by Pringle *et al.* (2006) with a sample of 8,883 men and women current drinkers over the age of 65 years, 79.2% reported using at least one prescription drug. Over a two year follow up with participants, the addition of any new medication doubled the odds of abstaining from alcohol (OR=1.82: $p<0.001$).

In Finland, Aira *et al.* (2005) reported that amongst a sample of home dwelling persons aged 75 years or over 44% of the sample used alcohol. Of these, 86.9% used medications on a regular basis. 38% of people taking antidepressants, 21% of people taking antihistamines, 38% taking benzodiazepines, 46% of those taking NSAIDS, 38% of those taking opiates and 40% of those taking warfarin were also drinking alcohol. In a Brazilian study, 0% of patients aged 60 years and over who were diagnosed with an ADR used alcohol on a daily basis (Passarelli, Jacobb, Filho & Figueras 2005). In the U.S. of a sample of 151 men and women aged 65 years and older who had reported an ADR, 46% reported consuming alcohol over the past 12 months (Chrischilles, Rubenstein, Van Gilder, Voelker, Wright & Wallace 2007).

Table 10: Common medications used by older people that are contraindicated for use with alcohol.

Drug type	Purpose of medication	Interaction with alcohol
Anaesthetic	Administered prior to surgery	Alcohol increases the dose of propofol required to induce loss of consciousness. Chronic alcohol consumption increases risk of liver damage that may be caused by anaesthetic gases enflurane and halothane.
Antibiotics	Used to treat infection	Alcohol use may cause nausea, vomiting, headache and possible convulsions with furazolidone, griseofulvin, metronidazole, quinacrine. Isoniazid and rifampin used to treat tuberculosis- especially problematic among elderly. Acute alcohol consumption decreases availability of isoniazid in the bloodstream, while chronic use increases availability of rifampin.
Anticoagulants	Prescribed to retard bloods ability to clot	Acute alcohol enhances warfarin's availability increasing risk of haemorrhaging. Chronic alcohol reduces warfarin's availability lessening protection from consequences of blood dotting.
Antidepressants	Reduce depression	Alcohol increases sedative effect of tricyclic antidepressants, impairing mental skills. Chronic alcohol use increases the availability of some tricyclics and decreases availability of others. Tyramine, found in some beers and wine interacts with some antidepressants to produce a rise in blood pressure. As little as 12g of alcohol may create a risk of an ADR.
Antidiabetic medication	Hypoglycaemic drugs are prescribed to lower blood sugar levels.	Acute alcohol consumption prolongs and chronic alcohol consumption decreases availability of tolbutamide. Alcohol can also interact to cause nausea and headache.
Antihistamine	Treat allergic symptoms	Alcohol may intensify sedation, in older persons may also cause dizziness.
Antipsychotic medication	Diminish psychotic symptoms	Acute alcohol use increases sedative effect, resulting in impaired coordination and breathing difficulties. Chronic use may result in liver damage.
Anti seizure medications	Treatment of epilepsy	Acute alcohol increases availability of phenytoin and risk of drug-related side effects. Chronic use may decrease phenytoin availability reducing protection against seizures.
Cardiovascular medications	Treat heart and circulatory system	Acute alcohol interacts with some of these drugs to cause dizziness or fainting. Chronic use decreases availability of propranolol used to treat high blood pressure.
Opiate based pain medication	Reduce moderate to severe pain	Combination of opiates and alcohol enhances sedative effect of both substances increasing risk of overdose

Non opiate based pain medication	Reduce pain	Aspirin and similar medications are commonly used by elderly. Some drugs can cause stomach bleeding and inhibit blood clotting- alcohol can exacerbate these effects. Risk of gastric bleeding, in addition aspirin may increase availability of alcohol heightening effects of a given dose of alcohol. Chronic alcohol use activates enzymes that transform acetaminophen into chemical that can cause liver damage.
Benzodiazepines	Anxiety and insomnia	Alcohol use may increase sedation. Combination of alcohol and lorazepam may result in decreased heart and breathing function.

(Adams 1995, Cusack & Vestal 1986, Dart 2001, Dunne 1994, Forster *et al.* 1993, Katona 2001, Korrapaf & Vestal 1995, Kurfees & Dotson 1987, Patat 2000, Pringle *et al.* 2005, Tanaka 2003, Weathermon & Crabb 1999)

2.10.8 Alcohol and total body water

Total body water (TBW) has previously been mentioned as important contextual information highlighting the risk of medication use amongst older people. It is also relevant to blood alcohol concentrations (BAC) in older people.

A higher BAC can be produced with a standard quantity of alcohol if it is absorbed more quickly, eliminated more slowly or the TBW for distribution is less (Vogel-Sprott & Barrett 1984). While neither alcohol absorption nor elimination are affected with ageing, TBW does decrease with age (Schoeller 1989, Watson, Watson & Batt 1980). TBW also varies across gender with females having a lower TBW (on average) than males. As women of all ages have less lean muscle mass than men, they are more susceptible to the effects of alcohol. With age there is a decrease in lean body mass versus total volume of fat, and the decrease in total body mass increases the total distribution of alcohol in the body (Blow & Barry 2002). While both men and women lose lean muscle mass as they age, because women have less to begin with this is further exacerbated with increasing age. Liver enzymes that metabolise alcohol also become less efficient with age and CNS sensitivity increases with age for both men and women (Blow & Barry 2002).

According to Atkinson (2002), a fasting 60 year old man will develop a peak alcohol level 20-25% higher than a 30 year old given the same amount of alcohol. This difference is even greater for women. This decreased alcohol tolerance among older people may lead to decreased consumption with no apparent reduction in intoxication. Vestal *et al.* (1977) reported that while older drinkers are probably at no greater risk of impairment than young drinkers at low doses (one to two standard drinks), at higher doses the older person would achieve a higher BAC. This age related physiological change may partially explain the longitudinal and cross sectional data showing a decline in alcohol consumption with age. That is, older people drink less but the effects may still be the same as they require less alcohol to achieve a similar BAC (Mirand & Welte 1994).

In research by the Department of Health and Welfare in Canada (Mirand & Welte 1994) sex was eliminated as a predictor of alcohol intake after adjusting for total body water. In the U.S. where heavy drinking among older adults is defined as two or more drinks per day, normal assessment of drinking will bias heavy drinking towards males. When TBW adjustments were made to consumption figures, female alcohol intake was on par or higher than male intake in terms of physiological or functional dose. (Goist & Sutker 1985, Marshall, Kingstone, Boss & Morgan 1983, Nicholson, Wang, Airhihenbuwa, Mahoney, Christina & Maney 1992). These results have significant public health ramifications and impact on the development of guidelines and assessment of prevalence of at-risk consumption.

2.10.9 Summary

Although alcohol has many social benefits, its use increases the risk of a wide range of harms in a dose dependent manner. Alcohol use has been associated with more than 60 different types of diseases and conditions and has been responsible for significant trauma and adverse drug reactions amongst older people. Because of the changes that occur with ageing, such as the decrease in total body water, older people are particularly vulnerable to not only the long-term but also short-term effects of alcohol. Evidence from Fillmore *et al.* (2006) has also contested the association between a low dose of alcohol and a reduction in the risk of heart disease. While the reviewed literature on alcohol-related harm supports Demos and Maclean's (2005) conclusion that the adverse effects of alcohol were condition specific, there remains a summative case that drinking above one to two standard drinks per day places older men and women at-risk of harm.

2.11 Pouring practices

One other area, that may influence prevalence estimates of at-risk consumption, is the validity of self-report consumption levels and the pouring practices of older drinkers.

The validity of self-reported alcohol consumption, has been a longstanding methodological concern (Ernhart, Morrow- Tlucak, Sokol & Martier 1988, Kaskutas & Graves 2000, Midanik 1982, Stockwell, Donath, Cooper-Stanbury, Chikritzhs & Mateo 2004). According to Knibbe and Bloomfield (2001) data from surveys only estimates between 40-60% of known alcohol sales. Despite these limitations, self-report surveys have been used in many countries to estimate the population levels of at-risk consumption. According to Stockwell et at. (2004), under-reporting of consumption may occur because high-intake drinkers and high-risk drinking days may be under-sampled, people have poor recall of past alcohol consumption, and find it difficult to estimate mean intake on drinking days.

Part of this difficulty is due to confusion about standard drinks sizes and alcohol content (Dawson, Grant & Chou 1995, Kaskutas & Graves 2000, Stockwell et at. 2004). According to Lemmens (1994), under-reporting of consumption was more likely to occur in off-premise settings as people drink from a variety of bottles, glasses and mugs, This finding has particular relevance for older Australians, who primarily drink at home (Australian Institute of Health and Welfare 2005b)

While a number of studies have investigated different aspects of offfpremise drinking and in particular container sizes and pouring practices, none have specifically focussed on older people.

In 1985 as part of the Dutch general population survey, 1,236 men and women, aged between 15 and 70 years, were interviewed. Of these, 863 who had consumed an alcoholic drink in the past week were interviewed about their pouring practices. Participants who drank wine, fortified wine or spirits were asked to pour water into a glass. For wine, the glasses used were 8% bigger than the standard 100 ml, spirit glasses were 30% larger (women reported drinking spirits from larger glasses than men) and fortified wine was poured into glasses 50% larger than standard. According to Lemmens (1994) the effect of the larger size of actual drinks increased estimates of consumption by 7.3%. The effect of the correction on estimated total number of drinks was on average twice as large for women (12%) than it was for men (6%) even though the effect

of male wine (+7%) and fortified wine consumption (+54%) was larger than in the case of women (+1% and +38% respectively). This ostensibly paradoxical result was due to the preference for beer amongst males. The results indicated that the self-reported drinks consumed at home contained more than a standard drink. This deviation was greatest for spirits (+26%), followed by fortified wines (+14%) and least for wine (+4%).

However, Lemmens, did not include demographic or age data on the sample of 863 participants. Secondly, no detail as to whether the water was clear or coloured to match particular alcoholic beverages was included. Nor was there information on what type of container the water was poured from (i.e. the shape and size of a vessel could influence the perceived volume), nor whether respondents were asked to pour the water up to the usual point they filled the glass when drinking alcohol or simply to fill the glass. Finally, respondents were not asked if they would record the amounts poured as one standard drink on a survey.

In 1987, Carruthers and Binns (1992) interviewed 356 Australian men and women (18 to 45 years), who reported having an alcoholic drink in the previous month, about their knowledge of standard drinks and asked them to pour samples of 12 alcoholic beverages. Water was used but participants were asked to use their own glasses. The amounts poured by participants were then measured using a graduated measuring cylinder. While 50% of the sample had heard of the term, standard drink, only 6% of males and 1% of females knew how many grams of alcohol were contained in one standard drink. The majority of participants poured standard serves or less of fortified wines, liqueurs, low alcohol beer, and wine coolers. However, full strength beer, wine and spirits were frequently poured in amounts exceeding a standard serve. The authors do not report whether this difference was statistically significant. In addition, no information was provided on how often respondents consumed any of the particular beverages. This is important, as Kaskutas and Graves (2000) reported that frequency of drinking affects the volume of alcohol poured. Unfortunately, no one over the age of 45 years was interviewed and no other demographic data were provided on the respondents.

In another Australian study, Stockwell and colleagues (1991) compared adults' ability to correctly pour a standard drink of beer and/or wine, and reported that wine drinkers had much greater difficulty than beer drinkers in correctly estimating a standard drink. However, only 72 participants took part in the study and of these only 24 completed the wine and the beer pouring exercise. While the research demonstrated how difficult it was for participants to pour standard serves of alcohol, the study's aim was not to assess individual's normal levels of pouring and subsequently no other data were reported.

In later Australian research by Banwell (1999), a group of 86 women recorded their alcohol consumption prospectively over a two-week period and then measured the amount of alcohol they consumed with a measuring jug. In the research, the women poured more than one standard drink when consuming wine, champagne, spirits and liqueurs, but poured less than one standard drink when drinking beer, cider and fortified wine. However, in the publication, which was only a brief communication, no information was included on the ages of the women, their reported alcohol consumption, nor the specific volumes of beverages poured.

Between 1994 and 1999 a random sample of 1,039 Danes were interviewed over the telephone about their drinking levels and knowledge of alcohol guidelines (Gronbaek *et al.* 2001). By 1999, 47% of women and 67% of men were aware of the alcohol guidelines in Denmark. However, over this period the knowledge of alcohol guidelines rose more sharply among young men and women than amongst people over the age of 65 years. Subject's alcohol consumption had a significant association with level of knowledge, with those drinking more than the recommended levels being two to four times more likely to know the national alcohol guidelines (Gronbaek *et al.* 2001).

In more recent research on knowledge of standard drinks, Lader and Meltzer (2001) reported that older people were less well informed than younger age groups in connection to alcohol units in the U.K. Their research showed that between 82 and 85% of younger people had heard of measuring alcohol

consumption in units, but among people over 65 years of age, this figure fell to 62%.

To investigate pouring practices amongst pregnant women, Kaskutas and Graves (2000) interviewed 221 women in the Los Angeles and San Francisco area between 1996 and 1997. Participants were asked about their drinking during the year prior to pregnancy and were then shown pictures pre-marked with letters corresponding to different number of fluid ounces. A number of pictures representing different shaped glasses were included for beer, malt liquor, wine, wine coolers, fortified wine and spirits. Respondents were required to nominate the can, bottle or glass they mainly used for a particular beverage and were asked how high they would fill the container.

The beer and wine cooler drinks poured were equivalent to one standard drink. However, wine was over-poured by 30%, spirits by 100%, malt liquor by 180% and fortified wine by 170%. When comparisons were made between those women who drank infrequently, on a weekly basis and on a daily basis, those who drank daily were more likely to select portion sizes that were larger than their counterparts who drank less frequently. This observation was only significant for beer, spirits and malt liquor. In order to assess respondents' ability to estimate the volume of their drink size respondents were asked to estimate in ounces the volume of the portion size they had selected.' The' beverages' estimated with the greatest accuracy were beer, malt liquor and wine coolers. However, the tendency was for women to under-estimate portion size with 43% to 55% under-estimating self-selected drink size (depending on beverage). Kaskutas and Graves (2000) concluded that when more accuracy is needed (as with assessing risk) it may be prudent to abandon the use of standard drink definitions when measuring alcohol consumption and instead allow respondents to indicate their portion sizes.

However, the authors did not specify how many different glass shapes were used, only that it was a diverse range. Nor did they specify how many respondents indicated that the pictures resembled their usual beverage container. Nor was there information on how often each of the participants drank

each of the particular beverages. Finally, they did not include information on how many weeks/months pregnant each woman was or control for the length of time since each subject last poured an alcoholic beverage.

In a paper published by White, Kraus McCracken and Swartzwelder (2003) with 106 college students in the U.S., students were asked to pour an amount of alcohol they believed necessary to produce one standard drink. Students over-poured spirits by 26%, mixed drinks by 80% and beer by 25%. In a follow up paper, White, Kraus, Flom, Kestenbaum, Mitchell, Shah and Swartzhelder (2005) reported that students over-poured all three beverages and also over-estimated the volume of all standard drinks, with the exception of beer. When students were given feedback about the over-pouring and were re-interviewed about their consumption over the prior two weeks, there was a significant increase in reported consumption.

Kerr *et al.* (2004b), after examining wine consumption and pouring amongst 249 wine drinkers in the U.S., reported that young women, middle aged men, "white" women, and "black" and Hispanic men drank 70% to over 100% more ethanol than indicated in self-report drink measures. There was no significant difference between men across age ranges. When beverage types were compared, women poured significantly greater quantities of both red and white wine than did men. Overall, average monthly volume of ethanol from wine was found to be 12% higher for women aged 55 years and older and 56% higher for older men. Income was negatively related to men's drink ethanol content with men in the highest income quintile having significantly smaller drinks. A positive but insignificant relationship with high income was also found for women.

This research was significant as the authors also asked participants to name a wine brand that typified their usual wine drinking at home and hence were able to specify a percentage alcohol by volume for self-reported wine beverages.

This methodology should increase the accuracy of the data, but only if people consistently drink wine which has the same percentage of alcohol by volume. In addition, although participants 50 years and older were included, the authors did

not provide information on the age range and hence it was not possible to determine if anyone older than 65 years was included. Additionally, participants were not asked if they would record the amounts poured as one standard drink. Examining this issue is vital for making conclusions about the validity of self-report data.

In a study in Edinburgh, Scotland, Gill and Donaghy (2004) recruited 251 participants aged between 30 and 50 years of age from three employment settings. Participants were asked to pour into a glass (provided by the research team) their usual servings of red wine and whiskey. Over 40% of participants reported that they more often drank at home than at a licensed premise, 94% of the sample poured their own drinks, 73% of the sample drank alcohol on a weekly basis and 27% monthly. The authors reported no significant differences between any of the subgroups or age groups on the amounts of alcohol poured. The average amount of wine poured by the sample was 1.92 U.K. standard drinks, equivalent to 160ml of wine. Women poured larger quantities of wine than their male counterparts did but this did not reach significance. In relation to whisky, participants poured the equivalent to 2.3 U.K. standard drinks, which was equivalent to 57 ml. Men poured significantly more whisky than women and participants aged 21-25 years poured significantly more than in those over 30 years of age.

This study again provided information that significant over-pouring of alcohol is common. However, in the research no information was provided on whether the two beverages that participants were asked to pour were the subject's usual drinking beverages. Finally, the authors acknowledged that participants were not asked whether what they poured equalled one standard U.K. drink and stated that research on this topic was required (Gill & Donaghy 2004).

More recently, Gill, Donaghy, Guise and Warner (2006) investigated binge drinking amongst university students. Nineteen female students were asked to pour into a glass (a standard wine glass for wine and a spirit or tall glass for spirits) the drink she would usually pour at home. Bottles of wine and vodka were provided for the exercise. The average alcohol content of the poured wine

was 1.98 U.K. standard drinks and the spirits were equivalent to 2.24 U.K. standard drinks. Unfortunately, no information was provided as to whether the wine was white or red or how often the participants drank wine or vodka as opposed to other beverages. The small sample size makes generalizations difficult, and participants were not asked how many standard drinks they would record the amount poured as.

Finally, Gill and O'May (2007) asked 297 adults to pour an amount of alcohol that they would normally pour for themselves or a guest at home. Results indicated that across all age groups and beverage type's participants on average poured the equivalent to 2.05 U.K. standard drinks. There were no differences between the amounts poured by men compared to women, except in relation to red wine, where men poured significantly more than women. How generalisable the results were to older people is difficult to say, as there were only 19 people over the age of 55 years included in the research and it was not possible to know if any of these were over the age of 65 as no further detail was provided by the authors. For a comparison of each of these studies see Table 11.

Table 11: Comparison of research investigating pouring practices.

Author	Year	Country	Sample size	Age of participants	Percentage over-pouring							
					Wine		Beer		Spirits		Fortified wine	
					Male	Female	Male	Female	Male	Female	Male	Female
Lemmens	1994	Netherlands	863	15+	1 8%	2%	n/a	n/a	23%	134%	17%	11%
Carruthers and Binns	1992	Australia	356	18-45	<50%	<50%	<40%	-20 to +20%	<80%	<90%	-10 to 20%	-30 to 0%
Stockwell *et al*	1991	Australia	72	18+	n/a							
Banwell	1999	Australia	86	unknown	n/a							
Kaskutas and Graves	2000	U.S	221 females	Average 26 years	n/a	30%	n/a	0	n/a	100%	n/a	170%
White *et al*	2003	U.S	106	18-22	n/a	n/a	25%		26%		n/a	n/a
Kerr *et al*	2004	U.S.	249	18+	36 to 70%	12 to 114%	n/a	n/a	n/a	n/a	n/a	n/a
Gill and Donaghy	20041	Scotland	238	30-50	80%	90%	n/a	n/a	250%	200%	n/a	n/a
Gill *et al*	2006	Scotland	19 females	18-26	n/a	98%	n/a	n/a	n/a	220%	n/a	n/a
Gill and O'May	2007	Scotland	297	18+	200%		n/a		200 to 230%		n/a	

None of the previous studies on pouring practices specifically reported results for participants aged 65 years and older. In those studies that asked participants to pour their usual serving of alcohol no participant was asked how many standard drinks the amount was equivalent to. Only the study by Kaskutas and Graves (2000) investigated the correlation between amounts poured and estimations of standard drink equivalents. This is a critical piece of information. Each study found evidence of over-pouring. The subsequent conclusion was that people underestimate their alcohol consumption. However, the two issues are separate. Research is required that not only asks people to pour their usual beverage size, but then also asks people how many standard drinks they would record for each beverage poured. The combination of these two elements would give a more accurate and valid assessment of consumption.

Because of the potential for under-reporting when asking respondents to quantify consumption using "standard drinks" the New Zealand National Alcohol Survey now allows respondents to report their consumption of different beverages in their own terms and interviewers then code these responses by using containers and glasses that are commonly used and sold. Using such methodology has led to a greater convergence between survey self-report data and figures on annual volume of alcohol consumed (Casswell, Huckle & Pledger 2002).

In summary, the pouring practices of drinkers have been recognized for some time as contributing to the under-estimation of consumption based upon self-report data. A number of studies have investigated the issue amongst adult populations in the Netherlands, Australia, the U.S. and Scotland. Results have indicated that men and women consistently over pour alcohol and subsequently under-estimate their alcohol consumption. While as a percentage, spirits have been poured in greater amounts (comparable to one standard drink) than wine and beer, no published research has specifically investigated the pouring practices of older people. Nor has any research investigated whether or not people adjust their self-report consumption responses based upon the amounts of alcohol they usually pour for themselves. As a corollary, investigation of the pouring practices of older people will provide more accurate data on

consumption levels, which will not only be relevant for the aging field but also for general alcohol epidemiological methodology.

2.12 Conclusion

With the ageing of the Australian population, it is important to become better informed about alcohol use amongst older people. Two fundamental gaps identified in literature review were age appropriate alcohol guidelines and investigation of the pouring practices of older people. Research on these issues is required so that accurate estimates of the prevalence of potentially at-risk alcohol consumption can be assessed. To that end, investigation of age appropriate alcohol guidelines, and the pouring practices older people in Australia, will be the focus of the current research.

Chapter Three: Study 1: Key informant research investigating alcohol guidelines for older Australians

3.1 Introduction

When developing the Australian Alcohol Guidelines, the National Health and Medical Research Council (NHMRC) used an evidence based medicine approach (Sackett *et al.* 1996). However, the NHMRC Working Party conceded that there were significant limitations in the evidence base relating to alcohol use amongst older people. This paucity of research made it difficult to develop specific alcohol guidelines for older people (Demos & McLean 2005).

As it has been common practice to exclude older persons from general health risk behaviour clinical trials (Levy, Kosteas, Slade & Myers 2006, Peel, McClure & Bartlett 2005) it is not surprising that literature specifically focusing on alcohol use amongst older people remains scarce. However, as people become more vulnerable to the negative effects of alcohol with age (Atkinson 2002, Schoeller 1989, Single *et al.* 2000, Varona & Morales 1999, Watson *et al.* 1980), the NHMRC have advised older people to drink less than the levels recommended to the general population (National Health and Medical Research Council 2001). Paradoxically, the national prevalence of at-risk alcohol consumption amongst older Australians has been calculated using the levels that have been recommended for the general population. More accurate assessment of the prevalence of at-risk consumption amongst older Australians requires the development of age-appropriate guidelines.

3.2 Aims

Study 1 involved in-depth interviews with 32 key informants from Australia and had three major aims. These were to:

1. Develop alcohol guidelines for 65 to 74 year old Australian men and women.
2. Investigate how the ageing of the Australian population may influence alcohol prevention and treatment initiatives.
3. Identify three research priorities on alcohol use amongst older Australians.

3.3 Methods

Before interviews commenced, it was necessary to develop the key informant questionnaire, identify potential key informants and determine what analysis would be required. The method section will provide details on each of these elements and will include information on the academic discipline, and professional experience of each key informant interviewed.

3.3.1 Development of key informant questionnaire

The key informant questionnaire was developed over a one-month period. In February 2005, the questionnaire was pre-tested with six professionals: a pharmacist, a researcher in ageing, three alcohol and other drug (AOD) researchers and one clinical AOD educator. In each interview participants were asked for feedback on the ease of comprehension, reactivity of questions (whether the questions appeared confrontational or leading), the organisation of questions and other issues that would improve the sequencing and ease of completion of the instrument (Rootman *et al.* 1984, Windsor *et al.* 1994). The final version of the questionnaire was then submitted for approval to the Higher Degrees Ethics and Research Committee's at Curtin University of Technology. No interviews were scheduled until the questionnaire was approved. See Appendix 1 for a copy of the key informant questionnaire.

3.3.2 Components of the key informant questionnaire

Informed written consent

The first page of the questionnaire included background information about the research and asked key informants to sign and date a consent form and return it by fax to the candidate. Once responses from each key informant were entered into a database, the pages that included responses from key informants were separated from the first page and stored in separate locked filing cabinets at the National Drug Research Institute (NDRI), Curtin University of Technology. No identifying information were entered as data.

Impact of the ageing of the population on alcohol prevention and treatment initiatives

There were nine questions included on alcohol prevention and treatment initiatives. Each of these questions produced qualitative data. See Table 12 for a list of the questions included.

Table 12: Alcohol prevention and treatment issues included in the key informant questionnaire.

1.	In your opinion how relevant is alcohol use amongst older people as a public health issue?
2.	In your opinion what impact will the ageing population have on alcohol prevention initiatives in Australia? Why?
3.	In your opinion where are the gaps in prevention initiatives for older drinkers?
4.	What do you see as the barriers to developing effective prevention responses in relation to alcohol use amongst older Australians?
5.	What do you think should be done to ensure the development of effective prevention responses in relation to alcohol use amongst older Australians?
6.	In your opinion what impact will the ageing population have on alcohol treatment services in Australia? Why?
7.	In your opinion where are there gaps in treatment initiatives for older drinkers?
8.	In your opinion what are the barriers to developing effective treatment responses to alcohol use amongst older Australians?
9.	What do you think can be done to ensure the development of effective treatment responses to alcohol use amongst older Australians?

Alcohol guidelines for 65 to 74 years old Australians

The major focus of the questionnaire was on potential alcohol guidelines for 65 to 74 year old Australian men and women. Key informants were asked to make recommendations based upon their knowledge of the research literature and their own professional experience. They were also asked to base recommendations upon the same assumptions that have been described in the NHMRC (2001) Australian Alcohol Guidelines. These assumptions were that a person was not on medication, did not have a family history of alcohol-related problems or a condition that was made worse by drinking, and was not about to undertake any activity involving risk or a degree of skill. To aid key informants,

information was included on the Alcohol Guideline No.1 (NHMRC, 2001). See Table 13 for the information provided to key informants and the questions asked about age-appropriate guidelines.

Table 13: Background information provided to key informants on the alcohol guidelines (NHMRC, 2001) and specific questions asked of key informants in relation to age-appropriate guidelines.

Current NHMRC Alcohol guidelines to avoid risk of harm in the short and longer term for men and women

Men

Standard drinks per day	Type of Risk
Up to 6	Reduce risk of acute harm
Up to 4	Reduce risk of chronic harm

Women

Standard drinks per day	Type of Risk
Up to 4	Reduce risk of acute harm
Up to 2	Reduce risk of chronic harm

Q10. What would you recommend as appropriate drinking limits for 65-74 year old men and women based upon the same exclusion as current guidelines e.g. not taking any medication?

Recommended Guidelines for 65-74 year old men and women based upon same exclusion as current guidelines e.g. Not on any medication

Men

Standard drinks per day	Type of Risk
	Reduce risk of acute harm
	Reduce risk of chronic harm

Women

Standard drinks per day	Type of Risk
	Reduce risk of acute harm
	Reduce risk of chronic harm

As medication use is common amongst older people, key informants were also asked to recommend appropriate alcohol guidelines for people who were using contraindicated medication. 'See Table 14 for the questions included on alcohol guidelines for people taking contraindicated medication.

Table 14: Question on alcohol guidelines for 65 to 74 year olds who were currently taking contraindicated medication.

11. Unfortunately we know from the literature that the majority of older people take medications, some of which are contraindicated with alcohol e.g. Benzodiazepines, analgesics and some antidepressants. For those people aged 65-74 years who were regularly taking any of these medications what would you recommend as suitable alcohol limits?

Recommended Guidelines for men and women who are currently taking contraindicated medication

Men		Women	
Standard drinks per day	Type of Risk	Standard drinks per day	Type of Risk
	Reduce risk of acute harm		Reduce risk of acute harm
	Reduce risk of chronic harm		Reduce risk of chronic harm

In addition to recommendations on appropriate alcohol guidelines for older Australians, key informants were asked a series of questions on communication and dissemination of alcohol guidelines. See Table 15 for the questions asked on these specific issues.

Table 15: Questions on communication and dissemination strategies related to the development of age-appropriate alcohol guidelines.

13. How best do you think information about drinking guidelines should be communicated to the general population?
14. How best do you think information about drinking guidelines should be communicated to older drinkers?
15. Do you think there should be any particular communication strategies for subgroups of older drinkers? (Please identify who these subgroups are and what specific strategies should be employed)
16. How best do you think information about drinking guidelines for older people be communicated to those professions who work with this age group?

Future research priorities

The final component of the questionnaire included a question on future research priorities in the area:

17: What would you identify as three key priorities for research in this area?

3.3.3 Statistical analyses

Responses to the questionnaire produced both quantitative and qualitative data. Descriptive statistics were used to examine differences between key informant groups and the recommended alcohol guidelines (i.e. independent t-test). The

primary statistical test of choice was one way ANOVA, conducted using SPSS (version15) software.

To increase the accuracy of the interpretation of qualitative data the following procedure was adopted: (1) question was stated, (2) a matrix of response themes was developed (3) the range of responses were described, (4) an interpretative discussion was provided (Windsor *et al.* 1994). A summary is provided in the results section of this chapter. To afford greater clarity quotes from key informants are included.

3.3.4 Interview and recruitment protocol

As the focus of the research was on alcohol use and older people the decision was made to select key informants from the ageing field, the alcohol and drug field and the general health, injury prevention and policy fields. As the aim was to develop alcohol guidelines for an Australian population, only key informants from Australia were selected. To ensure a consistent methodology, all interviews were conducted over the telephone.

Initial contact with potential key informants was made via email. This email included information about the research and a copy of the key informant questionnaire. Key informants were contacted a maximum of three times by email and once by telephone requesting their participation. If no response was made after these four contact attempts, the person was deemed as a non-response. When a key informant agreed to participate, a telephone interview was scheduled. Each key informant was asked to sign and return the formal consent form to the candidate (see Appendix 1). At the conclusion of the interview, each key informant was asked to recommend other key informants. For a nominated individual to be included as a potential key informant it was necessary to be nominated by at least two people. This methodology was used to ensure that the most appropriate experts were interviewed and to assess when saturation (the point at which no new information was forthcoming) had occurred (Kingdon 1995) thus determining when the selection process would cease.

The first key informant interview was conducted on 14 March 2005 and the last interview was conducted on 24 August 2005. Each interview took an average of thirty minutes to complete. In total, 32 individuals were interviewed as key informants. This number compares favourably to other published research using key informants (Burgers, Grol, Klazinga, Makela & Zaat 2003, Goren 2006, Markosyan, Babikian, DiClemente, Hirsch, Grigoryan & Del Rio 2006, Morojele, Kachienqa, Mokola, Nkoko, Parry, Nkowane, Moshia & Saxena 2006).

3.3.5 Sample

Key informants were divided into three groups. These were:

- Group 1: key informants from the gerontology field, (N=17).
- Group 2: key informants from the alcohol and other drug field (AOD), (N=9).
- Group 3: key informants from the health, injury prevention and policy field, (N=6).

Each key informant was given a single identifier from K1 to K32. The identifiers K1 through to K17 were randomly allocated to key informants from the gerontology field (Group 1). Codes K18 through to K26 were randomly allocated to key informants from the AGD field (Group 2), and K27 through to K32 were randomly allocated to key informants from the health, injury prevention and policy field (Group 3).

Recruitment of Group 1: key informants from the gerontology field (N=17).

Advice was sought from the Director of the Centre for Ageing Research at Curtin University of Technology on selection of key informants in the gerontology field. The Director was unaware of any gerontologists with specific expertise in alcohol research, but recommended contacting members from the "National ARC/NHMRC Research Network In Ageing Well" (Ageing Research Network). The Ageing Research Network was established in 2004 by the Australian Research Council (ARC) and the NHMRC. In April 2004, the Ageing Research Network consisted of 50 foundation members. These gerontologists worked at

universities across Australia and at the Australian Institute of Health and Welfare. In the Ageing Research Network website directory, each of the foundation members included details of their academic discipline, employer and major research interest. Research interests among members ranged from epidemiology, health economics, medical system instrumentation, seniors housing, transport economics to economic demography. As gerontologists would represent only one group of key informants, and in light of the fact that none of the members had listed alcohol as a research interest, the decision was made to stratify selection of an initial sample across disciplines and contact 50% of members. Then, using a reputational method of recruitment (Finnegan, Bracht & Viswanath 1989) these members would be asked to identify other key informants from the gerontology field. Subsequently, in this first recruitment round, 26 foundation members from the Ageing Research Network who had listed health (or similar) as a research interest were sent an email concerning the present research.

Of 26 individuals who were sent an email inviting their participation in the research:

- Fifteen agreed to participate. Two were later excluded. The first was excluded when unavailable for three scheduled interview times, and the second subsequently withdrew from participation because of time constraints.
- Three declined because they had insufficient knowledge of the topic.
- Eight did not reply.

In total, 13 individuals participated in the first round of interviews, an initial consent rate of 50%.

From the interviews conducted with the 13 foundation members from the Ageing Research Network, a further four potential key informants were identified. Three of these were from the AOD field. All three were interviewed and their details have been included in the list of key informants from Group 2. The one remaining gerontology key informant declined to participate due to "insufficient expertise" in the area of investigation.

Because it was proving difficult to identify key informants in the gerontology field that had expertise in relation to alcohol, a second round of recruitment was undertaken with associate members from the ARC/NHMRC Research Network in Ageing Well. In 2005, when this recruitment round occurred, there were 254 associate members. Apart from the researcher (who is one of the associate members), no other member listed alcohol or other drug use as an area of research interest. However, 12 potential key informants were identified on the basis that they had listed health promotion, health services, retirement village living, physiology of ageing, medication, or cognition and ageing as areas of research interest.

Of the 12 individuals who were sent an email inviting their participation in the research:

- Four agreed and were subsequently interviewed.
- One declined because of other commitments.
- Four declined because they had insufficient knowledge on the topic.
- Three did not reply.

The second round of recruitment resulted in four interviews being conducted, representing a participation rate of 33%.

In summary, two rounds of interviews yielded responses from 17 key informants from the gerontology field, an overall participation rate of 45%. Key informants resided in every State and Territory in Australia with the exception of Tasmania and the Northern Territory. All key informants held senior positions with an average of 20 years experience working in the gerontology field. See Table 16 for details of key informants.

Table 16: Details of key informants from Group 1: the gerontology field.

Occupation	Organisation	State	Time in Field
Epidemiologist	University	NSW	15 years
Director	University	ACT	25 years
Research	University	WA	35 years
Director/researcher	University	SA	45 years
Director/research/clinician	University	NSW	20 years
Research	University	NSW	10 years
Research	Non Government	WA	1 year
Education	University	VIC	40 years
Research	University	WA	5 years
Head of School	University	OLD	30 years
Research	University	ACT	13 years
Research	University	NSW	20 years
Research/clinician	University	OLD	15 years
Research and education	University	OLD	25 years
Research	University	OLD	3 years
Research	Hospital	NSW	10 years
Geriatrician/research	University	VIC	20 years

Recruitment of Group 2: key informants from the alcohol and other drug field (AOD) (N=9).

In Australia, there are three national drug research centres. Each Director was contacted and asked to nominate potential key informants from the AOD field. From this first round of recruitment nine key informants in the AOD field were identified, all of whom agreed to participate (100% consent rate). One further key informant in the gerontology area was identified, but had already been interviewed for Group 1.

In a second recruitment round, an article requesting potential key informants was placed in the December 2004 edition of Centrelines (see Appendix 2 for a copy of the article). Centrelines is a bi-monthly newsletter that is jointly produced by the National Drug Research Institute (NDRI, Western Australia) and the National Drug and Alcohol Research Centre (NDARC, NSW) and has a circulation list of approximately 500 recipients across Australia. No volunteers came forward as a result of the recruitment article. In a third recruitment round,

information was circulated electronically to members of the Alcohol and Drug Council of Australia. One individual responded, but after three attempts at scheduling an interview had been unsuccessful, the individual was excluded.

In summary, after three rounds of recruitment, ten key informants from the AOD field were identified and nine were interviewed (90% participation rate). Two of the key informants had also been members of the NHMRC (2001) Working Party on the Review of Recommendations regarding responsible drinking behaviour. Key informants were from four States across Australia and had an average of 19 years experience working in the AOD field. See Table 17 for details of the key informants interviewed from the AOD field.

Table 17: Details of key informants from Group 2: the AOD field.

Occupation	Organisation	State	Time in Field
Research, education	University	WA	25 years
Research, policy advice	University	SA	18 years
Research	University	NSW	18 years
Research	University	WA	10 years
Management	State Government	WA	6 years
Treatment, management	State Government	WA	20 years
Research	University	WA	30 years
Policy / Research	University	QLD	15 years
Research / education	University	NSW	25 years

Recruitment of Group 3: key informants from the health, injury prevention and policy field (N=6).

To complete the field of key informants, six other professionals who were recommended by other key informants were invited to participate. Each individual agreed to participate and was interviewed (100% consent rate). When asked to recommend other potential key informants, no new names were forthcoming. This eclectic group included a Federal Government politician and a General Practitioner who had worked primarily with older patients for over 20 years. On average key informants from Group 3 had over 13 years experience

in their respective professional fields. For details of key informants from Group 3 see Table 18.

Table 18: Details of key informants from Group 3: health, injury prevention and policy field.

Occupation	Organisation	State	Time in Field
Medical practitioner	Medical practice	WA	21 years
Pharmacist	Hospital	WA	5 years
Pharmacist	Community Pharmacy	WA	20 years
Research/education/policy	Federal Gov!.	ACT	20 years
Policy	Federal Gov!.	WA	10 years
Advocacy/prevention	NGO	WA	5 years

3.4 Results

The results from Study 1 will be described in three parts. Part 1 will include a discussion of key informant's comments on the impact of the ageing population on prevention and intervention issues. Part 2 will present the results on recommended alcohol guidelines and Part 3 will include a discussion of the recommendations by key informants concerning future research priorities.

3.4.1 Part 1: Investigation of the impact of the ageing of the population on prevention and treatment initiatives in Australia

Results for each question included in the interview that investigated the impact of the aging of the Australian population on alcohol prevention and treatment initiatives will be presented. This will involve the question being stated followed by a discussion of the responses from key informants.

Q1. In your opinion how relevant, is alcohol use amongst older people as a public health issue?

The responses from key informants to this question were diverse. Key informants from the gerontology field appeared split on the issue. Ten agreed

(59%) that alcohol use amongst older people was an important public health issue with one concluding that:

> ***"Alcohol use amongst older people is probably more relevant than we realise, but it is a hidden issue and many older people may not be aware of the problems alcohol can cause." (K1)***

Three (17%) gerontologists indicated that as little was known about the topic, it was difficult to know how relevant alcohol use was. Finally, four (24%) indicated that the topic was of little relevance:

> ***"I don't think alcohol use amongst older people is a very important issue. At least it has certainly not struck us as a key issue at the Centre." (K2)***

Key informants from the AOD sector also had a range of views about the relevance of alcohol use amongst older people as a public health issue. Three (30%) indicated that the topic was very important, three (30%) commented that relative to other public health issues the topic was as high a priority, while the remainder (n=3, 30%) suggested alcohol use amongst older people had been overshadowed by alcohol use amongst younger Australians. For example:

> ***"Relative to other public health issues, such as the documented harms associated with young people's use of alcohol this is not a priority, but it is still an important issue for older people." (K23)***

Amongst the third group of key informants (from the health, injury prevention and policy area), alcohol use amongst older people was perceived as an urgent public health issue. This is illustrated by the sentiment expressed in the following quote:

> ***"Very, very relevant- because of the high use of medications amongst older people and the potential worry about alcohol use with medications affecting driving ability and causing falls." (K32)***

All key informants agreed that alcohol use amongst older people was not currently viewed in their respective professional fields as an important area but as one key informant stated:

> ***"We will see an impact from 2010, and as a result we need to develop strategies now!" (K28)***

Q2. In your opinion what impact will the ageing of the population have on alcohol prevention initiatives in Australia? Why?

The consensus across groups of key informants was that there were few, if any prevention initiatives targeting alcohol use amongst older people. However, as mentioned by a number of key informants (n=8, 25%) as so little research had been conducted in the area it was impossible to determine whether any prevention initiatives were required. Nor did it appear that there was any impetus to gather data on alcohol use amongst older people as key informants indicated that a common view amongst the public, politicians and professionals was that older people did not drink. For example:

> ***"There is the assumption that older people do not do drugs. There needs to be a cultural change where professionals start to ask older people about their drug and alcohol use. Unless that happens we will never know what is happening and the myths will be perpetuated. "(K16)***

Q3. In your opinion, where are the gaps in prevention initiatives in Australia? Why?

Six (35%) key informants from the gerontology field were unaware of any prevention initiatives and consequently found it difficult to comment on any gaps. However, those that did respond indicated that the focus of prevention initiatives seemed to be on young people and that this may need to change with the ageing of the population. Two gerontologists also commented that alcohol use was simply not on the research radar in the gerontology field. One gerontologist who was a member of the ethics committee at a large university said he had not seen one postgraduate research submission on alcohol use amongst older people. The second gerontologist who had returned from an international gerontology conference, reported that no mention was made about alcohol use amongst older people, despite co-morbidity being a theme in many of the papers presented.

Key informants from Groups 2 and 3 highlighted the lack of research or focus on alcohol use and medications amongst older people as an important prevention gap. Below is a quote from one of the key informants in the AOD field:

"There are huge gaps in our knowledge base. Because of this we have no evidence to guide practice and thinking. Therefore we need to extemporize about the issues and one area that I think is likely to be important and one in which there is little information is alcohol and medication use amongst older people." (K22)

Q4. What do you see as the barriers to developing effective prevention responses in relation to alcohol use amongst older Australians?

Key informants identified a number of barriers to the development of effective prevention responses. The first of these was the absence of data on alcohol use amongst older people (n=7, 22%) making it difficult to determine whether a problem existed and hence whether or not prevention strategies were needed. The second barrier identified by seven key informants (22%) was that relevant professional groups did not acknowledge alcohol use amongst older people as an important issue. As stated by one key informant:

"We just don't see seniors as a major group experiencing alcohol related problems. This is partly seen because when compared to other issues such as high blood pressure, obesity and chronic disease, alcohol simply does not become an issue." (K24)

A third barrier was older people themselves. Seven key informants (22%) stated that in their opinion older people were unlikely to respond favourably to prevention initiatives as many were of the view that health enhancing behaviours were not important at their stage of life. Finally, six key informants (19%) indicated that there was a lack of political will to respond to the issue.

One key informant from the gerontology field noted that all of these impediments needed to be overcome because it made sound economic sense:

"We don't like to spend money on older people. But we must not forget about how valuable as a resource they are. For example, if we look at the huge amount of volunteer work that they do collectively as a group, it would be impossible to cost this contribution to society." (K16)

Q5. What do you think should be done to ensure the development of effective prevention responses in relation to alcohol use amongst older Australians?

There was universal agreement that more research was needed to provide an accurate picture of the current level of alcohol use amongst older people and what the commensurate harms were likely to be. According to 14 key informants (44%), until this evidence was available it was impossible to develop any prevention initiatives. As stated by one key informant:

> ***"Better information is required about the patterns and contexts of alcohol use and the factors that contribute to harm. We need to move beyond the assumptions that are merely drawn from research with younger populations." (K 18)***

However, to develop the range of research necessary would require a substantial monetary input from State and Federal governments' i.e.

> ***"The Federal government needs to dedicate money to ageing and alcohol use so that we know what the impact of alcohol actually is on older people. Funding in the ageing area is pathetic." (K14)***

Q6. In your opinion, what impact will the ageing population have on alcohol treatment services in Australia?

The comments from key informants on this issue were similar to their responses concerning prevention initiatives. That is, as so little was known about the impact of alcohol use, it was difficult to know what impact the ageing of the population would have on treatment services. However, six (20%) key informants surmised that in the future alcohol use amongst older people was likely to increase the pressure on a range of health services, including alcohol treatment services. These key informants also concluded that general acute care and nursing would experience the greatest impact of the ageing population, as older drinkers were likely to suffer from a range of conditions such as dementia, falls and other injuries. For example:

> ***"There is likely to be an increased demand for treatment services amongst older people and these people are likely to present with a range of co-morbid issues. Subsequently any effective treatment will need to more complex." (K12)***

Q7. In your opinion, where are the gaps in treatment initiatives for older drinkers?

The majority (n=10, 60%) of key informants from the gerontology field were unable to answer this question as they were unaware of current treatment initiatives and hence unable to comment on gaps. One gerontologist indicated that in his opinion no gaps existed.

The remainder of key informants agreed that there was very little if any treatment available specifically for older people. If an . older person were experiencing an alcohol related problem, they would need to present to a generic alcohol treatment service. According to key informants, this option was problematic; as such, services would be unappealing to older people and hence act as a deterrent to attending treatment. The following quote from a key informant from the AOD field reflects this point of view:

> ***"There are no treatment services available that specifically target older people. Of those general services that currently operate most would be very unappealing and possibly seen as threatening to most old people. In many clinical settings the waiting area can be very disruptive and there can be instances of aggression and abuse; as a result older people are simply not going to go to clinics for help." (K23)***

Q8. In your opinion what are the barriers to developing effective treatment responses to alcohol use amongst older Australians?

The lack of professionals trained in working appropriately with older people was one major barrier identified by seven (22%) key informants. According to ten (31%) key informants the barriers to developing effective treatment responses were compounded by two factors: (i) a lack of appropriate screening instruments and (ii) a negative view amongst professionals concerning alcohol use by older people. As one gerontologist concluded:

> ***"There are strong ageism attitudes amongst many professionals who think- what does it matter if an older person drinks too much- what difference will it make? This kind of attitude makes it difficult to create an impetus for change." (K1)***

Q9. In your opinion what are the barriers to developing effective treatment responses to alcohol use amongst older Australians?

All key informants agreed that more research on alcohol use amongst older people was required. According to key informants, until more was known about the extent of use, the range of harms, and effective intervention it was difficult if not impossible to develop treatment responses. There was agreement that fundamental data were required to develop an accurate picture of alcohol use amongst older people in general and from specific sub populations. As stated by one key informant who had worked with veterans for a considerable period:

> ***"We need better screening instruments, better training and better guidelines on how to effectively respond. This will require substantial skill development amongst the workforce and with that we also need better defined pathways of help for older people. We have a kids' helpline but where do old people go for help?" (K28)***

Summary

Key informants were concerned that future generations of older Australians were likely (individually and collectively) to be larger consumers of alcohol. Subsequently, alcohol use amongst older people was likely to become an increasingly important research area. However, key informants also acknowledged that it was very difficult to predict what implications the ageing of the population would have on the prevention and treatment of alcohol related harm as there was so little comprehensive data available that would aid in making predictions about the future.

Key informants from the AOD field indicated that alcohol use amongst young people had traditionally overshadowed alcohol use amongst older Australians. Nonetheless, the majority of key informants from the AOD field agreed that alcohol use amongst older people should be an area of professional concern. Alcohol use amongst older Australians did not appear to be a very important issue amongst many of the gerontologists interviewed. Illustrative of this sentiment was the comment made by one gerontologist:

> ***"It is a very interesting topic but until I received the email from you, alcohol use was not an issue I had ever really thought too much about in relation to older people." (K10)***

This comment was interesting, but unexpected. Obviously, for gerontologists who work directly with older people there are a myriad of important issues worthy of attention and research. However, given that 75% of older people have reported drinking in the prior 12 months, with 17% drinking alcohol on a daily basis and 10.5% drinking at risky levels for short-term harm (Australian Institute of Health and Welfare 2005b) the lack of research on the issue amongst both the gerontology and AOD field is surprising. To increase the focus on alcohol use amongst older people requires better intersectoral collaboration amongst professional groups from both the gerontology and AOD field. In particular, research that is available on alcohol use amongst older people needs to be highlighted and shared between all sectors who work with older Australians.

3.4.2 Part 2: Alcohol guideline recommendations

Key informants were asked to make two sets of alcohol guideline recommendations. The first were based upon the same assumptions that underpinned Guideline 1 from the NHMRC (2001), Australian Alcohol Guidelines (i.e. not on any medication, didn't have a family history of alcohol-related problems etc). The second set of guidelines was for 65 to 74 year olds who were taking contraindicated medication. Results will be presented separately for each set of guideline recommendations.

Alcohol guidelines for 65 to 74 year old Australians (not taking any contraindicated medication)

Apart from three key informants from the gerontology field, all other key informants agreed that because of physiological, and health issues, the alcohol guidelines recommended in Guideline 1 of the NHMRC (2001) Australian Alcohol Guidelines were too high for older people. Illustrative of the majority of comments was the following quote:

> ***"Older people are very different to 25 year olds. Because of their vulnerability and susceptibility to illness and disease etc. the current guidelines are neither valid, nor meaningful and are too high for older people." (K29)***

However, 12 key informants declined to recommend specific alcohol guidelines for older Australians. Eight key informants (four gerontologists, three AOD, and one key informant from Group 3) declined on the grounds that there was insufficient evidence available to support any nominated level. The remaining four (three gerontologists and one key informant from Group 3), declined to make recommendations, stating that the topic was beyond their field of expertise.

The recommendations from the remaining 20 key informants are summarised in Table 19. Key informants recommendations ranged from 1-6 standard drinks per day. When data was converted to a mean, key informants recommended that men drink no more than 3.55 standard drinks per day to avoid the risk of harm in the short-term (mode=3, recommended by 25% of respondents) and no more than 2.35 standard drinks to avoid the risk of harm in the long-term (mode=2, recommended by 35% of respondents). For women, key informants recommendations ranged from 1-4 standard drinks per day. When data was converted to a mean, key informants recommended that women drink no more than 2.45 standard drinks to avoid the risk of short-term harm (mode=2, recommended by 35% of key informants) and no more than 1.45 standard drinks per day to avoid the risk of long-term alcohol-related harm (mode=1, recommended by 40% of key informants). There were no significant differences between groups of key informants, increasing the validity of results (Phillips & Bagozzi 1986). See Table 19 for details.

Table 19: Recommended alcohol guidelines for 65 to 74 year old Australians.

Key informant group	Men (maximum standard drinks per day)				Women (maximum standard drinks per day)			
	Short-term harm		Long-term harm		Short-term harm		Long-term harm	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Group 1: (n=10) Gerontology	3.70	2-6	2.60	1-4	2.70	2-4	1.60	1-2
Group 2: (n=6) AOD	3.50	1-5	2.33	1-3	2.17	1-3	1.33	1-2
Group 3: (n=4) Health, injury prevention and policy	3.25	2-4	1.75	1-2	2.25	1-4	1.25	1-2
Total: (n=20)	3.55	1-6	2.35	1-4	2.45	1-4	1.45	1-2
F statistic	0.13		0.69		1.07		0.88	

Statistical significance * p<0.05, ** p<0.01 *** p<0.001

A rationale that was common amongst key informants was that alcohol use affected an older person's health significantly more than a younger person as older people were likely to be suffering from a range of age-associated illnesses. For example, as stated by one gerontologist:

> ***"The issue with older people is that many older people receive medical treatment and when your health is already compromised, the reality is that you should probably drink less." (K9)***

Even though key informants expressed concern about alcohol compromising the health of older people, there was acknowledgment that alcohol also had important social benefits for older people. For this reason, no key informants advocated an alcohol abstinence message for older Australians. The following two quotes are illustrative of the views put forward by key informants on the issue of abstinence.

> ***"I would not want old people to think they can't drink." (K3)***

> ***"Less is definitely better for old people. But on the other hand alcohol has many benefits for older people, such as reducing heart disease and for many older people it is an important part of socialising. Because of these things perhaps the message should be one drink a day maybe two." (K10)***

In summary, key informants recommended alcohol guidelines that were approximately 40% lower than those recommended in Guideline 1 of the Australian Alcohol Guidelines (National Health and Medical Research Council 2001).

Alcohol guidelines for 65 to 74 year olds who were taking contraindicated medication.

Only 14 key informants were willing to recommend alcohol guidelines for older Australians who were currently taking contraindicated medications. The remainder declined, because the area was beyond their field of expertise, or because when medication was involved the issue became far too complex to develop comprehensive recommendations. The majority (n=8, 58%) of key informants recommended that men do not drink at all when taking contraindicated medications. However, when all responses were aggregated, the mean result was that men drink no more than 0.71 standard drinks per day

to avoid the risk of short-term harm and no more than 0.57 standard drinks per day to avoid the risk of long-term alcohol-related harm. Similarly, 58% (n=8) of key informants recommended that older women who were taking contraindicated medication refrain from alcohol consumption. When all responses were aggregated, the mean result was that women drink no more than 0.5 standard drinks per day to avoid the risk of short-term harm and no more than 0.35 standard drinks per day to avoid the risk of long-term alcohol related harm. The responses from key informants are summarised in Table 20.

Table 20: Recommended alcohol guidelines for 65-74 year old Australians taking contraindicated medication.

Key informant group	Men (maximum standard drinks per day)				Women (maximum standard drinks per day)			
	Short-term harm		Long-term harm		Short-term harm		Long-term harm	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Group 1: (n=5) Gerontology	0.80	0-3	0.80	0-3	0.60	0-2	0.60	0-2
Group 2: (n=6) AOD	0.67	0-4	0.33	0-2	0.33	0-2	0.00	0-0
Group 3: (n=3) Health, injury prevention and policy	0.67	0-1	0.67	0-1	0.67	0-1	0.67	0-1
Total: (n=14)	0.71	0-4	0.57	0-3	0.50	0-2	0.35	0-2
F statistic	0.015		0.320		0.229		1.917	

Statistical significance * p<0.05, ** p<0.01 *** p<0.001

There were no significant differences between the recommendations from each group of key informants. However, because of the small numbers, caution is needed in interpreting results and any generalization is precluded.

The next section of the results will report on the responses from key informants on other areas concerning dissemination of alcohol guidelines for older Australians.

Q13. How best should information about drinking guidelines be communicated to the general public?

Nine key informants declined to answer this question, stating that the topic was beyond their field of expertise. Of the remainder, nine (40%) suggested that

mass media TV campaigns were the best way to communicate information on drinking guidelines to the general public. Other suggestions included: providing information through health professionals (recommended by five (22%) key informants), and providing advice at point of sale (recommended by three (13%) key informants. Labelling beverages, peer education and education through schools were other recommendations made by individual key informants.

Q14. How best should information about alcohol guidelines be communicated to older drinkers?

There was a range of responses to this question. More than 50% (n=17) of key informants recommended GP's as the best avenue for communicating information on alcohol guidelines as GP's have regular contact with older people and generally high credibility with people in this age group. For similar reasons, six (20%) key informants recommended community pharmacists as a suitable source for communicating information on alcohol guidelines to older people.

Other suggestions included seniors' magazines, sending information through seniors' clubs and via the internet. This last suggestion was made because three key informants (10%) indicated that the current cohort of older people was highly computer literate and the internet represented an anonymous way for older people to access health information.

According to two key informants, many older Australians were confused about the differences between the Australian Alcohol Guidelines and drink-driving guidelines. Both key informants were concerned that some older people understood the low-risk drinking recommendations in the NHMRC (2001) guidelines as how much alcohol it was safe to consume without exceeding the legal BAC level for driving.

A final point from a key informant from Group 3 (general health, injury prevention and policy) was that a large font size should be used for any printed material on alcohol guidelines so that older people (many of whom may have vision problems) could actually read the information.

Q15. Should there be any particular communication strategies for subgroups of older drinkers?

Twenty (62%) key informants answered this question. Eight (40%) indicated that the subgroups of older people for whom information was most critical were Indigenous and CALD (Culturally and Linguistically Diverse) populations. Other groups that were mentioned included veterans, people suffering from dementia, widowers, people on medication and people in rural and remote communities. Most key informants struggled to come up with communications strategies, but some suggestions included GP's, seniors groups, and one key informant recommended piloting a 24 hour-a-day confidential senior's telephone helpline. Key informants also stated that recommending particular communication strategies was difficult because so little was known about the drinking practices of older people from these population groups. For example:

> ***"Older people in general tend to be ignored. But CALD and Aboriginal older people are completely ignored. Maybe one reason behind this is that we simply do not know what or how to respond. But both groups really do need assistance and guidance." (K29)***

Q16. How best should information about alcohol guidelines for older people be communicated to those professions who work with this age group?

A view endorsed by 13 (40%) key informants was that information about alcohol guidelines should be delivered to all health and welfare professionals as part of their pre-service training. The recommendation was that learning how to work with older people should be a mandatory training component for all professional groups from psychology to pharmacy and medicine:

> ***"There should be training about the issues of ageing across all professional groups. Unfortunately, we currently only pay lip service to the area." (K1)***

Other key informants recommended that information be distributed through General Practitioners (n=6, 20%) or via professional journals (n=6, 20%).

Summary

The development and dissemination of alcohol guidelines for older Australians were regarded, by most of the key informants who took part in this research, as an important public health issue. According to key informants, the most appropriate professional group to disseminate information on alcohol guidelines to older people were GP's. However, to ensure that all older people were informed about alcohol guidelines would require that all health and welfare professionals had expertise in responding appropriately to alcohol issues amongst older people. A recent scoping exercise conducted in Western Australia (Woods 2008) of the AOD curriculum included in nursing, social work, psychology, medicine, pharmacy, and justice university courses highlighted how little training in alcohol and other drug use occurs. To include specific training on alcohol use and gerontology while ambitious may not be pragmatic. Considering this, ongoing research and advocacy about the importance of alcohol use amongst older people is important to help produce a climate in which comprehensive responses may become realized.

3.4.3 Part 3: Future research investigating alcohol use amongst older people in Australia.

The final section of the interview concerned recommendations for future research in the field. Based upon responses from key informants there was agreement that alcohol use amongst older people was a potentially fertile field for further research. The three most common research priorities identified by key informants were:

1. Epidemiological research investigating the prevalence of alcohol use and related harm amongst older men and women. Twenty-one (66%) key informants recommended this as a research priority.
2. Morbidity research investigating the harms associated with different levels of alcohol consumption amongst older people. Nine (28%) key informants recommended this as a research priority.
3. Investigation of age-appropriate drinking guidelines. Seven (22%) key informants recommended this as a research priority.

Other suggestions made by key informants included: research investigating poly-pharmacy use and alcohol; the development of research and effective screening instruments exploring the link between alcohol use and cognitive function.

3.5 Strengths and limitations of Study 1

Study 1 involved interviews with 32 key informants from the gerontology, AOD, health, injury prevention and policy fields. A strength of the research was the variety of professions that were represented. Key informants came from diverse sectors and included a politician, a Veterans advocate, and experts from the AOD field, a General Practitioner and two pharmacists who worked directly with older people. This breadth of expertise gave a robust range of opinion. Key informants were from almost all Australian jurisdictions, with the exception of Tasmania and the Northern Territory, and hence were able to provide a national perspective on the issues. Key informants also held senior positions in their respective fields and had on average 18 years professional experience.

A limitation of the research was that none of the key informants from the gerontology field had extensive expertise in alcohol research. This was a limitation, but as alcohol use amongst older people does not appear to be a significant research or priority area in the gerontology field in Australia, it is not surprising. Despite this lack of expertise amongst gerontologists, the alcohol guideline recommendations from this group did concur with those made by other key informants, lending greater credibility to the information collected from Group 1.

Another limitation of the research was the number of key informants who declined to make alcohol guideline recommendations. Only 20 (63%) key informants made recommendations for older Australians not taking any medication (the same criteria as in Guideline 1 of the Australian Alcohol Guidelines,(National Health and Medical Research Council 2001) and only 14 (44%) made recommendations for 65 to 74 year olds who were currently taking contraindicated medications. This lessens the validity of the recommendations. The difficulty that key informants had in making recommendations about alcohol

guidelines highlights the need for more empirical based research on alcohol use and the associated relative risks and benefits for older people.

3.6 Conclusion

Two conclusions emerge from the present research. Firstly, the present NHMRC (2001) Australian Alcohol guidelines are in all probability too high to determine accurately the prevalence of at-risk consumption among older Australians. As such, it is likely that the estimated prevalence, based on current guidelines, of alcohol-related harm amongst older Australians is conservative.

The majority of key informants recommended that more appropriate low-risk drinking guidelines for men were 2 (mean=2.35) standard drinks per day to avoid the risk of long-term alcohol related harm and no more than 3 (mean=3.55) standard drinks per day to avoid the risk of short-term harm from alcohol. For women they recommended no more than 1 (mean=1.45) standard drinks per day to avoid the risk of long-term harm and no more than 2 (mean=2.45) standard drinks per day to avoid the risk of short-term harm from alcohol.

While these recommendations were not intended as a substitute for empirical research on alcohol related harm and benefits it is worthy of note how similar these guidelines were to recommendations in Italy, New Zealand and the United Kingdom.

Based upon present NHMRC (2001) alcohol guidelines, the estimated prevalence of at-risk consumption amongst older Australians is low. Subsequently, there exists little urgency in conducting further research in the area. This is particularly apparent in the gerontology field, where alcohol use amongst older people was not a priority issue. Conversely, if analyses using more conservative alcohol guidelines were adopted, the estimates for harm amongst older Australians would likely increase. Such an outcome may increase the perceived importance of alcohol use amongst older Australians.

Considering that by 2050, 2.8 billion people will be aged 60 years and over (United Nations Department of Economic and Social Affairs Population Division 1998); that cancer will be one of the three main contributors to the burden of disease in developed countries (WHO, 1999); and that alcohol increases the risk of cancer (Bowlin, Leske, Varma, Nasca, Weinstein & Caplan 1997, Corrao *et al.* 1999, Nasca, Simin, Baptiste, Kwon, Jacobson & Metzger 1994, Smith-Warner *et al.* 1998, The World Cancer Research Fund and American Institute for Cancer Research 1997, World Cancer Research FundI American Institute for Cancer Research 2007) alcohol use amongst older Australians warrants a high research priority.

Chapter Four: Study 2: Investigation of alcohol use amongst 65 to 74 year old drinkers in Perth, Western Australia.

4.1 Introduction

With the ageing of the Australian population, it is likely that the number of older Australians at-risk of alcohol-related problems will increase. In 2004, it was estimated that 14.6% of older Australian men and 7.1% of older women consumed alcohol at levels that put them at-risk of alcohol related-harm in the short-term and that 7.9% of men and 5.2% of women drank at levels that put them at-risk of long-term alcohol-related harm (Australian Institute of Health and Welfare 2005b).

The accuracy of these estimates is however questionable in light of the increased vulnerability of older people to the effects of alcohol and the paucity of research investigating the validity and reliability of self-reported drinking behaviour amongst older populations.

Although previous research (Carruthers & Binns 1992, Gill & Donaghy 2004, Gill *et al.* 2006) has demonstrated that few people can accurately pour one standard drink of alcohol, it does not necessarily follow that whatever volume of alcohol is poured will be reported by individuals as one standard drink. Investigation of this association is critical in determining the accuracy of self-reported alcohol consumption.

As such, investigation of pouring practices has two important elements. The first element relates to quantifying the volumes of alcohol that people pour of individual beverages. While previous research (Kaskutas & Graves 2000, Stockwell *et al.* 1991, White *et al.* 2003) has shown that the usual amounts of alcohol that people pour for themselves are larger than one standard drink, no published literature has specifically investigated pouring practices amongst 65-74 year olds.

The second element that will affect the validity of self-reported alcohol consumption is how accurately people are able to convert amounts poured to standard drinks. For example, if a person poured 100ml of wine (12% Alc./volume-equivalent to one standard drink), but stated that they would classify the amount as half of one standard drink, the person would be underestimating their consumption by 50%. If the person stated they would classify the amount as 1.5 standard drinks, they would be overestimating their actual consumption by 50%. The same rationale would apply to other beverages dependent on the equivalent amounts poured in relation to standard drinks (based upon definitions developed by the NHMRC, (National Health and Medical Research Council 2001). Collating data that assesses the degree of over or under-reporting of consumption is important for increasing the validity of self-report figures on alcohol consumption.

4.2 Aims and hypotheses

Study 2 involved in-depth interviews with 844 men and women aged 65 to 74 years of age residing in the metropolitan area of Perth, Western Australia. The study had three major aims. These were:

1. To investigate the association between alcohol consumption and other variables (i.e. sex, marital status, qualifications, socio-economic status, reasons for drinking, problems associated with alcohol, medications, health).

2. To investigate the pouring practices of older Australian drinkers and examine what impact pouring practices have on the accuracy of self-reported alcohol consumption.

3. To investigate how knowledgeable this sample of older Australians was concerning the NHMRC (2001) Australian Alcohol Guidelines and standard drink terminology.

Hypotheses on the association between alcohol consumption and other variables.

The first aim of the Study 2 was to investigate the association between alcohol consumption and other variables amongst a sample of 65 to 74 year old who had consumed alcohol in the prior 12 months. Nine hypotheses were generated. These were:

- **Hypothesis 1:** men will report higher levels of alcohol consumption than women (Australian Institute of Health and Welfare 1999, 2002a, 2005a, da Costa *et al.* 2004, Lang *et al.* 2007, McKim & Quinlan 1991, Office for National Statistics 2001).
- **Hypothesis 2:** non-married men (including widowed) will report different levels of consumption when compared to married men (Brennan, Schutte & Moos 2005, Byrne, Raphael & Arnold 1999).
- **Hypothesis 3:** married women will report different levels of consumption when compared to either widowed, separated/divorced or women whom had never married (Ganry *et al.* 2001, Moore *et al.* 2006, Young & Powers 2005).
- **Hypothesis 4:** men and women who were more highly qualified will report higher levels of consumption than less qualified men and women (Ganry *et al.* 2001, Young & Powers 2005).
- **Hypothesis 5:** men and women who resided in higher socio-economic areas (based upon suburb postcode) will drink alcohol more frequently than those men and women who resided in lower socio-economic areas (Sulander *et al.* 2004).
- **Hypothesis 6:** frequency of drinking (independent of gender) will be associated with endorsement of a greater number of personal effects and social effects reasons for drinking (Graham *et al.* 1996).
- **Hypothesis 7:** volume of alcohol consumption will be associated with endorsement of a greater number of personal effects reasons for drinking (Graham *et al.* 1996).
- **Hypothesis 8:** women will report fewer alcohol related problems (based upon responses to the CAGE) than men (Fink, Morton, Beck, Hays,

Spritzer, Oishi, Tsai & Moore 2001c,' Graham, Carver & Brett 1995, Robbins 1991, Welte & Mirand 1992).

- **Hypothesis 9:** more women than men will report the use of medications (Graham *et al.* 1996, Graham & Vidal-Zeballos 1998). However, no hypothesis was generated on the association between alcohol use and medication.

As the literature on the association between current alcohol consumption and health is conflicting (Anstey *et al.* 2006, Atkinson 2002, Blow, Walton, Barry, Coyne, Mudd & Copeland 2000, Chikritzhs, Stockwell, Fillmore & Kerr 2002, Fillmore *et al.* 2006, Johnson 2000, Standridge, Zylstra & Adams 2004) no hypothesis was generated on the association between alcohol use and health.

Hypotheses on pouring practices

The second aim of Study 2 was to investigate the pouring practices of a sample of 65 to 74 year old men and women who had consumed at least one standard drink of alcohol in the prior 12 months.

Based upon evidence from research with younger participants (Gill & Donaghy 2004, Gill *et al.* 2006, Kaskutas & Graves 2000, Kerr *et al.* 2004b, Lemmens 1994, Stockwell *et al.* 1991) the following four hypotheses were formulated:

- **Hypothesis 10:** when men and women were asked to pour their usual serving of alcohol they will both pour alcoholic beverages that were greater than one standard drink.
- **Hypothesis 11:** the greater the alcoholic content of the beverage (percentage alcohol by volume), the greater the discrepancy of the poured drink from a 'standard' drink.
- **Hypothesis 12:** the type of glass used will influence the amounts of alcohol poured. With amounts poured into a spirit glass being greater than the comparable standard drink equivalent poured into a beer glass.
- **Hypothesis 13:** daily drinkers will pour larger volumes of alcohol when compared to those who drink less frequently.

Finally, while no hypothesis was generated, another aim of the study was to investigate whether or not people presume the amounts poured are equivalent to one standard drink, or if people do attempt to convert amounts poured into standard drinks how accurate this conversion is.

The results from this investigation of pouring practices will provide important information on the degree of over- or under-reporting of alcohol consumption amongst 65 to 74 year olds.

Knowledge of Australian alcohol guidelines

The third and final aim of Study 2 was to investigate issues surrounding the NHMRC (2001) Australian Alcohol Guidelines and standard drink terminology. Specifically, the study aimed to:

- Investigate what percentage of participants reported knowledge of the term "standard drink";
- Investigate what percentage of participants reported knowledge of the Australian Alcohol Guidelines;
- Assess how relevant participants perceived the Australian Alcohol Guidelines were to other older Australians;
- Develop alcohol guidelines as recommended by participants as appropriate for 65 to 74 year old Australian men and women; and,
- Compare the alcohol guidelines recommended by participants to the present Australian Alcohol Guidelines and to the recommendations made by the key informants from Study 1.

4.3 Methods

Before interviews commenced, it was necessary to establish the sample size that would be required to conduct the research, develop the research instrument, and calculate how elements of the questionnaire were to be scored, resolve how to recruit participants and determine the required analysis. The method section will provide detailed background on each of these elements and will include demographic information on the participants.

4.3.1 Sample size

The ability to detect small variations between reported standard drinks consumed and the actual amount of alcohol poured was central to this research. Due to the unique nature of this study, it was difficult to predict how large or small the difference between reported drinks and drinks poured might be. Sample size estimations were therefore conservatively based upon detecting a small effect size of 0.2. Thus, assuming a small effect size only, for a repeated measures design (i.e. multiple observations for each respondent regarding alcohol consumption) that controlled for gender, and where α=0.05 and β=0.20, a minimum of 800 participants (400 men and 400 women) would be required (the retest reliability correlation for this calculation is assumed to be marginally adequate at 0.05). As the questionnaire was to be administered in a face-to-face interview and no follow up was required, no attrition was expected.

However, to complete the research on schedule, a nine-month limit was placed on data collection. Based upon cost constraints and research indicating that alcohol consumption varies between metropolitan and rural areas (Chikritzhs *et al.* 2003) and that 'young-old' Australians living in non-metropolitan areas have been more likely to die from alcohol-attributable conditions than city dwellers (Chikritzhs & Pascal 2005a) the decision was also made to restrict the sample to the Perth metropolitan area.

4.3.2 Pilot testing

The research questionnaire that was used in Study 2 was developed over a two-month period and included: informed written consent, demographic details, alcohol consumption, alcohol-related problems, reasons for alcohol use, pouring practices, knowledge of standard drinks, medication use and health.

While Study 2 represents a stand-alone piece of research, it was also intended to use some of the gathered information in Study 3. As the aim of Study 3 was to conduct a secondary analysis of the National Drug Strategy Household Survey (NDSHS) 2004 data set, it was necessary for parts of the Study 2 research questionnaire to replicate interview questions used by the Australian Institute of

Health and Welfare in the 2004 NDSHS questionnaire. Despite the fact that some items could not be altered, the entire questionnaire was still pilot tested.

Initial pilot testing was with a group of ten colleagues and was used to determine how questions should be sequenced to reduce possible bias in recording the pouring data and to ascertain if any of the questions were likely to offend. No one in this pilot testing phase indicated any concern about the nature of the questions.

Once the sequencing had been finalized, the questionnaire was then further pilot tested on a sample of 20 older people (10 women and 10 men aged between 65 to 74 years). This entailed the candidate conducting a mock interview with each person and asking for feedback at the conclusion of the interview. Feedback was taken on the ordering of questions, the nature of questions (i.e. were there any questions which caused offence, or which they did not understand), the duration of the interview, the procedures for pouring beverages, the appearance of the pseudo alcohol, and the reimbursement paid to participants. Participants were also asked to provide any general feedback about the questionnaire and the interview process. Feedback from the participants was positive. No questions were identified as confrontational or intrusive, and all participants reported that the pouring exercise was "fun" or "interesting".

The pilot testing process identified one problem with the pouring exercise. In the initial version of the questionnaire, participants were asked to pour their beverage choices straight into the appropriate glass/container. However, during pilot testing a number of participants who drank spirits reported that without ice in their glass it was difficult to pour their usual beverage volume. One solution to this problem was to allow participants to place ice in their glass before pouring the particular beverage. However, if real ice was used, it could increase the liquid content in the glass and hence lead to an overestimation of the amount of alcohol poured. To overcome this problem, ice rocks (plastic ice cubes) were purchased from a local catering supplier. Feedback from participants in the pilot testing phase was that the ice rocks worked well as a substitute to ice.

Subsequently, the decision was made to use ice rocks as part of the research methodology for participants who drank spirits over ice.

Information was collected in the same order for each interview. Potential ordering effects are often controlled for by sequence randomization. In this study however, reversing the order of data collection was likely to lead to confounding due to the participant's learning about standard drinks before being asked about their pouring practice.

4.3.3 Components of the research questionnaire

Informed written consent

At the beginning of each interview, participants were informed of the nature of the research, and their written consent to participate was requested. Once responses from each questionnaire were entered into a database, the identifying material (including consent) was separated from the questionnaire and stored in a separate locked filing cabinet at NDRI. No identifying information was entered as data. (For a copy of the consent form see Appendix 3).

Demographics

The demographic questions from the 2004 National Drug Strategy Household Survey (Australian Institute of Health and Welfare, 2005) were replicated in the research questionnaire used in Study 2. This enabled a direct comparison of data obtained in Study 2 with data obtained from 65 to 74 year olds interviewed nationally in the 2004 NDSHS. The demographic questions gathered information on:

- Sex
- Age: in years
- Postcode of residence
- Marital status
- Country of birth
- Employment status

- Main occupation: There were nine categories based upon the classification of occupations developed by the ABS (Australian Bureau of Statistics 1997)
- Education: Information was collected on the highest year of primary or secondary schooling achieved; respondents were then asked if they had completed a trade or other educational qualification. If the answer was yes, respondents were asked to state the highest qualification that they had obtained.

Alcohol consumption

For comparative purposes, three of the same alcohol consumption questions used in the 2001 and 2004 versions of the NDSHS (Australian Institute of Health and Welfare 2002a, 2005a) were used in the Study 2 research questionnaire. These questions asked about usual alcohol consumption (Q23), quantity and frequency (QF) of consumption over the prior 12 months (Q24) and alcohol consumption on the day prior to the interview (Q25). The three specific questions were:

> Q23: On a day you have an alcoholic drink, how many standard drinks do you usually have?

To assist in answering this question, participants were shown coloured pictures of typical standard drinks. See Standard Drinks Guide, Figure 4. These were the same pictures used in the 2004 NDSHS.

Figure 4: Pictures of Australian standard drinks (Australian Institute of Health and Welfare 2005a)

The next alcohol question assessed the quantity and frequency of consumption (Cahalan, Cisin & Crossely 1967) in the past 12 months:

Q24. How often in the last 12 months, have you had each of the following number of standard drinks in a day?								
	Every day	5-6 days a week	3-4 days a week	1-2 days a week	2-3 days a month	About 1 day a month	Less often	Never
20 or more standard drinks a day								
11-19 standard drinks a day								
7-10 standard drinks a day								
5-6 standard drinks a day								
3-4 standard drinks a day								
1-2 standard drinks a day								

Finally, alcohol consumption on the day prior to the interview was assessed by asking:

Q25: How many standard drinks did you have yesterday?

Data from all three questions are reported in the Results section. However, as the Quantity/Frequency data (Q24) were used by the AIHW to determine prevalence of at-risk drinking (Australian Institute of Health and Welfare 2005a) this data set will be the standard against which hypotheses will be assessed.

Responses to Quantity/Frequency (Q24) will also be compared using the classification of at-risk drinking developed by the WHO (Department of Mental Health & Substance Dependence Non-Communicable Disease and Mental Health Cluster, 2000) to assess prevalence of at-risk drinking to health in the long-term in Australia. The classification system developed by the WHO is reproduced in Table 21.

Table 21: Classification of at-risk drinking developed by the WHO.

	Level of risk (based upon grams of alcohol consumed per day)		
Gender	Low	Medium	High
Men	1-40	41-60	61+
Women	1-20	21-40	41+

In addition to the above questions, participants were asked how old they were when they first consumed a full serving of alcohol, which alcoholic beverages they drank most often, how often they consumed alcohol over the past 12 months and in which settings they drank alcohol.

Alcohol related problems

In the critique of alcohol screening instruments (see Chapter Two) the four item CAGE (Ewing, 1984) was recommended as the preferred screening instrument to identify and assess potential alcohol "abuse" and dependence amongst older people. An affirmative answer to two or more questions has been used to indicate potential alcohol "abuse", however, Buschsbaum *et al.* (1992) and Dawe *et al.* (2002) recommend using a cut-off score of one (1) in participants who are aged 65 years and older. Therefore, in Study 2, CAGE respondents who gave one or more affirmative answers were identified as having potential alcohol-related problems. However, in the CAGE people are asked if they have

ever experienced problems, subsequently, its use in the present study may potentially over-estimate current levels of alcohol "abuse" (Watkins, Eisele & Matthews 2000).

In addition to the CAGE, participants were asked if they had ever experienced any problems because of their alcohol use. If a participant gave an affirmative response, they were asked to list those problems. A similar question had also been included by Graham *et al.* (1996) in their research with older Canadians.

4.3.4 Assessment of pouring practices

The critical pouring questions used in the research were based upon those developed and used by Kerr *et al.* (2004b). However, in the research by Kerr *et al.* (2004) only wine was assessed and interviews were conducted over the telephone.

In the present research participants were asked to nominate, in descending order, their three most commonly consumed alcoholic beverages. Each participant was then asked how they would usually drink each of these beverages i.e. from a glass, a can etc. If a participant indicated that they would usually drink the nominated beverage from a glass they were asked to bring the glass (or other nominated container/vessel) to the interview table to show the interviewer. Each glass was coded as either a short wide tumbler; beer glass; tall narrow highball glass; wine glass; or other.

Participants were then asked if they usually poured their own alcohol. The majority of both men (n=348, 97.5%) and women (n=355, 73.8%) indicated that they usually did pour their own alcohol. These participants were then asked to pour their usual serving of each of the three beverages (using the simulated alcohol). Participants who indicated that they did not usually pour their own alcohol (men: n=9, 2.5%; women: n=126, 26.2%) were asked to fill the glass to the level that was usually poured for them.

Participants who drank spirits were asked if they usually poured the spirit over ice. For those who did use ice, they were given the ice rocks and asked to place an appropriate amount of these in their glass as a substitute.

Participants were next asked if the amount that they had poured was similar to the amount they would have consumed when they last had a drink of the particular beverage. The majority of both men (n=352, 98.6%) and women (n=477, 99.2%) indicated that the amount poured was similar to the usual amount they consumed when they last had a drink of the beverage.

After the alcohol consumption questions (020 through to 025 inclusive) were completed, participants were asked if they would record each of the poured beverages as one standard drink (participants were not told how many mls they had poured). If the participant answered "no", they were asked to indicate how many standard drinks they would classify the amount as equalling. After collection of this information, each beverage was measured in either a 250ml (used for wine, beer and any other large volumes poured) or a 50ml (used for spirits) capacity glass-measuring cylinder and the amounts were recorded.

To assess the reliability of participants pouring their "usual serving", 20 participants were randomly selected and asked to re-pour their beverages at the conclusion of the interview. Results from a paired sample t-test revealed no significant difference between the amounts poured at Time One (M=132.00, SE=14.84) compared to the amounts poured at the re-test Time Two (M=131.11, SE=15.11, $t(26)=0.36$, $p>0.05$, $r=0.07$).

To determine the degree of over or under-reporting of consumption the raw data that were gathered from the above series of questions were converted to an actual number of standard drinks that included both the amount poured and the participant's perception of how many standard drinks the amount poured equalled. This conversion process involved the following three steps.

Step 1. A new variable (bev1%alc) was created based upon the percentage alcohol content of each beverage. These figures were based upon previous

levels reported by Borushek (2006). For example wine was coded as 12, regular beer as 4.9 etc. See Table 22.

Table 22: Percentage of pure alcohol allocated for each beverage type.

Beverage type% pure alcohol	
Wine	12
Regular beer	4.9
Mid strength beer	3.5
Low alcohol beer	2.7
Homebrew beer	4.9
Fortified wine, sherry, port	18
Cider	6
Champagne	11.5
Baileys	27
Spirits	40
Spirits in cans/premixed spirits	5

Step 2. To estimate the number of standard drinks that each poured beverage equated to, the following formula was applied:

No. of standard drinks (beverage1)=bev1%alc **x** no. of mls in beverage1 / 1 000 **x** specific gravity (0.789)

(Department of Mental Health and Substance Dependence Non-communicable Diseases and Mental Health Cluster 2000)

Applying this formula calculated the actual number of standard drinks that each beverage represented.

Volume of alcohol poured is an important variable for exploring pouring practices among drinkers but it does not necessarily relate directly to the degree of over- or under-reporting of alcohol consumed. This is because it does not directly address whether or not participants convert amounts poured into standard drinks when being interviewed about their consumption.

To give the most accurate picture in relation to the validity of survey data on quantity of alcohol consumed it is necessary to ask each person if they would

record the amount poured as one or more/less standard drinks to calculate the degree of under or over-reporting.

Step 3. To estimate the degree of over or under-estimation of the amount of alcohol poured, the following formula was applied

Number of standard drinks (beverage1) / the number of standard drinks, the participant stated the beverage equated to.

For example, if a person said that they would record the amount poured as one standard drink their result for "No. of standard drinks (beverage1)" was divided by 1. If they said, the drink was the equivalent of two standard drinks the result was divided by 2. If the participant stated that, the amount was equivalent to 0.5 standard drinks the result was divided by 0.5. Table 23 gives a further explanation of this methodology based upon the example of a person pouring 200ml (1.89 standard drinks) of wine.

Table 23: Conversion of amounts of alcohol poured.

Amount of alcohol poured (Standard drinks)	How many standard drinks does the amount poured equate to?	Over/under estimation of amount consumed	Consumption results
1.89	1	1.89	Underestimated
1.89	2	0.945	Overestimated
1.89	0.5	3.78	Underestimated

Using the above method of conversion a new variable called over-pouring was created. This variable was used to investigate the degree of under or over-reporting of consumption amongst participants based upon amounts poured and the participant's assessment of the number of standard drinks the amount equated to.

Reasons for drinking

According to Graham *et al.* (1996), examining older people's reasons for drinking may be very useful for differentiating levels of addictive behaviour. Research over the past forty years has now identified that reasons for drinking can be categorised as either personal effects or social effects reason for

drinking (Cahalan, Cisin & Crossely 1969, Mulford & Miller 1960). To further explore this domain, the research questionnaire included the 15 item checklist of reasons for drinking that had been originally developed by Adlaf, Smart and Jansen (1989) and Eliany *et al.* (1992) and published in research with older Canadians by Graham *et al.* (1996). The items in the Graham *et al.* (1996) checklist are reproduced in Table 24.

Table 24: Checklist of reasons for drinking (from research by Graham, *et al.* 1996).

Social effects reasons	Personal effects reasons
To be sociable	To help you relax
Because you like the taste	To feel good
To add to the enjoyment of meals	To relieve tension or anxiety
To accompany your partner/spouse	To pass the time
	To help you sleep
	To forget worries
	To block out depressing thoughts/ cheer you up
	To block out loneliness
	To feel less inhibited or shy
	To give you self confidence
	To relieve pain

Knowledge of Australian alcohol guidelines

There were also a series of questions on standard drinks and alcohol guidelines included in the research questionnaire. The series of questions were based upon those included in the NDSHS (2004). Study 1 and previous research conducted by Carruthers and Binns (1992). The questions on alcohol guidelines are replicated in Table 25.

Table 25: Alcohol guideline questions included in Study 2.

32. Before today, had you ever heard of a 'standard drink' of alcohol?
33. Before today, had you ever heard of the Australian Alcohol Guidelines?
34. In these Guidelines recommendations are made by the NHMRC about the number of standard drinks of alcohol an adult should drink to minimise the risk of ill health and maximise health benefits. Do you know what the NHMRC recommendations are for men?
35. Do you know what the NHMRC recommendations are for women?
36. What about for people in your age group.
37. Do you know what the NHMRC recommended limits are for older men?
38. Do you know what the NHMRC recommended limits are for older women?
39. How relevant do you think the Australian Alcohol Guidelines are for older people?
40. What would you recommend as the maximum number of standard drinks of alcohol a man aged 65- 74 years should drink to minimise the risk of ill health and maximise health benefits.

    a) Per day? ☐☐ No opinion ☐ Unsure ☐

    b) Per week? ☐☐ No opinion ☐ Unsure ☐

41. What would you recommend as the maximum number of standard drinks of alcohol a woman aged 65-74 years should drink to minimise the risk of ill health and maximise health benefits.

    c) Per day? ☐☐ No opinion ☐ Unsure ☐

    d) Per week? ☐☐ No opinion ☐ Unsure ☐

Medication use

Medication use amongst older populations is an important issue. However, as the research budget was limited it was not possible to employ qualified health professionals who would have been able to take a comprehensive medication assessment. Subsequently, participants were only asked if they had used any medication in the week prior to interview. If a person had taken any medication in the prior week, they were also asked how many different types of medication they took on the day before the interview.

Coding of method of recruitment

Recruitment information was also included in the questionnaire. This information was collected so that variations amongst the sample, that might have a bearing on interpretation and generalisability, could be assessed. See Table 26 for recruitment codes.

Table 26: Recruitment codes for participants in Study 2.

Method of recruitment	Code no.
Through pharmacy	1
Positive Ageing Foundation	2
Friend, acquaintance	3
Retirement village	4
Local paper	5
Senior Citizen Centre	6
General practitioner	7
Shopping centre notice board	8
Other	9

4.3.5 Sampling method

Eligible participants were individuals who had consumed alcohol in the previous twelve months. However, as people aged 65 to 74 years represent only 11% of the population in Perth (Australian Bureau of Statistics 2002) and only 69% of women and 78% of men (60yrs+) had consumed alcohol in the 12 months prior to the 2001 NDSHS (Drug and Alcohol Office 2003) a targeted recruitment strategy (Barnard 1995, Midford, Lenton, Boots, Acres, Loxley, Canty, James & Sutton 2001) was adopted. This strategy included advertising; snowballing (Barnard 1995); and, geographical sampling (Trotter & Medina-Mora 1997). The specific recruitment strategies used and the organisations targeted to recruit participants are described below.

Recruitment flyer

To aid in recruitment an A4 size flyer promoting the research was developed. There were two versions of the flyer. One version was used to distribute to individuals and the other was distributed to organisations to display. See Appendix 4 and 5.

Positive Ageing Foundation (PAF) Incorporated, WA

The PAF is a WA based self-funded, non-profit organisation with approximately 4,000 older people as members, the majority of whom reside in the Perth metropolitan area. The PAF has a confidential register of all members' names, age and addresses. Research conducted by the PAF had indicated that the prevalence of alcohol consumption in the previous twelve months amongst members was similar to that reported amongst older people in the 2001 NDSHS (Williams 2004).

Following a request from the candidate, the PAF Board agreed to send members information regarding the research. On the 15 March 2005, the PAF sent letters to all members aged 65 to 74 years inclusive across the Perth metropolitan area (see Appendix 6). A copy of the recruitment flyer (see Appendix 4) was also included. In total, 1,281 letters were posted by the PAF to members (Women: N=740; Men: N=541) residing in the Perth metropolitan area. To increase participation, a second letter was sent out by the PAF to members on 30 August 2005 (see Appendix 7).

Senior's networks

A range of recreational, residential and advocacy organizations affiliated with older people were approached about the research. Contact details for retirement villages, bowling clubs, senior citizen centres and Associations for Independent Retirees across the Perth metropolitan area were accessed from telephone, local council and WA State government directories. All establishments (see Table 27) identified through this process were sent a recruitment package. This package contained a letter from the candidate (see Appendix 8), a supporting

letter authenticating the research from the Director of the National Drug Research Institute, (see Appendix 9) and a copy of the recruitment flyer (see Appendix 5). Each organisation was requested to display the flyer to members/residents. Some of the larger retirement villages sent an electronic copy of the recruitment flyer to residents through their in-house television networks. Others sent hard copies to each resident, while some displayed the flyer in the retirement village common area or reception.

Table 27: Number of recruitment packages sent to senior's organisations in Perth.

Type of organisation	No. of organisations sent information
Retirement villages	99
Bowling clubs	60
Senior citizen centres	17
Association of Independent Retirees	13
Returned Serviceman's league (RSL)	1
Retirement and Aged Care Association	1
United Church Homes	1
Seniors Recreation of WA (Inc)	1
Retirement Village Association of WA	1
Freemasons Homes	1
Australian Pensioners League	1

Media

A media release (see Appendix 10) was sent out to 12 Community Newspapers across the Perth metropolitan area and to six senior specific publications. Five local community newspapers and three Senior's newspaper's published details on the research.

The same media release was sent to Curtin University's community radio station. From June to November 2005, Curtin University Community Radio ran two hundred and eighty, 35-second sound 'bites' about the research.

Table 28: Radio time slots promoting the research.

Time Slot	June	July	Aug	Sept	Oct	Nov
Breakfast (5.30am till 9am)	6	21	4	10	10	8
Morning (9am till 12pm)	7	7	10	10	10	7
Afternoon (12pm till 3pm)	2	4	4	4	5	4
Drive (3pm till 7pm)	1	9	13	13	13	7
Evening (7pm till10pm)	2	2	6	6	6	5
Late (10pm till1am)	1	6	3	8	8	6
Dawn (1am till 5.30am)	6	8	4	4	5	5

Stay On Your Feet Expo

The Injury Control Council of WA (ICCWA) annually conduct a statewide falls prevention program entitled Stay on Your Feet. As part of this program, ICCWA organised a number of "Expo's". On the 29 June 2005, an ICCWA Expo was held at the Westfield Carousel Shopping Centre, located in the southeastern Perth metropolitan area. The candidate managed a stall at the Expo promoting the research and distributing flyers to interested passers by. The ICCWA also produce a monthly newsletter. In the June 2005 newsletter, information was included about the research and interested people were asked to contact the candidate (see Appendix 11).

Pharmacies

In December 2004, permission was granted by the Pharmaceutical Council of Western Australia to approach community Pharmacists across the Perth metropolitan area and request that they display recruitment flyers about the research. However, because the recruitment flyer included details about reimbursement to participants there was some concern that inappropriate recruitment leads may have occurred. Because of these concerns, the flyers were only sent to six pharmacies across the Perth metropolitan area. The chief pharmacist in each of these was known personally by one of the key informants from Study 1.

Midlife and Menopause Support Group (MMSG)

The MMSG is a non-profit organisation for older women located in the metropolitan suburb of Subiaco, Perth. The MMSG have approximately 100 female members on their mailing list. On the 26th April, the MMSG sent every member a copy of the recruitment flyer (see Appendix 4).

Curtin University invigilators

In June 2005, Curtin University conducted training sessions with 'invigilators' for upcoming exams. As the candidate had been informed by Curtin University that many of the invigilators were over 60 years of age a copy of the recruitment flyer (see Appendix 4) was forwarded to the Coordinator of exams at Curtin University who printed and distributed the flyer to all invigilators.

Seniors Week

During Bank West Seniors week from 24th to 30th October 2005, there were a number of seniors programs occurring across the Perth metropolitan area. Recruitment flyers were sent to the coordinators of four of these programs:

- "Better bodies, better minds" organised by the Council on the Ageing (WA);
- "Come and Try Day" organised by WA Health Heart Program;
- "Seniors Lifestyle Expo and Art and Craft Exhibition" organised by Hartfield Park Recreation Centre; and,
- "Wellbeing Expo" organised by the Town of Bassendean.

Snowballing strategies

At the conclusion of each interview, each participant was asked if they knew of anyone else who might be interested in taking part in the research. When a participant indicated, they might know of other people interested in the study they were given a copy(s) of the recruitment flyer (see Appendix 4) to circulate.

Other

While the above represented the official methods of recruitment, over the course of the recruitment phase, it became apparent that enthusiastic participants were also distributing/displaying recruitment flyers. Anecdotally, the candidate was informed of recruitment flyer's being displayed at tennis clubs, bowling clubs (prior to formal contact), and public libraries across the Perth metropolitan area. It is not possible to estimate how many flyers were displayed through these means.

Recruitment numbers

The single largest group of participants (n=389, 46%) were recruited through the Positive Ageing Foundation. Some 21% (n=181) of participants were recruited through friends informing them of the research, and a further 9% (n=79) were recruited after seeing an advertisement about the research in a local newspaper. There were no significant differences between men and women as to how they were recruited into the research. See Table 29 for information on recruitment codes of study participants.

Table 29: Recruitment of study participants.

	Men		Women		
How participant became aware of the research project	N	%	N	%	z-score
Pharmacy	5	1.4	1	0.2	1.17
Positive Ageing Foundation	167	46.5	222	45.8	0.12
Friends	73	20.3	108	22.3	-0.39
Retirement village	11	3.1	23	4.7	0.70
Local paper	37	10.3	42	8.7	0.47
Senior citizen centre	3	0.8	15	3.1	-1.29
Shopping centre notice board	2	0.6	5	1.0	-0.43
Radio	7	1.9	5	1.0	0.64
Other	54	15.0	64	13.2	0.44
Total	359	100.0	485	100.0	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Interviewers

In light of the numbers of participants that would be required for the study and the time-line adopted, an application for funding was made to the Alcohol Education and Rehabilitation Foundation Inc, Australia, to employ casual interviewers (in addition to the candidate). This application was successful and over the course of the research, seven interviewers were employed. Six of these were female and one was male. Interviewers ranged in age from 30 to 52 years. All interviewers were personally known to the candidate and were recruited because of their non-judgmental, non-confrontational interpersonal style; had their own motor vehicle; and lived in suburbs, which provided a good coverage of the Perth metropolitan area. It was initially decided to recruit only female interviewers, because of concerns that potential participants particularly those that were single or frail might have safety concerns about volunteering if they were likely to be interviewed by a male. The use of female only interviewers had previously occurred in similar research by Graham *et al.* (1996). However, late in the recruitment phase the interviewer covering the southeast metropolitan area of Perth had to curtail her interviewing. The only other available suitable interviewer was a male. In light of the initial concerns about employing male interviewers, the interviewer was only given names of potential participants who indicated that they were happy to be interviewed by a male.

All interviewers undertook a training session conducted by the candidate. This session provided interviewers with: an overview of the study; contact details for the candidate and research supervisors; information on recording responses; procedures for entering participant's dwellings (e.g. displaying identification); and, mechanisms for reporting or clarifying problems. Each interviewer also had a mobile phone for safety and logistical reasons. Each interviewer had the opportunity to role-play two mock interviews before formally commencing interviews. A Curtin University 10 badge was issued to each interviewer, and it was mandatory for interviewers to display this at each interview.

In addition to the initial training session, there were three formal meetings between the candidate and all interviewers over the duration of the interviewing process. At these meetings, a review occurred of progress to date, problems

encountered and a series of hypothetical scenarios were discussed to ensure that each interviewer was coding responses in a similar fashion. The candidate was also in regular contact with individual interviewers over the course of the data collection phase. Each person interviewed a similar proportion of men and women. See Table 30.

Table 30: Numbers of men and women interviewed by each of the interviewers.

	Men		Women		
Interviewer	N	%	N	%	z-score
1	51	14.2	67	13.8	0.14
2	20	5.6	34	7.0	-0.79
3	66	18.4	75	15.5	0.94
4	68	19.0	98	20.2	-0.37
5	46	12.8	56	11.6	0.49
6	36	10.0	68	14.0	-1.53
7	27	7.5	40	8.2	-0.36
8	45	12.5	47	9.7	1.17
Total	359	100.0	485	100.0	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

To ascertain if there was any bias in the pouring data that were gathered, a one-way ANOVA was conducted on estimates of pouring as the dependent and interviewer as the independent variable. Results indicated that there was no significant difference between interviewers ($F(7,827)=1.914$, $p>0.05$).

Research trolley

Each interviewer was provided with a research trolley that included the materials needed for each interview. See Table 31 for full details on the contents of the research trolley.

Table 31: Contents of research trolley.

1x bottle each of gin, sherry, scotch, beer, red wine, white wine, port, water
Questionnaires
3 x plastic funnels (used to pour the contents of the glasses into the measuring cylinders)
1 x set of ice rocks (plastic ice cubes)
2 x plastic glasses (used in the case where a person indicated that they used the same glass for each of their three beverage choices, In this instance beverage 1 and then beverage 2 were poured into each of the wo plastic glasses and then the original vessel was then able to be re-used by the participant for their third beverage choice, This was methodology was used to avoid measuring the amount poured of any of the beverages until all beverages had been poured and until the appropriate time in the interview schedule)
2 x measuring cylinders (50ml and 250 ml)
Post interview: interviewer comments
ID card
Log for receipt of monies
Money for participants
Copies of recruitment flyer
Brochures with standard drink pictures
Clipboard & pens

No real alcohol was used in the research. Instead empty bottles of alcohol were filled with water that been mixed with different ingredients to give the appearance of particular alcoholic beverages. The ingredients that were used in creating each bottle of pseudo-alcohol are included in Table 32.

Table 32: Recipes for creating the pseudo-alcohol.

White wine: lime juice mixed with water
Red wine: Vimto red cordial mixed with water
Port: ten tea bags soaked in 750ml of hot water. Tea bags removed when water cooled,
Scotch, rum, brandy, sherry: two tea bags soaked in 750ml of hot water. Tea bags removed when water cooled.
Beer: one tea bag soaked in 750ml of hot water. Tea bag removed when water cooled.
Gin and vodka: cold water

Interview protocol

The telephone number and email address of the candidate were included in all recruitment materials. Subsequently, potential participants would either telephone or email the candidate to enquire about the research. The candidate would speak to all people interested in participating and determine their eligibility. To be eligible to participate, people had to be aged between 65 and 74 years inclusive, live in the Perth metropolitan area and had to have consumed at least one full serve of alcohol in the prior 12 months. Once a person was deemed as eligible to participate, the candidate explained that the aim of the research was to investigate alcohol use amongst older people and that a 30-minute interview was involved. If participants agreed to participate, permission was sought to pass on their contact details to the appropriate interviewer. All eligible participants agreed to this process. Once details were passed on by the candidate, the appropriate interviewer would then telephone each participant and arrange a convenient time for the interview.

All participants who volunteered were interviewed in their home (n=843) with the exception of one person who was interviewed at their place of work. At the conclusion of the interview, participants were given $10 as an acknowledgement of their time and any costs associated with attending the interview. After the interviewer had left the home of the participant, they completed a quantitative/qualitative instrument to code their perception of the participant's understanding of the interview questions. For a copy of this instrument, see Appendix 12. Based upon responses from interviewers, all participants appeared to comprehend the interview questions.

Because interviewing older people generally requires considerable time (Graham 2004) it was important that the survey questionnaire only contained measures directly associated with the primary focus of the research; namely investigation of pouring practices. Nonetheless, each interview took approximately 40 minutes to complete (range 25 minutes to 135 minutes). Interviews commenced on 5 March 2005 and concluded on 2 December 2005. Over this period, 844 people were interviewed.

Statistical analyses

Before any analysis was undertaken, the data were screened to identify any outliers. As it was planned to conduct parametric statistical tests on the data, histograms were plotted for each variable to assess whether the data were normally distributed and if the variances were homogenous. If data were found to violate either of these assumptions, the following strategies were applied: (i) natural arithmetic log transformation to achieve a normal distribution; (ii) Games-Howell test for post hoc analysis; (iii) use of an alternative non-parametric test (Field 2005). Additionally, when equal sample sizes and homogeneity of variance were met, the Tukey HSD post-hoc was used, but when sample sizes were different the Hochberg's GT2 was used (Field 2005).

Descriptive statistics were undertaken initially to examine differences between men and women, beverage types and level of drinking (Le. independent t-tests, chi square procedures, tests of two independent proportions). Multivariate models were then used to further analyse data. The primary statistical test of choice was one way ANOVA. Statistical analyses were conducted using either Microsoft EXCEL or SPSS (version 15) software.

Demographic characteristics of the sample

Of the 844 people interviewed 485 (57.4%) were women and 359 (42.6%) were men. The average age of men and women in the sample was 69 years. English was the main language spoken by the participants. The majority (59%) of participants were born in Australia. Of the remainder, 27% were born in the United Kingdom, while another 4% were born in other English speaking countries (South Africa, Ireland, New Zealand, and USA). Almost half of the sample (47%) had completed Year 12 schooling, and 24% of the sample had received a bachelor degree or higher qualification. Most participants (90%) were retired or on a pension, and 37% of the sample had professional occupations when last employed.

The majority of the sample was married (65.3%). However, there were significantly more married men than women, and significantly, more separated

or divorced women than men in the sample. Of the remainder of the sample, 21.9% were widowed and 21.2% were divorced. Statistical tests of the difference between two independent proportions revealed that the men and women were not significantly different on any other demographic variable. See Table 33.

Table 33: Demographic profile of participants in Study 2.

	Men		Women		
	N	%	N	%	z-score
Number of participants	359	43	485	57	
Average Age	69 years	n/a	69 years	n/a	
Marital status					
Married	299	83.3	252	52.0	5.43***
Separated or divorced	37	10.3	107	22.4	2.58**
Main Country of birth					
Australia	210	58.5	287	59.2	0.11
U.K.	97	7.0	134	27.6	0.11
Main language spoken					
English	359	100	484	99.8	0.49
Aboriginal or Torres Strait Islander	0	0	6	1.2	1.22
Employment status					
Retired or on a pension	324	90.3	438	90.3	0.12
Highest year of schooling					
Year 12	171	47.6	229	47.2	0.07
Year 10	107	30.3	142	29.3	0.09
Highest qualification	Bachelor +=100	28.2	Bachelor +=101	21.1	1.41
	Trade cert=90	25.4	Non trade=105	21.9	
Occupational category	Prof.=132	36.9	Prof.=178	36.8	0.11
	Assoc. Prof,=58	16.2	Adv. Clerical=64	13.2	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Comparison of sample to census data for 65-74 year olds residing in Perth and Western Australia

The Australian Bureau of Statistics (ABS) routinely conducts census surveys of the Australian population. At the time of writing, the last Australian census was

conducted in 2001. To compare the sample of men and women who participated in Study 2 with the 65 to 74 year old population of the greater metropolitan area of Perth and the State of Western Australia (W.A.), available census data were examined. However, the census data were limited and it was only possible to compare the samples on marital status, country of birth and schooling level. Tables 34 and 35 compare demographic characteristics of men and women participating in Study 2, with the residential population in the Perth metropolitan area and the State of W.A.

Compared to census data for 65 to 74 year olds in Perth, similar proportions of the men who took part in Study 2 were born in the U.K. and had completed Year 9 at school. Compared to census data for W.A., a similar proportion of the men in Study 2 had been born in Australia, were separated/divorced or widowed and had completed Year 9 at school. On other variables, the groups were different. See Table 34 for a comparison.

Table 34: Comparison of demographic characteristics for men in Study 2 compared to Perth and WA census data.

	Study 2 N	%	Perth N	%	z-score Study 2	WA N	%	z-score Study 2
Sample size	359	43	37,910	47.2		55,465	48.7	n/a
Average Age (years)	69	n/a	69	n/a	n/a	68	n/a	n/a
Marital status						N=55,465		
Married	299	83.3	n/a	n/a	n/a	42,589	76.8	2.89**
Separate/divorced	37	10.3				6,196	11.2	-0.52
Widowed	18	5.0				3,696	6.7	-1.24
other	5	1.4				2,984	5.3	
Country of birth		N=35,959				N=52,380		
Australia	210	58.5	16,869	46.9	4.33***	28,688	54.8	1.40
U.K.	97	27.0	8,560	23.8	1.41	11,286	21.5	2.49*
other	52	14.5	10,530	29.3		12,406	23.7	
School level		N=33,286				N=48,605		
Year 12	171	47.6	10,387	31.2	6.60***	13,525	27.8	8.27***
Year 10	107	29.8	7,853	23.6	2.73**	11,550	23.8	2.66**
Year 9	41	11.4	4,181	12.6	-0.64	6,447	13.3	-1.02
other	40	11.2	10,865	32.6		17,083	35.1	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

The marital status of women interviewed in Study 2 was different to the marital status of older women from the WA census. However, the women in Study 2 were representative of older women in WA who had been born in Australia and of other older women in Perth and WA on the proportion who completed Year 10 at school. On other variables, the groups were significantly different. For further details, see Table 35.

Table 35: Comparison of demographic characteristics for women in Study 2 compared to Perth and WA census data.

	Study 2 N	%	Perth N	%	z-score Study 2	WA N	%	z-score Study 2
Sample size	485	57	42,428	52.8		58,479	51.3	
Average Age (years)	69			69		69		
Marital status						N=58,479		
Married	252	51.9	n/a	n/a	n/a	34,986	59.8	-3.49***
Sep/divorced	109	22.5				6,412	11.0	7.98***
Widowed	106	21.9				15,355	26.3	-2.18*
other	18	3.7				1,726	2.9	
Country of birth			N=40,198			N=55,428		
Australia	287	59.2	20,867	51.9	3.15**	32,227	58.1	0.45
U.K.	134	27.6	8,525	21.2	3.39***	10,818	19.5	4.44***
other	64	13.2	10,806	26.9	-6.69***	12,381	22.3	-4.78***
School level			N=36,714			N=50,470		
Year 12	229	47.2	9,318	25.4	10.79***	11,877	23.5	12.08***
Year 10	142	29.3	9,862	26.8	1.18	13,594	27.0	1.15
Year 9	51	10.5	5,198	14.2	-2.26*	7,497	14.8	-2.65**
other	63	13.0	12,336	33.6	-9.44**	17,504	34.7	-9.90***

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

While a greater proportion of men and women in Study 2 had completed Year 12, this selection bias may possibly be explained by evidence indicating that people with a higher education level are more likely to drink alcohol (Graham and Braun, 1999). More women in the study were divorced than in the either Perth or WA samples of older women. Conversely, a greater proportion of men in the study were married than in either Perth or WA samples of older men. These differences are of note as they may affect the generalisability of results. However, as the evidence on the association between marital status and

consumption is conflicting (Moos et el., 2005; Graham & Braun, 1999; Graham & Schmidt, 1999), it is not possible to explain how such a selection bias occurred.

Socio-economic-status (SES)

SES was assessed by the postcode in which a participant resided and occupation (as most participants were retired this was assessed as previous occupation). Some 88-postcode areas in the Perth metropolitan area were represented among participants. The Australian Bureau of Statistics (ABS) has developed a measure of socio-economic-status for each postcode in Australia (see SEIFA (2001), which represents a continuous index of relative advantage/disadvantage.

SEIFA information for WA was obtained from the 2004 Australian Bureau of Statistics publication 'Census of Population and Housing: Socio-Economic Indexes for Area's (SEIFA)'. Two main SEIFA measures were applied: the Index of Disadvantage; and, the Index of Advantage/Disadvantage. The former is defined as an extension of socio-economic status (typically measured only by education, occupation and income) and includes the core measure of education, occupation and income as well as direct measures of socioeconomic disadvantage such as the number of motor vehicles; rooms in dwelling; unemployment; type of· residence; and, English language proficiency. More indirect measures that may reflect disadvantage are also included, such as Indigenous status and whether adults are divorced/separated.

These indexes are designed such that the larger the score, the more advantaged is the area under consideration. Therefore, for the Index of Disadvantage, at the Statistical Local Area (SLA) level, Australia as a whole scores an average of 999, with the ACT being the most advantaged state/territory scoring an average of 1,079 by SLA and Tasmania being the most disadvantaged at 949. WA scores an average of 977 by SLA.

Originally used as a means to compare between rural and urban areas, the index of Advantage/disadvantage is based on the Index of Disadvantage but essentially combines advantage and disadvantage to arrive at a 'net effect'. Variables specifically targeting a measure of advantage or disadvantage are excluded. At the SLA level, the average score for Australia is 994. The average SLA score in WA is 970, with the highest average being in the ACT at 1,121 and the lowest being in Tasmania at 928.

The scores for advantage of suburbs across Perth ranged from 703 to 1208. Using five equal intervals, the residential postcodes of participants were mapped against SES (see Table 36). No participants were recruited from suburbs in the lowest quintile.

Table 36: Socio-economic-status rankings of men and women in Study 2.

	Men		Women		z-score
SES quintile ranks	N	%	N	%	
2nd quintile score 804.1 to 905	5	1.4	0	0	1.50
3rd quintile score 905.1 to 1006	109	31.1	147	31.0	0.02
4th quintile score 1006.1 to 1107	150	42.9	235	49.6	-1.10
5th quintile score 1107.1 to 1208	86	24.6	92	19.4	1.02
Total	350	100	474	100	

Note: the higher the rank the higher the level of advantage.
Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

In relation to occupation, as discussed in the review of demographic characteristics, the single largest groups of participants were managers or professionals. However, a greater proportion of men were Managers, administrators and tradespersons compared to women. Conversely, a greater proportion of women had previously been employed as clerical staff. See Table 37.

Table 37: Previous occupations of men and women in Study 2.

Occupation	Men		Women		z-score
	N	%	N	%	
Managers and administrators	42	11.7	14	2.9	2.92**
Professionals	132	36.9	178	36.8	0.02
Associate professionals	58	16.2	61	12.6	0.85
Tradespersons and related workers	44	12.3	16	3.3	2.88**
Advanced clerical and related workers	3	0.8	64	13.2	-3.77***
Intermediate clerical, sales and service workers	15	4.2	59	12.2	-2.33*
Intermediate production and transport workers	21	5.9	6	1.2	2.17*
Elementary clerical, sales and service workers	21	5.9	58	12.0	-1.73
Labourers and related workers	22	6.1	24	5.0	0.43
n/a	0	0	4	0.8	-0.99
Total	358	100	484	100	

(Data were missing for two men)
Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Both, postcode and occupation would be used as independent SES variables in the analysis of alcohol consumption data.

Subjective health rating

Based upon participant's self-assessment of health, 321 men (89%) and 444 women (91%) rated their health as "Good" or better. There were no significant differences between the men and women on health rating.

Table 38: Rating of health of men and women in Study 2.

	Men		Women		
Rating of health	N	%	N	%	z-score
Excellent	80	22.3	110	22.7	-0.08
Very good	135	37.6	188	38.8	-0.19
Good	106	29.5	146	30.1	-0.10
Fair	33	9.2	34	7.0	0.67
Poor	5	1.4	7	1.4	-0.04
Total	359	100	485	100	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

4.4 Results

The results from Study 2 will be described in three parts. Part 1 will include the results on the investigation of the association between alcohol consumption and gender, marital status, qualifications, SES, reasons for drinking, problems associated with alcohol use, medication and health. Part 2 will present the results on the investigation of pouring practices and Part 3 will include a discussion of the investigation of participant's knowledge of the NHMRC (2001) Australian Alcohol Guidelines and standard drink terminology.

4.4.1 Part 1: Investigation of the association between alcohol and other variables

Age when first consumed alcohol

Women were significantly older (M=22.32, SE=0.55) than men (M=18.13, SE=0.35, t (842)=-5.95, $p<0.001$) when they reportedly first consumed a full glass of alcohol.

Frequency of alcohol use

The frequency of alcohol consumption over the prior 12 months was similar for both men and women (see Table 39). The largest proportion of both men (n=158, 44%) and women (n=163, 33.6%) were daily drinkers.

Table 39: Frequency of alcohol consumption amongst men and women in Study 2.

	In the last 12 months, how often did you have an alcoholic drink of any kind?				
Frequency of consumption	Men		Women		z-score
	N	%	N	%	
Every day	158	44.0	163	33.6	1.77
5 to 6 days a week	65	18.1	77	15.9	0.49
3 to 4 days a week	66	18.4	71	14.6	0.84
1 to 2 days a week	35	9.7	73	15.1	-1.31
2 to 3 days a month	21	5.8	49	10.1	-1.27
One day a month	6	1.7	20	4.1	-1.17
Less than one day a month	8	2.2	32	6.6	-1.70
Total	359	100	485	100	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Types of beverages consumed

Wine was the most popular choice of beverage for both men (n=218, 60.7%) and women (n=397, 81.2%). However, significantly more women than men nominated wine as their first preference and significantly more men than women nominated beer as their first preference. Preferences for other beverages were similar across both groups. See Table 40.

Table 40: Beverage 1 preferences for men and women in Study 2.

	Men		Women		
Beverage type	N	%	N	%	z-score
Wine	218	60.7	397	81.8	-3.92***
Beer	103	28.7	19	3.9	5.81***
Bottled spirits	23	6.4	41	8.5	0.08
Premixed spirits	0	0	1	0.2	-0.49
Other	15	4.2	27	5.6	-0.53
Total	359	100	485	100	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Sixty-three (17.5%) men and 136 (28.0%) women did not nominate a second beverage preference. Of the remainder, wine was the most commonly nominated beverage for both men (38.2%) and women (35.9%). See Table 41.

Table 41: Beverage 2 preferences for men and women in Study 2.

	Men		Women		
Beverage type	N	%	N	%	z-score
Wine	137	38.2	174	35.9	0.39
Beer	94	26.2	42	8.7	3.93***
Bottled spirits	40	11.1	86	17.7	-1.53
Premixed spirits	0	0	0	0	n/a
Other	25	6.9	47	9.7	-0.81
n/a	63	17.5	136	28.0	-2.04*
Total	359	100	485	100	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Only 172 (35.5%) women and 178 (52.2%) men nominated a third beverage preference. For both men (17.3%) and women (14.5%) the most common third preference was bottled spirits. See Table 42.

Table 42: Beverage 3 preferences for men and women in Study 2.

	Men		Women		
Beverage type	N	%	N	%	z-score
Wine	37	10.3	27	5.6	1.48
Beer	43	12.0	37	7.6	1.23
Bottled spirits	62	17.3	70	14.5	0.64
Premixed spirits	1	0.3	2	0.4	-0.19
Other	35	9.7	36	7.4	0.69
n/a	181	50.4	313	64.5	-2.37*
Total	359	100	485	100	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Drinking settings

Both men and women drank alcohol in a range of settings. The three most popular venues were drinking at home (n=800, 94.8%), at restaurants/cafes (n=655, 77.6%) and at friends homes (n=651, 77.1%). See Table 43.

Table 43: Usual place of alcohol consumption of men and women in Study 2.

Place	Men		Women		Total		z-score
	N	%	N	%	N	%	
In my own home	350	97.5	450	2.8	BOO	94.8	1.29
At friends house	261	72.7	390	0.4	651	77.1	-1.52
At licensed premises	146	40.6	150	0.9	296	35.1	1.68
At restaurants / cafes	273	76.0	353	B.4	655	77.6	0.61
At private parties	151	42.1	233	8.0	384	45.5	-0.99
At workplace	7	1.9	13	.7	20	2.4	-0.40
At raves/dance parties	8	2.2	13	.7	21	2.5	-0.24
In public places	83	23.1	116	3.9	199	23.6	-0.16
In a car	4	1.1	3	.6	7	0.8	0.45
At school IT AFE/Uni.	23	6.4	19	.9	42	5.0	0.95

(Respondents could select more than one response).
Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Alcohol consumption and gender

Alcohol consumption was estimated in three ways: usual consumption (023); quantity/frequency of consumption over the prior 12 months (024); and, amount of alcohol consumed on the day before to the interview (025). In response to 024 (quantity/frequency), men reported drinking 2.12 standard drinks per day while women reported drinking 1.09 standard drinks per day. Each of the three independent methods for measuring alcohol consumption indicated that men consumed significantly more alcohol than women. This result supported Hypothesis 1. See Table 44 for details.

Table 44: Alcohol consumption by men and women in Study 2.

Consumption question	Men		Women		t-value	DF
	M	S.E.	M	S.E.		
Q23 "On a day you have an alcoholic drink, how many standard drinks do you usually have?"	2.50	0.09	1.66	0.04	8.86**	515.48
Q24 "How often in the last 12 months have you had each of the following number of standard drinks in a day?"	2.12	0.11	1.09	0.05	8.71**	524.96
Q25 "How many standard drinks did you have yesterday?"	1.86	0.11	1.03	0.05	6.80**	528.77

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Using the classification system developed by the WHO (Department of Mental Health and Substance Dependence Non-communicable Diseases and Mental Health Cluster 2000) data from the OF (Q24) indicated that the majority of men (89.4%) and women (91.3%) were low-risk drinkers. There was no significant difference between the proportions of men and women who were drinking at-risky levels. See Table 45.

Table 45: Prevalence of at-risk consumption based upon WHO classification system.

Level of risk	Men		Women		Total		z-score
	N	%	N	%	N	%	
Low-risk	319	89.4	443	91.3	762	90.5	0.41
Medium-risk	21	5.9	35	7.2	56	6.7	0.33
High-risk	17	4.7	7	1.5	24	2.8	-1.21
Total	357	100	485	100	842	100	

(Data were missing for two men)
Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Using the NHMRC (2001) Australian alcohol guidelines as a benchmark, the majority of men and women were drinking at low-risk levels for both short- and long-term harm. See Table 46 for details.

Table 46: Prevalence of at-risk consumption based upon NHMRC (2001) alcohol guidelines.

Level of risk	Short-term harm					Long-term harm				
	Men		Women		z-score	Men		Women		z-score
	N	%	N	%		N	%	N	%	
Low-risk	252	70.4	400	82.5	1.76	319	89.4	445	91.8	0.50
At-risk	106	29.6	85	17.5	-1.76	38	10.6	40	8.2	-0.50
Total	358	100	485	100	357	100	485	100		

(Note: Short term harm = at-risk = for males the consumption of 7 or more standard drinks on anyone day and for females the consumption of 5 or more standard drinks on anyone day. Long term harm = at-risk = for men drinking more than 28 standard drinks per week, women more than 14 standard drinks per week)

Alcohol consumption and marital status

It was hypothesized (H2) that non-married men (including widowed) would report different levels of consumption than married men (Brennan et el. 2005, Byrne *et al.* 1999).

To address this hypothesis, data were examined using the three alternate measures of alcohol consumption and men were divided into two mutually exclusive groups: (i) currently married (including de-facto) (N=299, 83.3%) and (ii) non-married (including widowed, separated, never married, divorced or other) (N=60, 16.7%). As shown in Table 47, non-married men reported drinking significantly more alcohol than married men did on 023, which assessed consumption on a usual day. On the other two alcohol assessment questions, there were no significant differences between groups of men.

Table 47: Responses from men on the alcohol consumption questions based upon martial status.

Consumption question	Married Men		Non-married Men		t-value	D.F.
	M	S.E.	M	S.E		
Q23 "On a day you have an alcoholic drink, how many standard drinks do you usually have?"	2.41	0.09	2.98	0.26	2.47**	357
Q24 "How often in the last 12 months have you had each of the following number of standard drinks in a day?"	2.06	0.11	2.40	0.33	5.15	70.92
Q25 "How many standard drinks did you have yesterday?"	1.78	0.10	2.28	0.43	10.85	65.65

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Multiple linear regressions were used to explore the association between marital status and alcohol consumption among men. The dependent variable was 'usual' consumption (Q23) as this was the drinking measure that indicated a significant univariate association between married and non-married men. Independent variables were binary combinations of men with married status versus separated, widowed, and divorced men. Notably, the adjusted R^2 for the final model (only significant variables fitted) was less than 1% and therefore only

explained a very small amount of the variance in usual alcohol consumption among men.

Results indicated that compared to married men, both separated and divorced men drank significantly more alcohol. There was no significant difference between men who were married, widowed or never married on the quantity of usual alcohol consumption. See Table 48.

Table 48: Results of the multiple linear regression analysis for men on marital status and consumption.

Variables entered	B	S.E.	t-value	95% C.I.
Married vs. separated	1.22	0.55	2.22'	0.03
Married vs. widowed	0.34	0.40	0.85	0.40
Married vs. never married	-0.21	0.74	-0.28	0.78
Married vs. divorced	0.65	0.32	2.01*	0.04

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

It was also hypothesized (H3) that married women would consume different levels of alcohol compared to women who were either widowed, separated, divorced or had never married (Ganry *et al.* 2001, Young & Powers 2005). (This was a two tailed hypothesis because of the conflicting literature around marital status).

To address this hypothesis, data were examined using the three alternate measures of alcohol consumption and women were divided into two mutually exclusive groups: (i) currently married (including de-facto) and (ii) non-married (including, widowed, separated, never married, divorced or other). As shown in Table 49, on Q24 that assessed the Quantity/Frequency of consumption over the prior 12 months there was a significant difference between groups of women based upon their marital status.

Table 49: Comparison of women: married vs. non-married on reported consumption.

Consumption question	Married		Non-married		t-value	D.F.
	M	S.E.	M	S.E.		
Q23 "On a day you have an alcoholic drink, how many standard drinks do you usually have?"	1.66	0.06	1.65	0.05	0.23,	483
Q24 "How often in the last 12 months have you had each of the following number of standard drinks in a day?"	1.22	0.08	0.96	0.06	2.51*	483
Q25 "How many standard drinks did you have yesterday?"	1.10	0.08	0.95	0.08	1A2	483

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Data from the Quantity/Frequency (Q24) supported the research hypothesis (H3) that married women would consume different levels of alcohol compared to widowed, separated, and divorced or women· who had never married.

Based upon data for the Quantity/Frequency (Q24) a multiple linear regression analysis was undertaken to see if marital status was predictive of drinking among women. The dependent variable in the analysis was Quantity/Frequency consumption (Q24) as this was the only drinking measure that indicated a significant univariate association between married and non-married women. Independent variables were binary combinations of women with married status versus separated; widowed; and divorced women. Notably, the adjusted R^2 for the final model (only significant variables fitted) was less than 1% and therefore only explained a very small amount of the variance, in the Quantity/Frequency assessment of consumption amongst women.

Results indicated that married women drank significantly more alcohol than widowed women did. There was no significant difference in the Quantity/Frequency consumption between women who were married and separated, or never married or divorced. See Table 50.

Table 50: Results of the multiple linear regression analysis for women on marital status and reported consumption.

Variables entered	B	S,E,	t-value	95%C.1.
Married vs. separated	-0.43	0.47	-0.91	0.36
Married vs. widowed	-0.30	0.13	-2.24*	0.03
Married VS. never married	-0.25	0.28	-0.87	0.39
Married vs. divorced	-0.21	0.13	-1.60	0.11

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Alcohol consumption and qualifications

Data from men and women were compared to ascertain if there was support for the hypothesis (H4) that more highly qualified people would be heavier alcohol consumers. There were no significant differences between either men or women on any of the three alcohol consumption measures using qualification as the independent variable. This did not support the research hypothesis.

Table 51: Results for qualification as a predictor of consumption.

Consumption question	Women			Men		
	M	F-value	D.F.	M	F-value	D.F.
Q23 "On a day you have an alcoholic drink, how many standard drinks do you usually have?"	1.66	1.80	6,472	2.51	0.80	7,346
Q24 "How often in the last 12 months have you had each of the following number of standard drinks in a day?"	1.09	1.53	6,472	2.17	1.19	7,344
Q25 "How many standard drinks did you have yesterday?"	1.03	0.48	6,472	1.86	0.26	7,346

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Alcohol consumption and socio-economic-status (SES)

It was hypothesized (H5) that men and women who resided in higher socio-economic areas (based upon postcode) would drink alcohol more frequently.

To ascertain if the data supported this hypothesis a chi-square analysis was conducted using SES quintile for disadvantage (i.e. the higher the quintile score the higher the SES) and frequency of drinking. So as not to violate the

assumption of chi-square that frequencies are not less than five, it was necessary to combine data for the category "drank less than one day per month", with data for those participants who indicated that they drank alcohol approximately one day per month. Results for men indicated that there was a significant association between SES and frequency of drinking in the past 12 months $\chi^2(20)=28.586$, p=0.048. There was also a marginal albeit significant association for women . $\chi^2(20)=29.033$, p=0.044.

This result lent support to a relationship between SES and frequency of drinking. To explore the relationship between SES and alcohol consumption a series of ANOVAs were conducted.

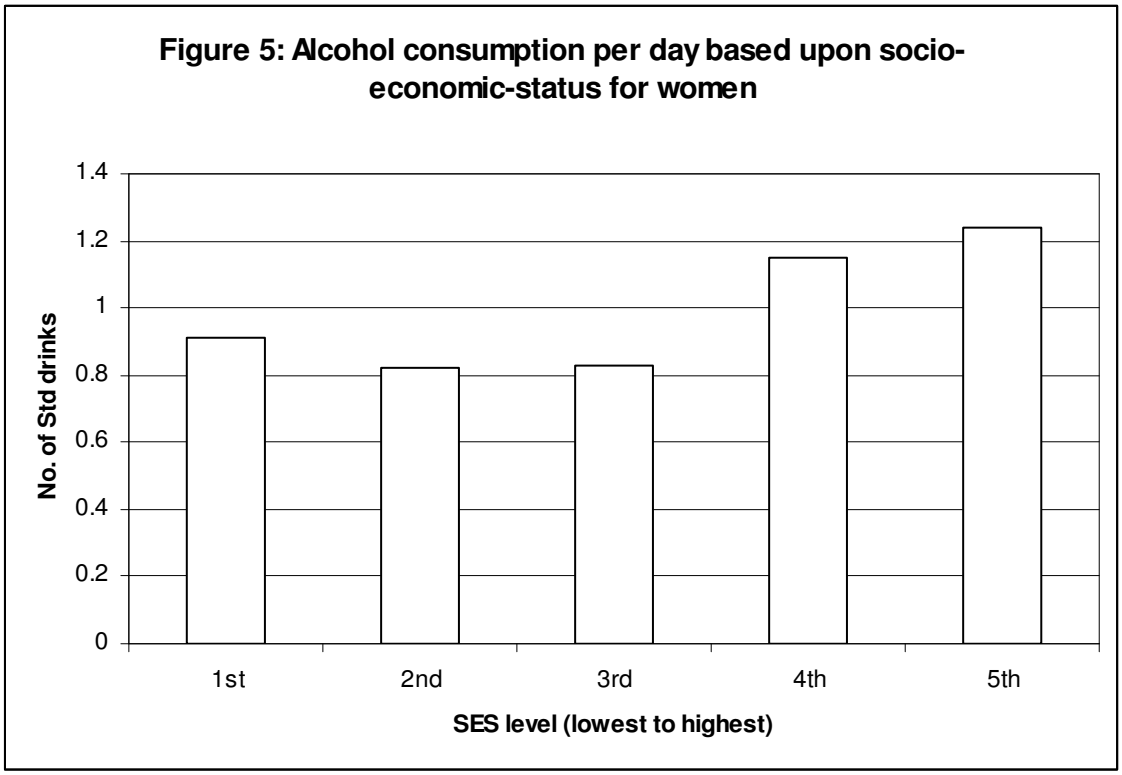
Table 52: Socio-economic-status and consumption of alcohol.

Consumption question	Women			Men		
	M	F-value	D.F.	M	F-value	D.F.
023 "On a day you have an alcoholic drink, how many standard drinks do you usually have?"	1.66	1.05	4,468	2.52	1.35	4,344
024 "How often in the last 12 months have you had each of the following number of standard drinks in a day?"	1.09	2.80*	4,468	2.17	1.07	4,342
025 "How many standard drinks did you have yesterday?"	1.03	2.36	4,468	1.87	1.85	4,344

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

A Tukey HSD post-hoc analysis indicated that women in the highest level of SES reported higher levels of alcohol consumption (M=1.27 standard drinks per day) compared to women in the second (M=0.83, p=0.02) and the third quintile group (M=0.85, p=0.03). See Figure 5.

Figure 5: Alcohol consumption per day based upon socio-economic-status for women



When occupational group and frequency of drinking were compared, results of a chi-square revealed a significant association for men χ^2 (40)=67.446, p=0.002 and a significant association for women χ^2 (45)=59.988, p=0.034.

To further explore occupation and alcohol consumption a series of ANOVAs were conducted.

Table 53: Previous occupation and consumption of alcohol .

Consumption question	Women			Men		
	M	F-value	D.F.	M	F-value	D.F.
Q23: On a day you have an alcoholic drink, how many standard drinks do you usually have?	1.66	1.12	9,474	2.49	0.42	8,349
Q24: How often in the last 12 months have you had each of the following number of standard drinks in a day?	1.09	1.21	9,474	2.26	1.81	8,347
Q25: How many standard drinks did you have yesterday?	1.02	1.48	9,474	1.85	1.80	8,349

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

These results indicate that SES and occupation influence frequency of alcohol consumption for both men and women, and that for women SES may have some impact on quantity of consumption. With women residing in the highest SES area reporting heavier consumption based upon Quantity/Frequency than other women.

Reasons for drinking

A bivariate correlation was undertaken between a participant's total score on reasons for drinking and the frequency of their drinking. Results of the correlation indicated that those who drank alcohol more frequently nominated a greater number of reasons for drinking ($r=0.165$, $p<0.05$). Although statistically significant, reasons for drinking only accounted for 2.7% of the variance and hence the result has limited clinical relevance.

A bivariate correlation was also undertaken between participant's volume of alcohol consumption (based upon Quantity/Frequency-Q24) and total score for reasons for drinking.

Table 54: Correlation between consumption (024) and reasons for drinking.

	Total sample		Women		Men	
	N	r	N	r	N	r
Total no. of reasons for drinking	842	0.14*				
No. of personal effects reasons for drinking	842	0.16*	485	0.17*	347	0.17***
No. of social effects reasons for drinking	842	0.04	485	0.09'	357	0.05

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

In relation to social effects reasons for drinking and volume of consumption there was no significant correlation for men but there was a significant correlation between volume of consumption and endorsement of social effects reasons for women. While significant, the variance accounted for was very small, making any definitive conclusions difficult.

Problems associated with alcohol

The majority of men (52.6%) and women (65.1%) scored zero on the CAGE instrument For full details see Table 55.

Table 55: CAGE scores for men and women in Study 2.

	CAGE score					
Gender	0	1	2	3	4	Total
Men (N)	189	98	45	23	4	359
%	52.6	27.3	12.5	6.4	1.1	100
Women (N)	315	115	43	11	0	484
%	65.1	23.8	8.9	2.3	0	100
Total (N)	504	213	88	34	4	843
Total%	59.8	25.3	10.4	4.0	0.5	100

Using the cut-off score of 1 (as suggested by Buschsbaum *et al.* (1992), and Dawe *et al.* 2002) there was no significant difference between the proportions of men and women who screened positive for problem drinking. This did not support Hypothesis 8 that stated that the proportion of women experiencing problems would be less than the proportion of men.

Table 56: CAGE score results for men and women collapsed to a score of zero or >=1.

	CAGE score		
Gender	0	>=1	Total
Men (N)	189	170	359
%	52.6	47.4	100
Women (N)	315	169	484
%	65.1	34.9	100
Total N	504	339	843
Total%	59.8	40.2	100

(z-score=-/+1.55, p>0.05)

To explore possible relationships between the presence of alcohol related problems (as identified by the CAGE) and alcohol consumption, a series of independent sample 2-tailed t-tests were conducted.

Results indicated that men and women who had a score of 1 or more on the CAGE reported significantly higher levels of alcohol consumption on all three measures of alcohol consumption. See Tables 57 and 58.

Table 57: T-test results for men (CAGE score and alcohol consumption).

Consumption measure	CAGE score	N	M	S.E.	D.F.	T
Q23: On a day you have an alcoholic drink, how many standard drinks do you usually have?	0	190	2.15	0.11	357	-4.49***
	1 or more	169	2.91	0.13		
Q24: How often in the last 12 months have you had each of the following number of standard drinks in a day?	0	190	1.56	0.12	314.54	-5.76***
	1 or more	167	2.75	0.17		
Q25: How many standard drinks did you have yesterday?	0	190	1.48	0.16	357	-3.70***
	1 or more	169	2.29	0.16		

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Table 58: T-test results for women (CAGE score and alcohol consumption).

Consumption measure	CAGE score	N	M	S.E.	D.F.	T
023: On a day you have an alcoholic drink, how many standard drinks do you usually have?	0	316	1.47	0.04	224.62	-5.53'*'
	1 or more	168	2.00	0.09		
024: How often in the last 12 months have you had each of the following number of standard drinks in a day?	0	316	0.87	0.04	205.23	-4.94**'
	1 or more	168	1.50	0.12		
025: How many standard drinks did you have yesterday?	0	316	0.82	0.05	248.60	-4,71**'
	1 or more	168	1.41	0.11		

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Medication

It was hypothesized (H9) that more women than men would report the use of medications (Graham et 81. 1996, Graham & Vidal-Zeballos 1998).

There was no significant difference between the proportion of men and women who were taking any medications in the last week. However, given that in excess of 83% of the sample reported the use of medications in the week prior to the interview., there was insufficient variance in results to detect any differences. This did not support Hypothesis 9. See Table 59.

Table 59: Medication use amongst men and women in Study 2.

Gender	Taking medication		Not taking medication		Total		
	N	%	N	%	N	%	z-score
Men	291	81.2	67	18.8	358	100	0.86
Women	413	85.2	72	14.8	485	100	
Total	704	83.5	139	16.5	843	100	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Of those people who had taken some medication in the prior week, 285 men (98%) and 404 women (98%) said they had taken medication yesterday. Of these people, 151 men (52%) and 203 women (49%), indicated taking 1 or 2 different types of medications. Sixty of the men (21%) and 77 of the women (19%) indicated taking five or more medications and one male had taken 17 different medications and one female had taken 15 different medications on the day prior to the interview.

When data for the numbers of medications taken yesterday were examined results from a one-way ANOVA indicated that there was no significant difference between men and women on the number of medications token on the day prior to the interview. See Table 60.

Table 60: Average number of medications taken by men and women on the day prior to the interview.

Women		Men			
N	M	N	M	F value	D.F.
412	2.93	290	3.02	0.30	1,700

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Health

A series of one-way ANOVAs were conducted on alcohol consumption and health. Results indicated that there was no significant difference in alcohol consumption for either men OT women based upon the self-assessment rating of health. See Tables 61 and 62.

Table 61: ANOVA results for men (health rating and alcohol consumption).

Consumption measure	Health rating	N	M	S.E.	D.F.	F
Q23: On a day you have an alcoholic drink, how many standard drinks do you usually have?	excellent	80	2.50	0.18	4	0.71
	very good	135	2.55	0.14		
	good	106	2.35	0.14		
	fair	33	2.70	0.37		
	poor	5	3.36	1.67		
	Total	359	2.50	0.09		
Q24: How often in the last 12 months have you had each of the following number of standard drinks in a day?	excellent	80	2.15	0.23	4	1.08
	very good	134	2.07	0.14		
	good	105	1.94	0.19		
	fair	33	2.69	0.46		
	poor	5	2.87	2.06		
	Total	357	2.12	0.11		
Q25: How many standard drinks did you have yesterday?	excellent	80	1.79	0.18	4	1.87
	very good	135	1.77	0.16		
	goad	106	1.73	0.17		
	fair	33	2.76	0.65		
	poor	5	2.60	2.36		
	Total	357	1.86	0.11		

Statistical significance: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 62: ANOVA results for women (health rating and alcohol consumption).

Consumption measure	Health rating	N	M	S.E.	D.F.	F
023: On a day you have an alcoholic drink, how many standard drinks do you usually have?	excellent	110	1.66	0.09	4	0.64
	very good	188	1.70	0.07		
	good	146	1.58	0.07		
	fair	34	1.66	0.10		
	poor	7	2.00	0.38		
	Total	485	1.65	0.04		
024: How often in the last 12 months have you had each of the following number of standard drinks in a day?	excellent	110	1.07	0.09	4	0.34
	very good	188	1.13	0.09		
	good	146	1.04	0.10		
	fair	34	1.09	0.15		
	poor	34	1.49	0.40		
	Total	485	1.09	0.05		
025: How many standard drinks did you have yesterday?	excellent	110	1.15	0.12	4	0.34
	very good	188	1.08	0.09		
	good	146	0.90	0.09		
	fair	34	0.87	0.18		
	poor	7	1.14	0.51		
	Total	485	1.03	0.05		

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

4.4.2 Part 2: Investigation of pouring practices

Based upon data gathered on Beverage 1 preferences, there were no significant differences between the amounts of alcohol that were poured by men and women ($t(839)=4.649$, $p>0.05$). However, both men and women poured amounts greater than one standard drink. See Table 63. This supported Hypothesis 10.

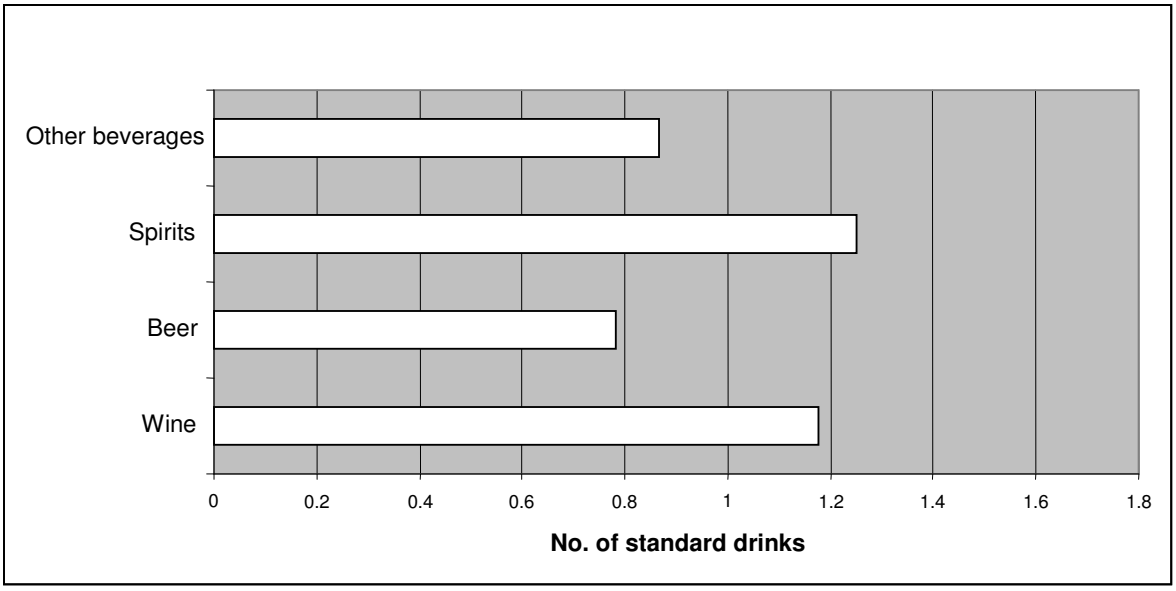
Table 63: Mean number of standard drinks poured by men and women.

Gender	N	Mean no. of standard drinks	F	p
Men	358	1.3180	2.646	0.104
Women	483	1.1556		

Alcohol content and the amount of alcohol poured

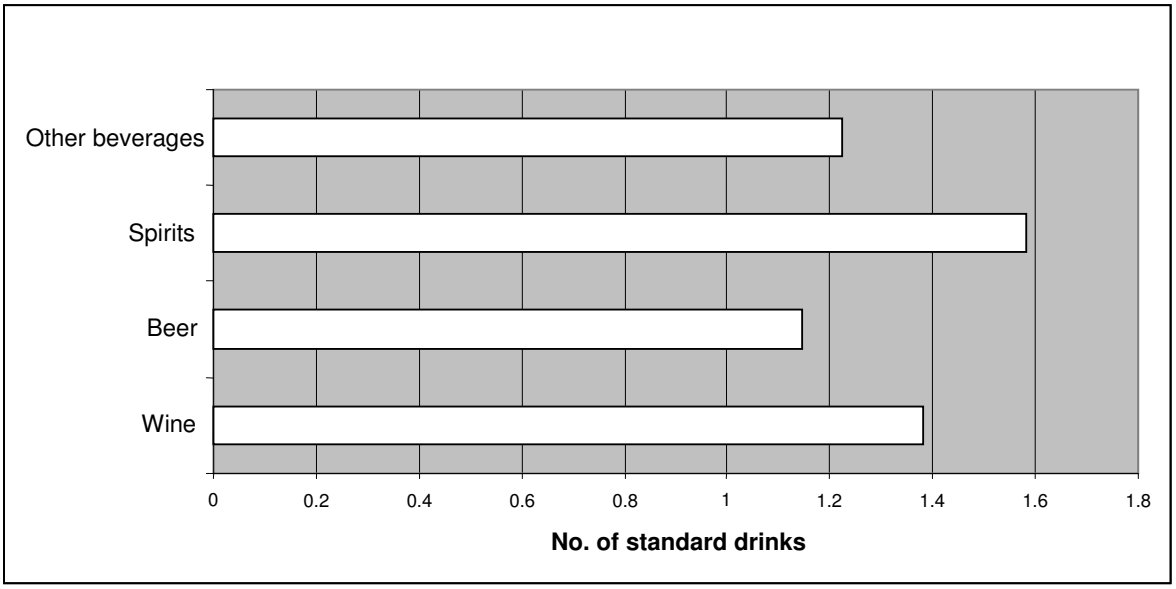
When volume of alcohol poured was converted to standard drinks, results of a one way ANOVA on data collected from women in the study indicated that there was a significant difference between the amount poured by beverage ($F(3,479)=9.66$, $p<0.001$). A Games Howell post-hoc indicated that greater amounts of wine (M=1.1B, SE=0.01) were poured than beer (M=0.79, SE=0.06, $p<0.001$) and other beverages (M=0.86, SE=0.08, p=0.002) and greater amounts of spirits (M=1.25, SE=0.13) were also poured than beer (p=0.014). See Figure 6.

Figure 6: Women: number of standard drinks poured by beverage type



There was also a significant difference for men ($F(3,354)=5.94$, p=0.001). A Hochberg post hoc test revealed that men poured significantly more standard drinks of wine (M=1.3B, SE=0.04) and spirits (M=1.5B, SE=0.14) compared to beer (M=1.15, SE=0.05, p=0.003 and p=0.005 respectively). See Figure 7.

Figure 7: Men: number of standard drinks poured by beverage type



Data for men and women supported Hypothesis 11 that the greater the alcoholic content of the beverage (i.e. spirits) the greater the discrepancy of the poured drink from a standard drink.

Type of glass used and pouring practices

It was hypothesized (H12) that the type of glass would influence the amounts of alcohol poured. Results for men indicated that the type of glass had no statistically significant effect on the numbers of standard drinks poured. See Table 64 for details.

Table 64: Type of glass used by men and the number of standard drinks poured.

Type of glass	N	Mean	S.E.	D.F.	F
Can	42	1.15	0.06	5	1.68
Short wide tumbler	31	1.24	0.11		
Beer glass	31	1.05	0.08		
Tall narrow highball	15	1.14	0.10		
Other	27	1.30	0.16		
Wine glass	201	1.28	0.03		
Total	347		0.03		

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Results for women indicated that glass type had a significant effect on the amount of alcohol poured. See Table 65.

Table 65: Type of glass used by women and the number of standard drinks poured.

Type of glass	N	Mean	S.E.	D.F.	F
Can	10	1.12	0.13	5	4.17**
Short wide tumbler	39	1.25	0.12		
Beer glass	8	0.83	0.08		
Tall narrow highball	14	1.03	0.11		
Other	35	0.92	0.08		
Wine glass	369	1.18	0.02		
Total	475	1.15	0.02		

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

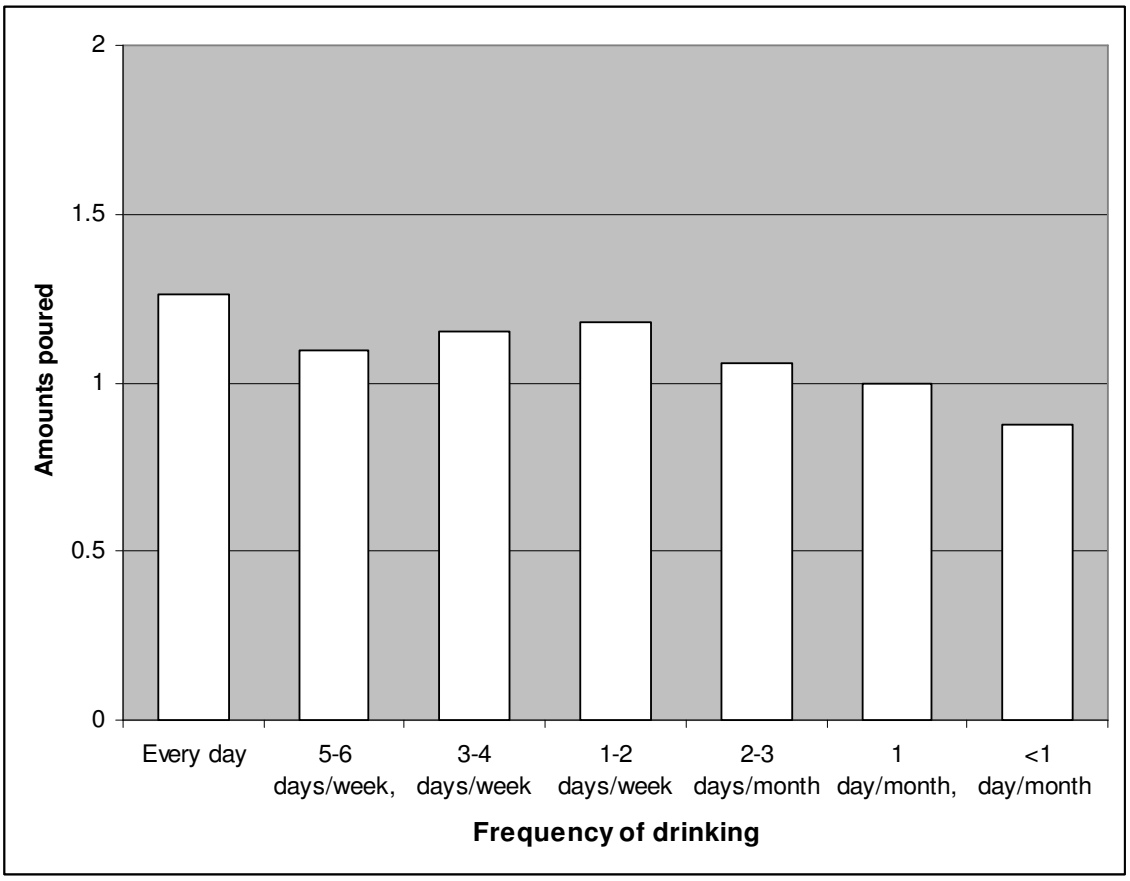
A Games-Howell post-hoc analysis indicated that women poured significantly less "alcohol" into a beer glass than a wine glass (p=0.02) and significantly less into an "other" category of glass than a wine glass (p=0.03). Interestingly, the greatest amount was poured into a short-wide tumbler, but because of the smaller sample size and the larger standard error, this result was not statistically different when compared to other beverages. This result did not support Hypothesis 12.

Frequency of drinking and volume poured

It was hypothesized (H13) that daily drinkers would pour larger volumes of alcohol compared to those who drank less frequently. Results of a one-way ANOVA indicated that for women there was a significant difference between groups (based upon frequency of drinking) and the number of standard drinks poured for Beverage 1 ($F(6,476)=4.97$ $p<0.001$). A Games-Howell post-hoc indicated that women who drank every day poured larger amounts (M=1.266, SE=0.041) than women who drank 5 to 6 days per week (M=1.10, SE=0.036, p=0.037) and those who drank less than one day per month (M=0.88, SE=0.08, p=0.003). Additionally, women who drank 1 to 2 days per week (M=1.19,

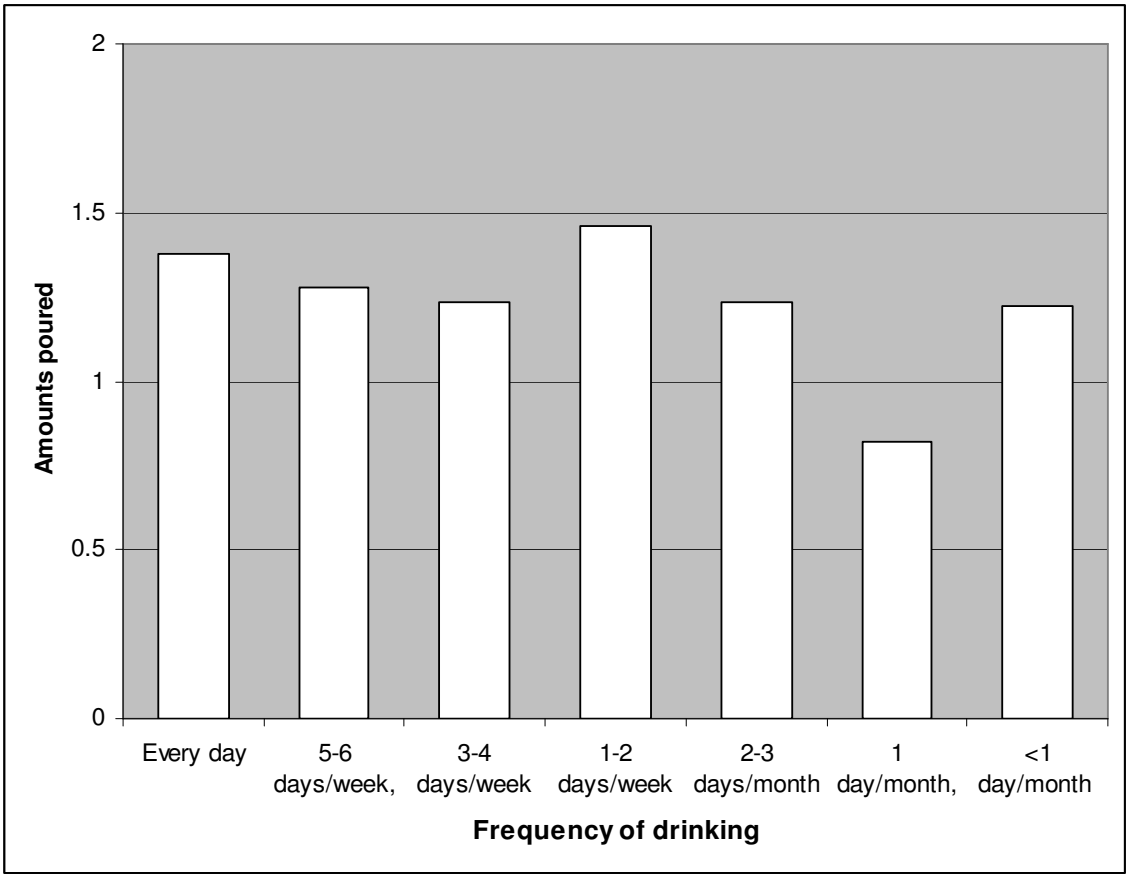
SE=0.O.05) poured a greater number of standard drinks than those who drank less than one day per month (M=0.88, SE=0.08, p=0.029). See Figure 8.

Figure 8: Results for women: frequency of drinking and amounts of alcohol poured (converted to standard drinks).



Results of a one way ANOVA indicated that for men there was no significant difference between groups (based upon frequency of drinking) and the amount of alcohol poured for Beverage 1 (F (6,351)=1.90, P>0.05).

Figure 9: Results for men: frequency of drinking and amounts of alcohol poured (converted to standard drinks). '



These results therefore only lend partial support for Hypothesis 13.

Validity of self-report based upon pouring practices.

Results for reliability of responses

The final aim of this component of the research was to investigate a) whether or not people presume the amounts poured are equivalent to one standard drink; and b) if people do attempt to convert amounts poured into standard drinks how accurate is the conversion.

Do people convert amounts of alcohol poured into standard drinks?

Based upon responses to question 26, and excluding those for whom the question was not applicable (i.e. those who indicated drinking from a can),

74.4% of men and 80.2% of women replied that they would record the amount of pseudo alcohol poured as one standard drink. For beverage 2, these figures were 79.9% for men and 83.3% for women. For beverage 3, the results were 83.9% and 83.4% for women. There was no significant difference between the responses from men and women. For more detail see Table 66.

Table 66: Responses to the question: for the glass of beverage (no.) would you record the amount as one standard drink?

Beverage	Gender		N/A	No	Yes	Total	Missing	z-score
1	Men	N	43	81	235	359	0	1.15
		%	12.0	22.6	65.5			
	Women	N	8	94	380	482	3	
		%	1.7	19.5	78.8			
2	Men	N	103	51	203	357	0	0.42
		%	28.9	14.3	56.7			
	Women	N	150	58	271	479	6	
		%	31.3	12.1	56.6			
3	Men	N	203	25	130	359	0	0.05
		%	56.7	7.0	36.3			
	Women	N	325	26	131	482	3	
		%	67.4	5.4	27.2			

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

In relation to the accuracy of people's ability to convert amounts poured to standard drinks and based upon the previously described methodology on converting the amounts of alcohol poured to a score for the degree of over or under-reporting men and women both under-reported consumption. See Table 67.

Table 67: Actual number of standard drinks that each poured drink was equivalent to.

Gender	N	Standard drink
Men	356	1.23
Women	479	1.16

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

The above results indicate that based upon their pouring practices and estimations of amounts poured, men underestimated consumption by 23% and women underestimated consumption by 16%. -An independent t-test indicated that men significantly underreported consumption compared to women ($F=0.809$, $t=2.116$, $p=0.035$).

Results of a repeated measures t-test indicated that there was no significant difference for women ($t(478)=0.08$, $p>0.05$), between the amounts of alcohol they poured and their estimations of how many standard drinks they had poured. For instance, on average women poured the equivalent of 1.16 (SE=0.02) standard drinks. Using the methodology (previously described) for converting amounts poured into standard drinks, women on average recorded each standard drink as 1.16 standard drinks. In other words, while approximately 20% indicated that they would not report the amount poured as one standard drink, the conversion process they used did not increase the accuracy of their self-reported consumption.

For men, there was a significant difference ($t(355)=3.33$, $p<0.001$) between the amounts they poured and their estimations of how many standard drinks they had poured. For instance, on average men poured the equivalent of 1.32 (S.E.=0.03) standard drinks. Using the methodology for converting amounts poured into standard drinks, men on average recorded each standard drinks as 1.23 (S.E.=0.02) standard drinks. Subsequently, men did make significant conversions to the amounts they poured. Although, they were still unable to accurately estimate the number of standard drinks that each beverage was, they nonetheless increased the accuracy of their self-reported consumption.

To examine whether type of beverage resulted in more or less under-reporting, results on self-reported consumption were compared for beer, wine and spirits. See Table 67. Men under-reported the amount consumed for all beverages. The women under-reported the amount they consumed of wine and spirits but not beer, where they over-reported consumption. Men significantly under-reported consumption compared to women for beer and wine, but not spirits, where both groups under-reported consumption.

Table 68: Final results on conversion of amounts poured to represent the degree of over or under-reporting of consumption for men and women for beer, wine and spirits.

Beverage	Men N	Women N	Pouring results Men	Pouring results Women	T
Beer	101	19	1.06	0.78	2.97**
Wine	217	394	1.28	1.18	2.92**
Spirits	23	40	1.39	1.30	0.41

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

This information has possible implications for prevalence estimates of at-risk consumption. To assess if prevalence estimates of at-risk consumption would be affected by including information of over/under-reporting, the data from the Quantity/Frequency (Q24) were multiplied by the over/under-reporting data. Results of this conversion are included in Table 69 and indicate that there were no significant differences in the drinking risk classification of men after the degree of over/under-reporting was taken into account.

Table 69: Prevalence of at-risk consumption (using Q24 Q/F) amongst men based upon WHO classification system comparing data before and after over/under-reporting was included.

	Results based upon Q24 data (QF)		Results based upon Q24 (QF) data combined with degree of over/under-reporting		
Level of harm	N	%	N	%	z-score
Low-risk (up to 40g per day)	319	89.3	281	78.7	1.94
Medium-risk (41 to 60g per day)	21	5.9	46	12.9	-1.60
High-risk (61 + g per day)	17	4.8	30	8.4	-0.98
Total	357	100	357	100	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Table 70: Prevalence of at-risk consumption (using Q24, Q/F) amongst women based upon the WHO classification system comparing data before and after over/under-reporting was included.

	Results based upon Q24 data (QF)		Results based upon Q24 data(QF) combined with degree of over / under reporting		
Level of harm	N	%	N	%	z-score
Low-risk (up to 20g per day)	443	91.4	389	81.2	2.27*
Medium-risk (21 to 40g per day)	35	7.2	75	15.5	-2.05*
High-risk (41 + g per day)	7	1.4	15	3.1	-0.87
Total	485	100	485	479	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

The results in Table 70 indicate that there were significantly fewer women who were classified as drinking at low-risk and a significantly greater proportion who were categorised as medium-risk drinkers after the degree of over/under-reporting was taken into account. While not significantly different, the number of women who were categorised as at high-risk (after under/over reporting had been included) increased by more than 100%. These results for women highlight the importance of including the effects of people's pouring practices and under-reporting in estimates of prevalence of at-risk
alcohol consumption.

The degree of over/under reporting amongst the sample was not associated with method of recruitment into the research, marital status or country of birth and as previously stated, was independent of each interviewer. See Table 71.

Table 71: Over/under-reporting of consumption, recruitment, marital status and country of birth.

Independent variable	Sample		
	Men	Women	D.F.
Recruitment method	0.22	1.08	8,826
Marital status	0.17	0.83	5,829
Country of birth	0.16	0.75	15,834

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

The above results all relate to analysis of the data gathered on participants' first beverage choice. Data were also gathered on participants' second and third beverage preferences. Results from two independent sample t-tests indicated that men and women underestimated consumption' on both the second and third beverages nominated. On both occasions, men significantly under-reported consumption compared to women, with men under reporting consumption by approximately 20% and women by 7%. See Table 72.

Table 72: T-test results for over/under-reporting of consumption for Beverages 2 and 3.

Beverage Number	Men			Women			D.F.	T
	N	M	SE	N	M	S.E.		
2	248	1.24	0.03	326	1.08	0.03	572	3.73***
3	172	1.21	0.05	165	1.05	0.04	326.5	2.62**

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

A final analysis was conducted to ascertain whether the type of glass would influence the degree of over or under-reporting. Results of a one-way ANOVA indicated that for men there was a significant difference between glass types and the number of standard drinks men estimated for beverages ($F(5,343)=3.68$ $p<0.01$). A Games-Howell post hoc test indicated that men who used wine glasses significantly underestimated consumption ($M=1.342$, $SE=0.027$) compared to men who drank out of beer glasses ($M=1.10$, $SE=0.04$, $p=0.001$).

Similarly, results indicated that for women there was a significant difference between glass types and the number of standard drinks women estimated for beverages ($F(5,472)=4.53$, $p<0.001$). A Games-Howell post-hoc indicated that women who used wine glasses significantly underestimated consumption ($M=1.19$, $SE=0.02$) compared to women who drank out of beer glasses ($M=0.82$, $SE=0.09$, $p=0.04$) and the "other" category of glass ($M=0.88$, $SE=0.09$, $p=0.02$).

4.4.3 Part 3: Knowledge of Australian alcohol guidelines

The final aim of Study 3 was to investigate participants' knowledge of standard drink terminology and the Australian Alcohol Guidelines.

Knowledge of the term standard drink

When asked, "before today had you ever heard of the term 'standard drink?'" the majority of both men (n=337, 93.9%) and women (n=437, 90.3%) replied that they had. Overall, 91.7% of the sample reported knowledge of the term standard drink.

Knowledge of the Australian alcohol guidelines

Of the sample, 181 men (50.4%) and 257 of women (53%) had ever heard of the Australian Alcohol Guidelines. These people were then asked if they knew what the alcohol guideline recommendations were for men and women. Of these, 114 (63.0%) men and 150 (58.4%) women indicated that they knew what the Australian alcohol guidelines were for men and 101 men (55.8%) and 164 women (63.8%) indicated they knew what the guidelines were for women. Therefore, of the total sample of participants only 31.9% of men and 31.3% of women indicated knowing what the guidelines were for men, and 28.5% of men and 34.8% of women indicated knowing what the guidelines were for women, Participants claiming to know what the guideline recommendations were for men and women were asked to specify these recommendations. See Table 73 for their responses.

Table 73: Estimations from men and women about levels for low-risk drinking as stated by the NHMRC (2001) alcohol guidelines.

	Risk of harm in the short-term Max std drinks per day			Risk of harm in the long-term Max std drinks per day		
	Men N=115	Women N=149	NHMRC (2001) alcohol guidelines	Men N=87	Women N=102	NHMRC (2001) Alcohol guidelines
Estimated Australian alcohol guidelines for men	3.11	4.10	6	18.91	18.54	28
	Men N=101	Women N=174		Men N=75	Women N=112	
Estimated Australian alcohol guidelines for women	2.13	2.27	4	11.59	10.58	14

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

In addition, participants were asked if they knew what the Australian alcohol guidelines were for older men and older women. Of those who had heard about the alcohol guidelines, 11 (6.1%) men and 21 (8.2%) women indicated that they knew what these recommendations were for older men. While 10 (5.5%) men and 22 (8.6%) women replied that, they knew what the Australian alcohol guidelines were for older women. Therefore, of the total sample of participants only 3.2% of men and 4.4% of women indicated knowing what the guidelines were for older men, and 2.9% of men and 4.7% of women indicated knowing what the guidelines were for older women. None of the sample was correct in their estimations of Guideline 8 (the Australian alcohol guideline for older men and women).

Relevance of the NHMRC (2001) Australian Alcohol Guidelines

When asked about the relevance of the Australian alcohol guidelines for older people, 72 (16%) of participants indicated that the guidelines were not at all relevant for older people, the remainder indicated that the guidelines were either somewhat or very relevant. There were no significant gender differences on answers to this question. See Table 74.

Table 74: Responses from men and women who had heard of the NHMRC (2001) alcohol guidelines, on the relevance of the guidelines to older Australians.

	Men		Women		z-score
	N	%	N	%	
Not at all relevant	30	16.6	42	16.3	0.04
Somewhat relevant	98	54.1	126	49.1	0.62
Very relevant	53	29.3	89	34.6	-0.69
Total	181	100	257	100	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Recommendations for alcohol guidelines for 65 to 74 year olds

Men and women were more prepared to make alcohol guideline recommendations on long-term rather than short-term harm. Recommendations for older men ranged from 0 to 7 (mean=2.44) standard drinks per day to avoid

the risk of short-term from 0 to 49 (mean=9.59) standard drinks per week to avoid risk of long-term alcohol-related harm. For older Australian women recommendations ranged from 0 to 6 (mean=1.69) standard drinks per day to avoid the risk of short-term harm and from 0 to 35 (mean=6.86) standard drinks per week to avoid the risk of long-term alcohol-related harm. See Tables 75 and 76 for recommendations regarding men and women in Study 2 compared to levels recommended by key informants in Study 1.

Table 75: Alcohol guideline recommendations from participants in Study 2 for older Australian men.

Short-term harm Maximum standard drinks per day			Long-term harm Maximum standard drinks per week		
Group (n)	M	Range	Group (n)	M	Range
Men (245)	2.49	0-7	Men (355)	9.73	0-42
Women (325)	2.40	1-7	Women (475)	9.48	1-49
Key Informant (20)	3.55	1-6	Key Informant (20)	11.50	5-20
Total (590)	2.48	0-7	Total (850)	9.64	0-49
F	7.20**		0.87		
Post hoc (Games Howell) Recommendations from KI sig diff from men* and women**					

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Table 76: Alcohol guideline recommendations from participants in Study 2 for older Australian women.

Maximum standard drinks per day					
Short-term harm			Long-term harm		
Group (n)	M	Range	Group (n)	M	Range
Men (225)	1.68	0-6	Men (354)	6.36	0-28
Women (336)	1.69	0.5-6	Women (474)	7.09	1-35
Key Informant (20)	2.45	1-4	Key Informant (20)	7.50	5-10
Total (581)	1.72	0-6	Total (848)	6.79	0-35
F	8.97***		1.97		
Post hoc (Games Howell) Recommendations from KI sig diff from men** and women**					

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

There were no significant differences between the levels recommended by men and women in the sample. However, based upon the average result, they did recommend a significantly lower level of alcohol consumption for men and women per day compared to the average levels suggested by key informants from Study 1 and the present Australian Alcohol Guidelines.

4.5 Summary and discussion

This section summarises the results as they relate to each hypothesis and includes a discussion of how the findings relate to a wider context. The limitations and strengths of the study are also considered.

Participants in Study 2 had been drinking alcohol for over four decades. On average men were 18 years old and women were 22 years old when they first consumed a full glass of alcohol. However, as participants were on average 69 years of age, some caution is required, as the question on age of first use of alcohol pre-supposes that participants have accurate recall of events from over 40 years ago.

Hypothesis 1: men will drink more heavily than women

Each of the three independent methods applied for measuring alcohol consumption indicated that men reportedly consumed significantly more alcohol than women. Using the Quantity/Frequency measure, older men were drinking, on average, 2.12 standard drinks per day compared to 1.09 standard drinks per day for women. These results supported Hypothesis 1 and are consistent with previous national and international literature on alcohol consumption and gender (Adlaf *et al.* 2005, Australian Bureau of Statistics 2006, Bloomfield, Gmel, Neve & Mustonen 2001). They are also consistent with the literature on alcohol use amongst older people (Adams & Cox 1995, Adlaf et at. 2005, Barnes 1979, Breslow *et al.* 2003, Office for National Statistics 2001). Moreover, as older men significantly under-reported consumption compared to women, the gender disparity in consumption levels was amplified.

Although the majority of men and women in Study 2 were drinking at low-risk levels (using NHMRC, 2001 guidelines), a greater proportion were drinking at risky levels compared to estimates for older people from the 2004 NDSHS. For instance, in the 2004 NDSHS, 7.9% of men and 5.2% of women aged 60 years and older drank at levels that put them at-risk of long-term harm and 14.6% of men and 7.1% of women drank at levels that put them at risk of short-term harm. In the present research, 10.6% of men and 8.2% of women drank at levels that put them at-risk of long-term harm and 29.6% of men and 17.5% of women drank at levels that put them at risk of short-term harm.

Three possible explanations for the divergent results include a) the NDSHS report includes abstainers, while only current drinkers were included in Study 2; b) there were a number of demographic differences between the samples; and c) results reported in the AIHW publication aggregated data for all participants over the age of 60 years. As there is considerable evidence (Adams *et al.* 1990, Clemens *et al.* 2007, Moore *et al.* 2005, Moos *et al.* 2004b, O'Halloran *et al.* 2003, Ruchlin 1997, Saunders *et al.* 1989, Temple & Leino 1989, Thundal *et al.* 2000) that people reduce alcohol use with age, aggregated results may represent a conservative estimate of consumption for the young-old cohort.

Both short-term and long-term at-risk drinking is a concern for older people. Drinking above low-risk levels makes them vulnerable to trauma and falls, and to chronic diseases such as liver disease and cancer. However, according to Crome and Crome (2005) ageism attitudes amongst many professionals preclude significant attention to alcohol use amongst older people. A counter to the view "at your age what does it matter!" (Crome & Crome, 2005, p346) has been research by Chikritzhs *et al.* (2003) that over the period 1993/94 to 2000/01 approximately 68,000 Australians aged between 60 to 74 years of age were admitted to hospital because of alcohol.

Hypothesis 2: non-married men (including widowed) will report different levels of consumption than married men

Of the three independent methods applied for measuring alcohol consumption, the only result to support Hypothesis 2 related to usual consumption (Q23). Compared to married men, both separated and divorced men drank significantly more alcohol. There was no significant difference in the quantity of 'usual alcohol consumption' between men who were· married and widowed or never married. However, as there were no significant differences on Q24 (Quantity/Frequency) it was concluded that the results did not support the research hypothesis.

The results for Q23 supported earlier research by Graham and Braun (1999) who reported that non-married men had a higher rate of consumption than married men, but not the Australian research by Byrne (1999) who reported that 18.9% of widowed men were at-risk of alcohol related harm compared to 8.3% of married men. Similarly, the results did not support the results from Moos *et al.* (2005) with 55-65 year olds who reported that married individuals drank more heavily than those not married. Nor the findings of Moore *et al.* (2006) that married men were significantly more likely to be at-risk drinkers compared to others.

More research is warranted on marital status and alcohol consumption amongst older men. It is possible that cohort changes may explain the divergence in results from 1999 to the present study, and cultural differences are one possible explanation for the differences to the research by Moos *et al.* (2005) and Moore *et al.* (2006), where both studies were conducted in the U.S.

Hypothesis 3: married women will consume different amounts of alcohol compared to either widowed, separated/divorced and women who had never married.

To address Hypothesis 3, data were examined using the three alternative measures of alcohol consumption and women were divided into two mutually exclusive groups: (i) currently married (including de-facto) and (ii) non-married (including, widowed, separated, never married, divorced or other). Unlike the

findings for men, results indicated a significant difference between groups of women on the Quantity/Frequency (Q24) consumption measure with married women reporting higher consumption than other women. This is different to the outcomes of Ganry *et al.* (2000) with elderly women in France, who reported that single women were more likely to be at-risk drinkers.

Results from a multiple linear regression analysis indicated that marital status only explained a very small amount of the variability in the Quantity/Frequency assessment of consumption and that the only two groups that significantly differed were married women and widowed women. These results lend only partial support to the hypothesis. When juxtaposed with the results from men where no differences were found based upon marital status, the finding is interesting. Unfortunately, no linkage variables were included in the present study, which would have permitted analysis of comparison of data from married couples and may have shed more light on the drinking patterns of couples and the possible issue of convergence in the drinking patterns amongst partners.

Hypothesis 4: men and women who were more highly qualified will be heavier alcohol consumers than less qualified men and women

The results did not support Hypothesis 4, that men and women with higher educational qualifications would be heavier alcohol consumers. This is contrary to the findings by Ganry *et al.* (2000) with older women in France, and Aguilar-Navarro *et al.* (2007) with older men and women in Mexico who reported a positive association between alcohol use and educational level. In rejecting Hypothesis 4, the data signify convergence amongst older peoples' drinking independent of level of qualifications.

Hypothesis 5: men and women who resided in higher socio-economic areas (based upon suburb postcode) will drink alcohol more frequently

In support of Hypothesis 5, there was a significant association between SES and frequency of drinking in the past 12 months for both men and women. There was also some evidence to suggest that for women (but not for men), SES might influence volume of consumption. However, results did not indicate a linear

relationship. Results of the Tukey HSD post-hoc analysis revealed that women from the highest level of SES reported higher levels of alcohol consumption compared to women in the second and the third quintile group but not the first quintile (see Figure 5). These findings indicate a potential a U-shaped relationship between SES and alcohol consumption. That is, the higher levels of consumption occur amongst those women from the lowest and highest levels of SES.

When the results for volume of consumption are juxtaposed against the results for frequency of drinking, the findings appear counter-intuitive. One explanation is that although women from higher SES areas drink on more days of the week, than those women from lower SES areas, they consume fewer drinks per drinking occasion. Conversely, women from lower SES areas, drink less frequently, but consume a great number of drinks per drinking occasion. Subsequently, when data from both groups were compared for average volume of consumption per day, the results from both groups are similar.

Although not a direct measure of SES, occupation group also revealed a significant association with alcohol consumption for men and women.

Hypothesis 6: Frequency of drinking (independent of gender) will be associated with higher endorsement of both personal effects and social reasons.

Participants who drank alcohol more frequently nominated a greater number of reasons for drinking. This supported Hypothesis 6. Although, frequency of drinking was correlated with reasons for drinking, it only accounted for 3% of the variation in the numbers of reasons nominated.

Hypothesis 7: Volume of alcohol consumption will be associated with higher endorsement of personal effects reasons for drinking.

Personal effects reasons for drinking and volume of consumption were significantly correlated for both men and women. This result supported Hypothesis 7 and the previous findings by Graham *et al.* (1996). However, the

amount of variance that volume of consumption accounted for was very small (3%).

In relation to 'social effects' reasons for drinking and volume of consumption, there was no significant correlation for men but there was a significant correlation between volume of consumption and endorsement of social effects reasons for women. Once again, though, volume of consumption accounted for less than 1% of the variance. The results for men support the findings of Graham *et al.* (1996) in Canada, indicating that independent of cultural differences heavier alcohol consumption is more closely associated with personal effects than social effects reasons for drinking amongst older people. In research with younger people, La Brie, Hummer and Pederson (2007) concluded that social reasons were significantly linked to consumption, and amongst young women social reasons for drinking predicted alcohol-related problems. These contrasting results indicate that the taxonomy of reasons for drinking may vary across age groups, but may remain relatively stable over time.

However, more research comparing gender and age groups is required to develop comprehensive explanatory models of alcohol use. Research by Kairouz, Gliksman, Demers and Adlaf (2002) with Canadian undergraduates, indicated that reasons for drinking are context specific and that reasons for drinking vary dependent on situational, environmental and individual factors. This may also explain why, in the present research personal effects reasons for drinking explained only 3% of the variance in volume of consumption. Future research with older people that involved contextual motivational models may be useful in helping to understand alcohol use.

Hypothesis 8: women will report fewer alcohol related problems (based upon responses to the CAGE) than men.

The results did not support Hypothesis 8. Based upon the CAGE, men did not report a greater number of problems associated with their alcohol use when compared to women. This conflicted with earlier overseas literature (e.g. Fink *et al.* 2001c, Graham *et al.* 1995, Robbins 1991, Welte & Mirand 1992). Men

and women who had a score of 1 or more on the CAGE also reported significantly higher levels of consumption on all three measures of alcohol use, indicating a positive relationship between alcohol related problems (as identified by the CAGE) and alcohol consumption. While the CAGE has been criticized as recording a number of false-positive results, the findings here of an association between CAGE score and current alcohol consumption support the validity of the CAGE as a screening instrument with older people.

Hypothesis 9: more women than men will report the use of medications.

There was no significant difference between the proportion of men and women who were taking any medications in the last week, with over 83% of the sample taking medication. Thus, Hypothesis 9 was not supported. While the type of medication was not assessed, it is noteworthy that so many of the sample, all of whom were current drinkers, were also on some form of medication. In the week prior to the interview, participants had taken, on average, three different types of medication.

As the literature on the association between alcohol consumption and health is conflicting (Anstey *et al.* 2006, Atkinson 2002, Blow et at. 2000, Chikritzhs *et al.* 2002, Fillmore *et al.* 2006, Johnson 2000, Standridge et at. 2004) no hypothesis relating to the association between alcohol use and the subjective health rating was generated.

There was no significant difference in alcohol consumption for either men or women based upon the self-assessment rating of health. Nonetheless, it was interesting that men who rated their health as poor also reported the highest levels of consumption (not statistically significant) across all three-alcohol assessment questions (Q23-25). Similarly, women who rated their health as poor had the highest level of consumption (not statistically significant) on both usual consumption of alcohol (Q23) and Quantity/Frequency of consumption (Q24). These results suggest that more research on medication, health and concomitant alcohol use is warranted to explain the paradigm surrounding the

'sick-quitter' notion commonly associated with declining alcohol consumption with age.

Hypothesis 10: men and women will pour alcoholic beverages that were greater than one standard drink.

There were no significant differences between the amounts of alcohol that were poured by men and women, but both poured quantities greater than one standard drink. On average, men poured the equivalent of 1.3 standard drinks and women poured 1.2 standard drinks. This supported Hypothesis 10 and the findings from previous research with younger participants (Lemmens, 1994, Stockwell et a/.1991, White *et al.* 2003, 2005, Kerr *et al.* 2004, Gill and Donaghy, 2004).

Hypothesis 11: the greater the alcohol-content of the beverage, the greater the discrepancy of the poured drink from a 'standard' drink.

Results from both men and women supported Hypothesis 11. Based solely on amounts poured, men over-poured wine by 38%, spirits by 58% and beer by 15%. Women over-poured wine by 18%, spirits by 25% and beer was under-poured by 21%. These results confirm previous research with younger samples in relation to amounts poured based on percentage of alcohol per volume (Lemmens, 1994, Carruthers and Binns, 1992; Kaskutas & Graves, 2000; Gill & Donaghy, 2006).

The results also support the findings of Lemmens (1994); Kerr *et al.* (2004) and Gill and Donaghy (2006) that men pour larger volumes of wine than women. The findings also support the research by Banwell (1999) that showed that women poured less than one standard drink when pouring beer and the research by Gill and Donaghy (2004) that men pour larger volumes of spirits than women. However, in the research by Gill and Donaghy (2004) and Gill and O'May (2007) with younger participants, both men and women were over-pouring spirits by approximately 200%. Because of the differing methodologies, it is difficult to compare the present results with other research that has investigated pouring practices. Nonetheless, results suggest that older men and women over-pour

alcohol, but not to the same degree as younger people. With the exception of the research by Lemmens (1994) in the Netherlands, the present results were lower than all other published research on pouring practices.

Hypothesis 12: the type of glass used will influence the amounts of alcohol poured.

The type of glass used by men had no significant effect on the number of standard drinks poured. Conversely, women poured significantly less "alcohol" into a beer glass than a wine glass ($p=0.02$) and significantly less into an "other" category of glass than a wine glass ($p=0.03$).

When combined with the results from Hypothesis 11, the results seem to indicate that for men, beverage type rather than the shape of the glass is more important in predicting the amount of alcohol that will be poured. For women a combination of both beverage type and the shape of the glass appear to be important predictors of amount poured. From a harm reduction perspective this indicates that different types of information on the relationship between beverage types and glass shape be given to men and women to inform them about standard drink volumes. One possible explanation for the gender differences reported in pouring and recording of amounts may be experience with the particular beverage.

While men in the present study were not interviewed in detail about their drinking history, the literature does suggest that at younger ages men predominantly drink beer (Australian Institute of Health and Welfare, 2005). In the present research and in other Australian research (Australian Institute of Health and Welfare, 2005) older men prefer wine. This shift in drinking preferences may explain, at least in part, why older men over-pour wine. That is, older men have fewer years of experience with wine as their primary beverage, beer is usually consumed in a can (hence no need to measure quantities poured) and beer has a lower percentage alcohol content by volume. Consumption of wine warrants further investigation, particularly in light of the

finding by Kerr et at. (2004) on age, period and cohort modelling of alcohol consumption, that wine consumption was independent of age effects.

The "familiarity" explanation may also be relevant for the results on under-pouring of beer for women. In this case, if women traditionally drink wine where a standard drink is approximately 100 ml, when they pour a glass of beer (which has a lower percentage alcohol by volume) they may be pre-conditioned to pour smaller amounts. More research is required to investigate the plausibility of these explanations.

Hypothesis 13: daily drinkers will pour larger volumes than those who drank less frequently.

Women who drank every day poured larger volumes than women who drank 5 to 6 days per week and those who drank less than one day per month. However, they did not pour larger volumes than other groups (i.e. those who reported drinking 3 to 4 days per week, 1 to 2 days per week, 2 to 3 days per month, or about one day per month). The two groups who poured the largest amounts were those women who reported drinking every day and those who drank 1 to 2 times per week. These results did not support Hypothesis 13.

Finally, this second part of the study investigated how accurately people were able to convert amounts poured into standard drinks. When the amounts poured were converted by drinkers into standard drinks, men under-reported consumption of wine by 28%, spirits by 39% and beer by 6%. For women, wine consumption was under-reported by 18%, spirits by 30% and beer over reported by 22%. Overall, both men and women underestimated consumption, but the difference between men and women was significant with men underestimating their consumption by 23% and women underestimating consumption by 16%.

These variations in the accuracy of self-reported consumption were significant and when applied to prevalence estimates of risk resulted in a significant increase in the number of men and women who became classified as at-risk from their alcohol consumption. These outcomes highlight the importance of

including the effects of people's pouring practices and under-reporting in estimates of prevalence of at-risk alcohol consumption

When actual amounts poured and amounts participants stated they would record each amount as, were compared, there was no significant difference between the two amounts for women, but there was a significant difference for men. This finding indicated that for men at least, the amounts of alcohol poured should not be assumed to represent how much they are likely to underreport their consumption.

Although no hypotheses were generated in relation to alcohol guidelines, the results on this component of the research are worthy of discussion. From a public health perspective, 91.7% of the sample had heard of the term standard drink. Conversely, 52% of the sample had heard of the Australian alcohol guidelines and 31% indicated that they knew what the specific guidelines were. While such proportion might be cause for concern, it is interesting to note that amongst the sample who indicated knowing what the specific guidelines were, the reported levels were considerably less than the present Australian alcohol guidelines.

When asked what appropriate guidelines were for older people, the results from older people were less than the present 2001 NHMRC guidelines and less than those recommended by the key informants interviewed in Study 1. A strong anecdotal message that came through from interviews with older people, was that older people cannot and should not drink the same amount as younger people. The 2001 Australian alcohol guidelines are presently under review. When they are finalized and released, it would be beneficial for marketing and advertising campaigns to target older Australians, as 84% of the sample interviewed indicated that alcohol guidelines were relevant for older Australians.

4.6 Strengths and limitations

Study 2 included interviews with 844 men and women across the Perth metropolitan area. Attempts were made to access a cross-section of the 65 to 74 year old drinking population. The sample was representative of the general

65 to 74 year old population in Perth, WA on most but not all demographic variables. For example, the people interviewed in Study 2 had completed higher levels of schooling compared to other older people across Perth or WA, and included a greater proportion of married men and separated/divorced women.

However, as with previous research conducted with older people in Australia (Australian Bureau of Statistics 2006, Australian Institute of Health and Welfare 2005b) the sample were primarily low-risk drinkers, 38% of whom drank alcohol on daily basis, who preferred wine (73%) and indicated a preference for drinking at home (95%).

The numbers of older people and the wide range of suburbs they were recruited from were strengths of the study. The precise methodology used in gathering information on the amounts of alcohol poured was a particular strength of the study. The fact that interviews were conducted in participants' homes allowed use of the actual glass that people would normally drink from, ice rocks were available for spirit drinkers, actual beer, wine, and spirit bottles were used and each contained coloured water to recreate each alcoholic beverage as accurately as possible. No previous research had adopted this methodology. The results on the pouring exercise were also robust and independent of marital status, method of recruitment and interviewer. However, consumption in friend's homes and other informal and public drinking venues was not assessed. It is not possible to gauge how much over-pouring and under-reporting would occur in these drinking settings and what impact this would have on older people's actual alcohol consumption. However, given that the majority of older people report drinking at home (Australian Institute of Health and Welfare 2005a), investigation of pouring practices in public drinking settings is likely to be of greater relevance to younger age groups.

Future research on pouring practices should also investigate the amounts of alcohol poured on second and subsequent drinks poured. This was not assessed in the present study. However, as suggested by Gill and Donaghy (2004) it is possible that only the first drink at home is poured into an empty glass and that later drinks may simply 'top up' the level of alcohol and hence be

very difficult to quantify. Similarly, it also remains to be determined how consumption levels will influence pouring practices the longer a drinking· session continues (Gill and Donaghy, 2004). While this line of enquiry is perhaps of more relevance to younger age groups who drink alcohol less frequently, but in larger volumes, it should also be investigated in future research with older people.

While a range, of recruitment strategies were employed to ensure a diverse sample, the fact that 46% of participants were recruited from the Positive Ageing Association may reduce the generalisabilty of results. It was also the aim of the study to recruit at least 400 men and 400 women. However, only 359 men were recruited. To compensate for this limitation, 485 women were recruited.

Another limitation of the research was that data were not collected on the type of residence of each participant. Men and women who were interviewed resided in houses in residential streets, in apartments and in different types of retirement village enclaves. As no data were collected on this demographic variable it was not possible to investigate if this type of living arrangement had any impact on alcohol consumption patterns. Although data was gathered on marital status, information was not gathered to allowed data from couples to be linked. Inclusion of this information would have been useful in exploring the issue of convergence of alcohol patterns amongst partners.

Due to concerns surrounding medication use amongst older people, it would also have been useful to include a comprehensive assessment of medication use, However, as the budget did not permit employment of nursing qualified interviewers (as employed by Graham *et al.* 1996) and there were concerns about the response burden for participants, the decision was made not to include detailed information on medications. Despite these limitations, the research makes an important contribution to the existing knowledge on alcohol use amongst older Australians,

4.7 Conclusion

No previous published literature has explored the pouring practices of older men and women nor investigated how people convert amounts poured into standard

drinks. The major finding of the research was that older men and older women significantly under-report their consumption of alcohol by approximately 18%,

Previous studies on pouring practices have found evidence that drinkers under-estimate poured alcohol content but few have requested that drinkers attempt to equate the poured amount to a standard drink, This is an important distinction, and combining assessment of volumes poured and how this equates to a standard drink provides a more accurate evaluation of the validity of an individual's self-reported consumption.

Research confirms how difficult it is for people to estimate the correct number of standard drinks poured, even when shown pictures of typical standard drinks. This difficulty has been a common feature of research with younger age groups. While improvements in standard drink labelling on alcoholic beverages are warranted, what impact they will have on the accuracy of self-report data is difficult to know (Lemmens, 1994), In addition to labelling on beverages, labelling on wine, spirit and beer glasses to indicate the equivalent of one standard drink is recommended. However, as this is not likely to be practical, research that replicates the present methodology would be useful to develop age, gender and beverage specific accuracy-reporting indicators that could be applied to self-reported consumption levels.

Chapter Five: Study 3: Secondary data analysis of the 2004 National Drug Strategy Household Survey (NDSHS)

5.1 Introduction

The Australian National Drug Strategy was initiated in 1985 following a Special Premiers' Conference to achieve a balance between demand reduction and supply reduction measures to minimize drug related harm in Australian society (Australian Institute of Health and Welfare 2005b). The aims of the National Drug Strategy are to prevent and reduce the uptake of harmful drug use and minimize the harmful effects of licit and illicit drugs in Australia (Australian Institute of health and Welfare 2002a). The National Drug Strategy is the responsibility of the Ministerial Council on Drug Strategy, a national ministerial level forum in Australia. Under the auspices of the National Drug Strategy, the Australian Institute of Health and Welfare (AIHW) conduct a National Drug Strategy Household Survey (NDSHS) across Australia every three years (Australian Institute of Health and Welfare 2005b). Previous surveys have been conducted in 1985, 1988, 1991, 1993 and 2001 (Australian Institute of Health and Welfare 2002a). Data from these surveys have contributed to the development of policies for Australia's response to drug-related issues (Australian Institute of Health and Welfare 2002a). In the National Drug Strategy Household Survey conducted in 2004 almost 30,000 Australians aged 12 years and over were interviewed (Australian Institute of Health and Welfare 2005b).

The results from the NDSHS are published as part of the AIHW Statistics Series and data from the 2004 NDSHS led to the publication of Statistics on Drug Use in Australia 2004, an important document for the development of national alcohol and other drug policy initiatives. The publication contains information on tobacco, alcohol, illicit drugs and pharmaceutical drug use amongst Australians (Australian Institute of Health and Welfare, 2005).

Summary statistics are presented for different age groups, representing ten-year cohorts up to the age of 60 years. However, from age 60 years, all data is aggregated. This precludes scrutiny of alcohol and other drug· use amongst

different cohorts of older Australians. In light of the ageing of the Australian population, the heterogeneity of older people, and the paucity of research investigating alcohol use amongst older people it is judicious that research which specifically investigates alcohol use amongst one cohort of older people is conducted.

5.2 Aims

Study 3 involved analysis of the 2004 NDSHS data available from 3,066 men and women who were aged between 65 and 74 years (inclusive). The study had five major aims. These were:

1. To estimate the prevalence of at-risk consumption of alcohol amongst the sample based on World Health Organization drinking guideline recommendations.

2. To estimate the prevalence of at-risk consumption of alcohol amongst the sample based upon Guideline 1 of the 2001 NHMRC Australian Alcohol Guidelines.

3. To estimate the prevalence of at-risk consumption of alcohol amongst the sample based upon the alcohol guidelines recommended by key informants from Study 1.

4. To estimate the prevalence of at-risk consumption of alcohol amongst the sample based upon World Health Organization drinking guideline recommendations combined with results from Study 2 investigating the degree of over/under reporting of consumption amongst 65 to 74 year olds.

5. To estimate the prevalence of at-risk consumption of alcohol amongst the sample based upon the alcohol guidelines recommended by key informants from Study 1 combined with results from Study2 investigating the degree of over/under reporting of consumption amongst 65 to 74 year olds.

5.3 Methods

The method section will provide information on the questionnaire used in the NDSHS 2004, the recruitment and sample selection procedures, benchmarks against which the data will be assessed, the analysis undertaken and the demographic characteristics of the sample.

5.3.1 Research questionnaire

The 2004 NDSHS questionnaire included 355 questions on a range of drug related topics. As the aim of Study 3 was to investigate alcohol use amongst 65 to 74 year-olds, only the demographic and alcohol sections of the NDSHS questionnaire were analysed. These relevant sections from the NDSHS questionnaire are described below.

Demographic questions

The demographic questions used in the 2004 NDSHS gathered information on:

- Sex
- Age (in years)
- Postcode of residence
- Marital status
- Country of birth
- Employment status
- Main occupation: There were collapsed into nine categories based upon the classification of occupations developed by the ABS (Australian Bureau of Statistics 1997)
- Education: Information was collected on the highest year of primary or secondary schooling achieved; respondents were then asked if they had completed a trade or other educational qualification. If the answer was yes, respondents were asked to state the highest qualification that they had obtained.

These demographic questions were replicated in the research questionnaire developed and used in Study 2.

5.3.2 Alcohol consumption

For comparative purposes, three of the same alcohol questions that were used in Study 2 were analyzed from the NDSHS 2004. These questions asked about usual alcohol consumption (F13), quantity and frequency (Quantity/Frequency) of consumption over the prior 12 months (F15) and alcohol consumption on the day prior to the interview (F 17). The three specific questions were:

F13:	On a day when you have an alcoholic drink, how many standard drinks do you usually have?

To assist in answering this question, participants were shown coloured pictures of typical standard drinks (see Standard Drinks Guide Figure 10).

Figure 10: Pictures of standard drinks (Australian Institute of Health and Welfare 2005a)

The next alcohol question assessed the quantity and frequency of consumption (Cahalan et el., 1967) in the past 12 months.

F15. Please record how often in the last 12 months you have had each of the following number of standard drinks in a day?								
	Every day	5-6 days a week	3-4 days a week	1-2 days a week	2-3 days a month	About 1 day a month	Less often	Never
20 or more standard drinks a day								
11-19 standard drinks a day								
7-10 standard drinks a day								
5-6 standard drinks a day								
3-4 standard drinks a day								
1-2 standard drinks a day								

Finally, alcohol consumption on the day prior to the interview was assessed by asking:

F17: How many standard drinks did you have yesterday?

Question F13 (On a day you have an alcohol drink, how many standard drinks do you usually have?) did not allow respondents to state the specific number of standard drinks. Instead, participants were given a range of responses to select from i.e. 13 or more drinks, 11-12 drinks, 7-10 drinks, 5-6 drinks, 3-4 drinks, 1-2 drinks, These responses were coded by the AIHW as the following: if a person responded that they would normally consume 13 or more drinks, this was scored as 13 drinks, a response of 11-12 standard drinks became 11.5 drinks, a response of 7-10 became 8.5 drinks and so on.

In addition to the above questions, participants were asked: how old they were when they first consumed a full serving of alcohol; how often they consumed alcohol over the past 12 months; in which settings they drank alcohol; and what type of alcohol they usually consumed (options included: cask wine, bottled wine, regular strength beer, mid-strength beer, low alcohol beer, home-brewed

beer, pre-mixed spirits in a can, bottled spirits and liqueurs, pre-mixed spirits in a bottle, fortified wine, port, vermouth, sherry, etc, other).

In order to obviate the possibility that the order of possible responses within questions might affect the likelihood of selection, response lists were rotated so that blocks of possible answers were presented in equal numbers across all samples.

While data from all alcohol questions are reported in the results section, as the Quantity/Frequency data (F15) were used by the AIHW to determine prevalence of at-risk drinking (Australian Institute of Health and Welfare 2005a) this data set will be the standard against which results will be assessed.

5.3.3 Sample selection and recruitment

The Australian Institute of Health and Welfare (AIHW) commissioned Roy Morgan Research Pty Ltd, to conduct the NDSH survey. Households to be interviewed were selected by a multi-stage, stratified-area random 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.

The 2004 NDSHS employed two collection modes: drop-and-collect (see below) and the computer-assisted telephone interview (CATI). The CATI component of the survey was conducted between June and November 2004, and the drop-and-collect component was conducted between July and November 2004. The sample was designed so that each method was implemented in separate census collection districts.

The data from the drop-and-collect methodology were gathered from a national random selection of households that returned self-completion booklets. One attempt was made by the interviewer to collect the completed questionnaire. If collection was not possible at this time, a reply-paid pre-addressed envelope was provided. The respondent was the household member aged 12 years or

over to next have a birthday. The number of respondents who completed the survey from this sample was 24,109 (a response rate of 47.8%). CATI data were collected from a national random selection of households. As for the drop-and-collect sample, the respondent was the household member aged 12 years or over to next have a birthday. The number of respondents who completed the survey from this sample was 5,336 (a response rate of 37.8%). Across both methodologies, the overall response rate was 45.6%. This low response rate may affect the reliability of results as may the different sampling techniques used.

The over-sampling of less populated states and territories, in order to return reliable estimates, produced a sample that was not proportional to the state/territory distribution of the Australian population aged 12 years and over (see Table 77). Additionally, the Queensland Health Department funded Roy Morgan Research to over sample data in that State. The drop-and-collect methodology was used for this additional targeted sample of 12 to 29 year-olds in Queensland.

Table 77: Comparison of 2004 NDSHS sample and 2004 State/ Territory estimated residential population distributions, by gender.

	State/Territory								
Numbers	NSW	VIC	OLD	WA	SA	TAS	ACT	NT	AUSTRALIA
Males	3,594	2,755	2,547	1,256	1,116	523	565	484	12,840
Females	4,678	3,558	3,374	1,727	1,309	715	622	622	16,605
Persons	8,272	6,313	5,921	2,983	2,425	1,238	1,187	1,106	29,445
% of total NDSHS sample	28.1	21.4	20.1	10.1	8.2	4.2	4.0	3.8	100
% of 2004 population aged 12 years and over*	33.5	24.8	19.2	9.8	7.7	2.4	1.6	0.9	100

* Source: (Australian Institute of Health and Welfare 2005a); (Australian Bureau of Statistics 2004, 2007)

Of the overall sample, 3,066 (10.4%) of the people interviewed were aged between 65 and 74 years of age. See Table 78.

Table 78: Number of participants in the 2004 NDSHS by age group.

Gender	12-64 years		65-74years		75+ years		Total	
	N	%	N	%	N	%	N	%
Male	10,431	81.2	1,469	11.5	940	7.3	12,840	100
Female	13,881	83.6	1,597	9.6	1,127	6.8	16,605	100
Total	24,312	82.6	3,066	10.4	2,067	7.0	29,445	100

The overall proportion of people aged between 65 and 74 years of age who were interviewed as part of the NDSHS (2004) was similar to the proportion of 65 to 74 year olds in the Australian population (based upon available Census data from 2001 and 2006. See Table 79.

Table 79: Numbers of 65 to 74 years olds interviewed in the 2004 NDSHS and numbers of 65 to 74 year olds in Australia in 2001 and 2006

Gender	NDSHS	Census 2001	z-score	Census 2006	z-score
Men	1,469	615,537	-0.19	668,451	-0.84
Women	1,597	664,633	0.19	704,986	0.84
Total	3,066	1,280,170		1,373,437	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Benchmarks against which data will be assessed

Responses to the Quantity/Frequency (F15) will be compared using three different classification systems as benchmarks. The first of these is the classification of at-risk drinking developed by the WHO (Department of Mental Health & Substance Dependence Non-Communicable Disease and Mental Health Cluster, 2000) to assess prevalence of at-risk drinking to health in the long-term. This classification of at-risk drinking developed by the WHO is reproduced in Table 80.

Table 80: Classification of at-risk drinking developed by the WHO.

	Level of risk (based upon standard drinks of alcohol consumed per day)		
Gender	Low	Medium	High
Men	1-4	4.1-6	6.1+
Women	1-2	2.1-4	4.1+

The second system is the classification of at-risk drinking developed by the NHMRC (2001) for the general population to assess prevalence of at-risk drinking. This classification of at-risk drinking developed by the NHMRC (2001) is reproduced in Table 81.

Table 81: NHMRC (2001) alcohol guidelines for adult Australians.

	Low-risk drinking (maximum standard drinks of alcohol consumed per day)	
Gender	Short-term harm	Long-term harm..
Men	6.0	4.0
Women	4.0	2.0

Finally, responses to Quantity/Frequency (F15) will also be compared using the classification of at-risk drinking developed by key informants in Study 1 to assess prevalence of at-risk drinking amongst older Australians. As it represented a more conservative estimate, the mean scores were used. These levels of at-risk drinking developed by key informants are reproduced in Table 82. In addition, it was the aim of Study 3 to investigate the prevalence of at-risk consumption of alcohol amongst the sample once data from Study 2 was included on the under/over reporting of beverages. In Study 2, it was possible to identify the three specific beverages that participants drank most often and then, through investigation of participant's pouring practices and how they converted these volumes poured into standard drinks to determine the degree of over or under-reporting of consumption by gender and beverage type. However, in the NDSHS (2004), it was not possible to isolate the specific beverage type consumed most often by participants, unless a participant only drank one beverage type.

Table 82: Key informant recommendations for alcohol guidelines for 65 to 74 year old Australians.

	Low-risk drinking (maximum standard drinks of alcohol consumed per day)	
Gender	Short-term harm	Long-term harm..
Men	3.55	2.35
Women	2.45	1.45

To address this problem, a new variable was created in the NDSHS data set called "main beverage". Amongst the sample of participants who indicated consuming at least one standard drink in the past 12 months, 153 men and 119 women indicated only drinking one type of alcoholic beverage. Of these, 62 drank wine, 117 drank beer, 83 drank spirits and five drank one "other" type of beverage. For the remaining 2028 respondents, main beverage choices were unclear. See Table 83.

After the "main beverage" variable was created, another new variable was created called "reporting" (R). For this variable, scores from Study 2 were included on over/under-reporting based upon beverage type and gender. For those participants for whom their primary beverage choice was unknown, the value for over/under-reporting that was applied was an average score from Study 2 across all beverage types. See Table 83 for values of over/under-reporting allocated for each beverage type.

Table 83: Beverage choices of participants in the NDSHS and values allocated for over/under-reporting (R) based on results from Study 2.

Gender	Wine		Beer		Spirits		Other only		Beverage unknown		Total
	N	R	N	R	N	R	N	R	N	R	N
Men	13	1.28	105	1.06	30	1.39	5	1.39	1,057	1.23	1,210
Women	49	1.18	12	0.78	53	1.18	5	0.87	971	1.16	1,090
Total	62		117		83		10		2,028		2,300

Finally, to calculate the impact of over/under reporting on prevalence of at-risk consumption, this new variable "reporting" was multiplied by the number of standard drinks reported by participants in response to question F15 (Quantity/Frequency of consumption). Prevalence of at-risk consumption was then re-assessed using this new data set and the WHO and key informant alcohol guideline recommendations as benchmarks.

5.3.4 Statistical analyses

Before any analysis was undertaken, data were screened to identify any outliers. Histograms were plotted for each of the continuous variables to identify possible variation from the normal distribution and variances were examined for

homogeneity. When either of these assumptions appeared to be violated, the following strategies were applied: (i) natural arithmetic log transformation to achieve an approximate normal distribution; (ii) Games-Howell test for post hoc analysis; (iii) use of an alternative non-parametric test (Field 2005). Additionally, when equal sample size and homogeneity of variance were met, the Tukey HSD post hoc was used, but when sample sizes were different the Hochberg's GT2 was applied (Field 2005).

Descriptive statistics were initially undertaken to examine drinking level variations between men and women (i.e. independent t-tests, chi square procedures, and tests of two independent proportions). Data on alcohol consumption were then re-analysed using: WHO alcohol guideline recommendations, NHMRC alcohol guideline 1, and recommendations from key informants from Study 1. Finally, data were re-analysed when information was included from Study 2 on the degree of over/underreporting by beverage type. These new prevalence estimates were contrasted with previous estimates using tests of two independent proportions. The primary statistical test of choice was one way ANOVA. Statistical analyses were conducted using either Microsoft EXCEL or SPSS (version 15) software.

5.3.5 Demographic characteristics of the sample

Of the 3,066 people interviewed, who were aged between 65 and 74 years inclusive, 2,300 (75.0%) (1210 men and 1090 women) had consumed an alcoholic drink in the last 12 months. To enable a comparison between Study 2 (where all participants were current drinkers) and the 2004 NDSHS, analyses were conducted on data from this sample of 2,300 people (unless explicitly stated otherwise).

The majority of older men in the NDSHS sample were married (n=901, 76.2%), had been born in Australia (n=824, 69.4%), and were retired or on a pension (n=988, 83.0%). A test of independent proportions indicated that a similar proportion of men in the 2004 NDSHS and men in Study 2 were: . separated/divorced or widowed; born in the U.K.; had completed either Year 9 or

Year 10; and had a trade qualification. On all other variables, the groups were significantly different. See Table 84.

Table 84: Demographic characteristics of men from Study 3 and men interviewed in Study 2.

	Study 2 N	%	Study 3 N	%	z-score
Sample size	359	43	1,210	52.6	
Average Age (years)	69	n/a	69	n/a	
Marital status		N=1,182			
Married	299	83.3	901	76.2	2.16*
Separate/divorced	37	10.3	117	9.9	0.17
Widowed	18	5.0	105	8.4	-1.81
Other	5	1.4	59	5.0	-2.30*
Country of birth		N=1,188			
Australia	210	58.5	824	69.4	-2.94**
U.K.	97	27.0	164	13.8	-1.33
other	52	14.5	200	16.8	-0.811
Main language		N=1,187			
English	359	100	1132	95.4	3.19**
other	0	0	55	4.6	-3.19**
Indigenous		N=1,184			
Aboriginal / TSI	0	0	1	0	0.42
Employment		N=1,190			
Retired/ pension	324	90.3	988	83.0	2.56*
Other	35	9.7	202	17.0	-2.56*
School level		N=1,146			
Year 12	171	47.6	414	36.1	2.97***
Year 10	107	29.8	288	25.1	1.34
Year 9	41	11.4	123	10.8	0.28
other	40	11.2	321	28.0	-4.97***
Highest qualification		N=1,210			
Bachelor degree +	100	27.8	176	14.5	4.48***
Trade certificate	90	2.5	350	28.9	-1.10
Associate Diploma	61	1.7	82	6.8	4.55***
Occupation		N=1,111			
Professional	132	36.8	167	15.0	6.72***
Associate Prof.	58	16.2	33	3.0	6.81***
Trade	44	12.2	153	13.8	-0.55
Other	125	34.8	758	68.2	-8.49***

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

A similar method of comparison was undertaken for all women. The majority of older women in Study 3 were married (n=541, 50.8%), had been born in Australia (n=796, 74.8%), and were retired or on a pension (n=928, 86.9%). A similar proportion of women from both Study 3 and Study 2 were married, of Aboriginal or Torres Strait Islander descent, retired and had completed Year 10 at school. On all other variables, the groups of women were significantly different. See Table 85.

Table 85: Demographic characteristics of women in Study 3 and women interviewed in Study 2.

	Study 2		Study 3		z-score
	N	%	N	%	
Sample size	485	57	1,090	47.4	
Average age (years)	69	n/a	69	n/a	
Marital status		N=1,064			
Married	252	51.9	541	50.8	0.28
Separate/divorced	109	22.5	153	14.4	2.58**
Widowed	106	21.9	333	31.3	-2.63**
Other	18	3.7	37	3.5	0.16
Country of birth		N=1,064			
Australia	287	59.2	796	74.8	-4.27***
UK	134	27.6	145	13.6	4.57***
Other	64	13.2	123	11.6	
Main language		N=1,072			
English	484	99.8	1,039	96.9	2.47*
Other	1	0.2	33	3.1	-2.47*
Indigenous		N=1,058			
Aboriginal/ TSI	5	1.2	9	0.8	0.24
Employment status		N=1,068			
Retired/ pension	438	90.3	928	86.9	1.32
Other	47	9.7	140	13.1	-1.32
School level		N=1.034			
Year 12	229	47.2	319	30.8	4.22***
Year 10	142	29.3	271	26.2	0.85
Year 9	51	10.5	137	13.3	-1.03
Other	63	13.0	307	29.7	-4.81***

Highest qualification		N=1.034			
Non trade	105	21.6	102	9.8	4.25***
Bachelor degree +	101	20.8	133	12.8	2.73**
Associate Diploma	53	10.9	64	6.2	2.19*
n/a/other	226	46.7	735	71.2	-6.28***
Occupation		N=980			
Professional	178	36.7	104	10.6	7.97***
Advanced clerical	64	13.2	192	19.6	-2.03*
Associate Professional	61	12.6	2	0.2	7.35***
Other	182	37.5	682	69.6	-7.85***

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

5.4 Results

This results section will firstly describe the sample in relation to age of first alcohol use, frequency of alcohol use, types of beverages most often consumed and settings in which alcohol was consumed. Following on from this description, results will be presented on the prevalence of at-risk consumption of alcohol amongst the sample of older Australians based upon:

- the WHO drinking guideline recommendations;
- Guideline 1 of the 2001 NHMRC Australian Alcohol Guidelines;
- Alcohol guidelines recommended by key informants from Study 1;
- WHO drinking guideline recommendations combined with results from Study 2 investigating the degree of over/under-reporting of consumption amongst 65 to 74 year aids; and
- Alcohol guidelines recommended by key informants from Study 1 combined with results from Study 2 investigating the degree of over/under-reporting of consumption amongst 65 to 74 year aids.

Description of sample

Age when first consumed alcohol

Amongst the sample who reported consuming alcohol in the past 12 months (n=2,300), women were on average 22.69 years old (S.E.=0.31) when they reportedly first consumed a full glass of alcohol. This was significantly older than

men, who were on average 18.81 years old (S.E.=0.20, t (1895.67) - 10.60, p<0.001).

Frequency of alcohol use

Of the 2,300 (1,210 men and 1,090 women) participants who indicated consuming alcohol in the last 12 months, frequency of drinking was available for 2,212 (1,174 men and 1,038 women) participants. Excluding respondents that said that they no longer drank alcohol (13 men, 21 women), the frequency of alcohol consumption differed significantly between men and women. See Table 86. A significantly greater proportion of men drank on a daily basis, while a greater proportion of women drank less than one day per month.

Table 86: Frequency of alcohol consumption over the past 12 months of men and women in Study 3.

Frequency of consumption	Men		Women		z-score
	N	%	N	%	
every day	335	28.8	171	16.8	3.10**
5 to 6 days a week	204	17.6	141	13.9	1.10
3 to 4 days a week	172	14.8	132	13.0	0.58
1 to 2 days a week	170	14.6	153	15.0	-0.12
2 to 3 days a month	116	10.0	112	11.0	-0.36
one day a month	61	5.3	91	8.9	-1.58
less than one day a month	103	8.9	217	21.3	-3.83***
Total	1,161		1,017		

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Types of beverages consumed

As participants were asked to nominate all beverages consumed, it was not possible to identify the three main beverages consumed by men and women. In addition, data were incomplete for some 134 respondents. However, based upon available data a greater proportion of men drank beer and a greater proportion of women drank wine. Preferences for other beverage types were similar across genders. See Table 87.

Table 87: Beverages consumed by men and women in Study 3.

	Men N=1,157		Women N=1,009		Total N=2,166		
Beverage	N	%	N	%	N	%	z-score
Wine	889	76.8	992	98.3	1,881	86.8	-6.87***
Beer	1,045	90.3	264	26.2	1,309	60.4	14.19***
Bottled spirits	329	28.4	314	31.1	643	29.7	-0.64
Premixed spirits	28	2.4	53	5.3	81	3.7	-1.61
Other	243	21.0	241	23.9	484	22.3	-0.75

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Drinking settings

The majority of both men and women usually drank at home (87.1%). Other popular venues were restaurants (47.7%) and at friends homes (45.1%). However, a greater proportion of men indicated a preference for drinking at home (89.8%) and at licensed premises (45.7%) than women (84% and 34.3% respectively). Conversely, a greater proportion of women (55.3%) indicated a preference for drinking at restaurants/cafes when compared to men (41.3%). See Table 88.

Table 88: Venue for consuming alcohol among men and women in Study 3.

Place	Men N	%	Women N	%	z-score
In my own home	876	89.8	680	84.0	2.25*
At friends house	401	41.1	404	49.9	-1.54
At licensed premises	446	45.7	278	34.3	2.40*
At restaurants/cafes	403	41.3	448	55.3	-2.54*
At private parties	297	30.5	272	33.6	-0.52
At workplace	8	0.8	2	0.2	0.75
At raves/dance parties	8	0.8	5	0.6	0.25
In public places	7	0.7	6	0.7	-0.01
In a car	3	0.3	a	a	0.73
At school/TAFE/University	1	0.1	1	0.1	-0.05
Other	21	2.2	4	0.5	1.38
Total responses	957		810		

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

The most popular venues for drinking alcohol amongst participants in the NDSHS and Study 2 were home, at restaurants/cafes and at friend's homes. See Table 89.

Table 89: A comparison of responses from men and women in Study 3 and men and women interviewed in Study 2.

Place	Men and women from Study 3 sample		Men and women from Study 2 sample		z-score
	N	%	N	%	
In my own home	1,556	87.1	800	94.8	-3.67***
At friends house	805	45.1	651	77.1	-10.28***
At licensed premises	724	40.6	296	35.1	1.96
At restaurants/cafes	851	47.7	655	77.6	-9.64***
At private parties	569	31.9	384	45.5	-4.47***
At workplace	10	0.6	20	2.4	-2.74**
At raves/dance parties	13	0.7	21	2.5	-2.50*
In public places	13	0.7	199	23.6	-13.53***
In a car	3	0.2	7	0.8	-1.73
At school/TAFE/University	2	0.1	42	5.0	-6.11***
Other	25	1.4	n/a	n/a	n/a
Total responses	1,767		844		

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Alcohol consumption and gender

Based upon all three methods of assessing alcohol consumption, men reported drinking significantly larger amounts of alcohol than women. See Table 90. In response to F15 (Quantity/Frequency) men reported drinking 1.33 standard drinks per day while women reported drinking 0.64 standard drinks per day.

Table 90: Reported levels of alcohol consumption of men and women in study 3.

Consumption measure	Men			Women			t-value	D.F.
	M	S.E.	N	M	S.E.	N		
F13 On a day you have an alcoholic drink how many std drinks do you usually have?	2.81	0.06	1151	1.88	0.03	995	14.06***	1721.25
F15 Quantity Frequency (std drinks per day)	1.33	0.05	1012	0.64	0.03	973	10.95***	1591.35
F17 How many std drinks did you have yesterday?	1.84	0.07	1159	0.86	0.04	1018	12.54***	1866.36

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Having given a descriptive overview of alcohol use amongst the sample the remainder of the results section present findings related to analysis of the quantity frequency data (F15) using the WHO drinking guidelines, NHMRC alcohol guidelines, alcohol guidelines recommended by key informants and incorporation of the results from Study 2 on over/under-reporting of consumption.

Prevalence of at-risk alcohol consumption amongst the sample based upon WHO guidelines

Using the WHO drinking guideline recommendations, results indicated that 2.9% of men and 1.3% of women were classified as high-risk drinkers. There were no significant gender differences. See Table 91. These prevalence estimates were similar to those reported amongst men and women in Study 2. See Table 92 for a comparison of the samples.

Table 91: Prevalence of at-risk alcohol consumption amongst men and women in Study 3 based upon WHO classification system for low-risk drinking

Level of risk	Men		Women		
	N	%	N	%	z-score
Low-risk	937	92.6	915	94.0	-0.63
Medium-risk	46	4.5	45	4.6	-0.04
High-risk	29	2.9	13	1.3	1.16
Total	1,012	100	973	100	

(Data were missing for 198 men)
Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Table 92: Prevalence of at-risk alcohol consumption amongst men and women in Study 2 based upon WHO classification system for low-risk drinking.

Level of risk	Study 2				NDSHS 2004				z-score	
	Men		Women		Men		Women		Men	Women
	N	%	N	%	N	%	N	%		
Low-risk	319	89.4	443	91.3	937	92.6	915	94.0	-1.41	-1.28
Medium-risk	21	5.9	35	7.2	46	4.5	45	4.6	0.74	1.37
High-risk	17	4.8	7	1.4	29	2.9	13	1.3	1.26	0.11
Total	357	485	1012	100	973	100				

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Prevalence of at-risk alcohol consumption based upon NHMRC (2001) Australian alcohol guidelines

The second aim of Study 3 was to estimate the prevalence of at-risk consumption of alcohol amongst the sample based upon Guideline 1 of the NHMRC (2001) Australian Alcohol Guidelines. Results indicated that 17.4% of men and 10.0% of women drank at levels that put them at short-term risk of alcohol-related harm at least once a year. See Tables 93 and 94.

Table 93: Prevalence of short-term at-risk drinking for men based upon NHMRC (2001) alcohol guidelines.

Level of risk	At least weekly		At least monthly		At least yearly	
	N	%	N	%	N	%
Low-risk	1,117	94.1	1,069	90.1	980	82.6
Medium-risk	58	4.9	94	7.9	133	11.2
High-risk	12	1.0	24	2.0	74	6.2
Total	1,187	100	1,187	100	1,187	100

(23 men Indicated they were abstainers and were removed from analysis)

Table 94: Prevalence of short-term at-risk drinking for women based on NHMRC (2001) alcohol guidelines.

Level of risk	At least weekly		At least monthly		At least yearly	
	N	%	N	%	N	%
Low-risk	1,020	97.1	1,001	95.3	945	90.0
Medium-risk	23	2.2	34	3.2	70	6.7
High-risk	7	0.7	15	1.5	35	3.3
Total	1,050	100	1,050	100	1,050	100

(40 women indicated they were abstainers and were removed from analysis)

Using the combined Quantity/Frequency score collapsed to an estimate of standard drinks per-day, 97.1% (n=1153) of men drank at low-risk levels and 2.9% (n=34) drank at a risky level (six or more standard drinks equating to at-risk consumption). Amongst the women, 98.7% (n=960) drank at low-risk levels and 1.3% (n=13) drank at a risky level (4 or more standard drinks per day). Based upon a test of independent proportions, there was no significant difference between the proportions of men and women who were drinking at risky levels (z-score=1.09).

In relation to long-term harm, a similar proportion of men (10.5%) and women (8.3%) were drinking at levels that would put them at-risk of long-term alcohol-related. See Table 95.

Table 95: Prevalence of long-term at-risk drinking amongst men and women based upon NHMRC (2001) alcohol guidelines

Level of risk	Men		Women		Total		
	N	%	N	%	N	%	z-score
Low-risk	1,063	89.5	963	91.7	2,026	90.6	-0.82
Medium-risk	83	7.0	71	6.8	154	6.9	0.10
High-risk	41	3.5	16	1.5	57	2.5	1.36
Total	1,187	100	1,050	100	2,237	100	

(23 men and 40 women indicated they were abstainers and were removed from above table)
Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

When data were included for all 65 to 74 year aids (i.e. data from abstainers were included) the proportion of men and women that were at-risk of long-term harm reduced from 9.4% to 6.9%. See Table 96.

Table 96: Prevalence of long-term at-risk drinking amongst all men and women in the 2004 NDSHS (including abstainers) based upon the NHMRC (2001) alcohol guidelines.

Level of risk	Men		Women		Total	
	N	%	N	%	N	%
Low-risk	1,345	91.5	1,510	94.6	2,855	93.1
Medium-risk	83	5.7	71	4.4	154	5.0
High-risk	41	2.8	16	1.0	57	1.9
Total	1,468	100	1,597	100	3,065	100

Prevalence of at-risk alcohol consumption based upon key informant recommendations

The third aim of Study 3 was to estimate the prevalence of at-risk alcohol consumption amongst the sample based on the alcohol guidelines recommended by key informants from Study 1. Analysed as drinks per-day, the Quantity/Frequency data (F15) indicated that 8.8% of men and 4.6% of women were at-risk of short-term harm. See Table 97.

Table 97: Prevalence of at-risk consumption based upon key informant recommendations for low-risk drinking in the short-term.

Level of risk	Men		Women		Tolal		
	N	%	N	%	N	%	z-score
Low-risk	923	91.2	928	95.4	1,851	93.2	-1.81
At-risk	89	8.8	45	4.6	134	6.8	1.81
Total	1,012	100	973	100	1,985	100	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

There were no significant gender differences in relation to long-term harm, with 24.8% of men and 29.7% of women categorised as at-risk. See Table 98.

Table 98: Prevalence of at-risk consumption based upon key informant recommendations for low-risk drinking in the long-term.

Level of risk	Men		Women		Total		
	N	%	N	%	N	%	z-score
Low-risk	761	75.2	684	62.8	1,445	72.8	1.20
At-risk	251	24.8	289	29.7	540	27.2	-1.20
Total	1,012	100	973	100	1,985	100	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

To investigate whether the guidelines recommended by key informants would produce significantly different results to the present Australian alcohol guidelines, in terms of the proportions of men and women categorised as at-risk, comparisons were made between both sets of guidelines. On both risk of short-term and long-term harm, guidelines recommended by key informants (from Study 1) resulted in significantly greater proportions of men and women being categorised as at-risk of harm when compared to results based upon the present Australian alcohol guidelines. For results see Tables 99-102 that include data for men and then women comparing results based upon key informants recommendations versus Australian alcohol guidelines.

Table 99: A comparison of the numbers of men categorised as at-risk of short-term harm based on the NHMRC (2001) alcohol guidelines versus recommendations from key informants.

Level of risk	Men at-risk based upon Australian alcohol guidelines		Men at-risk based upon key informant recommendations		
	N	%	N	%	z-score
Low-risk	1,153	97.1	923	91.2	2.78
At-risk	34	2.9	89	8.8	-2.78
Total	1,187		1,012		

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Table 100: A comparison of the numbers of men categorised as at-risk of long-term harm based on the NHMRC (2001) alcohol guidelines versus recommendations from key informants.

Level of risk	Men at-risk based upon Australian alcohol guidelines		Men at-risk based upon key informant recommendations		
	N	%	N	%	z-score
Low-risk	1,063	89.5	761	75.2	4.11***
At-risk	124	10.5	251	24.8	-4.11***
Total	1,187	100	1,012	100	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Table 101: A comparison of the numbers of women categorised as at-risk of short-term harm based on the NHMRC (2001) alcohol guidelines versus recommendations from key informants.

Level of risk	Women at-risk based upon Australian alcohol guidelines		Women at-risk based upon key informant recommendations		
	N	%	N	%	z-score
Low-risk	960	98.7	928	95.4	2.13*
At-risk	13	1.3	45	4.6	2.13*
Total	973	100	973	100	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Table 102: A comparison of the numbers of women categorised as at-risk of long-term harm based on the NHMRC (2001) alcohol guidelines versus recommendations from key informants.

Level of risk	Women at-risk based upon Australian alcohol guidelines		Women at-risk based upon key informant recommendations		
	N	%	N	%	z-score
Low-risk	963	91.7	684	62.8	5.95***
At-risk	87	8.3	289	29.7	5.95***
Total	1,050	100	973	100	

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

When data were included for all 65 to 74 year old participants from the NDSHS (i.e. abstainers were included) the prevalence of the population at-risk of long-term harm was 17.6%. See Table 103.

Table 103: Prevalence of at-risk consumption based upon key informant recommendations for long-term harm (including all 65 to 74 year olds from the 2004 NDSHS).

Level of risk	Men		Women		Total	
	N	%	N	%	N	%
Low-risk	1,218	82.9	1,308	81.9	2,526	82.4
At-risk	251	17.1	289	18.1	540	17.6
Total	1,469	100	1,597	100	3,066	100

Prevalence of at-risk alcohol consumption based upon WHO recommendations combined with data from Study 2 on over/under-reporting

The fifth aim of Study 3 was to estimate the prevalence of "at-risk" alcohol consumption amongst the sample based upon WHO recommendations and including the results from Study 2 investigating the degree of over/under reporting of consumption amongst 65 to 74 year olds. When the information from Study 2 on over/under-reporting for each beverage was included and

responses to the Quantity/Frequency (F15) were re-analyzed, the proportion of men who were categorised as at-risk of alcohol-related harm (based upon WHO definitions) increased from 7.4% to 10.3% and the proportion of women increased from 5.9% to 8.2%. The increase in the number of men and women who became categorised as at-risk was not statistically significant. See Table 104.

Table 104: Prevalence of at-risk consumption amongst men and women comparing WHO recommendations before and after data was adjusted for over/under-reporting.

Level of risk	Before adjustment				After adjustment				z-score men	z-score women
	Men		Women		Men		Women			
	N	%	N	%	N	%	N	%		
Low-risk	937	92.6	915	94.0	908	89.7	893	91.8	1.13	0.97
Medium-risk	46	4.5	45	4.6	63	6.2	62	6.4	-0.84	-0.85
High-risk	29	2.9	13	1.3	41	4.1	18	1.8	-0.73	-0.45
Total	1,012	100	973	100	1,012	100	973	100		

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

Prevalence of at-risk alcohol consumption based upon drinking guidelines recommended by key informants from Study 1 combined with information on the degree of over/under reporting from Study 2.

The final aim of Study 3 was to estimate the prevalence of at-risk consumption of alcohol amongst the sample based upon the drinking guidelines recommended by key informants from Study 1 combined with information on the degree of over/under reporting from Study 2. Following this adjustment there was no significant increase in the proportion of men and women categorised as at-risk of short-term harm. See Table 105.

Table 105: Prevalence of at-risk consumption for short-term harm amongst men and women comparing key informant recommendations before and after data was adjusted for over/under-reporting.

Level of risk	Before adjustment				After adjustment				z-score men	z-score women
	Men		Women		Men		Women			
	N	%	N	%	N	%	N	%		
Low-risk	923	91.2	928	95.4	884	87.4	923	94.9	1.40	0.26
At-risk	89	8.8	45	4.6	128	12.6	50	5.1	-1.40	-0.26
Total	1,012	100	973	100	1,012	100	973	100		

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

For estimates on long-term harm, information on over/under-reporting lead to statistically significant increases in the proportions of men categorised as at-risk, with the percentage of men at-risk of harm increasing from 24.8% to 35.2%. The proportions of women at-risk of long-term harm also increased, but not significantly. See Table 106.

Table 106: Prevalence of at-risk consumption for long-term harm amongst men and women comparing key informant recommendations before and after data was adjusted for over/under-reporting.

Level of risk	Before adjustment				After adjustment				z-score men	z-score women
	Men		Women		Men		Women			
	N	%	N	%	N	%	N	%		
Low-risk	761	75.2	684	70.3	656	64.8	672	69.1	2.55*	0.30
At-risk	251	24.8	289	29.7	356	35.2	301	30.9	-2.54*	-0.30
Total	1,012	100	973	100	1,012	100	973	100		

Statistical significance: * p <0.05, ** p<0.01, *** p<0.001

5.5 Summary and discussion

This section summarises and discusses the results of the analyses described above. A summary of results as they relate to each area of investigation is

presented, as well as a discussion of how the findings relate to a wider context. The limitations and strengths of the study are then explored.

Participants in Study 3 had been drinking alcohol for over four decades. On average men were 18 years old and women were 22 years old when they first consumed a full glass of alcohol. These are the same ages as reported by men and women in Study 2. As with Study 2, where caution was advised about the accuracy of recall over so many years, it is noteworthy that both samples gave such similar responses even when groups were from different parts of the country and from divergent cultural and demographic backgrounds.

As, with the results for Study 2, men drank more heavily than women on each of the three independent methods applied for measuring alcohol consumption. Using the quantity frequency measure, men were drinking 1.33 standard drinks per day compared to 0.64 standard drinks per day for women. While low, both levels are above the level recommended by the WHO (2006) to minimise risk. Results on men's consumption relative to women are consistent with previous research which has reported higher levels of alcohol consumption amongst men compared to women, independent of age (Hassan & Shiu 2007, Robbins 1989, Wilsnack *et al.* 2000).

Estimation of the prevalence of at-risk consumption of alcohol amongst the sample based on World Health Organization drinking guideline recommendations.

Using the WHO drinking guideline recommendations, results indicated that 2.9% of men and 1.3% of women were classified as high-risk drinkers. There were no significant gender differences. These were similar to the prevalence estimates amongst the sample in Study 2 of which 4.9% of men and 1.5% of women were classified as high-risk drinkers. These results are also noteworthy considering the differences in the demographics between the samples and differing responses in relation to frequency of alcohol consumption. In the sample of people interviewed in Study 2, 44% of men and 33.6% of women indicated drinking alcohol on a daily basis. In the NDSHS, only 28.8% of men and 16.8%

of women reported drinking alcohol on a daily basis. Despite these differences, similar proportions of both samples were categorised as at-risk based upon WHO guidelines. Trying to compare these results to the international literature is difficult however, as most literature does not report results against WHO guidelines.

Prevalence of at-risk consumption of alcohol amongst the sample based upon the alcohol guidelines recommended by key informants from Study 1,.

When alcohol guidelines recommended by key informants from Study 1 were used as the benchmark to estimate prevalence of at-risk consumption amongst the sample, there was a significant shift in the number of men and women who became classified as at-risk of both short and long-term alcohol-related harm.

In relation to short-term harm, based upon the NHMRC alcohol guidelines 2.9% of 65-74 year old men were classified as at-risk of harm. Using key informant recommendations, this figure rose to 8.8%. Similarly, for long-term harm the figures rose from 10.5% to 24.8% for men. According to the 2004 NDSHS results, of all males 14 years and older, 10.1% were drinking at levels that were putting them at risk of long-term harm.

In relation to women, according to NHMRC guidelines for long-term harm, 8.3% were classified as at-risk of harm. However, when key informants' recommendations were applied this figure increased to 29.7%. Based upon 2006 Census data, this figure equates to approximately 306,000 65-74 year olds who were current drinkers, being at-risk of alcohol-related harm.

When analysis was conducted that included current drinkers and abstainers, 17.1% of men and 18.1% of women were classified as at-risk for long-term harm. This figure is noteworthy for two reasons. Firstly, when compared to results published by the AIHW (2005), the age group most at-risk of long-term alcohol-related harm were persons in the 20-29 years age group, as 14.4% of males and 15.1% of females were classified as at-risk. However, both of these

figures are lower than the proportions of 65-74 year old men and women classified as at-risk when key informant recommendations were used as a benchmark. This indicates that when age-appropriate alcohol levels are used as a benchmark, then similar proportions of males and females are at-risk of alcohol related harm, independent of age. This being the case, then prevention and other responses need to be developed for the entire population, not just young people.

The second reason why the results are noteworthy is in relation to international literature on alcohol consumption amongst older age groups. The recommendations from key informants for long-term harm were similar to the NIAAA recommendations in the U.S. In the U.S. amongst a community based national sample of men using 24 grams of alcohol or more per day as the benchmark, prevalence estimates ranged from 5.1% (Lang *et al.* 2007) to 12.1% (Satre *et al.* 2007). In the United Kingdom, using more than 16 grams of alcohol per day as the benchmark, 14.2% of older men were at-risk of potential harm (Lang *et al.* 2007). These figures are all less than the 17.1% reported amongst older men in the present study.

For older women in the U.S. prevalence estimates ranged from 2.2% (Breslow *et al.* 2003) to 25.8% (Fleming et el. 2007). In the United Kingdom, 2.95% of older women were reported by Lang *et al.* (2007) to be drinking more than 16 grams of alcohol per day. With the exception of the research by Fleming *et al.* (2007), these results are lower than the 18.1% reported amongst older women in the present study.

When the data was analysed for current drinkers, 24.8% of men and 29.7% of older women were classified as at-risk of long-term alcohol-related harm based upon key informant recommendations. These figures are similar to the results of Moos *et al.* (2004) in the U.S., with drinkers, where 26.3% of men and 28.9% of women reported drinking above NIAAA guidelines.

These findings could indicate that older men and women in Australia, drink more than in other countries or that a greater proportion of older men and women in

Australia are current drinkers than in other countries. This could explain why the prevalence estimates reported in the present study were higher than in the U.S. for population based comparisons but very similar when only drinkers were compared. Future research making cross-cultural comparisons would be beneficial, but unless similar benchmarks are used, the validity of the comparisons will be significantly limited.

Prevalence of at-risk consumption of alcohol amongst the sample based upon World Health Organization drinking guideline recommendations combined with results from Study 2 investigating the degree of over/under reporting of consumption amongst 65 to 74 year olds.

When data for WHO recommendations and data on over/under-reporting were included the percentages of men and women categorised as at risk increased but failed to reach significance. This result indicates that including data on pouring practices does not significantly increase the proportion of the population categorised as at-risk of alcohol-related harm.

However, including data on pouring practices is recommended for case-control research as some individual participants (based upon data from Study 2) pour very large volumes of alcohol. For example, one male participant poured in excess of 500ml of wine as a standard drink.

Prevalence of at-risk consumption of alcohol amongst the sample based upon the alcohol guidelines recommended by key informants from Study 1 combined with results from Study 2 investigating the degree of over/under reporting of consumption amongst 65 to 74 year olds.

When key informant recommendations were used (i.e. as a mean - older men and women should consume no more than 2.35 and 1.45 standard drinks per day on average respectively to avoid the risk of long-term alcohol-related harm and no more than 3.55 and 2.45 standard drinks per day respectively to avoid the risk of short-term alcohol-related harm), and data on over/under-reporting were combined the proportions of men deemed at-risk of long-term harm, increased from 29.7% to 35.2%. This proportion is higher than results from

much other international research (Aira *et al.* 2005, Bjork *et al.* 2006, Cawthon *et al.* 2007, Fleming *et al.* 2007, Ganry *et al.* 2000, McGuire *et al.* 2007, Vicente *et al.* 2006) with the exception of results from Brazil, where da Costa *et al.* (2004) reported that 43.8% of 60-69 year old men drank more than 30 grams of alcohol per day.

The significant increases in prevalence estimates when differing alcohol levels are used demonstrate how critical appropriate empirical based guidelines are for determining the possible prevalence of alcohol related harm. In the present research, when the age specific levels as recommended by key informants were applied, figures for the prevalence of harm began to imitate results from younger age groups. For example, based upon data from the NDSHS 2004, the Australian Institute of Health and Welfare (2005) concluded that persons in the 20 to 29 years age group were most likely to consume alcohol in a way that put them at-risk for long-term harm, as 14.4% of them were drinking at levels that classified them "at-risk" or at "high-risk". Based upon key informant recommendations, 27.2% of all 65 to 74 year olds who had consumed alcohol in the past 12 months and 17.6% of all 65 to 74 year olds are at-risk of long-term alcohol related harm.

When data on the degree of over/under-reporting were combined with the recommendations from key informants the proportions of men categorised as at-risk of long-term harm increased significantly from 24.8% to 35.2%. For women, the proportions increased from 29.7% to 30.9%, but this was not statistically significant. The results reflect the sex differences in pouring practices and under-reporting. As men under-estimated their consumption of alcohol to a greater degree than women, it was anticipated that when this data were combined with key informant recommendations, that an increase in the proportions at-risk of alcohol related harm would be greater amongst men than amongst women.

These results highlight that assessment of the pouring practices and degree of over/under-reporting of consumption amongst older men and women is an important field of research and that inclusion of data on these variables will alter

the estimated prevalence rates of alcohol related harm. With the ageing of the population, this is important information and may have a significant bearing on future public health planning.

5.6 Strengths and limitations

While there have been a number of international studies that have attempted to investigate issues surrounding pouring practices, none have specifically focused upon older people. Nor has any previous research attempted to investigate what impact an alteration in recommended alcohol guidelines would mean for prevalence estimates of harm amongst older people. With its large sample of nationally representative young-old Australians and its detailed investigation of their alcohol use, this study is a first for Australia.

Although caution needs to be taken concerning the transferability of results across countries, the present research may also guide future methodological practice and provide a benchmark against which future research may be compared.

The study also has some limitations. The results from Study 2 were applied to data in Study 3 that was gathered by the AIHW. Yet, the participants interviewed in the two studies were different on a number of demographic variables and data were collected differently in the two research approaches/studies. Despite the demographic differences, there were however, no significant differences between the proportions of men and women in both studies who were classified as at-risk of alcohol-related harm (using the current Australian alcohol guidelines as a benchmark). This similarity in reported alcohol consumption, provides support for applying data gathered from participants in Study 2 to data gathered from participants in Study 3. If the proportions of men and women who had been at risk of harm had been significantly different, then this would have reduced the validity of the research.

A second limitation concerned the different methodologies used to collect data. In Study 2, the questionnaire was administered using face-to-face interviews. In Study 3, the questionnaire was administered as an anonymous self-complete

questionnaire or as a telephone interview. These different approaches may have influenced the responses from participants. However, Reddy, Fleming, Howels, Rabenhorst, Casselman and Rosenbaum (2006) and Rosenbaum, Rabenhorst, Reddy, Fleming and Howells (2006)after comparing the differences between participants disclosure on sensitive topics using either a telephone interview, face-to-face interview, paper and pencil self complete and an automated telephonic data collection system, found that the method of data collection had no significant effect on results, and reported no significant effect by gender. This supported earlier work by Midanik (1982).

Another potential limitation concerned the methodology used to assess short-term harm. When the AIHW estimate the prevalence of long-term harm, they use the Quantity/Frequency series of questions and collapse data to produce an estimate of the number of standard drinks per day/week/year. These data are easily combined with data on estimates of over/under-reporting.

However, they estimate prevalence of short-term harm quite differently. Short-term harm is estimated by summing the numbers of respondents who indicate drinking above certain categories (i.e. for men this is drinking above the category of 5-6 standard drinks in anyone day and for women drinking above 3 to 4 standard drinks in anyone day). As these are categorical variables, it is not possible to combine data with information on over/under-reporting. To overcome this problem, in the present study short-term harm was generally assessed using the collapsed version of the Quantity/Frequency/day. This methodology did however result in more conservative estimates than the method used by the AIHW (2005) for calculating short-term harm.

It is also of note that as the AIHW have not incorporated design effects in their weighting of variables for the different sampling techniques used; this may have resulted in some errors in their reported estimates of prevalence. As Study 3 used AIHW data this also places a limitation on the present results.

5.7 Conclusion

No previously published research has applied data on pouring practices to prevalence data on at-risk consumption amongst older people. Nor has any previously published literature reported prevalence of at-risk consumption amongst one specific cohort using an age-specific alcohol guideline.

There is a great deal of evidence indicating that older people are more vulnerable to the effects of alcohol (Alcohol Concern 2002, American Medical Association Council on Scientific Affairs 1996, Anstey *et al.* 2006). As a consequence there has been acknowledgment that the alcohol levels used to assess the prevalence of harm amongst older people should be lower than those used to assess harm amongst the remainder of the adult population (See Chapter Three and Clough *et al.*(2004»). However, until now, no research has investigated what impact any change in alcohol guidelines would have on estimates of the prevalence of at-risk consumption.

Results from the present research demonstrated that when age appropriate guidelines were used as benchmarks, the prevalence of short-term harm amongst a national sample of 65 to 74 year old Australian men increased by 260% and increased amongst women by 346%. In relation to long-term harm, prevalence estimates increased by 202% amongst men and 332% amongst women.

When data were analysed using the age specific alcohol guidelines recommended by key informants and included information on under-reporting, the percentages of men and women classified as at-risk of short-term harm increased by 376% and 384% respectively. For long-term harm, the number of men at-risk of harm increased by 287%, and the number of women increased by 346%. These results highlight the important influence that 'alcohol guidelines' and under-reporting are on the estimated prevalence of alcohol related harm.

Traditionally, alcohol use amongst older Australians has received little attention. This is not surprising when national prevalence estimates of at-risk consumption have been so low. However, as indicated in the present research, older

Australians are drinking significant amounts of alcohol and when lower at-risk limits are applied, the proportion of older people at-risk of potential harm increases significantly.

This study also indicates that conducting further research on pouring practices and under/over reporting of consumption is important. In the present research, estimates of the prevalence of long-term harm amongst men increased significantly when data on under-reporting were included. This is a substantial finding which has implications for future study design and methodological approaches undertaken in consumption surveys. As reported in Study 2, under-reporting of consumption varied between genders and across beverages. In Study 3, under-reporting resulted in significant differences occurring in the prevalence of at-risk consumption amongst men.

This is an important consideration for national epidemiological research. Based upon AIHW publications in Australia, younger men traditionally drink beer and older men indicate a preference for wine and spirits (Australian Institute of Health and Welfare 2005b). It is therefore possible, that the degree of under-reporting will vary across age groups dependent on beverage selection and possibly length of time drinking a particular beverage. More research is needed with younger age groups which explores not only pouring practices and beverage types but also the ability of drinkers to convert these volumes to standard drinks. Such an approach may indicate whether it is only older men and women who significantly under-report consumption or whether it is a variable that is dependent on beverage type but independent of age.

In concluding, the present study has highlighted that when lower at-risk alcohol limits are applied the prevalence of at-risk consumption amongst older Australians rises substantially. It is hoped that these results may lead to an increased focus on alcohol use amongst older Australians and facilitate the development of empirically based age-appropriate alcohol guidelines.

Chapter Six: Discussion and recommendations

Like many other countries, Australia is witnessing a rapid ageing of the population. Older people presently constitute 13% of Australia's population (Australian Bureau of Statistics, 2007), but by 2050 the Australian Bureau of Statistics (2000) estimate that older people will represent 25% of the national population. As a consequence, the demographic profile of Australia will vary considerably from the current profile. This phenomenon will, in all probability, have an influence on the national burden of disease and mortality - some of which will arise from alcohol use amongst older people.

Despite the ageing of the population and the harms associated with alcohol use, there has been little research on alcohol use amongst older people. This has been compounded by the exclusion of older people from many large national outcome studies on alcohol use (e.g. Project MATCH in the U.S. and the National Treatment Outcome study in the U.K (Gossop, Marsden, Stewart & Kidd 2003, Project MATCH research group 1998) and the methodological limitations that have occurred when older people have been included. For example, Australian research has tended to treat older people as a single homogenous group. Thus, in national government reports such as those produced through the National Drug Strategy Household Survey (Australian Institute of Health and Welfare 1999, 2002a, 2005b) responses for all people over the age of 60 years is often aggregated into one group. This practice, has made it difficult to determine the prevalence of at-risk consumption amongst different age groups of older people.

Given that the world's older population is growing at a rate of 2.4% per year and is projected to increase to 257 million by the year 2025 (Evans 2000), such exclusions and limitations are untenable. According to the Australian Association of Gerontology (2005) there remains a brief window of opportunity to prepare for the exponential growth in the numbers of older people that will confront health, aged care and medical services in the coming decades. The demographic transition facing Australia and many other countries has generated a major research challenge across a wide range of health, economic, financial and policy

areas. With the rapidly ageing population we are, according to the Australian Association of Gerontology (2005), in "uncharted territory" in terms of our understanding of the many interrelated factors influencing the quality of life of older Australians.

The present research has attempted to provide foundation information from which an extensive knowledge of alcohol use practices amongst older Australians can be built. The research involved investigation of three areas: age appropriate alcohol guidelines for 65 to 74 year olds; alcohol pouring practices of a sample of 65 to 74 year olds; and prevalence of at-risk alcohol consumption amongst 65 to 74 year old Australians. The remainder of this chapter will summarise the results of the three studies, discuss strengths and limitations of the research and recommend future research and policy initiatives in the alcohol and ageing area.

6.1 Summary of research findings

In Study 1, telephone interviews were conducted with 32 key informants across Australia to investigate alcohol guidelines for older people. Key informants recommended that older men should consume no more than 2 (mean=2.35) standard drinks per day to avoid the risk of long-term alcohol-related harm and no more than 3 (mean=3.55) standard drinks per day to avoid the risk of short-term alcohol-related harm. They also recommended that older women should consume no more than 1 (mean=1.45) standard drink per day to avoid the risk of long-term alcohol-related harm and no more than 2 (mean=2.45) standard drinks per day to avoid the risk of short-term alcohol-related harm. These recommendations were significantly less than the present NHMRC (2001) alcohol guidelines, but were similar to official recommendations in Italy, New Zealand and the United Kingdom for older people. The recommendations by key informants (i.e. no more than 2 standard drinks for men and no more than 1 standard drink for women) in respect to long-term harm were the same as those currently recommended by the Cancer Council of Australia (2007); to avoid the risk of alcohol related cancer and similar to those suggested by Clough *et al.* (2004) who recommended that older men drink no more than 12 grams and

older women drink no more than 8 grams of alcohol per day. This conformity of results reinforces the authority of the key informant recommendations.

The second study involved interviews with 844 men and women aged 65 to 74 years from Perth, Western Australia. All participants had consumed at least one full serve of alcohol in the prior twelve months and were required to pour their "usual" amount of alcohol in their "usual" glass. Based upon volumes of alcohol poured, men, on average, underestimated alcohol consumption by 32% and women by 16%. These results confirm previous research with younger samples in relation to amounts poured based on percentage of alcohol per volume (Lemmens, 1994, Carruthers and Binns, 1992; Kaskutas & Graves, 2000; Gill & Donaghy, 2006).

The results also support the findings of Lemmens (1994); Kerr *et al.* (2004) and Gill and Donaghy (2004) that men pour larger volumes of wine than women. The findings also concur with the research by Banwell (1999) which showed that women poured less than one standard drink when pouring beer and the research by Gill and Donaghy (2004) that men poured larger volumes of spirits than women. However, in the research by Gill and Donaghy (2004) and Gill and O'May (2007) with younger participants, both men and women were over-pouring spirits by approximately 200%. Because of the differing methodologies, it is difficult to compare the present results with other research that has investigated pouring practices. Nonetheless, results suggest that older men and women over-pour alcohol, but not to the same degree as younger people. With the exception of findings by Lemmens (1994) in the Netherlands, the present results indicated lower levels of over-pouring than all other published studies on pouring practices.

Participants were also asked whether they would record the volume poured as one or more/less standard drinks. Based upon responses to these questions, on average, men underestimated their alcohol consumption by 23% and women underestimated their alcohol consumption by 16%. A further break-down of the data revealed that men under-reported consumption of wine by 28%, spirits by 39% and beer by 6% and older women under-reported consumption of wine by

18%, spirits by 30% and over-reported consumption of beer by 22%. The findings also suggested that for men, beverage type rather than the shape of the glass that the person used was more important in predicting the amount of alcohol that was poured. For women, a combination of both beverage type and the shape of the glass appeared to be important predictors of amount poured.

The third study included a review of data from the 2004 National Drug Strategy Household Survey on the drinking practices of 2,300 Australian men and women aged 65 to 74 years. Secondary data analysis was conducted taking into consideration the findings from Studies 1 and 2. When key informant recommendations were combined with data that had been adjusted (based upon the degree of under-reporting reflected in Study 2), the prevalence of at-risk consumption amongst older Australians increased by over 300 percent, with approximately one third of all older drinkers being classified at risk of long-term alcohol related harm. Because of differing methodologies and benchmarks against which prevalence estimates of at-risk consumption have been described, it is difficult to compare the present findings to much of the international literature on alcohol use amongst older populations. However, the percentage of older men and women classified as at risk of alcohol related harm, using the methodology adopted in Study 3, were similar to the findings by Moos *et al.* (2004), who investigated alcohol use amongst a community based sample of older people in the U.S. and reported that 26.3% of men and 28.9% of women were drinking above NIAAA guidelines. Conversely, the results remained considerably less than those reported by da Costa *et al.* (2004) in Brazil, who reported that 43.8% of older men were drinking more than 30g of alcohol per day. In addition to methodological differences, cultural differences in the acceptability of alcohol among older people are an important consideration when making international comparisons. Because of these differences; caution is required when contrasting and comparing results from different countries.

6.2 Strengths and limitations

The present study makes an important contribution to the existing knowledge base on alcohol use amongst older Australians. A major strength of Study 1 was the diversity of professional groups that key informants were recruited from, and

their experience in their respective fields. Another strength was the innovative nature of the research. That is, no previous research has attempted to distinguish age-appropriate alcohol guidelines for older Australians. Study 2 was significant for three reasons. Firstly, no published research has specifically investigated the pouring practices of older drinkers. Secondly, no published research has attempted to convert the volume of alcohol poured by an individual into an over- or under-estimation of consumption. Another strength of the research was the methodology- that is, as participants were interviewed in their own homes, they were more likely to be able to use the specific glass from which they usually drank alcohol. This increased the accuracy of estimating the usual volume of alcohol consumed by individuals. A major strength of Study 3 was the originality of the methodology. That is, no previous research has applied information gathered from investigation of pouring practices to prevalence data on at-risk consumption amongst older people. Nor has any published literature reported prevalence of at-risk consumption amongst one specific cohort using age-specific guidelines.

The present research also had a number of limitations. A limitation of Study 1 was the deficiency in alcohol expertise amongst the gerontologists interviewed. Despite this, the alcohol guideline recommendations from gerontologists were not significantly different from other groups of key informants. It is also important to note that the method of recruitment means that generalizations cannot be made about the alcohol expertise of this professional group.

Sample selection was a limitation of Study 2. Even though a range of recruitment strategies was adopted, 46% of the sample was recruited from one organisation: the Positive Ageing Association. Another limitation was that due to financial and time restraints, no detailed information was collected on the medication use or type of residence of participants. Finally, in Study 3, the participants interviewed in the National Drug Strategy Household Survey were different on some demographic variables from those interviewed in Study 2. Nonetheless, the results from Study 3 indicate how changes in alcohol guidelines can have a major impact on prevalence estimates of at-risk alcohol consumption.

6.3 Recommendations

The principal recommendation is that alcohol guidelines for older people should be lower than currently recommended by the NHMRC (2001) to the general population. Specific age appropriate alcohol guidelines are necessary because the physiological changes that occur with ageing render older people more vulnerable to the effects of alcohol. For example, as people age, the fat-to-water ratio in their body changes, with fat content increasing and water content decreasing (Vestal *et al.* 1977, Vogel-Sprott & Barrett 1984). Consequently, drink-for-drink and all other things being equal, a 65 year old will produce a higher blood alcohol level than a 30 year old. Co-occurring conditions are also much more prevalent in older than younger populations and alcohol may interact differently with these chronic conditions (e.g. depression, gastrointestinal reflux disease) and with medications (e.g. sedatives and arthritic medications) (Moore *et al.* 2006). Even modest alcohol use in old age is potentially harmful, as a contributor to falls , compromised memory, mismanagement of medication, and inadequate diet (Clough *et al.* 2004). More conservative formal guidelines are therefore an important step towards accurately informing older people about low-risk alcohol consumption and ultimately reducing future harm.

Because of the prevalence of co-occurring conditions amongst older people, it is also recommended that future research on alcohol associated morbidity and mortality, includes consideration that some conditions (e.g. cancer, depression etc.) may be caused by alcohol use, rather than viewing such indicators as covariates (Fuchs *et al.* 1995, Serdula, Koong, Williamson, Anda, Madans, Kleinman & Byers 1995). The effect of alcohol on mortality and morbidity will vary considerably depending on the presence or absence of these chronic conditions. Failure by analysts to consider these inter-relationships may in part, account for the apparent contradiction and inconsistencies observed in many population studies concerning alcohol use and protective effects.

While there is evidence suggesting that low-risk alcohol guidelines for older people should be reduced, alcohol may have important social benefits for this population. For this reason, it is recommended that researchers should investigate the benefits of alcohol use particularly in terms of socialization. The

increased popularity of large retirement enclaves, some of which may include licensed premises, may influence alcohol use amongst future generations of older Australians. While a number of participants in the present research were recruited from retirement villages, because type of residence was not recorded, it was not possible to investigate whether individuals were drinking more or less in these residential settings. It would be useful to investigate what function alcohol plays in the lives of residents in these settings. In particular, it is recommended that research focus on the patterns of people's days and how this relates to and is affected by their consumption of alcohol. How for instance, do low to moderate levels of alcohol affect the ability of older people to manage the necessities of independent daily living and do the patterns of alcohol consumption amongst residents in separate retirement villages converge? Based upon Single's (1988) availability theory, it is possible that consumption amongst individual retirement village establishments will vary depending on the physical and economic availability of alcohol in each of these settings. Comparing alcohol consumption across different retirement villages would provide useful information that could determine whether such enclaves represent potential at-risk settings for older people.

While other research (Carruthers & Binns 1992, Gill & Donaghy 2004, Gill *et al.* 2006, Kaskutas & Graves 2000, Lemmens 1994) has investigated pouring practices, it has typically used the degree of over/under-pouring as evidence of the degree of under/over-reporting and has not investigated whether people convert amounts they pour to standard drinks. As such, it is recommended that future research investigate under/over-reporting of consumption using the present study's methodology with other cohorts from differing demographic, age and regions. Such research will indicate how similar the pouring practices are of different groups of older people, and whether or not beverage rather than age or culture is the optimum predictor of over pouring.

In addition, it is recommended that future research investigate the amounts of alcohol that individuals pour on second and subsequent drinks poured. If, as suggested by Gill and Donaghy (2004), only the first drink at home is poured into an empty glass and later drinks simply 'top up' the level of alcohol, then

monitoring consumption could be quite difficult. Investigation of these practices would be particularly relevant for older people who might be more likely to drink at home compared to their younger counterparts. Similarly, it also remains to be determined how consumption levels will influence pouring practices the longer a drinking session continues (Gill and Donaghy, 2004). Both these lines of enquiry may provide information that could be used to increase the accuracy of self-reported alcohol consumption.

The majority of assessment instruments (excepting the ARPS and shARPS (Fink *et al.* 2002a, Fink *et al.* 2002b, Fink *et al*. 2002c) do not adequately focus on issues relevant to older people, or include assessment of co- occurring conditions, particularly medication use (Epstein, Fischer-Elber & Al-Otaiba 2007). Consequently, research is needed to develop age-appropriate alcohol screening tools which are psychometrically sound, clinically useful and capable of compensating for factors that are specific to older drinkers to enable more effective identification of exactly who is at-risk (Fink *et al.* 1996). Such screening tools, should detect those older people whose drinking pattern, while not necessarily meeting the criteria for at-risk consumption, may be putting their physical or psychological health at risk (O'Connell *et al.* 2004).

Research has shown that worsening health is associated with drinking cessation (Eigenbrodt, Fuchs, Hutchinson, Paton, Goff & Couper 2000, Satre & Arean 2005). Conversely, as health worsens, the need for prescription medication increases (Pringle *et al.* 2006). Significant problems can occur among those people who continue to drink and use prescription medications. For this reason, more research is required on medication use amongst older drinkers. Australian research (National Health Strategy 1992) has shown that aged pensioners use 22% of all prescription drugs and 55% of psychotropic drugs. In the present study, 83% of all participants had taken at least one type of medication in the prior week, and on the day prior to the interview men and women had on average taken four different types of medication. Polypharmacy use, drinking, adverse drug reactions and health status amongst older drinkers should be explored further.

While research has shown that alcohol consumption declines with age, according to Gilhooly (2005) there is growing evidence that at least some of the reduction can be accounted for by cohort differences. More longitudinal research that controls for age, period, cohort and beverage choice is needed to better understand alcohol consumption and ageing. Such research is important because if period and cohort differences are major contributors to a reduction in alcohol use with age, then the high levels of alcohol consumption amongst the present generation of 'baby boomers' may lead to an increase in morbidity amongst future generations of older people.

Although more research is needed on the above issues, the ageing of the population is of such significance that provision for possible prevention and treatment strategies needs to be considered now. Specialist alcohol and other drug services already exist throughout Australian states and territories, but they cater for few older people (Shand & Mattick 2002) and do not collectively provide a health service attuned to dealing with the needs of older clients. A review of the scope of current addiction services and of the relationship between specialist alcohol and other drug services, elderly mental health services and general medical services is recommended to ensure that health service and support personnel become aware of, and educated in the health considerations confronting older people when alcohol consumption is an issue. Services would need to be based upon modified strategies and approaches that included a culture of respect, age-specific settings, flexibility and a holistic approach that embraced the psychological, physical and social needs of older people (Crome and Crome, 2005).

From a prevention perspective, information about low-risk alcohol consumption should be disseminated to groups of older people and those approaching retirement. Such information should also be included in all health and aged-care programs and services for older people. Furthermore, strategies should be developed that will help people to prepare for the changes that occur with ageing and include the provision of pre-retirement health checks, counselling and advice. A greater focus on alcohol and healthy ageing should be incorporated into professional education and training for all health and welfare

professions. These strategies could place prevention on the agenda of every public, private, and voluntary agency. Over time, this may result in alcohol use amongst older people becoming a whole of community initiative, much in the same way that health, safety, and even more recently, crime prevention are now seen as everybody's business.

With the ageing of the global population, irrespective of any increase in alcohol consumption, innovative prevention and intervention techniques and approaches targeted at potential older at-risk drinkers are required. Such approaches should consider elder-specific patterns of alcohol use and the distinct medical and mental health issues relevant to older people. Both the health and gerontology fields must develop time- and cost-effective methods of screening, intervention and prevention options to provide an optimal response to a potentially vulnerable and growing population.

As stated at the outset of this thesis, alcohol is no ordinary commodity. Older people are physiologically more vulnerable to the harmful effects of alcohol, however, because of their advanced age, many may be less inclined to act upon advice to reduce their consumption. This complexity is highlighted by the following quote:

"Who are we to tell a gun shearer that he can't drink any more, when the arthritis is so bad and his stomach is too tender for anti-inflammatories, and his emphysema stops his breathing so he cant get around like he use to, and he can't afford on a disability pension to go and see his name up in Longreach Outback Hall of Fame?" (p.1064) (Parliament of Victoria Drugs and Crime Prevention Committee 2006)

Striking the balance among harm reduction, health and quality of life is the conundrum for future research and policy in the field of alcohol and ageing. As the Australian community and populations throughout the developed world continue to age rapidly, well considered, evidence-based responses to this challenge are required sooner rather than later.

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Glossary of terms

The following list contains a number of terms frequently used in this thesis. A brief explanation is provided for each term to assist the reader.

Older people People aged 60 years and older.

Young-old People aged 65 to 74 years of age.

Older-old People aged 75 to 84 years of age.

Oldest-old People aged 85 years and older

Standard drink While this varies from country, in Australia the term refers to 10g of ethyl alcohol

Long-term risk The level of long-term risk associated with regular daily patterns of drinking, defined by the total amount of alcohol typically consumed per week.

Short-term risk The risk of harm (particularly injury or death) in the short-term that is associated with given levels of drinking on a single day.

Low-risk Refers to the consumption of alcohol at which there is only minimal risk of harm and for some people, there is the likelihood of health benefits. In Australia, low risk consumption for men is defined as up to six standard drinks on anyone day, (on no more than three days per week), for risk of harm in the short-term and up to four standard drinks per day on an average day for risk of harm in the long-term. For women low-risk drinking is defined as up to four standard drinks on anyone day (on no more than three days per week) for risk of harm in the short-term and up to two standard drinks per day on an average day for risk of long-term harm.

At-risk	Drinking above levels recommended as low-risk.
Risky	Levels of consumption at which risk of harm is significantly increased beyond any possible benefits. In Australia, this equates to seven to ten standard drinks per day for men and five to six standard drinks per day for women for short-term risk and five to six standard drinks per day for men and three to four standard drinks per day for women for risk of harm in the long-term
High-risk	refers to drinking levels at which there is a substantial risk of serious harm and above which risk continues to increase rapidly. In Australia, this is defined as men drinking 11 or more standard drinks on anyone-day and women drinking seven or more standard drinks on anyone-day for risk of short-term harm. For long-term harm high-risk drinking is defined as men drinking seven or more standard drinks per day or 43 or more standard drinks per week, and for women it is defined as five or more standard drinks per day or 20 or more standard drinks per week.

Glossary of acronyms

The following list contains a number of acronyms frequently used in this thesis. A brief explanation is provided for each acronym to assist the reader.

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
AOD	Alcohol and other drugs
NDSHS	National Drug Strategy Household Survey
NHMRC	National Health and Medical Research Council
TBW	Total body water
WHO	World Health Organization.

Appendices

Appendix 1: Key informant questionnaire

KEY INFORMANT SURVEY: ALCOHOL AND OLDER AUSTRALIANS
Information Sheet and Consent Form

Celia Wilkinson, a PhD candidate from the National Drug Research Institute (NDRI) at Curtin University, is conducting research into alcohol use amongst older Australians. As part of this research she is interviewing a number of key informants who are knowledgeable about alcohol, older people or both.

The key informant interview consists of 19 questions and lasts approximately 25 minutes. Celia will forward a copy of the survey instrument to you and will then contact you at an agreed time to conduct the interview over the telephone. The interview notes and responses will be confidential. What you say will only be used in reports on the research but your name will not be mentioned. You are free to skip any questions and can withdraw from the survey at any time. Celia will send a summary report out to you at the end of the key informant research phase.

If you have any queries about this project you can contact:

Celia Wilkinson	PhD Candidate, National Drug Research Institute, Curtin University Tel: 0892661636. Email: celia.wilkinson@postgrad.culiin.edu.au
Steve Allsop	Director and Professor, National Drug Research Institute, Curtin University of Technology Tel: 08 9266 1606.
Tanya Chikritzhs	Research Fellow, National Drug Research Institute, Curtin University. Tel: 08 9266 1609.

Do you agree to participate in this interview?

Yes ☐ No ☐

Name of key informant _____
Signature of key informant _____
Date _____

Please fax this signed consent form to Celia Wilkinson at the National Drug Research Institute, Curtin University of Technology on:

Fax Number: 08 9266 1611

Inteview details

Date and time of interview .....

Key informant details

Contact details:
Telephone .....

Email. .....

Current Position .....

Name of
organisation .....

Address of
organisation .....

What is your primary occupational role .....

How long have you worked in your current field .....

What is the main component of your work? e.g. Research, treatment, prevention, education, policy .....

Type of organisation

Industry body ☐ TAFE ☐ Government Dept ☐

University ☐ Private Org ☐ Other (please specify)

☐ . . . . . .

Background

Over the next 50 years the number of older people (60 years and over) in Australia is expected to increase to 6.5 million, representing approximately 30% of the total population (ABS, 2004). Globally, it is estimated that by 2050 the proportion of persons aged 60 or over is expected to triple increasing to 2.8 billion or 30% of the world's population (United Nations Department of Economic and Social Affairs Population Division 1998). As a result of the global expansion of the aged population some concerns have been raised about a potential increase in the number of older people experiencing alcohol related problems in Australia. Despite this, there are very few studies examining alcohol use amongst older people.

Key informant Questions

1. In your opinion how relevant is alcohol use amongst older people as a public health issue?

2. In your opinion what impact will the ageing population have on alcohol prevention initiatives in Australia? Why?

3. In your opinion where are the gaps in prevention initiatives for older drinkers?

4. What do you see as the barriers to developing effective prevention responses in relation to alcohol use amongst older Australians?

5. What do you think should be done to ensure the development of effective prevention responses in relation to alcohol use amongst older Australians?

6. In your opinion what impact will the ageing population have on alcohol treatment services in Australia'! Why?

7. In your opinion where are there gaps in treatment initiatives for older drinkers?

8. In your opinion what are the barriers to developing effective treatment responses to alcohol use amongst older Australians?

9. What do you think can be done to ensure the development of effective treatment responses to alcohol use amongst older Australians?

Alcohol Guidelines

To minimise risks in the short and longer term, and gain any longer-term benefits from alcohol the NHMRC recommend that, males should consume an average of no more than four standard drinks a day, and no more than 28 standard drinks over a week, not more than six standard drinks in anyone day, and have one or two alcohol-free days per week. Women should consume an average of no more than two standard drinks a day, and no more than 14 standard drinks over a week, and not more than four standard drinks in any one day, and have one or two alcohol-free days per week. There is considerable evidence that ageing modifies the body's responses to alcohol, including the manner and rate of absorption, distribution and excretion of the drug and that compared to younger persons, older people also achieve a higher blood alcohol concentration for a given quantity of alcohol. As a result the NHMRC have recommended that older people, if they drink, should consider drinking less than the general population drinking levels, but do not specify an amount. The next few questions ask for your opinion on appropriate alcohol limits for older people, specifically 65-74 year old men and women.

Current NHMRC Alcohol Guidelines to avoid risk of harm in the short and longer term for men and women

Men		Women	
Standard drinks per day	Type of Risk	Standard drinks per day	Type of Risk
Up to 6	Reduce risk of acute harm	Up to 4	Reduce risk of acute harm
Up to 4	Reduce risk of chronic harm	Up to 2	Reduce risk of chronic harm

10. What would you recommend as appropriate drinking limits for 65-74 year old men and women based upon the same exclusion as current guidelines e.g. not taking any medication?

Recommended Guidelines for 65-74 year old men and women based upon same exclusion as current guidelines e.g. Not on any medication

Men		Women	
Standard drinks per day	Type of Risk	Standard drinks per day	Type of Risk
	Reduce risk of acute harm		Reduce risk of acute harm
	Reduce risk of chronic harm		Reduce risk of chronic harm

11. Unfortunately we know from the literature that the majority of older people take medications, some of which are contraindicated with alcohol ego Benzodiazepines, analgesics and some antidepressants. For those people aged 65-74 years who were

regularly taking any of these medications what would you recommend as suitable a1cohollimits?

Recommended Guidelines for men and women who are currently taking contraindicated medication

Men		Women	
Standard drinks per day	Type of Risk	Standard drinks per day	Type of Risk
	Reduce risk of acute harm		Reduce risk of acute harm
	Reduce risk of chronic harm		Reduce risk of chronic harm

12. Would you like to make any additional comment on drinking levels for older people?

13. How best do you think information about drinking guidelines should be communicated to the general population?

14. How best do you think information about drinking guidelines should be communicated to older drinkers?

15. Do you think there should be any particular communication strategies for subgroups of older drinkers? (Please identify who these subgroups are and what specific strategies should be employed)

16. How best do you think information about drinking guidelines for older people be communicated to those professions who work with this age group?

17. What would you identify as three key priorities for research in this area?

18. Do you have any other comments in relation to alcohol use and older people?

19. Can you suggest any other key informants in the area that we should contact?

Name .....

Position .....

Telephone .....

Email. .....

Address .....

That concludes our questions
Thank you for your assistance.
As soon as this phase of the research is completed you will be sent a summaryreport.

==========

END OF QUESTIONNAIRE

Appendix 2: Centrelines request for key informants

ALCOHOL AND OLDER DRINKERS

Research project – call for key informants

Do you have an interest in the NHMRC Australian Alcohol Guidelines and Ageing? Celia Wilkinson, a PhD candidate from NDRI, is conducting research on alcohol use amongst older people. Part of her research involves exploration of the Australian Drinking Guidelines as they apply to 65-74 year olds. Celia is looking for key informants to interview on the topic. Each key informant would be sent a survey and then telephoned by Celia for a 15-minute interview. The results of the key informant interviews will be used to re-analyse data from the 2004 NDSHS on the prevalence of at risk drinking amongst 65-74 year old current drinkers. Celia is also conducting a large study examining the pouring practices of older drinkers. All key informants would be given a summary report of her research findings.

If you can help or recommend someone, contact Celia on 08 9266 1636 or celia.wilkinson@student.curtin.edu

Appendix 3: Consent form and questionnaire for Study 2

COMMUNITY SURVEY OF ALCOHOL USE AMONGST 65-74 YEAR OLDS
INFORMATION SHEET AND CONSENT FORM

Interviewer code	☐☐
Recruitment Code	☐☐
Postcode	☐☐☐☐
Survey Date *(Office use only)*	☐☐☐☐☐☐

Alcohol is widely used and enjoyed throughout our society, and for many people it forms part of an enjoyable and healthy lifestyle. Some professionals have argued that alcohol consumption is of benefit both psychologically and physically to many people. One area that little is known about is alcohol use amongst older people. This survey by a research team from Curtin University aims to better fill the gaps in our knowledge about the use of alcohol amongst older Australians.

There are no right or wrong answers to any of the questions. Any information you provide will be confidential. No one but members of the research team will know the answers that you give, and by law they aren't allowed to tell others what you say. The survey will take about 30 minutes and you are free to withdraw from the survey at any time. At the end of the survey you will be given $10 and a glass as an acknowledgement of your commitment to participate. To be eligible for the survey you must be aged between 65 and 74 years inclusive and had a drink of alcohol in the last 12 months.

(1) Do you fit these criteria?
No ☐ Yes ☐

(2) Do you have any questions?
No ☐ Yes ☐

(3) Are you willing to take part in the survey?
No ☐ Yes ☐

I understand what this survey is about and consent to participate. I also understand that I can withdraw at any time.

Participant's Name: .....

Participant's Signature: .....

Demographics

I need to get the following details to make sure that the people we survey represent a cross section of the older community

(Please tick the box that applies)

1. Is the participant male or female? Male ☐ Female ☐

2. Could you please tell me how old you arc? Age in years ☐☐
(if person is not within the 65-74 year inclusive age range discontinue interview)

3. Are you of Aboriginal or Torres Strait Islander Origin? Yes ☐ No ☐
Don't know ☐

4. What is your current marital status

Married (including defacto) ☐	Widowed ☐	Divorced ☐
Separated but not divorced ☐	Never married ☐	Other (please specify) ……..…. ☐

5. In which country were you born?

Australia ☐	China ☐	Germany ☐	Greece ☐	Hong Kong ☐
India ☐	Ireland (republic of) ☐	Italy ☐	Lebanon ☐	Malaysia ☐
Malta ☐	Netherlands ☐	New Zealand ☐	Philippines ☐	Poland ☐
South Africa ☐	Turkey ☐	United Kingdom (England, Scotland, Wales, Northern Ireland) ☐		USA ☐
Vietnam ☐	Serbia and Montenegro (formerly Yugoslavia) ☐			
Other (please write in) ☐				

6. *(If not born in Australia ask the person):* In what year did you first arrive in Australia to live here for one year or more?
Year--- ☐☐☐☐ Not applicable ☐

7. What is the main language spoken at home? *(Mark one-response only)*

English ☐	Arabic (including Lebanese) ☐	Cantonese ☐
Greek ☐	German ☐	Italian ☐
Mandarin ☐	Serbian/Croatian ☐	Spanish ☐
Vietnamese ☐	Other Asian language ☐	Other European language ☐
Other ------ ☐		

8. What is the main language **YOU** speak at home? *(Mark one-response only)*

English ☐	Arabic (including Lebanese) ☐	Cantonese ☐
Greek ☐	German ☐	Italian ☐
Mandarin ☐	Serbian/Croatian ☐	Spanish ☐
Vietnamese ☐	Other Asian language ☐	Other European language ☐
Other ------ ☐		

9. What other languages are spoken at home? *(Mark all that apply)*

English ☐	Arabic (including Lebanese) ☐	Cantonese ☐
Greek ☐	German ☐	Italian ☐
Mandarin ☐	Serbian/Croatian ☐	Spanish ☐
Vietnamese ☐	Other Asian language ☐	Other European language ☐
Other ------ ☐		

10. Which of the following best describes your employment status. Are you ....

Retired or on a pension	☐	Doing home duties	☐
Working full time for pay	☐	Working part time for pay?	☐
Volunteer work	☐	Other - please specify	☐

11. Have you ever been in paid work? Yes ☐ No ☐
(if no, go to Q14)

12. What kind of work did you do (or do you do) when you last worked?
(Ask them to describe the job in which they worked most hours only)

Title .....
Main duties/tasks .....

13. What kind of industry, business or service was/is carried out by your last or main employer? *(Ask them to describe as fully as possible ego Plumbing, footwear manufacturing, real estate, roadfright transport, book retailing, dairy farming etc.)*

14. What is the highest year of primary or secondary school you have completed?

Did not go to school	☐	Year 9 or equivalent	☐
Year 6 or below	☐	Year 10 or equivalent	☐
Year 7 or equivalent	☐	Year 11 or equivalent	☐
Year 8 or equivalent	☐	Year 12 or equivalent	☐

15. Have you completed a trade certificate or other educational qualification?
Yes ☐ No ☐
(if no, go to Q.17)

16. What is the highest qualification that you have obtained?

Trade certificate	☐	Non-trade certificate	☐
Associate Diploma	☐	Undergraduate Diploma	☐
Bachelor Degree	☐	Doctorate	☐
Masters Degree, Postgraduate Degree or Postgraduate Diploma			☐

Thanks. I will now move onto the main part of the survey

Alcohol

17. What type of alcohol do you usually drink?
(Mark all that apply)

Cask wine ☐	Low alcohol beer (1% to 2.9%) ☐	Premixed spirits in a can (eg. UDL, Jim Beam and Cola) ☐
Bottled wine ☐	Home brewed beer ☐	Premixed bottles (e.g.) Bacardi breezers, sub-zero, lemon ruski/stolis) ☐
Regular strength beer (> 4%) ☐	Fortified wine, port, vermouth, sherry etc? ☐	Bottled spirits and liqueurs (eg. scotch, brandy, vodka, rum, Kahlua, midori, baileys etc) ☐
Mid strength beer (3% 3.9%) ☐	Cider ☐	Other (please specify ☐

18. Of these beverages, which types do you drink most often? *(if more than one type, ask participant to come up with three most commonly used. Ask participant to rank the three in order, with 1 being the beverage most often consumed etc. If a wine drinker ask them whether they drink red or white wine).*

Beverage Type No. 1 .....

Beverage Type No.2 .....

Beverage Type No.3 .....

a) If person drinks beer or pre-mixed spirits in a can or bottle ask them:

How would you usually drink this? Would you:

If person drinks from a can ask the first three questions. If person drinks from bottle ask the last three questions. If the person drinks beer ask them whether the beer is from a bottle or can and then ask appropriate questions from below.	**Beverage 1·**	**Beverage 2**	**Beverage 3**
1. Usually drink from the can but occasionally pour into a glass	☐	☐	☐
2. Always drink from the can	☐	☐	☐
3. Usually pour the drink into a glass/container	☐	☐	☐
4. Usually drink from the bottle/stubbie but occasionally pour into a glass	☐	☐	☐
5. Always drink from the bottle/stubbie	☐	☐	☐

*b) If the person **only** drinks beer from a stubbie/bottle ask them what size bottle/stubbie they usually drink?*

☐☐☐ ml Unsure ☐

(If all three beverages are always consumed from a can, bottle or stubbie then go to Q 20 on Page 7).

Pouring Practice

The next area I would like to ask you about relates to the type of glass or container that you would usually use when you would have a drink of: .....
(beverage types listed above).

Would you please get the glass/container that **you** would use when you have a drink of each of these beverages. *(Note to Interviewer: Then bring out the bottles you have in your kit. If the participant uses the same glass for all drinks then after they have poured each beverage pour the contents into one of the research glasses (not the measuring beaker) and note which beverage is in which glass. If the person drinks a spirit ask them whether they would usually pour the drink straight or over ice. If over ice use the ice rocks in kit).*

19. Would you usually pour your own alcoholic drink? Yes ☐ No ☐
(if no, then in next questions ask the person to pour the usual serving that would be poured for them)

In each of these bottles we have coloured water to replicate the appearance of wine, beer etc. *(use examples that match the beverages used by participant)*. Using these bottles could you please now pour your usual serve of:

Beverage type No.1 ..... (After pouring ask the person: is that about as much as you would have consumed when you last had a drink of) Yes ☐ No ☐ Unsure ☐

Note what type of glass/container was used:

Short wide tumbler	☐	Beer glass	☐
Tall narrow highball	☐	Other (please specify)	☐
Wine glass	☐		

Beverage type No.2 ..... (After pouring ask the person: is that about as much as you would have consumed when you last had a drink of) Yes ☐ No ☐ Unsure ☐

Note what type of glass/container was used:

Short wide tumbler	☐	Beer glass	☐
Tall narrow highball	☐	Other (please specify)	☐
Wine glass	☐		

Beverage type No.3 ..... (After pouring ask the person: is that about as much as you would have consumed when you last had a drink of) Yes ☐ No ☐ Unsure ☐

Note what type of glass/container was used:

Short wide tumbler	☐	Beer glass	☐
Tall narrow highball	☐	Other (please specify)	☐
Wine glass	☐		

Thanks that's great; I would now like to ask you a couple of further questions about your use of alcohol and then your opinions about the benefits and potential problems of alcohol use for older people.

Consumption

20. About what age were you when you had your first full serve of alcohol? *(e.g. a glass of wine, a whole nip of spirits, a glass of beer, etc.)*

Age in years ☐☐ Unsure ☐

21. In the last 12 months, how often did you have an alcoholic drink of any kind? *(mark one response only)*

Every day	☐	5 to 6 days a week	☐
3 to 4 days a week	☐	1 to 2 days a week	☐
2 to 3 days a month	☐	About one day a month	☐
Less than one day per month	☐		

22. **Where** do you **usually** drink alcohol? *(Mark all that apply- explain that stems may appear unusual for older people but need to ask to match existing data)*

In your own home	☐	At a friend's house	☐
At a party at someone's house	☐	At raves/dance parties	☐
At restaurant/cafes	☐	At licensed premises (e.g. pub/club)	☐
At school, TAFE, University	☐	At your workplace	☐
In public places (e.g. parks)	☐	In a car or other vehicle?	☐
Somewhere else? (specify)	☐		

23. On a day that you have an alcoholic drink, how many standard drinks do you usually have? *(Show the participant the pictures of standard drinks taken from the NDSHS)*

☐☐

24. How often in the last 12 months have you had each of the following number of standard drinks in a day?

No of drinks	Every day	5-6 days a week	3-4 days a week	1-2 days a week	2-3 days a month	About1 day a month	Less often	Never
20 or more standard drinks a day								
11-19 standard drinks a day								
7-10 standard drinks a day								
5-6 standard drinks a day								
3-4 standard drinks a day								
1-2 standard drinks a day								

25. How many standard alcoholic drinks did you have yesterday?

No. of drinks ☐☐

(if less than one please indicate to the nearest fraction: ¼☐ ½☐ ¾☐)

26. Self assessment of standard drinks

(Note to interviewer: if not visible bring back to the interview the glasses poured and then ask the following questions)

a) For the glass of ..... **(Beverage type No.1)** would you record this amount as one standard drink?

Yes ☐

No ☐

(if no) How many drinks would you have recorded this as? .....

a) For the glass of ..... **(Beverage type No.2)** would you record this amount as one standard drink?

Yes ☐

No ☐

(if no) How many drinks would you have recorded this as? .....

a) For the glass of ..... **(Beverage type No.3)** would you record this amount as one standard drink?

Yes ☐

No ☐

(if no) How many drinks would you have recorded this as? .....

27. *(For those people who **only** drink alcohol straightfrom can/bottle/stubbie ask):*

a) For the can/bottle/stubbie of ..... **(Beverage type No.1)** would you record this amount as one standard drink?

Yes ☐

No ☐

(if no) How many drinks would you have recorded this as? .....

a) For the can/bottle/stubbie of ..... **(Beverage type No.2)** would you record this amount as one standard drink?

Yes ☐

No ☐

(if no) How many drinks would you have recorded this as? .....

a) For the can/bottle/stubbie of ..... **(Beverage type No.3)** would you record this amount as one standard drink?

Yes ☐

No ☐

(if no) How many drinks would you have recorded this as? .....

(Note to interviewer: then measure how many mls each of the drinks equals and record amounts. Jfbeer, premixed spirits note the mls from the can/bottle/stubbie.}

Beverage Type No.1: *No of mls* ☐☐☐

Beverage Type No.2: *No of mls* ☐☐☐

Beverage Type No.3: *No of mls* ☐☐☐

28. Have you ever felt you ought to cut down on you drinking? Yes ☐ No ☐

29. Have people ever annoyed you by criticising your drinking? Yes ☐ No ☐

30. Have you ever felt bad or guilty about your drinking? Yes ☐ No ☐

31. Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover? Yes ☐ No ☐

Knowledge Utility

That's great. Next I would like to ask you for your opinions about drinking guidelines.

32. Before today, had you ever heard of a 'standard drink' of alcohol?

Yes ☐ Unsure ☐ No ☐

33. Before today, had you ever heard of the Australian Alcohol Guidelines?

Yes ☐ Unsure ☐ No ☐ *(if no, go to Q39)*

34. In these Guidelines recommendations are made by the NHMRC about the number of standard drinks of alcohol an adult should drink to minimise the risk of ill health and maximise health benefits.

Do you know what the NHMRC recommendations are for men?

No ☐ *(if no, go to Q.35)* Yes ☐ If yes:

a) What is the maximum number of standard drinks over a week for men?

☐☐.☐

b) What is the maximum number of standard drinks in any one day for men?

☐☐.☐

35. Do you know what the NHMRC recommendations are for women?

No ☐ *(if no, go to Q.35)* Yes ☐ If yes:

a) What is the maximum number of standard drinks over a week for women?

☐☐.☐

b) What is the maximum number of standard drinks in any one day for women?

☐☐.☐

36. What about for people in your age group.

Do you know what the NHMRC recommended limits are for older men:

Yes ☐ No ☐ Unsure ☐

(If yes)
What are the recommendations?
.....
.....
.....
.....

37. Do you know what the NHMRC recommended limits are for older women:

Yes ☐ No ☐ Unsure ☐

(If yes)
What are the recommendations?
.....
.....
.....
.....

38. How relevant do you think the Australian Alcohol Guidelines are for older people?

Not at all relevant ☐ Somewhat relevant ☐ Very relevant ☐

39. What would you recommend as the maximum number of standard drinks of alcohol a man aged 65-74 years should drink to minimise the risk of ill health and maximise health benefits.

a) Per day? ☐ No opinion ☐ Unsure ☐

b) Per week? ☐ No opinion ☐ Unsure ☐

40. What would you recommend as the maximum number of standard drinks of alcohol a woman aged 65-74 years should drink to minimise the risk of ill health and maximise health benefits.

a) Per day? ☐ No opinion ☐ Unsure ☐

b) Per week? ☐ No opinion ☐ Unsure ☐

Consequences of alcohol use

I would now like to get your opinion on the reasons that older people drink alcohol and the potential problems.

41. For you personally what are the reasons you like to have a drink of alcohol?

.....
.....
.....
.....

Do any of the following reasons also apply:
(mark all that apply)

Because you like the taste	☐	To be sociable	☐
To add to the enjoyment of meals	☐	To accompany your partner/spouse	☐
To help you relax	☐	To feel good	☐
To relieve tension or anxiety	☐	To pass the time	☐
To help you sleep	☐	To forget worries	☐
To block out depressing thoughts	☐	To cheer you up	☐
To block out loneliness	☐	To feel less inhibited or shy	☐
To give you self confidence	☐	To relieve pain	☐

42. Have you ever experienced any problems as a result of your alcohol use?

Yes ☐ No ☐

(If yes) What were these problems?

1) .....

2) .....

3) .....

4) .....

5) .....

6) .....

7) .....

43. Finally, I would just like to ask you a few questions about your health. In general, would you say your health is:

Excellent	☐	Fair	☐
Very good	☐	Poor	☐
Good	☐		

44. Have you taken any medications over the last week? *(This includes those prescribed by a Doctor and over the counter medications that do not require a prescription.)*

Yes ☐ (Continue) No ☐

If yes, how many different types of medications did you take yesterday?

Number of different medications ☐☐

Unsure ☐

Thanks. Finally, could you please tell me how you heard about the research?

(please circle one response and transfer no. to front of questionnaire)

Through pharmacy/chemist 1	Positive Ageing Foundation 2
Friends, acquaintance etc 3	Retirement village 4
Local paper 5	Senior Citizen centre 6
Dr's surgery 7	Shopping centre noticeboard 8
Other specify 9	

That concludes our questions.
Thank you very much for your help and participation in our research.

Then give the person the $10 and ask them if they know any other person who might be interested in helping and give them Celia's contact details to pass on to potential participants.

==========

Appendix 4: Recruitment flyer sent to individuals

National Drug Research Institute
Preventing harmful drug use in Australia

Curtin
University of Technology

Calling all Seniors

Would you like to have some fun, take part in some University research and receive *$10* as a thank you for your time?

If you are aged between 65 and 74 and have had a drink of alcohol in the past year, then we would like to talk to you.

This Curtin University approved research is confidential, only takes about 30 minutes and we visit you to do the interview.

Interviews will be conducted until December 2005.

If you can help out, please contact:
Celia Wilkinson
Doctoral Student
National Drug Research Institute
Curtin University of Technology
Tel: 9266 1636
celia.wilkinson@postgrad.curtin.edu.au

Appendix 5: Recruitment flyer sent to organisations

National Drug Research Institute
Preventing harmful drug use in Australia

Curtin
University of Technology

Calling all Seniors

Would you like to have some fun, take part in some University research and receive *$10* as a thank you for your time?

If you are aged betweeen 65 and 74 and had a drink of alcohol in the past year, then we'd like to talk to you.

This Curtin University approved research is confidential, only takes about 30 minutes and we visit you to do the interview.

Interviews will be conducted until December 2005.

If you can help out, please contact:
Celia Wilkinson
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Celia Wilkinson Alcohol project Tel: 9266 1636 Celia Wilkinson Alcohol project Tel: 9266 1636 Celia Wilkinson Alcohol project Tel: 9266 1636 Celia Wilkinson Alcohol project Tel: 9266 1636 Celia Wilkinson Alcohol project Tel: 9266 1636 Celia Wilkinson Alcohol project Tel: 9266 1636 Celia Wilkinson Alcohol project Tel: 9266 1636 Celia Wilkinson Alcohol project Tel: 9266 1636 Celia Wilkinson Alcohol project Tel: 9266 1636

Appendix 6: Letters sent out to Positive A-geing Foundation members

Dear Positive Ageing Research Group Member .

Researchers from Curtin University and the National Drug Research Institute are undertaking a study to examine the pouring practices of 65-74 year old current drinkers living in Perth. Very little research has been conducted in this area and this study will provide a better understanding about older people's alcohol use. The results will be used to help develop future public health policies and initiatives in this important area.

We have enclosed a pamphlet that gives you some more information about the study. If you are aged between 65 and 74 years, have consumed alcohol during the last 12 months and are interested in joining the study or would like further information, please contact Celia Wilkinson on (08) 9266 1636 as soon as possible.

Thank you for continuing to support the Positive Ageing Research Group and its role in improving the health and well-being of older Australians.

Yours sincerely

Dr Peta Williams
Research and Projects Manager
Positive Ageing Foundation of Australia

15 March 2005.

Appendix 7: Second letter sent out by the Positive Ageing Foundation

Dear Positive Ageing Research Group Member

Earlier this year we contacted you about a research study investigating older people's alcohol use. The researchers from Curtin University and the National Drug Research Institute were overvvhelmed by the response and would like to thank all those people who took part. They have now interviewed around 550 people. However, they still need more people and aim to interview another 450 by the end of this year.

If you are aged between 65 and 74 years of age, have consumed alcohol in the last 12 months and are interested in joining the study but were not involved in the first round of interviews, please contact Celia Wilkinson on (08) 92661636 as soon as possible.

Importantly, this study is open to all interested people who meet the criteria not just Research Group Members. So, if you know someone who might be interested in participating please let them know about the study.

Thank you once again for your time and support in improving the health and well-being of older Australians.

Yours sincerely

Dr Pete Williams
Research & Projects Manager
Positive Ageing Foundation of Australia

30 August 2005.

Appendix 8: Letters sent to organisations by the Candidate

Namc Address Date

Dear .....

My name is Celia Wilkinson and I am a PhD candidate at the National Drug Research Institute at Curtin University and am investigating alcohol usc amongst older people for my Doctoral study.

The research has been approved by Curtin University Ethics and Research Committees and involves interviewing 500 men and 500 women aged 65-74 years of age who have had a drink of alcohol in the last year. The face to face interviews take about 30 minutes, are confidential, anonymous and voluntary. Interviewers travel to the participant's home to conduct the interview so no travel is required by participants. As a thankyou for taking part, each participant is given $10 and a free glass provided by the Australian Government Department of Health and Ageing. Interviews will be conducted until December 2005.

It is the aim of the research to provide a better insight into the use of alcohol amongst older people and provide evidence that can be used for the development of future health policy initiatives. As the number of participants is so large I am contacting a range of organisations affiliated with seniors for assistance. To that end would it be possible for you to display the attached poster so that interested persons in your club can contact me should they wish to participate.

If you have any questions about the research please do not hesitate to contact me or my PhD supervisor, Professor Steve Allsop (Director, National Drug Research Institute, Curtin University).

Thankyou for your assistance in my research.
Sincerely

Celia Wilkinson
PhD Candidate
National Drug Research Institute
Curtin University of Technology
Tel: 9266 1636
Email: celia.wilkinson@postgrad.curtin.edu.au

Appendix 9: Letters of support from Professor Allsop that were sent to organisations.

Name
Title
Address

Dear ……..

I am writing to indicate my support for the PhD research, being undertaken by Celia Wilkinson from the National Drug Research Institute, on alcohol use and older people. I am one of the supervisors of this program of study and Celia will have my full support.

I have worked in the alcohol and drug field for over twenty years and am pleased that Celia wishes to expand our knowledge base concerning alcohol use amongst older Australians. With the rapid ageing of the Australian population it is important, from both a public health and a clinical perspective, that we know more about older people's alcohol use. Unfortunately, very little research has been conducted in this important area and Celia's proposed research will provide important evidence that can be used for the development of future public health policy initiatives.

I commend Celia's PhD research to you and hope that you consider favourably her request for assistance by displaying the enclosed recruitment poster.

Yours sincerely

Professor Steve Allsop (PhD)
DIRECTOR
National Drug Research Institute
Curtin University of Technology

Appendix 10: Media release sent out to newspapers and Curtin radio

National Drug Research Institute

Preventing harmful drug use in Australia

Older people and drinking: Becoming a full bottle

For Immediate Release

June 13, 2005

Older people across Perth are being asked to take part in important research into alcohol consumption among 65-74 years olds being conducted by Curtin's National Drug Research Institute.

According to Celia Wilkinson, who is conducting the research as part of her PhD thesis, there is a wealth of research on alcohol use amongst young people but little on the drinking habits of older people.

Ms Wilkinson is looking for participants in the Perth metropolitan area to take part in the project. To take part, participants must be aged 65-74 and have had a drink of alcohol in the past 12 months.

During 3D-minute interviews, participants are asked about the types of alcohol they drink, reasons for drinking, and their opinions on national drinking guidelines.

Ms Wilkinson, who plans to interview 1000 people by the end of this year, said there was a significant and important gap in the knowledge about older people's alcohol use.

With% of the Australian population expected to be aged over 65 years by 2050, this gap needed to be addressed.

"Alcohol use amongst older people will have more and more implications for the community as the population continues to age," Celia said.

"This research will provide important evidence that can be used to develop future public health initiatives to improve the wellbeing of older Australians."

To take part in the research, contact Celia Wilkinson on 9266 1636.

NOTE TO EDITORS: IMAGES AVAILABLE ON REQUEST

MEDIA CONTACT: Celia Wilkinson (08) 9266 1636
Vic Rechichi, NDRI Media Officer 0414 682 055

Appendix 11: Information sent to the Injury Control Council of Western Australia, to distribute to members.

Alcohol Use and Older Australians

In Australia, as in most western societies, the use of alcohol is responsible for significant mortality and morbidity as well as economic and social harm. Conversely, for many people alcohol forms part of an enjoyable and healthy lifestyle. While there has been a great deal of research on alcohol use amongst young people, very little research has focused on alcohol use amongst older Australians. This gap is particularly significant when we consider the rapid ageing of the Australian population. In the current decade the size of the older population is expected to increase by 26% and over the next 50 years the older population is expected to reach 6.5 million people, representing 25% of the total population.

In an attempt to better understand alcohol use amongst older people, Celia Wilkinson (a PhD Candidate at Curtin University) has commenced a large research project that involves interviewing 1000 men and women between the ages of 65 and 74 years (inclusive) about their use of alcohol and their opinions on a number of health guidelines. All participants receive $10 and a glass from the Department of Health and Ageing for taldng part. If you are aged 65 to 74 years old, have had at least one drink of alcohol in the past year and are interested in taking part in this Curtin University approved project then Celia would appreciate hearing from you. She can be contacted by telephone on 9266 1636 or email at celia.wilkinson@student.curtin.edu.au

Appendix 12: Qualitative questionnaire used in Study 2

Interviewer comments:

Do you think that the participant fully understood the questions being asked?

Yes, appeared to completely understand all questions	☐	
Participant seemed a little confused on a few questions	☐	Explain .....
.....		
No, did not appear to understand the majority of questions	☐	Explain .....
.....		

Did the participant have any problems pouring the beverages?

No problems ☐	
Minor problems with one or two beverages ☐	Explain ....
Major problems ☐	Explain ....

Do you have any other comments?

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