

Death, disease and disability due to alcohol in New Zealand

Executive summary

This summary outlines the main findings from a series of projects undertaken by researchers at the School of Population Health at Auckland University since 2002. The research group, headed by Professor Rod Jackson, undertook to investigate the effects of alcohol consumption on a range of health conditions using information that had already been collected in the course of several large studies at the University. Following on from this, the group assessed the measurable impacts of alcohol on health in New Zealand using both local and international research about the effects of alcohol on a wide range of conditions. These projects resulted in the publication of seven research papers, two editorials and the ALAC report "The burden of death, disease and disability due to alcohol in New Zealand." A brief summary of each of these publications is given below.

Bramley D, Broad J, Harris R, Reid P, Jackson R. Differences in patterns of alcohol consumption between Māori and non-Māori in Aotearoa (New Zealand). *New Zealand Medical Journal*. 2003;116:U645.

As well as the overall amount of alcohol we drink, our pattern of drinking has been shown to have an important influence on health. However, in most research on alcohol the amount people drink has been reported as an averaged number of glasses per day or per week, obscuring differences in the number of days they drink and the amount usually consumed on a single occasion.

This study sought to compare Māori and non-Māori patterns of drinking, in order to better understand the health impacts of alcohol for Māori. Information from five large New Zealand surveys was pooled to look at these patterns. Marked differences in drinking patterns were demonstrated, even though Māori and non-Māori consumed very similar amounts of alcohol on average. Non-Māori were more likely to be drinkers of alcohol than Māori (there were less abstainers), and drank alcohol on more days of the year. These differences were greatest in older people. However, the volume of alcohol consumed on a typical drinking occasion was consistently 35-40% less for non-Māori than Māori drinkers, resulting in the same average consumption.

Although there was variation in methods used and populations studied in the studies examined, the findings were very consistent and were similar in both men and women, in young, middle-aged and older adults. These data suggest that the health effects of current alcohol consumption would be markedly different in Māori and non-Māori populations.

Wells L, Broad J, Jackson R. Alcohol consumption and its contribution to the burden of coronary heart disease in middle-aged and older New Zealanders: a population based case-control study. *New Zealand Medical Journal* 2004;117:1-13.

There has been considerable discussion about the potential benefits of alcohol consumption and, in particular, its role in the reduction in heart disease. Uncertainty remains about how great the benefit is, who gets a benefit from drinking alcohol, and how much alcohol you need to drink to get a benefit. This study used information gathered from 3000 middle-aged and older New Zealanders to investigate these questions.

Amongst men aged 35-74 there was a substantial reduction in heart attacks for those who drank alcohol more than once a month, compared with non-drinkers. These regular drinkers were only half as likely to have a heart attack as non-drinkers, and this was the same across a range of drinking patterns: from men who reported drinking less than once a week to those drinking every day, and from men who usually had only one drink to those typically having four or more drinks in a session. Amongst women of the same age, the effect of alcohol was less clear-cut and this was partly because there were fewer women who had heart attacks in the study. The reduction in risk associated with drinking was smaller than for men (20-40% reduction) and only seen in light-to-moderate drinkers.

From this information about risk reduction the investigators estimated that if everyone had the same risk of a heart attack as the regular drinkers, there would be 15% fewer heart attacks in men and 21% fewer heart attacks in women in New Zealand.

Many different types and amounts of alcoholic beverages were consumed by participants in this study but only the alcohol content was taken into account, as there is no convincing evidence that one type of beverage is more beneficial for the heart than others.

There are a number of issues that should be borne in mind when considering these findings. Firstly, a reduction in risk would be most beneficial for those whose risk of a

heart attack is otherwise high. In general this will be older people, and men more than women. In particular, there is no benefit for young people. Secondly, this study did not include any Māori or Pacific people and it is not known whether the findings would be the same in these populations. Thirdly, the information about drinking was collected from participants themselves and may underestimate true volume or frequency of alcohol consumption. Fourthly, benefits to the heart need to be considered in the light of other risks and benefits of alcohol. Finally, it was surprising that people who drank only about once per week had a significantly lower risk of coronary disease compared to non drinkers as it unlikely this amount of alcohol has significant biological effect. This finding has stimulated our research group to reconsider the validity of protective association generally observed between alcohol and coronary disease and we report our concerns in an editorial in the Lancet that is summarised at the end of this report.

Bramley D, Broad J, Jackson R, Reid P, Harris R, Ameratunga S, Connor J. Cardiovascular risk factors and their associations with alcohol consumption: are there differences between Māori and non-Māori in Aotearoa (New Zealand)? NZ Med J 2006;119(1232):1929.

There are no epidemiological studies of the effect of alcohol on coronary heart disease outcomes in Māori populations, and it is unclear whether the effects would be similar to those seen in non-Māori New Zealanders and other European populations studied overseas. To investigate whether there might be important differences, this study examined whether the relationship between alcohol and each of a number of risk factors for coronary disease was different between Māori and non-Māori. Smoking, blood pressure (systolic and diastolic), high-density lipoprotein (HDL or “good cholesterol”), the ratio of total cholesterol to HDL, blood sugar levels and body mass index (BMI) were considered. As in the previous study by Bramley and colleagues described above, information from five large New Zealand surveys was pooled to investigate these associations.

The study found that Māori had generally higher levels of coronary disease risk than non-Māori as measured by all of these risk factors, i.e. more of the population smoked, average values for blood pressure, cholesterol ratio, serum glucose, and BMI were higher, average HDL was lower, and diabetes was more common.

A relationship between alcohol consumption and each of the risk factors was demonstrated for both Māori and non-Māori. For lipids (HDL and cholesterol ratio),

serum glucose, diabetes and BMI this relationship appeared to be same for Māori and non-Māori. However for smoking and blood pressure, differences were observed. While these differences are difficult to interpret in this exploratory study, they do suggest there are ways in which the effect of alcohol on coronary disease could differ between Māori and non-Māori. The similarity of the effect of alcohol on blood lipids (HDL) in Māori and non-Māori suggests that a regular drinking pattern would be associated with some reduction in risk of heart attacks in Māori, as increased HDL is thought to contribute to as much 50% of the protective effect of alcohol on the heart. Likewise these findings suggest that the reduction in diabetes in light-to-moderate drinkers that is seen in European populations would be found Māori.

Scragg R, Metcalf P. Do triglycerides explain the U-shaped relation between alcohol and diabetes risk? *Diabetes Research and Clinical Practice* 2004;66:147-56.

The effect of alcohol on the risk of diabetes was investigated in detail in this study of more than 5000 working adults aged 40-65, which included almost 20% Māori and Pacific workers. While fasting blood glucose level was not affected by the amount of alcohol people drank, when participants were given a glucose tolerance test (a diagnostic test for diabetes) there was a U-shaped relationship between average daily consumption of alcohol and the 2 hour blood glucose reading. That is, light drinkers (who averaged about half a drink per day) had less risk of diabetes than either non-drinkers or heavy drinkers. This was similar in men and women and in all ethnic groups, and was consistent with many previous studies in European populations. Other research has shown this relationship to be mediated by alcohol improving insulin sensitivity. From the data in this study the proportion of diabetes cases attributable to people not drinking alcohol was 6.5%, which is very minor in comparison to the proportion of cases attributable to obesity (54%). While light-to-moderate drinkers can be reassured that they are not increasing the risk of diabetes by drinking, encouraging non-drinkers to drink alcohol would not be an effective population strategy to prevent diabetes.

The investigators also considered whether part of this effect of alcohol on diabetes risk was due to other variables associated with alcohol intake such as exercise, smoking, body mass index (BMI), HDL cholesterol, blood pressure or triglycerides. Accounting for most of these factors either had no effect or reduced the protective association of alcohol with diabetes a little. However controlling for triglyceride levels increased the protective effect of alcohol on diabetes and this effect was strongest

amongst heavy drinkers, resulting in an L-shaped rather than U-shaped relationship. This finding suggests that alcohol may affect diabetes risk by a mechanism related to triglyceride metabolism, and that in heavy drinkers this counteracts the benefits of alcohol on improving insulin sensitivity.

Connor J, Norton R, Ameratunga S, Jackson R. The contribution of alcohol to serious car crash injuries. *Epidemiology* 2004;15:337-44.

Alcohol has some of its greatest adverse effects on health through the impact of intoxication on injury risk. All categories of injury are affected, both intentional and unintentional, but one of the largest is road traffic injury. This study, conducted in the Auckland region, estimated how much the risk of a serious injury car crash was increased by driver's blood alcohol at different levels. Drivers who had blood alcohol level of 3-50 mg% (and were therefore still below the legal limit) were found to have three times the risk compared with non-drinking drivers, and drivers with blood alcohol above 50 mg% had 23 times the risk of being involved in a crash where someone in their car was hospitalised or killed. While the increase in risk associated with a positive blood alcohol level below the limit is fairly modest the number of affected drivers is large, and this group was found to account for 5% of all serious injury crashes or one-sixth of alcohol-attributable crashes. Overall, 30% of all serious injury crashes were attributable to alcohol and would not have occurred if no drivers had a positive blood alcohol. Two-thirds of these crashes involved drivers with a blood alcohol of more than 150 mg%.

While this report deals with a number of methodological issues about studying alcohol and car crashes, it also discusses the setting of legal limits for drink-driving. The selection of a limit is primarily a political rather than a scientific issue, and must balance the prevention of injury, the capability for enforcement, and public acceptability. However the kind of epidemiological evidence seen here can indicate where there is most potential for reduction of harm and can help predict the effects of changes in policy. It is noteworthy that the study findings suggest equal proportions of alcohol-related injury crashes are attributable to drivers with blood alcohol concentrations of 3 to 50 mg% (i.e. below the current legal limit) as those with levels of 51 to 150 mg%.

Connor J, Broad J, Rehm J, Vander Hoorn S, Jackson R. The burden of death, disease and disability due to alcohol in New Zealand. *NZ Med J* 2005;118:1412.

This paper outlines the findings of the much larger ALAC report¹ of the same name. The aim of this project was to estimate the impact of alcohol consumption on the health of our population, in terms of the amount of death, disease and disability due to (and prevented by) alcohol each year in New Zealand. To do this the research team adapted methods that were developed by the World Health Organisation (WHO) for measuring the impact of important risk factors on health at a regional and global level. We estimated the burden of alcohol for the whole of New Zealand, and for Māori and non-Māori separately where possible. We included all health conditions that have a known relationship with alcohol consumption and for which there is research demonstrating how strong the effect of alcohol is. The scope was limited to diseases and conditions that are recorded in our health statistics. We used information about volume and pattern of alcohol consumption in Māori and non-Māori men and women in five different age groups over 15 years old to calculate how many deaths and how much disability from each cause would be due to alcohol. In two separate analyses we estimated mortality in 2000, and disability-adjusted life years in 2002.

We estimated that almost 4% of all deaths in New Zealand in 2000 were attributable to alcohol consumption (approximately 1040 deaths), and that approximately 980 deaths were prevented by alcohol, resulting in a net loss of about 60 lives. Since many of the alcohol-attributable deaths occurred before middle age and the deaths prevented by alcohol were almost entirely amongst older people, the balance of years of life lost and gained due to alcohol consumption was much less favorable. There were 17,200 years of life lost, but only 5,300 years of life gained; a net loss of almost 12,000 years of life due to alcohol.

The burden of mortality from alcohol use was not evenly spread in the population. The rate of years of life lost due to alcohol was four to five times higher in men than in women, largely due to high alcohol-related mortality in men in the 15-44 year age group. These differences between men and women were seen in both the Māori and non-Māori populations. However, both Māori men and Māori women had higher mortality than non-Māori of the same age. Overall, Māori had 4 times the alcohol-related mortality of non-Māori, and more than double the rate of years of life lost due to alcohol.

¹ Connor J, Broad J, Rehm J, Vander Hoorn S, Jackson R. The burden of death, disease and disability due to alcohol.. ALAC Occasional Publication No.23. Wellington: Alcohol Advisory Council of New Zealand, 2005.

Injury was a major contributor to alcohol-related mortality, being responsible for 51% of deaths (532 deaths) and 72% of years of life lost (12,434 YLLs). Most alcohol-related deaths before middle age were due to injury. Cancers accounted for a further 24% of alcohol-related deaths, with the remainder being due to other chronic diseases. Most of the positive effects of alcohol consumption were seen in prevention of deaths from heart attacks in those older people who had a frequent low volume intake pattern of drinking (78% of all deaths prevented). Reduction in deaths due to stroke, diabetes and complications of gallstones made up the remainder.

In a separate analysis we included the effect of alcohol on non-fatal conditions as well, measuring the combination of fatal and non-fatal health effects as disability-adjusted life years (DALYs). A total of 33,500 DALYs were lost due to alcohol in the New Zealand population in 2002. This comprised 7.4% of all DALYs lost in the population from all causes (10% of all DALYs in men and 4% in women). The largest single cause of DALYs lost was alcohol use disorders (including dependency and abuse), responsible for 49%. The benefits of alcohol resulted in a gain of approximately 7,500 DALYs, and these were evenly split between men and women. Overall, there was a net loss of 26,000 DALYs attributable to alcohol, with 76% lost by men.

These figures underestimate the adverse impacts of alcohol consumption on health, as they exclude many mental health outcomes, and important social consequences. However, a pattern of drinking that reduces harms from these causes and maximises potential benefits (i.e. regular light drinking) would also reduce harms in other unmeasured areas.

Five major messages emerged from this analysis:

- There are no health benefits of drinking alcohol before middle age
- The pattern of drinking is very important in determining the health effects of alcohol consumption
- Injury is responsible for half of all alcohol-attributable deaths and almost three-quarters of the years of life lost due to alcohol
- There is a large burden of disability due to alcohol use disorders that is not reflected in mortality figures
- The health burden of alcohol falls inequitably on Māori.

Connor J, Broad J, Rehm J, Vander Hoorn S, Jackson R. Patterns of drinking and estimates of alcohol-related mortality in New Zealand. *Contemporary Drug Problems* 2005;32:527-46.

The report on the burden of alcohol in New Zealand made a number of assumptions when calculating the figures given in the section above. Some of these related to the predicted impact of the different average patterns of drinking in Māori and non-Māori. Firstly, an assumption was made that Māori would get the same reduction in heart disease from alcohol consumption as non-Māori, although there is no direct evidence that this is true. Secondly, evidence from New Zealand car crash research was used to estimate how much more of the injury burden was due to alcohol in Māori than non-Māori. To explore the importance of these assumptions to the way we characterise the health burden of alcohol, this study compared the main mortality findings of the burden project for three different scenarios. These were 1. Assuming that the whole population had the same pattern of drinking; 2. Assuming that the pattern of drinking seen in Māori not only increases the proportion of injuries attributable to alcohol but also eliminates the protective effect against heart disease, as suggested by some international research; 3. Assuming the different pattern of drinking has an effect on injuries but not heart disease (as in the original burden report).

The overall burden of alcohol mortality calculated from these three approaches were markedly different, showing that the variation in pattern of drinking in subgroups in the population can have a major impact on estimates alcohol-related harm. The use of a single drinking pattern measure for the whole country resulted in an underestimation of the national health burden of alcohol, because the more detrimental pattern was in the smaller population subgroup. More importantly, from a policy perspective, it also vastly underestimated the disparities in alcohol-related outcomes in the two populations. Better evidence about the effects of pattern of drinking on health and better ways to incorporate the variability of patterns into analyses are needed. They will improve our understanding of the balance of risks and benefits of alcohol, highlight important disparities, and increase the potential for prevention of harm.

Connor J. The health benefits of alcohol: yeah right. *NZ Med J* 2005;118(1216):1499.

This editorial in the *NZMJ* aimed to highlight the importance of pattern of drinking to the health impacts of alcohol, and to draw attention to the recently published ALAC Burden of Alcohol report. It comments on two papers in the same issue of the journal

concerning alcohol. The paper by Huakau et al² presents results from the first representative survey of alcohol consumption amongst Pacific people in New Zealand. This shows a pattern of drinking more extreme than the Māori pattern, compared with the non-Māori pattern. That is, the proportion of drinkers is lower but the volumes consumed at each occasion are higher, being about double the volumes of the average NZ drinker. The impacts on both acute (injury) and chronic (disease) outcomes are likely to be more severe than for Māori. In combining all Pacific people into one group this study may be obscuring differences in drinking patterns between different ethnic groups. The second alcohol-related paper³ explored one of the physiological mechanisms thought to contribute to an observed increased coronary risk in heavy drinkers, that is, the raising of plasma homocysteine. Finally, the editorial points out that drinking cultures do not change rapidly and that we could be doing much more to implement policies and enforce existing regulations that have been shown to reduce alcohol-related harm. There is little evidence that education and media campaigns change outcomes.

Jackson R, Broad J, Connor J, Wells S. Alcohol and ischaemic heart disease: probably no free lunch. Lancet 2005;366:1911-2.

This Lancet editorial attracted a lot of interest in the media and in journals by putting forward the provocative view that the observed effect of light-to-moderate drinking reducing heart disease may not be real, but due to (understandable) shortcomings in the studies examining the association. As there have never been any randomised trials of alcohol consumption and heart disease, there remains the possibility that light drinkers have lower rates of heart disease because of other characteristics of their lives, rather than because of the alcohol. Light drinkers could be different from other people in unmeasured ways, as well as in the recognised ways that the studies have attempted to adjust for. Two main pieces of evidence are presented to support this idea. One is a large survey that demonstrates how different light-to-moderate drinkers are from non-drinkers, and the other is the analogous example of the effect of hormone replacement therapy (HRT) on heart disease in women. The well-established protective effect of HRT on heart disease was debunked with the publication of the first high quality randomised trial, which showed no effect. The suggestion is made that protection from heart disease may require a larger intake of

² Huakau J, Asiasiga L, Ford M, Pledger M, Casswell S, Suaalii-Sauni T, et al. New Zealand Pacific peoples' drinking style: Too much or nothing at all? *New Zealand Medical Journal* 2005;118.

³ Robinson G, Narasimhan S, Weatherall M, Beasley R. Raised plasma homocysteine levels in alcoholism. *New Zealand Medical Journal* 2005;118.

alcohol than currently suggested, in which case there is no “window of benefit” where one gets the heart benefits without the other alcohol-related risks.