

Student: Jinhee Ahn

Title: Testing the validity of New Zealand's low-risk drinking guidelines

Supervisor(s): Professor Doug Sellman, Associate Professor Joe Boden, Associate Professor Simon Adamson and Professor Chris Frampton

Sponsor: Cancer Society of New Zealand Canterbury/West Coast Division

Introduction:

Harm from alcohol consumption can be broadly divided into long term and short term harms. Short term harms are caused by the immediate effects of alcohol on the body and include intoxication related injuries and alcohol poisoning. Long term harms such as liver disease in comparison occur due to toxic effects of alcohol on the body over time from recurrent consumption of significant amounts of alcohol.

Drinking guidelines attempt to set an upper limit on the amount of alcohol that may be consumed in which both long and short term harms from alcohol are minimized. This project focussed on short term harms related to per occasion drinking. In 2011, the Health Promotion Agency (HPA) revised the drinking guidelines in New Zealand and referred to these as "low risk" drinking guidelines as follows:

- For women: no more than 4 standard drinks on any one occasion
- For men: no more than 5 standard drinks on any one occasion

In New Zealand, a standard drink is equivalent to 10 grams of pure alcohol.

Aim:

The purpose of this project is to explore the validity of the current HPA guidelines for per occasion low risk drinking.

Methods:

(1) Mathematical modelling

The estimated blood alcohol concentration (EBAC) in grams per 100mL of blood was mathematically modelled for both men and women for a range of body weights (45-110kg in women, 50-120kg in men), range of standard drinks (1-5 in women, 1-6 in men) and range of drinking periods (1-5 hours) using the formula:

$$EBAC = (0.806 \times \text{standard drinks} \times 1.2) / (\text{body water constant} \times \text{body weight}) - (\text{metabolism rate constant} \times \text{drinking period})$$

This formula combines the key factors which influence a person's blood alcohol concentration (BAC) such as weight and gender specific body water content. Some of these factors are subject to variability hence this study also modelled the uncertainty associated with these parameters in the formula for each result. This involved the use of the statistical software SPSS to run 2000 simulations for each combination of gender, weight, drinking period and number of standard drinks consumed. Additionally, statistical analysis identified the percentage of the population who would be either below or at a BAC of 0.04 for each combination as a BAC of 0.04 was chosen as representing an upper limit of "low risk" drinking.

(2) Community Survey

40 people aged 18 and above were randomly selected from the Christchurch Residential White Pages to complete a telephone survey. The participants were briefly questioned about the current HPA per occasion low risk drinking guidelines. Additionally, participants undertook a thought experiment where women and men were to imagine drinking 4 and 5 standard drinks respectively over a 2 hour period and then asked to rate their level of functioning in 3 scenarios. Participants were asked again to rate their level of functioning for the same 3 scenarios if they had consumed no alcohol for comparison.

Results:

The average weights of men and women in New Zealand are around 90kg and 75kg respectively. The mathematical modelling showed that 11.7% of 90kg men who have consumed 5 standard drinks in a 2 hour drinking period would have a BAC of 0.04 or less. Extending the drinking period to 3 hours showed an increase to 44.5%. Lowering the number of standard drinks consumed to 4 and then 3 for a 2 hour drinking period showed that the proportion of 90kg men with a BAC of 0.04 or less would increase to 47.2% and 90.6% respectively. For women, the results revealed that 4.5% of 75kg females who have had 4 standard drinks in 2 hours would have a BAC of 0.04 or less. This increased to 25.1% if the drinking period was extended to 3 hours. Similarly to men, reducing the number of standard drinks consumed to 3 and then 2 for a 2 hour drinking period raised the figures to 37.1% and 87.9% respectively. The mathematical model further demonstrated that men and women below the average weights are even less likely to have a BAC of 0.04 or less than the numbers stated previously.

40 out of the 95 participants (42%) that were contacted, completed the telephone survey. The thought experiment section of the survey revealed that the majority of people believed that they would function better in the 3 scenarios if they had consumed no alcohol compared to having 4 or 5 standard drinks in 2 hours. Around half the participants (49%) thought the current guidelines for per occasion drinking was at the right level. All the other participants except one thought the guidelines were either too high or far too high. However, when participants were initially invited to guess the number of standard drinks the current guidelines indicate for per occasion low risk drinking many stated a number below the 4 and 5 standard drinks with the median number being 2.5.

Conclusion:

This study identified that a large proportion of New Zealand men and women would reach BAC levels over 0.04 if they consumed 5 and 4 standard drinks respectively as stated by the HPA guidelines for per occasion drinking over 2 to 3 hours. The mathematical model suggests that the current per occasion drinking guidelines for both men and women are too high and should be lowered to match the description of "low risk" drinking as defined by a BAC of 0.04.

The community survey, although a small study, shows there is a perceived reduction in the ability to function under the influence of alcohol at levels stated by the drinking guidelines. Interestingly, the survey further revealed that a considerable proportion of people seemed to adjust their initial thoughts on what they believed would constitute "low risk" drinking from more conservative numbers of standard drinks to that of the guideline.