

Title: *Harnessing advances in computer simulation to inform policy and planning to reduce alcohol-related harms*

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Online Resource 2: Parameter estimates and data sources (NSW alcohol model)

Variable	Description	Value	Source	Comments
P(Youth Group Change Venue Per Hour)	The probability that a group of young people will change venues in a drinking precinct per hour.	0.12	Scott, N et al. SimDrink: An agent-based netlogo model of young, heavy drinkers for conducting alcohol policy experiments. JASSS, 2016.	
P(Host Event)	The probability that someone will host a private event on any given evening. This is a base rate that does not take into consideration alcohol prices.	0.033 (i.e. approximately once a month)	Unconfirmed estimate	
Alcohol Metabolism Per Hour (ml / hour)	The amount of alcohol a person metabolizes per hour, e.g., 15ml per hour.	15 ml	Widmark EMP. Widmark Equation for predicting Blood Alcohol Concentration: http://www.mayomedicallaboratories.com/test-info/drug-book/alcohol.html . 1981.	
Average Weekly Income Population Is Willing To Spend On Alcohol	The amount of money the average person is willing to spend on alcohol from a bottle shop each week.	Value = \$25	Approximated from: Australian Bureau of Statistics (2011). Household Expenditure Survey, Summary of Results, 2009-10, Cat. No. 6530.0 Canberra, Australian Bureau of Statistics.	
Default Social Network Size	The average size of an individual's friend and co-worker social networks.	Initial value = 8	Derived from http://www.gallup.com/poll/112723/Gallup-Daily-US-Consumer-Spending.aspx	
Widmark equation	Values for the Widmark equation used to compute BAC	Distribution ratio: Male = 0.68 Female = 0.55 Ethanol Density (g/ml) = 0.8	Widmark Equation for predicting Blood Alcohol Concentration: http://www.mayomedicallaboratories.com/test-info/drug-book/alcohol.html . 1981.	

Standard drink	Information about the contents of a standard drink of alcohol e.g. ml alcohol per unit.	Alcohol (g) = 10 Alcohol (ml) = 12.5	NHMRC Australian Guidelines to reduce health risks from drinking alcohol. Commonwealth of Australia: National Health and Medical Research Council; 2009 Jan 1: http://www.nhmrc.gov.au/files/nhmrc/publications/attachments/ds10-alcohol.pdf
Generic Drink Price	The average price people pay for one generic drink in various contexts.	At Bar = \$6 At Bottle Shop: Low quality = \$1.00 Normal quality = \$1.80	Figures approximated from: Callinan, S. et al. (2015) Who Purchases Low-Cost Alcohol? Alcohol and Alcoholism. 50(6).
Single Occasion Risk Drinking	The number of standard drinks required (inclusive) for a drinking episode to be considered risky drinking.	4	NHMRC Australian Guidelines to reduce health risks from drinking alcohol. Commonwealth of Australia: National Health and Medical Research Council; 2009 Jan 1: http://www.nhmrc.gov.au/files/nhmrc/publications/attachments/ds10-alcohol.pdf
Lifetime risk drinking	The number of standard drinks per day beyond which an individual is said to be a lifetime risk of chronic alcohol-related harms.	2	NHMRC Australian Guidelines to reduce health risks from drinking alcohol. Commonwealth of Australia: National Health and Medical Research Council; 2009 Jan 1: http://www.nhmrc.gov.au/files/nhmrc/publications/attachments/ds10-alcohol.pdf
Average Commute	The average time people need to commute to work.	0.75 (45 minutes)	Estimate
Average Preloading Session	The average time spent preloading before going to a licensed venue.	1 hour	Estimate

Average Time Spent Getting To Peer Event	The average time people need to get to and from social drinking events, like parties or things at friends' homes.	0.25 (15 minutes)	Estimate	
Average Time Spent At Bottle Shop	The time people spend at the bottle shop looking for liquor.	0.17 (approximately 10 mins)	Estimate	
Physical Drinks Acquired Per Bottle Shop Trip	The average number of physical drinks a person retrieves when they go to a bottle shop.	6	Estimate	
Blackout BAC	The BAC level at which someone blacks out and is therefore unable to drink more.	0.40	Estimate	
Time to Drink (Minutes)	The time required to drink one physical serving of a given type of alcohol.	15 minutes	Estimate	
Price Sensitivity parameters:				
Time to Adjust to New Price (Months)	The number of months required to adjust to a sudden price increase.	1 month	Estimate	
Moderate Drinker Price Sensitivity*	Price elasticities for moderate drinkers.*	-0.4971*	Marsden Jacob Associates. Bingeing, collateral damage and the benefits and costs of taxing alcohol rationally. Report to the Foundation for Alcohol Research and Education, October 2012: http://bettertax.gov.au/files/2015/06/Foundation_for_Alcohol_Research_and_Education_Submission_2.pdf	Beer data is used as a simplifying assumption *NB These categories are used for price elasticity classifications ONLY. Please see details in rows below.
Hazardous Drinker Price Sensitivity*	Price elasticities for hazardous drinkers.*	-0.3926*	Marsden Jacob Associates. Bingeing, collateral damage and the benefits and costs of taxing alcohol	Beer data is used as a simplifying assumption *NB These categories are

			rationally. Report to the Foundation for Alcohol Research and Education, October 2012: http://bettertax.gov.au/files/2015/06/Foundation_for_Alcohol_Research_and_Education_Submission_2.pdf	used for price elasticity classifications ONLY. Please see details in rows below.
Harmful Drinker Price Sensitivity*	Price elasticities for harmful drinkers.*	-0.2628*	Marsden Jacob Associates. Bingeing, collateral damage and the benefits and costs of taxing alcohol rationally. Report to the Foundation for Alcohol Research and Education, October 2012: http://bettertax.gov.au/files/2015/06/Foundation_for_Alcohol_Research_and_Education_Submission_2.pdf	Beer data is used as a simplifying assumption *NB These categories are used for price elasticity classifications ONLY. Please see details in rows below.
Moderate drinker category	Maximum drinks	Standard drinks per day = 2; drinks per week = 14.	Marsden Jacob Associates. Bingeing, collateral damage and the benefits and costs of taxing alcohol rationally. Report to the Foundation for Alcohol Research and Education, October 2012: http://bettertax.gov.au/files/2015/06/Foundation_for_Alcohol_Research_and_Education_Submission_2.pdf	
Hazardous drinker category	Maximum drinks	Standard drinks per week male = 40, female = 28.	Marsden Jacob Associates. Bingeing, collateral damage and the benefits and costs of taxing alcohol rationally. Report to the Foundation for Alcohol Research and Education, October 2012: http://bettertax.gov.au/files/2015/06/Foundation_for_Alcohol_Research_and_Education_Submission_2.pdf	

Average duration of chronic harm in years	Duration of a chronic illness from onset to recovery (or death)	<p>Liver cancer = 3.79 years</p> <p>Breast cancer = 4.23 years</p> <p>Colorectal cancer = 3.3 years</p> <p>Mouth and oropharynx cancers = 3.93 years</p> <p>Oesophagus cancer = 3.6 years</p> <p>Hypertensive heart disease = 7.96 years</p> <p>Ischaemic heart disease = 7.86 years</p> <p>Stroke = 9.35 years</p> <p>Liver cirrhosis = 4 years</p>	<p>Calculated for NSW 2010 from the Australian Burden of Disease dataset:</p> <p>Begg S VT, Barker B, Stevenson C, Stanley L & Lopez A. Burden of disease and injury in Australia, 2003. Cat. no. PHE 82 Canberra: Australian Institute of Health and Welfare http://www.aihw.gov.au/publications/index.cfm/title/10317;2007.</p> <p>Duration given for stroke is for those that survive beyond 28 days. It is assumed from the data that 20% of stroke patients do not survive beyond 28 days.</p>
Average duration or acute harm in weeks	Average time it takes to recover from an acute harm/injury	4 weeks	Calculated for NSW 2010 from the Australian Burden of Disease dataset
Probability of long term disability	Probability that an acute harm will result in long term disability	0.087	Calculated for NSW 2010 from the Australian Burden of Disease dataset
P(ED Admission)	The probability that an individual will be admitted to emergency when suffering an acute harm.	0.1	Estimate
P(Hospitalization ED Admission)	The probability that an individual will be hospitalised if they present to an emergency department for harm.	0.1	Estimate
Injuries (falls, fires, drownings)	Relative risks by average consumption	<p>1 = 1.05</p> <p>2 = 1.11</p>	Corrao et al 2004. A meta-analysis of alcohol consumption

of standard drinks per day

3 = 1.16
 4 = 1.22
 5 = 1.28
 6 = 1.35
 7 = 1.42
 8 = 1.49
 9 = 1.55
 10 = 1.63
 11 = 1.65
 12+ = 1.68

and the risk of 15 diseases. Prev Med 38: 613-19

Alcohol poisoning (unconsciousness and death)	Probability of becoming unconscious given a certain blood alcohol concentration.	BAC = 0.3-0.399, p = 0.6; BAC = 0.4-0.499, p = 0.8; BAC = 0.5+, p = 0.9.	Expert estimate	It was estimated that only 60% of people that become unconscious go to ED (and are diagnosed with alcohol poisoning).
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Hospitalisation rate for ED alcohol poisoning	Hospitalisation rate given ED presentation for alcohol poisoning.	5%	Expert estimate	Assumption that 95% recover overnight in ED.
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Death from alcohol poisoning	Probability of death from alcohol poisoning given a certain blood alcohol concentration.	BAC = 0.3-0.399, p = 0.4; BAC = 0.4-0.499, p = 0.6; BAC = 0.5+, p = 0.8.	Expert estimate	
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Road traffic accidents (deaths)	Risk estimates for alcohol exposure and motor vehicle driver and motorcycle rider deaths as a result of the accident.	Refer to table below, from page 34 of adjacent reference.	Lloyd C 1992. Alcohol and fatal road accidents: estimates of risk in Australia 1983. Accident Analysis and Prevention 24:339-48 (as cited by Ridolfo B & Stevenson C (2001) The Quantification of Drug-caused Mortality and Morbidity in Australia, 1998. AIHW cat. no. PHE 29. Drug Statistics Series no. 7. Australian Institute	
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		Blood alcohol concentration					
		>0-0.05		>0.05-0.10		>0.10	
Sex	Age	RR	95% CI	RR	95% CI	RR	95% CI
Male	<21	2.01	1.12-3.60	10.38	5.31-20.29	67.35	35.40-128.11
	21-29	1.14	0.58-2.23	4.96	2.59-9.49	113.88	73.24-177.07
	30-50	1.33	0.66-2.69	5.74	2.92-11.27	142.43	89.15-227.56
	>50	1.44	0.61-3.37	3.75	1.38-10.19	45.15	22.58-90.27
	All ages	1.45	1.04-2.04	5.86	4.18-8.23	96.82	75.03-124.94
		Blood alcohol concentration					
		>0.01-0.10		>0.10		>0.10	
		RR	95% CI	RR	95% CI	RR	95% CI
Female	<30	1.78	0.72-4.39	72.59	34.83-151.29		
	30+	2.22	0.99-4.96	52.36	18.86-145.37		
	All ages	2.01	1.10-3.66	65.17	36.19-117.38		

of Health and Welfare, Canberra).

Road traffic accidents (hospitalisations)

Risk estimates for hospitalisations for road traffic accidents based on blood alcohol concentration.

Refer to Table below, from page 36 of adjacent reference.

Ridolfo B & Stevenson C (2001) The Quantification of Drug-caused Mortality and Morbidity in Australia, 1998. AIHW cat. no. PHE 29. Drug Statistics Series no. 7. Australian Institute of Health and Welfare, Canberra).

Blood alcohol concentration	RR
0.01–0.03	0.69
0.04–0.06	1.83
0.07–0.09	3.20
0.10 and over	12.94

Violence

Relative risk estimates used for violence

Unable to find relative risk estimates for violence, therefore the general injuries RRs based on number of drinks consumed in the episode were used.

Ridolfo B & Stevenson C (2001) The Quantification of Drug-caused Mortality and Morbidity in Australia, 1998. AIHW cat. no. PHE 29. Drug Statistics Series no. 7. Australian Institute of Health and Welfare, Canberra.

Lip, oral and pharyngeal cancer

Relative risks by average standard drink consumption for lip, oral and pharyngeal cancer

- 1 = 1.28
- 2 = 1.65
- 3 = 2.12
- 4 = 2.72
- 5 = 3.32
- 6 = 4.06
- 7 = 4.95
- 8 = 5.58
- 9 = 6.05
- 10 = 6.69
- 11 = 7.77
- 12+ = 8.85

Corrao et al 2004. A meta-analysis of alcohol consumption and the risk of 15 diseases. Prev Med 38: 613-19.

Oesophageal cancer

Relative risks by average standard drink consumption for oesophageal cancer

- 1 = 1.14
- 2 = 1.28
- 3 = 1.46
- 4 = 1.65
- 5 = 1.87
- 6 = 2.23

Corrao et al 2004. A meta-analysis of alcohol consumption and the risk of 15 diseases. Prev Med 38: 613-19.

7 = 2.46
8 = 2.94
9 = 3.49
10 = 3.67
11 = 4.06
12+ = 4.95

Liver cancer

Relative risks by average standard drink consumption for liver cancer.

1 = 1.09
2 = 1.16
3 = 1.25
4 = 1.35
5 = 1.42
6 = 1.49
7 = 1.58
8 = 1.65
9 = 1.79
10 = 1.84
11 = 1.92
12+ = 2.01

Corrao et al 2004. A meta-analysis of alcohol consumption and the risk of 15 diseases. *Prev Med* 38: 613-19.

Breast cancer (women)

Relative risks by average standard drink consumption for breast cancer (women).

1 = 1.11
2 = 1.22
3 = 1.28
4 = 1.48
5 = 1.57
6 = 1.65
7 = 1.82
8 = 2.12
9 = 2.27
10 = 2.46
11 = 2.66
12+ = 2.94

Corrao et al 2004. A meta-analysis of alcohol consumption and the risk of 15 diseases. *Prev Med* 38: 613-19.

Colorectal cancer

Relative risks by average standard drink consumption for colorectal cancer.

1 = 1.08
2 = 1.14
3 = 1.23
4 = 1.31
5 = 1.33
6 = 1.39
7 = 1.48
8 = 1.52
9 = 1.57

Corrao et al 2004. A meta-analysis of alcohol consumption and the risk of 15 diseases. *Prev Med* 38: 613-19.

		10 = 1.63		
		11 = 1.69		
		12+ = 1.71		
Hypertensive diseases	Relative risks by average standard drink consumption for hypertensive diseases.	1 = 1.16 2 = 1.35 3 = 1.57 4 = 1.82 5 = 2.12 6 = 2.4 7 = 2.72 8 = 3.25 9 = 3.67 10 = 4.26 11 = 4.85 12+ = 5.75	Corrao et al 2004. A meta-analysis of alcohol consumption and the risk of 15 diseases. <i>Prev Med</i> 38: 613-19.	
Ischaemic heart disease	Relative risks by average standard drink consumption for ischaemic heart disease	1 = 1 2 = 1 3 = 1 4 = 1 5 = 1 6 = 1 7 = 1 8 = 1.05 9 = 1.11 10 = 1.12 11 = 1.19 12+ = 1.25	Corrao et al 2004. A meta-analysis of alcohol consumption and the risk of 15 diseases. <i>Prev Med</i> 38: 613-19	For the purposes of this model it was assumed that there was no protective effect of drinking at low to moderate levels (for ischemic heart disease) based on Stockwell et al. Do 'moderate drinkers have reduced mortality risk? A systematic review and meta-analysis of alcohol consumption and all-cause mortality. <i>Journal of Studies on alcohol and drugs</i> . 2016; 77(2): 185-198.
Haemorrhagic stroke	Relative risks by average standard drink consumption for haemorrhagic stroke.	1 = 1 2 = 1.14 3 = 1.34 4 = 1.62 5 = 1.82 6 = 2.34 7 = 2.72 8 = 3.49 9 = 4.06 10 = 4.95	Corrao et al 2004. A meta-analysis of alcohol consumption and the risk of 15 diseases. <i>Prev Med</i> 38: 613-19.	

11 = 6.05

12+ = 7.39

Alcoholic Liver cirrhosis	Annual probability of liver cirrhosis by standard drink consumption per day.	< 1 = 0.00074 1 – 1.99 = 0.00032 2 – 3.99 = 0.00074 4 – 5.99 = 0.00285 6 – 10 = 0.00537 10+ = 0.00671 NB – all figures rounded to 5 decimal points	Becker et al 1996, Prediction of risk of liver disease by alcohol intake, sex, and age: A prospective population study. Hepatology journal 23(5): 1025	Attributable risk assumed to be 1.
Hospitalization Rate Per Year Distribution	The distribution of hospitalizations per year for people living with chronic disease	Cancers	Australian Institute of Health and Welfare & Australasian Association of Cancer Registries 2012. Cancer in Australia: an overview, 2012. Cancer series no. 74. Cat. no. CAN 70. Canberra: AIHW.	
		Alcohol use disorders	Data provided by NSW Ministry of Health	
		Stroke	Australian Institute of Health and Welfare 2013. Stroke and its management in Australia: an update. Cardiovascular disease series no. 37. Cat. no. CVD 61. Canberra: AIHW.	
		Liver cirrhosis	Mortality rate of alcoholic liver disease and risk of hospitalization for alcoholic liver cirrhosis, alcoholic hepatitis and alcoholic liver failure in Australia between 1993 and 2005. Internal Medicine Journal, 2011.	

		Other chronic conditions	Feyer, A. et al (2014) Chronic disease program management: final report Oct 2014. Figure 49, page 119.	Assumed a long tail distribution
ED Presentation Rate Per Year	The distribution of emergency department presentations per year for individuals with chronic disease.	Figure 49, page 119	Feyer, A. et al (2014) Chronic disease program management: final report Oct 2014.	Assumed a long tail distribution
Delinquent Behaviour Multiplier By Age_females	Describes how much more likely females are to get into delinquent behaviour per litre of total alcohol consumption by age.	Derived from figure 18 in the adjacent citation.	NHMRC Australian Guidelines to reduce health risks from drinking alcohol. Commonwealth of Australia: National Health and Medical Research Council; 2009 Jan 1: http://www.nhmrc.gov.au/files/nhmrc/publications/attachments/ds10-alcohol.pdf	Also informed by Figures 11, 12 and 13 in the adjacent citation.
Delinquent Behaviour Multiplier By Age_males	Describes how much more likely males are to get into delinquent behaviour given their age and alcohol consumption.	Derived from figure 18 in the adjacent citation.	NHMRC Australian Guidelines to reduce health risks from drinking alcohol. Commonwealth of Australia: National Health and Medical Research Council; 2009 Jan 1: http://www.nhmrc.gov.au/files/nhmrc/publications/attachments/ds10-alcohol.pdf Figures 18	Also informed by Figures 11, 12 and 13 in the adjacent citation.
Hazardous Behaviour Multiplier By Age_females	Describes how much more likely females are to get into hazardous behaviour per litre of total alcohol consumption by age.	Derived from figure 17 in the adjacent citation.	NHMRC Australian Guidelines to reduce health risks from drinking alcohol. Commonwealth of Australia: National Health and Medical Research Council; 2009 Jan 1: http://www.nhmrc.gov.au/files/nhmrc/publications/attachments/ds10-alcohol.pdf	Also informed by Figures 11, 12 and 13 in the adjacent citation.
Hazardous Behaviour	Describes how much more likely males are to get into hazardous	Derived from figure 17 in the adjacent citation.	NHMRC Australian Guidelines to reduce health risks from	Also informed by Figures 11, 12 and

Multiplier By Age_males	behaviour per litre of total alcohol consumption by age.	drinking alcohol. Commonwealth of Australia: National Health and Medical Research Council; 2009 Jan 1.	13 in the adjacent citation.
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Additional data and evidence sources used to inform design of the model

- National Drug Strategy Household Survey data – 2010-2013
- Centre for Epidemiology and Evidence. Trends in alcohol use and health-related harms in NSW: Report of the Chief Health Officer 2016. Sydney: NSW Ministry of Health: <http://www.health.nsw.gov.au/hsnsw/Pages/chief-health-officers-report-2016.aspx>
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- Australian Health Survey: First Results, 2011–12 — New South Wales weights by age and sex, ABS: 43640DO001_20112012: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4364.0.55.0012011-12?OpenDocument>
- Life Tables, States, Territories and Australia, 2011-2013: NSW Data: ABS: 3302.0.55.001 <http://www.abs.gov.au/ausstats/abs@.nsf/mf/3302.0.55.001>
- Deaths, Australia, 2014: NSW data: ABS: 3302.0 <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3302.02014?OpenDocument>

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<http://www.abs.gov.au/ausstats/abs@.nsf/mf/3310.0>
 - Cancer in New South Wales: Incidence Report 2009. Cancer Institute NSW, NSW Government. 2014. ISBN 978-1-74187-966-7
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<http://nceta.flinders.edu.au/files/8014/5758/1219/EN607.pdf>
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<http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/6530.0Media%20Release12009-10?opendocument&tabname=Summary&prodno=6530.0&issue=2009-10&num=&view=>
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