



Government of **Western Australia**
Department of **Health**

Methodology for Developing Western Australia Specific Alcohol-related Aetiological Fractions

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May 2017

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Suggested citation

Van Diemen, A; Jian, L; Xiao, J and Somerford, P. (2017). Methodology for Developing Western Australia Specific Alcohol-related Aetiological Fractions.

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Abbreviations

AAF	Alcohol-related Aetiological Fraction/ Alcohol Attributable Fraction
ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
ARIA+	Accessibility/Remoteness Index of Australia (+)
HMDS	Hospital Morbidity Data System
ICD-10-AM	International Statistical Classification of Diseases and Related Health Problems 10th Revision, Australian Modification
IHD	Ischaemic Heart Disease
MVA	Motor vehicle accident
NDSHS	National Drug Strategy Household Survey
NHMRC	National Health and Medical Research Council
PCA	Per capita consumption of alcohol
RR	Relative risk
WA	Western Australia
WHO	World Health Organization

1. Background

Harmful use of alcohol ranks among the top five risk factors for death, injury and disability, and disease throughout the world (WHO 2014).

A method for determining the fraction of death, injury and disability or disease that can be attributed to alcohol consumption for any particular condition was presented by Holman et al in the early 1990s and revised in 1995 (Holman and English 1995). Use of this methodology, known as alcohol-related aetiological fraction (AAF), can enable researchers to estimate the extent of disease that might be prevented if alcohol consumption is prevented or reduced. In 2008, the Department of Health Western Australia (WA) completed its first quantification of the impact of alcohol consumption on the population of WA using AAF (Xiao et al 2008).

Since then, AAF has been used extensively to assess alcohol-related hospitalisations and deaths in WA. Meanwhile, research on the impact of alcohol consumption on population health has progressed substantially with a broadening of the range of conditions investigated and the establishment of a host of new causal relationships. Among the latter are links between alcohol consumption and the incidence/clinical condition of colorectal cancer, gastro-oesophageal haemorrhage and respiratory infections (WHO 2014).

Another development is that disease trends and levels of exposure to risk factors are now considered in a global context. For example, an examination of WA hospital morbidity data revealed that 7,655 treatment episodes in 2012/2013 were alcohol related, representing an absolute increase of 88% since 2003/2004. Meanwhile, alcohol-attributable hospitalisation rates for cancer of the larynx decreased over the 10-year period by an average of 6.27% per year.

In addition, the changes of social economic status and lifestyle contribute to the change of alcohol-related disease burden and related social economic burden. These changes require updated AAFs to more accurately and precisely evaluate current burden of disease/injury/death related to harmful alcohol use in WA.

In this latest revision, an epidemiological method that combines alcohol consumption data with disease causation studies has been used to determine the overall burden of disease from alcohol. The resulting fractions indicate the proportion of each alcohol-attributable disease that is due to alcohol consumption. These fractions are further broken down into age, gender, Aboriginality and region. For example, approximately 62% of oesophageal cancers in non-Aboriginal men aged 35–54 are caused by alcohol (see Appendix 5).

2. Conditions

Conditions known to be associated with the consumption of alcohol were grouped into 7 categories; cancers, cardiovascular disease, digestive system diseases, neuropsychiatric diseases, infectious diseases, maternal, infant and child diseases and injuries and poisonings. Categories, conditions, International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Australian Modification (ICD-10-AM) and source of relative risk in the 2016 version are listed in Table 1.

Table 1. Category, Condition, associated ICD-10-AM codes and source of relative risk estimates

Category	Condition	ICD 10-AM codes	Source of relative risk
Cancer	Mouth and Oropharyngeal cancer	C00-C14, D00.0-D37.0	(Tramacere, Negri et al. 2010)
	Oesophageal cancer	C15, D00.1	(Islami, Fedirko et al. 2011)
	Colorectal cancer	C18-21, D01.0-D01.3, D37.3-D37.5	(Fedirko, Tramacere et al. 2011)
	Liver cancer	C22, D01.5	(Turati, Galeone et al. 2014)
	Pancreatic cancer	C25, D37.71	(Tramacere, Scotti et al. 2010)
	Laryngeal cancer	C32, D02.0, D38.0	(Islami, Tramacere et al. 2010)
	Breast cancer	C50, D05, D48.6	(Key, Hodgson et al. 2006)
Cardiovascular disease	Hypertensive disease	I10-I11	(Briasoulis, Agarwal et al. 2012)
	Ischaemic heart disease	I20-I25	(Roerecke and Rehm 2012) (Roerecke and Rehm 2010) (Roerecke and Rehm 2014)
	Cardiac arrhythmias	I47.1, I47.9, I48	(Samokhvalov, Irving et al. 2010)
	Alcoholic cardiomyopathy	I42.6	AAF = 1
	Heart failure	I50	Indirect, see individual methodology
	Ischaemic stroke	I63, I65-I66, I69	(Patra, Taylor et al. 2010)
	Haemorrhagic stroke	I60-I62, I67.4, I69.0-I69.2	(Patra, Taylor et al. 2010)
	Unspecified stroke ¹	I64, I69.4	Indirect, see individual methodology
	Oesophageal varices	I85	(Corrao, Bagnardi et al. 1998)
Infectious disease	Lower respiratory tract infection	J10.0, J11.0, J12-J22,	(Samokhvalov, Irving et al. 2010)
Digestive disease	Gastro-oesophageal laceration-haemorrhage syndrome	K22.6	(Lee, Yoon et al. 2006) (Kortas, Haas et al. 2001) (Pyper 1985)
	Alcoholic gastritis	K29.21-K29.29	AAF = 1
	Alcoholic liver cirrhosis	K70	AAF = 1
	Other liver diseases – morbidity	K72.1, K73, K74, K76.0, K76.6, K76.7, K76.9	(Corrao, Bagnardi et al. 1998)
	Other liver diseases – mortality	K72.1, K73, K74, K76.0, K76.6, K76.7, K76.9	(Rehm, Taylor et al. 2010)
	Acute pancreatitis	K85.0, K85.8, K85.9	(Roberts, Akbari et al. 2013)

Category	Condition	ICD 10-AM codes	Source of relative risk
	Alcoholic pancreatitis acute	K85.2	AAF = 1
	Alcoholic pancreatitis chronic	K86.0	AAF = 1
	Chronic pancreatitis	K86.1	(Irving, Samokhvalov et al. 2009)
Neuropsychiatric	Alcoholic Mental and behavioural disorders	F10, E51.2, R78.0, T51, X45, X65, Y15, Y90-Y91, Z71.4, Z72.1	AAF = 1
	Alcoholic polyneuropathy/ nervous system degeneration	G31.2, G62.1	AAF = 1
	Epilepsy	G40-G41	(Samokhvalov, Irving et al. 2010)
Maternal, infant and child	Maternal care for damage to foetus from alcohol (incl. Foetal alcohol syndrome disorder)	O35.4, Q86.0	AAF = 1
	Foetal and newborn affected by maternal use of alcohol	P04.3	AAF = 1
	Child abuse ²	T74, Y06, Y07, Z61.6 (age < 15)	(Laslett and Livingston 2010)
Injury and poisoning	Motor vehicle accidents	V02-V04, V09.0, V09.2, V09.3, V09.9, V12-V14, V19 (exc .3), V20-V79, V80.3-V80.5, V81.0, V81.1, V82.0, V82.1, V83-V86 (.0-.3), V86.5-V86.9, V87-V88, V89 (.0, .2, .9), V98, V99	(Taylor B 2010)
	Falls	W00-W19	(Taylor B 2010)
	Drowning/ Submersion	W65-W74, V90, V92, T75.1	(Richard C Franklin 2010)
	Fire, burns and scalds	X00-X19	(Taylor B 2010)
	Poisoning	X40-X44, X46-X49, Y10-Y14, Y16-Y19	(Taylor B 2010)
	Other unintentional injuries	W21-W22, W24-W34, W39, W44-W45, W49, W51-W52, W58-59, W60, W75-W84	(Taylor B 2010)
	Self-inflicted injuries	X60-X64, X66-X84, Y87.0	(Taylor B 2010)
Assault ³	X85-X99, Y00-Y09, W50, Y87.1, Z04.5, T74	(Taylor B 2010)	

3. Data sources

The data sources used for the 2016 revision are summarised in Table 1.

Table 2. Data sources used in the 2016 version

Data sources	
Hospitalisations 2005 to 2014	Western Australia Department of Health ⁺
Deaths 2005 to 2012	Western Australia Department of Health ⁺
Alcohol consumption prevalence- Non Aboriginal WA	AIHW National Drug Strategy Household Survey 2010 & 2013
Alcohol consumption prevalence- Aboriginal Australia*	Australian Aboriginal and Torres Strait Islander Health Survey (2012)

+ Data from these sets are used for the calculations of the AAFs for heart failure and unspecified stroke

* Due to low population numbers the daily consumption for Aboriginal people is based on national survey data rather than Western Australia specific data. The categories remain the same as for non-Aboriginal people. Consumption differences by Aboriginality were included in the calculations to maximise accuracy, particularly given Aboriginal Australians have a higher rate of abstention than non-Aboriginal people

4. Methods

There are two major methods to derive AAFs for alcohol-related illnesses and injuries, namely the direct and indirect methods. The latter is often used for calculation of AAFs for conditions with multiple causes in order to determine the proportion of the disease which is attributable to alcohol.

4.1 Direct method

In the direct method, the AAFs can be estimated directly from a series of pooled cases for the number of incidents where alcohol was the primary cause and each case can be identified as caused or not caused by alcohol. Some conditions identified within ICD-10-AM are wholly attributable to alcohol such as alcoholic cardiomyopathy or alcoholic gastritis, and in these cases the AAF equals 1. While in many other disease and injury categories, alcohol has been identified as an element (or partially attributable cause) in the causal relationship and in these cases the AAF is a fraction less than 1. When there is a lack of systematic meta-analyses available to use the indirect method it is necessary to use the direct method even though these AAFs are less transferable across populations than those derived indirectly. For example, from a representative series of gastro-oesophageal laceration haemorrhage syndrome hospitalisations, an estimated 55% (Pyper 1985, Kortas, Haas et al. 2001, Lee, Yoon et al. 2006) were caused by alcohol. Thus, an aetiological fraction of 55% can be applied to all gastro-oesophageal laceration haemorrhage syndrome hospitalisations in the patient population to estimate the number attributable to alcohol.

The conditions for which the direct method has been utilised are listed in Table 3.

Table 3. Conditions where direct method is used

AAF=1	AAF<1
Alcoholic cardiomyopathy	Gastro-oesophageal laceration-haemorrhage (Mallory Weiss tear)
Alcoholic gastritis	
Alcoholic liver disease	
Alcoholic pancreatitis - chronic	
Alcoholic pancreatitis - acute	
Alcoholic myopathy	
Alcohol induced pseudo-Cushing syndrome	
Degeneration of the nervous system due to alcohol	
Alcoholic polyneuropathy	
Inhalation of gastric contents	
Mental and behavioural disorders due to use of alcohol	
Alcoholic psychosis	
Alcohol dependence	
Alcohol abuse	
Alcohol use	
Excess blood alcohol levels	
Evidence of alcohol involvement by blood alcohol level	
Evidence of alcohol involvement by intoxication	
Alcohol poisoning - undetermined intent	
Accidental alcohol poisoning	
Intentional self-poisoning by exposure to alcohol	
Toxic effect of alcohol	
Foetus & newborn affected by maternal use of alcohol	
Maternal care for damage to foetus from alcohol	
Foetal Alcohol Syndrome Disorder (FASD)	

4.2 Indirect method

For the indirect method, the source of aetiological fractions is from studies of the comparative rates of death, illness or injury in groups of people exposed and not exposed, or exposed at varying levels to alcohol consumption. It involves combining the estimated consumption of a set population with the estimated relative risk of specific conditions at a consumption level. Relative risk estimates are generally derived using meta-analyses of cohort, case-control and cross sectional studies, and are generally transferable across populations.

4.2.1 Standard indirect method

The majority of indirectly calculated AAFs were based on the sum of the partial AAFs as below:

$$AAF = \frac{\sum P_i(RR_i - 1)}{\sum P_i(RR_i - 1) + 1}$$

where P_i is the prevalence of alcohol consumption at risk level i and RR_i is the relative risk of the relevant condition associated with alcohol consumption at risk level i compared with non-alcohol consumption (Holman and English 1995).

Some conditions are more complicated, such as heart failure, which includes more than one cause, while for others a clear cause is not identified, such as unspecified stroke. For these conditions, specific procedures were applied for deriving AAFs. Refer to 4.2.2 and 4.2.3 for details.

4.2.2 Specific procedure for deriving AAFs for heart failure

A method (Ridolfo and Stevenson 2001) was devised to construct a fraction for heart failure (both AAF for heart failure hospitalisation and AAF for heart failure death), which is a weighted average of fractions for all other forms of heart disease. The formulas are as follows:

AAF for heart failure (hospitalisation)

$$= \left(\frac{(\text{IHD AAF} \times \text{no. IHD hosp}) + (\text{Hypert. AAF} \times \text{no. Hypert hosp}) + (\text{SVD AAF} \times \text{no. SVD hosp}) + (\text{ACM AAF} \times \text{no. ACM hosp})}{\text{Total no. CVD hosp} - \text{Total no. HF hosp}} \right)$$

AAF for heart failure (death)

$$= \left(\frac{(\text{IHD AAF} \times \text{no. IHD death}) + (\text{Hypert. AAF} \times \text{no. Hypert death}) + (\text{SVD AAF} \times \text{no. SVD death}) + (\text{ACM AAF} \times \text{no. ACM death})}{\text{Total no. CVD death} - \text{Total no. HF death}} \right)$$

IHD=Ischaemic Heart Disease; Hypert.=Hypertension; SVD=Supraventricular Cardiac Dysrhythmia; ACM=Alcoholic Cardiomyopathy; CVD=Cardiovascular Diseases; HF= Heart Failure; hosp=hospitalisation

Due to the small number of cases in remote Aboriginal populations, the AAFs for heart failure for the whole State Aboriginal population were used for this population to avoid unstable and unreliable AAFs.

4.2.3 Specific procedure for deriving AAFs for unspecified stroke

In morbidity and mortality data, some stroke cases were coded as unspecified stroke. The reason for this is that ischaemic and haemorrhagic stroke can only be differentiated definitively by sophisticated imaging techniques that were not always available. The AAF calculation formulas for unspecified stroke are listed below. This method assumes that the proportion of haemorrhagic and ischaemic strokes in the 'unspecified' group is the same or very similar to the observed proportions who are given a specific diagnosis.

AAF for unspecified stroke death

$$= \left(\frac{\text{No. Isch stroke deaths}}{\text{No. Isch stroke deaths} + \text{No. Haem stroke deaths}} \right) \times \text{Isch stroke AAF}$$

$$+ \left(\frac{\text{No. Haem stroke death}}{\text{No. Isch stroke death} + \text{No. Haem stroke death}} \right) \times \text{Haem stroke AAF}$$

AAF for unspecified stroke hospitalisation

$$= \left(\frac{\text{No. Isch stroke hosp}}{\text{No. Isch stroke hosp} + \text{No. Haem stroke hosp}} \right) \times \text{Isch stroke AAF}$$

$$+ \left(\frac{\text{No. Haem stroke hosp}}{\text{No. Isch stroke hosp} + \text{No. Haem stroke hosp}} \right) \times \text{Haem stroke AAF}$$

Isch stroke = Ischaemic stroke; Haem stroke = haemorrhagic stroke; hosp=hospitalisation

5. Procedures

The calculation of these WA specific AAFs requires two fundamental pieces of information:

- the relative risk,
- the prevalence.

RR is used to measure the causal relationship between exposure to risky alcohol consumption and the condition being studied. It is the ratio of the probability of an event occurring (ie, developing a condition) in an exposed group (ie, various alcohol risk consumption level) to the probability of developing that condition in an abstainer group. Prevalence is used to measure the proportion of the relevant population engaging in the alcohol consumption at different levels of risk.

5.1 Determine alcohol consumption prevalence at different level of risk

In order to determine the RRs for each condition, two parameters need to be available:

- the risky/harmful alcohol consumption level,
- prevalence of alcohol consumption by age, gender and Aboriginality for different consumption levels.

5.1.1 Alcohol consumption categories

Harmful alcohol use is risky for both individual drinkers and for others affected given that it leads to increased levels of serious injury and health problems. Alcohol consumption categories (Table 4) are determined based on a combination of the 2001 and 2009 NHMRC Australian Guidelines to Reduce Health Risks from Drinking Alcohol (NHMRC 2001, NHMRC 2009). This hybrid is necessary as the 2009 guidelines provide only two risk categories – low risk and high risk – for daily alcohol consumption, however to accurately estimate outcomes using the indirect AAF method there must be at least three categories of consumption prevalence.

For the open ended (harmful) categories the risk ratios were derived by multiplying the risk ratio for the lower limit of the category (i.e. 61g for males, 41g for females) by 1.2 as per (Berlin, J. 1994).

Table 4. Risk levels of alcohol consumption for alcohol-related health conditions

	Low risk	Hazardous (risky)	Harmful (high risk)
Male	>0 – 20g	21g – 60g	61g+
Female	>0 – 20g	21g – 40g	41g+

When defining risk levels for injuries and poisonings, the consumption categories were applied as per 'Australian Alcohol Aetiological Fractions for Injuries Treated in Emergency Departments' (Chikritzhs T. 2011). Chikritzhs et al used Australian based Emergency Department studies to estimate the number of people presenting with an injury to EDs who had been drinking in the 6 hours prior to the presentation. This allows for the analysis of the acute consequences (injuries) of single episode drinking, which is a more accurate methodology than using long term drinking patterns to determine acute outcomes. The categories derived were 'abstainers' (nothing to drink in the 6 hours prior to injury), 'less than four standard drinks' and 'greater than four standard drinks' (Table 5). The open ended category of 'greater than four standard drinks' was capped at 80g for males and 60g for females, with a range taken across these values.

Table 5. Risk levels of alcohol consumption for injuries and poisonings

	Abstainers	< 4 standard drinks	> 4 standard drinks
Male	0g	>0 – 40g	41g – 80g
Female	0g	>0 – 40g	41g – 60g

For injuries and poisonings, these categories were applied to the risk ratios from 'The more you drink the harder you fall: A systematic review and meta-analysis of how acute alcohol consumption and injury or collision risk increase together (Taylor B 2010), which also used alcohol consumption in the 6 hours prior to injury to calculate the risk ratios for various conditions. This allowed for 'MVA', 'falls' injuries, 'all other' injuries to be calculated separately.

5.1.2 Consumption prevalence categories

Consumption prevalence data for non-Aboriginal Western Australians was obtained from the AIHW using a combination of the 2010 and 2013 'National Drug Strategy Household Survey' (Table 6-7). Categories were based on a combination of the 2001 and 2009 NHMRC Australian Guidelines to Reduce Health Risks from Drinking Alcohol, for reasons discussed above.

Table 6. Average daily consumption prevalence (%) for male, non-Aboriginal Western Australians

Average level of daily alcohol consumption	15-24	25-34	35-44	45-54	55-64	65+
Never had a full serve of alcohol	16.1	6.8	5.0	3.6	2.9	4.7
Ex-drinker	4.5	4.6	4.3	8.3	10.2	11.4
Low risk	47.6	47.9	53	50.7	57.9	62.1
Hazardous	27.5	33.6	27.9	27.1	24.1	18.8
Harmful	1.3	7.2	9.7	10.3	4.9	3.1

Table 7. Average daily consumption prevalence (%) for female, non-Aboriginal Western Australians

Average level of daily alcohol consumption	15-24	25-34	35-44	45-54	55-64	65+
Never had a full serve of alcohol	19.7	8.8	8.4	6.6	7.9	21.5
Ex-drinker	3.0	7.1	5.3	7.5	9.4	18.8
Low risk	61.2	68.4	76.7	71.9	74	55.9
Hazardous	11.8	11.3	6.7	12.1	5.9	2.4
Harmful	4.3	4.4	3.0	1.9	2.8	1.5

Abstainers were categorised as lifetime abstainers (never had a full serve of alcohol) and ex-drinkers. At this point in time there was insufficient data to include these as separate categories in the analysis, thus for the purposes of this report the two were combined.

Consumption prevalence data for Aboriginal Western Australians was sourced from the Australian Bureau of Statistics (Table 8-9), as a customised subset of the 'Australian Aboriginal and Torres Strait Islander Health Survey' requested by Epidemiology Branch in 2012. Due to low population numbers the daily consumption for Aboriginal people was based on national survey data rather than Western Australia specific data. The categories remain the same as for non-Aboriginal people.

Table 8. Average daily consumption prevalence (%) for male, Aboriginal Australians

Average level of daily alcohol consumption	15-24	25-34	35-44	45-54	55+
Never had a full serve of alcohol/ex-drinker	65.4	13.4	19.5	20.7	32.5
Low risk	54.6	52.6	45.5	54.1	41.7
Hazardous	12.9	24.8	23.2	17.0	18.4
Harmful 61g+	4.1	9.2	11.7	8.2	7.3

Table 9. Average daily consumption prevalence (%) for female, Aboriginal Australians

Average level of daily alcohol consumption	15-24	25-34	35-44	45-54	55+
Never had a full serve of alcohol/ex-drinker	34.5	26.4	22.7	28.4	53.3
Low risk	56.6	62.6	65.9	59.5	39.8
Hazardous	6.1	6.9	6.7	7.1	3.4
Harmful	2.8	4.1	4.8	5.0	3.5

5.1.3. Relative Risks for different conditions

For the indirect method to be accurate the consumption data used must match the exposure levels (or categories) reported in the meta-analyses. Traditionally meta-analyses have reported risk ratios using a minimum of three defined risk levels, with abstainers as reference group with a risk ratio of 1. More recently some meta-analyses have been providing risk-ratios on a dose-response distribution curve. This increases the accuracy of risk ratios at specific consumption levels. To utilise these dose-response distributions one must either (a) model the population consumption as a distribution (rather than in categories) or (b) extrapolate the risk ratios from the dose response curves into categories which match the consumption categories in use. In the current work, the latter method was used where dose-response risk ratio curves were presented, as the Western Australian consumption data was not available as a distribution.

5.2 Derive AAFs by age, sex and Aboriginality and region

As mentioned above, the AAFs for the majority of chronic conditions were calculated by using the standard indirect method.

Using liver cirrhosis as an example, the RRs selected for liver cirrhosis in males and females were mainly based on a systematic review study by Rehm et al (Rehm J 2010) and the RRs selected are displayed in Table 10.

Table 10. The RRs of hospitalisation related to liver cirrhosis from different alcohol consumption levels by gender

	Low	Hazard	Harm
Male	1.32	2.95	5.75
Female	1.32	2.21	3.44

By using prevalence information from Table 6-9 and RRs from Table 10, we can derive AAFs for liver cirrhosis by using the standard indirect method. For example, The AAF (hospitalisation) for male Aboriginal aged 30 years can be derived as follows:

$$AAF = \frac{\sum P_i(RR_i - 1)}{\sum P_i(RR_i - 1) + 1} = \frac{((0.452*(1.32-1))*(0.175*(2.95-1))+(0.063*(5.75-1)))}{((0.452*(1.32-1))*(0.175*(2.95-1))+(0.063*(5.75-1)))+1} = 0.440.$$

AAF (hospitalisation) for female non-Aboriginal aged 30 years can be calculated as follows:

$$AAF = \frac{\sum P_i(RR_i - 1)}{\sum P_i(RR_i - 1) + 1} = \frac{((0.684*(1.32-1))*(0.113*(2.21-1))+(0.044*(3.44-1)))}{((0.684*(1.32-1))*(0.113*(2.21-1))+(0.044*(3.44-1)))+1} = 0.316,$$

You can find these AAFs in Appendix 1 and 4.

6. Limitations

There are several major limitations in estimating alcohol consumption, and therefore calculating AAFs.

1. Self-report national surveys are likely to be an under-estimate of consumption. Using the National Drug Strategy Household Survey (NDSHS) 2010 data, Gao et al estimated the annual mean per capita consumption of alcohol (PCA) in Western Australia to be 6.56 litres of pure alcohol per person (Gao, Ogeil et al. 2014). Using Western Australian alcohol sales data, the National Alcohol Sales Data Project estimate that PCA for Western Australia in 2009/10 was 12.37 litres (NASDP stage 3 report), almost twice that estimated by the self-reported survey.
2. This method has utilised consumption data from 2010-2013 to estimate daily consumption. The NDSHS has indicated that Australians are reporting less consumption in these most recent surveys than in years prior. Therefore estimates of alcohol related harm for earlier years are likely to be conservative.
3. Using categorical data caps the level of alcohol consumption measured, and does not allow for distribution of consumption. While abstainers are included, those who drink large amounts of alcohol are excluded (Ogeil, Room et al. 2015). Some researchers have estimated that this may lead to an under-estimation of alcohol mortality of up to 25.5% in men and 8% in women (Gmel, Shield et al. 2013)
4. Patterns of drinking, in particular heavy episodic drinking, are not accounted for. Whilst this has been partially accounted for in the calculations of alcohol related injuries in this report, there is emerging evidence that heavy episodic drinking may also affect the risk of chronic diseases, such as ischaemic heart disease (Roerecke and Rehm 2010).
5. The current methodology used by the Global Burden of Disease is to up-shift national survey data using sales data, and produce a continuous gamma distribution of consumption (Gao, Ogeil et al. 2014). This would be the ideal methodology as it would:
 - decrease the under-estimation from recall-based surveys
 - allow for an uncapped, more accurate upper limit and
 - allow for direct comparison to risk ratios presented as dose-response curves.

In this situation the Western Australia specific consumption data was not available in a format or quantity which would allow a gamma distribution to be produced, so the traditional method of categories was utilised. Whilst it is methodologically possible, albeit significantly more complex, to apply an up-estimation to categorical consumption data, one further consideration is that the underlying risk ratios used are also based on recalled consumption information. Therefore, it is possible that there is a systematic underestimation of alcohol consumption across both the derived risk ratios in the meta-analyses and the survey based population consumption data. Adjusting for only the survey based consumption data may result in an overestimation of the alcohol-attributable burden (Rehm, Klotsche et al. 2007).

These issues mean it is likely that the consumption data presented in this version is an underestimation of actual alcohol consumption in Western Australia. If the consumption levels reported in the meta-analyses used are accurate, then the AAFs may also be an underestimation. If the consumption levels reported in the meta-analyses are also an underestimation, then the AAFs will be closer to the true proportion. Either way, the figures presented in this version are unlikely to be an over-estimate of the alcohol attributable burden of disease in Western Australia.

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Appendices

Appendix 2: AAFs for Female Aboriginal Non-remote

Condition	Hosp/Dth	0	1_4	5_9	10_14	15_19	20_24	25_29	30_34	35_39	40_44	45_49	50_54	55_59	60_64	65_69	70_74	75_79	80_85	85plus	
Alcoholic cardiomyopathy	Both	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Alcoholic gastritis	Both	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Alcoholic liver disease	Both	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Alcoholic Mental and behavioural disorders	Both	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Alcoholic myopathy or pseudo-Cushing disease	Both	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Alcoholic pancreatitis acute	Both	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Alcoholic pancreatitis chronic	Both	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Alcoholic polyneuropathy or nervous system degeneration	Both	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Assault	Both	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
Breast Cancer	Both	0.000	0.000	0.000	0.000	0.083	0.083	0.089	0.089	0.093	0.093	0.092	0.092	0.092	0.061	0.061	0.061	0.061	0.061	0.061	0.061
Cardiac arrhythmia	Both	0.000	0.000	0.000	0.000	0.050	0.050	0.050	0.050	0.050	0.050	0.056	0.056	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
Child abuse emotional psychological	Both	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389
Child abuse Maltreatment syndrome, unspecified	Both	0.332	0.332	0.332	0.332	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Child abuse physical	Both	0.350	0.350	0.350	0.350	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Child abuse sexual	Both	0.270	0.270	0.270	0.270	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Colorectal cancer	Both	0.123	0.123	0.123	0.123	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cervical cancer	Both	0.000	0.000	0.000	0.000	0.084	0.084	0.089	0.089	0.092	0.092	0.093	0.093	0.093	0.059	0.059	0.059	0.059	0.059	0.059	0.059
Drowning	Both	0.051	0.051	0.051	0.130	0.209	0.209	0.209	0.209	0.250	0.250	0.305	0.305	0.230	0.230	0.204	0.204	0.094	0.094	0.094	0.094
Epilepsy	Both	0.000	0.000	0.000	0.000	0.145	0.145	0.153	0.153	0.158	0.158	0.159	0.159	0.104	0.104	0.104	0.104	0.104	0.104	0.104	0.104
Falls	Both	0.000	0.000	0.000	0.000	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170	0.170
FASD & Maternal care for damage to foetus from alcohol	Both	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Fires, burns, scalds	Both	0.000	0.000	0.000	0.000	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
Foetus & newborn affected by maternal use of alcohol	Both	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gastro-oesophageal laceration-haemorrhage syndrome	Both	0.000	0.000	0.000	0.000	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560
Haemorrhagic stroke	Death	0.000	0.000	0.000	0.000	0.070	0.070	0.070	0.070	0.072	0.072	0.080	0.080	0.080	0.045	0.045	0.045	0.045	0.045	0.045	0.045
Haemorrhagic stroke	Hosp	0.000	0.000	0.000	0.000	0.018	0.018	0.018	0.018	0.017	0.017	0.019	0.019	0.019	0.010	0.010	0.010	0.010	0.010	0.010	0.010
Heart failure	Death	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.040	0.000	0.003	0.001	0.002	0.002	0.004
Heart failure	Hosp	0.000	0.000	0.000	0.000	0.035	0.037	0.019	0.025	0.023	0.009	0.009	0.010	0.009	0.009	0.005	0.005	0.008	0.006	0.003	0.003
Hypertension	Both	0.000	0.000	0.000	0.000	0.031	0.031	0.031	0.031	0.033	0.033	0.037	0.037	0.037	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Ischaemic heart disease	Death	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ischaemic heart disease	Hosp	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ischaemic stroke	Death	0.000	0.000	0.000	0.000	0.009	0.009	0.009	0.009	0.008	0.008	0.009	0.009	0.009	0.005	0.005	0.005	0.005	0.005	0.005	0.004
Ischaemic stroke	Hosp	0.000	0.000	0.000	0.000	0.010	0.010	0.010	0.010	0.010	0.010	0.011	0.011	0.011	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Laryngeal cancer	Both	0.000	0.000	0.000	0.000	0.175	0.175	0.185	0.185	0.191	0.191	0.191	0.191	0.128	0.128	0.128	0.128	0.128	0.128	0.128	0.128
Liver cancer	Both	0.000	0.000	0.000	0.000	0.063	0.063	0.067	0.067	0.069	0.069	0.070	0.070	0.070	0.043	0.043	0.043	0.043	0.043	0.043	0.043
Motor vehicle accident injuries	Both	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370
Mouth & Oropharyngeal cancer	Both	0.000	0.000	0.000	0.000	0.270	0.270	0.283	0.283	0.291	0.291	0.293	0.293	0.293	0.203	0.203	0.203	0.203	0.203	0.203	0.203
Oesophageal cancer	Both	0.000	0.000	0.000	0.000	0.406	0.406	0.428	0.428	0.438	0.438	0.438	0.430	0.430	0.328	0.328	0.328	0.328	0.328	0.328	0.328
Oesophageal varices	Death	0.000	0.000	0.000	0.000	0.726	0.726	0.739	0.739	0.746	0.746	0.747	0.747	0.747	0.645	0.645	0.645	0.645	0.645	0.645	0.645
Oesophageal varices	Hosp	0.000	0.000	0.000	0.000	0.279	0.279	0.292	0.292	0.300	0.300	0.303	0.303	0.303	0.210	0.210	0.210	0.210	0.210	0.210	0.210
Other liver diseases	Death	0.000	0.000	0.000	0.000	0.726	0.726	0.739	0.739	0.746	0.746	0.747	0.747	0.747	0.645	0.645	0.645	0.645	0.645	0.645	0.645
Other liver diseases	Hosp	0.000	0.000	0.000	0.000	0.279	0.279	0.292	0.292	0.300	0.300	0.303	0.303	0.303	0.210	0.210	0.210	0.210	0.210	0.210	0.210
Other unintentional injuries	Both	0.000	0.000	0.000	0.000	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
Pancreatic cancer	Both	0.000	0.000	0.000	0.000	0.013	0.013	0.012	0.012	0.012	0.012	0.015	0.015	0.015	0.007	0.007	0.007	0.007	0.007	0.007	0.007
Pancreatitis acute	Both	0.000	0.000	0.000	0.000	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
Pancreatitis chronic	Both	0.000	0.000	0.000	0.000	0.031	0.031	0.031	0.031	0.032	0.032	0.036	0.036	0.036	0.020	0.020	0.020	0.020	0.020	0.020	0.020
Poisoning	Both	0.000	0.000	0.000	0.000	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
Respiratory infections	Both	0.000	0.000	0.000	0.000	0.044	0.044	0.045	0.045	0.046	0.046	0.049	0.049	0.049	0.029	0.029	0.029	0.029	0.029	0.029	0.029
Self inflicted injuries	Both	0.000	0.000	0.000	0.000	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
Unspecified stroke	Death	0.000	0.000	0.000	0.000	0.0															

Appendix 3: AAFs for Male Aboriginal Remote

Condition	Hosp/Dth	0	1_4	5_9	10_14	15_19	20_24	25_29	30_34	35_39	40_44	45_49	50_54	55_59	60_64	65_69	70_74	75_79	80_85	85plus
Assault	Both	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290
Alcoholic Cardiomyopathy	Both	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Alcoholic Gastritis	Both	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Alcoholic Liver disease	Both	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Alcoholic Mental and behavioural disorders	Both	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Alcoholic myopathy or pseudo-Cushing disease	Both	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Alcoholic neuropathy - acute	Both	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Alcoholic pancreatitis- chronic	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cardiac arrhythmia	Both	0.000	0.000	0.000	0.070	0.070	0.143	0.143	0.143	0.156	0.156	0.111	0.111	0.110	0.110	0.110	0.110	0.110	0.110	0.110
Child abuse emotional psychological	Both	0.389	0.389	0.389	0.389	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Child abuse neglect	Both	0.350	0.350	0.350	0.350	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Child abuse not otherwise specified	Both	0.332	0.332	0.332	0.332	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Child abuse physical	Both	0.270	0.270	0.270	0.270	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Child abuse sexual	Both	0.123	0.123	0.123	0.123	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Colorectal Cancer	Both	0.000	0.000	0.000	0.000	0.102	0.102	0.171	0.171	0.177	0.177	0.139	0.139	0.135	0.135	0.135	0.135	0.135	0.135	0.135
Drowning	Both	0.051	0.051	0.051	0.130	0.209	0.209	0.250	0.250	0.305	0.305	0.305	0.230	0.230	0.204	0.204	0.094	0.094	0.094	0.094
Epilepsy	Both	0.000	0.000	0.000	0.000	0.186	0.186	0.296	0.296	0.305	0.305	0.245	0.245	0.241	0.241	0.241	0.241	0.241	0.241	0.241
FASD & Maternal care for damage to foetus from alcohol	Both	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Falls	Both	0.000	0.000	0.000	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190
Fires, burns, scalds	Both	0.000	0.000	0.000	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290
Foetus & newborn affected by maternal use of alcohol	Both	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gastro-oesophageal laceration-haemorrhage syndrome	Both	0.000	0.000	0.000	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560
Haemorrhagic Stroke	Death	0.000	0.000	0.000	0.091	0.091	0.170	0.170	0.180	0.180	0.180	0.133	0.133	0.132	0.132	0.132	0.132	0.132	0.132	0.132
Haemorrhagic Stroke	Hosp	0.000	0.000	0.000	0.108	0.108	0.192	0.192	0.202	0.202	0.153	0.153	0.152	0.152	0.152	0.152	0.152	0.152	0.152	0.152
Heart Failure	Death	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.176	0.000	0.023	0.040	0.037	0.031	0.063	0.013	0.008	0.018	0.027	0.013
Heart Failure	Hosp	0.000	0.000	0.000	0.076	0.084	0.085	0.077	0.053	0.033	0.018	0.019	0.022	0.025	0.023	0.011	0.019	0.019	0.036	0.058
Hypertension	Both	0.000	0.000	0.000	0.122	0.122	0.203	0.203	0.203	0.209	0.209	0.147	0.111	0.111	0.109	0.109	0.109	0.109	0.109	0.109
Ischaemic Heart Disease	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ischaemic Stroke	Death	0.000	0.000	0.000	0.017	0.017	0.046	0.046	0.058	0.058	0.052	0.034	0.034	0.031	0.031	0.031	0.031	0.031	0.031	0.031
Ischaemic Stroke	Hosp	0.000	0.000	0.000	0.014	0.014	0.040	0.040	0.040	0.052	0.052	0.034	0.034	0.031	0.031	0.031	0.031	0.031	0.031	0.031
Laryngeal Cancer	Both	0.000	0.000	0.000	0.188	0.188	0.281	0.281	0.281	0.283	0.283	0.236	0.236	0.229	0.229	0.229	0.229	0.229	0.229	0.229
Liver Cancer	Both	0.000	0.000	0.000	0.078	0.078	0.139	0.139	0.147	0.147	0.147	0.111	0.111	0.109	0.109	0.109	0.109	0.109	0.109	0.109
Liver cirrhosis unspec	Death	0.000	0.000	0.000	0.521	0.521	0.712	0.712	0.712	0.735	0.735	0.649	0.649	0.648	0.648	0.648	0.648	0.648	0.648	0.648
Liver cirrhosis unspec	Hosp	0.000	0.000	0.000	0.378	0.378	0.542	0.542	0.542	0.557	0.557	0.473	0.473	0.471	0.471	0.471	0.471	0.471	0.471	0.471
MVA injuries	Both	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450
Mouth & Oropharyngeal Cancer	Both	0.000	0.000	0.000	0.353	0.353	0.508	0.508	0.508	0.520	0.520	0.441	0.441	0.438	0.438	0.438	0.438	0.438	0.438	0.438
Nervous system degeneration	Both	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Oesophageal Cancer	Both	0.000	0.000	0.000	0.493	0.493	0.623	0.623	0.623	0.629	0.629	0.569	0.569	0.558	0.558	0.558	0.558	0.558	0.558	0.558
Oesophageal varices	Death	0.000	0.000	0.000	0.521	0.521	0.712	0.712	0.712	0.735	0.735	0.649	0.649	0.648	0.648	0.648	0.648	0.648	0.648	0.648
Oesophageal varices	Hosp	0.000	0.000	0.000	0.378	0.378	0.542	0.542	0.542	0.557	0.557	0.473	0.473	0.471	0.471	0.471	0.471	0.471	0.471	0.471
Other unintentional injuries	Both	0.000	0.000	0.000	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290
Pancreatic Cancer	Both	0.000	0.000	0.000	0.017	0.017	0.051	0.051	0.061	0.061	0.061	0.037	0.037	0.038	0.038	0.038	0.038	0.038	0.038	0.038
Pancreatitis acute	Both	0.000	0.000	0.000	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
Pancreatitis chronic	Both	0.000	0.000	0.000	0.124	0.124	0.260	0.260	0.260	0.287	0.287	0.205	0.205	0.206	0.206	0.206	0.206	0.206	0.206	0.206
Poisonings	Both	0.000	0.000	0.000	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290
Respiratory infections	Both	0.000	0.000	0.000	0.058	0.058	0.118	0.118	0.127	0.127	0.127	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
Self inflicted injuries	Both	0.000	0.000	0.000	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290
Unspecified Stroke	Death	0.000	0.000	0.000	0.000	0.000	0.046	0.170	0.139	0.180	0.139	0.109	0.109	0.132	0.132	0.132	0.132	0.132	0.132	0.132
Unspecified Stroke	Hosp	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Appendix 5: AAFs for Male Non-Aboriginal

Condition	Hosp/Dth	0	1_4	5_9	10_14	15_19	20_24	25_29	30_34	35_39	40_44	45_49	50_54	55_59	60_64	65_69	70_74	75_79	80_85	85plus
Assault	Both	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290
Alcoholic Cardiomyopathy	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Alcoholic Gastritis	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Alcoholic Liver disease	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Alcoholic Mental and behavioural disorders	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Alcoholic myopathy or pseudo-Cushing disease	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Alcoholic pancreatitis - acute	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Alcoholic pancreatitis - chronic	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Breast Cancer	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cardiac arrhythmia	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Child abuse emotional psychological	Both	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389
Child abuse neglect	Both	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350
Child abuse not otherwise specified	Both	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332
Child abuse physical	Both	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270
Child abuse sexual	Both	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123
Colorectal Cancer	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Drowning	Both	0.051	0.051	0.051	0.051	0.130	0.209	0.209	0.209	0.250	0.305	0.305	0.305	0.230	0.204	0.204	0.204	0.094	0.094	0.094
Epilepsy	Both	0.000	0.000	0.000	0.000	0.000	0.244	0.244	0.294	0.294	0.294	0.294	0.294	0.294	0.245	0.245	0.211	0.211	0.211	0.211
FASD & Maternal care for damage to foetus from alcohol	Both	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Falls	Both	0.000	0.000	0.000	0.000	0.000	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190	0.190
Fires, burns, scalds	Both	0.000	0.000	0.000	0.000	0.000	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290
Foetus & newborn affected by maternal use of alcohol	Both	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gastro-oesophageal laceration-haemorrhage syndrome	Both	0.000	0.000	0.000	0.000	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560	0.560
Haemorrhagic Stroke	Death	0.000	0.000	0.000	0.000	0.132	0.132	0.166	0.166	0.169	0.170	0.170	0.170	0.131	0.131	0.131	0.105	0.105	0.105	0.105
Haemorrhagic Stroke	Hosp	0.000	0.000	0.000	0.000	0.152	0.152	0.188	0.188	0.191	0.191	0.192	0.192	0.151	0.151	0.151	0.125	0.125	0.125	0.125
Heart Failure	Death	0.000	0.000	0.000	0.000	0.000	-0.046	-0.071	-0.071	-0.043	-0.046	-0.038	-0.034	-0.054	-0.067	-0.078	-0.082	-0.082	-0.080	-0.074
Heart Failure	Hosp	0.000	0.000	0.000	0.000	0.086	0.072	0.063	-0.001	-0.053	-0.120	-0.128	-0.129	-0.152	-0.152	-0.154	-0.158	-0.157	-0.165	-0.165
Hypertension	Both	0.000	0.000	0.000	0.000	0.164	0.164	0.199	0.199	0.201	0.201	0.202	0.202	0.164	0.164	0.164	0.139	0.139	0.139	0.139
Ischaemic Heart Disease	Death	0.000	0.000	0.000	0.000	-0.080	-0.080	-0.071	-0.071	-0.051	-0.042	-0.042	-0.042	-0.084	-0.084	-0.093	-0.093	-0.093	-0.089	-0.089
Ischaemic Heart Disease	Hosp	0.000	0.000	0.000	0.000	-0.084	-0.084	-0.110	-0.110	-0.102	-0.102	-0.101	-0.101	-0.076	-0.076	-0.056	-0.056	-0.056	-0.056	-0.056
Ischaemic Stroke	Death	0.000	0.000	0.000	0.000	-0.030	-0.030	-0.016	-0.016	-0.012	-0.012	-0.007	-0.007	-0.040	-0.040	-0.054	-0.054	-0.054	-0.054	-0.054
Ischaemic Stroke	Hosp	0.000	0.000	0.000	0.000	-0.034	-0.034	-0.022	-0.022	-0.018	-0.018	-0.013	-0.013	-0.044	-0.044	-0.057	-0.057	-0.057	-0.057	-0.057
Laryngeal Cancer	Both	0.000	0.000	0.000	0.000	0.235	0.235	0.276	0.276	0.279	0.279	0.278	0.278	0.239	0.239	0.239	0.212	0.212	0.212	0.212
Liver Cancer	Both	0.000	0.000	0.000	0.000	0.108	0.108	0.135	0.135	0.138	0.138	0.139	0.139	0.108	0.108	0.108	0.090	0.090	0.090	0.090
Liver cirrhosis unspec	Death	0.000	0.000	0.000	0.000	0.631	0.631	0.699	0.699	0.699	0.710	0.713	0.713	0.628	0.628	0.628	0.558	0.558	0.558	0.558
Liver cirrhosis unspec	Hosp	0.000	0.000	0.000	0.000	0.472	0.472	0.535	0.535	0.535	0.540	0.541	0.541	0.470	0.470	0.470	0.416	0.416	0.416	0.416
MVA injuries	Both	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450	0.450
Mouth & Oropharyngeal Cancer	Both	0.000	0.000	0.000	0.000	0.442	0.442	0.502	0.502	0.506	0.506	0.507	0.507	0.441	0.441	0.441	0.391	0.391	0.391	0.391
Nervous system degeneration	Both	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Oesophageal Cancer	Both	0.000	0.000	0.000	0.000	0.560	0.560	0.613	0.613	0.613	0.620	0.620	0.620	0.568	0.568	0.568	0.528	0.528	0.528	0.528
Oesophageal varices	Death	0.000	0.000	0.000	0.000	0.631	0.631	0.699	0.699	0.710	0.713	0.713	0.713	0.628	0.628	0.628	0.558	0.558	0.558	0.558
Oesophageal varices	Hosp	0.000	0.000	0.000	0.000	0.472	0.472	0.535	0.535	0.535	0.540	0.541	0.541	0.470	0.470	0.470	0.416	0.416	0.416	0.416
Other unintentional injuries	Both	0.000	0.000	0.000	0.000	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290
Pancreatic Cancer	Both	0.000	0.000	0.000	0.000	0.032	0.032	0.046	0.046	0.046	0.046	0.050	0.052	0.031	0.031	0.031	0.020	0.020	0.020	0.020
Pancreatitis acute	Both	0.000	0.000	0.000	0.000	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220	0.220
Pancreatitis chronic	Both	0.000	0.000	0.000	0.000	0.192	0.192	0.247	0.247	0.258	0.258	0.262	0.262	0.187	0.187	0.187	0.142	0.142	0.142	0.142
Poisonings	Both	0.000	0.000	0.000	0.000	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290
Respiratory infections	Both	0.000	0.000	0.000	0.000	0.088	0.088	0.114	0.114	0.117	0.117	0.118	0.118	0.087	0.087	0.087	0.068	0.068	0.068	0.068
Self inflicted injuries	Both	0.000	0.000	0.000	0.000	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290	0.290
Unspecified Stroke	Death	0.000	0.000	0.000	0.000	0.078	0.132	0.166	0.166	0.130	0.145	0.160	0.160	0.096	0.098	0.082	0.062	0.056	0.050	0.039
Unspecified Stroke	Hosp	0.000	0.000	0.000	0.000	0.048	0.048	0.062	0.062	0.049	0.048	0.048	0.048	0.006	-0.004	-0.016	-0.018	-0.016	-0.013	-0.009

Appendix 6: AAFs for Female Non-Aboriginal

Condition	Hosp/Dth 0	1_4	5_9	10_14	15_19	20_24	25_29	30_34	35_39	40_44	45_49	50_54	55_59	60_64	65_69	70_74	75_79	80_85	85plus	
Assault	Both	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250
Alcoholic Cardiomyopathy	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250
Alcoholic Gastritis	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250
Alcoholic Liver disease	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250
Alcoholic Mental and behavioural disorders	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250
Alcoholic myopathy or pseudo-Cushing disease	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250
Alcoholic pancreatitis - acute	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250
Alcoholic pancreatitis- chronic	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250
Breast Cancer	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.062
Cardiac arrhythmia	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009
Child abuse emotional psychological	Both	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.389	0.000
Child abuse neglect	Both	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.000
Child abuse not otherwise specified	Both	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.332	0.000
Child abuse physical	Both	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.270	0.000
Child abuse sexual	Both	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.123	0.000
Colorectal Cancer	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.056
Drowning	Both	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.094
Epilepsy	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.099
FASD & Maternal care for damage to foetus from alcohol	Both	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Falls	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.170
Fires, burns, scalds	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250
Foetus & newborn affected by maternal use of alcohol	Both	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gastro-oesophageal laceration-haemorrhage syndrome	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.560
Haemorrhagic Stroke	Death	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Haemorrhagic Stroke	Hosp	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Heart Failure	Death	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.161
Heart Failure	Hosp	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.059
Hypertension	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.053
Ischaemic Heart Disease	Death	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.066
Ischaemic Heart Disease	Hosp	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.368
Ischaemic Stroke	Death	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.192
Ischaemic Stroke	Hosp	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.093
Laryngeal Cancer	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.122
Liver Cancer	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.038
Liver cirrhosis unspc	Death	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.633
Liver cirrhosis unspc	Hosp	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.196
MVA injuries	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.370
Mouth & Oropharyngeal Cancer	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.193
Nervous system degeneration	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
Oesophageal Cancer	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.344
Oesophageal varices	Death	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.633
Oesophageal varices	Hosp	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.196
Other unintentional injuries	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250
Pancreatic Cancer	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pancreatitis acute	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.220
Pancreatitis chronic	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010
Poisonings	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250
Respiratory infections	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.021
Self inflicted injuries	Both	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250
Unspecified Stroke	Death	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.065
Unspecified Stroke	Hosp	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.108

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