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AODstats

Methods for the Victorian data maps

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AODstats Methods
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INTRODUCTION

This methods document describes the data, sources, and calculations that are presented in AODstats. It is intended as a reference for AODstats users who require background information when interpreting and presenting data and graphs sourced from AODstats.

METHODOLOGY

AODstats website (www.aodstats.org.au) presents alcohol and other drug-related secondary data collected from a variety of data sources. Secondary data analysis involves using data for purposes other than what was originally intended when collected, such as re-analysing census or government survey data. These types of data are also referred to as 'available data' or 'indicator data'. As well as censuses and surveys, administrative data such as hospitalisation, mortality, road injury, and assault data are widely used for secondary analysis. Administrative data is based on routinely collected information for reporting and monitoring purposes. Although there are a multitude of sources for secondary data analysis, at present the focus of AODstats is largely administrative data.

There are several advantages to using secondary data. These include: population coverage, sample size (usually larger than could be achieved otherwise), and cost effectiveness, as savings are made at most stages of the research process such as survey design, data collection, data entry and preparation.

However, there are also a number of limitations to consider before using secondary data, such as incomplete or missing data, and inadequate coding. For example, the VicRoads data captures information on road accidents involving all road users, including drivers, passengers of vehicles, and pedestrians. However, road injury data collated by VicRoads does not include a measure of alcohol involvement in all injuries, as blood alcohol readings are not routinely performed by police at all accidents. A surrogate measure for alcohol-related road injury is therefore warranted, yet – although surrogate measures would provide an adequate solution – they are not perfect. There will inevitably be events that are missed when they should be included and, conversely, events included when they should not.

Data Sources

Fifteen data sources, comprising seven unit record datasets and eight aggregated datasets, are used in AODstats. They include:

- Victorian emergency department presentations data from the Victorian Emergency Minimum Dataset (VEMD);
- Victorian hospital admissions data from the Victorian Hospital Admitted Episodes Data (VAED);
- Alcohol- and drug-related ambulance attendances from the Turning Point Ambo Project;
- Alcohol and drug treatment services data (ADIS) from DHHS;
- Victorian Cause of Death Unit Record File (COD URF) from the Australian Coordinating Registry (ACR);
- Serious road injuries from the VicRoads Road Network Database (RNDB);
- Aggregated assault and family incident data derived from the Victoria Police Law Enforcement Assistance Program data (LEAP);
- DirectLine telephone service data from Turning Point;
- Counselling online information from Turning Point;
- Needle and Syringe Program data from DHHS;

- Opioid Replacement Therapy data from DHHS;
- HIV, Hepatitis B, and Hepatitis C notifications from Burnet Institute

Emergency department presentations (VEMD)

Data on presentations to Emergency Departments (ED) are obtained from the Victorian Emergency Minimum Dataset (VEMD). The VEMD is a database maintained by the Victorian Department of Health and Human Services, and contains detailed demographic, clinical, and administrative information on all presentations to Victorian public hospitals with 24-hour ED. This includes a range of fields regarding the reason for each presentation (using ICD10 diagnoses), as well as age, sex, resident local government area (LGA), and other variables. The ICD10 codes used for AODstats can be found in Tables 2, 3 and 4.

Hospital admissions (VAED)

Information on alcohol- and drug-related hospital admissions are obtained from the Victorian Admitted Episodes Dataset (VAED). The VAED is a database maintained by the Victorian Department of Health and Human Services, and contains details of all acute hospital separations in Victoria including information on the cause of the admission (according to ICD coding), as well as the age, sex, and resident LGA of the admitted patient. The term 'acute hospitals' refers to public, private, and denominational hospitals, acute facilities in rehabilitation and extended care (sub-acute) facilities, day procedure centres, and designated acute psychiatric units in public hospitals. Residential care (nursing homes), hostels, supported residential services, and state managed psychiatric institutions are not included in the VAED. An overview of the VAED is provided at http://www.health.vic.gov.au/hdss/vaed_(DH_2014). The ICD10 codes used for AODstats can be found in Tables 2, 3 and 4.

There was a policy change in Victoria between 2011/12 and 2012/13 for VAED data. Prior to this, care provided in the ED (continuous care for at least 4 hours in the ED) would also be counted as a VAED admission/separation. This could be causing an over-representation of cases or double counting of ED cases. Therefore, with the ED cases included in the VAED data, there will be a discontinuity in the trend data, and data from 2012/13 onwards cannot be compared to data prior to this policy change. This issue, however, has been addressed in the updated version of AODstats. ED cases from VAED dataset have been identified and removed for all years prior to 2012/13, by examining a set of variables suggested by the Victorian Department of Health and Human Services.

Ambulance attendances

The Ambo Project database is maintained by Turning Point. This is a database of alcohol and other drug related attendances by Ambulance Victoria. Data is available from 1998 onwards for the Metropolitan Melbourne area (Dietze, Cvetkovski et al. 2000). Victorian regional data has been coded from May 2011. The database contains information from the patient care records completed by the attending ambulance paramedics. Since October 2006, Ambulance Victoria has utilised an electronic system whereby ambulance paramedics are required to complete an electronic patient care record (ePCR) for every incident that they attend and for which they provide a service. These electronic records are downloaded onto VACIS®. The paper based PCRs, and more recently the electronic format, are coded and entered into a database by Turning Point. This database includes attendances for all types of drug involvement, including alcohol, illicit drugs, and pharmaceutical drugs. An overview of the most recent Ambo Project report can be found here: http://www.turningpoint.org.au/site/DefaultSite/filesystem/documents/Ambo%20Report%20-%20trends%20in%20alcohol%20and%20drug%20related%20ambulance%20attendances%202013-14(1).pdf (Lloyd, Matthews et al. 2015).

The attribution of a substance being involved in the event is based on ambulance paramedic mention of the involvement of the substance, established through paramedic clinical assessment,

patient self-report, or information provided by someone at the scene. Cases are included if the immediate or very recent over- or inappropriate use of the substance directly contributed to the attendance (Lloyd, Matthews et al. 2014).

There are three categories of alcohol-related ambulance attendances: (1) alcohol mentions, (2) alcohol intoxication with or without other drugs involved, and (3) alcohol (intoxication) only. Although other drugs cannot be absolutely ruled out in 'alcohol (intoxication) only' attendances, case data indicates that the attendance was caused by alcohol and, as far as could be determined, no other substances were involved in the presentation. The 'alcohol mentions' category includes those cases where alcohol was mentioned as being involved, but may or may not be the primary reason for attendance and may not have contributed to the ambulance attendance. AODstats provides information on any alcohol intoxication associated with an attendance, alcohol (only) intoxication, as well as alcohol intoxication with other drugs (categories two and three).

Drug-related attendances include cases where illicit or prescription drugs were primarily involved in the event, but other substances may have been present.

Data are provided across a ten year period. For ambulance data, there is an exception to this for some drug types. Alcohol intoxication has been coded since October 2006 and therefore data is provided from the next financial year (2007/08). Synthetic cannabinoids began being coded from January 2014 and are therefore included in the illicit drug category from the 2014/15 financial year and emerging psychoactive began being coded in July 2015 and are included in the illicit drug category from 2015/16 financial year.

There are several months of missing data over the ten years. Where this is the case, numbers are imputed for the missing months based on the same month in the year prior and after, taking the average of the two. This includes 5 days in September 2014 and all of October-December 2014, due to industrial action.

Alcohol and Drug Information System (ADIS)

The Victorian Department of Health and Human Services funds community-based agencies to provide specialist alcohol and drug treatment services across the state. The collection of client information is a mandatory requirement. In 1996, an interim version of a new system for collection of this information, called the Alcohol and Drug Information System (ADIS), was established pending the development of a final version of ADIS (implemented from 2000/01). The data presented in AODstats are derived from ADIS-contributing specialist drug and alcohol agencies (including community health centres) in Victoria. Unit level data were obtained from the Department of Health and Human Services.

Mortality Data

The confidential Cause of Death Unit Record File (COD URF) data file holds information on all deaths that occur for all residents. Deaths are coded from death certificates compiled by the collective jurisdictional Registries of Birth, Deaths and Marriages, and State and Chief Coroners, using ICD10 codes for calendar years 1999 onwards. Prior to 2007, the Australian Bureau of Statistics (ABS) was the Australian Coordinating Registry (ACR) for obtaining COD URF and since 2007 (i.e. 2008 calendar year), data is obtained from the new ACR, the Queensland Registry of Births, Deaths and Marriages (BDM).

In AODstats, all numbers are based on deaths of persons who usually resided in Victoria for the year in which the death occurred. To estimate numbers of deaths relating to drug use, aetiological fractions (AFs) were applied to all alcohol- and illicit drug-related deaths (English, Holman et al. 1995) unless specified otherwise. Pharmaceutical drug-related deaths were not able to be presented for AODstats due to very small numbers. From 1999 to 2004, amendments for alcohol

that drew on the Australian Institute of Health and Welfare (AIHW) relative risk updates and re-weighted estimates on the drinking population were incorporated into the data (Ridolfo and Stevenson 2001).

Serious Road Injury (SRI) data

The VicRoads Road Network Database (RNDB) is compiled from Victoria Police information. Forms completed by police detailing each crash, where (according to LGA) and when it occurred, persons involved, vehicles involved, and a description of the crash are entered into a police database. This information is transferred weekly to the VicRoads RNDB. Additional information from these forms, not entered by police, is added to the RNDB by VicRoads. Data were obtained from VicRoads. Where needed, crashes were assigned to LGAs according to the recorded postcode of the location of the accident through the application of ABS census-derived conversion data.

It is important to note that in December 2005, Victoria Police implemented a new application called the Traffic Incident System (TIS). The TIS is used to record details of road crashes, and is the source of the data that is available in the crash statistics. This new system has resulted in a discontinuity in the data series. Thus, Victoria Police have advised that data from 2006 onwards are not comparable to previous years' data when undertaking time-series trend analysis.

In addition to a system change, there has also been a change in the definition of a serious road injury (SRI). From 2009/10 onwards, an SRI is not defined as a fatality or transport to hospital. Rather, it is a fatality or an admission to hospital. Police now follow up with the hospital, and only those cases that are admitted are classified as an SRI. The reader will note a sizeable decrease in the number of SRIs between 2008/09 and 2009/10, and it is largely attributable to this definition change. As well as definition change, data may also be incomplete when an incident has not yet been approved by Victoria Police. This may be due to ongoing investigation or prosecution by the courts. Furthermore, an incident may not yet have been finalised and therefore cannot be processed by VicRoads due to incorrect and/or missing information. Finally, data may be incomplete when the incident record is returned to Victoria Police for amendment.[1] Please note that serious road injuries relate to all road users, not just drivers (pedestrians, passengers, cyclists etc.).

Up to the 2011/12 financial year, SRI data was obtained directly from the VicRoads RNDB for use in AODstats. As of the 2012/13 financial year, SRI data was downloaded from VicRoads CrashStats (an online interactive statistics and mapping application for road crashes) (VicRoads 2013) . Therefore, there may be a discontinuity in the trend data from the 2012/13 financial year. The updated data for calendar years 2006/2015 have been downloaded from this link: https://www.data.vic.gov.au/data/dataset/crash-stats-data-extract. CrashStats updates this online data on a monthly basis.

Law Enforcement Assistance Program (LEAP)

The Victoria Police collate statistics on the number of reported incidents recorded for a variety of offence types on the Law Enforcement Assistance Program (LEAP), a computerised database established in 1993. Reported incidents of assault and family incidents (a measure of domestic violence) are recorded along with information on the location of the assault. Data were obtained from Victoria Police. All LEAP data were assigned to LGAs according to the relevant recorded postcode through application of ABS census-derived conversion data until 2007/08, after which data is provided in LGA categories. Data on the location of assaults and family incidents are used

[1] This information was provided by Victoria Police in a personal communication with VicRoads (February 2012)

herein. Victim's residence for assault may be included in future editions.

The Crime Statistics Agency (CSA) collates statistics from the Victoria Police LEAP data. CSA conducts quality checks and processes the data before analysing the data to identify movements and potential trends. The resulting aggregated statistics are then signed off by the Chief Statistician, and crime statistics are released to the public every quarter via the CSA website. The datasets include: offences recorded, alleged offender incidents, victim reports, and family incidents. The annual financial year statistical release also includes two additional datasets: unique offenders and unique victims.

DirectLine, Turning Point

DirectLine provides 24-hour telephone counselling, information, and referral services for Victorians to discuss alcohol- and other drug-related issues. DirectLine is managed by HealthLink, a program of Turning Point. The Population Health Research team has access to data from July 1998 and conducts a variety of analyses for drug trend monitoring in Victoria.

Data were limited to valid DirectLine calls by removing all administrative, hoax, immediate hang up or wrong number calls. HealthLink manages several addiction-related health information and referral telephone support services and calls for these services were also excluded from analysis. Specifically, telephone calls for the YSASline, Drug and Alcohol Clinical Advisory Service (DACAS), Youth Campaign calls and Gambler's Help, from Tasmania or from the Northern Territory were excluded.

Postcode is not reliably collected in DirectLine (approximately 30% of postcodes are missing), and is the postcode of the call location, making extraction of data by LGA unfeasible. Therefore, DirectLine data is only presented at a State level in AODstats.

Needle and Syringe Program, DHHS

The Needle and Syringe Program (NSP) data have been collated from the Australian NSP Survey. It is an annual cross-sectional survey of NSP attendees across Australia that forms the basis of human immunodeficiency virus (HIV) and hepatitis C (HCV) surveillance among people who inject drugs in Australia. Monitoring behavioural indices of risk, in addition to infection prevalence, the Australian NSP Survey provides important information for planning prevention and treatment and also supporting policies and services. Each year during the designated survey week, all clients who attend selected NSPs are asked to complete a brief, anonymous questionnaire and to provide a capillary blood sample for HIV and HCV antibody testing. The questionnaire collected data on demographic characteristics, injecting behaviours, sexual behaviours, and history of BBV testing, imprisonment, and drug treatment.

Opioid Replacement therapy, DHHS

Opioid Replacement Therapy (ORT) data have been collated from the Victorian Opioid Pharmacotherapy Program. Methadone and buprenorphine are used in the treatment of opioid dependence. Medical practitioners, nurse practitioners and community pharmacies can apply for approval to become a pharmacotherapy prescriber or pharmacotherapy supplier. Data are presented for the number of clients using ORT and the drug types involved.

HIV, Hepatitis B and C, Burnet Institute

HIV, Hepatitis B and Hepatitis C data are collected from the communicable diseases epidemiology and surveillance program at Burnet Institute. The Viral hepatitis group collates and provides Victorian data from their surveillance system measuring hepatitis B and C incidence and prevalence in Australia. The HIV group collates and provides data from their surveillance system of HIV notifications.

Drug categories

The following drug categories are included in analysis here.

1. Alcohol: Indicates case of alcohol intoxication, with or without other drug/substance involved in paramedic attendance.
2. Any Illicit Drugs: Indicates case where an illicit drug was primarily involved in the event, including heroin, other opioids, amphetamines, cannabis, stimulants, GHB, hallucinogens, inhalants, or other illicit drugs. It cannot be ruled out that other substances were not present.
3. Amphetamines: Indicates case where any amphetamine was involved in attendance.
4. Crystal methamphetamine: Indicates case where crystal meth or ice was involved in attendance. This category is a subset of all amphetamine-related attendances.
5. Cannabis: Indicates case where cannabis or hashish was involved in attendance.
6. GHB (Gamma-hydroxybutyrate): Indicates case where GHB was involved in attendance.
7. Heroin: Indicates case where any heroin was involved in attendance.
8. Inhalants: Indicates case where any volatile substance, inhalant or solvent was involved in attendance, such as chrome or petrol.
9. Other Stimulants (excluding amphetamines): Indicates case where a stimulant was involved in attendance, including cocaine or ecstasy.
10. Hallucinogens: Indicates case where a hallucinogen was involved in attendance, including LSDs or mushrooms.
11. Any Pharmaceutical Drugs: indicates case where a prescription drug was primarily involved in the event, including antidepressants, antipsychotics, benzodiazepines, other opioids including methadone and other synthetic narcotics, non-opioid analgesics, other tranquilisers or another medication (prescribed or non-prescribed) other than those explicitly mentioned. It cannot be ruled out that other substances were not present.
12. Antidepressants: Indicates cases where an antidepressant was involved in attendance, such as citalopram or sertraline.
13. Antipsychotics: Indicates cases where an antipsychotic was involved in attendance, such as amisulpride or quetiapine.
14. Benzodiazepines: Indicates case where a benzodiazepine was involved in attendance, such as alprazolam or diazepam.
15. Opioids: Indicates case where an opioid was involved in attendance, including opioid analgesics such as morphine or oxycodone.
16. Analgesics: Indicates case where pain relief medications were involved in attendance, such as aspirin or paracetamol.

Data extraction and transformation

Some of the datasets obtained required further transformation prior to analysis.

Cases resulting from high-risk alcohol and other drug consumption were extracted from the overall datasets through the following procedure:

17. Emergency Department presentations containing alcohol- or drug-related ICD-10 [2]

[2] ICD (international classification of disease) is published by the World Health Organisation, with Australian

diagnosis codes were extracted from VEMD

18. Hospital admissions containing alcohol- or drug-related ICD-10 diagnosis codes as the primary diagnosis were extracted from VAED.
19. Fatalities involving alcohol or drugs were extracted from Cause of Death (COD) Unit Record Files (URF) where aetiological fractions were then applied to estimate to alcohol or drug-related harms

Estimation of aetiological fractions (AFs)

The AF provides an estimate of the likelihood that the case was caused by high-risk consumption of alcohol. An AF of 1.00 means that the case was definitely caused by high-risk alcohol consumption (for example, alcohol cardiomyopathy).

Mortality data used in AODstats estimates alcohol- and illicit drug-caused harm using AFs. These were based on the methods and results of the large meta-analysis conducted by English and colleagues (English, Holman et al. 1995). The AFs calculated by English et al. (English, Holman et al. 1995) use low risk drinking (see table below for definition) as the basis for comparison. The AFs estimate the risk of a particular disease or condition for those drinking at hazardous and harmful levels compared with those who drink at low risk levels. In their update of the English et al.'s (English, Holman et al. 1995) work, the Australian Institute of Health and Welfare (AIHW) estimated AFs in which abstinence is the basis for comparison (Ridolfo and Stevenson 2001). The AIHW AFs estimate the risk of a particular disease or condition for those who drink alcohol at any level, compared with those who do not drink at all.

English et al. (English, Holman et al. 1995) used low risk drinking as the base for comparison because they argued that policy in Australia is directed towards encouraging responsible drinking rather than abstinence, and thus estimates using abstinence as the base would not be so useful for policy makers. The English et al. (English, Holman et al. 1995) AF estimates, however, do not take abstinence into account at all. It can be argued that the comparison of most use for policy makers is between persons who drink at harmful or hazardous levels, and persons who abstain or drink at low risk levels.

TABLE 1: CLASSIFICATION OF ALCOHOL INTAKE LEVELS ACCORDING TO NHMRC GUIDELINES

Alcohol intake level	Standard drinks per day (1 standard drink = 10 g alcohol)	
	Males	**Females**
'Abstinence'	0-0.25	0-0.25
Low risk	0.26-4.00	0.26-2.00
Hazardous	4.01-6.00	2.01-4.00

amendments carried out by the National Centre for Classification in Health (Sydney). It is a "system of categories to which morbid entities are assigned according to established criteria". It is also the classification used in cause of death coding in Australia. (The International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM), Australian Classification of Health Interventions (ACHI) and Australian Coding Standards (ACS) NCCH (2000). ICD-10-AM: Tabular List of Diseases. Canberra, National Centre for Classification in Health, Commonwealth of Australia.

Harmful	6.01+	5.01+

Source: (English et al. 1995), p.61

Within AODstats, the AFs based on indirect methods of estimation were re-estimated using abstinence and low risk drinking as the basis for comparison. The AFs used estimate the risk of a particular disease or condition for those drinking at hazardous and harmful levels, compared with those who abstain or drink at low risk levels (Table 1).

The main difference between the various approaches to AFs is in the case of ischemic heart disease. There is a significant body of evidence which suggests that moderate alcohol intake has a protective effect against ischemic heart disease. This protective effect appears to be fully realised within low drinking levels, and it appears that increased alcohol intake does not lead to any additional benefit. AFs which use abstinence as the base for comparison will therefore have a value assigned for ischemic heart disease (the value will be negative, as it will represent the proportion of cases of ischemic heart disease avoided through consumption of alcohol). The AFs used herein do not include a value for ischemic heart disease because low risk drinking and abstinence are used as the base for comparison. AFs were re-estimated for the following conditions: oropharyngeal cancer, oesophageal cancer, liver cancer, laryngeal cancer, breast cancer, hypertension, supraventricular arrhythmias, cholelithiasis, low birth weight, psoriasis, stroke, and fall injuries. For breast cancer, stroke, and fall injuries, the updated relative risk estimates in the recent AIHW meta-analysis were used (Ridolfo and Stevenson 2001). For the other conditions, relative risks from English et al.'s (1995) meta-analysis were used. The AFs were updated using estimates of prevalence of low risk, hazardous, and harmful alcohol consumption calculated by AIHW based on data from the 1995 Australian National Health Survey. These are estimates for Australia. There are no reliable recent estimates relating specifically to Victoria (Ridolfo and Stevenson 2001).

Wholly (or partially) attributable alcohol- and/or drug-related hospitalisations

Applying an AF to diagnostic codes allows all conditions relating to alcohol to be considered. However, an AF can only be reliably applied to the 'principal' diagnosis on admission. This excludes those diagnoses that contributed to the admission, but were not the principal diagnosis. However, it captures events such as assaults, falls, and accidents that are partially alcohol and/or drug-related, which is a major strength. Meanwhile, a major critique of the AF method is the focus on the principal diagnosis only, which may lead to an underestimation of alcohol-attributable harms when utilising this approach.

Wholly (or partially) attributable alcohol and/or drug-related hospitalisations represents an alternative measure to the AF method described above. Using VAED data, admissions with a 'primary' diagnoses wholly (or partially) attributable to alcohol and or drugs were used for AODstats. This method considers all those diagnostic fields for each hospital admission coded as a primary diagnosis. That is, all codes were inspected for the existence of at least one diagnosis wholly (or partially) attributable to alcohol and/or drugs that was also considered to be a primary diagnosis (i.e. "P" in diagnostic field). Primary diagnoses are applied if they required 'commencement, alteration or adjustment of therapeutic treatment', 'diagnostic procedures', or 'increased clinical care and/or monitoring'[3]. Lists of the diagnoses considered to be wholly (or partially) attributable to alcohol and/or drugs are provided in Table 2, Table 3 and Table 4.

[3] Source: Victorian Additions to the Australian Coding Standards, Department of Human Services

TABLE 2: DISEASE CONDITIONS WHICH ARE BY DEFINITION ALCOHOL-RELATED

ICD 10	Disease	ICD 10	Disease
E24.4	Alcohol-induced pseudo-Cushing's syndrome	T51	Toxic effect of alcohol (AF=1)
F10	Mental and behavioural disorders due to use of alcohol (AF=1)	T51.0	Toxic effect of ethanol (AF=1)
F10.0	Acute intoxication (AF=1)	T51.1	Toxic effect of methanol (AF=1)
F10.1	Harmful use (AF=1)	T51.8	Toxic effect of other alcohols (AF=1)
F10.10	Alcohol abuse, uncomplicated (AF=1)	T51.9	Toxic effect of unspecified alcohol (AF=1)
F10.12	Alcohol abuse with intoxication (AF=1)	X45	Accidental poisoning by and exposure to alcohol (AF=1)
F10.14	Alcohol abuse with alcohol-induced mood disorder (AF=1)	X65	Intentional self-poisoning by and exposure to alcohol
F10.15	Alcohol abuse with alcohol-induced psychotic disorder (AF=1)	Y15	Poisoning by and exposure to alcohol, undetermined intent
F10.18	Alcohol abuse with other alcohol-induced disorders (AF=1)	Y90	Evidence of alcohol involvement determined by blood alcohol level
F10.19	Alcohol abuse with unspecified alcohol-induced disorder (AF=1)	Y90.0	Blood alcohol level of less than 20 mg/100 ml
F10.2	Dependence syndrome (AF=1)	Y90.1	Blood alcohol level of 20-39 mg/100 ml
F10.3	Withdrawal state (AF=1)	Y90.2	Blood alcohol level of 40-59 mg/100 ml
F10.4	Withdrawal state with delirium (AF=1)	Y90.3	Blood alcohol level of 60-79 mg/100 ml
F10.5	Psychotic disorder (AF=1)	Y90.4	Blood alcohol level of 80-99 mg/100 ml
F10.6	Amnesic syndrome (AF=1)	Y90.5	Blood alcohol level of 100-119 mg/100 ml
F10.7	Residual and late-onset psychotic disorder (AF=1)	Y90.6	Blood alcohol level of 120-199 mg/100 ml
F10.8	Other mental and behavioural disorders (AF=1)	Y90.7	Blood alcohol level of 200-239 mg/100 ml
F10.9	Unspecified mental and behavioural disorders (AF=1)	Y90.8	Blood alcohol level of 240 mg/100 ml or more
G31.2	Degeneration of nervous system due to alcohol	Y90.9	Presence of alcohol in blood, level not specified
G62.1	Alcoholic polyneuropathy (AF=1)	Y91	Evidence of alcohol involvement determined by level of intoxication
G72.1	Alcoholic myopathy	Y90	Evidence of alcohol involvement determined by blood alcohol level
I42.6	Alcoholic cardiomyopathy (AF=1)	Y90.0	Blood alcohol level of less than 20 mg/100 ml
K29.2	Alcoholic gastritis (AF=1)	Y90.1	Blood alcohol level of 20-39 mg/100 ml
K29.20	Alcoholic gastritis without hemorrhage (AF=1)	Y90.2	Blood alcohol level of 40-59 mg/100 ml
K29.21	Alcoholic gastritis with hemorrhage (AF=1)	Y90.3	Blood alcohol level of 60-79 mg/100 ml
K70	Alcoholic liver disease (AF=1)	Y90.4	Blood alcohol level of 80-99 mg/100 ml
K70.0	Alcoholic fatty liver (AF=1)	Y90.5	Blood alcohol level of 100-119 mg/100 ml
K70.1	Alcoholic hepatitis (AF=1)	Y90.6	Blood alcohol level of 120-199 mg/100 ml
K70.2	Alcoholic fibrosis and sclerosis of liver (AF=1)	Y90.7	Blood alcohol level of 200-239 mg/100 ml
K70.3	Alcoholic cirrhosis of liver (AF=1)	Y90.8	Blood alcohol level of 240 mg/100 ml or more
K70.4	Alcoholic hepatic failure (AF=1)	Y90.9	Presence of alcohol in blood, level not specified
K70.9	Alcoholic liver disease, unspecified (AF=1)	Y91	Evidence of alcohol involvement determined by level of intoxication
K85.2	Alcohol-induced acute pancreatitis (AF=1)	Y91.0	Mild alcohol intoxication
K86.0	Alcohol-induced chronic pancreatitis (AF=1)	Y91.1	Moderate alcohol intoxication
O35.4	Maternal care for (suspected) damage to foetus from alcohol	Y91.2	Severe alcohol intoxication
P04.3	Foetus and newborn affected by maternal use of alcohol	Y91.3	Very severe alcohol intoxication
Q860	Fetal alcohol syndrome (dysmorphic)	Y91.9	Alcohol involvement, not otherwise specified
R78.0	Finding of alcohol in blood	Z72.1	Problems related to lifestyle: Alcohol use

TABLE 3: DISEASE CONDITIONS WHICH ARE BY DEFINITION ILLICIT DRUG-RELATED

ICD10	Disease	AODstats sub-category of drug
T43.62	Poisoning by amphetamines (AF=1)	Amphetamines
F12.0 – F12.9	Mental and behavioural disorders due to use of cannabinoids (AF=1)	Cannabis
T40.7	Poisoning by narcotics and psychodysleptics [hallucinogens]: Cannabis (AF=1)	Cannabis
F16.0 – F16.9	Mental and behavioural disorders due to use of hallucinogens (AF=1)	Hallucinogen
R78.3	Finding of hallucinogen in blood	Hallucinogen
T40.8	Poisoning by narcotics and psychodysleptics [hallucinogens]: LSD (AF=1)	Hallucinogen
T40.9	Poisoning by narcotics and psychodysleptics [hallucinogens]: Hallucinogens (mescaline, psilocin, psilocybine) (AF=1)	Hallucinogen
T40.1	Poisoning by narcotics and psychodysleptics [hallucinogens]: Heroin (AF=1)	Heroin
F18.0 – F18.9	Mental and behavioural disorders due to use of volatile solvents (AF=1)	Inhalant
T51.2	Toxic effects of 2-Propanol	Inhalant
T51.3	Toxic effects of fusel oil	Inhalant
T52	Toxic effects of organic solvents	Inhalant
T52.0	Toxic effects of petroleum products	Inhalant
T52.1	Toxic effects of benzene	Inhalant
T52.2	Toxic effects of homologues of benzene	Inhalant
T52.3	Toxic effects of glycols	Inhalant
T52.4	Toxic effects of ketones	Inhalant
T52.8	Toxic effects of other organic solvents	Inhalant
T52.9	Toxic effects of unspecified organic solvent	Inhalant
T53	Toxic effects of halogen derivatives of aliphatic and aromatic hydrocarbons	Inhalant
T53.0	Toxic effects of carbon tetrachloride	Inhalant
T53.1	Toxic effects of chloroform	Inhalant
T53.2	Toxic effects of trichloroethylene	Inhalant
T53.3	Toxic effects of tetrachloroethylene	Inhalant
T53.4	Toxic effects of dichloromethane	Inhalant
T53.5	Toxic effects of chlorofluorocarbons	Inhalant
T53.6	Toxic effects of other halogen derivatives of aliphatic hydrocarbons	Inhalant
T53.7	Toxic effects of other halogen derivatives of aromatic hydrocarbons	Inhalant
T53.9	Toxic effects of unspecified halogen derivatives of aliphatic and aromatic hydrocarbons	Inhalant
X46	Accidental poisoning by and exposure to organic solvents and halogenated hydrocarbons and their vapour (Incl: benzene and homologues, carbon tetrachloride [tetrachloromethane], chlorofluorocarbons, petroleum (derivatives))	Inhalant
X47	Accidental poisoning by and exposure to other gases and vapours	Inhalant
X66	Intentional self-poisoning by and exposure to organic solvents and halogenated hydrocarbons and their vapours (Incl: benzene and homologues, carbon tetrachloride [tetrachloromethane], chlorofluorocarbons, petroleum (derivatives))	Inhalant
X67	Intentional self-poisoning by and exposure to other gases and vapours	Inhalant
Y16	Poisoning by and exposure to organic solvents and halogenated hydrocarbons and their vapour, undetermined intent (Incl: benzene and homologues, carbon tetrachloride [tetrachloromethane], chlorofluorocarbons, petroleum (derivatives))	Inhalant
Y17	Poisoning by and exposure to other gases and vapours	Inhalant

F11.0 – F11.9	Mental and behavioural disorders due to use of opioids (AF=1)	Opioid
R78.1	Finding of opiate drug in blood	Opioid
T40.0	Poisoning by narcotics and psychodysleptics [hallucinogens]: Opium (AF=1)	Opioid
T40.6	Poisoning by other and unspecified narcotics	Opioid
R78.6	Finding of steroid agent in blood	Steroid
F14.0 – F14.9	Mental and behavioural disorders due to use of cocaine (AF=1)	Stimulant
F15.0 – F15.9	Mental and behavioural disorders due to use of other stimulants, including caffeine (AF=1)	Stimulant
R78.2	Finding of cocaine in blood	Stimulant
T40.5	Poisoning by narcotics and psychodysleptics [hallucinogens]: Cocaine (AF=1)	Stimulant
T43.6	Poisoning by psychotropic drugs [psychostimulants] with potential for use disorder (AF=1)	Stimulant
T43.60	Poisoning by unspecified psychostimulants (AF=1)	Stimulant
T43.63	Poisoning by methylphenidate (AF=1)	Stimulant
T43.69	Poisoning by other psychostimulants (AF=1)	Stimulant
O35.5	Maternal care for (suspected) damage to foetus by drug (drug addiction)	N/A
R78.4	Finding of other drugs of addictive potential in blood	N/A
X42	Accidental poisoning by and exposure to narcotics and psychodysleptics (hallucinogens), not elsewhere classified (AF=1)	N/A
X62	Intentional self-poisoning by and exposure to narcotics and psychodysleptic (hallucinogens), not elsewhere classified (AF=1)	N/A
Y12	Poisoning by and exposure to narcotics and psychodysleptics (hallucinogens), not elsewhere classified, undetermined intent	N/A
Z72.2	Problems related to lifestyle: Drug use	N/A

TABLE 4: DISEASE CONDITIONS WHICH ARE BY DEFINITION PHARMACEUTICAL DRUG-RELATED

ICD10	Disease	AODstats sub-category of drug
T39.0 – T39.4	Poisoning by non-opioid analgesics, antipyretics and antirheumatics.	Analgesics
T39.8 – T39.9	Poisoning by non-opioid analgesics, antipyretics and antirheumatics.	Analgesics
X40	Accidental poisoning by and exposure to non-opioid analgesics, antipyretics and antirheumatics (Incl: 4-aminophenol derivatives, nonsteroidal anti-inflammatory drugs [NSAID], pyrazolone derivatives, salicylates).	Analgesics
X60	Intentional self-poisoning by and exposure to non-opioid analgesics, antipyretics and antirheumatics (Incl: 4-aminophenol derivatives, nonsteroidal anti-inflammatory drugs [NSAID], pyrazolone derivatives, salicylates).	Analgesics
Y10	Poisoning by and exposure to non-opioid analgesics, antipyretics and antirheumatics, undetermined intent (Incl: 4-aminophenol derivatives, nonsteroidal anti-inflammatory drugs [NSAID], pyrazolone derivatives, salicylates).	Analgesics
T43.0 – T43.5	Poisoning by psychotropic drugs.	Antidepressant
T43.3	Poisoning by phenothiazine antipsychotics and neuroleptic	Antipsychotics
T43.4	Poisoning by butyrophenone and thiothixene neuroleptics	Antipsychotics
T43.5	Poisoning by other and unspecified antipsychotics and neuroleptics	Antipsychotics
T43.50	Poisoning by unspecified antipsychotics and neuroleptics	Antipsychotics
T43.59	Poisoning by other antipsychotics and neuroleptics	Antipsychotics
T42.5	Poisoning by benzodiazepines	Benzodiazepines
T36.0 – T36.9	Poisoning by systemic antibiotics.	Other pharmaceutical
T37.0 – T37.5	Poisoning by other systemic anti-infectives and antiparasitics.	Other pharmaceutical
T37.8 – T37.9	Poisoning by other systemic anti-infectives and antiparasitics.	Other pharmaceutical
T38.0 – T38.9	Poisoning by hormones and their synthetic substitutes and antagonists.	Other pharmaceutical
T43	Poisoning by psychotropic drugs, not elsewhere classified	Other pharmaceutical

T43.8 – T43.9	Poisoning by psychotropic drugs, other or unspecified	Other pharmaceutical
T44.0 – T44.9	Poisoning by drugs primarily affecting the autonomic nervous system.	Other pharmaceutical
T45.0 – T45.9	Poisoning by primarily systemic and haematological agents.	Other pharmaceutical
T46.0 – T46.9	Poisoning by agents primarily affecting the cardiovascular system.	Other pharmaceutical
T47.0 – T47.9	Poisoning by agents primarily affecting the gastrointestinal system.	Other pharmaceutical
T48.0 – T48.7	Poisoning by agents primarily affecting acting on smooth and skeletal muscles and the respiratory system.	Other pharmaceutical
T49.0 – T49.9	Poisoning by topical agents primarily affecting skin and mucous membrane and by opthalmological, otorhinolaryngological and dental drugs.	Other pharmaceutical
T50.0 – T50.9	Poisoning by diuretics and other and unspecified drugs, medicaments and biological substances.	Other pharmaceutical
X41	Accidental poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs (Incl: antidepressants, barbiturates, hydantoin derivatives, iminostilbenes, methaqualone, compounds, neuroleptics, psychostimulants, succinimides and oxazolidinediones, tranquilizers). (AF=1)	Other pharmaceutical
X61	Intentional self-poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs (Incl: antidepressants, barbiturates, hydantoin derivatives, iminostilbenes, methaqualone, compounds, neuroleptics, psychostimulants, succinimides and oxazolidinediones, tranquilizers). (AF=1)	Other pharmaceutical
Y11	Poisoning by and exposure to antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, undetermined intent (Incl: antidepressants, barbiturates, hydantoin derivatives, iminostilbenes, methaqualone, compounds, neuroleptics, psychostimulants, succinimides and oxazolidinediones, tranquilizers).	Other pharmaceutical
R78.5	Finding of psychotropic drug in blood	Other pharmaceutical
F13.0 – F13.9	Mental and behavioural disorders due to use of sedatives or hypnotics. (AF=1)	Tranquiliser
T41.0 – T41.5	Poisoning by anesthetics	Tranquiliser
T42.0 – T42.3	Poisoning by antiepileptic, sedative-hypnotic and antiparkinsonism drugs.	Tranquiliser
T42.5 – T42.8	Poisoning by antiepileptic, sedative-hypnotic and antiparkinsonism drugs.	Tranquiliser
T40.2 – T40.4	Poisoning by narcotics and psychodysleptics. (AF=1)	N/A
X43	Accidental poisoning by and exposure to other drugs acting on the autonomic nervous system	N/A
X44	Accidental poisoning by and exposure to other and unspecified drugs, medicaments and biological substances	N/A
X63	Intentional self-poisoning by and exposure to other drugs acting on the autonomic nervous system	N/A
X64	Intentional self-poisoning by and exposure to other and unspecified drugs, medicaments and biological substances	N/A
Y13	Poisoning by and exposure to other drugs acting on the autonomic nervous system, undetermined intent	N/A
Y14	Poisoning by and exposure to other and unspecified drugs, medicaments and biological substances, undetermined intent	N/A

Alcohol-related serious road injuries

Alcohol intoxication is a major contributing factor to road accidents in Victoria. However, there is no data source currently available in Victoria that directly measures alcohol involvement in road injuries apart from fatal crashes. To provide improved understanding of alcohol involvement in road injuries, Rumbold et al. (1997) examined a number of surrogate measures of alcohol involvement in road crashes. The rate of serious road injuries (those resulting in fatalities or hospital emergency department presentations) occurring in 'high alcohol hours' based on time of day and day of week was selected as the most appropriate surrogate measure of alcohol

involvement. In the case of high alcohol hours, this corresponds to the period in which most drink-driving takes place. Research has shown that, in high alcohol hours, 38 per cent of drivers admitted to hospital or killed as a result of a crash had a Blood Alcohol Concentration (VicHealth Centre for Tobacco Control 2004) in excess of 0.05 per cent. This compares with four per cent in low alcohol hours (Cavallo and Cameron 1992). The high alcohol hours used herein are based on updated work conducted at Monash University Accident Research Centre (Gantzer 1995) and are listed in Table 6. Serious road crashes occurring during these high alcohol hours are referred to as 'alcohol-related serious road injury' in AODstats. Data based on time of day were extracted from the road crash data from VicRoads assigned to Victorian LGAs based on location of accident.

TABLE 5: HIGH ALCOHOL HOURS USED IN THE SELECTION OF ALCOHOL-RELATED ROAD CRASH CASES IN METROPOLITAN AND NON-METROPOLITAN AREAS OF VICTORIA

Metropolitan areas			Non-metropolitan areas		
Sun 6 pm	To	Mon 6 am	Sun 6 pm	To	Mon 6 am
Mon 8 pm	To	Tue 6 am	Mon 8 pm	To	Tue 4 am
Tue 6 pm	To	Wed 4 am	Tue 6 pm	To	Wed 4 am
Wed 6 pm	To	Thu 6 am	Wed 6 pm	To	Thu 4 am
Thu 6 pm	To	Fri 6 am	Thu 6 pm	To	Fri 6 am
Fri 4 pm	To	Sat 8 am	Fri 6 pm	To	Sat 8 am
Sat 4 pm	To	Sun 8 am	Sat 4 pm	To	Sun 10am

Source: (Gantzer 1995)

Assaults during high alcohol hours

Data relating to incidents of assault were obtained from the Victoria Police Law Enforcement Assistance Program (LEAP) database. The 'alcohol' flag in these data is deemed not reliable by Victoria Police, and therefore is not a viable option to determine alcohol involvement in assaults. As such, a surrogate measure for assaults occurring in high alcohol hours was adopted. These high alcohol hours were defined on the basis of information collected in Geelong as part of the Evaluation of the Geelong Local Industry Accord Project (Rumbold, Malpass et al. 1998). This information showed that assault offences in which alcohol was involved were more likely to occur in late evening and early morning hours. On the basis of this data, Rumbold et al. (1998) identified three categories of assault as follows:

- **High alcohol hour (HAH) assaults** - Fridays or Saturdays between 8 pm and 6 am. Alcohol involvement was noted in 65 per cent of these assaults.
- **Medium alcohol hour (MAH) assaults** - Sunday through Thursday, between 8 pm and 6 am. In 54 per cent of such assaults, alcohol involvement was noted.
- **Low alcohol hour (LAH) assaults** - on all days between 6 am and 8 pm. Only 22.5 per cent of the assaults that occurred during this period were noted to have alcohol involvement.

Assault cases occurring in high alcohol hours were extracted from the LEAP dataset and then assigned to Victorian LGAs on the basis of the recorded postcode of location of the incident up until 2007/08, when LGA was provided.

DATA ANALYSIS

Software

SPSS, STATA, and SAS are all statistical software programs used for data cleaning, analysis, and extraction for AODstats.

- SPSS supports statistical analysis of data. It allows for in-depth data access and preparation, analytical reporting, graphics, and modelling.
- STATA is a complete integrated statistical software package, providing the user with everything they need for data analysis, data management, and graphics.
- SAS provides advanced analytics, multivariate analyses, business intelligence, data management, and predictive analytics.

StatPlanet is a mapping software program, created to produce user-friendly interactive maps and visualisations from users' own data and metadata. It allows the user to utilise tools to better explore and analyse the data according to their needs. StatPlanet can be used to visualise location-based statistical data, and provides the option of including interactive graphs and charts to create feature-rich interactive infographics.

Rates per 10,000 population

In order to correct for variation in population size between LGAs, the data were transformed into rates per 10,000 population, using the estimated resident population for that LGA. Population rates were calculated for each of the datasets included in the series, using the formula detailed below:

$$\text{Crude rate} = \frac{\#\ of\ events\ (hospitalications, deaths, etc)}{population\ (LGA, State)} \times 10,000$$

Rates are calculated for the total population, males, females, and those aged 15 to 24 years (where numbers permit). A number of LGAs included have a small number of cases and therefore, to protect individual confidentiality, data is not reported where an area has numbers less than five. Furthermore, rates based on small numbers can produce unstable results. For instance, small numbers and small population can produce larger than expected results. Where rates appear unduly high, low, or show rapid change, please consider the actual raw number, as it may be small and distort interpretation.

Please note that rates reported in AODstats are crude rates. Crude rates allow for adjustment of population size across different areas; however, they do not adjust for certain demographic attributes (specifically age and sex). From a public health perspective there are advantages to standardising for age and/or sex, as it allows comparisons across areas to be made more accurately. However, from a policy perspective, knowing what is impacting the rates is equally important. Given that age and gender are key contributors to alcohol harms and use, if an area has more men and younger people, this information is important and policy and services need to be aware.

Confidence intervals (95% CI)

Confidence intervals for rates were calculated using the exact method based on the Poisson distribution (Dobson, Kuulasmaa et al. 1991, Buchan 2004). Where 95% confidence intervals do not overlap, this can be broadly interpreted as indicating a statistically significant difference. Throughout AODstats these differences are termed significant.

Exact Poisson confidence intervals for:

$$LL = \frac{\left(\chi^2_{\frac{\alpha}{2},2d}\right)}{2e}$$

$$UL = \frac{\left(\chi^2_{1-\frac{\alpha}{2},2(d+1)}\right)}{2e}$$

Where:
d = number of events (e.g. deaths)
e = exposure (e.g. population size)
α = 1-confidence interval, e.g. if confidence interval is 95%, α = 0.05
X^2 α,v is the $(100*\alpha)^{th}$ chi-square centile with v degrees of freedom
LL = lower limit
UL = upper limit

Population estimates

ABS estimated resident population (ERP) on age, sex, and statistical local areas is used throughout, estimated at 30 June for all years. For financial year data, e.g. 2011/12, 2011 ERP data is used.

Local Government Area (LGA) Location

The LGA location is dependent upon the indicator. Some indicators provide event location and some provide residential location. Table 6 outlines which indicators are represented by event location or residential location in AODstats.

TABLE 6: LGA LOCATION BY INDICATOR

Indicator	LGA Location
Ambulance attendance	Event
Emergency presentation	Resident
Hospital admission	Resident
ADIS treatment service	Resident
Assaults	Event
Family Violence	Event
Serious Road Injury	Event

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