AODstats

Methods for the Victorian data maps

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AODstats Methods
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INTRODUCTION

Turning Point is Australia's leading national addiction treatment, training and research centre, seeking to transform the way society provides treatment, specialist care and support for those affected by addiction. This work transforms lives, with over 100,000 Australians seeking support from Turning Point's skilled clinicians every year. Turning Point's research and health surveillance teams inform new cutting edge treatments and shape health and social policy. The workforce training and education team equip frontline staff with skills and confidence to respond.

Alcohol and other drug stats (AODstats) is an interactive statistics and mapping website capturing information on harms related to alcohol and the use of illicit and pharmaceutical drugs in Victoria

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 primary and 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'. Administrative data sets including hospitalisation data, mortality, road injury, and assault data are widely used for secondary analysis. Administrative data are 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 and interpreting secondary data, such as incomplete or missing data, and inadequate coding. For example, the VicRoads datasets capture 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 concentration (BAC) readings are not performed by police at all accidents. A surrogate measure for alcohol-related road injury is therefore warranted. For example, high alcohol hours – explained in more detail later in this document – are used as the surrogate. Although surrogate measures can 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. Ferris et al [1] demonstrated the utility of the surrogate HAH measure for determining changes in alcohol-related serious road injuries.

DATA SOURCES

Fourteen data sources, comprising six-unit record datasets and seven aggregated datasets, are used in AODstats. They include:

- Ambulance data from Ambulance Victoria
- Victorian hospital admissions data from the Victorian Hospital Admitted Episodes Data (VAED),

accessed from Victorian Department of Health and Human Services (DHHS);
- 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), accessed from Crime Stats Agency (CSA);
- DirectLine telephone service data from Turning Point;
- Counselling Online information from Turning Point;
- Needle and Syringe Program (NSP) data from DHHS;
- Opioid Replacement Therapy (ORT) data from DHHS;
- HIV, Hepatitis B, and Hepatitis C notifications from Burnet Institute;

Ambulance Data

The examination of alcohol- and other drug-related events attended by ambulance paramedics in Victoria is a collaborative project between Turning Point's NAMHSU team and Ambulance Victoria, and is funded by the Victorian Department of Health and Human Services. The annual report for the Ambo Project: Alcohol and Drug-Related Ambulance Attendances was previously published online [2] and is now incorporated into the AODstats online platform.

Ambulance Victoria (AV) is the Victorian Government enterprise charged with the state-wide role of ensuring that the people of Victoria receive the most appropriate response to personal and community medical emergencies, and medical transport. It is a critical link in Victoria's healthcare and emergency management systems. An overview of AV and their services is provided at https://www.ambulance.vic.gov.au/about-us/our-services/[3].

In response to fatal heroin overdose increases in Victoria in the late 1990's, Turning Point established a project to examine non-fatal heroin overdose using ambulance service records, with data available from 1998 onwards for the Metropolitan Melbourne area [4]. Inclusion of alcohol, pharmaceutical drugs and illicit substances other than heroin expanded the reach of the research and the project has evolved into the National Ambulance Surveillance System (NASS), a unique Australian system for monitoring and mapping acute harms related to alcohol and other drug consumption [5]. Data for AODstats, sourced from NASS, are available from Metropolitan Melbourne and regional Victorian areas from 2012 onwards.

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-10 coding [6]), 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 [7]. The ICD-10 codes used for AODstats can be found in Tables 2, 3 and 4.

Victorian Alcohol and Drug Collection (VADC)

Since 2018 the Victorian Alcohol and Drug Collection (VADC) has collected client level statistical information from alcohol and drug treatment services across the state [8]. The VADC replaced the Alcohol and Drug Information System (ADIS) which was used up to and including the 2017/18

financial year [8]. Drug treatment services with Victoria provide a range of assessment, treatment and support services to adults an young people who have alcohol and/or drug use problems, and to their families and carers [8]. The data presented in AODstats are derived from unit level data using both ADIS up to 2017/18 and VADC (from 2018/19) obtained from the Department of Health and Human Services. Note, due to clinics changing when they were ready, there is no clear cut date as to when ADIC changed to VADC in the 2018/19 financial year, which means there are two datasets (ADIS and VADC) merged together for the year. Data from 2019/20 will be only from VADC.

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. Up to and including 2007, the Australian Bureau of Statistics (ABS) was the Australian Coordinating Registry (ACR) for obtaining COD URF and since the 2008 calendar year, data have been 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 [9] unless specified otherwise. These estimates incorporated any 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 [10]. Pharmaceutical drug-related deaths were not able to be presented for AODstats due to very small numbers.

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 postcode) and when it occurred, persons involved, vehicles involved, and a description of the crash are entered into a police database. Please note that serious road injuries relate to all road users, not just drivers (pedestrians, passengers, cyclists etc.). 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. 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.

Over time, there has been a change in the definition of a serious road injury (SRI). From 2009/10 onwards, an SRI has been defined as a fatality or an admission to hospital. Since 2009/10, police follow up with the hospital, and only those cases that are admitted are classified as an SRI. Prior to this, an SRI was defined as a fatality or transport to hospital. Therefore, AOD-stats users will notice a sizeable decrease in the number of SRIs between 2008/09 and 2009/10, largely attributable to this definition change. As well as this 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]

SRI data were downloaded from VicRoads CrashStats (an online interactive statistics and mapping

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

application for VicRoads RNDB road crashes) [11]. CrashStats updates this online data on a monthly basis and is downloaded from this link: https://www.data.vic.gov.au/data/dataset/crash-stats-data-extract.

Law Enforcement Assistance Program (LEAP), Crime Statistics Agency (CSA)

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 Crime Statistics Agency (CSA), which collates statistics from the Victoria Police LEAP database. 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. AODstats reports victim assaults and family incidents and is provided at an LGA level.

DirectLine, Turning Point

DirectLine (including Ice Advice and Pharmacotherapy Information) 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 NAMHSU@ TP 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, as defined by qualified counsellors. 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.

Counselling Online, Turning Point

Counselling Online provides 24-hour online counselling, information and referral services, which is easily accessible and anonymous, for all people in Australia. For AODstats, all numbers are based on services of persons who usually resided in Victoria for the year in which the service occurred.

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. For AODstats, only data regarding needle distribution and returns are reported.

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 on our site:

1. Alcohol: Indicates case of alcohol involvement (intoxication for Ambulance data), with or without other drug/substance involved.
2. Alcohol Only: Although other drugs cannot be absolutely ruled out in 'alcohol only' attendances, data indicates that the presentation was caused by alcohol and, as far as could be determined; no other substances were involved – Only available for Ambulance data
3. Amphetamines (Any): Indicates case where any amphetamine was involved.
4. Amphetamines (Crystal): Indicates case where crystal methamphetamine or 'ice' was involved. This category is a subset of Amphetamines (Any).
5. Analgesics: Indicates case where pain relief medications were involved, such as aspirin or paracetamol.
6. Antidepressants: Indicates cases where an antidepressant was involved, such as citalopram or sertraline.
7. Antipsychotics: Indicates cases where an antipsychotic was involved, such as amisulpride or quetiapine.
8. Benzodiazepines: Indicates case where a benzodiazepine was involved, such as alprazolam or diazepam.
9. Cannabis: Indicates case where cannabis or hashish was involved.
10. GHB (Gamma-hydroxybutyrate): Indicates case where GHB was involved.
11. Hallucinogens: Indicates case where a hallucinogen was involved, including LSD or mushrooms.
12. Heroin: Indicates case where any heroin was involved.
13. Heroin Overdose (responded to naloxone): Indicates case where heroin was involved in attendance and a positive response to the administration of naloxone was recorded.
14. Illicit Drugs (Any): Indicates case where any illicit drug was primarily involved in the event, including heroin, opioids, amphetamines, cannabis, stimulants, GHB, hallucinogens, inhalants, synthetic cannabis, or other illicit drugs not explicitly mentioned. It cannot be ruled out that other substances were not present.
15. Inhalants: Indicates case where any volatile substance, inhalant or solvent was involved, such as chrome or petrol.
16. Opioids: Indicates case where an opioid was involved, including opioid analgesics such as morphine or oxycodone.
17. Other Sedatives: Indicates case where a sedative (excluding opioids and benzodiazepines)

was involved in the event, such as ketamine.

18. Other Stimulants (excluding amphetamines): Indicates case where a stimulant was involved, including cocaine or ecstasy.
19. Pharmaceutical Drugs (Any): Indicates case where a prescription or pharmaceutical drug was primarily involved in the event, including antidepressants, antipsychotics, benzodiazepines, analgesics, sedatives, pharmacotherapy, steroids or other medications (prescribed or non-prescribed) not explicitly mentioned. It cannot be ruled out that other substances were not present.
20. Pharmacotherapy: Indicates case where synthetic opioids were involved such as those used in ORT, including methadone and buprenorphine.

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:

1. Ambulance data are manually coded for alcohol and other drugs
2. Hospital admissions containing alcohol- or drug-related ICD-10 diagnosis codes, as the primary diagnosis, were extracted from VAED.
3. 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
4. Alcohol hours were applied to Serious road injury data, using available time stamps, to determine alcohol harms

Determination of AOD-related ambulance events

Specialist NAMHSU@Turning Point project staff manually code for the drugs and substances involved in the event. A case is determined to be AOD-related if the immediate or recent over or inappropriate use of a substance or medication is assessed as significant to the reason for paramedic attendance. Chronic use of a substance alone is not sufficient for inclusion in the analysis. More specific details of these methods can be found here: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0228316 [5].

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 [9]. The AFs calculated by English et al. [9] 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 [9] work, the Australian Institute of Health and Welfare (AIHW) estimated AFs in which abstinence is the basis for comparison [10]. 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. [9]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. [9] 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
Harmful	6.01+	5.01+

Source: (English et al [9]), 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 may have a protective effect against ischemic heart disease [9]. 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 [10]. For the other conditions, relative risks from English et al.'s [9] 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. .

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' diagnosis 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'[2]. 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.

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

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

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
T41.0	Poisoning by Inhaled anaesthetics	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 – T52.9	Toxic effects of organic solvents	Inhalant
T53 – T53.9	Toxic effects of 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
T40.2 – T40.4	Poisoning by narcotics and psychodysleptics. (AF=1)	Opioid
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)	Other Illicit
P04.4	Fetus and newborn affected by maternal use of drugs of addiction	Other Illicit
R78.4	Finding of other drugs of addictive potential in blood	Other Illicit
X42	Accidental poisoning by and exposure to narcotics and psychodysleptics (hallucinogens), not elsewhere classified (AF=1)	Other Illicit
X62	Intentional self-poisoning by and exposure to narcotics and psychodysleptic (hallucinogens), not elsewhere classified (AF=1)	Other Illicit
Y12	Poisoning by and exposure to narcotics and psychodysleptics (hallucinogens), not elsewhere classified, undetermined intent	Other Illicit
Z72.2	Problems related to lifestyle: Drug use	Other illicit

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

ICD10	Disease	AODstats sub-category of drug
T39 – 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 – T43.2	Poisoning by antidepressants (Including Tricyclic and tetracyclic antidepressants, Monoamine-oxidase-inhibitor antidepressants, Other and unspecified antidepressant	Antidepressants
T43.3 – T43.59	Poisoning by antipsychotics (Including phenothiazine antipsychotics and neuroleptics, butyrophenone and thiothixene neuroleptics, other and unspecified antipsychotics and neuroleptics, unspecified antipsychotics and neuroleptics, other antipsychotics and neuroleptics)	Antipsychotics
T42.5	Poisoning by benzodiazepines	Benzodiazepines
F13.0 – F13.9	Mental and behavioural disorders due to use of sedatives or hypnotics. (AF=1)	Sedative
T41.0 – T41.5	Poisoning by anesthetics	Sedative
T42.0 – T42.3	Poisoning by antiepileptic, sedative-hypnotic and antiparkinsonism drugs. (Including Hydantoin derivatives, iminostilbenes, Succinimides and oxazolidinediones, barbiturates))	Sedative
T42.5 – T42.8	Poisoning by antiepileptic, sedative-hypnotic and antiparkinsonism drugs. (Including Mixed antiepileptics, other and unspecified antiepileptic and sedative-hypnotic drugs, antiparkinsonism drugs and other central muscle-tone depressants)	Sedative
R78.5	Finding of psychotropic drug in blood	Other pharmaceutical
R78.6	Finding of steroid agent in blood	Other pharmaceutical
T36.0 – T36.9	Poisoning by systemic antibiotics.	Other pharmaceutical
T37.0 –	Poisoning by other systemic anti-infectives and antiparasitics.	Other pharmaceutical

T37.9		
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 – T44.9	Poisoning by drugs primarily affecting the autonomic nervous system.	Other pharmaceutical
T45 – T45.9	Poisoning by primarily systemic and haematological agents.	Other pharmaceutical
T46 – T46.9	Poisoning by agents primarily affecting the cardiovascular system.	Other pharmaceutical
T47 – T47.9	Poisoning by agents primarily affecting the gastrointestinal system.	Other pharmaceutical
T48 – T48.7	Poisoning by agents primarily affecting acting on smooth and skeletal muscles and the respiratory system.	Other pharmaceutical
T49 – T49.9	Poisoning by topical agents primarily affecting skin and mucous membrane and by opthalmological, otorhinolaryngological and dental drugs.	Other pharmaceutical
T50 – 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
X43	Accidental poisoning by and exposure to other drugs acting on the autonomic nervous system	Other pharmaceutical
X44	Accidental poisoning by and exposure to other and unspecified drugs, medicaments and biological substances	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
X63	Intentional self-poisoning by and exposure to other drugs acting on the autonomic nervous system	Other pharmaceutical
X64	Intentional self-poisoning by and exposure to other and unspecified drugs, medicaments and biological substances	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
Y13	Poisoning by and exposure to other drugs acting on the autonomic nervous system, undetermined intent	Other pharmaceutical
Y14	Poisoning by and exposure to other and unspecified drugs, medicaments and biological substances, undetermined intent	Other pharmaceutical

Alcohol-**related** serious road injuries

Alcohol intoxication is a major contributing factor to road accidents in Victoria. However, no data source is 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. [12] 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 [13] in excess of 0.05 per cent. This compares with four per cent in low alcohol hours [14]. The high alcohol hours used herein are based on updated work conducted at Monash University Accident Research Centre [15] 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: [15]

Assaults during high alcohol hours

Data relating to incidents of assault were obtained, via CSA 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 [16]. 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. [17] 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 extracted from the LEAP dataset were assigned high, medium or low alcohol hours based on time stamp and assigned to Victorian LGAs on the basis of the recorded postcode of location of the incident.

Data analysis

Software

Microsoft Excel, SPSS and STATA are 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 [18].
- STATA is a complete integrated statistical software package, providing the user with everything they need for data analysis, data management, and graphics [19].

Tableau (v2021.1.1) [20] is the mapping software program used to produce user-friendly interactive maps and visualisations. Allowing users to explore and analyse alcohol and other drug related harms in the Victorian.

Rates per 100,000 population

In order to correct for variation in population size between areas (local government areas for example), the data were transformed into rates per 100,000 population, using the estimated resident population for that area. Population rates for whole of state were calculated for each of the datasets included in the series, using the average of the formula detailed below:

$$\textbf{Crude rate} = \frac{of events(hospitalications, deaths, etc)}{population(LGA, State)} \times 100{,}000$$

For the local government area and metropolitan and regional levels, the rates are calculated according to the formula below:

$$\frac{\sum_i^j events_i}{\sum_i^j population_i} \times 100{,}000$$

Where $events_i$ and $population_i$ are the number of events and the population, respectively, in the ith year.

Age and gender specific rates are calculated for the total population, males, females, and age groups (where numbers permit). A number of areas included have a small number of cases and therefore, to protect individual confidentiality, data are 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) within different geographical areas. 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 for policy and services to be aware.

Confidence intervals (95% CI)

Confidence intervals for rates were calculated using the exact method based on the Poisson distribution [21, 22]. 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
Hospital admission	Residential
ADIS treatment service	Residential
DirectLine	Residential
Counselling Online	Residential
Assaults	Event
Family Violence	Event
Serious Road Injury	Event
Deaths	Residential

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