REPORT 22

NATIONAL WASTEWATER DRUG MONITORING PROGRAM

AUSTRALIAN CRIMINAL INTELLIGENCE COMMISSION

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

University of South Australia

CONTENTS

CEO FOREWORD

I am pleased to present Report 22 of the Australian Criminal Intelligence Commission (ACIC)'s National Wastewater Drug Monitoring Program (the Program).

This report is based on data collected in December 2023 and February 2024. In December 2023, the Program covered 55% of the Australian population. The findings are critical to the ACIC's insights on Australia's illicit drug markets, which are supplied by serious and organised criminal groups.

Much of the harm Australians suffer at the hands of organised crime is due to illicit drugs. Groups engaged in illicit drug trafficking and production have no regard for our laws or the harms their trade causes. They are highly capable, well-resourced, resilient and increasingly transnational.

Some of the data in this report reveals disturbing trends. In December 2023 there was record high cocaine consumption in both capital cities and regional areas, record methylamphetamine consumption in capital cities and record nicotine consumption in regional areas. Average consumption of methylamphetamine, cocaine, MDMA, MDA, ketamine, alcohol and tobacco increased in both capital city and regional sites, despite large seizures of some of the illicit drugs. Average consumption of cannabis decreased in both capital city and regional sites.

Section 5 of the report provides updated directly comparable 2023 data from the Sewage Core Group Europe (SCORE), which covers 112 cities from 34 countries in Europe, Asia, North and South America and Oceania. The results for March to May 2023 confirm the strong preference in world terms by Australian illicit drug users for illicit stimulants, where we ranked fourth of 34 participating countries. The results also highlight the domination of methylamphetamine in our domestic stimulant market. Australia had the second highest methylamphetamine consumption per capita compared with 29 other countries. Australia also ranked 20th of 32 countries for consumption of cocaine, 15th of 33 countries for consumption of MDMA and third of 20 countries for consumption of cannabis.

A multi-dimensional approach that targets supply, demand and harm reduction is critical to reducing drug use and its associated harms in Australia. Wastewater analysis is one of the most cost-effective, least intrusive methods of measuring drug use at a population level. Wastewater data reveal drug market resilience, but also points of vulnerability that present opportunities for coordinated strategies that improve the safety of the Australian community.

The ACIC remains committed to working with domestic and international law enforcement and intelligence partners to disrupt and dismantle serious organised criminal networks that continue to supply illicit drugs to Australian markets. Some law enforcement investigations are now conducted in conjunction with bespoke high intensity wastewater analysis so that the effectiveness of responses can be monitored. Wastewater analysis is also used increasingly as a component of drug 'early warning' programs.

ACKNOWLEDGEMENTS

I would like to acknowledge the valuable support and expertise of The University of Queensland and the University of South Australia, which undertook the data collection and analysis underpinning this report, and the ACIC officers who contributed to the project.

Heather Cook
Chief Executive Officer
AUSTRALIAN CRIMINAL INTELLIGENCE COMMISSION

SNAPSHOT

The December 2023 collection covers around **55 per cent** of Australia's population – about **14.1 million Australians**.

Capital city **alcohol, cocaine, MDMA, MDA, heroin** and **ketamine** average consumption exceeded regional consumption.

Regional **nicotine, methylamphetamine, oxycodone, fentanyl** and **cannabis** average consumption exceeded capital city consumption.

DECEMBER 2023 HIGHLIGHTS

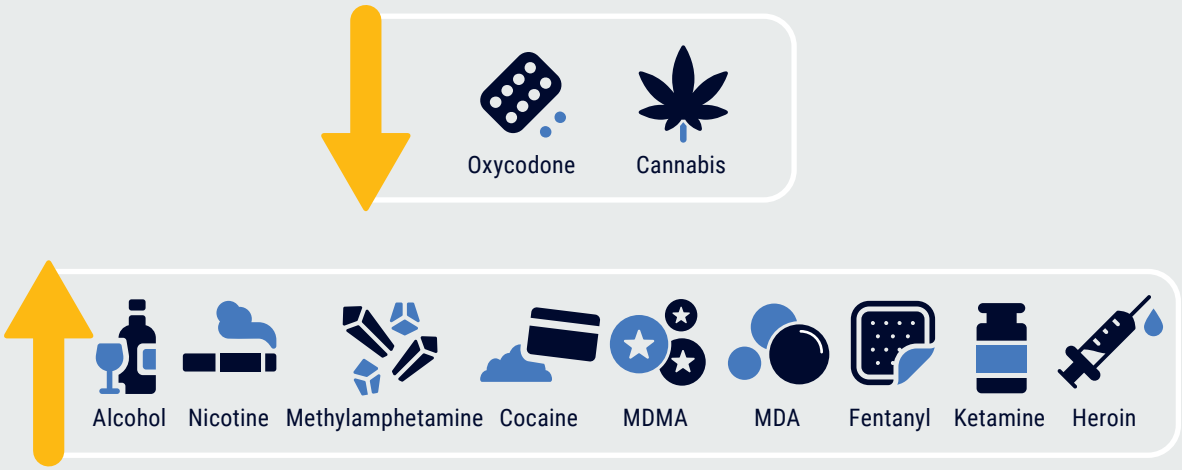
RECORD HIGHS

COCAINE
capital city and regional

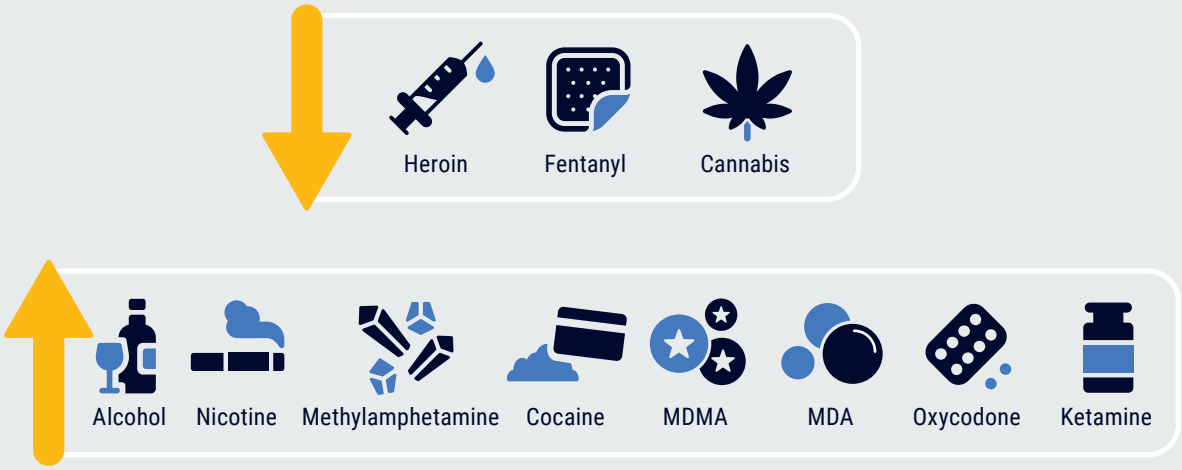
NICOTINE
regional

METHYLAMPHETAMINE
capital city

Between August and December 2023, the population-weighted average **capital city** consumption of:



Between August and December 2023, the population-weighted average **regional** consumption of:



INTERNATIONAL DRUG CONSUMPTION COMPARISONS

METHYLAMPHETAMINE

consumption in Australia ranked
2nd of 30 SCORE* countries

COCAINE

consumption in Australia ranked
20th of 32 SCORE* countries

MDMA

consumption in Australia ranked
15th of 33 SCORE* countries

CANNABIS

consumption in Australia ranked
3rd of 20 SCORE* countries

*SCORE – Sewage Core Group Europe covering Europe, Asia, the Americas and Oceania.

INTRODUCTION

This is the 22nd report of the National Wastewater Drug Monitoring Program (the Program) to be publicly released by the Australian Criminal Intelligence Commission (ACIC). Report 22 presents data on Australia's drug consumption for 12 substances and includes data for December 2023 (capital city and regional sites) and February 2024 (capital city sites only).

The Program is an Australian Government-funded initiative that assists in understanding drug use within populations, providing a measure of the demand for a range of drugs, an important aspect of national health. Illicit drugs and licit drugs with abuse potential are inherently harmful. Reliable drug consumption data are a key indicator of levels of community harm because the level of community harm is directly related to the quantity of substances consumed.

Findings presented in ACIC wastewater reports provide law enforcement, policy, regulatory and health agencies with objective data on drug use. These data create opportunities to shape responses to the demand and supply sides of illicit drug markets, particularly in high-use areas, and can inform harm reduction strategies. They inform priority-setting that is responsive to constantly evolving drug markets domestically and internationally.

Longitudinal data captured by the Program increase our understanding of drug use nationally, in specific locations and over time. They provide valuable insight into trends and emerging issues in drug consumption across Australia and can identify new sources of risk.

IMPLEMENTATION

The ACIC contracted The University of Queensland, and through it the University of South Australia, to deliver the Program. Relationships have been built between the universities and the operators of wastewater facilities across Australia to permit collection and analysis of samples.

In this report, Program wastewater analysis measured the presence[1] of the following substances:

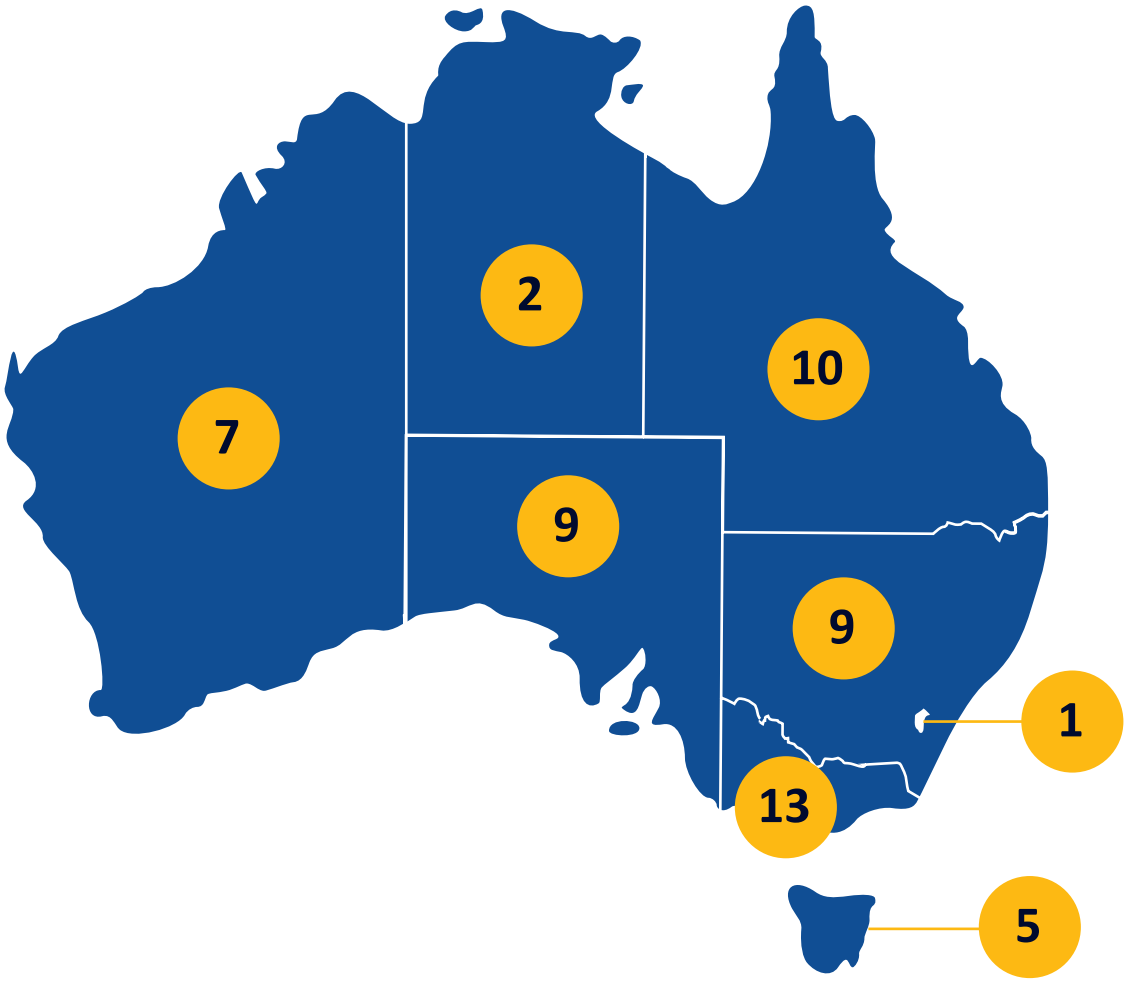
- methylamphetamine
- amphetamine
- cocaine
- 3,4-methylenedioxymethylamphetamine (MDMA)
- 3,4-methylenedioxyamphetamine (MDA)
- heroin
- cannabis
- oxycodone
- fentanyl
- nicotine
- alcohol
- ketamine.

The ACIC continues to review the range of monitored substances with its partners, stakeholders and universities.

1 The contract recognises that threshold levels are substance dependent and will vary accordingly. Refer to the research findings for further information on detection levels, and whether it was possible to measure all substances.

Both contracted universities monitor wastewater across Australia, covering all state and territory capital cities and a range of regional cities and towns. In December 2023, 56 wastewater treatment plants participated nationally, covering 55% of the Australian population (Figure 1).[2] Sites were selected to permit the ACIC to provide data on major population areas, sites of actual or potential concern from a drug use perspective and sites where treatment plant operators have established relationships with the universities.

Figure 1: The breakdown of sites by jurisdiction for December 2023.



Participation by all states and territories is vital to informing our understanding of the national picture of drug use and demand. Although the location of sites within and between states and territories may change over the life of the Program, the intention is to ensure site continuity.

2 Sampling also occurred in February 2024 in capital city sites, with 20 participating wastewater sites nationally, covering approximately 48 per cent of the Australian population.

REPORTING

Program reports are published 3 times a year. In accordance with current wastewater analysis conventions, the terms of the contract, and to protect the integrity of the Program, the exact locations of wastewater treatment plants sampled are not publicly released by the ACIC. Stakeholders in law enforcement, health and other relevant policy agencies are provided with classified information identifying actual sampling locations to inform appropriate responses.

Reported results reflect per capita use in all locations and, with the exception of MDA and ketamine (for which reliable dose figures are unavailable), are expressed in terms of both the number of doses and the weight or volume consumed per capita of the respective substances, to facilitate comparison between substances.

EXPLOITATION OF PROGRAM DATA

The Program is based on a well-established, internationally recognised methodology. Program data provide an important basis for the development of empirically-informed government and private sector policy and decision making. The reports provide regular, timely, unambiguous and detailed measures of the level of demand for the listed substances in the Australian population, complementing other drug datasets published in Australia.

Wastewater data are also particularly useful for identifying differences in levels of drug consumption in capital cities and regional areas of Australia. The data reinforces different dynamics that apply to both capital city and regional markets and illustrate drug consumption variations that exist within and between states and territories. Understanding these preferences is important in the development and delivery of national responses and in tailoring responses to suit the specific needs of individual jurisdictions. Wastewater analysis also permits the ACIC to gain insight into the decision-making of serious and organised crime groups that supply illicit drug markets.

Regular wastewater reporting enables the ACIC and partners to detect and respond to increasing drug threats in a timely way. The number and diversity of regional sites that participate in the Program permit confident assessments to be made of drug trends outside of the capital cities that can be used to inform local responses. This is important because it allows wastewater data to complement a number of other Australian drug data collections that have limited regional coverage or are confined to capital cities. It also permits the ACIC and partners to speak with greater confidence about local drug threats.

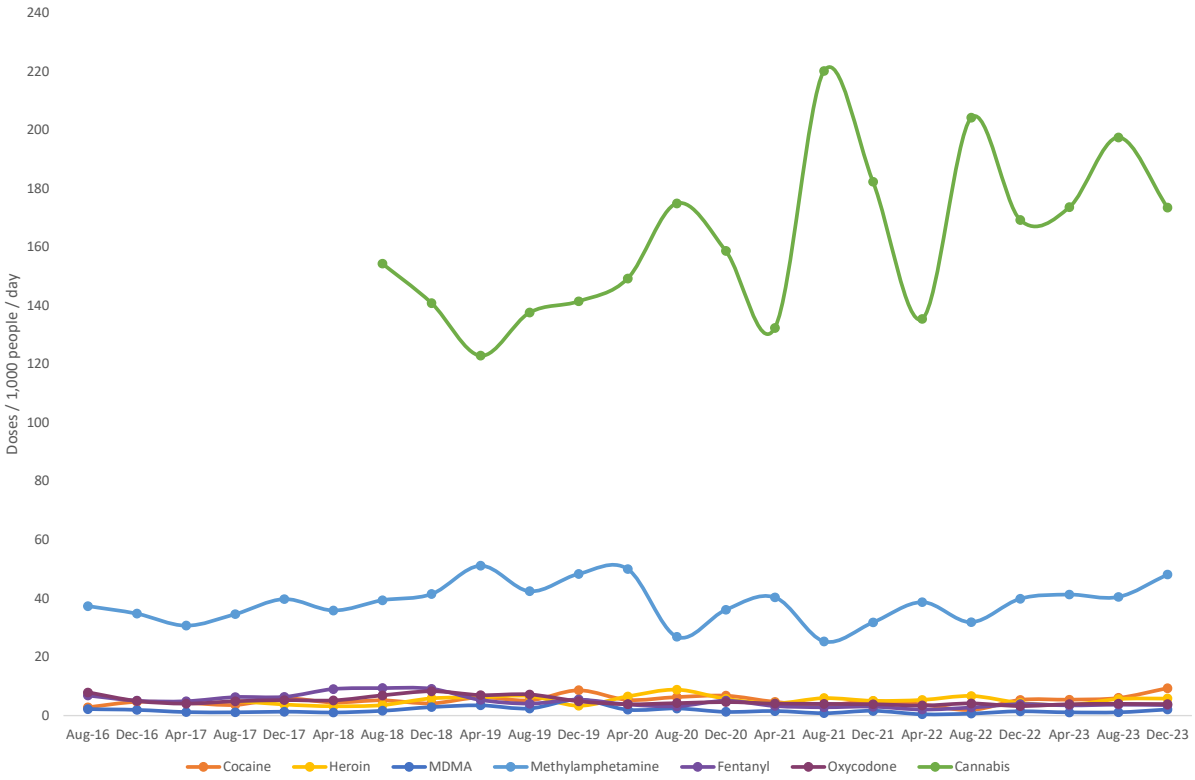
Triangulated data show that domestic drug markets are complex and vary between jurisdictions, with external influences affecting markets in different ways at different time periods. Other Program data illustrate that consumption of the respective drugs also varies considerably at different sites within jurisdictions. It is important that Australian drug datasets are interpreted holistically.

The ACIC engages with academic institutions, industry and public sector agencies to identify further data applications. Identified opportunities included informing responses in high-risk areas; measuring drug use in specific local areas; estimating the size of discrete illicit markets; and exploring options for monitoring the effectiveness of existing demand, supply and harm reduction initiatives. The Program is sufficiently flexible to allow for bespoke collection activity in different geographic locations and at varying intervals in response to identified needs and objectives.

DRUG CONSUMPTION SNAPSHOT

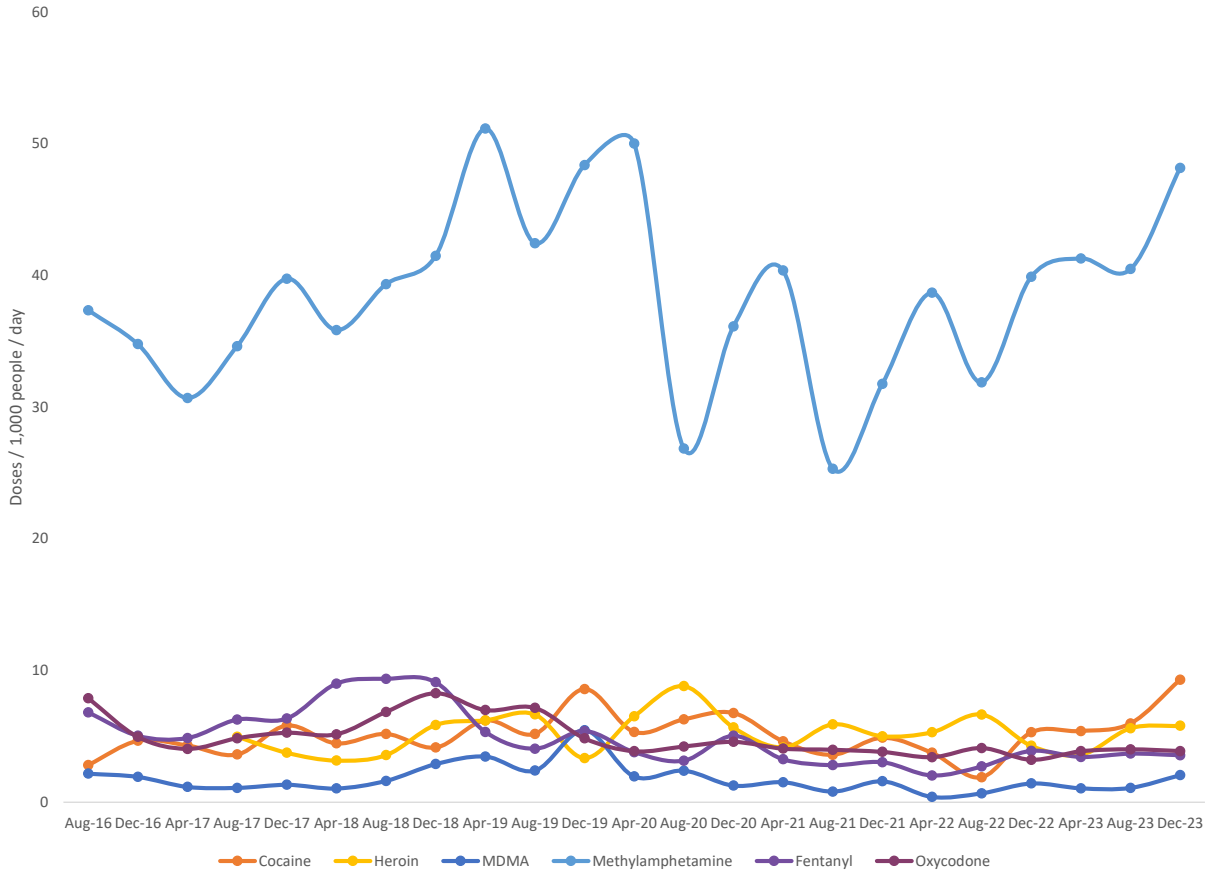
Nicotine and alcohol aside, cannabis is the most consumed drug by a large margin, despite substantial fluctuations. In December 2023, cannabis consumption was 3.6 times higher than the consumption of methylamphetamine and 18.6 times higher than the consumption of cocaine (Figure 2).

Figure 2: National average drug consumption of cannabis, methylamphetamine, cocaine, MDMA, heroin, oxycodone and fentanyl.



Consumption of drugs other than cannabis and methylamphetamine also fluctuated throughout the life of the Program, albeit within a narrower range. There has been a considerable increase in cocaine consumption since the record low level in August 2022, to a record high level in December 2023. Despite a tangible increase in MDMA consumption, it remains lower than the other illicit stimulants monitored by the Program. Consumption of heroin, fentanyl and oxycodone remained relatively stable nationally.

Figure 3: National average drug consumption of methylamphetamine, cocaine, MDMA, heroin, oxycodone and fentanyl.



INTERNATIONAL COMPARISON

One of the advantages of wastewater analysis is that the process has been standardised by a European network of laboratories called SCORE[3]. The SCORE network permits comparison between analytical results obtained from countries in Europe, Oceania, North and South America and Asia. These results confirm the considerable per capita consumption of illicit stimulants in Australia, even in world terms, and that our illicit stimulant consumption is dominated by methylamphetamine.

3 SCORE is the Sewage Core Group Europe.

RESEARCH FINDINGS

Prepared by The University of Queensland (B Tscharke, R Verhagen, R Bade, J O'Brien, P Prasad, D Barry, K Marano, G Elisei, T Reeks, P Thai, K Thomas, J Mueller) and University of South Australia (E Jaunay, M Ghetia, S Paxton, B Simpson, J White, C Gerber)

LIST OF ABBREVIATIONS:

ABS	Australian Bureau of Statistics
ACIC	Australian Criminal Intelligence Commission
ACT	Australian Capital Territory (capital city is Canberra)
DASSA	Drug and Alcohol Services South Australia
LC-MS/MS	Liquid chromatography tandem mass spectrometry
LOD	Limit of detection
LOQ	Limit of quantification
MDA	3,4-methylenedioxyamphetamine
MDMA	3,4-methylenedioxymethylamphetamine
NSW	New South Wales (capital city is Sydney)
NT	Northern Territory (capital city is Darwin)
NWDMP	National Wastewater Drug Monitoring Program
Qld	Queensland (capital city is Brisbane)
SA	South Australia (capital city is Adelaide)
SPE	Solid phase extraction
Tas	Tasmania (capital city is Hobart)
THC	Tetrahydrocannabinol
THC-COOH	11-nor-9-carboxy-tetrahydrocannabinol
Vic	Victoria (capital city is Melbourne)
WA	Western Australia (capital city is Perth)
WWTP	Wastewater treatment plant

TERMINOLOGY:

Methylamphetamine is also commonly known as methamphetamine. In this report methylamphetamine is used, consistent with the preferences of the ACIC.

MDMA is commonly known as ecstasy.

Alcohol consumption in this report refers to ethanol consumption, but the more general term 'alcohol' is used throughout.

Nicotine consumption has replaced tobacco consumption as the target metabolites may also be derived from nicotine replacement products such as gums and patches.

THC and THC-COOH: Tetrahydrocannabinol is the main psychoactive compound in cannabis and is referred to as THC throughout this report. Cannabis consumption levels have been calculated from the THC metabolite, 11-nor-9-carboxy-tetrahydrocannabinol (THC-COOH).

1: EXECUTIVE SUMMARY

BACKGROUND

The Australian Criminal Intelligence Commission (ACIC)'s National Wastewater Drug Monitoring Program (NWDMP) has reported on selected substances of concern in Australia since August 2016. The NWDMP focuses on 12 licit and illicit drugs, including nicotine, alcohol; the stimulants methylamphetamine, amphetamine, cocaine, MDMA (ecstasy) and MDA; the opioids oxycodone, fentanyl, and heroin; as well as cannabis and ketamine. Estimates of drug consumption in a population are determined from measured concentrations of drug metabolites in wastewater samples. Results are used to monitor trends in drug consumption over the life of the Program. Wastewater treatment plants (WWTPs) located across capital cities and regional Australia, covering all states and territories, have been invited to participate in the Program. Each site has been allocated a unique code which is assigned to each WWTP throughout the course of the Program. Site names are not included in this report to maintain treatment plant confidentiality.

DATA IN THIS REPORT

Sampling for Report 22 included wastewater samples collected for up to 7 days in both December 2023 and February 2024. The December 2023 collection involved regional and capital city sites, while February 2024 included capital city sites only. A total of 56 sites participated in December 2023, consisting of 20 capital city sites and a further 36 regional sites, covering a population of 14.1 million Australians. Data from this report equates to coverage of approximately 55 per cent of Australia's population for December 2023 and 48 per cent for February 2024. A total of 514 new samples have been added to the 10,675 previously collected, bringing the total number since the beginning of the Program to 11,189. The collected samples provide comprehensive Australia-wide baseline data against which subsequent results can be compared to ascertain both spatial and temporal trends.

RESULTS

Alcohol and nicotine were the highest consumed drugs in all states and territories in December 2023, followed by cannabis and methylamphetamine. The scale of drug consumption for the remaining drugs varied by state and territory.

NICOTINE

- Consumption has generally been higher in regional Australia, both in the current reporting period and across the life of the Program.
- Regional consumption of nicotine has been increasing since August 2022 and is now at a record high level.

ALCOHOL

- Population weighted average consumption of alcohol in capital cities exceeded regional consumption in December 2023 for the first time since 2018.
- Alcohol consumption has been decreasing in many states and territories, and nationally, over the past 2 years.

METHYLAMPHETAMINE

- In the last 2 reporting periods, population weighted average consumption has been higher in regional parts of the country.
- Consumption has generally been increasing, reaching its highest levels in regional areas of each jurisdiction during the past 2 years.
- December 2023 recorded the highest national capital city consumption over the life of the program and regional average consumption was the highest since April 2020.

COCAINE

- Consumption has been higher on average in the capital cities than in regional areas.
- Consumption has been increasing in most jurisdictions since the record lows in August 2022.
- In December 2023, the national average consumption for capital cities and regional areas was at the highest level since reporting began in August 2016.

MDMA

- MDMA consumption levels have generally been increasing since April 2022.
- National average MDMA consumption at capital city and regional sites in December 2023 was at its highest level since August 2020.

MDA

- MDA excretion remains relatively low nationally and average capital city excretion exceeded that at regional sites in December 2023.

OXYCODONE AND FENTANYL

- The average consumption of both drugs is higher in regional Australia.
- National average oxycodone and fentanyl consumption has been relatively steady over the last year.

HEROIN

- Overall consumption remains relatively steady and is substantially higher in capital cities than in regional areas.
- Many sites, particularly in regional areas, had levels below the detection limits.

CANNABIS

- Consumption is substantially higher on average in regional areas than in capital cities.
- Several capital cities have reached their lowest levels of cannabis consumption in the past 2 years.
- National average consumption estimates have been relatively stable over the past year.

KETAMINE

- Average ketamine excretion is higher in the capital cities.
- Average excretion in capital cities has increased since August 2023.

2: INTRODUCTION

2.1 PREAMBLE

Wastewater analysis is a technique for monitoring the population-scale consumption of substances. The University of Queensland and University of South Australia have provided the wastewater data from 2016 to 2023 and have been re-commissioned to provide data for a further 4 years to 2027, including another 12 public reports. Samples are collected at wastewater treatment plants for one week every 2 months for sites in capital cities and for one week every 4 months for regional sites. The aim is to acquire data on the population-scale use of substances that cause potential harm, either through addiction, health risks or criminal and anti-social behaviour. The intention is to build on baseline data of substance consumption across Australia to establish trends. This latest NWDMP report compares consumption data from previous reports with results obtained from all sites in December 2023 and capital cities in February 2024. The report presents patterns of substance consumption across Australia, showing differences in levels between capital cities and regional centres, within and between states and territories, and nationally.

Compounds of concern include nicotine from nicotine intake (consumption of tobacco products, gums, patches, e-cigarettes/vapes), ethanol from alcohol consumption, pharmaceutical substances with abuse potential such as oxycodone, fentanyl, and ketamine, as well as illicit substances including methylamphetamine, MDMA, MDA, cocaine, cannabis, and heroin.

3: METHODS

Wastewater-based monitoring of drug consumption is based on the principle that any substance that is consumed (irrespective of whether it is swallowed, inhaled/smoked, or injected) is excreted in urine or faeces. This may be either in the chemical form it was consumed and/or in a chemically modified form that is referred to as a metabolite. Once the excreted substance or metabolite is flushed into the sewer network, it will arrive at a wastewater treatment plant, assuming the point of excretion forms part of a wastewater catchment (Figure 4).

Information on the current drug list and their metabolites of interest are described in Appendix 1. The first NWDMP report (available at acic.gov.au) also provides an in-depth description of the methodologies and calculations used. Collectively, waste products in the sewer system arrive at a WWTP. There, samples can be collected over a defined sampling period, typically sub-sampled over the course of a day. First, the concentration of target substance in the wastewater sample is measured. Next, information on the amount of wastewater entering the WWTP, the population serviced by the plant, as well as information about the substance metabolism are used to calculate consumption estimates. Estimates have units of mass per day per 1,000 people (mg/day/1,000 people) or doses per day per 1,000 people (doses/day/1,000 people). Sites of different land area can be compared directly when estimates are expressed per 1,000 people. As many thousands of people contribute to each sample, it is not possible to identify drug consumption from individuals. The method is considered non-invasive and privacy is ensured.

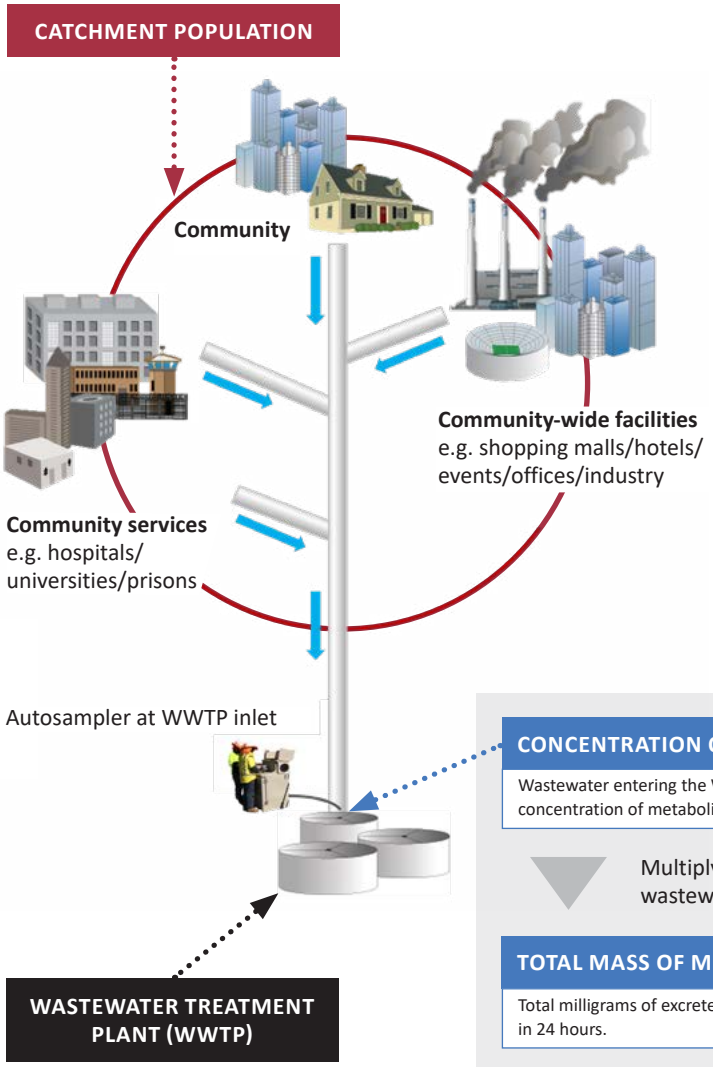
After their consumption, drugs can either pass through the body unchanged, or get converted into metabolites. Methylamphetamine is partially metabolised and excreted as amphetamine, while part of a MDMA dose is converted to MDA. The relationships between these compounds have been well studied and have been accounted for in this report (Pizarro et al. 2002; Khan & Nicell 2011). MDA is a drug but also a metabolite of MDMA. Since the proportion of MDA excreted after MDMA consumption is known, the proportion of MDA coming from MDMA metabolism was subtracted from the total measured amount of MDA. Similar calculations are conducted for methylamphetamine and amphetamine, where amphetamine coming from methylamphetamine consumption is subtracted from the total amount of amphetamine. Due to the lack of information of MDA elimination following MDA ingestion, consumption estimates cannot be calculated, so therefore MDA is reported as excretion.

Cannabis results in earlier reports were expressed as the amount consumed per day per 1,000 people but were not reported as doses. From Report 19, the calculations for cannabis were revised to allow the scale of cannabis consumption to be compared to other drugs by including a dose. More information is provided in Appendix 1. MDA and ketamine results are reported as the amount (mg) of drug excreted per day per 1,000 people as no suitable scientific information is available to convert amounts excreted to amounts consumed in wastewater.

Samples are collected over 24 hours using autosamplers that collect time or flow proportional samples. Wastewater treatment plant operators aid with collecting the samples from the influent autosampler (where the wastewater enters the treatment plant). Apart from a few sites in regional Western Australia, from August 2018 operators have been collecting a second daily sample with the preservative sodium metabisulphite (0.5% m/v) to allow for the detection of the cannabis metabolite.

Wastewater samples were analysed at the University of South Australia and The University of Queensland laboratories. The steps include filtration of the samples followed by an enrichment or concentration step. Then the concentrated sample is injected, or (for chemicals with sufficiently high concentrations) directly injected into the analytical instruments. The instrumental analysis consists of chromatographic separation and compound specific detection by liquid chromatography tandem mass spectrometry (LC-MS/MS). A summary of the extraction and analytical methods is given in Report 1. Methods to extract and analyse the cannabis metabolite are outlined in Tscharke et al. (2016). The excretion and dose information used in the calculations can be found in Appendix 1. Drug consumption estimates for each catchment population were calculated from these measured concentrations using daily flow volumes provided by the WWTPs and estimates of the catchment population size by evaluating census data vs. catchment maps, together with excretion and dose data on the drugs of interest obtained from the scientific literature.

Figure 4: Schematic of the population catchment area and methodology used to convert concentrations of substances in wastewater to consumption estimates.



CONCENTRATION OF EXCRETED METABOLITE (measured)

Wastewater entering the WWTP is sampled over a 24 hour period. The average concentration of metabolite is measured, i.e. grams of metabolite per litre of wastewater.

Multiply concentration by total volume of wastewater flowing into WWTP over 24 hours

TOTAL MASS OF METABOLITE EXCRETED (calculated)

Total milligrams of excreted metabolite that reaches the WWTP from the catchment in 24 hours.

Divide by catchment population (thousands of people)

MASS OF METABOLITE EXCRETED/1000 PEOPLE (calculated)

Milligrams of metabolite excreted on average by 1000 people in the catchment in 24 hours.

Divide by excretion rate i.e. the mass of metabolite excreted for every unit of drug consumed, and multiply by the difference in molecular weight between the drug and its' metabolite

MASS OF DRUG CONSUMED/1000 PEOPLE (calculated)

Milligrams of drug consumed on average by 1000 people in the catchment in 24 hours.

Divide by the mass of drug typically consumed in one go (i.e. the standard dose)

DOSES OF DRUG CONSUMED/1000 PEOPLE (calculated)

Number of doses of drug consumed on average by 1000 people in the catchment in 24 hours.

3.1 PARTICIPATING WASTEWATER TREATMENT PLANTS (WWTPs)

Fifty-six WWTPs across Australia participated in the NWDMP for the December 2023 collection period (Figure 5). Of these, 20 sites were in capital cities and a further 36 in regional areas, covering a wide range of catchment population sizes. Sites were selected in consultation with the ACIC. The number of participating sites for this report and a complete list of participating sites, number of samples and relative catchment sizes are listed in Table 1 and Appendix 2. To maintain the confidentiality of the participating sites, all sites were allocated a unique code to de-identify their results for the course of the Program. Only site codes are presented in the results.

Figure 5: Participating WWTPs in December 2023 showing the number of capital city and regional sites by state and territory. Each state or territory is assigned a colour which is used to identify them in figures.

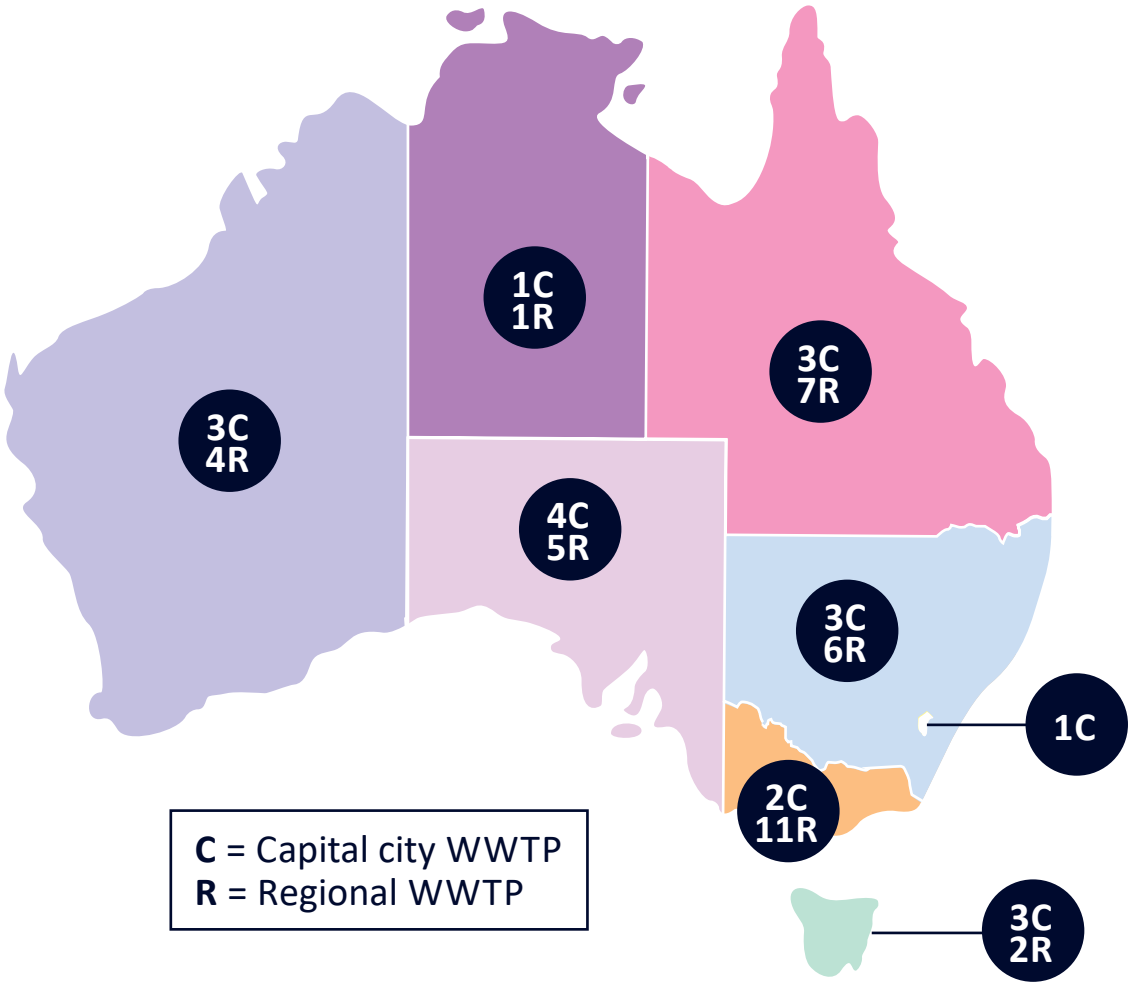


Table 1: Number of participating WWTPs for the periods covered in this report. One collection period aims to collect data from both capital city (C) and regional (R) sites, while the other collection period aims to collect data from capital city sites only.

State/territory	Dec 2023 Capital	Dec 2023 Regional	Feb 2024 Capital
ACT	1	–	1
NSW	3	6	3
NT	1	1	1
Qld	3	7	3
SA	4	5	4
Tas	3	2	3
Vic	2	11	2
WA	3	4	3
Sites	**20**	**36**	**20**
Population (millions) C & R	**12.1**	**2.0**	**12.1**
% of Australian Population	**47.6**	**7.8**	**47.6**
Total population (millions)		**14.1**	**12.1**
% of Australian Population		**55.4**	**47.6**

Estimates have been rounded to the nearest 0.1 million. Census 2021 population used (25,422,788) for population percentage estimates.

3.2 SAMPLE COLLECTION AND PREPARATION

Daily composite samples were collected by treatment plant staff on 7 consecutive days, or where 7 days was not possible, across as many consecutive days as possible. Weekend samples in many of the Tasmanian sites were not available. Small revisions may be made to historical data when more accurate data become available, for example, when updated flow measurements supplied by wastewater treatment authorities or population estimates become available. Samples were stored at 4°C or were frozen prior to transport to South Australia or Queensland. Further details of the sampling protocol and relevant quality controls are included in Irvine et al. (2011), Lai et al. (2011), Lai et al. (2015), Tscharke et al. (2016) and Bade et al. (2019). All other descriptions of calculations, extractions and analytical methods are outlined in Report 1 (available at acic.gov.au). Methods to detect and analyse THC-COOH are outlined in Tscharke et al. (2016).

3.3 PRESENTATION OF DATA AND INTERPRETATION OF GRAPHS

Reported averages: All averages for state/territory or Australia-wide drug consumption data are presented throughout this report as population weighted averages. The number of people in the catchment population is used as the weighting for the respective drug consumption data for that population. For example, to calculate the population weighted average of capital city consumption, the consumption data for each WWTP was multiplied by the respective population, all data were then summed and divided by the total population across all capital city sites. Reported average values are therefore not skewed towards usage data from small, non-representative populations.

Per capita consumption: The per capita consumption estimates presented in this report are calculated using the total estimated catchment population (which includes children). Per capita alcohol consumption has previously been reported by the Australian Bureau of Statistics (ABS) based on population numbers for people aged 15 and over. The consumption values presented in this report will underestimate consumption determined for an adult-only population. For consistency, data from other studies were recalculated where necessary using the estimated total population.

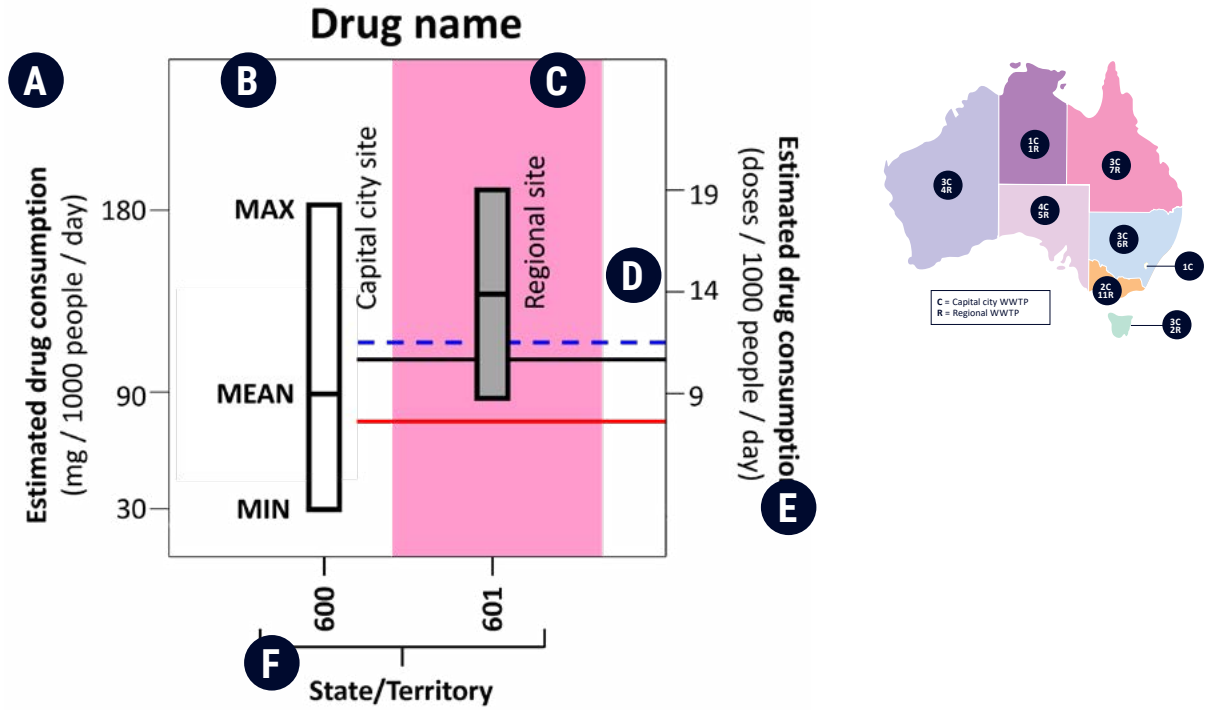
Graphical presentation of data: An overview of how the data is presented in the graphs for the individual sites is given in Figure 6. This includes information on interpreting the consumption data presented on the vertical axes in all graphs in this report. To improve readability of graphs with higher results in one site, we have reduced the graph height and labelled the higher value on the bar (values obtained from the left axis). In some graphs, the values plotted in the graph can be read as either mass of drug consumed (left axis) or doses of drug consumed (right axis). For the specific cases of MDA and ketamine, the amount of MDA and ketamine excreted following their consumption is not known, and therefore the drugs can only be expressed as how much drug was excreted into the sewer network, e.g., the mg excreted per 1,000 people per day. From Report 19, cannabis results were also presented as doses per day per 1,000 people, similar to other drugs. This has to be considered when referring to historical reports where results were shown only as mg consumed per day per 1,000 people. In addition, the calculation of cannabis used a different excretion rate prior to Report 19. From Report 19 all current and historical data have been revised and are comparable within the report.

Instrumental method limits of detection and limits of quantification: Since the wastewater samples contain very low quantities of particular drugs, the limit of detection (LOD) was determined analytically as the lowest concentration of that drug that could be determined in the sample (using the methods described in Report 1). A drug may be present at a concentration below the LOD. However, trace quantities may be present at undetectable levels. The limit of quantification (LOQ)[4] is a concentration (higher than the LOD), above which we have high confidence that the concentration measured on the analytical instrument is accurate. Above the LOD but below the LOQ there may be some uncertainty as to the actual concentration. To be conservative (a drug may be present but there is uncertainty as to its concentration) and in line with current practice, for back calculations to estimate per capita consumption, a concentration below the LOD was included as a value of LOD/√2. A concentration above the LOD but below LOQ is included at the midpoint between the LOD and LOQ (i.e. (LOD + LOQ)/2). The frequency of detection is included in Appendix 3.

Weekly pattern of drug use: The pattern of drug consumption over the sampling week for the sites in this report cannot be elucidated from the data included. We present the maximum, minimum and average (for individual sites as illustrated in Figure 6) and only population-weighted average values for all other graphs. Consistent patterns of drug consumption in Australia from previous wastewater studies indicate that some substances such as cocaine, MDMA and alcohol have significantly higher consumption on weekends. Other drugs such as methylamphetamine, oxycodone and fentanyl tend to have smaller differences between days of the week (Lai et al. 2015, Tscharke et al. 2016).

4 LOQ is the lowest level that can be accurately measured.

Figure 6: Explanation of the graphs used for individual sites. General concepts relevant to all graphs in the report are also outlined (unique site codes, explanation of vertical axes, colour coding).



A

The **LEFT HAND AXIS** shows the estimated total mass consumed (in milligrams, mg) of a drug which is calculated by measuring the concentration of the drug's metabolite in a 24 hour wastewater composite sample, multiplying by the flow volume in the 24 hours, dividing by the population size and applying an excretion factor for the metabolite (see Equation 1, Report 1 for details).

To convert the mass consumed (left axis) to the estimated doses consumed (right axis), we divide the estimated mass consumed by the standard dose amount. Dose amount and excretion factors are given in Appendix 1 of Report 4. In this example, at Site 600, the minimum consumption was 30 mg in one day, the maximum was 180 mg and average was 90 mg per day over the sampling period (for every 1,000 people).

B

We collect wastewater data for up to 7 days and estimate the amount of drug consumed for each day of sampling. We plot the maximum **(MAX)** day's consumption, the minimum **(MIN)** day's consumption and the average **(MEAN)** across the 7 days. If the box is long, there is a large difference in consumption patterns over the week, for example, if the drugs are used excessively at weekends but not often during the week. Alternatively, a short box suggests a similar drug usage every day of the week. See also main text.

C

COLOURS help identify the State or Territory that the data related to (colours are consistent between figures).

D

These lines represent the **POPULATION WEIGHTED AVERAGES** for drug consumption for all capital city sites (blue dotted line), all regional sites (red line) and for all sites combined (black line). The method to calculate weighted population averages is given in the main text. In this example, the average consumption for regional Site 601 (horizontal bar with red checked box) is above both the average for regional sites and all sites nationally. In contrast, the average consumption for capital city Site 600 is below the national average.

E

The **RIGHT HAND AXIS** shows the estimated number of doses of a drug consumed by 1,000 people in the catchment in a 24 hour period: e.g., one dose would be 1 cigarette, 1 standard drink or 1 injected amount of drug. In this example, at Site 601, the minimum consumption was 9 doses in 1 day, the maximum was 19 and average was 14 per day over the sampling period (for every 1,000 people).

F

UNIQUE NUMBER allocated to each WWTP to maintain confidentiality. WWTP names will not be disclosed publicly.

4: RESULTS

Estimated drug consumption data are presented differently in the following sections. Results are compared at the individual site level for December 2023 (section 4.1), and averaged to state or territory to compare longer term trends for the past 2 years (section 4.2). Trends are also presented nationally (section 4.3) and within each state and territory (section 4.4). December 2023 data were used for section 4.1, which compares the individual sites as it included the latest set of results for the full suite of sites. We recommend exercising caution when comparing results between sites as some plants provided samples for fewer days than others. The number of collection days can vary from 5 to 7. For example, sites in Tasmania are not always able to collect samples over the weekend. It is not always possible to coordinate collection of the same week of the month at all sites, so sampling weeks may not correspond in all instances. A list of the detection frequency for each drug can be found in Appendix 3. The uncertainties in individual population estimates have less impact when data are averaged, for example at the state/territory or national level. The uncertainties in population estimates are likely to be higher for smaller sites (e.g., regional communities) or where large short-term population changes occur due to employment opportunities, tourism, or festival events.

4.1 INDIVIDUAL SITE COMPARISON OF DRUG CONSUMPTION IN DECEMBER 2023

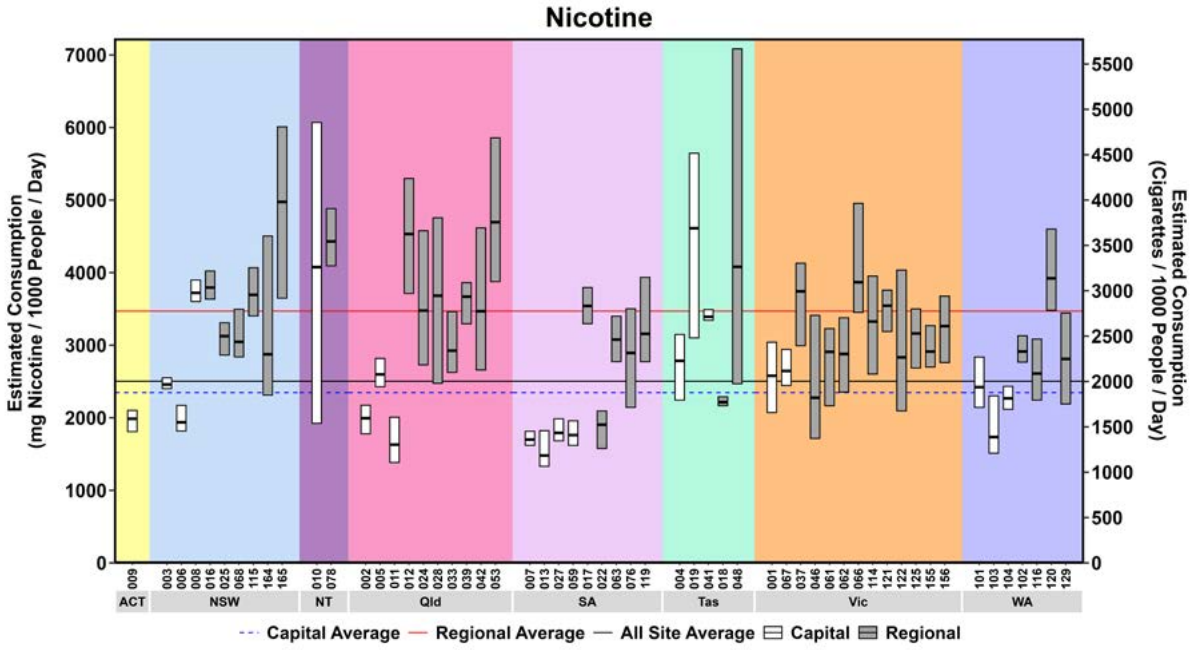
4.1.1 NICOTINE AND ALCOHOL

Nicotine is the main psychoactive substance present in tobacco leaves, some vaping products and nicotine replacement therapies used to facilitate cessation of smoking. Two nicotine metabolites, cotinine and hydroxycotinine, were used to estimate the consumption of nicotine. The estimate is expressed as nicotine in this report as the method cannot distinguish between nicotine from tobacco, e-cigarettes, or nicotine replacement therapies such as patches and gums.

On a national level, Figure 7 shows the average nicotine consumption was higher in regional areas compared to capital cities in December 2023 (red horizontal and blue dotted lines, respectively). A site in regional New South Wales had the highest mean consumption in December 2023, followed by a site in regional Queensland and another in Hobart.

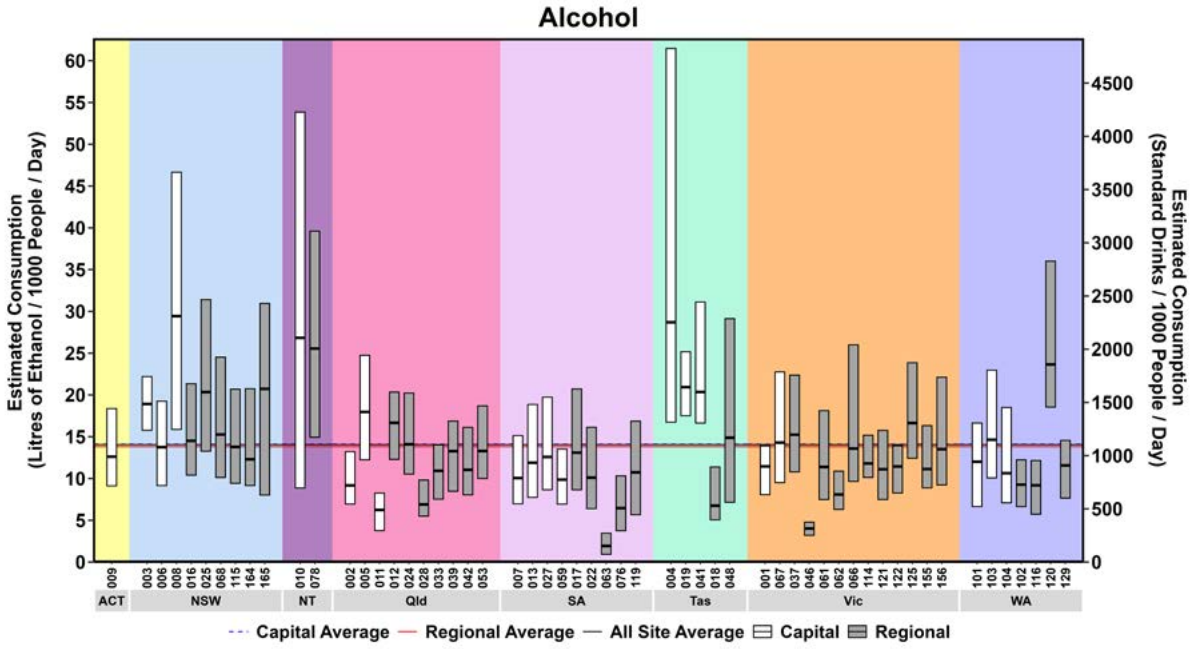
The specific marker of ethanol consumption, ethyl sulphate, was used to determine the scale of alcohol consumption across the country. The regional average consumption of alcohol was almost identical to the capital city average (Figure 8). Higher alcohol consumption was found in capital city sites in Sydney, Darwin and Hobart.

Figure 7: Estimated nicotine consumption for December 2023 in mass of nicotine consumed per day (left axis) and number of cigarettes per day (right axis) per thousand people. The number of collection days varied from 5 to 7.



- Higher consumption in regional areas
- Large difference between sites

Figure 8: Estimated alcohol consumption for December 2023 in litres consumed per day (left axis) and standard drinks per day (right axis) per thousand people. The number of collection days varied from 5 to 7.



- Similar regional and capital city average consumption
- Very large weekly spread in some capital city sites

4.1.2 STIMULANTS

4.1.2.1 METHYLAMPHETAMINE

The national average methylamphetamine consumption was higher in regional parts of the country (Figure 9). Regional sites in Western Australia, South Australia and Queensland had well-above average consumption . There was considerable variation in methylamphetamine consumption within and between jurisdictions in December 2023.

4.1.2.2 AMPHETAMINE

The measured concentration of amphetamine in the December 2023 samples mostly fell within a range which is consistent with the reported excretion rates following methylamphetamine consumption (Gracia-Lor et al. 2016). The results broadly matched our previous findings (see Appendix 4 of Report 1). The levels of amphetamine in wastewater samples can be mostly attributed to the metabolism of methylamphetamine. However, it is also excreted following consumption of prescribed drugs lisdexamfetamine and dexamfetamine, and the method cannot differentiate between this medical consumption and illicit consumption. The high levels of methylamphetamine in most parts of the country means a firm conclusion is not possible.

4.1.2.3 COCAINE

Benzoylecgonine, the specific metabolite of cocaine, was used to estimate consumption. The average consumption of cocaine was higher in capital cities compared to regional areas (Figure 10). A site in Sydney had the highest mean cocaine consumption. Cocaine consumption in some regional parts of the New South Wales, as well as a site in Queensland, was also relatively high.

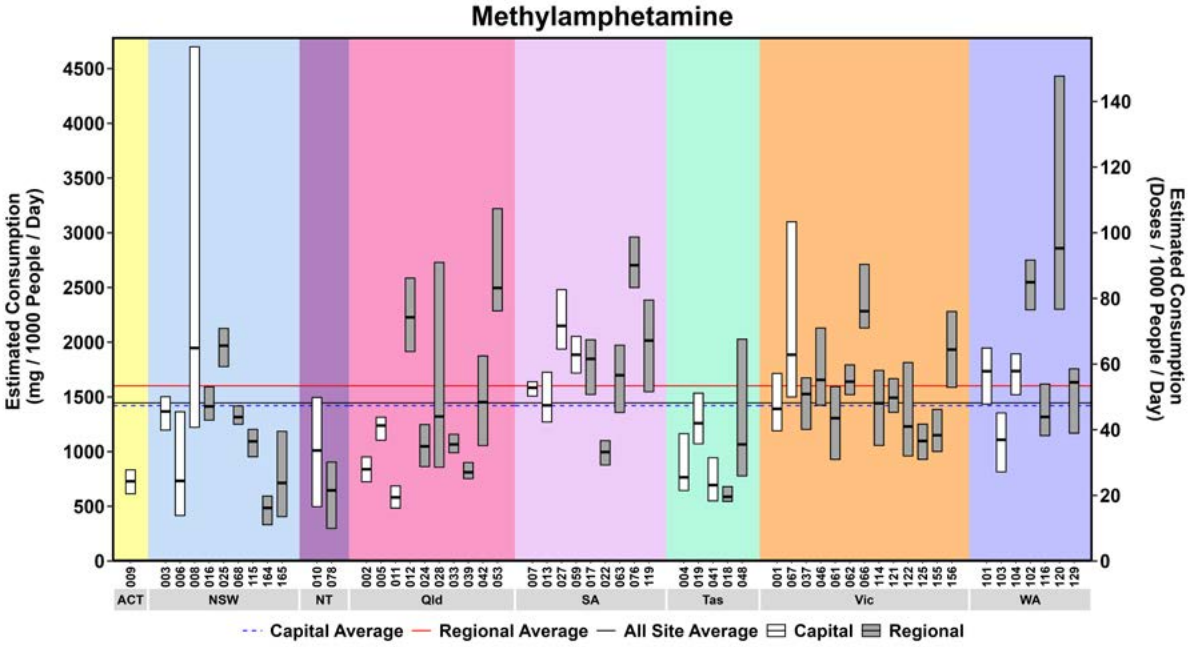
4.1.2.4 MDMA (3,4-METHYLENEDIOXYMETHYLAMPHETAMINE)

Average consumption of MDMA was lower in regional Australia compared to the capital cities (Figure 11). A site in Sydney and Hobart had the highest mean MDMA consumption in the country in December 2023. Nevertheless, the amounts should be seen in the context of the relatively low MDMA dose amounts compared to the other stimulants.

4.1.2.5 MDA (3,4-METHYLENEDIOXYAMPHETAMINE)

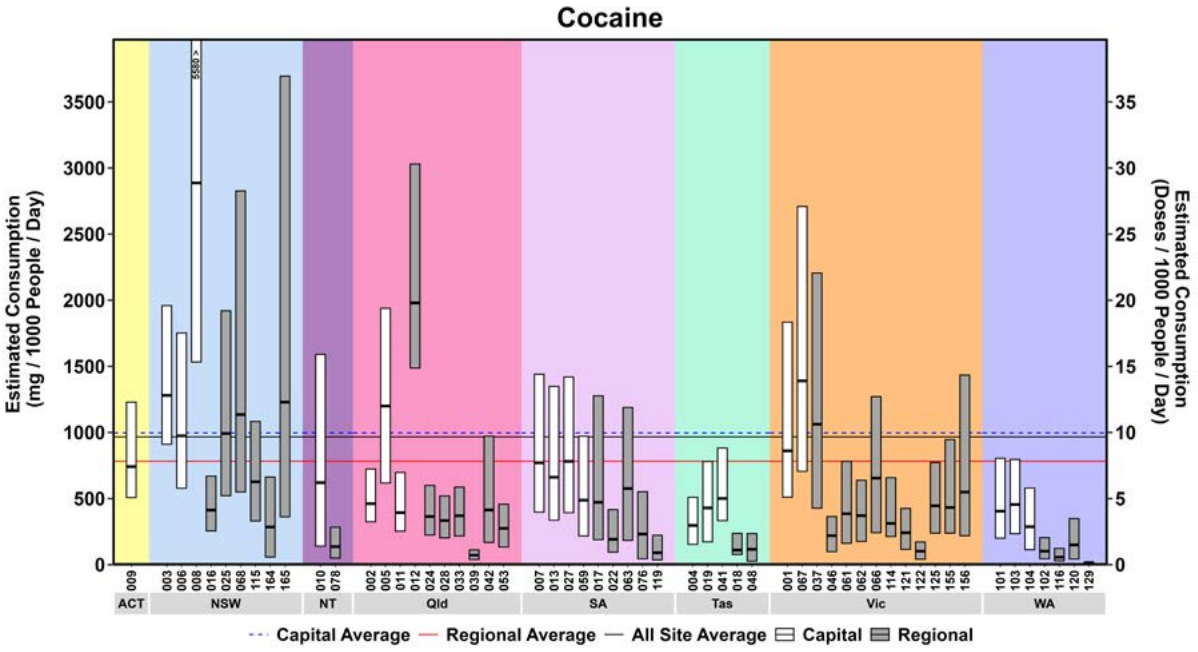
The results for MDA are expressed as excreted amounts (Figure 12). The national average MDA excretion for regional areas was lower than in capital cities. Sites in Hobart, regional South Australia and Sydney had excretion estimates above other parts of the country.

Figure 9: Estimated methylamphetamine consumption for December 2023 in mass consumed per day (left axis) and doses per day (right axis) per thousand people. The number of collection days varied from 5 to 7.



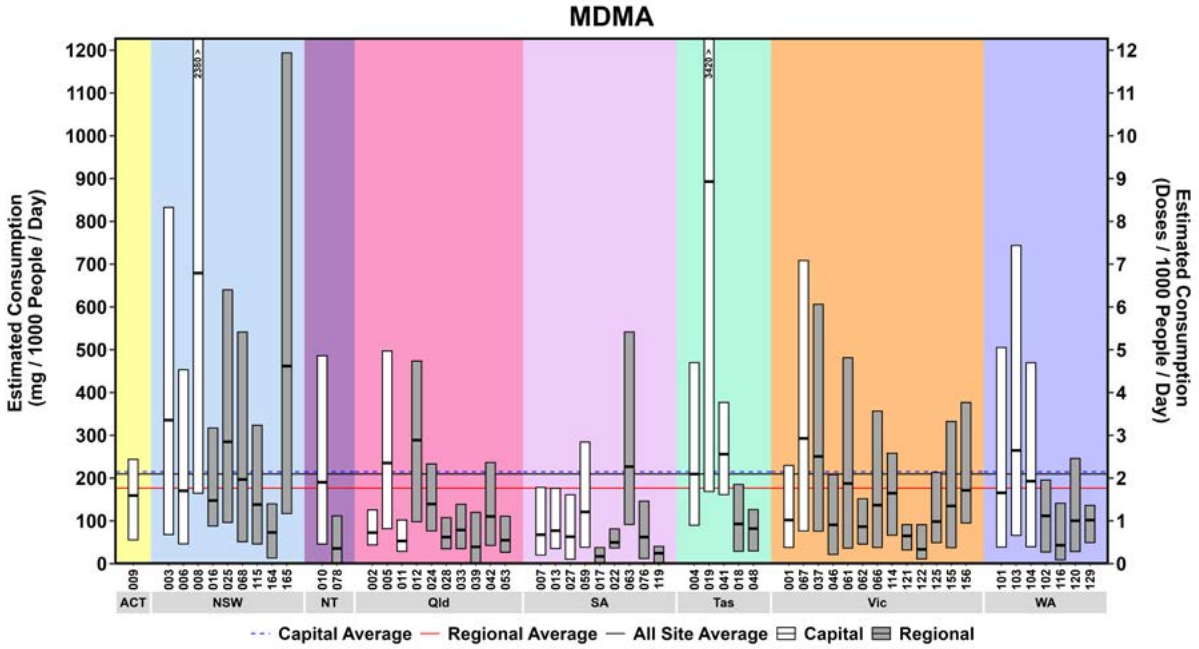
- Higher regional average consumption
- High mean consumption at some regional WA, SA and Qld sites

Figure 10: Estimated cocaine consumption for December 2023 in mass consumed per day (left axis) and doses per day (right axis) per thousand people Text describing the extreme values shown above the graph are based on the left y axis. The number of collection days varied from 5 to 7.



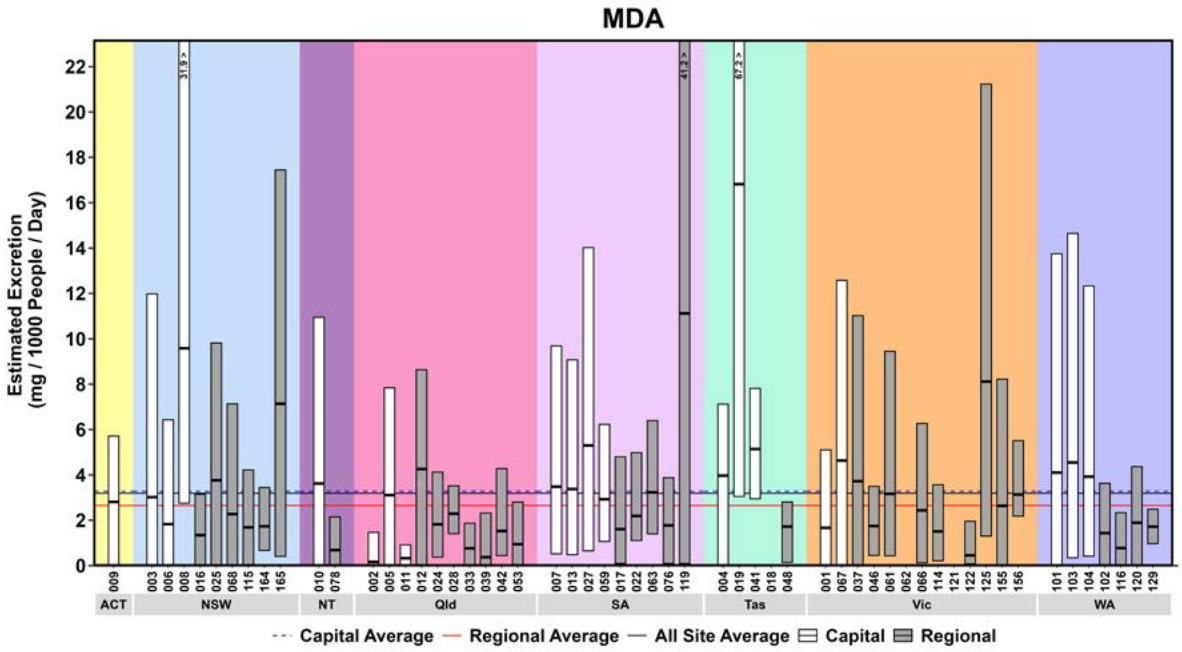
- Higher capital city consumption
- High consumption in parts of Sydney

Figure 11: Estimated MDMA consumption for December 2023 in mass consumed per day (left axis) and doses per day (right axis) per thousand people. Text describing the extreme values shown above the graph are based on the left y axis. The number of collection days varied from 5 to 7.



- Higher average capital city consumption
- Parts of Sydney and Hobart had relatively high consumption

Figure 12: Estimated MDA excretion for December 2023 in mass excreted per day per thousand people. Text describing the extreme values shown above the graph are based on the left y axis. The number of collection days varied from 5 to 7.



- Lower regional average excretion
- Relatively high excretion at several sites

4.1.3 OPIOIDS

Two prescription opioids, oxycodone and fentanyl, are included in the report, as well as heroin, an illicit drug. The main metabolites (noroxycodone, norfentanyl and 6-monoacetylmorphine) were measured to estimate the consumption of these drugs. Oxycodone and fentanyl are legally prescribed pharmaceuticals to treat pain. Although wastewater analysis cannot differentiate between prescribed consumption and consumption for non-medical purposes, these substances remain of interest due to their abuse potential.

4.1.3.1 OXYCODONE

Oxycodone consumption in the December 2023 collection week is shown in Figure 13. The average consumption of oxycodone was higher in regional areas compared to capital cities, with the highest mean consumption recorded at a regional site in Queensland. Several sites had noticeably lower consumption estimates, well below the capital city and regional averages.

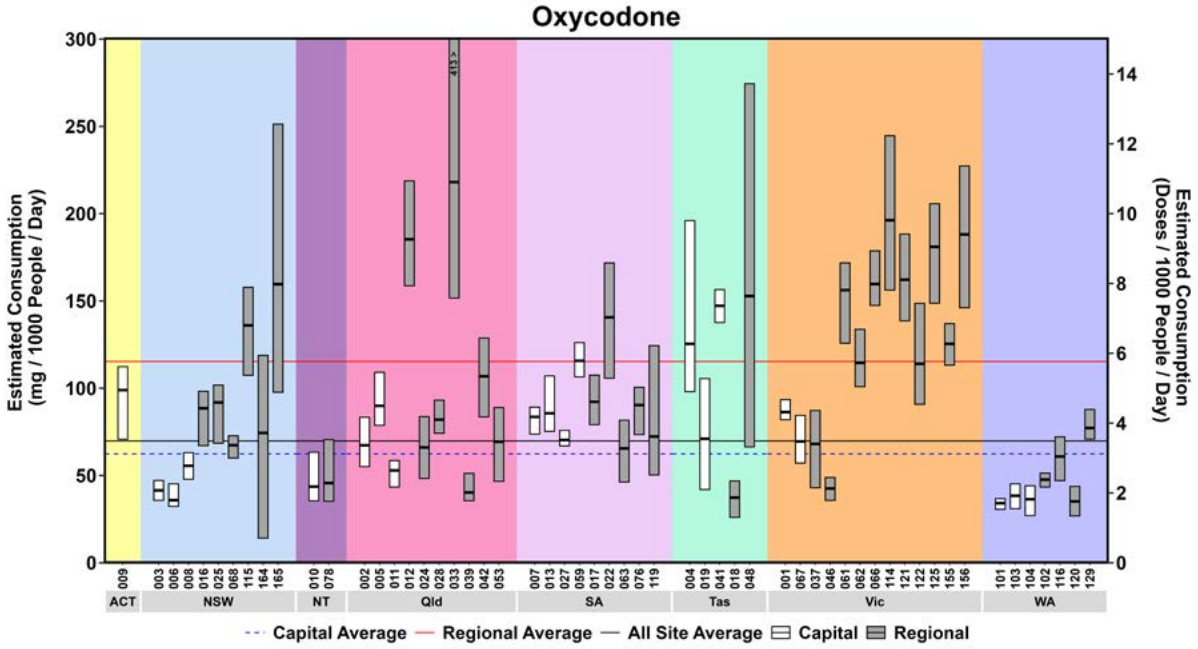
4.1.3.2 FENTANYL

Fentanyl consumption was also higher on average in regional Australia compared to the capital cities (Figure 14). Mean consumption was highest at some regional sites in Victoria and South Australia. Some sites in Hobart had the highest fentanyl consumption of the capital cities. Fentanyl levels fell below the limit of detection for all or some days of the week at several sites.

4.1.3.3 HEROIN

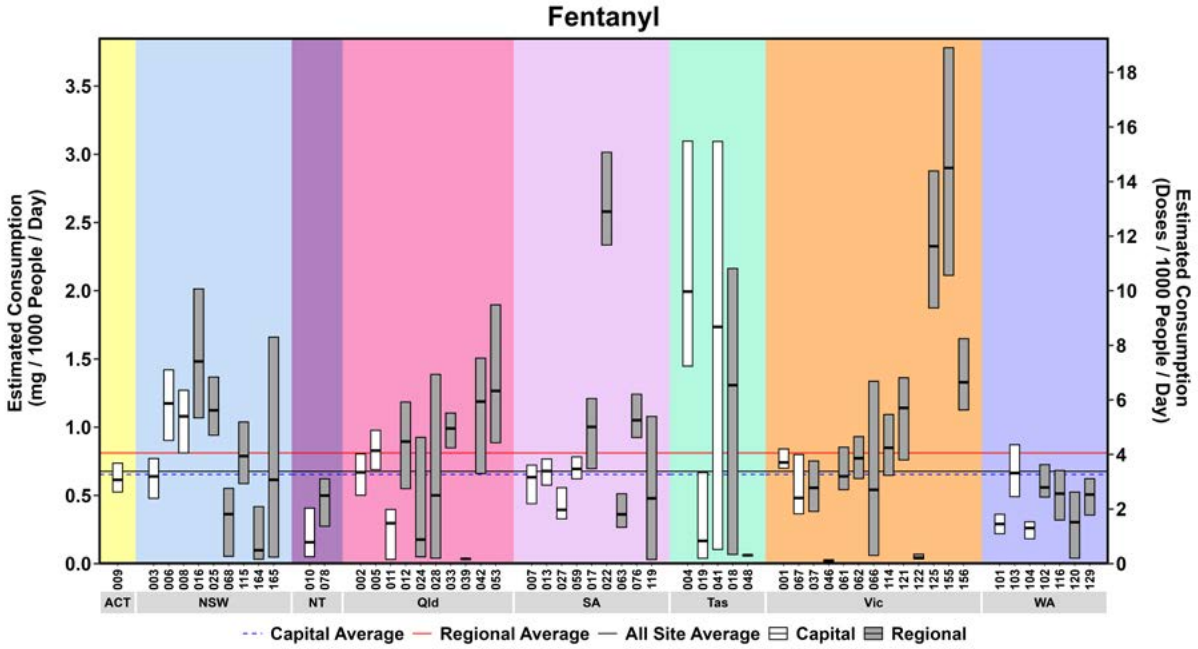
Heroin consumption was substantially higher on average in the capital cities of Australia in December 2023 (Figure 15). Estimates fell below the limits of detection in most regional sites in Australia. The clear exception was a site in regional Victoria which had the highest mean heroin consumption in Australia in December 2023. Parts of Sydney, Melbourne and Perth had high heroin consumption compared to other capital city sites.

Figure 13: Estimated oxycodone consumption for December 2023 in mass consumed per day (left axis) and doses per day (right axis) per thousand people. Text describing the extreme values shown above the graph are based on the left y axis. The number of collection days varied from 5 to 7.



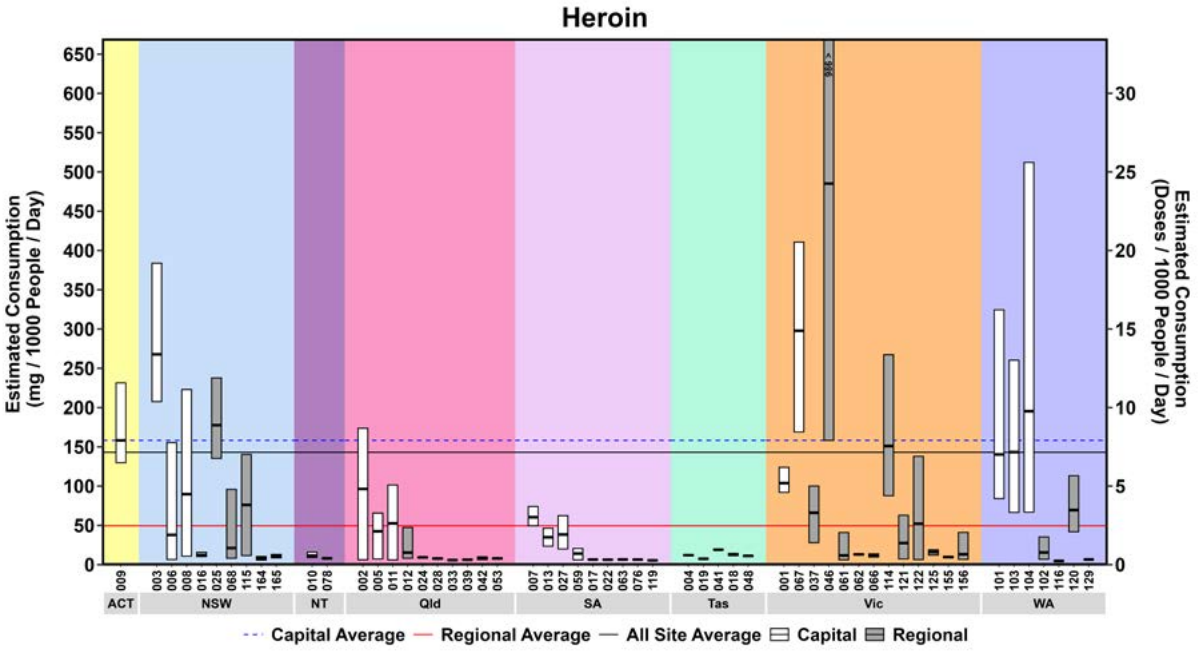
- Higher regional average consumption
- Large variation in consumption between locations

Figure 14: Estimated fentanyl consumption for December 2023 in mass consumed per day (left axis) and doses per day (right axis) per thousand people. The number of collection days varied from 5 to 7.



- Higher regional average consumption
- Varied consumption between locations

Figure 15: Estimated heroin consumption for December 2023 in mass consumed per day (left axis) and doses per day (right axis) per thousand people. Text describing the extreme values shown above the graph are based on the left y axis. The number of collection days varied from 5 to 7.



- **Regional consumption often very low**
- **High consumption at some sites in Vic, NSW, and WA**

4.1.4 CANNABIS

Tetrahydrocannabinol (THC) is the main psychoactive compound found in cannabis. The compound is metabolised and mostly cleared through the gastrointestinal tract. A small proportion is excreted through the kidneys as 11-nor-9-carboxy-tetrahydrocannabinol (THC-COOH). The latter is known to adsorb to various surfaces, including sewer infrastructure and particulates suspended in the wastewater (e.g. Pandopulos et al. 2022 and Campos-Manas et al. 2022). Therefore, in terms of wastewater analysis, the sewer design and collection method may play a part in the reportable levels of the target metabolite used for the purposes of the NWDMP. Accordingly, any spatial comparisons should be made with caution. Upon collection, samples require preservation to avoid degradation of THC-COOH, without using acidification (McCall et al. 2016). This is one reason cannabis consumption is not reported on a regular basis in other countries where wastewater analysis is routinely conducted, as acidification is a common preservation technique.

For the NWDMP, separate samples are collected each day and preserved specifically for THC-COOH analysis, except in some sites in regional Western Australia where this is not possible. The dose amount (8 mg) used in the report is based on the desired effect on an average user of the active ingredient, regardless of the route of administration, e.g. inhaled smoke, part of a plant being used or oral ingestion through edible forms (Freeman and Lorenzetti, 2020). An 8 mg amount would represent between 210–450 mg of dried cannabis containing 15% THC, depending on occasional or regular users consuming the product (Sharma et al. 2012).

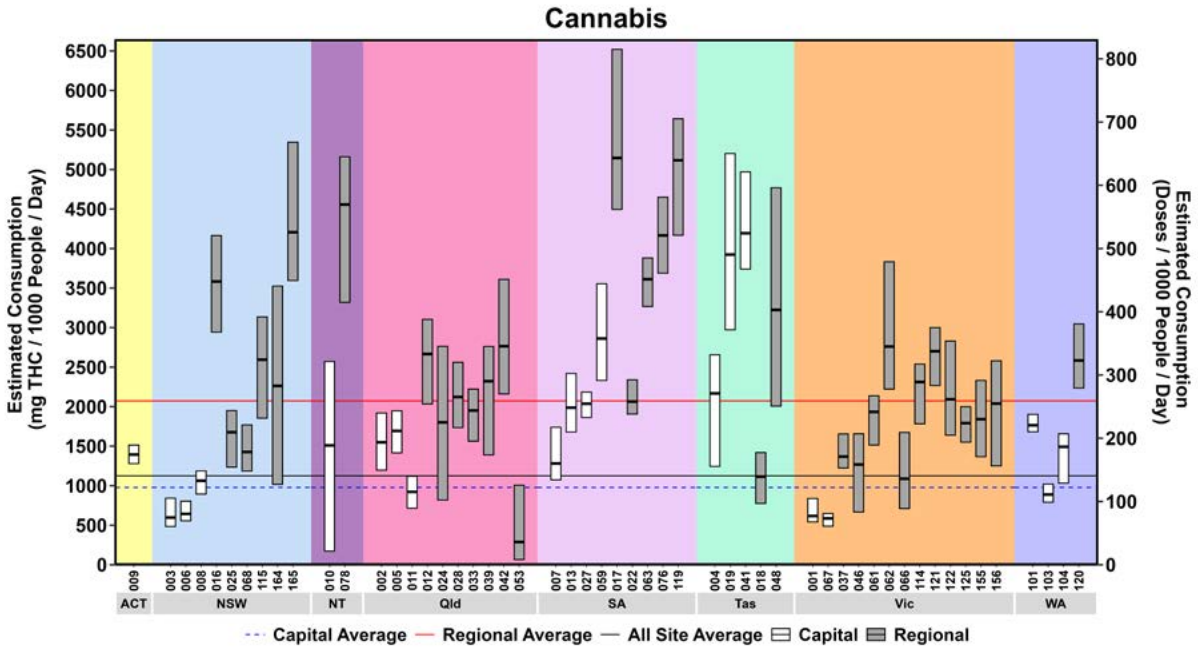
The spatial comparison for cannabis consumption in December 2023 is shown in Figure 16. Regional cannabis consumption was substantially higher than in the capital cities and a large range was observed between sites. Cannabis consumption tended to be the lowest in Australia's largest capital cities. Regional sites in several jurisdictions had relatively high consumption.

4.1.5 KETAMINE

Ketamine, measured as its metabolite, norketamine, is used medically for the management of acute pain, often associated with surgery or trauma. Ketamine also has veterinary applications. Due to its sedative and hallucinogenic effects, the drug has been associated with illicit substance abuse and is listed as a new psychoactive substance by the United Nations Office on Drugs and Crime. The reported proportions of ketamine and its metabolites in wastewater leave some doubt as to an appropriate factor to convert excreted amounts to consumed amounts. Therefore, measured levels are being shown here as excreted daily mass loads.

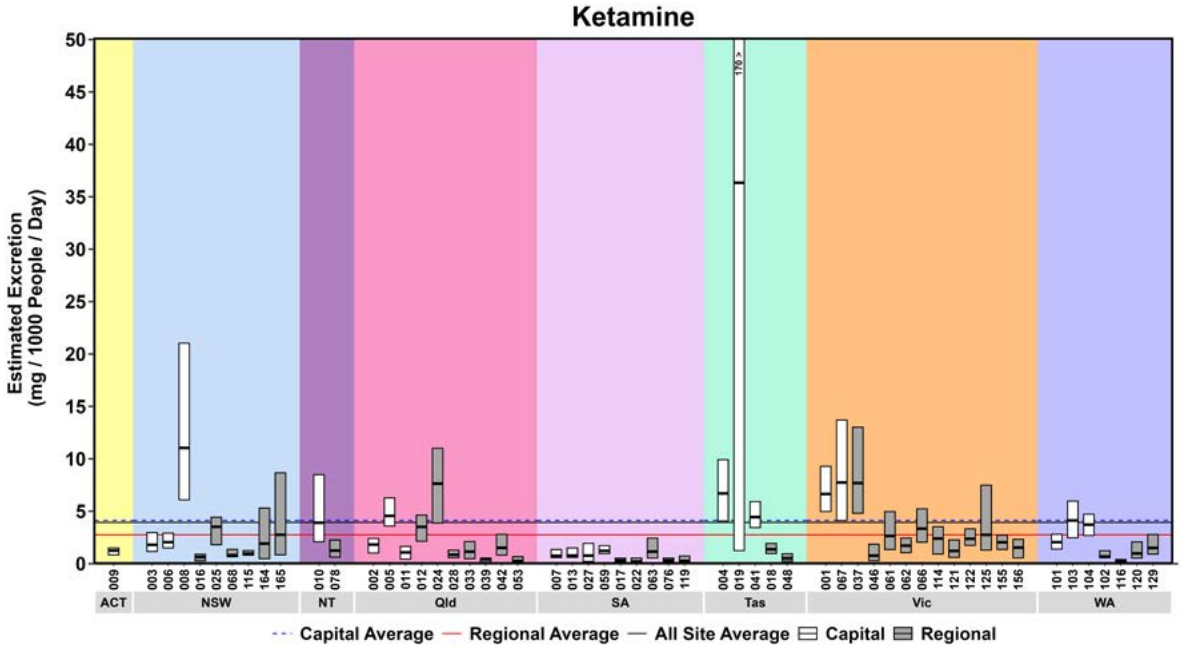
Ketamine excretion in December 2023 was higher across the nation in capital cities compared to regional sites (Figure 17). A site in Hobart had the highest mean excretion of all sites. Many sites across several jurisdictions had excretion levels below the national average.

Figure 16: Estimated cannabis consumption for December 2023 in mass consumed per day (left axis) and doses per day (right axis). The number of collection days varied from 5 to 7.



- **Higher regional consumption**
- **Variable consumption within jurisdictions and across the country**

Figure 17: Estimated ketamine excretion for December 2023 in mass excreted per day (left axis) per thousand people. Text describing the extreme values shown above the graph are based on the left y axis. The number of collection days varied from 5 to 7.



- Higher capital city excretion
- Low excretion levels in the majority of sites

4.2 TEMPORAL CHANGES IN DRUG CONSUMPTION ESTIMATES BY JURISDICTION

The per capita consumption of each drug outlined in the following figures compares data acquired in this report to previous collection periods on a state or territory basis. The data relating to capital cities in this section have been updated to include both the December 2023 and February 2024 collections, while regional areas were updated for December 2023. This needs to be considered when comparing results between sections 4.1 and 4.2.

Although every effort has been made to assess the same sites for each period, the individual sites and the number of sites used to generate the population-weighted averages may have changed between periods. Comparing between time points should be done with caution. This is most evident for the regional averages, where regional participation has been more varied between periods, while capital city site participation is much more consistent (see Appendix 2 in this report for sites participating in this report). Due to the larger number of data points collected by the Program, the current report presents the last 2 years of data. Prior data dating back to 2016 for each substance of interest is available on the ACIC website by jurisdiction.

Note: The horizontal red, blue and black lines on each temporal graph which represent the averages are the cumulative average across all sampling time points and all samples analysed for each substance. They are not the averages for only the current reporting period as found in section 4.1. Updated changes to the graphs relating to this report are the 2 most recent bars consisting of capital cities (December 2023 and February 2024) and the single most recent bar for regional areas (December 2023). Some temporal changes reflected in these bars may be a consequence of updated populations used in the calculations, see Appendix 4 of Report 17 for the difference in populations for the 2016 and 2021 Census for each catchment.

4.2.1 NICOTINE AND ALCOHOL

The consumption of nicotine (which includes tobacco, e-cigarettes, and replacement therapies), has been consistently higher in regional parts of Australia since the Program commenced (Figure 18). Consumption of nicotine in the capital cities varied, with no consistent pattern emerging. Consumption has been increasing in most capital cities. The latest results show increased consumption in regional areas of all jurisdictions except New South Wales. Regional Northern Territory had the highest average consumption of the jurisdictions.

Alcohol consumption has been decreasing in most jurisdictions over the past 2 years, with some beginning to flatten (Figure 19). Long-term average alcohol consumption is higher in regional Australia than in the capital cities. This gap has been narrowing, with many jurisdictions recording similar consumption in regional areas and capital cities in December 2023. Tasmania is the obvious exception. The Northern Territory and Hobart had the highest consumption in December 2023.

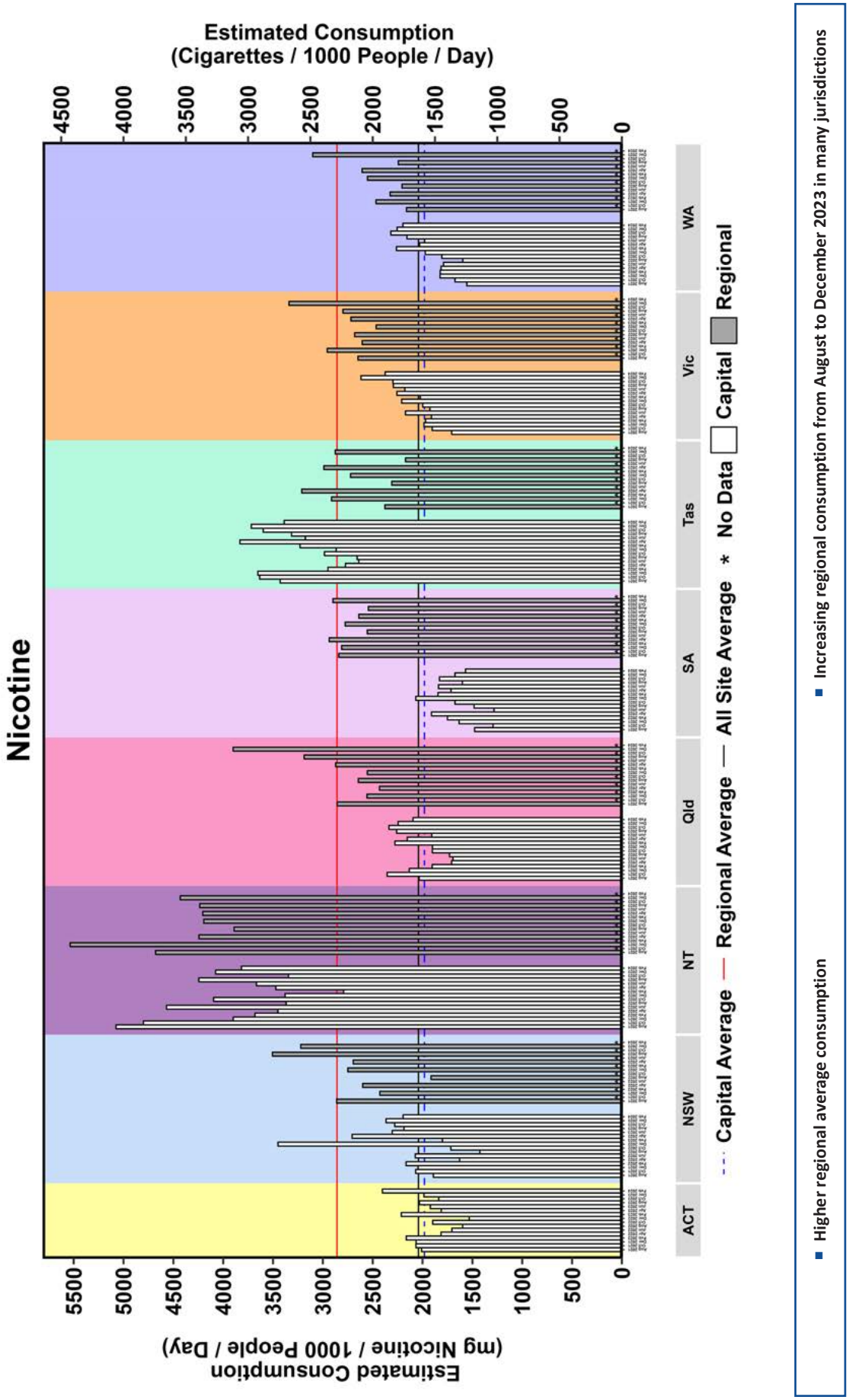


Figure 18: Estimated average consumption of nicotine by state/territory, August 2021 to February 2024, where 1 cigarette provides 1.25 mg of nicotine.

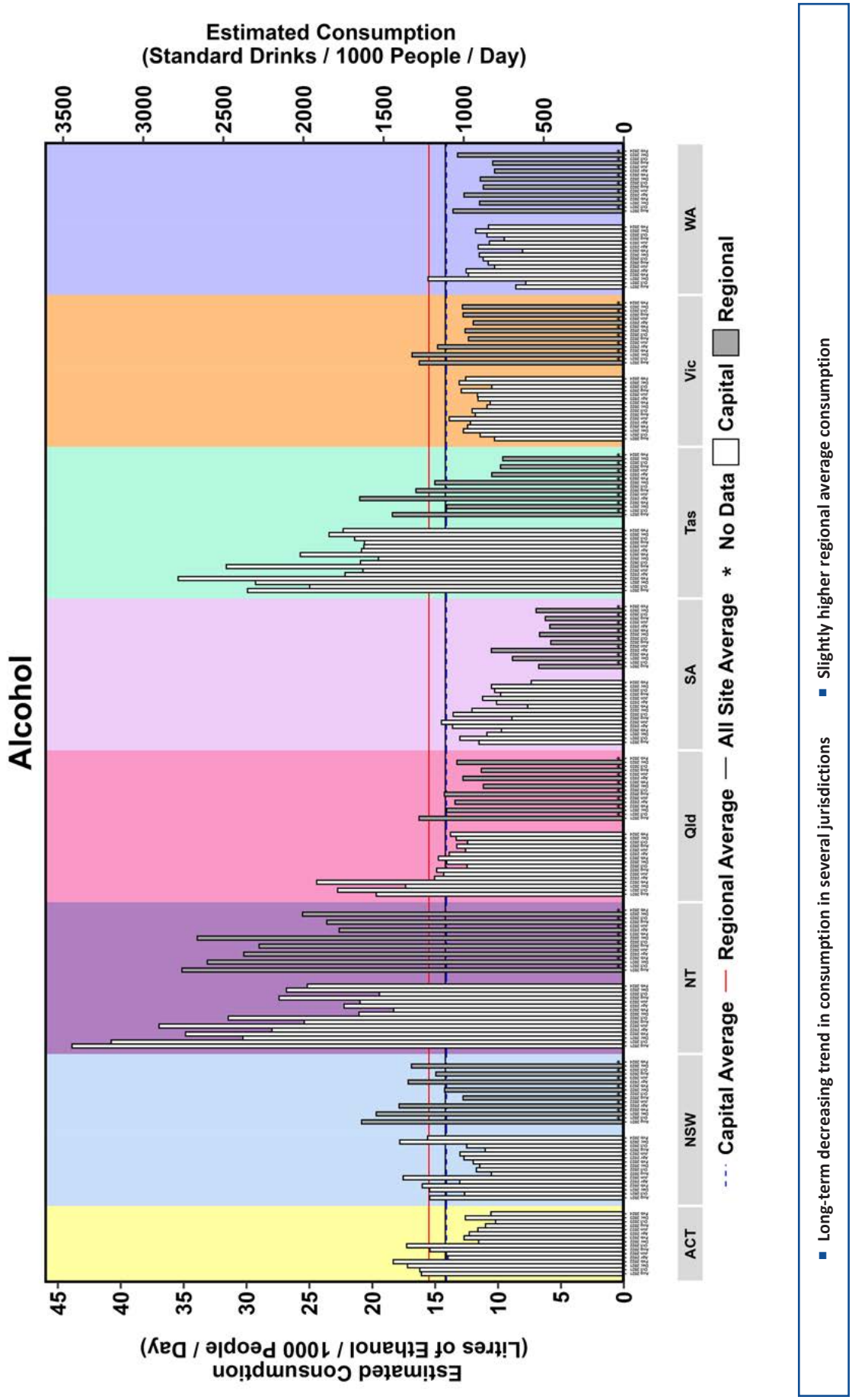


Figure 19: Estimated average consumption of alcohol by state/territory, August 2021 to February 2024. A standard drink is 10.0 g, or 12.6 mL.

4.2.2 STIMULANTS

4.2.2.1 METHYLAMPHETAMINE

Temporal changes in the consumption of methylamphetamine are shown in Figure 20. Consumption increased in almost every jurisdiction, reaching highest levels in the past year in many parts of the country. Regional Western Australia had the highest consumption nationally in December 2023.

Historical levels of methylamphetamine consumption predating the NWDMP have been available for some sites, shown in Figure 21 and Figure 22. Recent consumption of the drug has been relatively high at Perth and Melbourne sites, but has been relatively stable in Adelaide and at Site 033 in Queensland. Methylamphetamine consumption in Melbourne and at Site 012 in Queensland in December 2023 is at or close to the highest level recorded since monitoring started.

4.2.2.2 COCAINE

Cocaine consumption continued recent increasing trends across the country (Figure 23). Sydney and Melbourne tend to have the highest capital city consumption and New South Wales and Queensland the highest regional consumption. Regional parts of several states increased sharply towards the end of 2023. Long-term average cocaine consumption is higher in capital cities than in regional areas. However, the December 2023 result had higher consumption in regional Queensland than in Brisbane.

4.2.2.3 MDMA

MDMA consumption is shown in Figure 24. Average consumption has historically been higher in regional areas, however in some jurisdictions the trend is now reversing. Hobart had the highest MDMA consumption in December 2023. Large fluctuations are apparent in parts of the country.

4.2.2.4 MDA

MDA is expressed in excreted amounts due to the lack of drug metabolism information (Figure 25). Excretion of MDA is low, and levels tend to fluctuate substantially in most jurisdictions. On average, regional MDA excretion is substantially higher than in the capital cities. Hobart had the highest levels in December 2023.

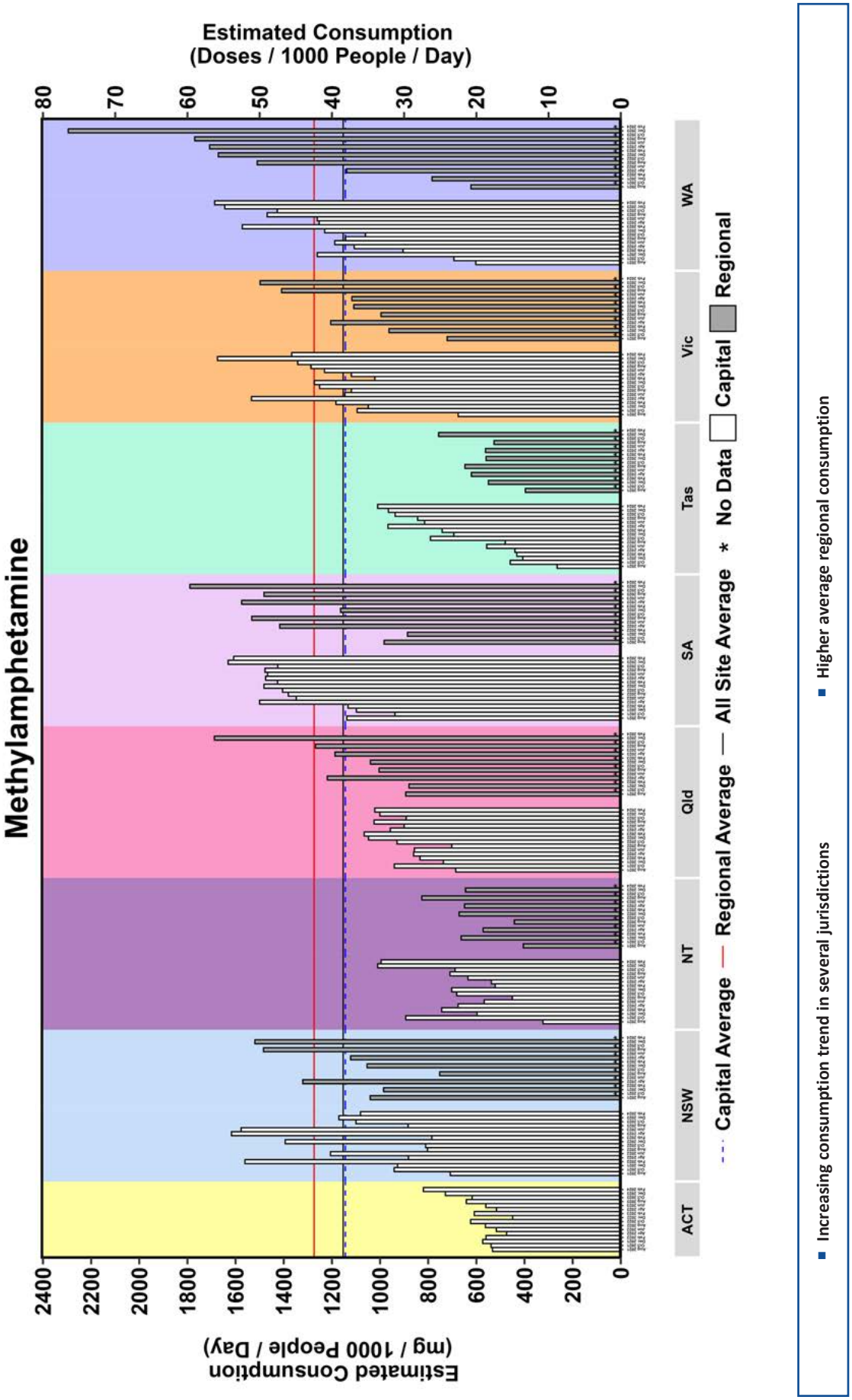


Figure 20: Estimated average consumption of methylamphetamine by state/territory, August 2021 to February 2024.

Figure 21: Change in methylamphetamine consumption for sites in Queensland and Adelaide with historical data.

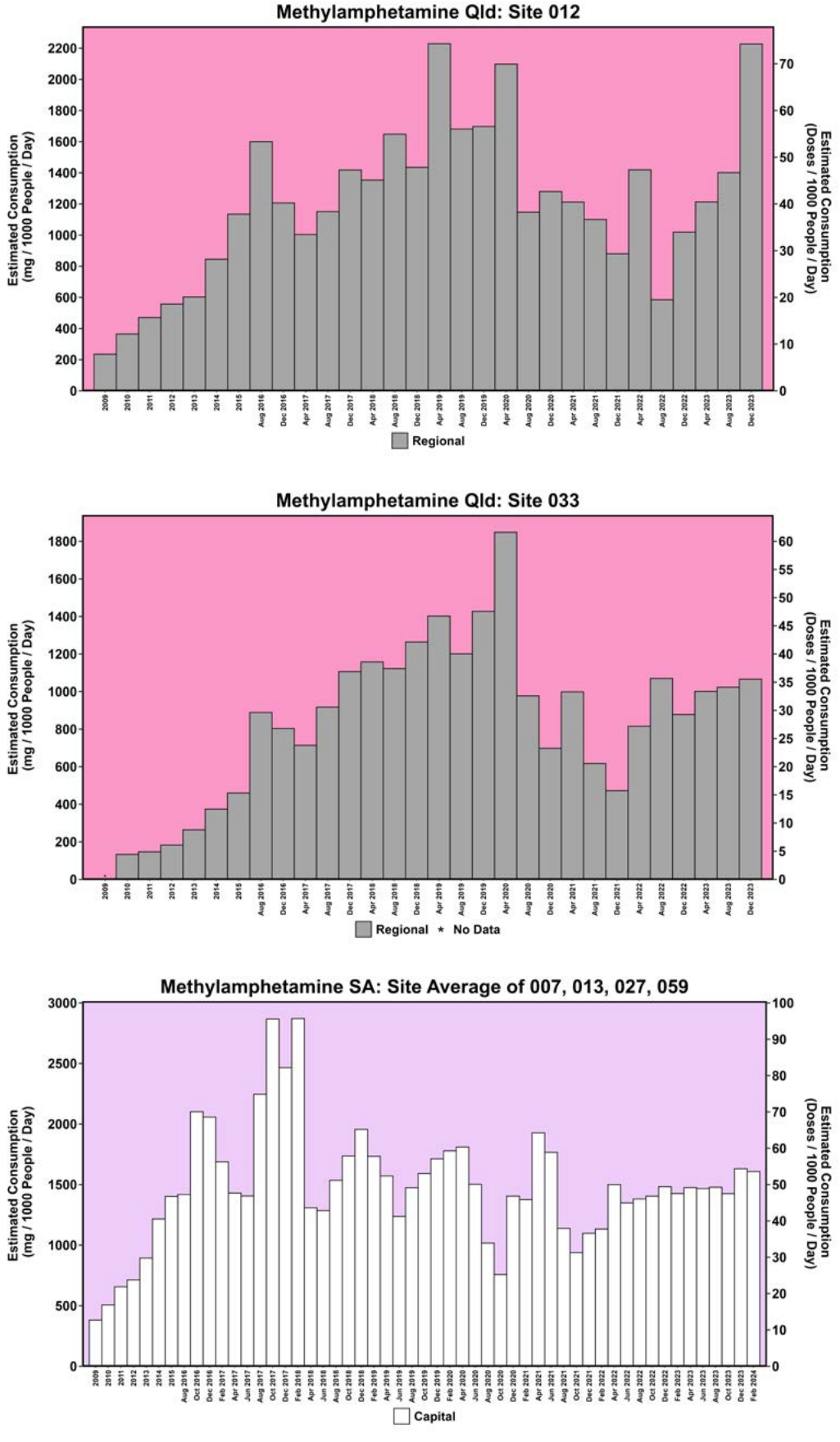
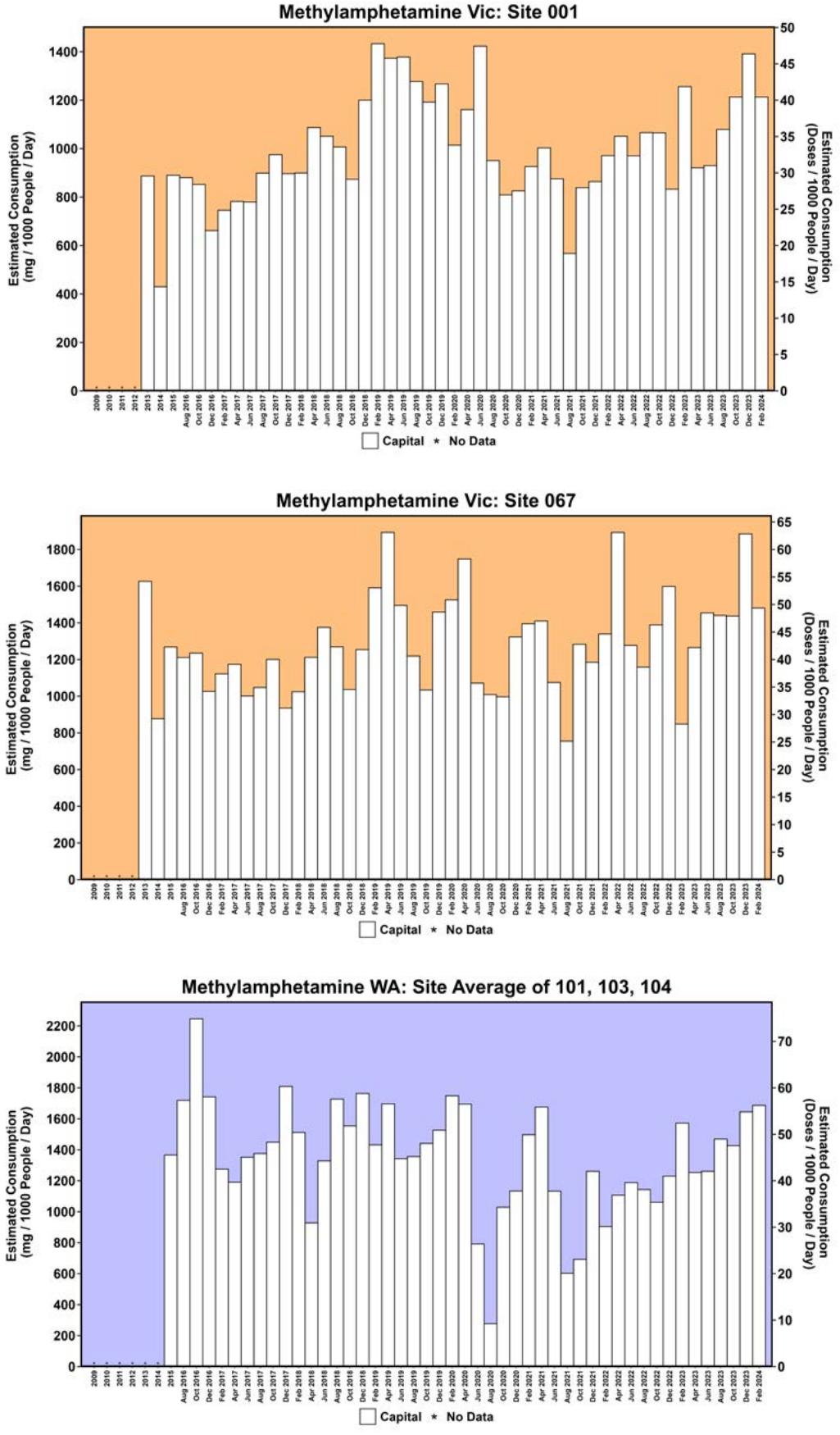


Figure 22: Change in methylamphetamine consumption for sites in Melbourne and Perth with historical data. Both Melbourne sites were the average of one week per year in 2013, 2014 and 2015.



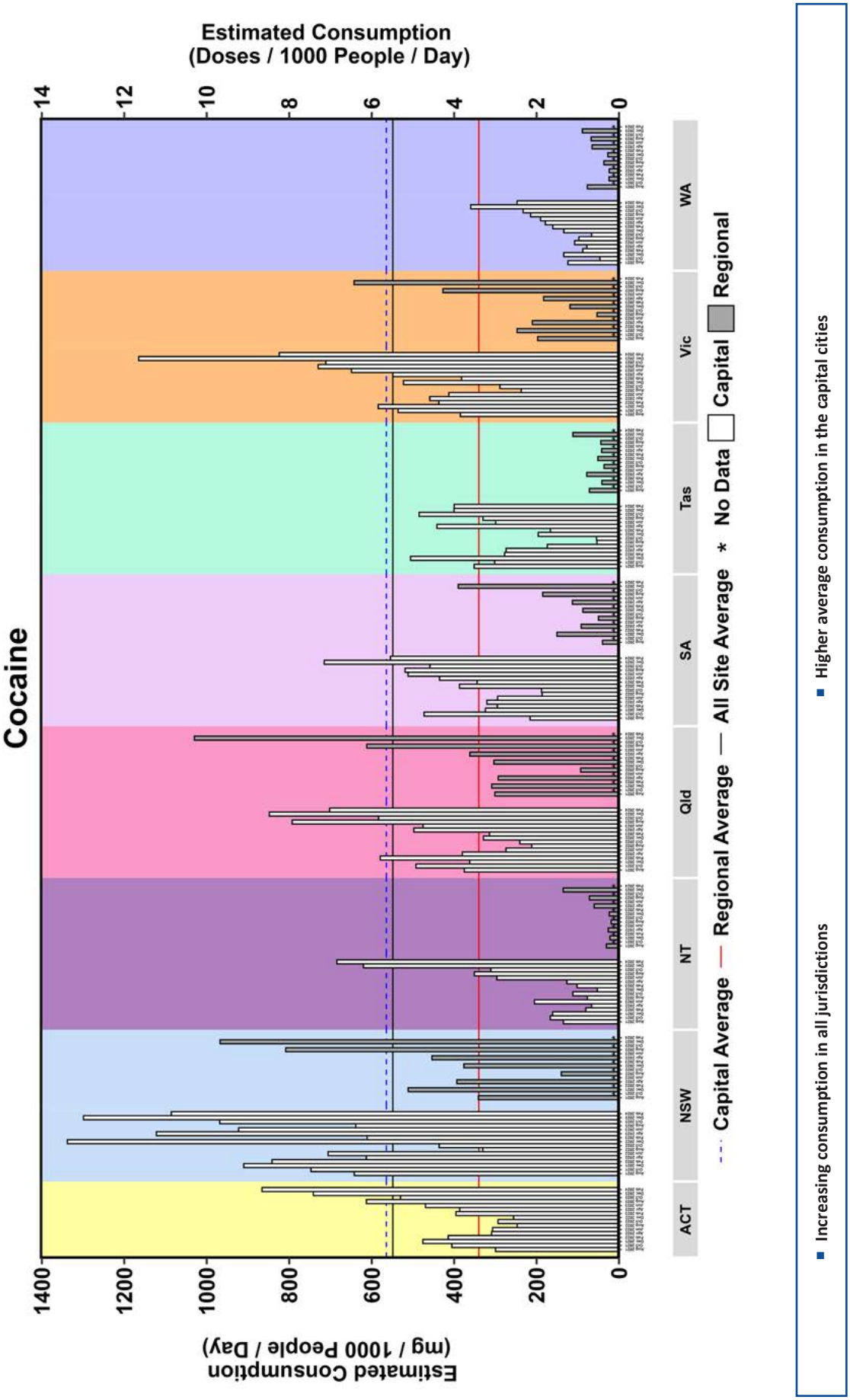


Figure 23: Estimated average consumption of cocaine by state/territory, August 2021 to February 2024.

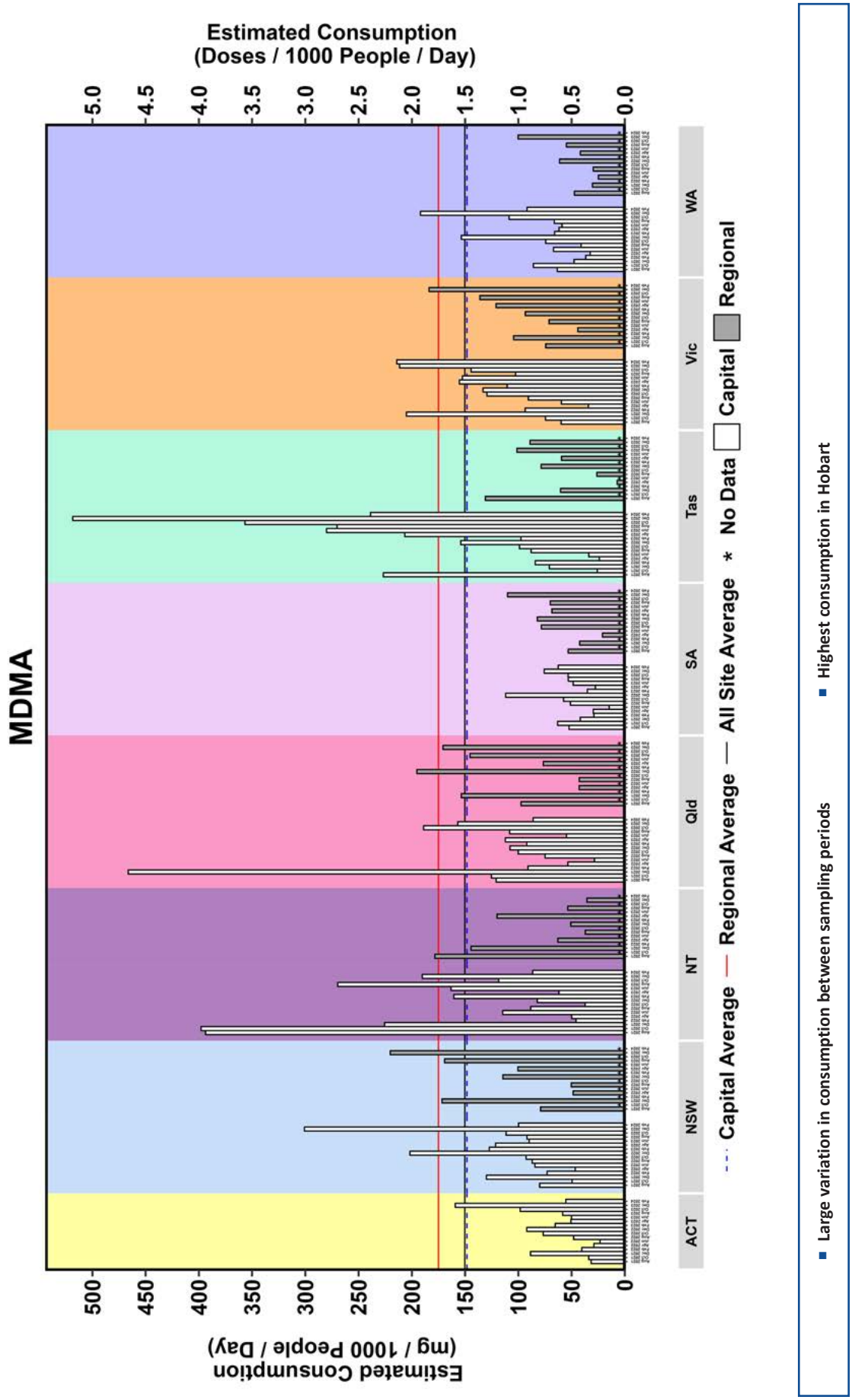


Figure 24: Estimated average consumption of MDMA by state/territory, August 2021 to February 2024.

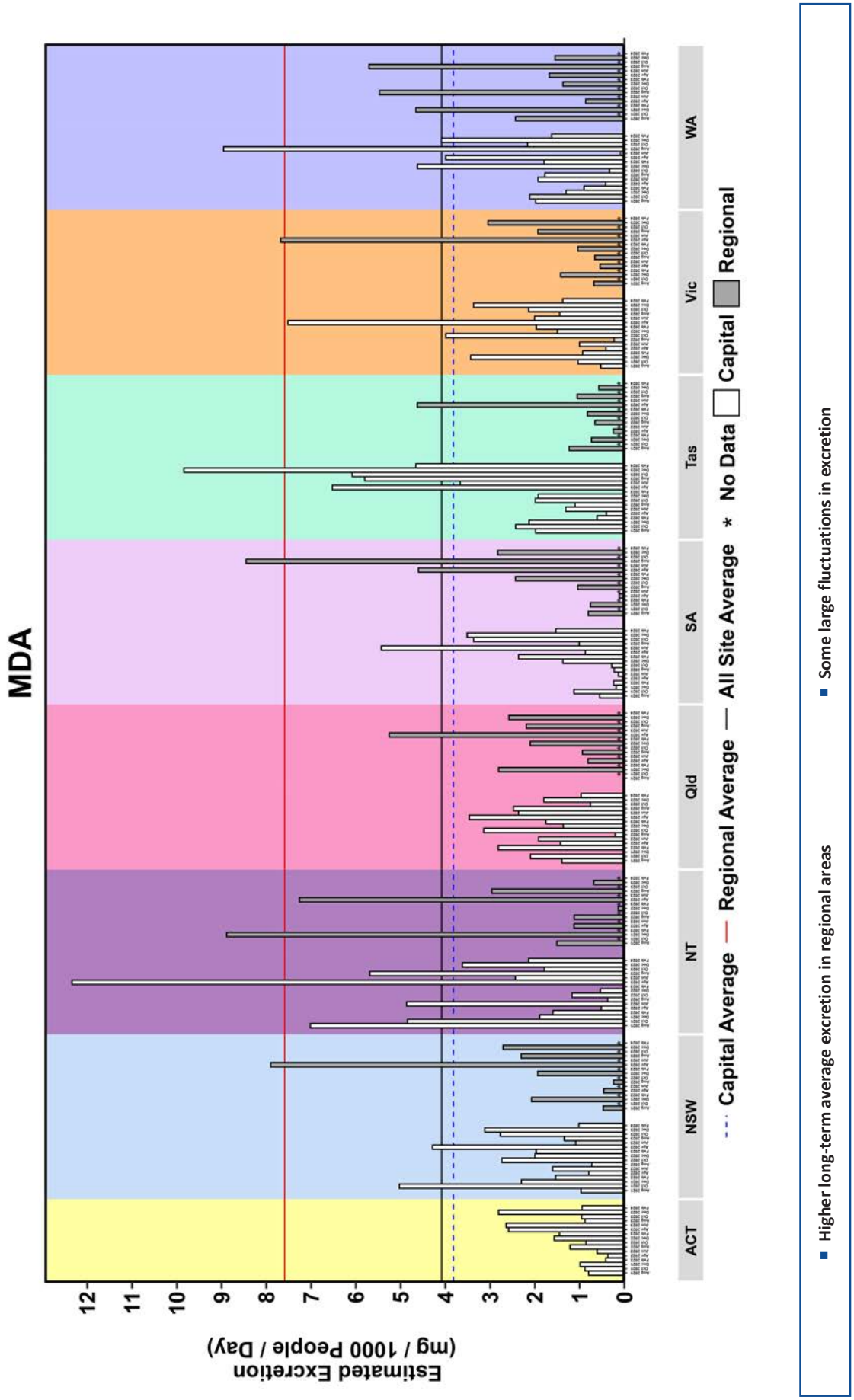


Figure 25: Estimated average excretion of MDA by state/territory, August 2021 to February 2024.

4.2.3 OPIOIDS

4.2.3.1 OXYCODONE

Changes in oxycodone consumption over time are shown in Figure 26. Long-term averages for oxycodone consumption have been substantially higher in regional areas compared to capital cities. No consistent patterns are evident between locations. Recent oxycodone consumption was highest in regional Queensland in December 2023.

4.2.3.2 FENTANYL

Fentanyl also has higher average regional consumption compared to the capital cities (Figure 27), Tasmania excepted. Nevertheless, consumption in regional Tasmania is closing the gap to consumption in Hobart. Regional consumption decreased in all jurisdictions from August to December 2023, while consumption increased in all but one capital city.

4.2.3.3 HEROIN

Unlike the pharmaceutical opioids, heroin consumption has tended to be higher in the capital cities compared to regional Australia (Figure 28). Melbourne has consistently been the city with the highest heroin consumption, whereas consumption in Darwin and Hobart is low. The December 2023 result in Perth was unusually high compared to prior results. Tangible regional heroin consumption is limited to New South Wales and Victoria.

Historical heroin data from before the Program are available for Adelaide (pre-2016). Combined with recent results, it shows that heroin consumption has declined over the past decade (Figure 29).

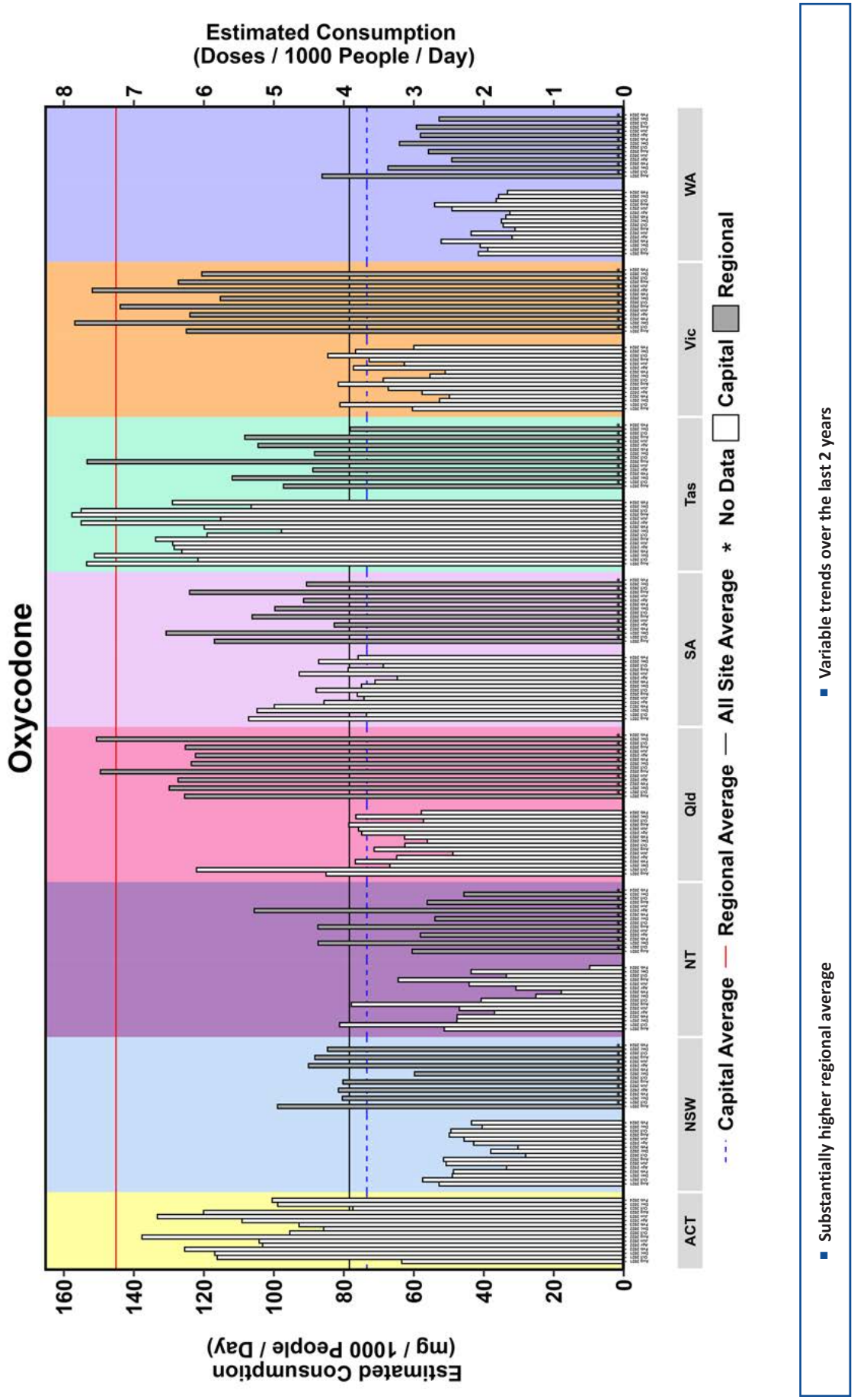


Figure 26: Estimated average consumption of oxycodone by state/territory, August 2021 to February 2024.

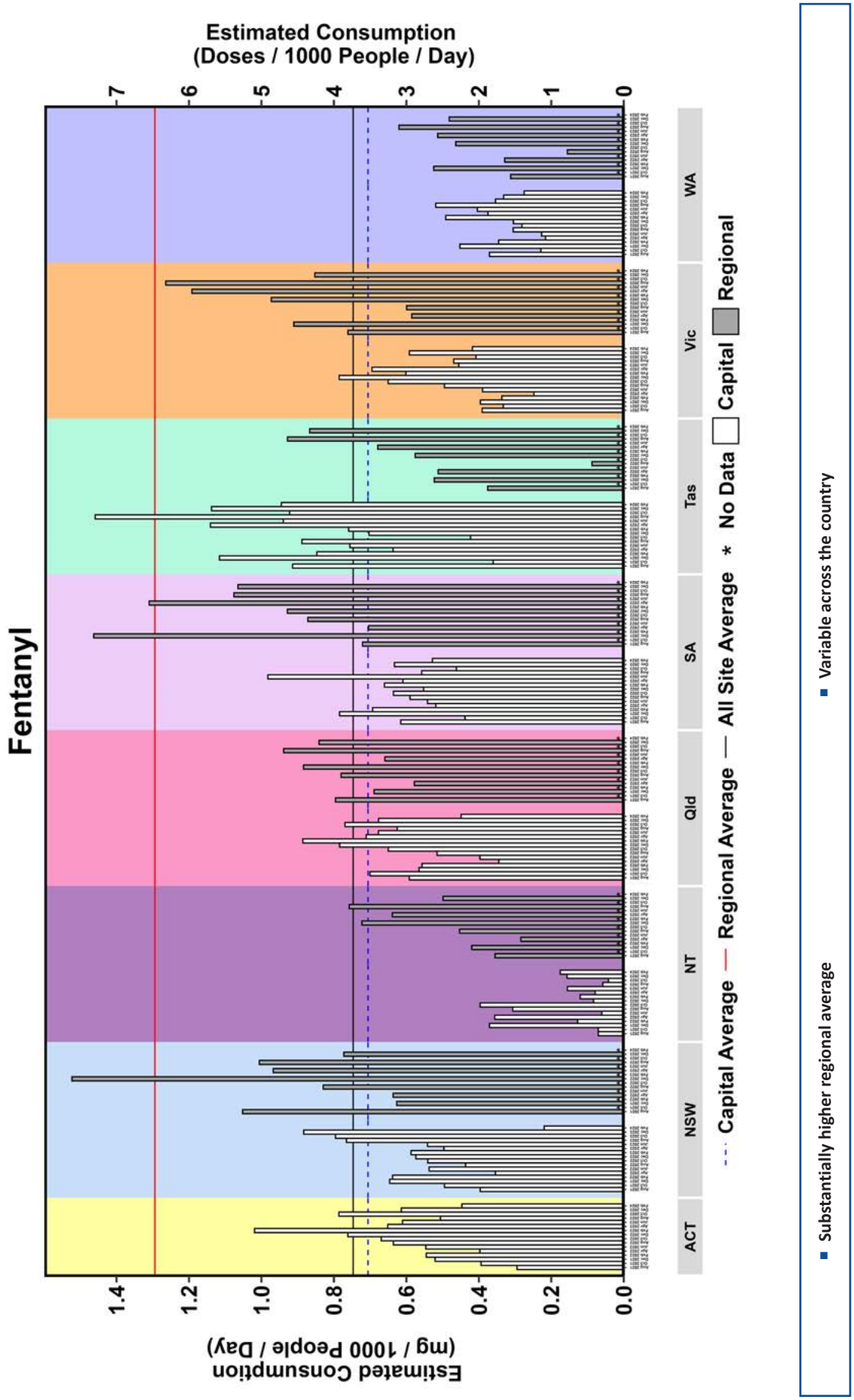


Figure 27: Estimated average consumption of fentanyl by state/territory, August 2021 to February 2024.

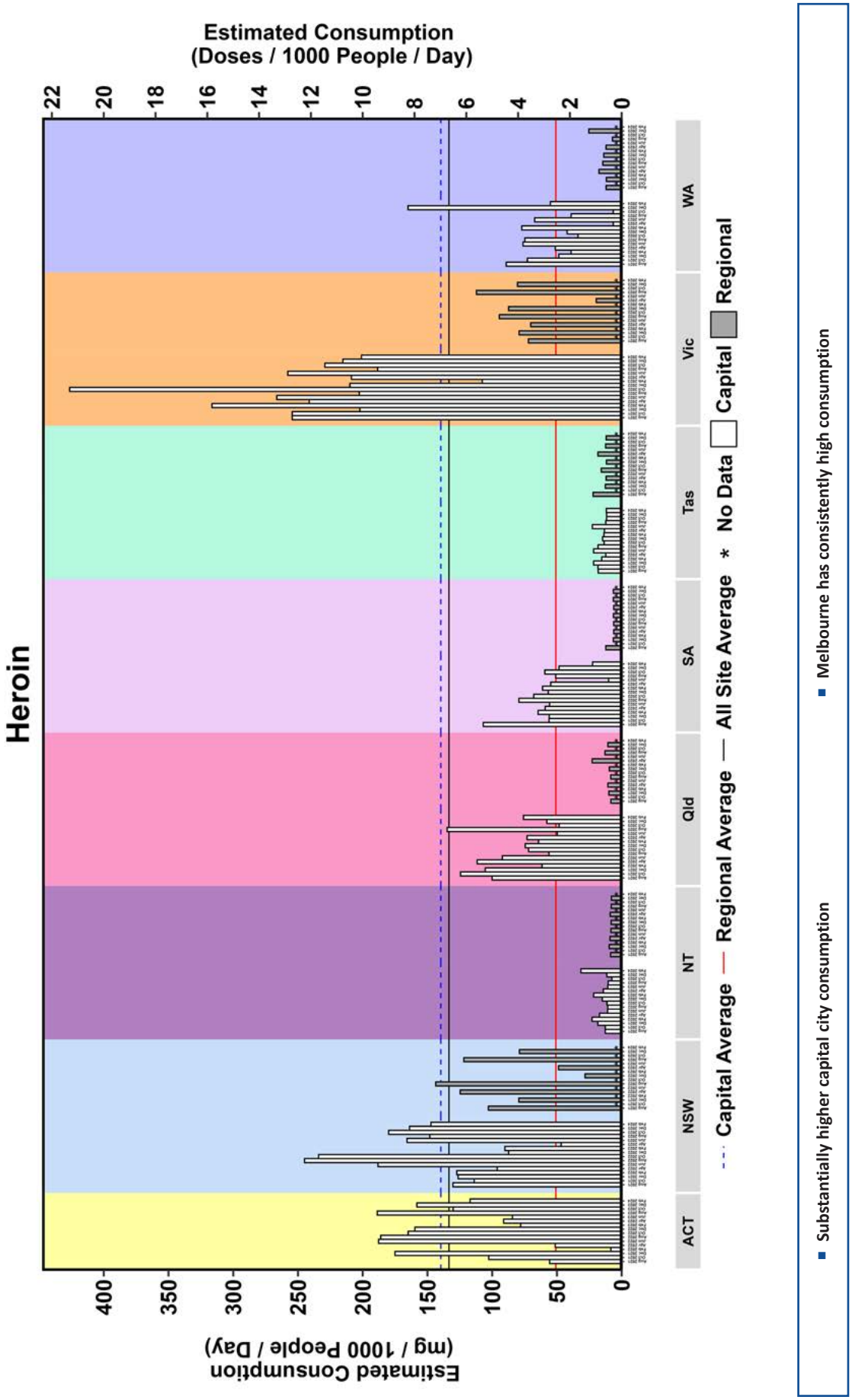
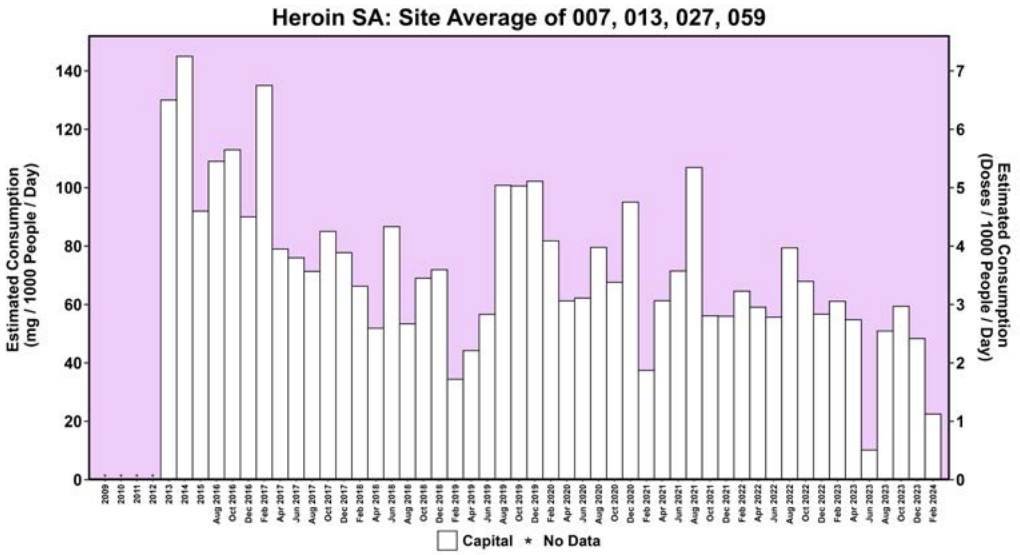


Figure 28: Estimated average consumption of heroin by state/territory, August 2021 to February 2024.

Figure 29: Change in heroin consumption for sites in Adelaide with historical data.



4.2.4 CANNABIS

The longer-term average cannabis consumption in regional Australia is substantially higher than in the capital cities (Figure 30). Decreasing consumption was observed in several capital cities in the current collection period. Cannabis consumption in regional Northern Territory and South Australia has consistently been amongst the highest in the country, while Sydney and Melbourne are consistently at lower levels than the other capital cities.

Long-term cannabis data are available for Adelaide (Figure 31). The latest collection period showed cannabis consumption below the historical high levels in the previous reporting period (August 2023).

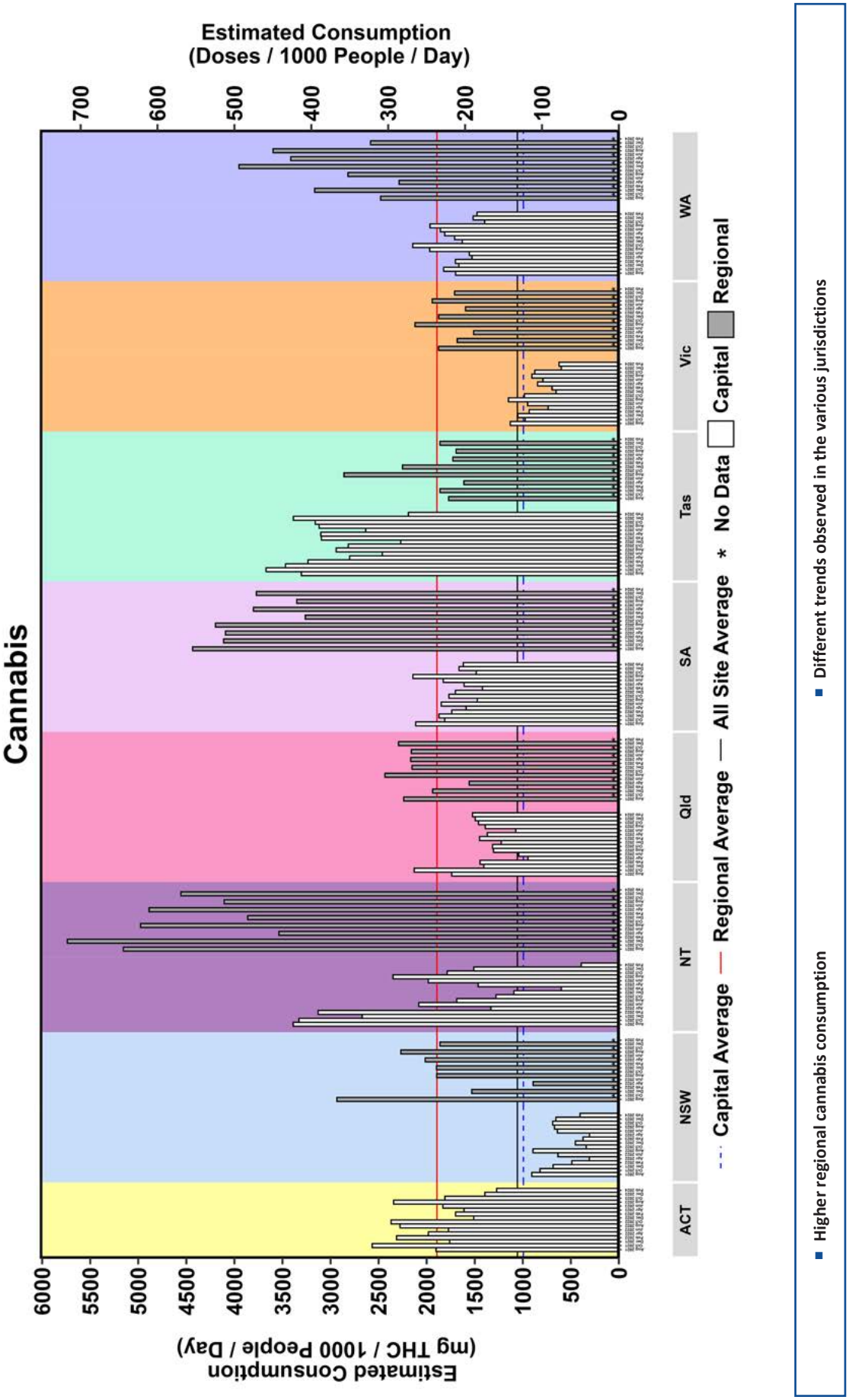
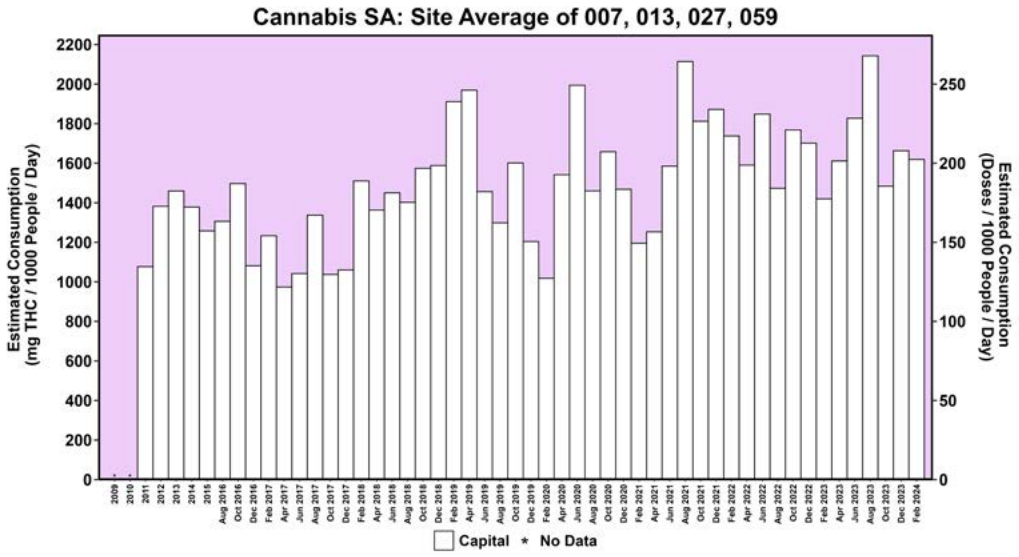


Figure 30: Estimated average consumption of cannabis by state/territory, August 2021 to February 2024.

Figure 31: Change in cannabis consumption for sites in Adelaide with historical data. Cannabis is detected via the THC metabolite, THC-COOH.



4.2.5 KETAMINE

Ketamine excretion is relatively low and is generally higher in capital cities compared to regional areas (Figure 32). A large spike was observed in Hobart in December 2023 and is the highest observed over the past 2 years. Ketamine excretion appears to be increasing in Melbourne and a number of other jurisdictions.

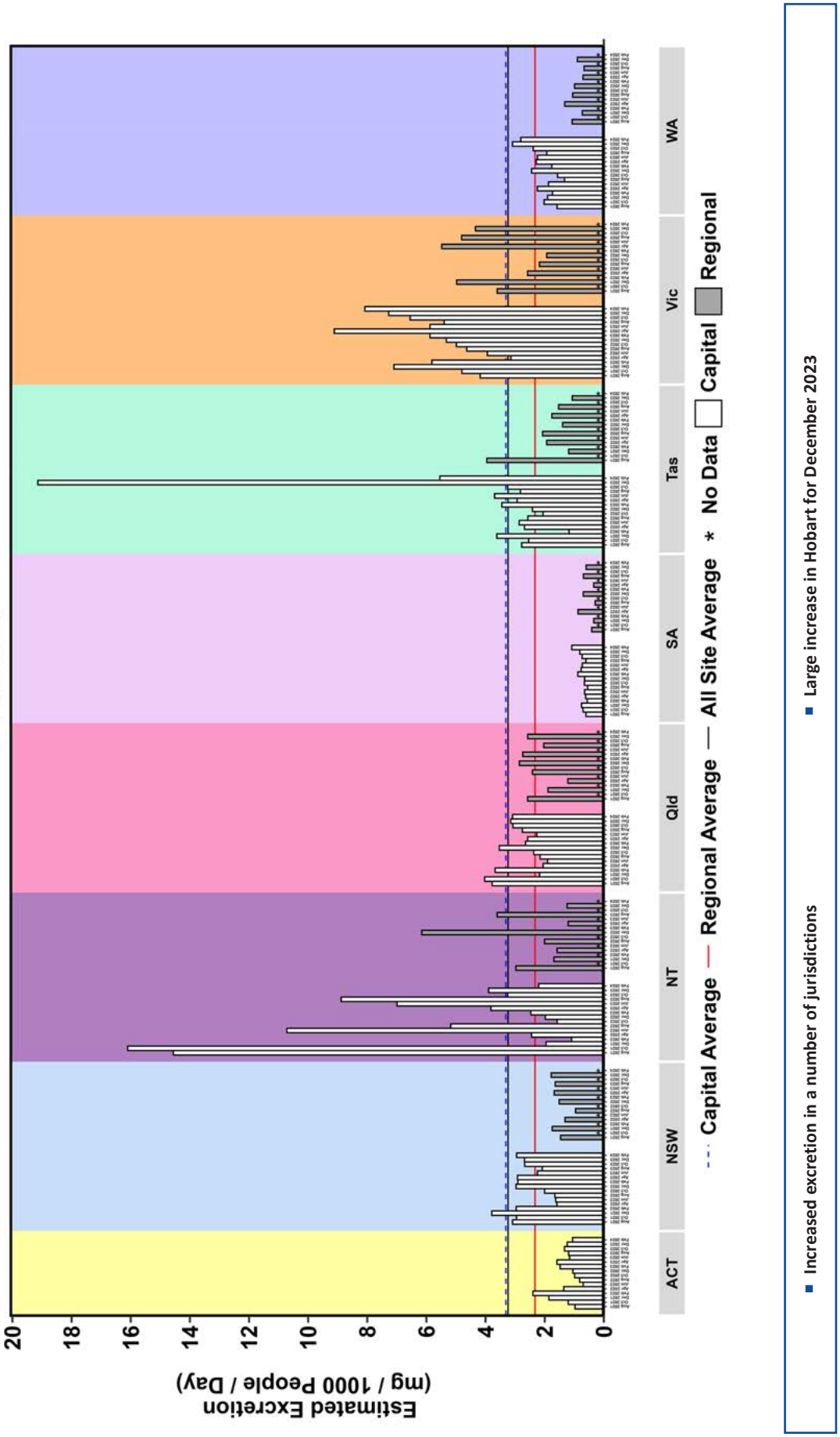


Figure 32: Estimated average excretion of ketamine by state/territory, August 2021 to February 2024.

4.3 NATIONAL CAPITAL CITY AND REGIONAL AVERAGES

To show national trends for the individual substances, all capital city and regional sites were combined for each substance (Figure 33 to Figure 38). Fewer sites participated in October 2016 and to account for this, the average consumption in August and December 2016 was used to provide the overall October 2016 estimate. Regional sites are collected every second sampling period.

4.3.1 NICOTINE AND ALCOHOL

National nicotine consumption is shown in Figure 33. Regional averages of nicotine have been higher than capital city averages over the life of the Program. There has been increasing regional consumption of nicotine since August 2022. Average regional nicotine consumption was at a record high level in December 2023.

Alcohol consumption has fluctuated over the life of the Program within a relatively narrow range but has an overall decreasing trend (Figure 33). Average regional alcohol consumption has been above that of the capital cities in most periods, but in December 2023 average capital city consumption was higher.

4.3.2 STIMULANTS

4.3.2.1 METHYLAMPHETAMINE

National methylamphetamine consumption trends are shown in Figure 34. The average national regional consumption was higher than capital cities in December 2023. Methylamphetamine consumption has been increasing since August 2022 and is back to pre-COVID consumption levels. The trend is evident in the capital cities, where consumption is at near record levels, and in regional parts of the country.

4.3.2.2 COCAINE

Cocaine consumption has been higher in capital city areas compared to regional areas in all periods of the Program (Figure 34). Since the record low of August 2022, cocaine consumption has increased tangibly and in December 2023 was at record high levels in both regional areas and the capital cities. Capital city consumption then decreased in February 2024 but was still higher than most other previous reporting periods.

4.3.2.3 MDMA

National average MDMA consumption was higher for the capital cities compared to regional areas in December 2023 (Figure 35). Since the record low levels of MDMA consumption reported in April 2022, MDMA consumption has increased, with the level recorded in December 2023 the highest since August 2020.

4.3.2.4 MDA

MDA excretion showed similar levels between the capital cities and regional areas for December 2023 (Figure 35). Excretion levels remain low compared to the sporadic highs observed prior to August 2020, particularly for regional areas. There was only a slight increase in consumption between August and December 2023.

4.3.3 OPIOIDS

4.3.3.1 OXYCODONE

Oxycodone consumption was higher in regional areas than in the capital cities for the current collection period and over the life of the Program (Figure 36). Oxycodone consumption was consistently high between December 2018 and August 2019, followed by a decline in consumption in regional areas. The December 2023 levels were similar to the August 2023 collection for both capital cities and regional areas.

4.3.3.2 FENTANYL

Regional consumption estimates of fentanyl exceed that of the capital cities, similar to oxycodone (Figure 36). More samples are falling below the detection and quantification limits. Fentanyl consumption peaked between April and December 2018, followed by a decline to historic lows in April 2022. Consumption in capital cities and regional areas has remained relatively stable over the past year, with a decrease in regional areas in December 2023 and in the capital cities in February 2024.

4.3.3.3 HEROIN

Heroin consumption is higher in capital cities compared to regional areas (Figure 37). The consumption of heroin has fluctuated over the life of the Program. Between August and December 2023, average capital city heroin consumption increased, while average regional consumption decreased. Heroin consumption at many regional sites in December 2023 was below the limits of detection.

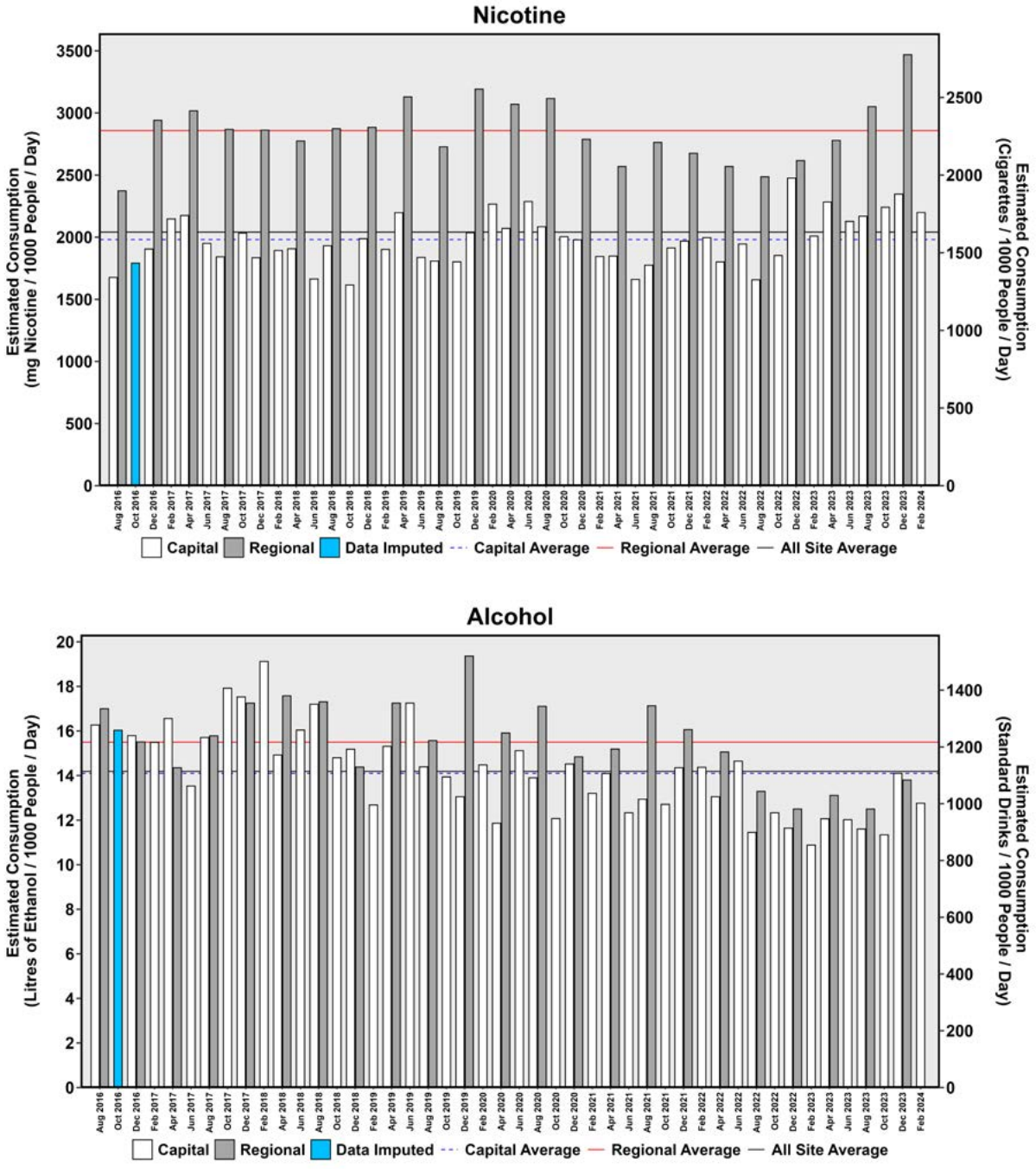
4.3.4 CANNABIS

Cannabis consumption is shown in Figure 37 and has been monitored since August 2018. Cannabis consumption is substantially higher in regional areas than in the capital cities. Cannabis trends have fluctuated over time. Average consumption in the capital cities and regional areas decreased between August and December 2023.

4.3.5 KETAMINE

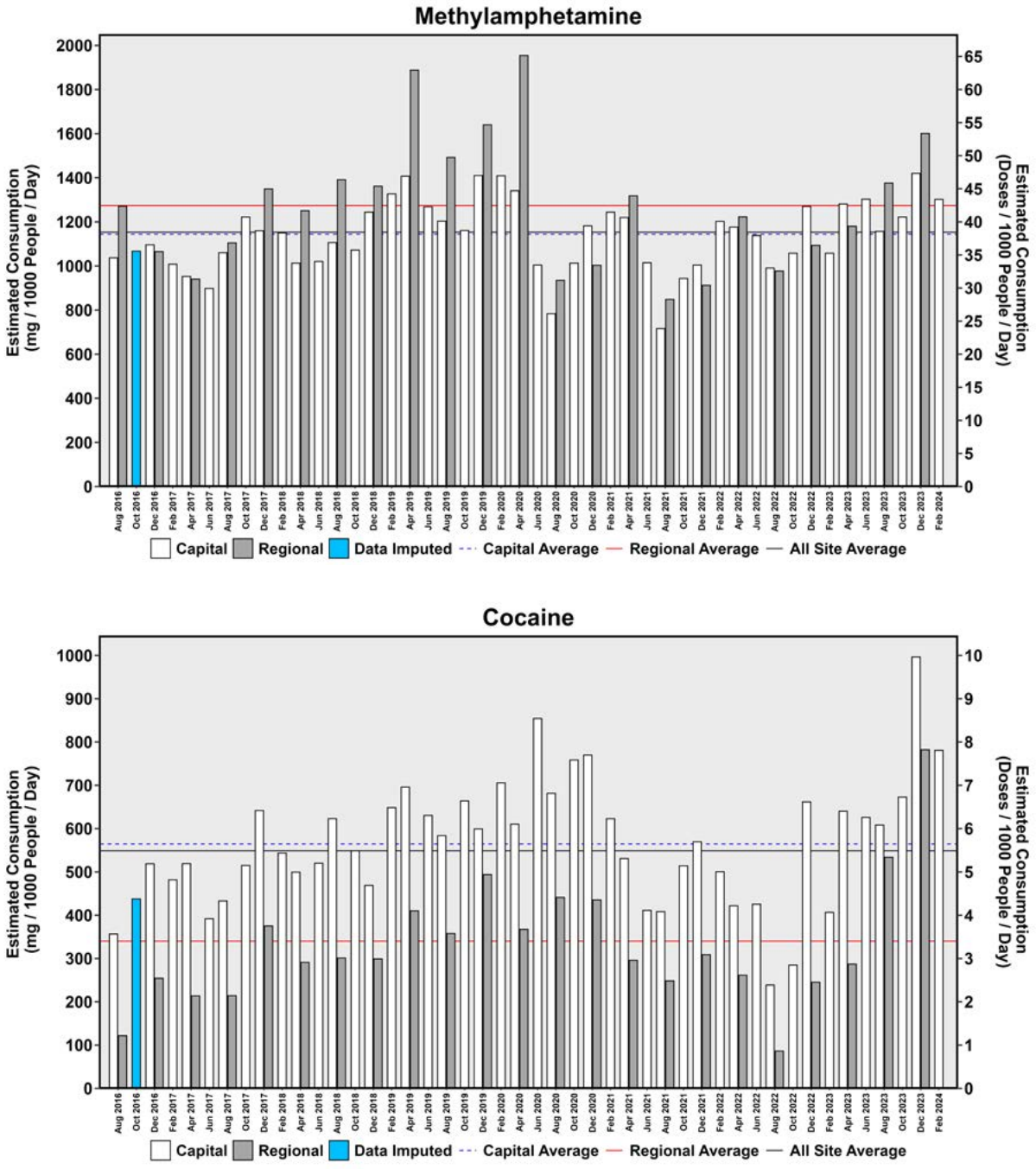
Ketamine excretion in regional parts of Australia has always been lower than in the capital cities (Figure 38). Excretion levels in the capital cities increased from August to December 2023 and then further increased to February 2024, to the second-highest level recorded by the Program. Regional consumption was relatively stable.

Figure 33: The population-weighted average of all sites for nicotine and alcohol.



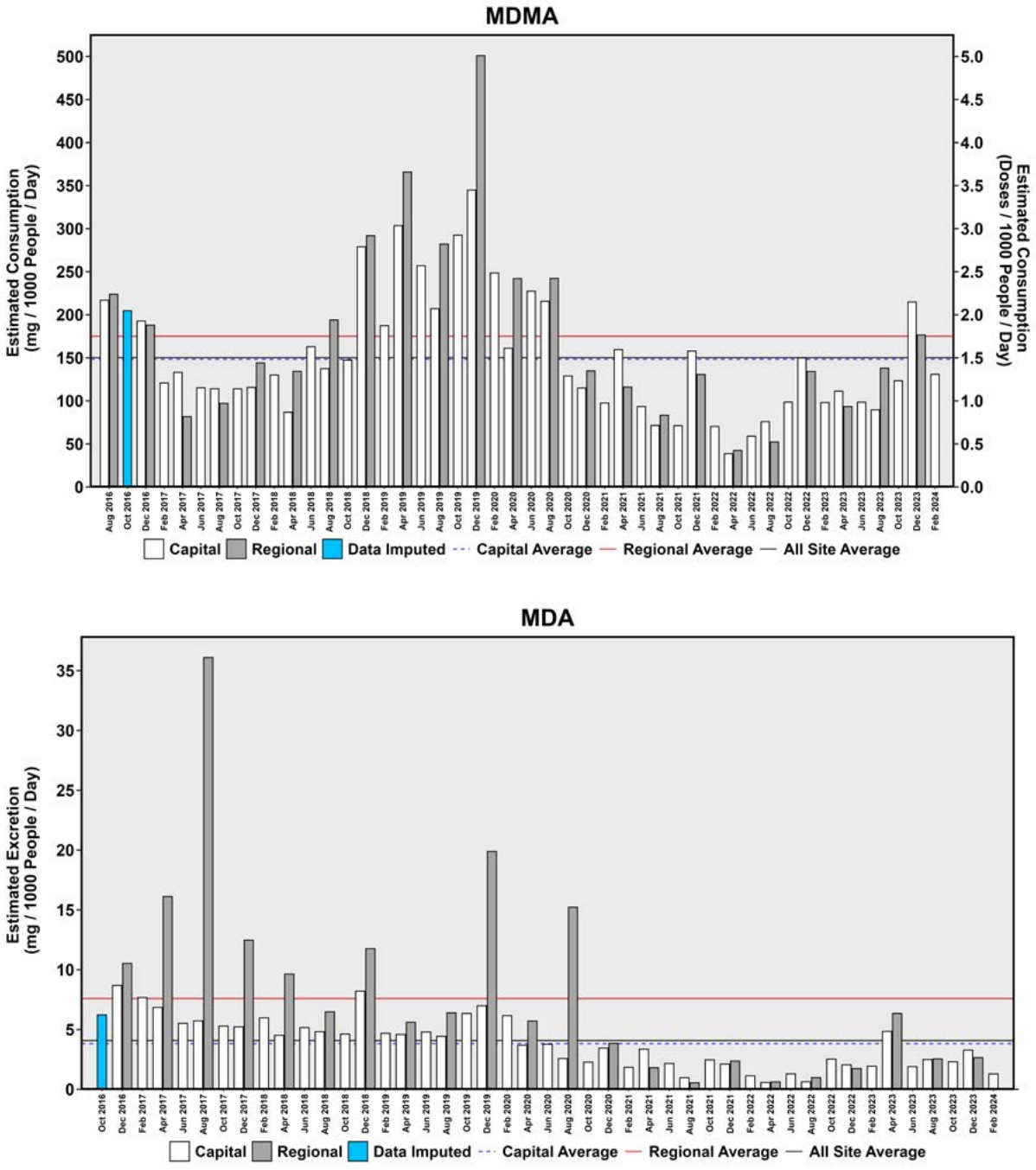
As Queensland and New South Wales capital city sites were not sampled in October 2016, their average consumption in August and December 2016 was used to provide the overall October estimate.

Figure 34: The population-weighted average of all sites for methylamphetamine and cocaine.



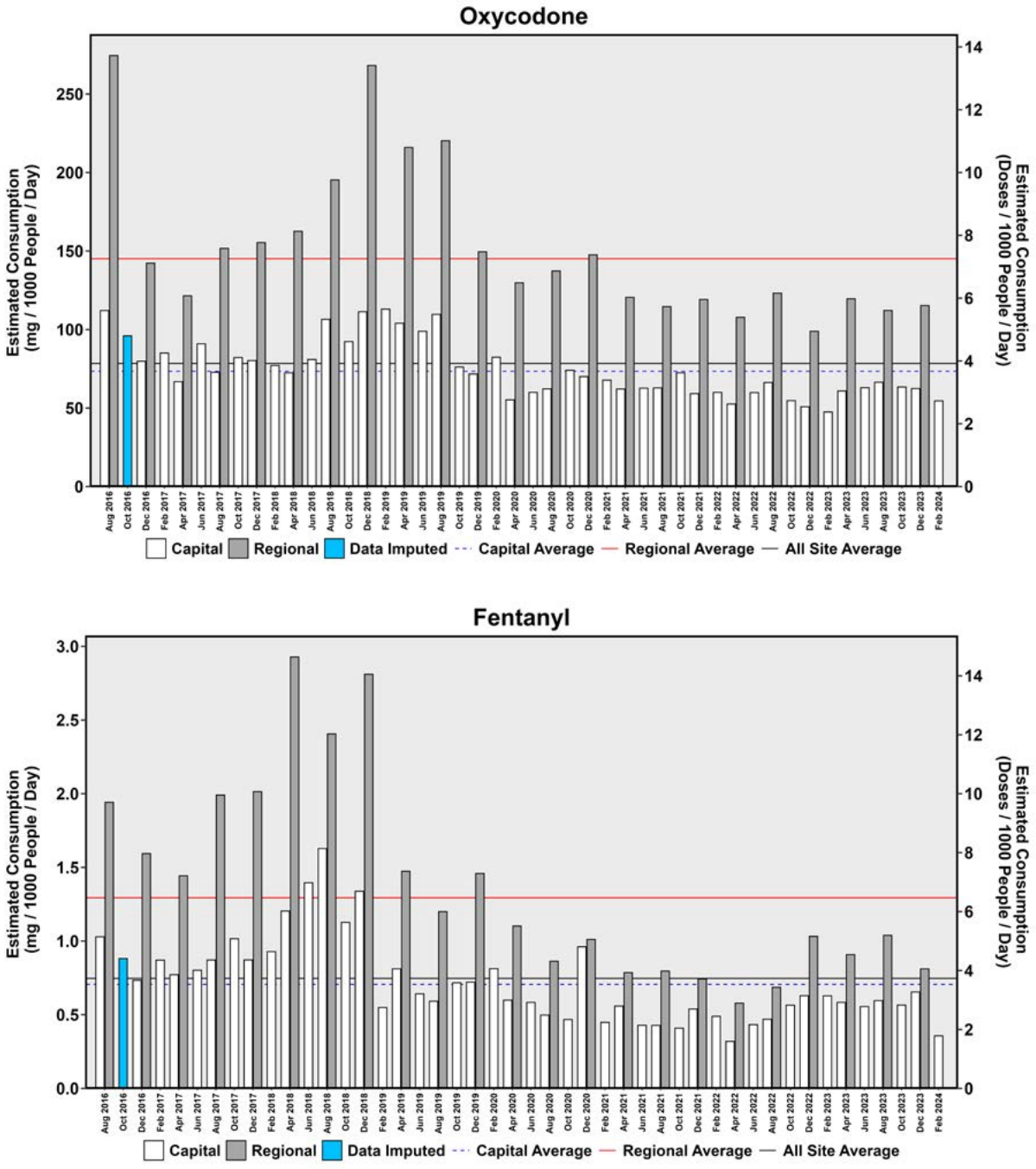
As Queensland and New South Wales capital city sites were not sampled in October 2016, their average consumption in August and December 2016 was used to provide the overall October estimate.

Figure 35: The population-weighted average of all sites for MDMA and MDA.



As Queensland and New South Wales capital city sites were not sampled in October 2016, their average consumption in August and December 2016 was used to provide the overall October estimate.

Figure 36: The population-weighted average of all sites for oxycodone and fentanyl.



As Queensland and New South Wales capital city sites were not sampled in October 2016, their average consumption in August and December 2016 was used to provide the overall October estimate.

Figure 37: The population-weighted average of all sites for heroin and cannabis.

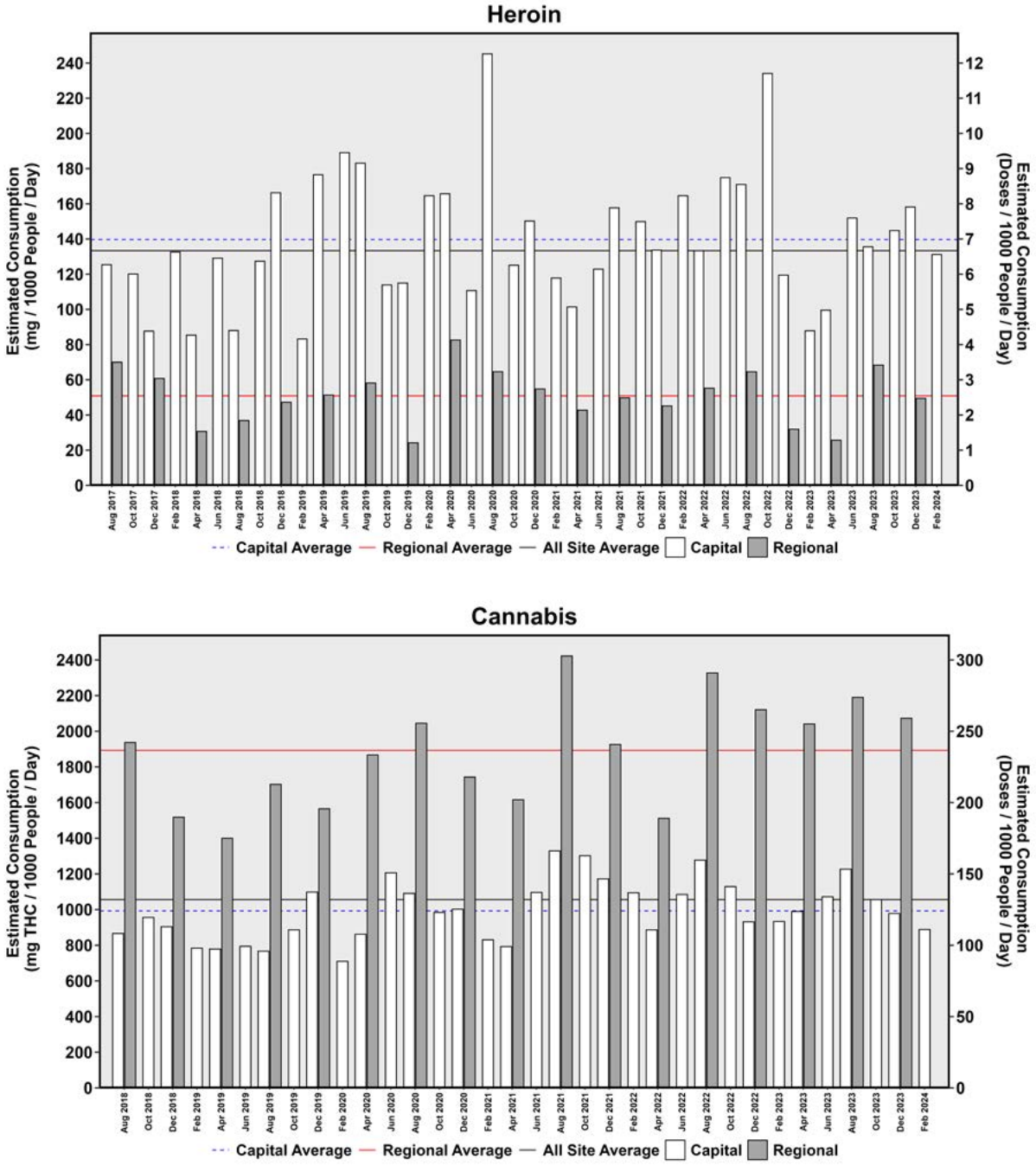
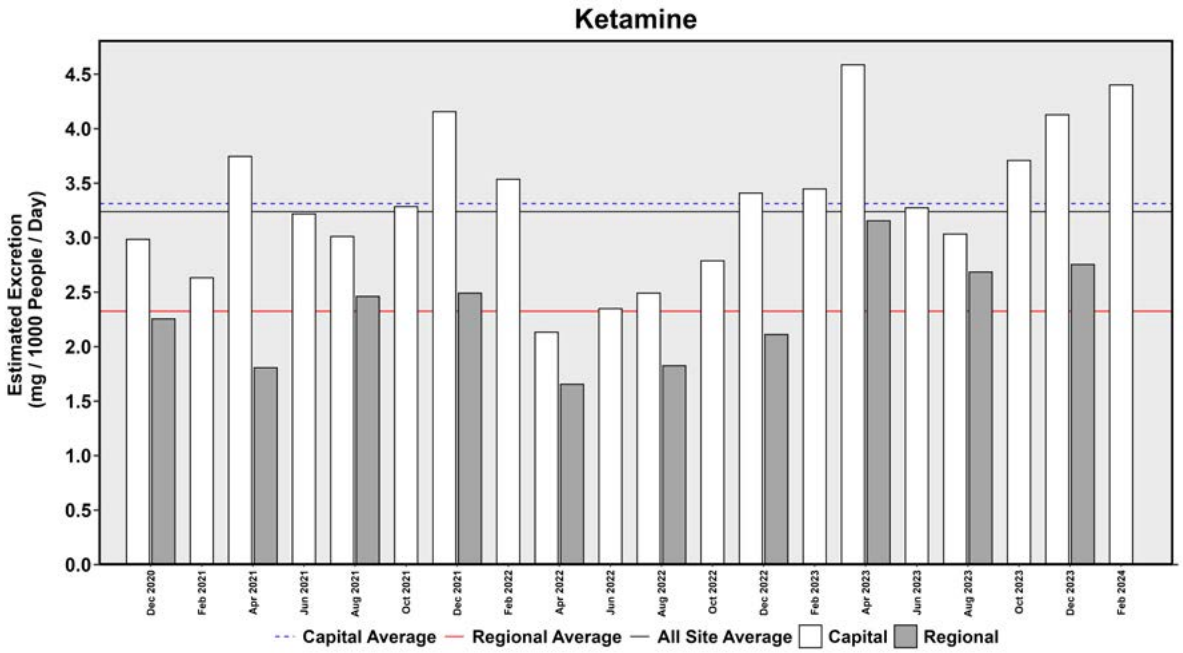


Figure 38: The population-weighted average of all sites for ketamine.



4.4 DRUG PROFILE FOR EACH STATE AND TERRITORY

Drug consumption was reported as the number of doses consumed to compare the scale of different drug consumption within the same region (for example, within a state or territory), and plotted on the same figure. In the absence of clear pharmacokinetic excretion data for MDA and ketamine, these compounds were excluded from the section as they are reported as the amount excreted.

When the amount of drug measured in wastewater was normalised for population size and average dose consumed (excretion factors listed in Appendix 1), alcohol and nicotine remained consistently the highest consumed substances in all states and territories.

In terms of the remaining substances with available dose information, cannabis ranked the highest in all jurisdictions (Figure 39 to Figure 42). The scale of cannabis consumption is substantially higher than the other substances included in the figures. Due to this, the graphs have been divided into 2 parts, so all drugs remain visible. Following cannabis, methylamphetamine is by far the next highest-ranking drug included in the Program. Subsequent rankings differ by jurisdiction.

Figure 39: Profile of average drug consumption by state or territory, August 2021 to February 2024 for capital sites and to December 2023 for regional sites, Australian Capital Territory and New South Wales. Consumption is shown as the number of doses per 1,000 people per day to allow comparison of drugs of different types within the same region (state or territory). The circles represent the cumulative national average of all time points for the respective drugs.

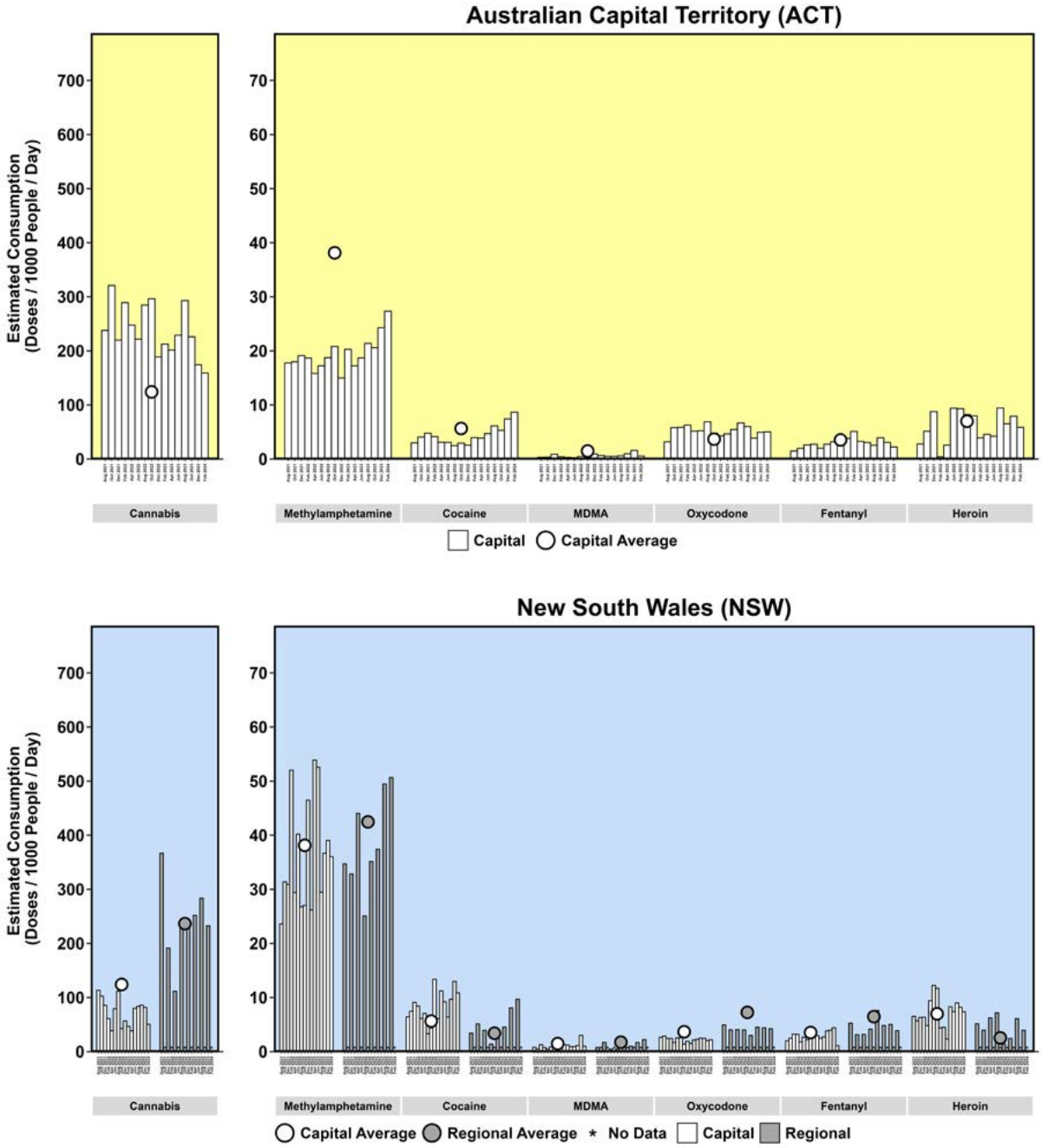


Figure 40: Profile of average drug consumption by state or territory, August 2021 to February 2024 for capital sites and to December 2023 for regional sites, Northern Territory and Queensland.

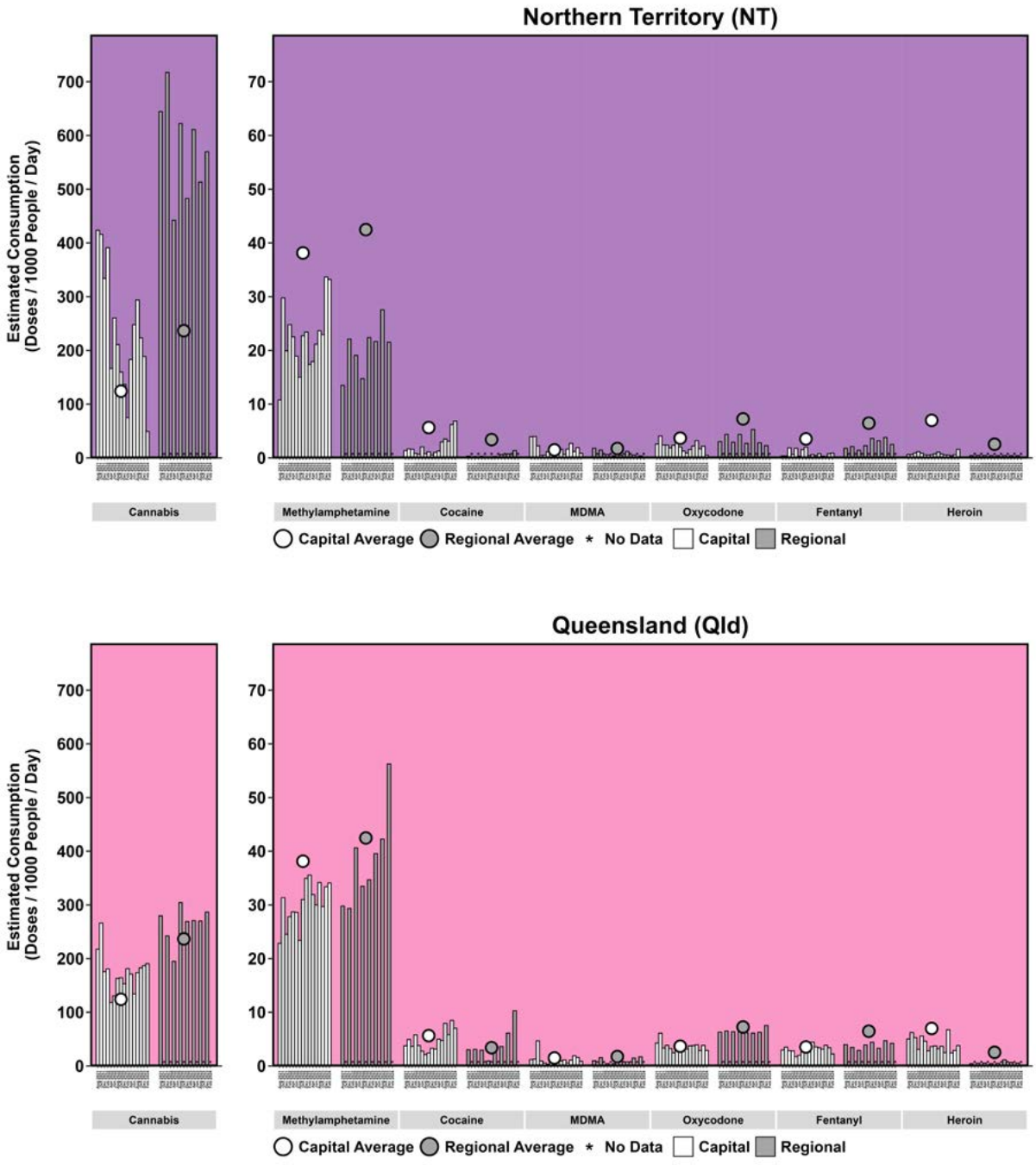
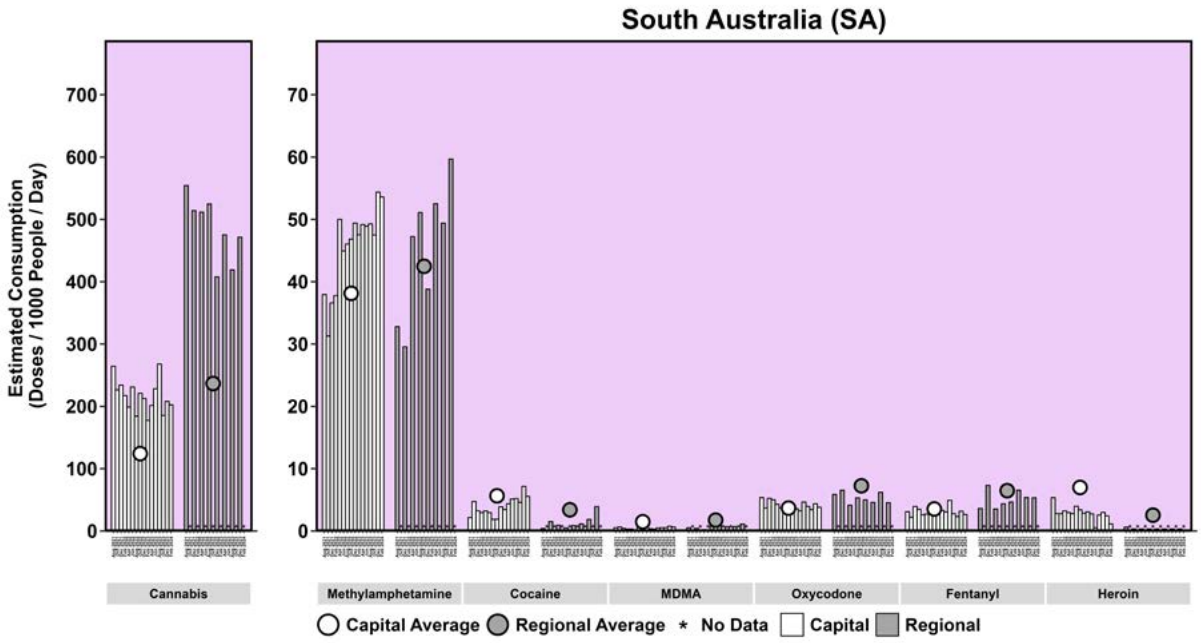


Figure 41: Profile of average drug consumption by state or territory, August 2021 to February 2024 for capital sites and to December 2023 for regional sites, South Australia, and Tasmania.



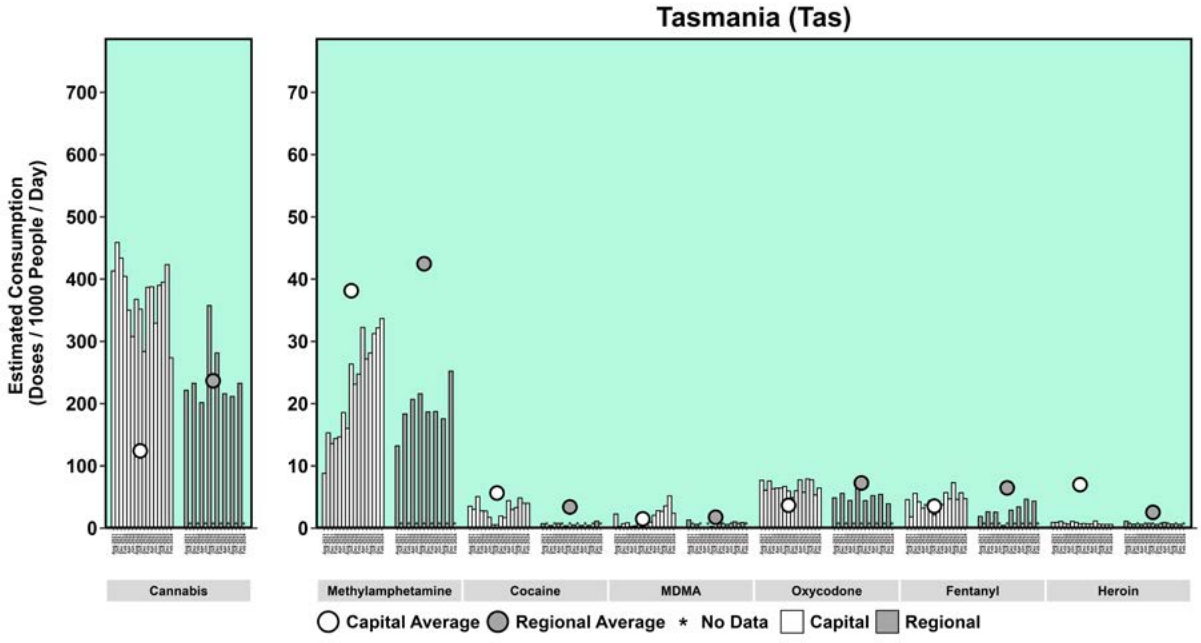
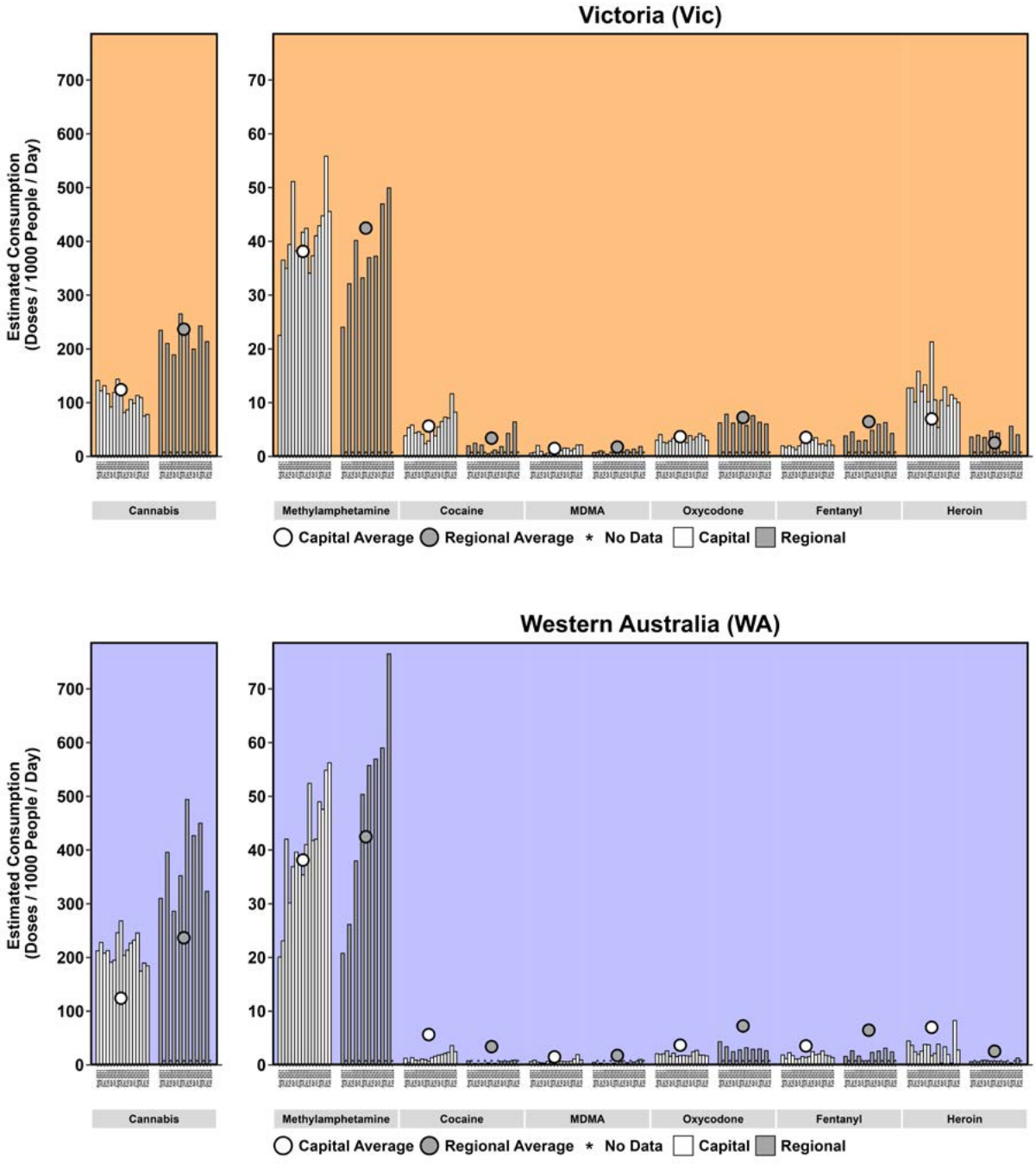


Figure 42: Profile of average drug consumption by state or territory, August 2021 to February 2024 for capital sites and to December 2023 for regional sites, Victoria, and Western Australia.



5: COMPARISONS WITH INTERNATIONAL DATA

5.1 BACKGROUND

Wastewater-based epidemiology has been standardised by a European network of laboratories focussed on quality sampling and analysis, called the Sewage Core Group Europe (SCORE). The SCORE network facilitates an annual inter-laboratory testing program among participating laboratories that research and measure illicit drugs in wastewater across the globe. SCORE is partially funded by the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). As part of this routine laboratory benchmarking, participating laboratories which pass analytical criteria are invited to submit 7 days of wastewater data for their region in roughly the same time period, thus ensuring the quality of the analysis and comparability of reported data. The research teams at The University of Queensland and the University of South Australia have taken part in and passed this testing regime for more than 5 years. As the methods are standardised internationally, this allows for the comparison of data between countries.

European data from this inter-laboratory testing regime were obtained from the SCORE network, as reported on the EMCDDA website. Recent available data were from March and May 2023 from participating laboratories, specifically data from 112 cities in 34 countries across Europe, Oceania, Asia, and North and South America. Most sites were from Europe. SCORE reports their results as the amount of drug excreted in mg per day per 1,000 people, whereas the NWDMP converts these measures to consumption (either as mg consumed/day/1,000 people or doses consumed/day/1,000 people). To compare the same units, the SCORE data were converted to the NWDMP consumption estimates by applying the same excretion factors and doses used in the NWDMP. Similarly, the data for each site were aggregated by population-weighting each site to formulate the country average.

A comparison between the per-capita consumption of stimulants was made between Australia (from the NWDMP) and the recent SCORE study. While these comparisons are useful to evaluate the relative scale of consumption across several countries, it should be noted that comparisons need to be understood in the context of preferences and availability of drugs in different countries. For example, throughout many parts of Europe, amphetamine is more commonly consumed than methylamphetamine, whereas in Australia methylamphetamine is more commonly consumed. Additionally, the latest SCORE data may relate to only a single site or city per country, so the data from one site might not necessarily be representative of drug consumption across the country.

5.2 RESULTS

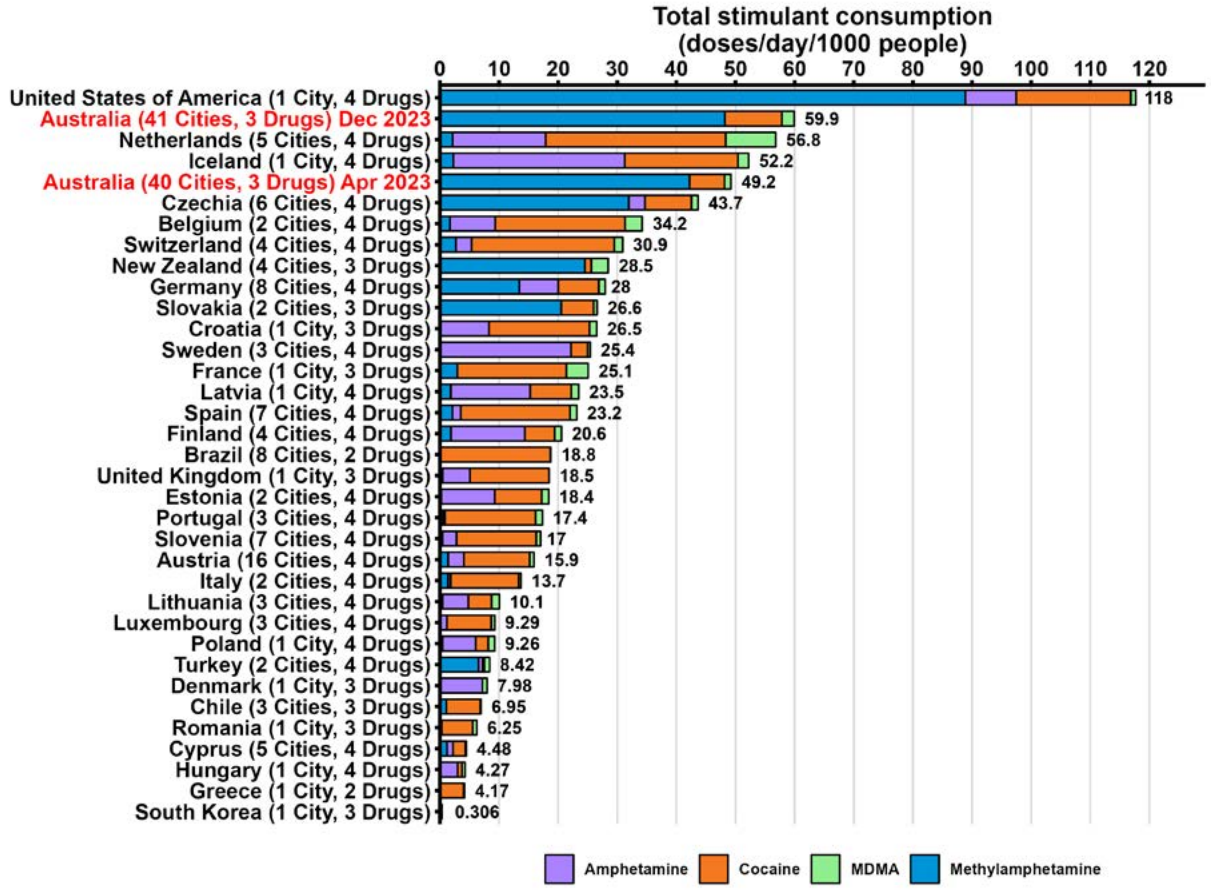
Due to the difference in preferences of stimulant drugs, it may be useful to compare the total stimulant consumption between locations to account for these preferences. In Figure 43 cocaine, MDMA, methylamphetamine and amphetamine were summed as the number of doses/day/1,000 people to evaluate the total consumption of these 4 common stimulants. In the case of amphetamine, all data were adjusted for the expected fraction of the drug which is excreted following methylamphetamine consumption. The Australian data did not include amphetamine, as generally the majority of amphetamine in the wastewater is suspected to be due to methylamphetamine metabolism or from ADHD medications. In some countries, including Australia, amphetamine

(dexamfetamine, dextroamphetamine or lisdexamfetamine) can be prescribed for the treatment of ADHD, which cannot be separated using the methods which have been used to acquire the data. It should also be noted that not all sites measured for or detected all drugs, which may also limit the comparisons between some locations.

Australian data submitted to SCORE was collected in April and December 2023. Comparisons of Australian data with SCORE data are based on the data obtained in April 2023, as it represented roughly the same sampling period as the other participating countries.

Australia ranked fourth highest in terms of combined stimulant consumption when compared to the SCORE dataset at 49 doses per day per 1,000 people (Figure 43).

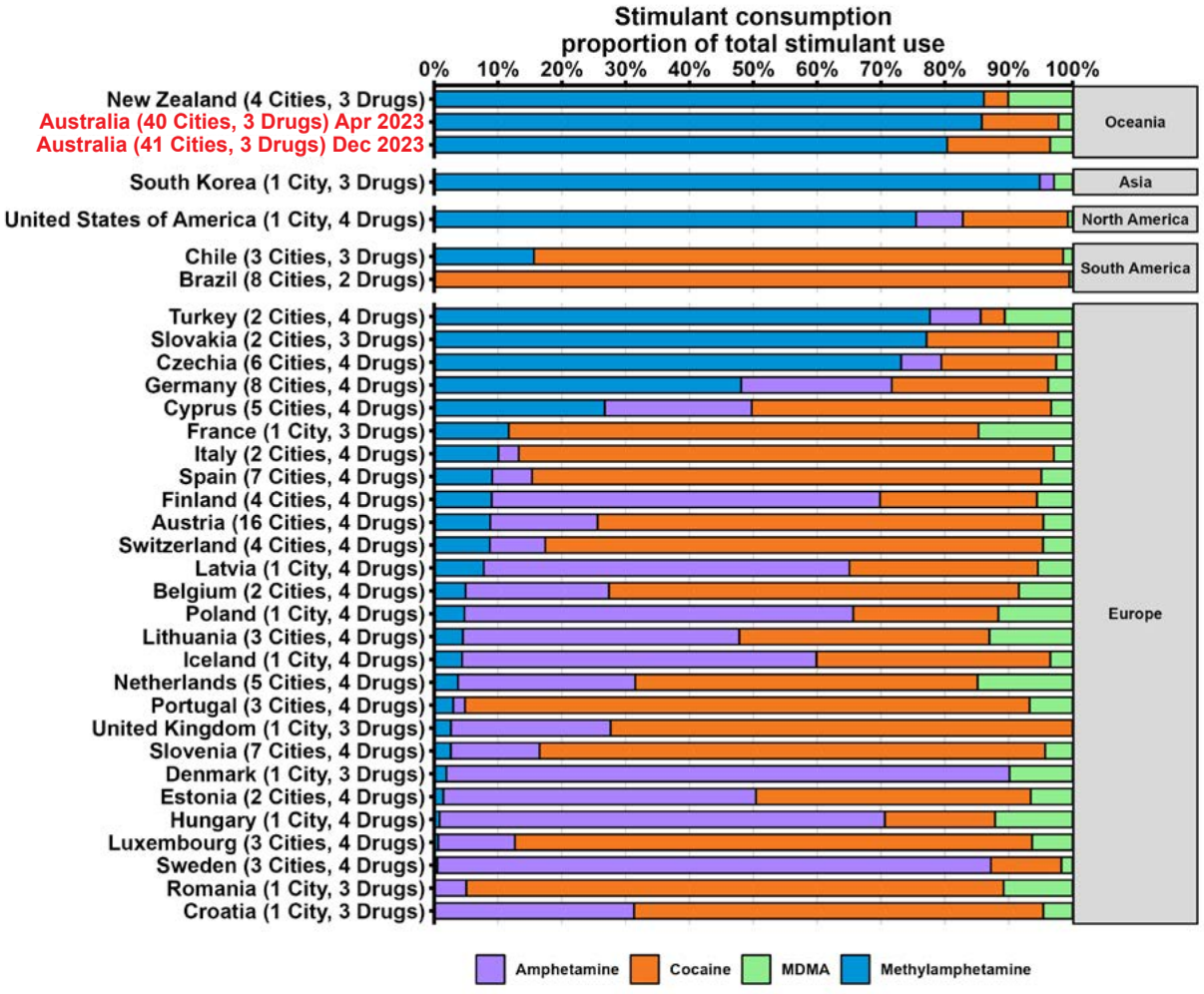
Figure 43: The total amount of stimulants consumed (as the population-weighted average doses per 1,000 people per day).



Note: the international estimates are based on data from a single or small number of sites per country and therefore may not represent the national per capita consumption for a given drug in a specific country. All SCORE European data were from March – May 2023. Australian data is from April and December 2023.

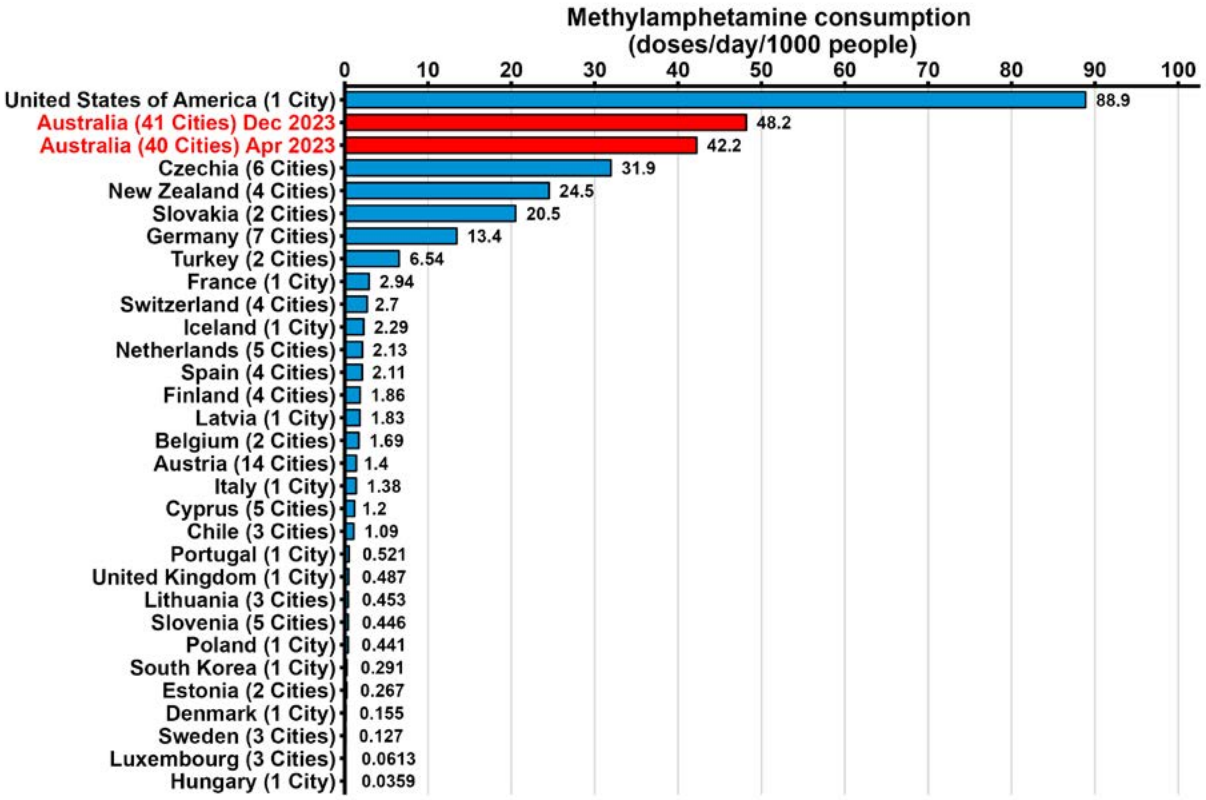
The proportion that each of the 4 stimulants contributes to the total number of doses can be visualised a different way to reveal which of the drugs contributed most within each country. Figure 44 shows the same data as Figure 43 but with each drug scaled as a percentage of the total stimulants consumed within each country. This representation of the data (scaled to the same value of 100%) reveals the contribution of each drug to the total use, or drug profile, which can be compared between locations. The profile of stimulant consumption in Australia is heavily influenced by methylamphetamine, which comprises more than 80% of the 3 main illicit stimulants consumed.

Figure 44: National population weighted average consumption for cities reported in the SCORE European study for methylamphetamine, MDMA, cocaine and amphetamine, represented as the proportion of the total stimulant consumption in each country. Note that some countries did not analyse for or detect all substances.



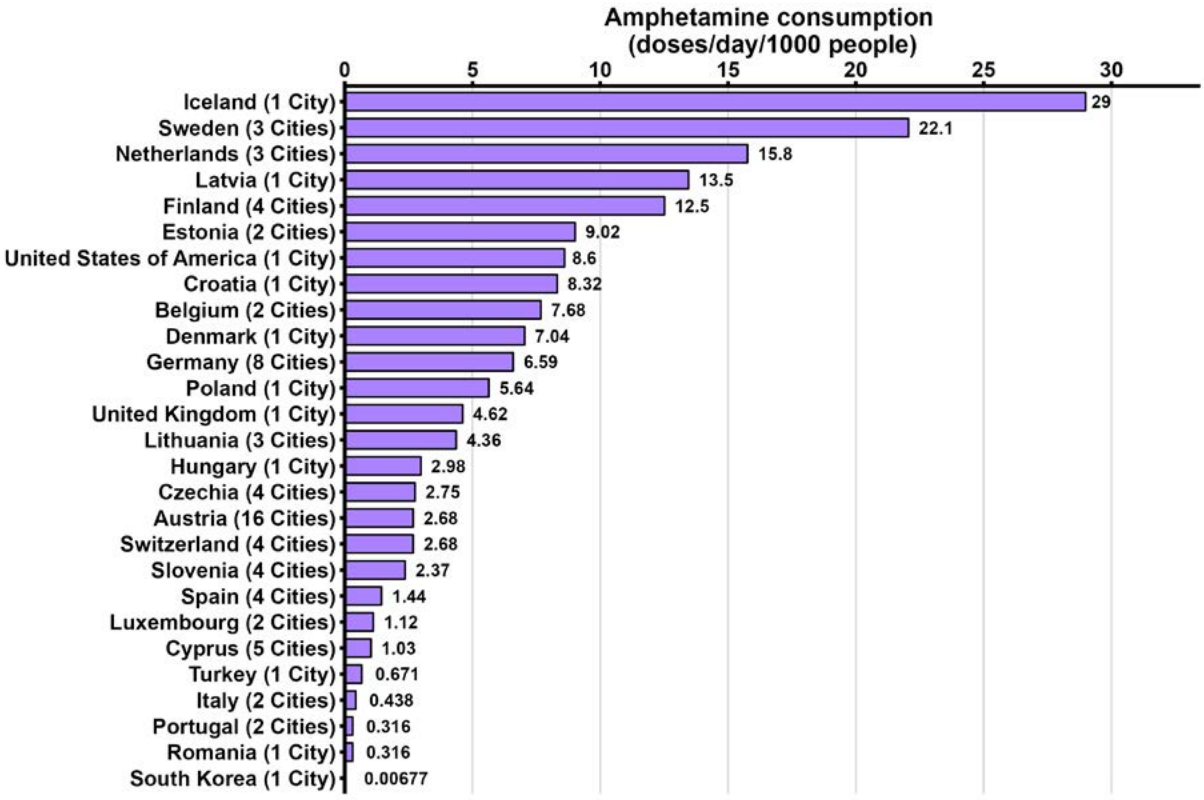
The high methylamphetamine consumption estimates in Australia were evident when compared with sites in the SCORE study (Figure 45). Methylamphetamine levels in Australia (42 doses/day/1,000 people) were the second highest behind the site in the United States of America (89 doses/day/1,000 people), and ahead of Czechia (32 doses/day/1,000 people). Some countries with reasonably high methylamphetamine consumption according to police actions or research papers, such as in Asia and other parts of the Americas, are not represented here. Amphetamine data is shown for the other countries in Figure 46.

Figure 45: National population weighted average consumption of methylamphetamine in SCORE data and Australia.



Note: the international estimates are based on data from a single or small number of sites per country and therefore may not represent the national per capita consumption for a given drug in a specific country. All SCORE European data were from March – May 2023. Australian data is from April and December 2023.

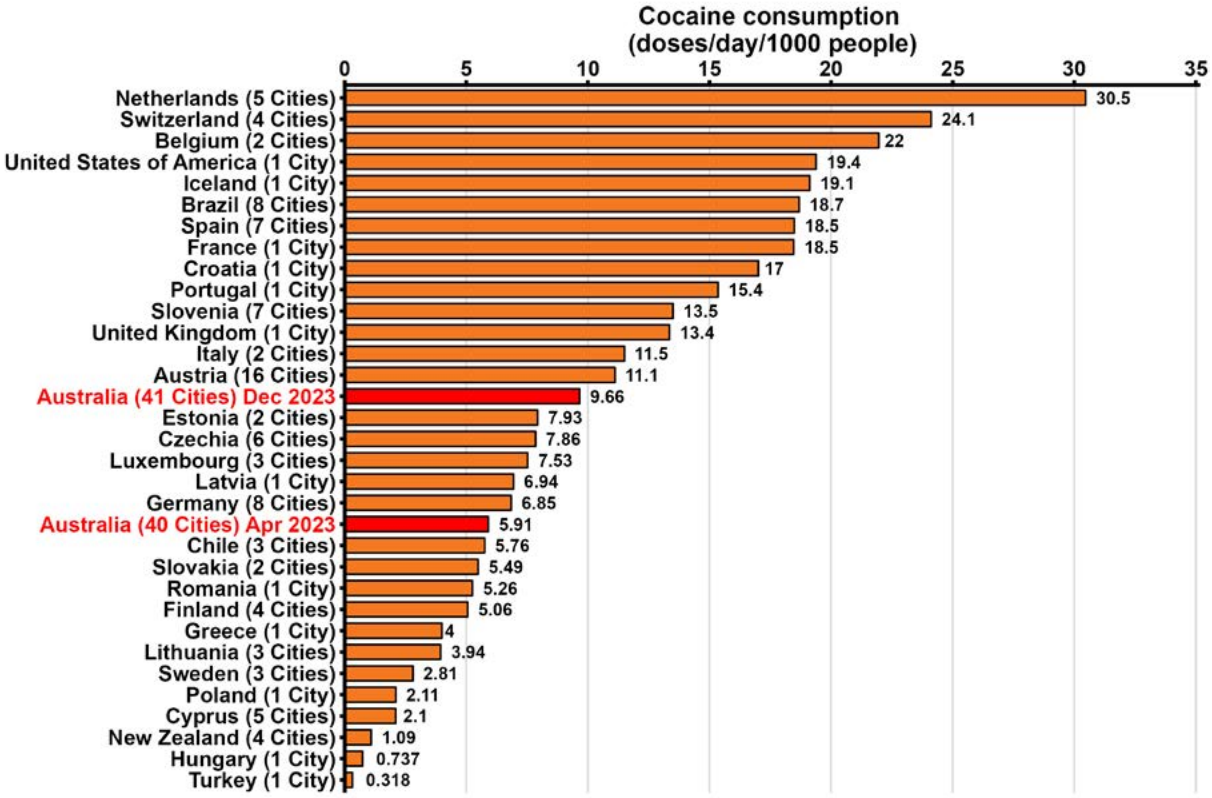
Figure 46: National population weighted average consumption of amphetamine in SCORE data.



Note: the international estimates are based on data from a single or small number of sites per country and therefore may not represent the national per capita consumption for a given drug in a specific country. All SCORE European data were from March – May 2023. Australian data is from April and December 2023.

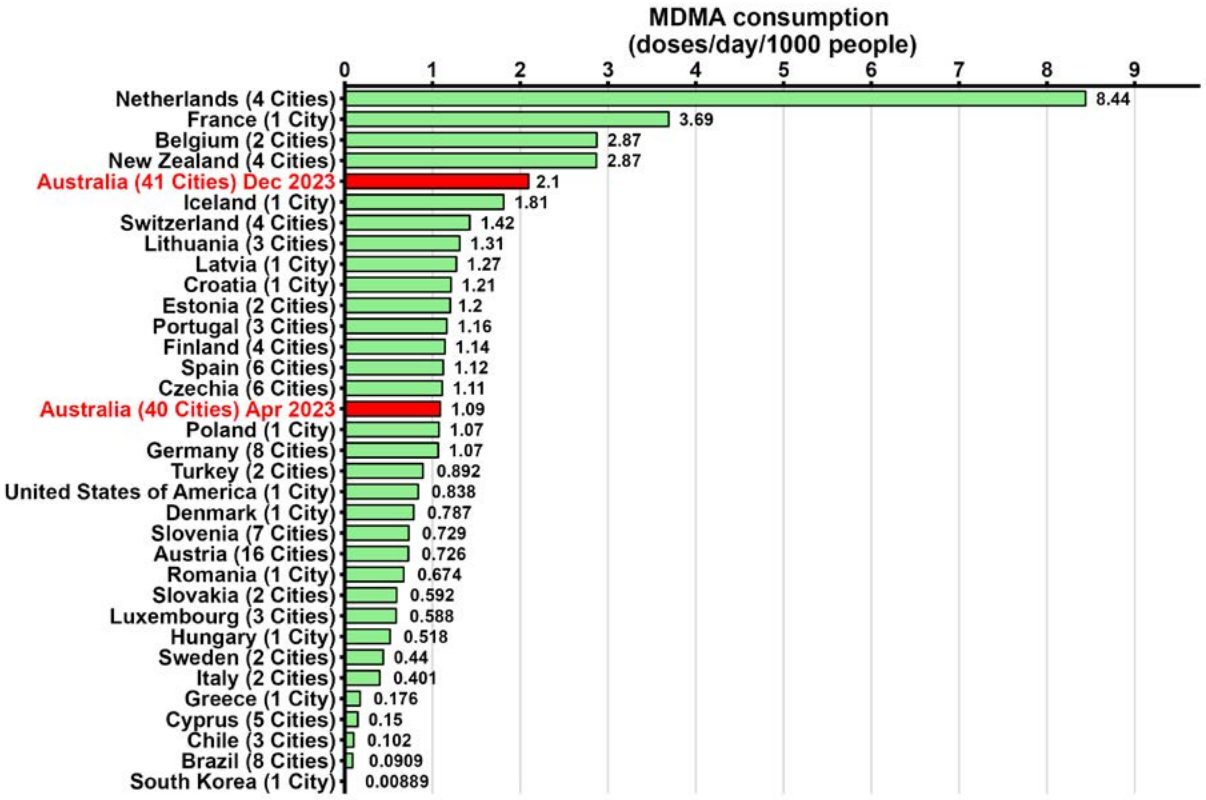
Australian data were also compared to the SCORE dataset for cocaine (Figure 47) and MDMA (Figure 48). Australian cocaine consumption was towards the lower end (6 doses/day/1,000 people) and well below the highest consumption observed in the Netherlands, Switzerland and Belgium which all had estimates greater than 20 doses/day/1,000 people. Australian MDMA consumption ranked towards the middle of the SCORE sites (1 dose/day/1,000 people).

Figure 47: National population weighted average consumption of cocaine in SCORE data and Australia.



Note: the international estimates are based on data from a single or small number of sites per country and therefore may not represent the national per capita consumption for a given drug in a specific country. All SCORE European data were from March – May 2023. Australian data is from April and December 2023.

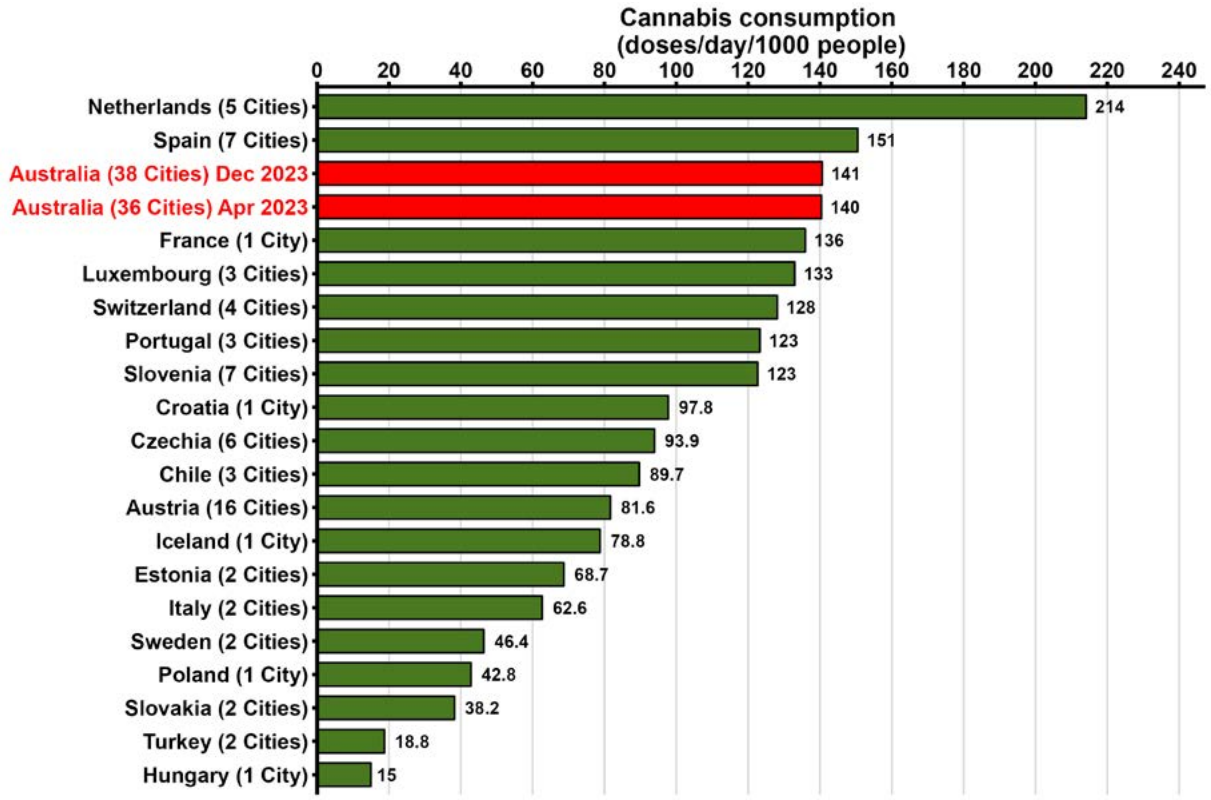
Figure 48: National population weighted average consumption of MDMA in SCORE data and Australia.



Note: the international estimates are based on data from a single or small number of sites per country and therefore may not represent the national per capita consumption for a given drug in a specific country. All SCORE European data were from March – May 2023. Australian data is from April and December 2023.

Australian data was compared with cannabis consumption in 19 other countries (Figure 49). Caution should be applied when comparing between data as the legal status of cannabis varies between countries and even within countries. Therefore, participating cities may not be representative of countries as a whole. Of the monitored sites, only sites in the Netherlands and Spain had higher consumption than Australia.

Figure 49: National population weighted average consumption of cannabis in SCORE and Australian datasets.



Note: the international estimates are based on data from a single or small number of sites per country and therefore may not represent the national per capita consumption for a given drug in a specific country. All SCORE European data were from March – May 2023. Australian data is from April and December 2023.

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We also would like to acknowledge the wider wastewater-based epidemiology field which includes addiction specialists, analytical chemists, environmental engineers, forensic scientists, pharmacologists, policy advisors and sewer engineers for their ongoing contributions to knowledge, willingness to share both methodology and data, critical review and for advancing wastewater analysis research.

The symbols/images used in Figure 4 in the report were provided courtesy of the Integration and Application Network, University of Maryland, Center for Environmental Science (ian.umces.edu/symbols/).

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8: APPENDICES

APPENDIX 1: DRUG-SPECIFIC PARAMETERS FOR ANALYTICAL REPORTING AND USAGE CALCULATIONS.

Analyte levels of detection, levels of reporting, highest detection, excretion factors and standard doses from the literature.

Analyte/metabolite	Drug	Limit of detection (LOD) [ng/L]	Limit of quantification (LOQ) [ng/L]	Excretion factor	Standard dose pure drug (mg)
Amphetamine	Amphetamine	12	16	0.394[a]	30[b]
Cocaine	Cocaine	17	50	0.075[b]	100[b]
Cotinine	Nicotine	33	100	0.3[c]	1.25[c]
Norfentanyl	Fentanyl	0.1	0.1	0.3[d]	0.2[d]
MDA*	MDA	1	4	n.a.	n.a.[#]
MDMA	MDMA	1.5	2	0.225[b]	100[b]
Mephedrone	Mephedrone	0.4	0.8	n.a.	n.a.
Methylamphetamine	Methylamphetamine	33	100	0.39[g]	30[b]
Methylone	Methylone	0.01	0.1	n.a.	n.a.
Hydroxycotinine	Nicotine	17	50	0.44[c]	1.25[c]
Noroxycodone	Oxycodone	0.1	1	0.22[f]	20[d]
Ethyl Sulphate	Alcohol (ethanol)	167	500	0.00012[e]	10g[e]
Benzoylecgonine	Cocaine	33	100	0.35[g]	100b
6-Monoacetylmorphine	Heroin	0.5	1.0	0.013[h]	20[i]
THC-COOH	THC (Cannabis)	30	180	0.1[##]	8[**]
Norketamine	Ketamine	1	2	n.a.[^]	n.a.

n.a. = data not available; a = (Khan and Nicell 2012); b = (Zuccato et al. 2008); c = (Castiglioni et al. 2015); d = (Rossi 2016); e = (Ryu et al. 2016); f = (Lalovic et al. 2006); g = (Lai et al. 2011); h = (Boerner et al. 1975); i = (Sullivan et al. 2006).

* Data is not available in the scientific literature for the proportion of MDA that is eliminated following MDA consumption. However, data is available detailing the proportion of MDA eliminated after MDMA consumption. Therefore, our MDA estimate of mg excreted per day per 1,000 people is the amount of MDA excreted from the population after considering the metabolic fraction excreted from MDMA.

\# It is likely that the dose for MDA is similar to that of MDMA, or 100 mg.

^ Ketamine is excreted as norketamine and several conjugated metabolites. As the level of conjugation is not well known and conjugated metabolites (e.g., glucuronides) are likely to deconjugate in the sewer, a ketamine excretion rate has not been assigned at this time. Once the impact of in-sewer deconjugation is known, this will be revised.

** A dose of 8 mg THC has been suggested to provide the desirable effect for the average user, regardless of the route of administration (Freeman and Lorenzetti, 2020). This takes into consideration that not all the available THC in a joint or edibles is inhaled or absorbed by the lung or the intestine and enters the blood stream.

Between 23% (edibles) and 31% (smoked) of an ingested dose of cannabis is excreted in faeces as the metabolite, THC-COOH, and another 3% in urine in free or conjugated form (Wall and Perez-Reyes, 1981). Recent research shows that the particulate fraction of wastewater can contain upwards of 40% of the total excreted THC-COOH load (Campos-Manas et al. 2022). Experiments by the authors of this report on wastewater from around Australia show that the water-soluble fraction of THC-COOH on average is about 33% of the total load, inclusive of the bound glucuronide which deconjugates in the sewer. Therefore, a correction factor of 10% has been applied in this report to convert the measured excreted load to consumed amounts. This number was derived as follows:
Of THC consumed, 30% enters the sewer as THC-COOH (Wall and Perez-Reyes, 1981). This load partitions with approximately 67% adsorbed to particulates and 33% dissolved in the water fraction on average (unpublished data). Therefore, the measured amount in water represents 10% of the original amount of THC consumed. This approach represents a reasonable average based on local data and may need to be refined further as more research becomes known. It should not be considered a universal correction factor for cannabis due to the differences between wastewater and infrastructure in other countries.

APPENDIX 2: SAMPLING DETAILS OF EACH SITE FOR DECEMBER 2023 AND FEBRUARY 2024

Sites	Location	Dec 2023	Feb 2024	Population
ACT: 009	Capital	7	7	> 150,000
NSW: 003	Capital	7	7	> 150,000
NSW: 006	Capital	7	7	> 150,000
NSW: 008	Capital	7	7	> 150,000
NSW: 016	Regional	7	–	30,000 to 150,000
NSW: 025	Regional	7	–	> 150,000
NSW: 068	Regional	7	–	> 150,000
NSW: 115	Regional	7	–	30,000 to 150,000
NSW: 164	Regional	7	–	< 30,000
NSW: 165	Regional	7	–	< 30,000
NT: 010	Capital	7	7	30,000 to 150,000
NT: 078	Regional	7	–	< 30,000
Qld: 002	Capital	7	7	> 150,000
Qld: 005	Capital	7	7	> 150,000
Qld: 011	Capital	7	4	> 150,000
Qld: 012	Regional	7	–	> 150,000
Qld: 024	Regional	7	–	30,000 to 150,000
Qld: 028	Regional	7	–	30,000 to 150,000
Qld: 033	Regional	7	–	30,000 to 150,000
Qld: 039	Regional	7	–	< 30,000
Qld: 042	Regional	7	–	30,000 to 150,000
Qld: 053	Regional	7	–	< 30,000
SA: 007	Capital	7	7	> 150,000
SA: 013	Capital	7	7	> 150,000
SA: 027	Capital	7	7	30,000 to 150,000
SA: 059	Capital	7	7	> 150,000
SA: 017	Regional	7	–	< 30,000
SA: 022	Regional	7	–	< 30,000
SA: 063	Regional	7	–	< 30,000
SA: 076	Regional	7	–	< 30,000
SA: 119	Regional	7	–	< 30,000
Tas: 004	Capital	5	7	< 30,000
Tas: 019	Capital	5	5	30,000 to 150,000
Tas: 041	Capital	5	5	< 30,000
Tas: 018	Regional	5	–	30,000 to 150,000
Tas: 048	Regional	5	–	< 30,000

APPENDIX 2 (CONTINUED)

Sites	Location	Dec 2023	Feb 2024	Population
Vic: 001	Capital	7	7	> 150,000
Vic: 067	Capital	7	7	> 150,000
Vic: 037	Regional	7	–	> 150,000
Vic: 046	Regional	7	–	30,000 to 150,000
Vic: 061	Regional	7	–	30,000 to 150,000
Vic: 062	Regional	7	–	< 30,000
Vic: 066	Regional	7	–	30,000 to 150,000
Vic: 114	Regional	7	–	30,000 to 150,000
Vic: 121	Regional	7	–	< 30,000
Vic: 122	Regional	7	–	< 30,000
Vic: 125	Regional	7	–	30,000 to 150,000
Vic: 155	Regional	7	–	30,000 to 150,000
Vic: 156	Regional	6	–	< 30,000
WA: 101	Capital	7	7	> 150,000
WA: 103	Capital	7	7	> 150,000
WA: 104	Capital	7	7	> 150,000
WA: 102	Regional	7	–	30,000 to 150,000
WA: 116	Regional	7	–	< 30,000
WA: 120	Regional	7	–	< 30,000
WA: 129	Regional	7	–	< 30,000
Regional Sites		36	–	
Capital Sites		20	20	
Total Sites		**56**	**20**	
Regional Sites		247	–	
Capital Samples		134	133	
Total Samples		**381**	**133**	
Cumulative Samples		**11,056**	**11,189**	

APPENDIX 3: PROPORTION OF SAMPLES ABOVE LOD (%) FOR EACH DRUG AND PERIOD ASSESSED[5]

Drug	Location	Dec 2023	Feb 2024
Alcohol	Capital	100	100
Alcohol	Regional	100	–
Amphetamine	Capital	100	99
Amphetamine	Regional	100	–
Cannabis	Capital	100	100
Cannabis	Regional	100	–
Cocaine	Capital	100	100
Cocaine	Regional	96	–
Fentanyl	Capital	91	71
Fentanyl	Regional	78	–
Heroin	Capital	73	63
Heroin	Regional	21	–
Ketamine	Capital	99	98
Ketamine	Regional	85	–
MDA	Capital	80	60
MDA	Regional	71	–
MDMA	Capital	100	97
MDMA	Regional	98	–
Methylamphetamine	Capital	100	100
Methylamphetamine	Regional	100	–
Nicotine	Capital	100	100
Nicotine	Regional	100	–
Oxycodone	Capital	100	99
Oxycodone	Regional	100	–

5 Percentage detections for previous collection periods are available in Appendix 4 of Report 6 and Appendix 3 of Reports 7 to 21.

CONCLUSIONS

CONCLUSIONS

For the 22nd report of the NWDMP, wastewater analysis was conducted in December 2023 (capital city and regional sites) and February 2024 (capital city sites only). The Program identified variations in patterns of drug consumption over time and within and between jurisdictions. Consistent with previous reports, findings show that of the substances monitored with known doses, nicotine and alcohol remain the most consumed licit drugs in Australia. Cannabis was the most consumed illicit drug in Australia, followed by methylamphetamine.[6]

METHYLAMPHETAMINE

When comparing data for August and December 2023, the population-weighted average consumption of methylamphetamine increased in both capital city and regional sites, with the capital city level the highest recorded by the Program. Average capital city methylamphetamine consumption then decreased from December 2023 to February 2024. In December 2023, average regional methylamphetamine consumption exceeded capital city consumption. In December 2023, Victoria had the highest estimated average capital city consumption of methylamphetamine, while Western Australia had the highest average regional consumption.

COCAINE

When comparing data for August and December 2023, the population-weighted average consumption of cocaine increased in both capital city and regional sites to the highest levels recorded by the Program. Average capital city cocaine consumption then decreased from December 2023 to February 2024. Average capital city cocaine consumption continued to exceed average regional consumption. In December 2023, New South Wales had the highest estimated average capital city consumption of cocaine, while Queensland had the highest average regional consumption.

3,4-METHYLENEDIOXYMETHYLAMPHETAMINE (MDMA)

When comparing data for August and December 2023, the population-weighted average consumption of MDMA increased in both capital city and regional sites. Average capital city MDMA consumption then decreased from December 2023 to February 2024. In December 2023, average capital city MDMA consumption exceeded regional city consumption. In December 2023, Tasmania had the highest estimated average capital city MDMA consumption, while New South Wales had the highest average regional consumption.

6 Throughout this report, unless otherwise stated, all comparisons on the consumption of different drugs are based on doses consumed rather than drug mass.

3,4-METHYLENEDIOXYAMPHETAMINE (MDA)

MDA is a metabolite of MDMA, but also an illicit drug in its own right. When comparing data for August and December 2023, MDA excretion[7] increased in both capital city and regional sites. Average capital city MDA excretion then decreased from December 2023 to February 2024. In December 2023, average capital city MDA excretion exceeded average regional excretion. In December 2023, Tasmania had the highest estimated average capital city excretion of MDA, while Victoria the highest average regional excretion.

HEROIN

When comparing data for August and December 2023, the population-weighted average consumption of heroin increased in capital city sites and decreased in regional sites. Average capital city heroin consumption then decreased from December 2023 to February 2024. Average capital city heroin consumption continued to exceed average regional consumption. In December 2023, Victoria had the highest estimated average capital city and regional consumption of heroin.

CANNABIS

When comparing data for August and December 2023, the population-weighted average consumption of cannabis decreased in both capital city and regional sites. Average capital city cannabis consumption further decreased from December 2023 to February 2024. Average regional cannabis consumption continued to exceed average capital city consumption. In December 2023, Tasmania had the highest estimated average capital city consumption of cannabis, while the Northern Territory[8] had the highest average regional consumption.

KETAMINE

When comparing data for August and December 2023, the population-weighted average excretion of ketamine increased in both capital city and regional sites. Average capital city ketamine excretion further increased from December 2023 to February 2024. Average capital city ketamine excretion continued to exceed regional ketamine excretion. In December 2023, Tasmania had the highest average capital city ketamine excretion, while Victoria had the highest average regional excretion.

OXYCODONE

When comparing data for August and December 2023, the population-weighted average consumption of oxycodone decreased in capital city sites and increased in regional sites. Average capital city oxycodone consumption further decreased from December 2023 to February 2024. Average regional oxycodone consumption continued to exceed average capital city consumption. In December 2023, Tasmania had the highest estimated average capital city consumption of oxycodone, while Queensland had the highest average regional consumption.

7 The term excretion (as opposed to consumption) is used for MDA and ketamine in this report due to the absence of clear information in the scientific literature around suitable factors to estimate consumption of the substances in wastewater.

8 As the Northern Territory only has 2 participating sites, results may not be representative of the Territory as a whole. The 2 sites cover approximately 25% of the population of the Northern Territory.

FENTANYL

When comparing data for August and December 2023, the population-weighted average consumption of fentanyl increased in capital city sites and decreased in regional sites. Average capital city fentanyl consumption then decreased from December 2023 to February 2024. Average regional fentanyl consumption continued to exceed average capital city consumption. In December 2023, Tasmania had the highest estimated average capital city consumption of fentanyl, while South Australia had the highest average regional consumption.

NICOTINE

When comparing data for August and December 2023, the population-weighted average consumption of nicotine increased in both capital city and regional sites, with the regional level the highest recorded by the Program. Average capital city nicotine consumption then decreased from December 2023 to February 2024. Average regional nicotine consumption continued to exceed average capital city consumption. In December 2023, the Northern Territory[9] had the highest average capital city and regional consumption of nicotine.

ALCOHOL

When comparing data for August and December 2023, the population-weighted average consumption of alcohol increased in both capital city and regional sites. Average capital city consumption then decreased from December 2023 to February 2024. In December 2023, average capital city alcohol consumption exceeded average regional consumption. In December 2023, the Northern Territory[10] had the highest average capital city and regional consumption of alcohol.

NEXT REPORT

The 23rd report of the NWDMP is scheduled for public release in October 2024.

9 As the Northern Territory only has 2 participating sites, results may not be representative of the Territory as a whole. The 2 sites cover approximately 25% of the population of the Northern Territory.

10 Ibid.