

K-Holes and weekend highs- Emerging recreational patterns of the anaesthetic drug ketamine in wastewater

Cobus Gerber

On behalf of the

National Wastewater Drug Monitoring Program research team: Cobus Gerber, Bradley Simpson and Jason White (University of South Australia) Ben Tscharke, Rory Verhagen, Richard Bade, Jake O'Brien, Phong Thai, Kevin Thomas and Jochen Mueller (University of Queensland).

Ketamine

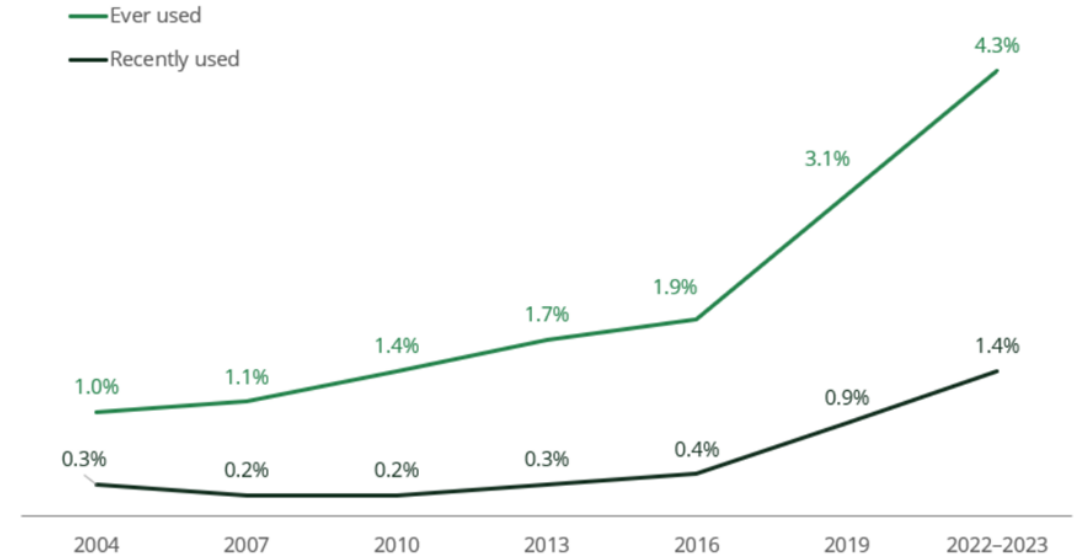
Pharmaceutical use

- Used in emergencies by paramedics
- Dispensed to patients in hospitals (wafers) or used in theatres for surgery
- Usually second-line analgesic
- Treatment-resistant depression: not extensively used in Australia yet and supervised

Recreational use

- Lighter doses: ease comedown effects of other drugs or 'take the edge off' stimulants, feeling of intoxication
- *Higher doses*: dissociation, 'K-holes'
- *Kitty flipping*: combining MDMA and ketamine on a night out, taken in conjunction or purchased pre-mixed

Figure 1: Use of ketamine in Australia, people aged 14 and over, 2004 to 2022–2023



Australian Institute of Health and Welfare (AIHW). *Low-prevalence illicit drugs in the NDSHS* Canberra; 2024. <https://www.aihw.gov.au/reports/illicit-use-of-drugs/low-prevalence-illicit-drugs-ndshs>



03 MARCH 2024,
8:05AM

Media Release

Surge in ketamine imports into Australia

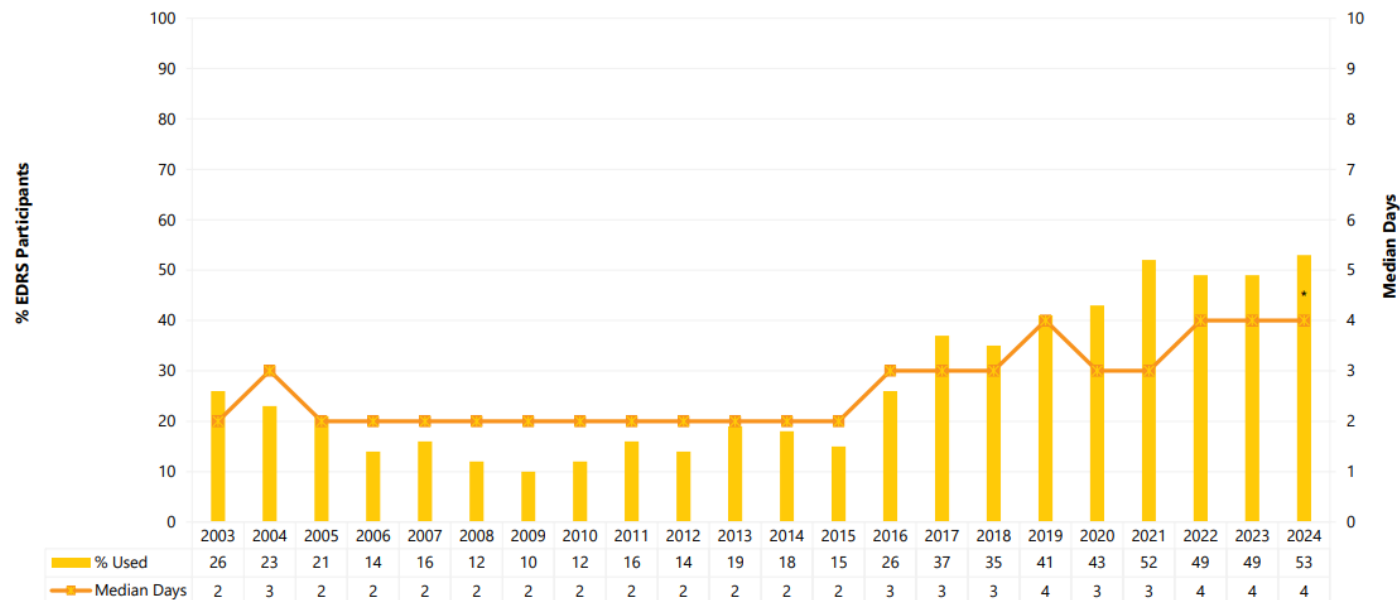
This is a joint release between the Australian Federal Police and Australian Border Force

Importation of ketamine

- Increased border seizures in 2023 (882 kg) compared to 2022 (415 kg)³



Figure 35: Past six month use and frequency of use of non-prescribed ketamine, nationally, 2003-2024



Ecstasy and Related Drugs Reporting System (EDRS)

- 740 participants (2024)
- Sample of people who regularly use ecstasy and/or other stimulants



Table 14: Past six month use of non-prescribed ketamine, by capital city, 2003-2024

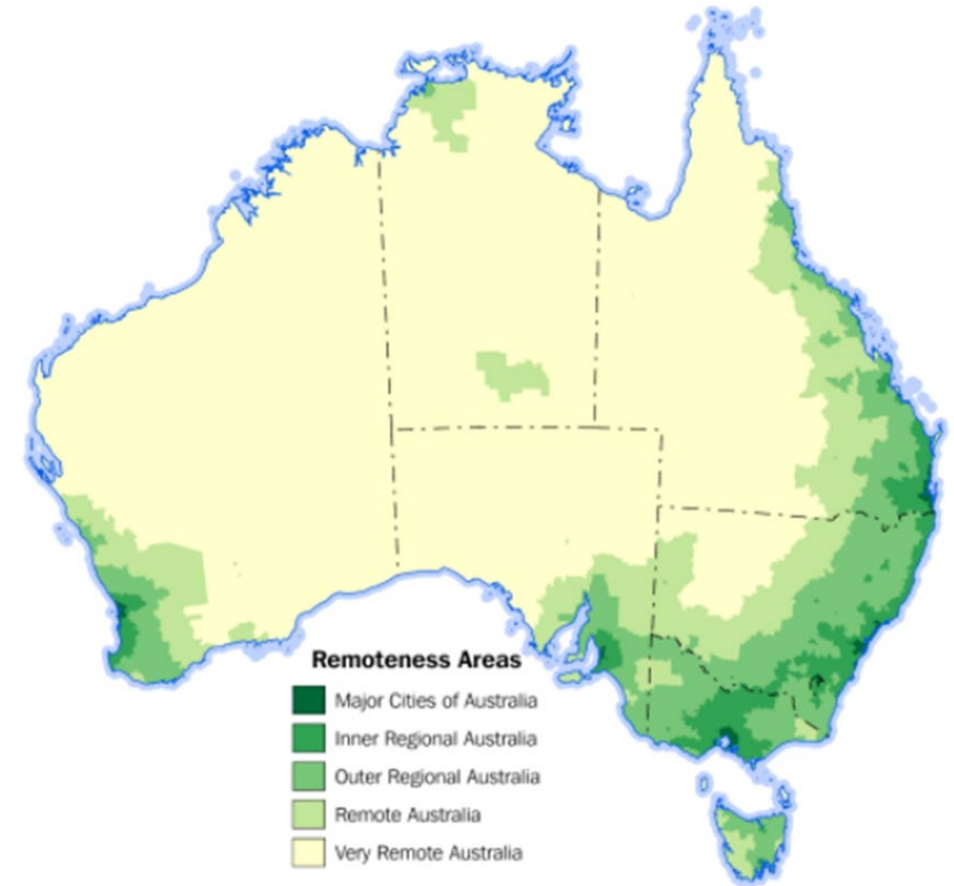
%	Syd	Can	Mel	Hob	Ade	Per	Dar	Bri/GC
2021	76	51	81	46	28	41	55	37
2022	56	39	88	38	29	39	~	51
2023	54	56	82	51	37	36	~	35
2024	61	46	80	30*	49	55*	41	52*

National Wastewater Drug Monitoring Program

Sampling campaign

Funded by the Australian Criminal Intelligence Commission

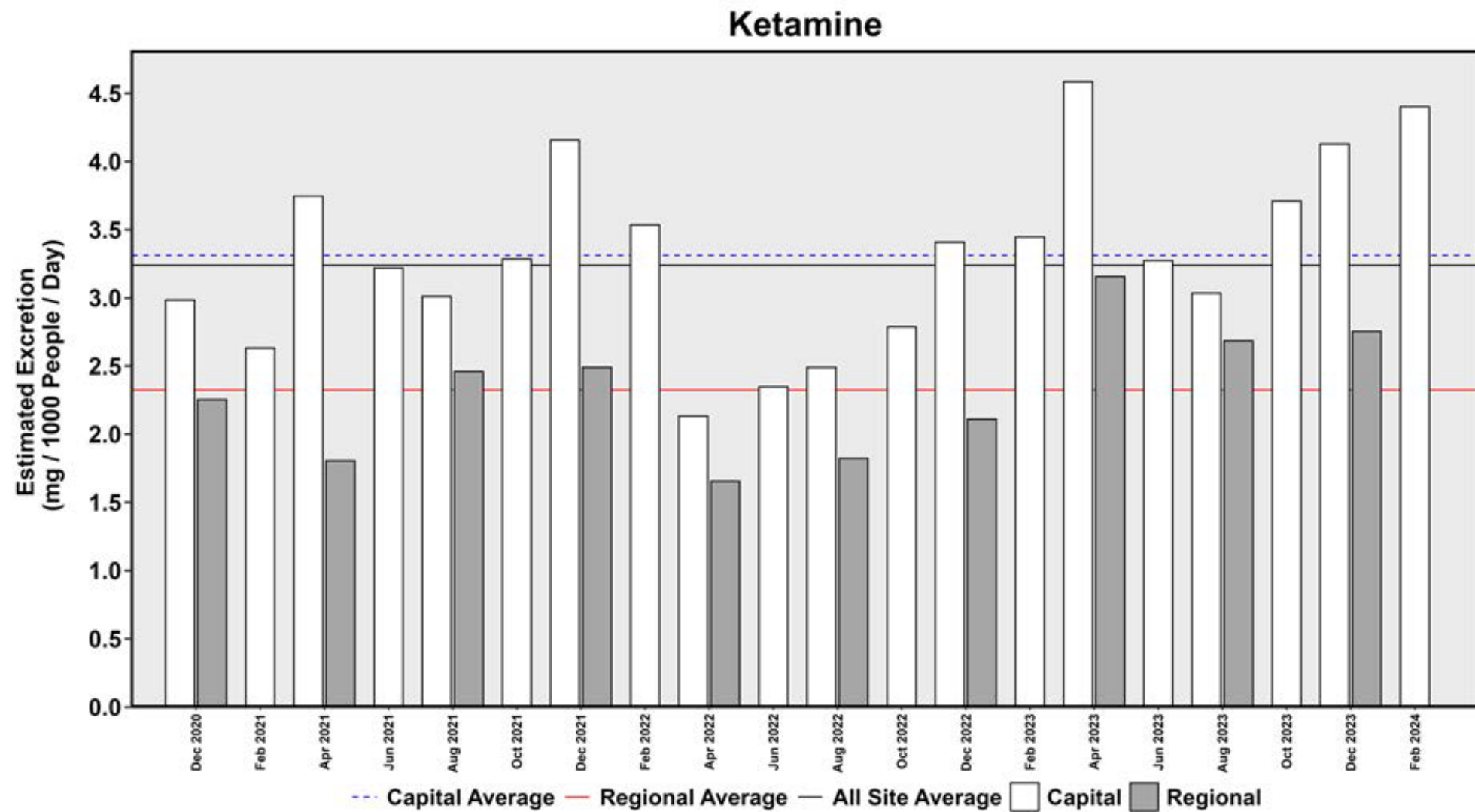
- 50 sites included in this study covering major city centres and regional sites
- Bimonthly (capital city sites) and quarterly (regional sites) monitoring from 2021 to 2023
- 7 days of 24-hour composite influent wastewater samples



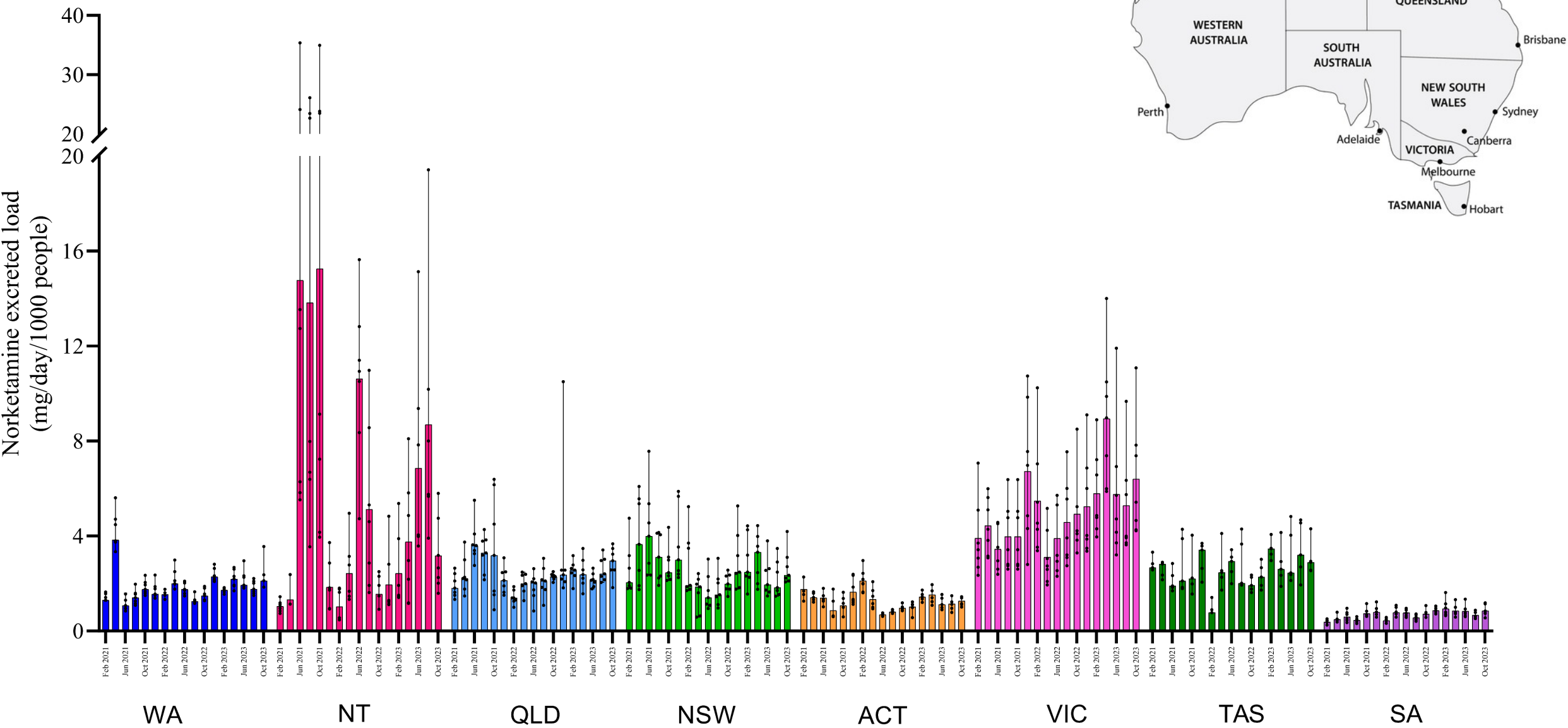
Australian Bureau of Statistics (Jul2021-Jun2026), [Remoteness Areas](#), ABS Website

- In this study:
 - Major cities: 19 sites
 - Inner regional: 19 sites
 - Outer regional and remote: 12 sites

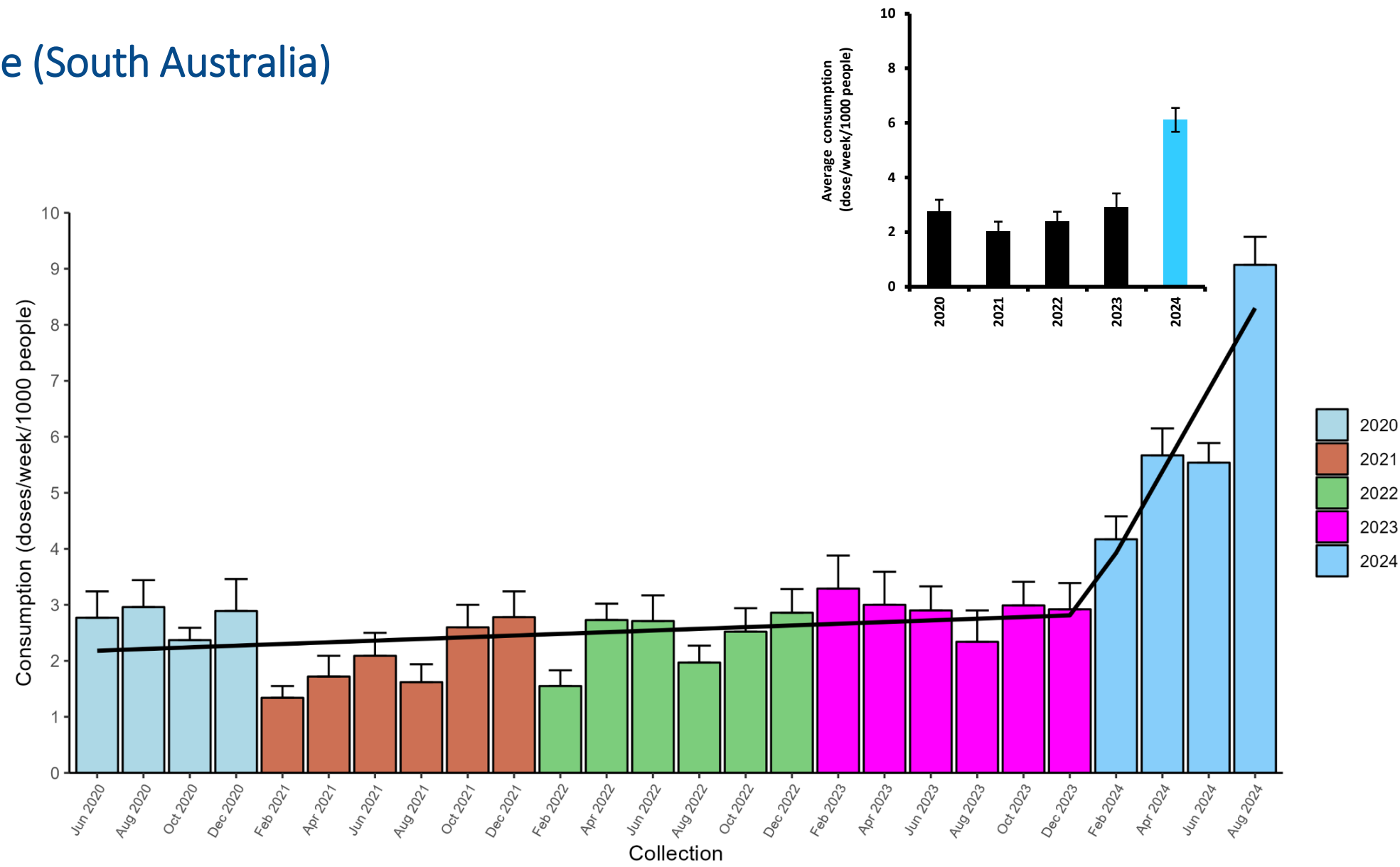
Capital city *versus* Regional

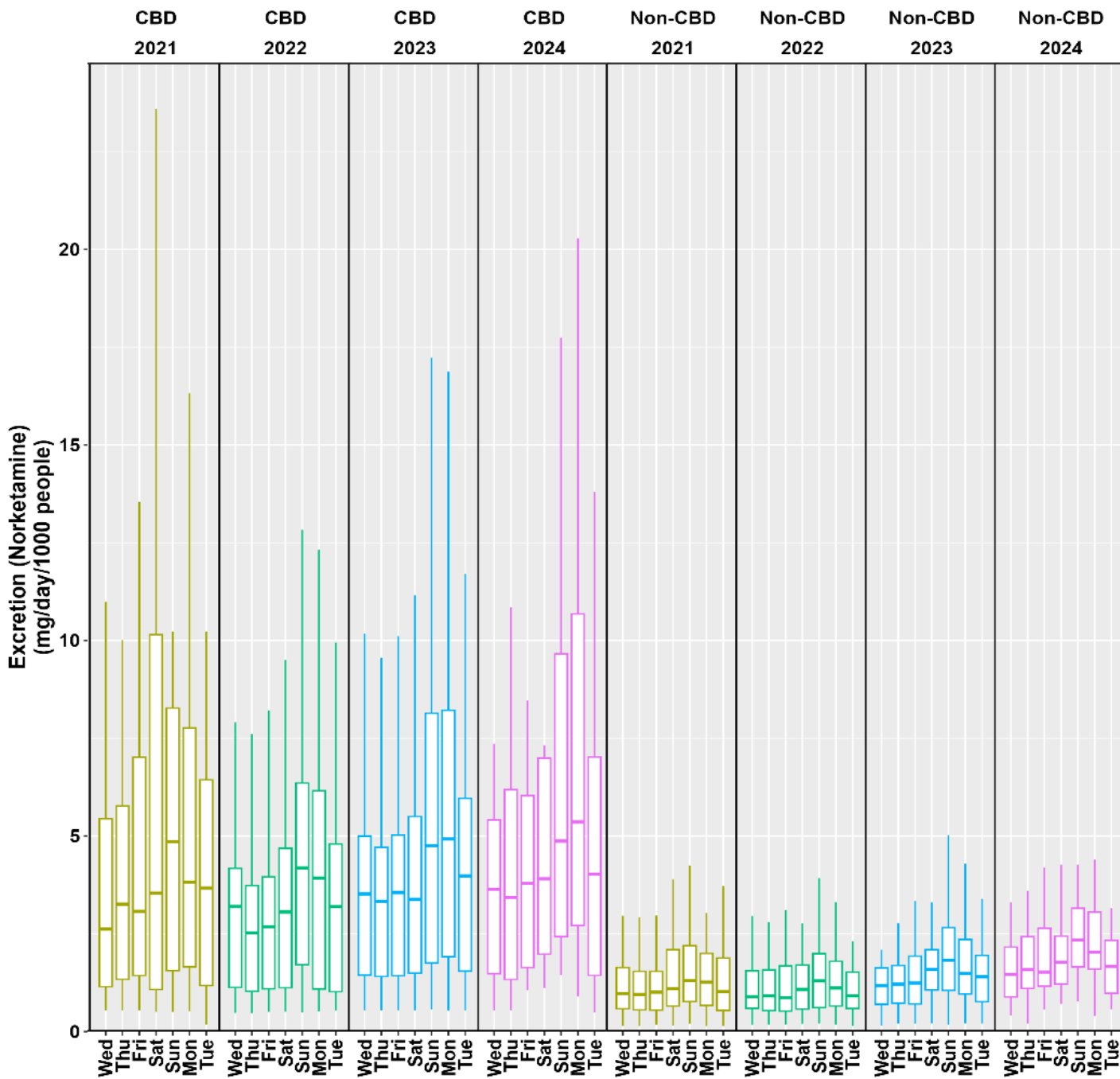


Scale of norketamine excreted loads across Australia



Ketamine (South Australia)

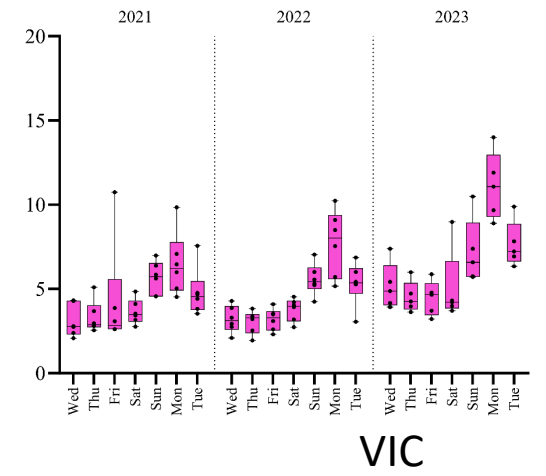
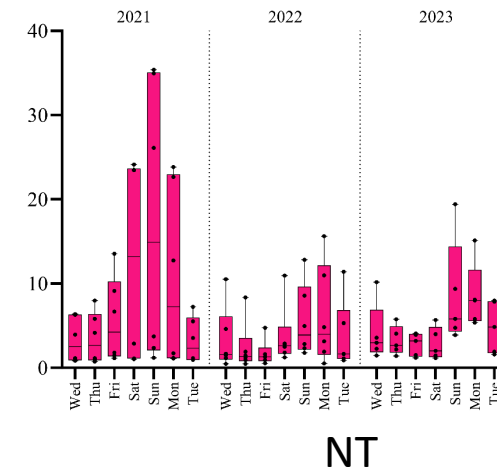
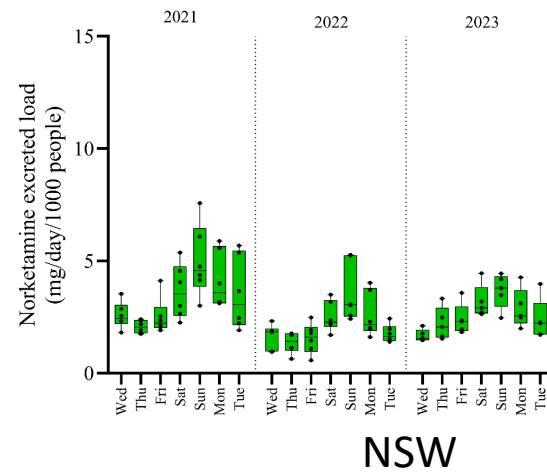




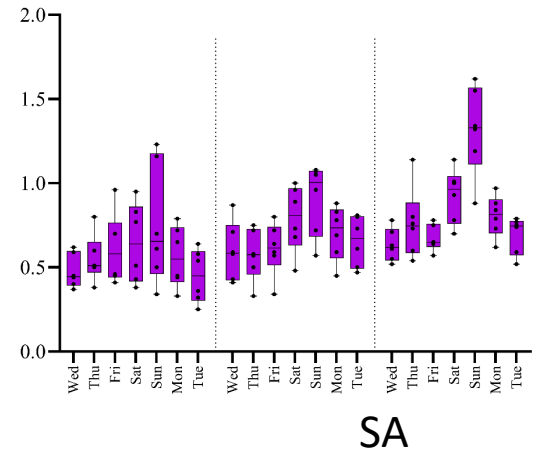
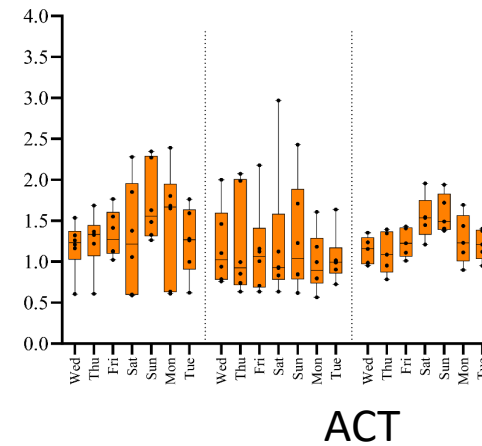
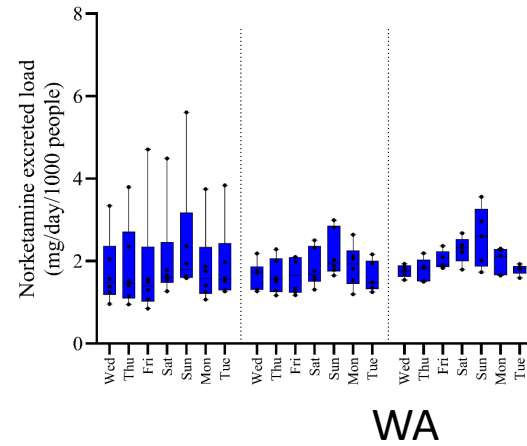
Other remoteness indicators

- Of the 50 sites, 20 could be classed as 'central business district' (CBD)
- Includes sites that cover main city centres

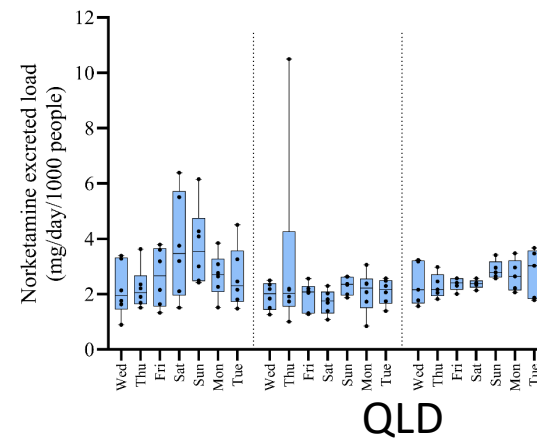
Weekend
pattern evident



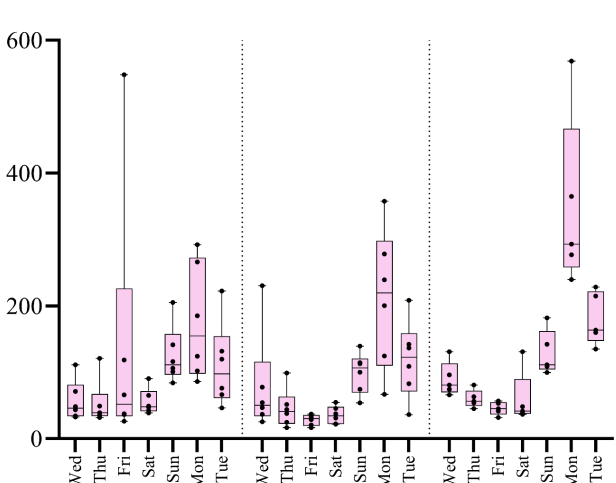
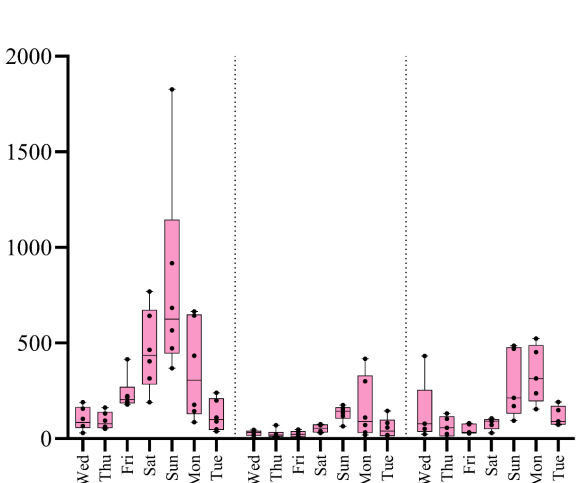
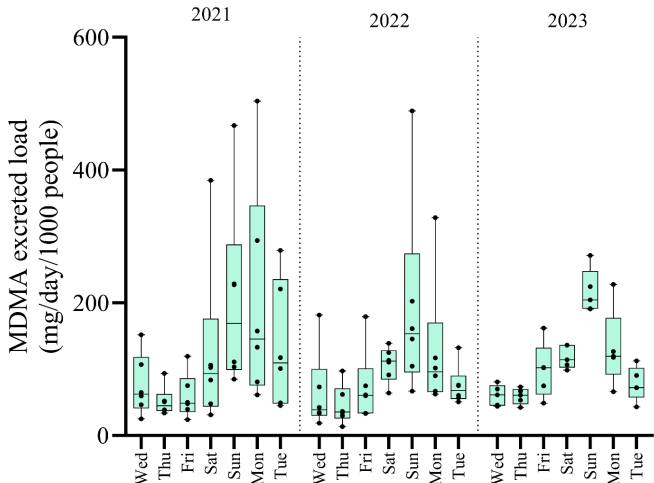
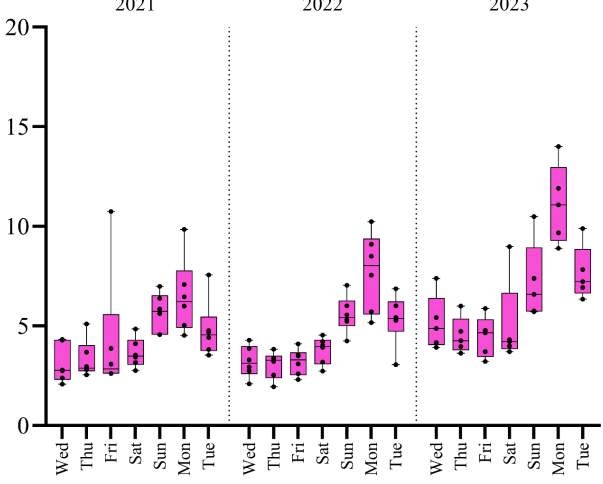
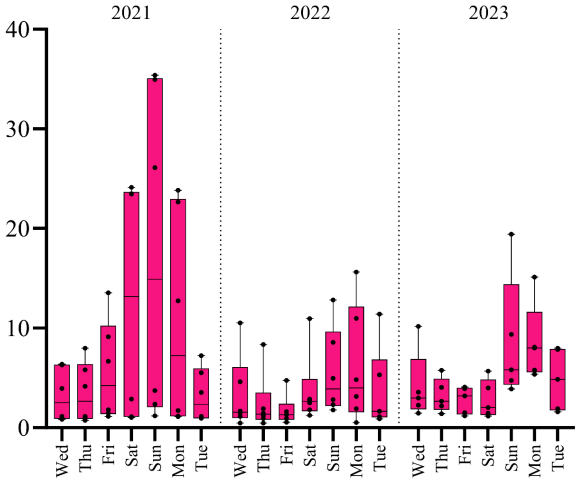
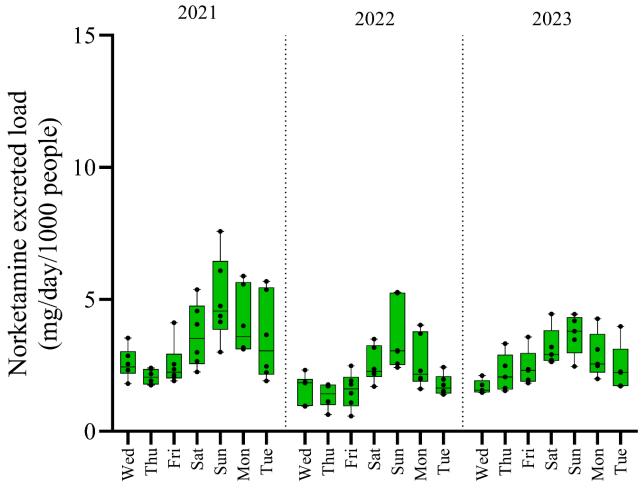
Weekend pattern
emerging



No obvious
weekend pattern



Weekly trend compared to MDMA



NSW

NT

VIC

Conclusion

- There is a significant association with higher ketamine excreted loads in major cities
- The excreted loads display a recreational pattern across the sampling week in most jurisdictions
- Medical use of ketamine in Australia cannot explain an increasing weekend trend over time



Acknowledgments

Population Health Chemistry group

Dr Emma Jaunay

Dr Bradley Simpson

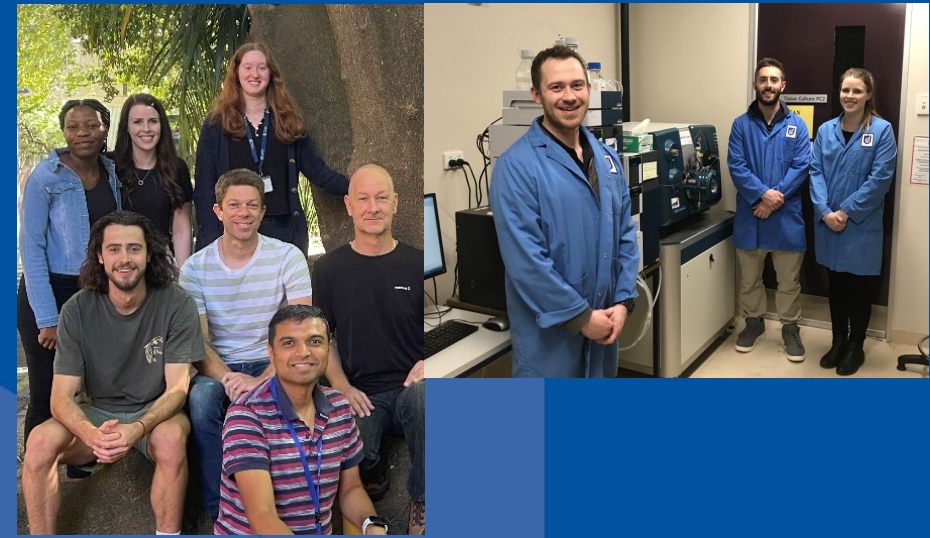
Professor Jason White

Brock Peake

Maulik Ghetia



University of
South Australia



Past members that have contributed to historical Drug Monitoring program in South Australia

Research partners:

SA Health, Drug and Alcohol Services of South Australia and Preventative Health SA

Australian Criminal Intelligence Commission

University of Queensland, National Wastewater Drug Monitoring Program team

Funding:

SA Health

Australian Criminal Intelligence Commission

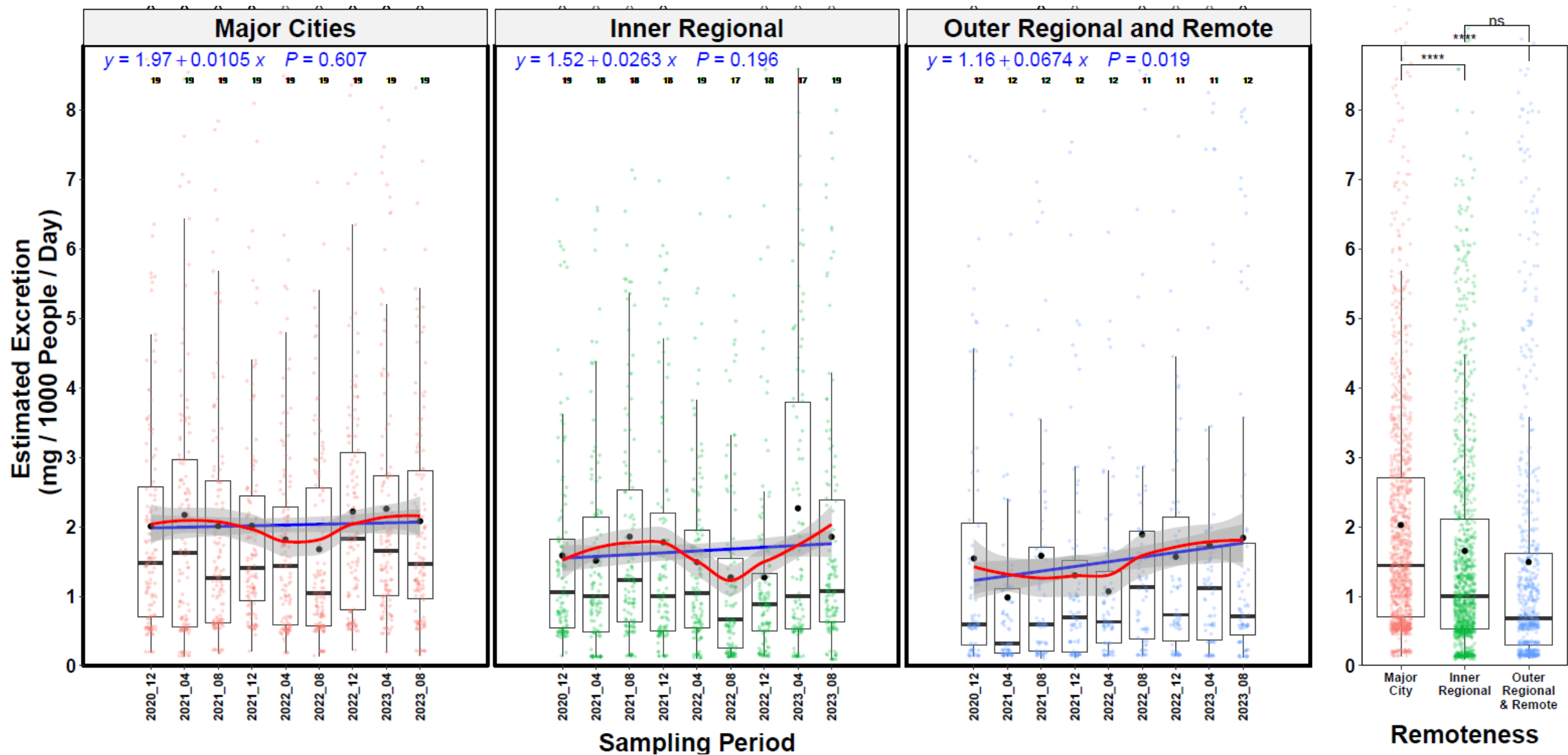
Wastewater treatment plant staff that collect the samples and provide flow rates for the program

Wastewater catchment mapping used to determine population and socioeconomic data was conducted under an ARC Linkage Project (LP190101124).

National
Wastewater Drug
Monitoring
Program latest
report



Norketamine excreted loads when sites are grouped by remoteness categories



Black circles represent the mean and the black line the median. The blue line is the linear trend and the red line the loess smoothed trend

Graphs prepared by Dr Ben Tschärke

Norketamine excreted loads when sites are grouped by IRSAD categories

