

# Stimulant use disorder: A global overview

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UNSW  
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Better and fairer care. Always.

## Acknowledgement of country

I am privileged to join today from the lands of the Kanien'kehá:ka Nation.

I work and live on unceded lands of the Gadigal and Bidjigal people of the Eora nation (Sydney, Australia).

I pay my respects to elders past and present and any First Nations people here today.





## Acknowledgement of people with lived-living experience

I recognize the centrality of the contribution of people with lived-living experience to research on stimulant use disorder.



## Conflicts of interest

NCCRED is funded by the Australian Government Department of Health, Disability and Ageing.

I am employed by St Vincent's Hospital Sydney into New South Wales Government health system and University of New South Wales and recipient of competitive Australian and New South Wales Government research funding

No other conflicts to declare

# Outline

**This presentation will provide a broad overview of key issues related to extra-medical cocaine and methamphetamine use:**

- Epidemiology**
- Impacts**
- Introduction to treatment**

**At the end of the session participants should be able to:**

- 1. Summarise global trends in cocaine and methamphetamine use**
- 2. Understand stimulant use disorder and related harms**
- 3. Explain evidence based therapeutic approaches to stimulant use disorder**

# Background

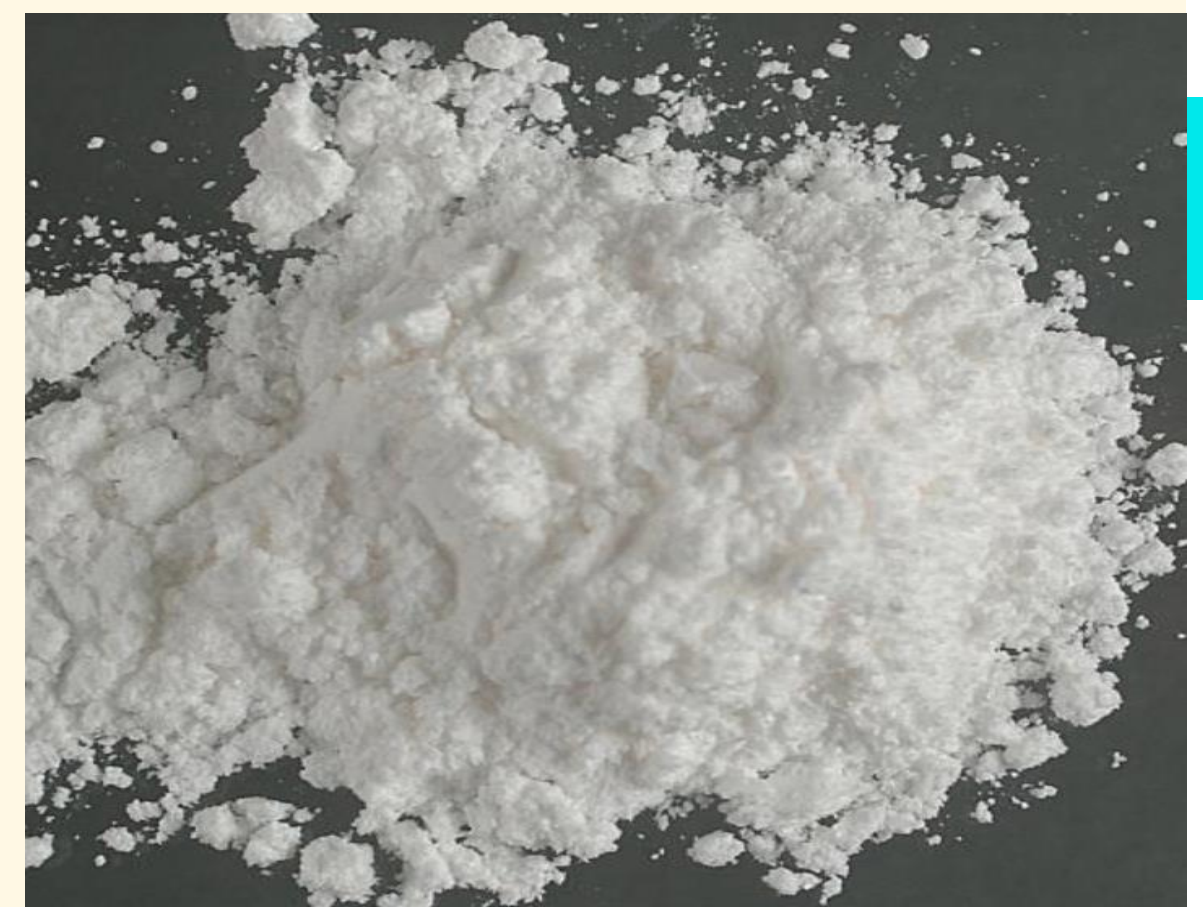




# Cocaine



1961 UN Single  
Convention on  
Narcotic Drugs



Salt



Base ("crack")



# Methamphetamine

Pills



YaBa

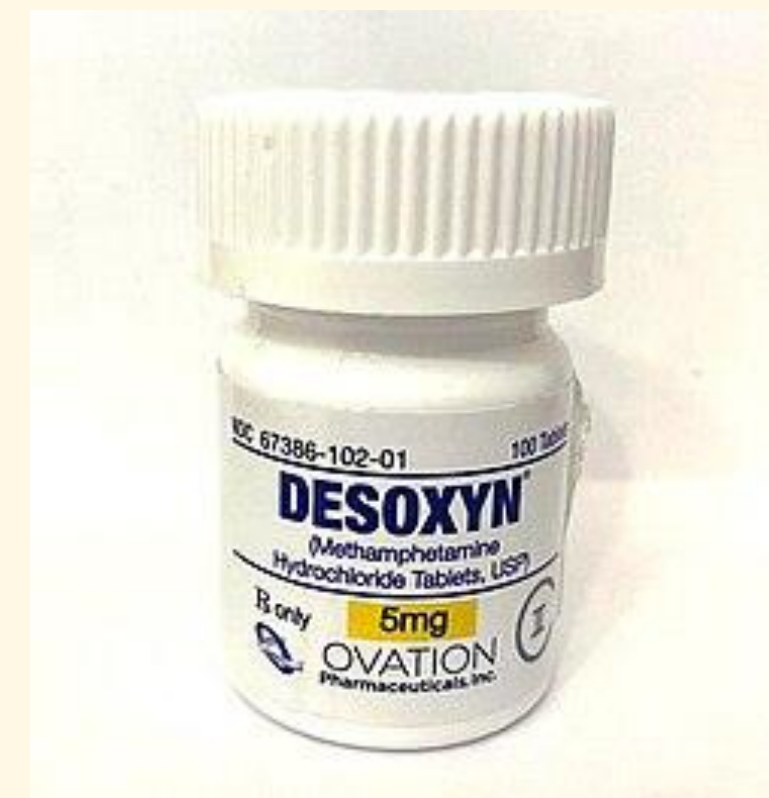
Powder



Crystal



Pharmaceutical



1961 UN Single Convention on Narcotic Drugs



# Onset of action

Smoked



Crystal MA  
Base cocaine  
< 5 minutes

Injected



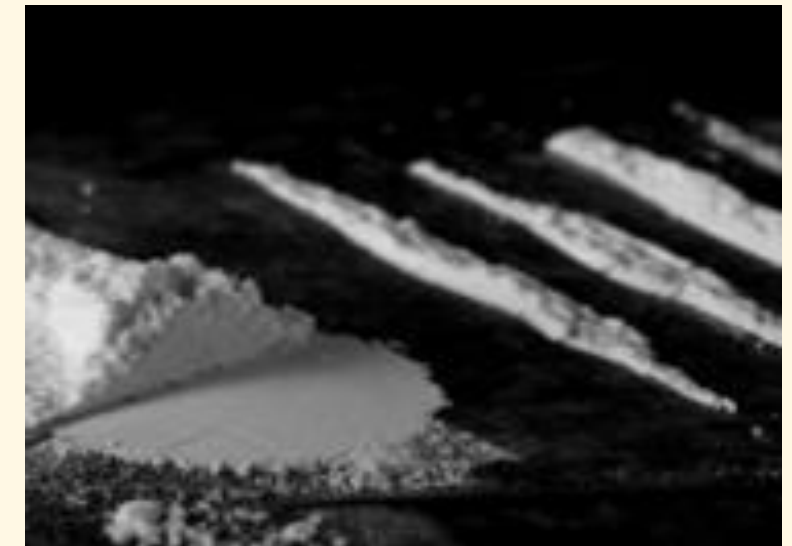
MA/salt  
cocaine  
<5 minutes

Swallowed



15-60  
minutes

Snorted



MA 3-5 minutes  
Cocaine <50  
minutes (some  
swallowed,  
delayed second  
peak - hours)

## Duration of action

### Cocaine

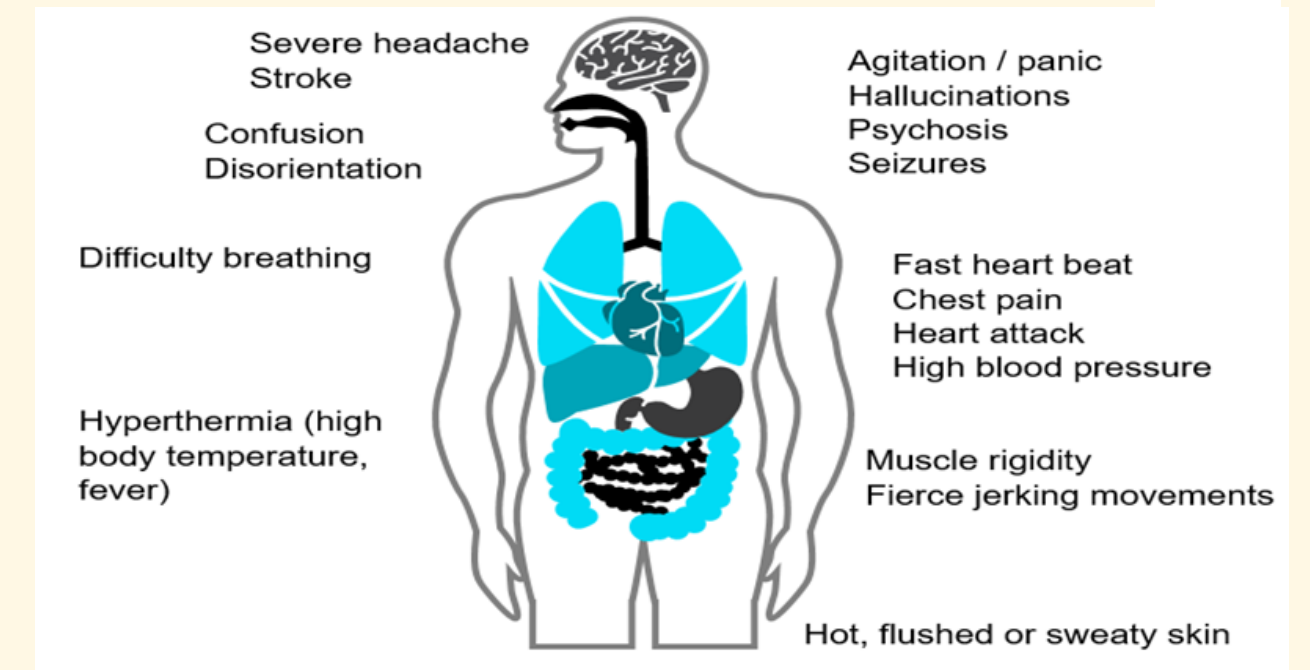
- 15-60 minutes

### Methamphetamine

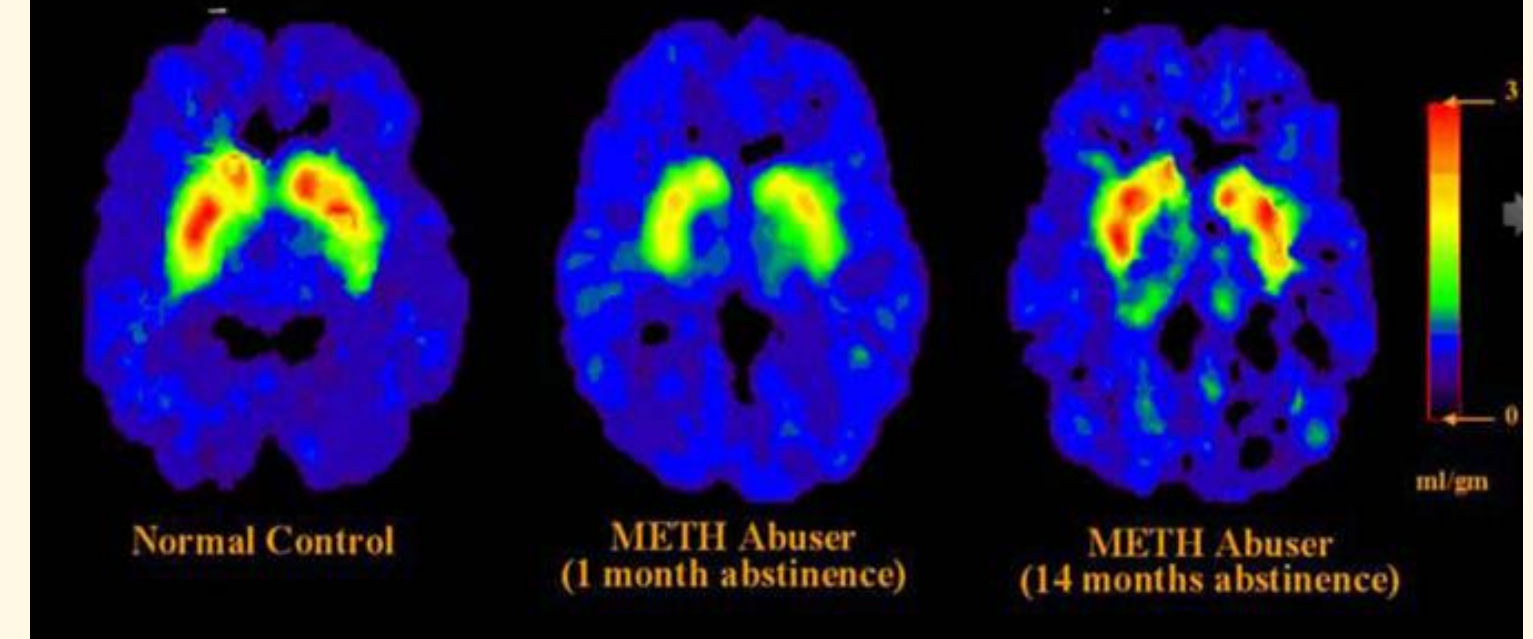
- 4-12 hours
- Can last up to 36 hours
- Metabolites excreted in urine < 7 days

# Pharmacology

- Stimulants of the Central Nervous System
- Increases: activation of dopamine, norepinephrine, serotonin
- Can cause release of dopamine into synaptic cleft - increased dopamine concentration
  - Abnormally high concentration of dopamine can contribute to methamphetamine toxicity
  - Norepinephrine effects: increases HR, BP
- Toxicity → Figure
- Long recovery period → Figure



**Figure 2. Partial Recovery of Brain Dopamine Transporters in Methamphetamine (METH) Abuser After Protracted Abstinence**

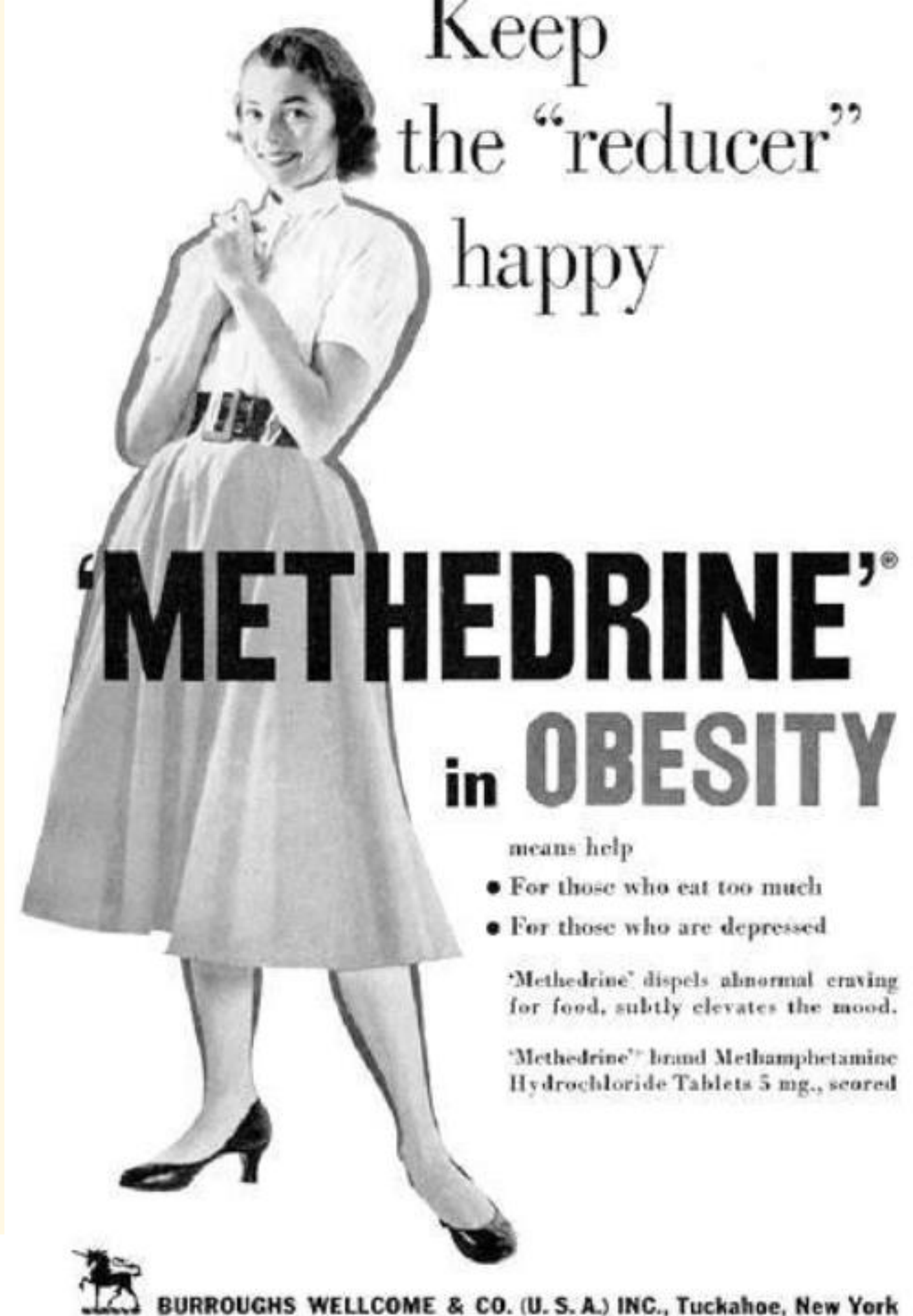




# Effects

## Short term

- Euphoria
- Improve alertness, focus and concentration
- Increase libido
- Promote a general sensation of well-being
- Reduce fatigue and appetite



Keep  
the “reducer”  
happy


**‘METHEDRINE’<sup>®</sup>**  
**in OBESITY**

means help

- For those who eat too much
- For those who are depressed

‘Methedrine’ dispels abnormal craving for food, subtly elevates the mood.

‘Methedrine’<sup>®</sup> brand Methamphetamine Hydrochloride Tablets 5 mg., scored

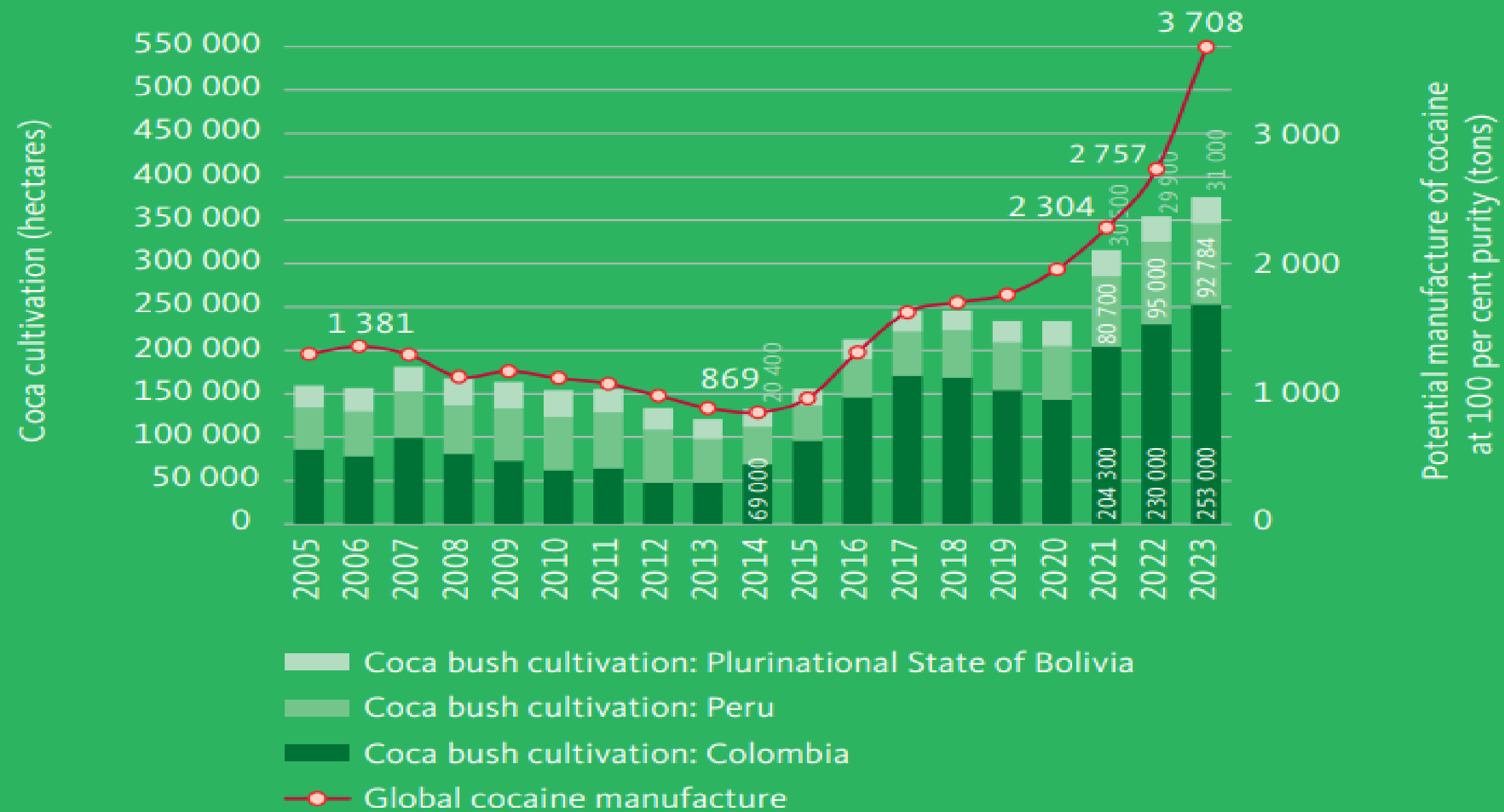
 BURROUGHS WELLCOME & CO. (U. S. A.) INC., Tuckahoe, New York

# Epidemiology



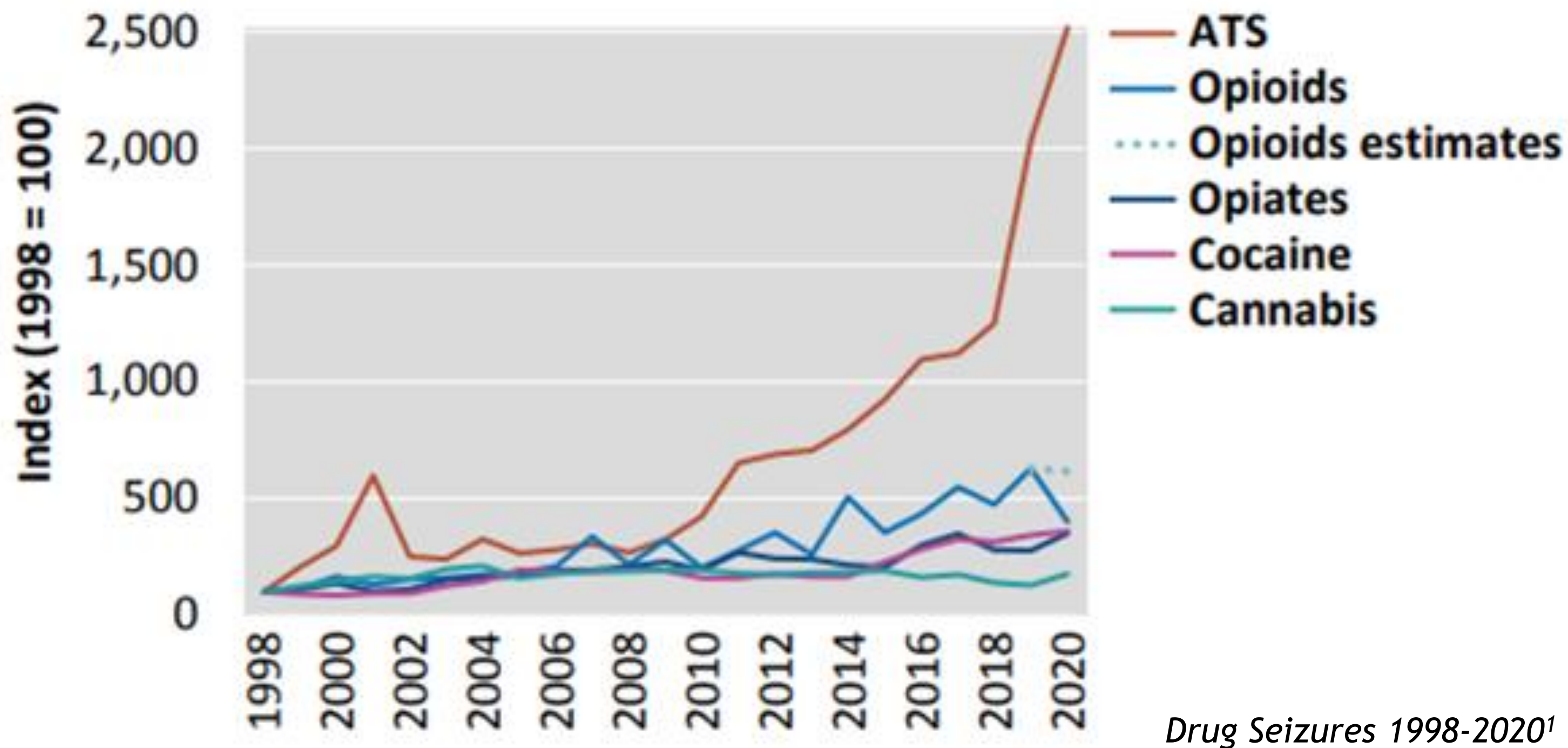
# UNODC - increasing cocaine production

ILLICIT COCA CULTIVATION AND COCAINE PRODUCTION, 2005–2023



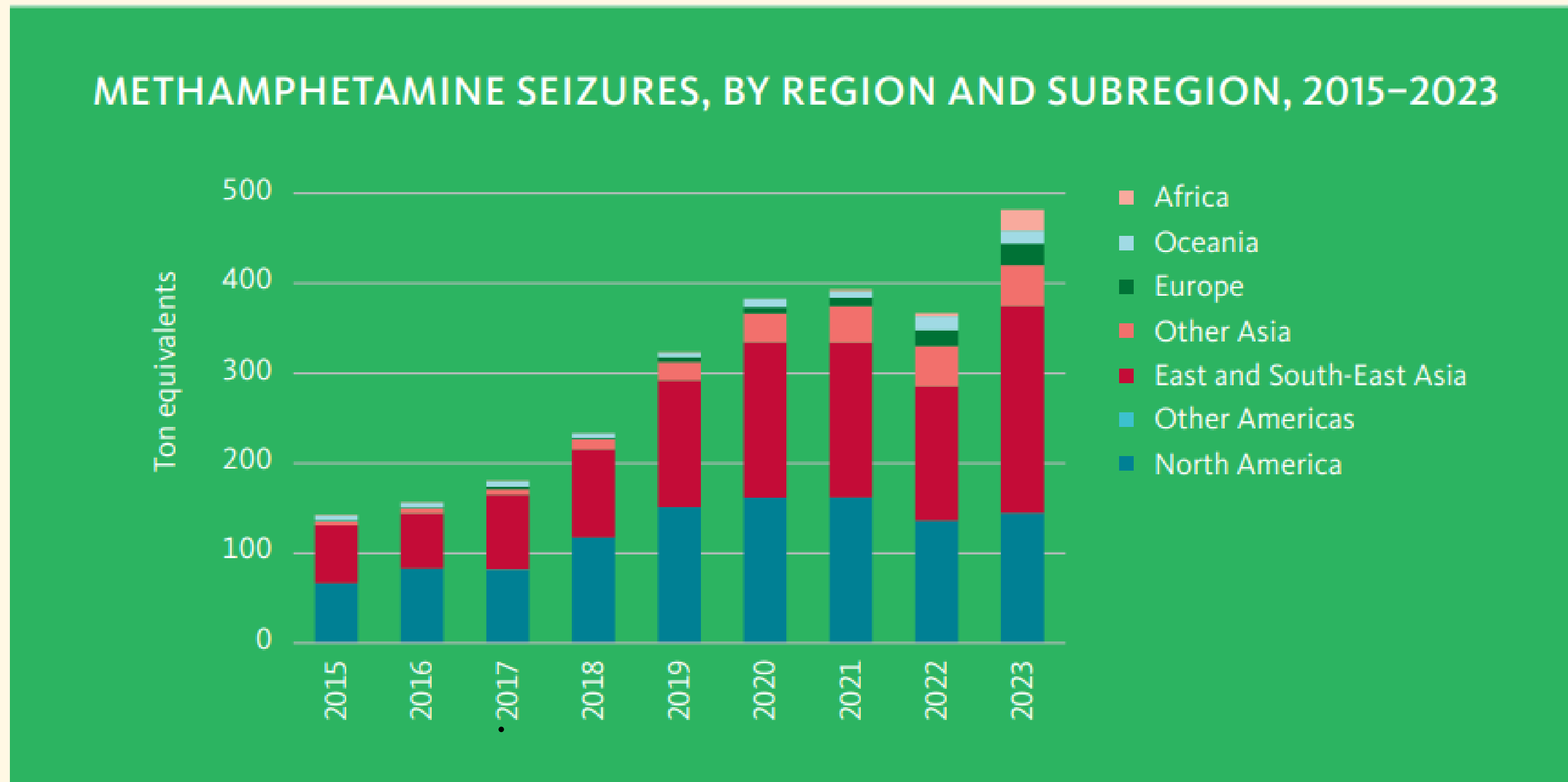


# Methamphetamine production increasing

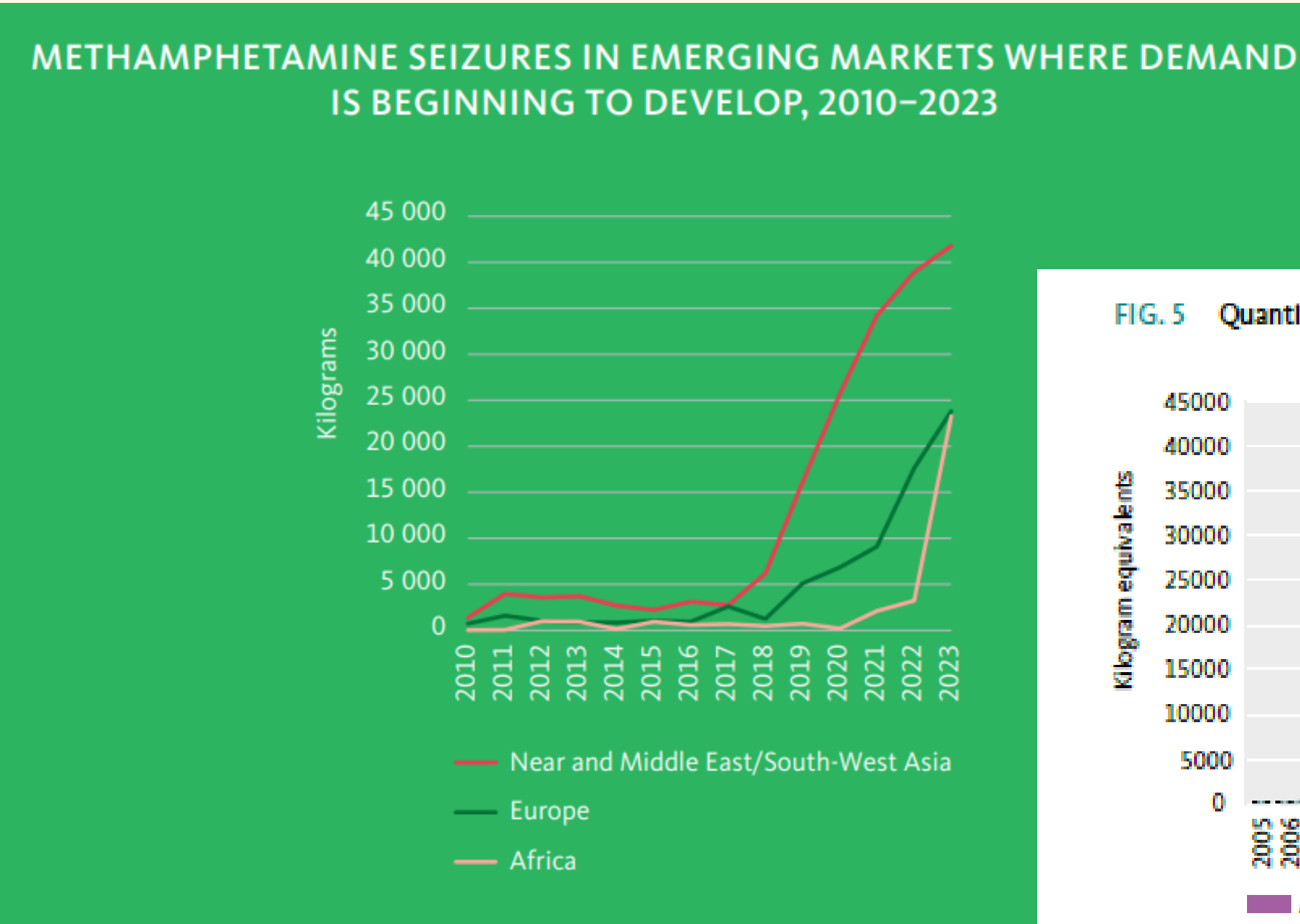


Methamphetamine seizures outpaced other drug seizures in the 10 years to 2020

# Decreasing / stabilising in North America....

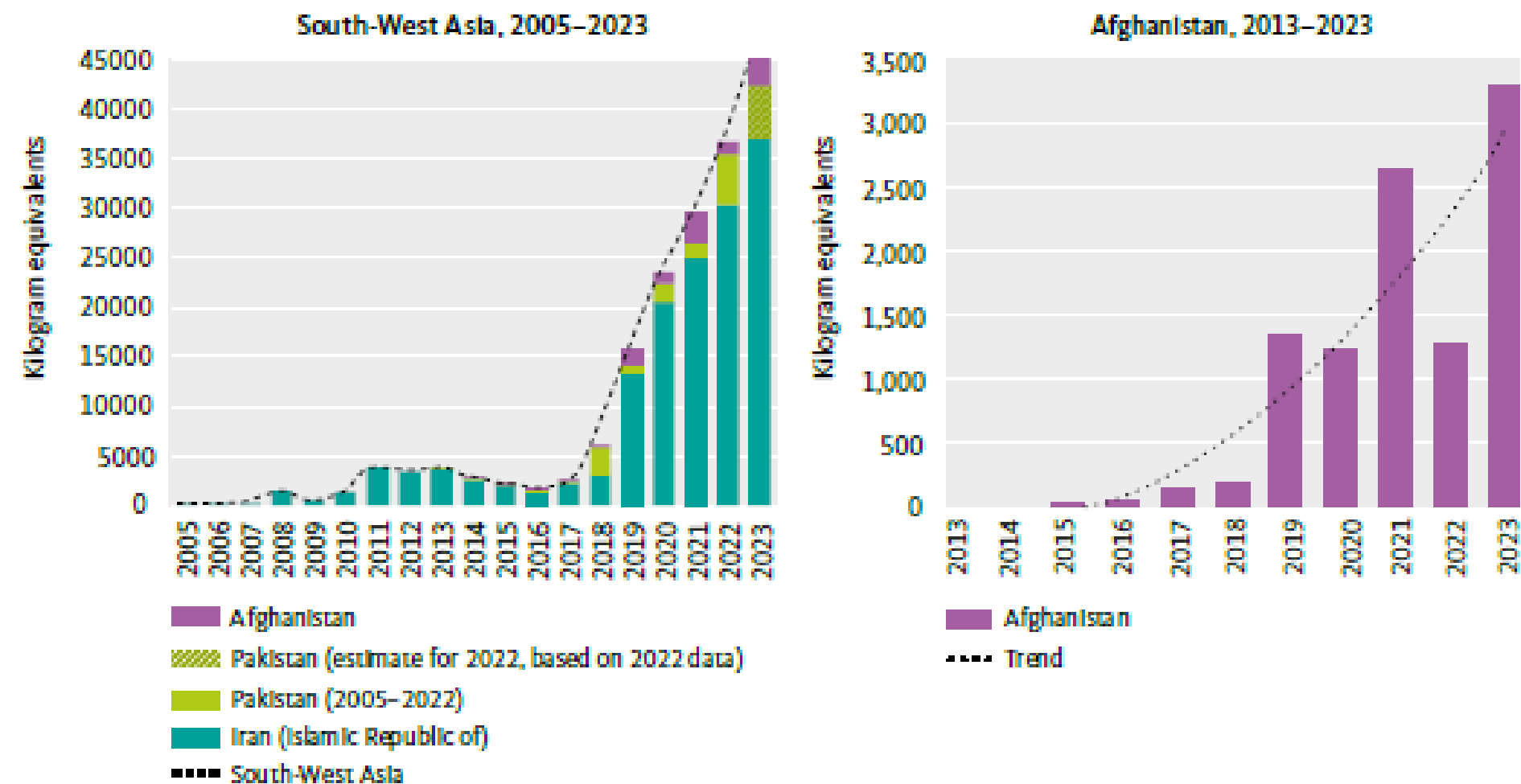


...but increasing in the rest of the world



UNODC WDR 2025

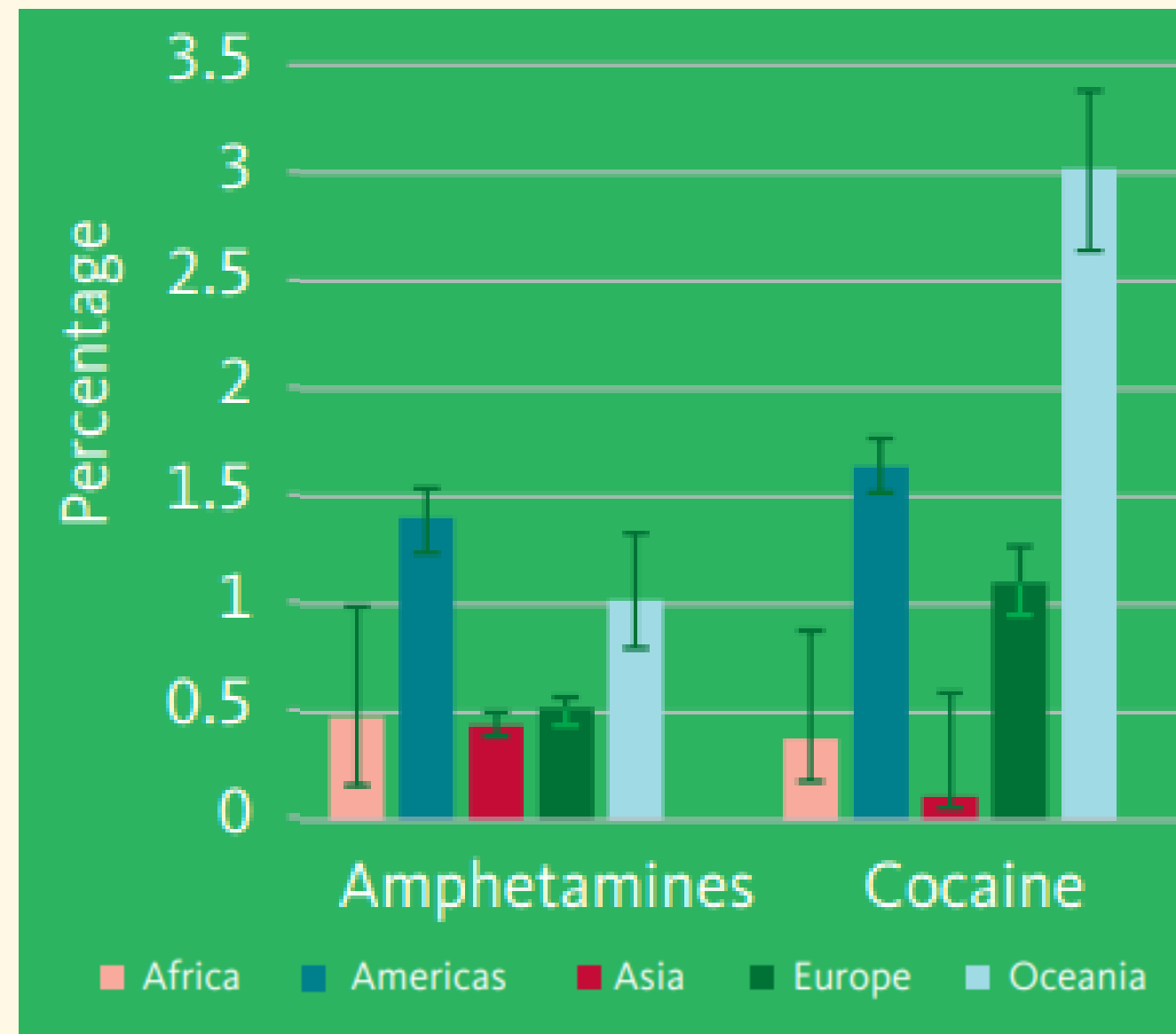
FIG. 5 Quantities of methamphetamine seized in South-West Asia, 2005–2023



Source: UNODC, *Afghanistan Opium Survey 2023*, August 2023.



# Annual prevalence of amphetamines and cocaine use by region, 2023



Globally 2023 age 15-64

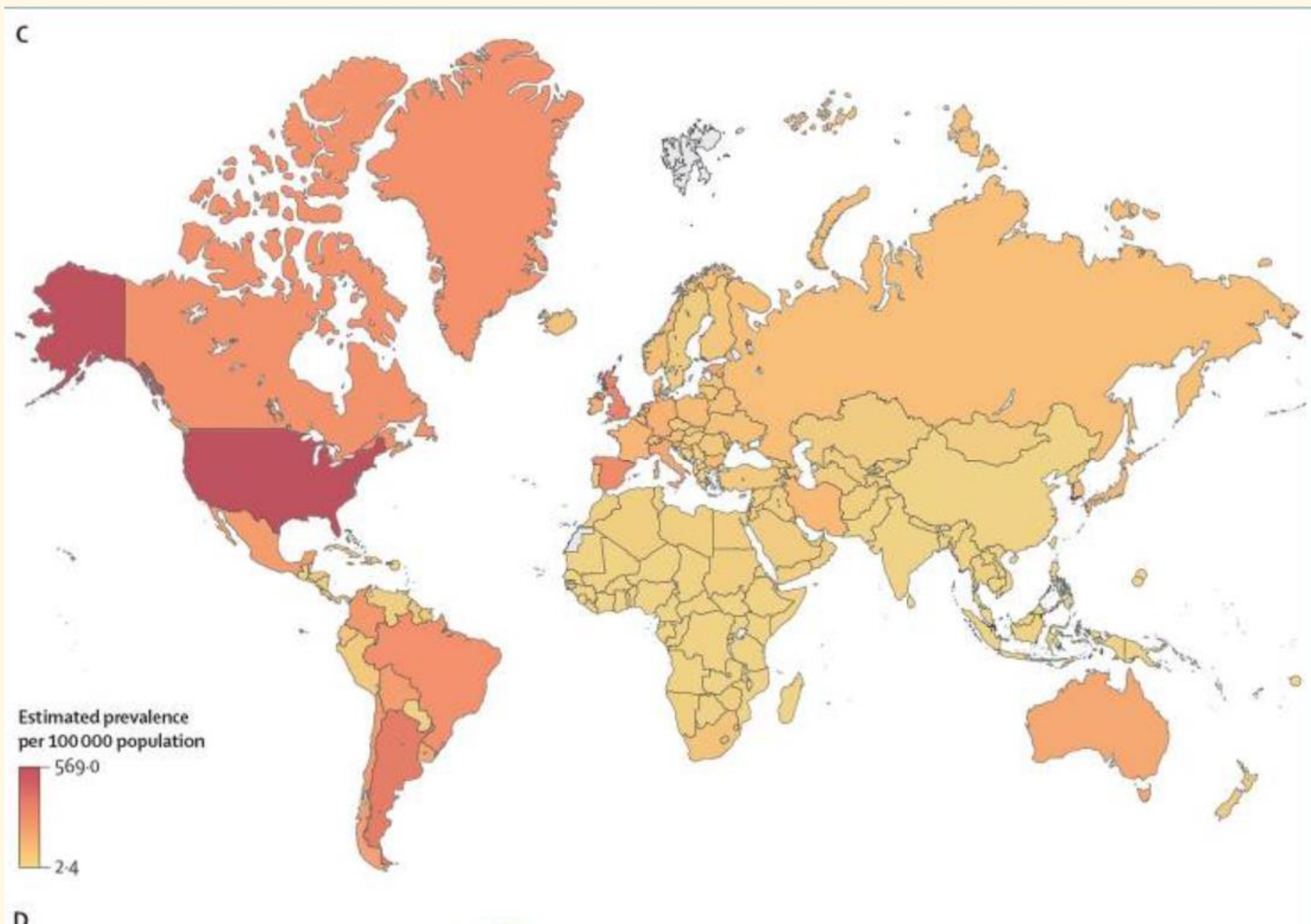
Amphetamines

- 31M
- 0.6%
- women 0.3%, men 0.8%

Cocaine

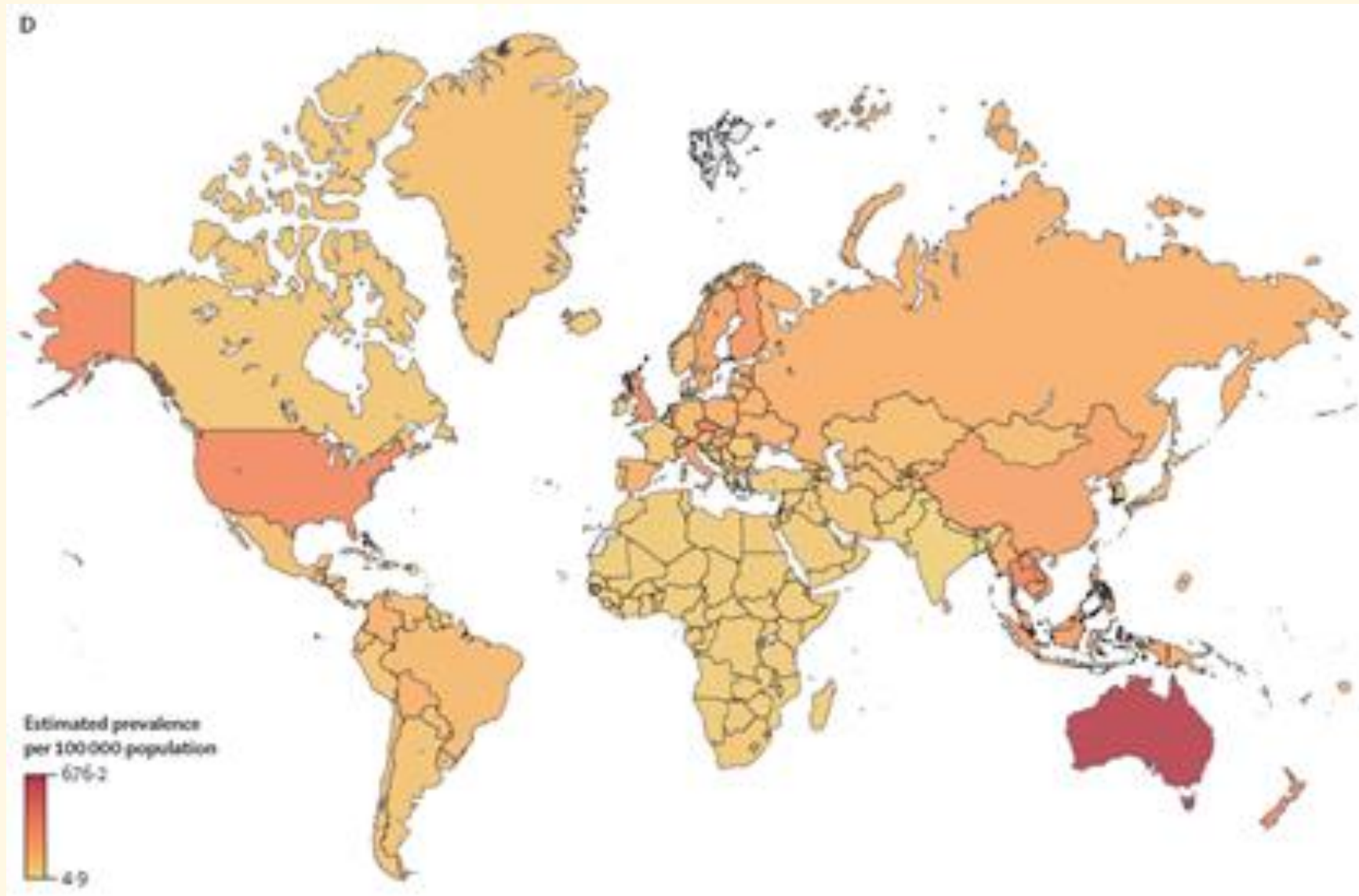
- 25M (up from 17M 2013)
- 0.5%
- women 0.2%, men 0.7%

# Cocaine use disorder



- GBD data 2017
- Cocaine dependence / severe use disorder was globally estimated to affect 64 people [95% CI 57-72] per 100,000 population in 2016
- 5.0M people [4.5-5.6M])
- Highest rates of dependent use are in high-income North American countries

# Methamphetamine use disorder



- Methamphetamine dependence / severe use disorder is globally estimated to affect 96 people [95% CI 70-128] per 100,000 population
- 7.4M people [5.4-9.8M]) (likely underestimate)
- Highest rates of dependent use are in Australia and North America

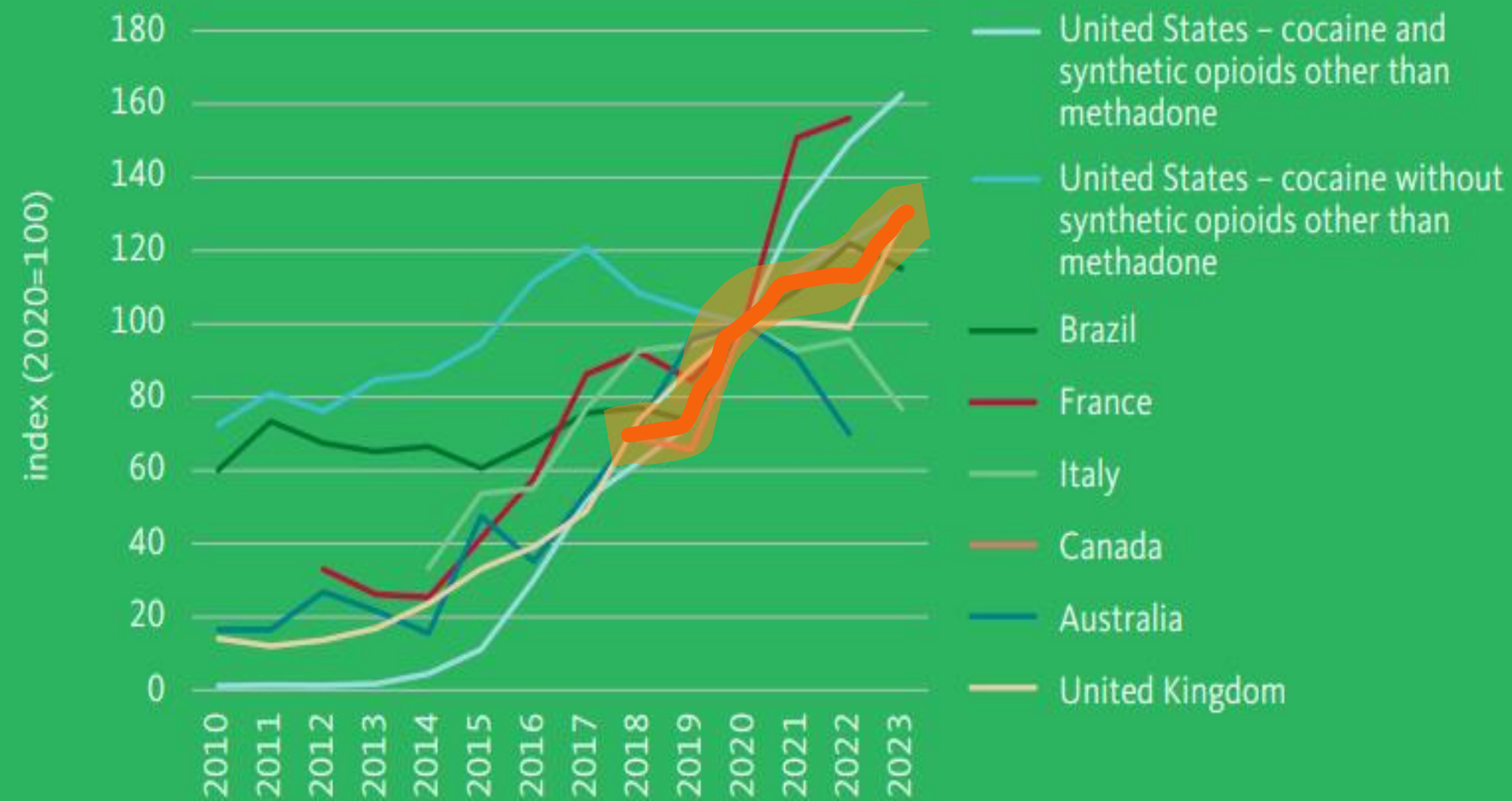


# Impacts

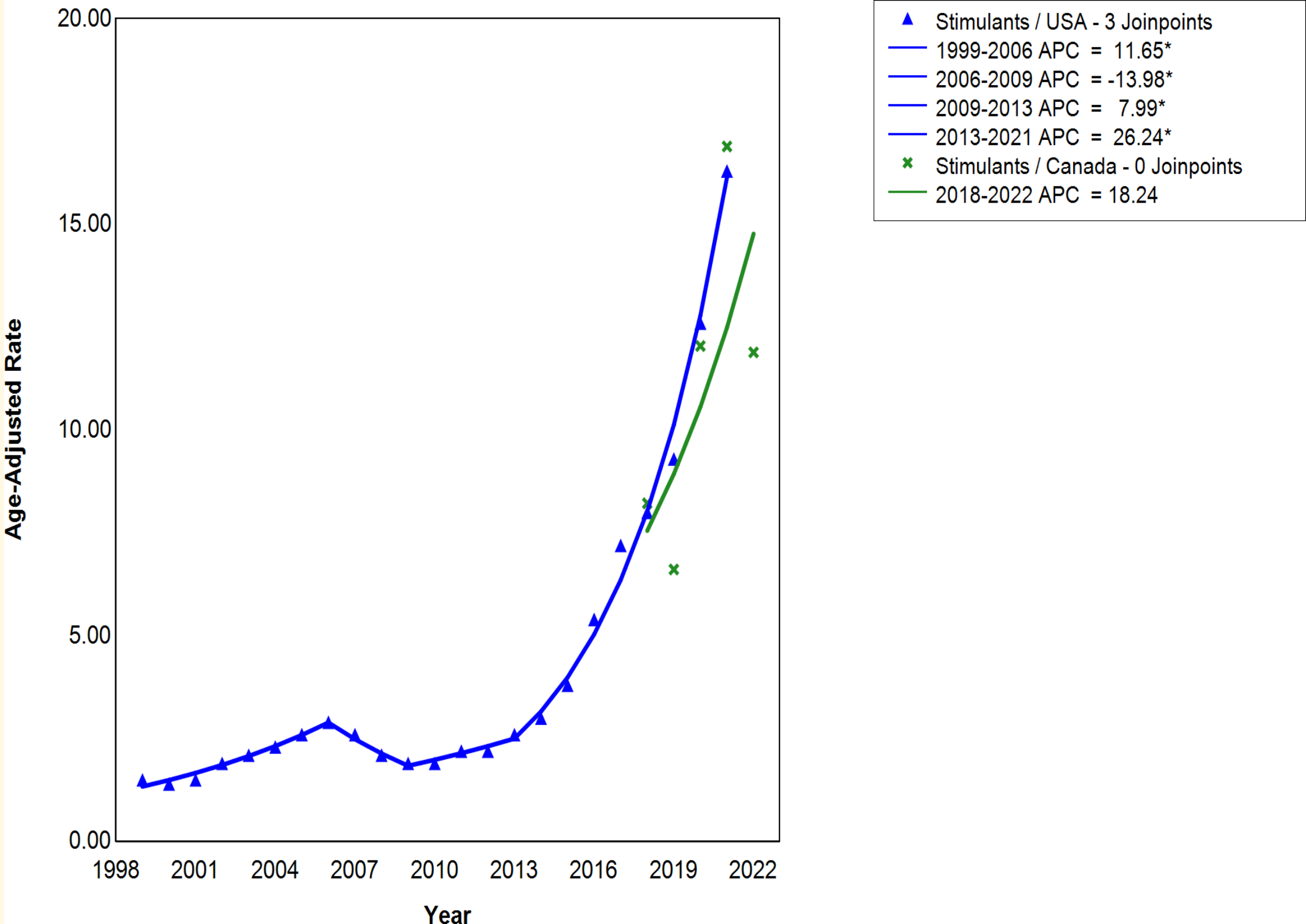


# Increasing cocaine-related deaths

TRENDS IN DEATHS DIRECTLY ATTRIBUTABLE TO COCAINE USE IN COUNTRIES WITH HIGH PREVALENCE OF COCAINE USE AND AVAILABLE DATA, INDEXED (2020 = 100), 2010–2023



# Stimulant involved deaths in US and Canada



Co-use of methamphetamine and opioids increases overdose risk

2021-24 overdoses in US: 73% stimulant involved also involved opioids

Stimulant alone: older, history cardiovascular disease

# Stimulant involved deaths starting to decline in US and Canada

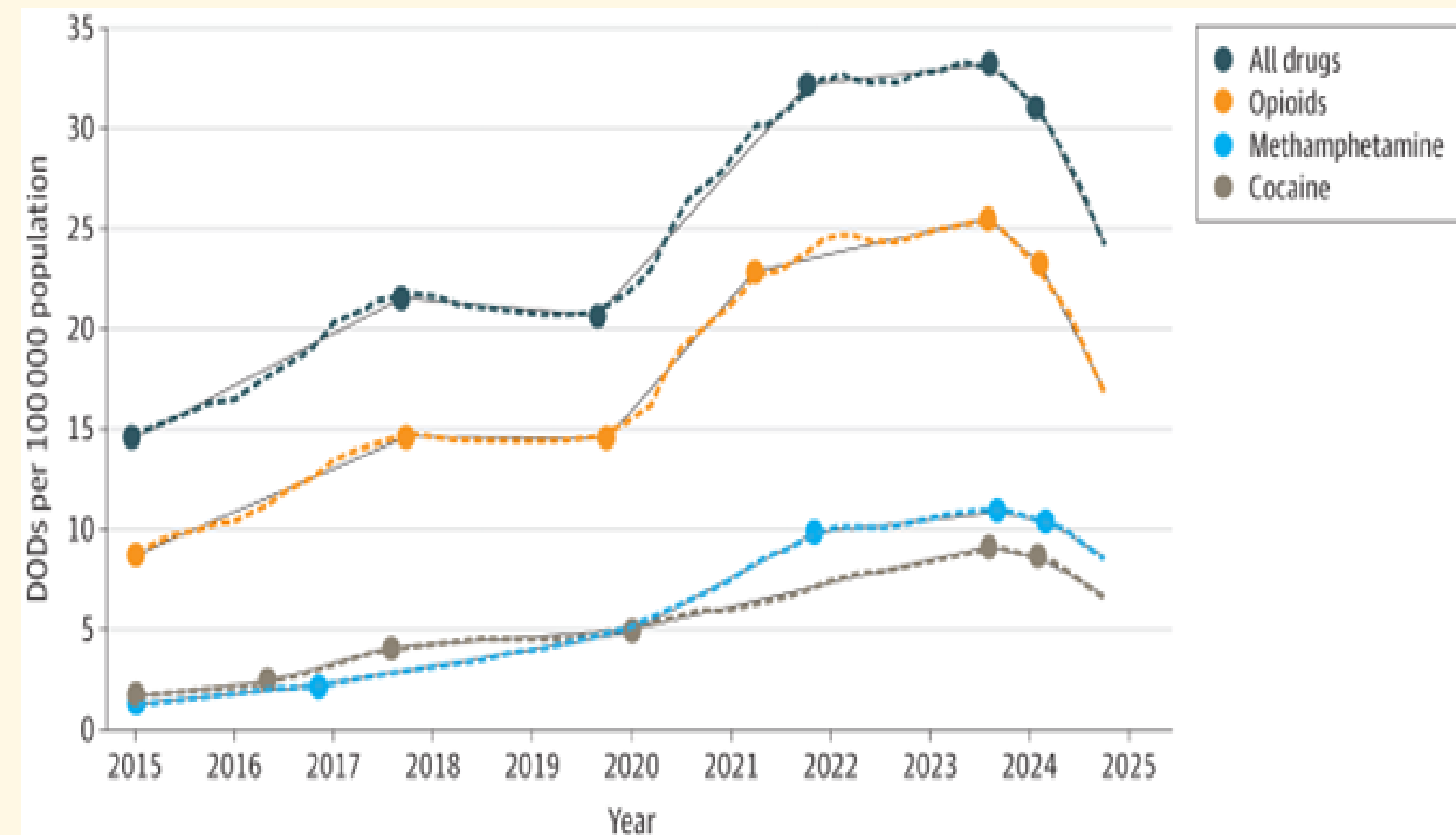
Declining since 2023 in US

29% decrease 4/2024-3/2025  
cf previous year in Canada

Not uniformly (by population  
or location)

Supply dynamics, reduced at  
risk population

Deaths involving stimulants declining  
at slower rate than opioids in US





# Mortality

Mortality is elevated among cohorts of people who use amphetamines and cocaine regularly

	Amphetamines	Cocaine
	SMR (95% CI)	SMR (95% CI)
Suicide	12.20 (4.89-30.47)	6.26 (2.84-13.80)
Drug poisoning	24.70 (16.67-36.58)	NA
Accidental injury	5.12 (2.88-9.08)	6.36 (4.18-9.68)
Cardiovascular	5.12 (3.74-7.00)	1.83 (0.39-8.57)
Homicide	11.90 (7.82-18.12)	9.38 (3.45-25.48)
All-cause	6.83 (5.27-8.84)	6.13 (4.15-9.05)

# Chronic harms - Stimulant use disorder (DSM-5-TR)

≥ 2 within 12 months
Used more than intended
Tried and cannot stop or cut down
A great deal of time spent procuring, using or recovering from use
Craving
Continued use despite impact on work, school, home responsibilities
Continued use despite impact on relationships
Gave up other activities
Used when physically hazardous
Continued use when physical and psychological problems
Tolerance
Withdrawal symptoms on reducing or ceasing use

## Severe ≥ 6

- Equivalent to ICD dependence
- US data: % dependent of those who ever used
  - 11% amphetamines
  - 16% cocaine

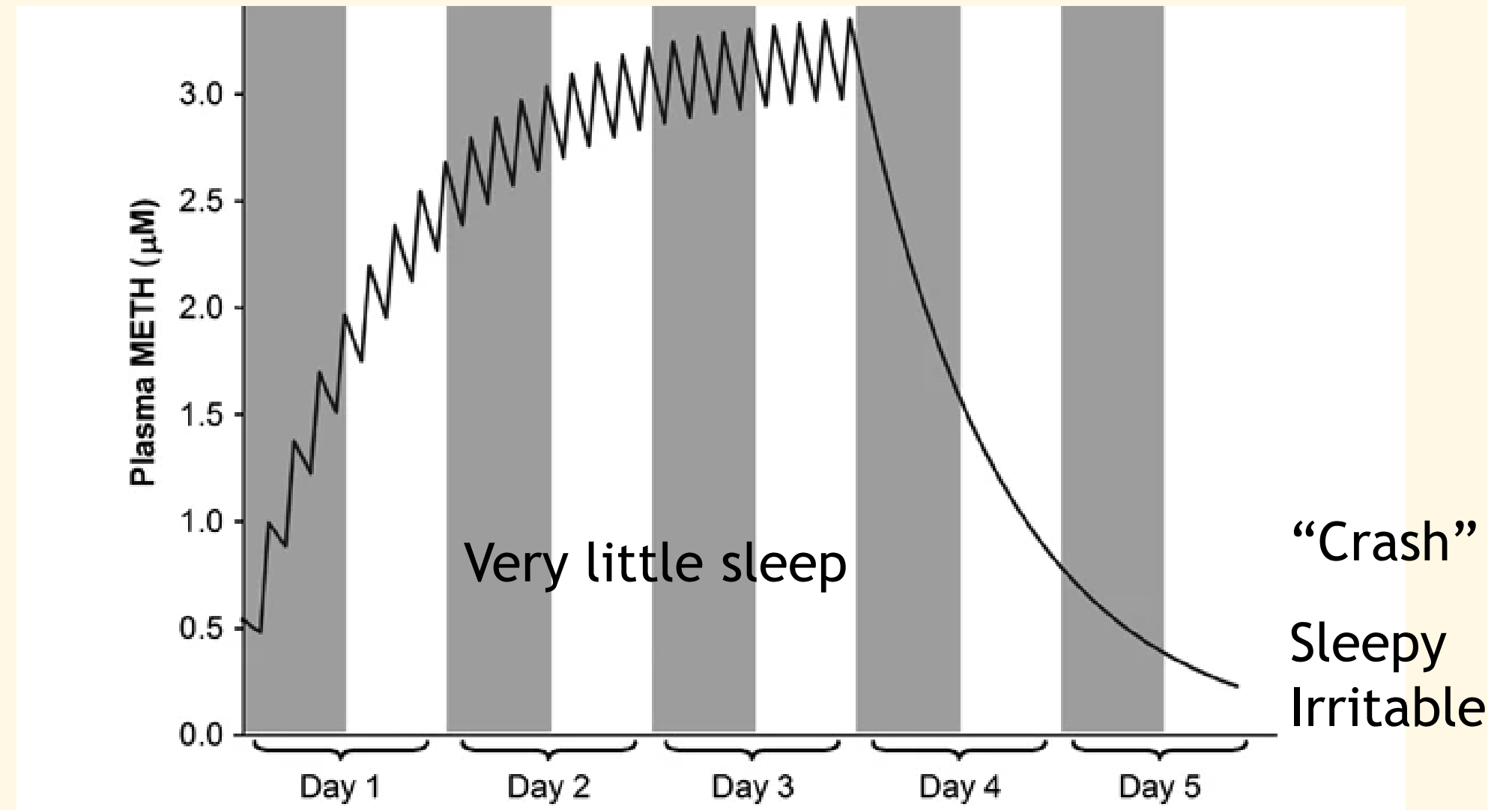
## Co-existing opioid use disorder

MA use - disruption to OAT retention  
Higher frequency use - greater impact on retention

# Methamphetamine use patterns

Occasional to daily

Some people may typically have three days of use followed by “crash period” eg:

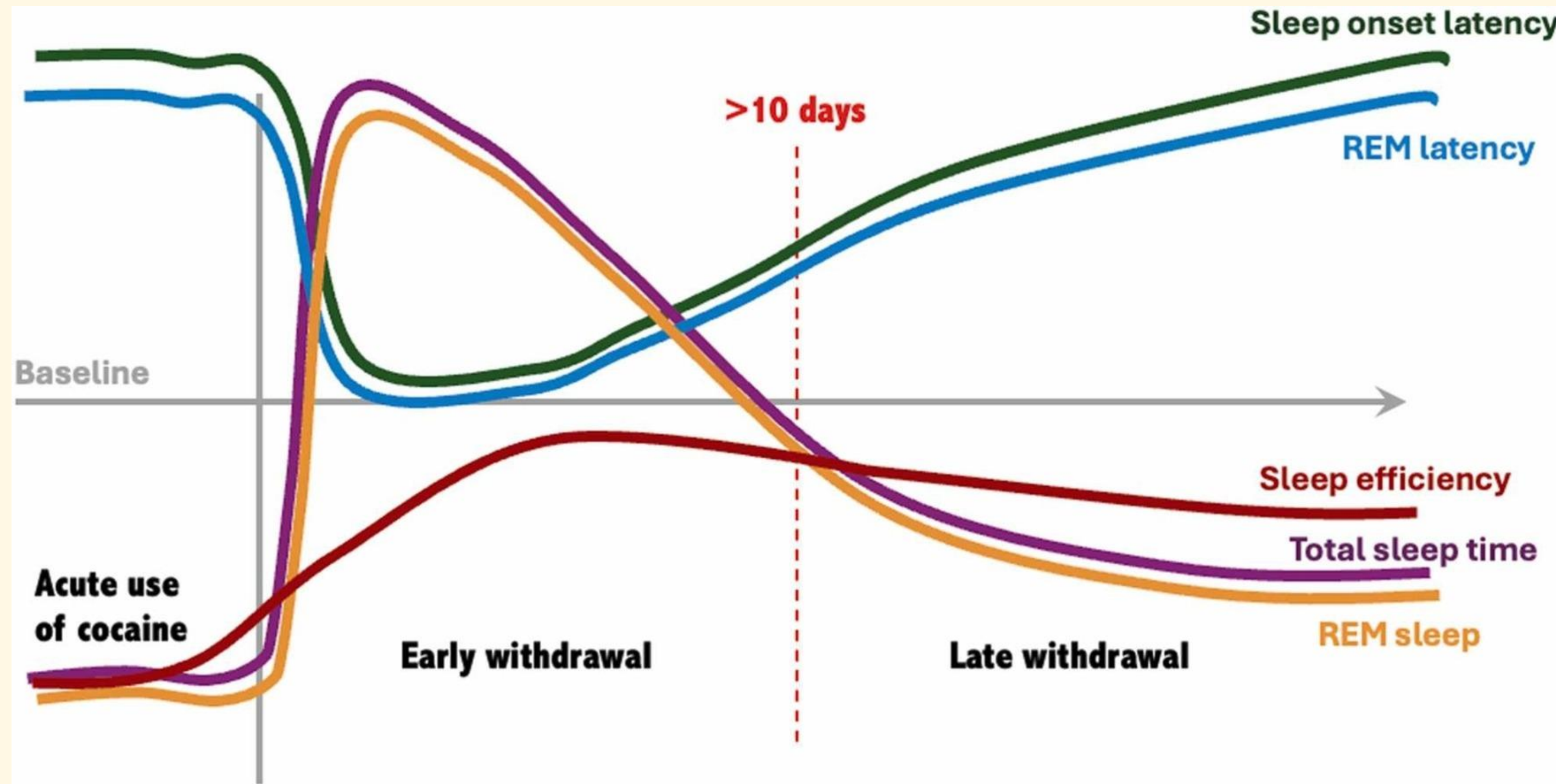


Kuczenski et al, Neuropsychopharmacol, 2009



# Sleep architecture disruption

Contributes to mood disorders,  
cognitive impairment, and psychosis



# Harms - physical

- Hyperthermia and dehydration
- Seizures
- Stroke (particularly haemorrhagic)
- Cardiovascular disease (hypertension, arrhythmias, cardiomyopathy, myocardial infarction) - increase overdose risk
- Pulmonary arterial hypertension
- Respiratory disease - inhalation route, nasal septum necrosis - cocaine insufflation
- Renal impairment - ischaemic (particularly cocaine), vasculitis, rhabdomyolysis
- Hepatotoxicity
- Immune suppression
- Injecting related skin and soft tissue infection, BBV, STI
- Injury, assault
- Violence - dose related effects in some samples, with increased risk in presence of psychosis and alcohol use; evidence inconsistent and difficult to disentangle from structural contextual factors (illegal drug market, gender)



# Methamphetamine use and HIV

## Behavioural

- Sharing of injecting equipment, blood
- Unprotected sex
- Prolonged sexual exposure +/- skin/mucosal tears
- Decreased use /adherence to HIV prevention/treatment

## Biological

- Methamphetamine immune suppression
  - Increased risk HIV infection
  - Increased HIV viral replication
- Combination methamphetamine and HIV
  - Faster progression of HIV associated neurocognitive disorder (HAND)
  - Faster progression to AIDS
  - Higher viral load
  - Antiretroviral resistance



RAJ CREATIONZS/Shutterstock.com

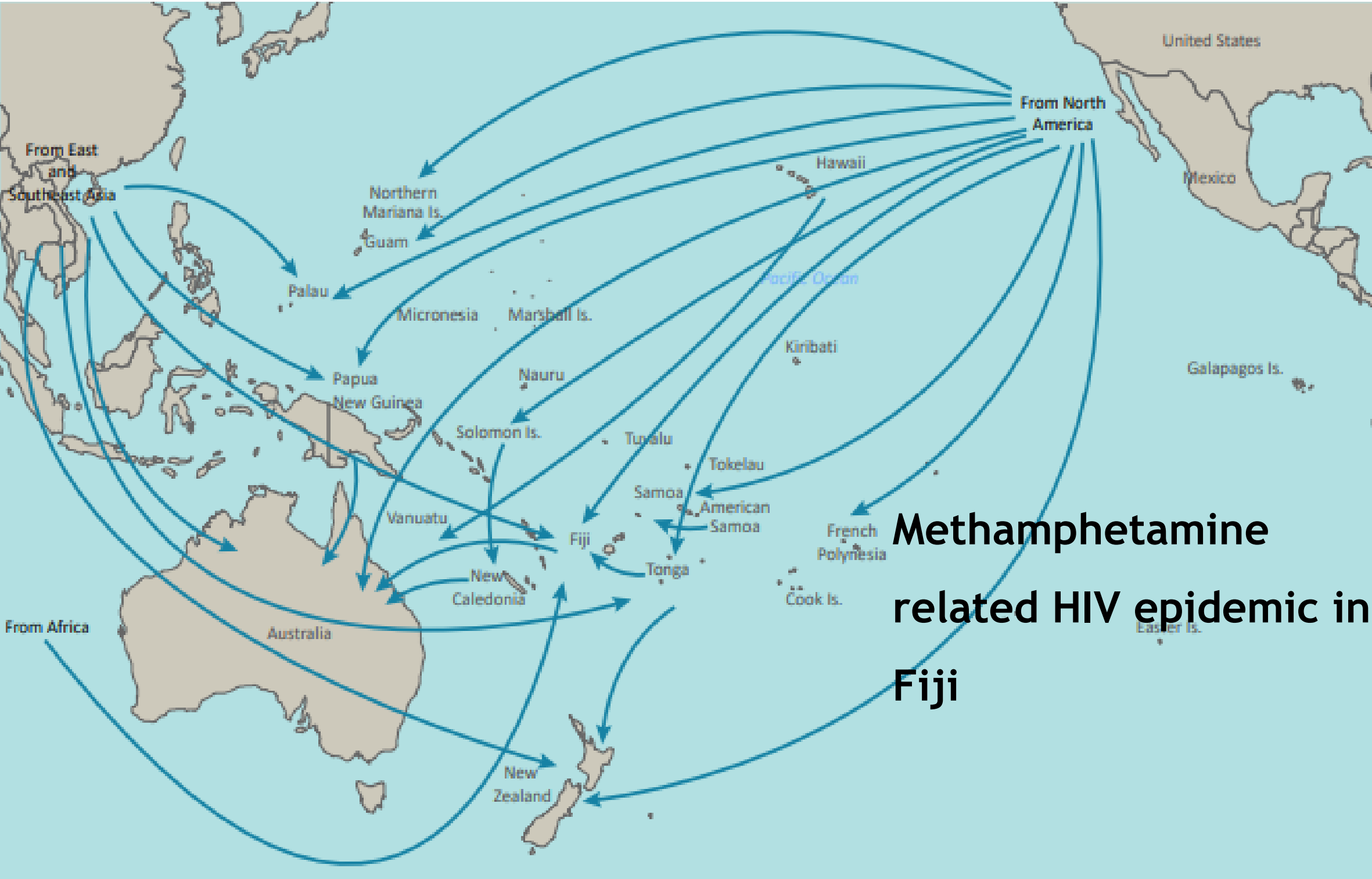
## Social

- Sexual and gender minority - may have worse health outcomes for combined methamphetamine use disorder and HIV infection
- Economic drivers of (unsafe) transactional /commercial sex work
- Access to harm reduction technologies



# Shift in methamphetamine-related harm

Map 1. Identified trafficking routes of methamphetamine impacting the Pacific



**Methamphetamine  
related HIV epidemic in  
Fiji**

# Mental health and cognition

- Chronic high dose use associated with
  - Anxiety
  - Depression
  - Suicidality
  - Psychosis
  - Neurocognitive impacts
- *Mental health benefits not well studied - some evidence that past 6-month (non-dependent use) of was protective against self reported depression (cocaine) and anxiety (methamphetamine) in one Australian sample of gay and bisexual men (univariate analysis)*

## Social harms

- Legal, financial, stigma, exclusion, family, work, involuntary treatment

# Individual and structural vulnerabilities

To developing use disorder

To experiencing harm from use

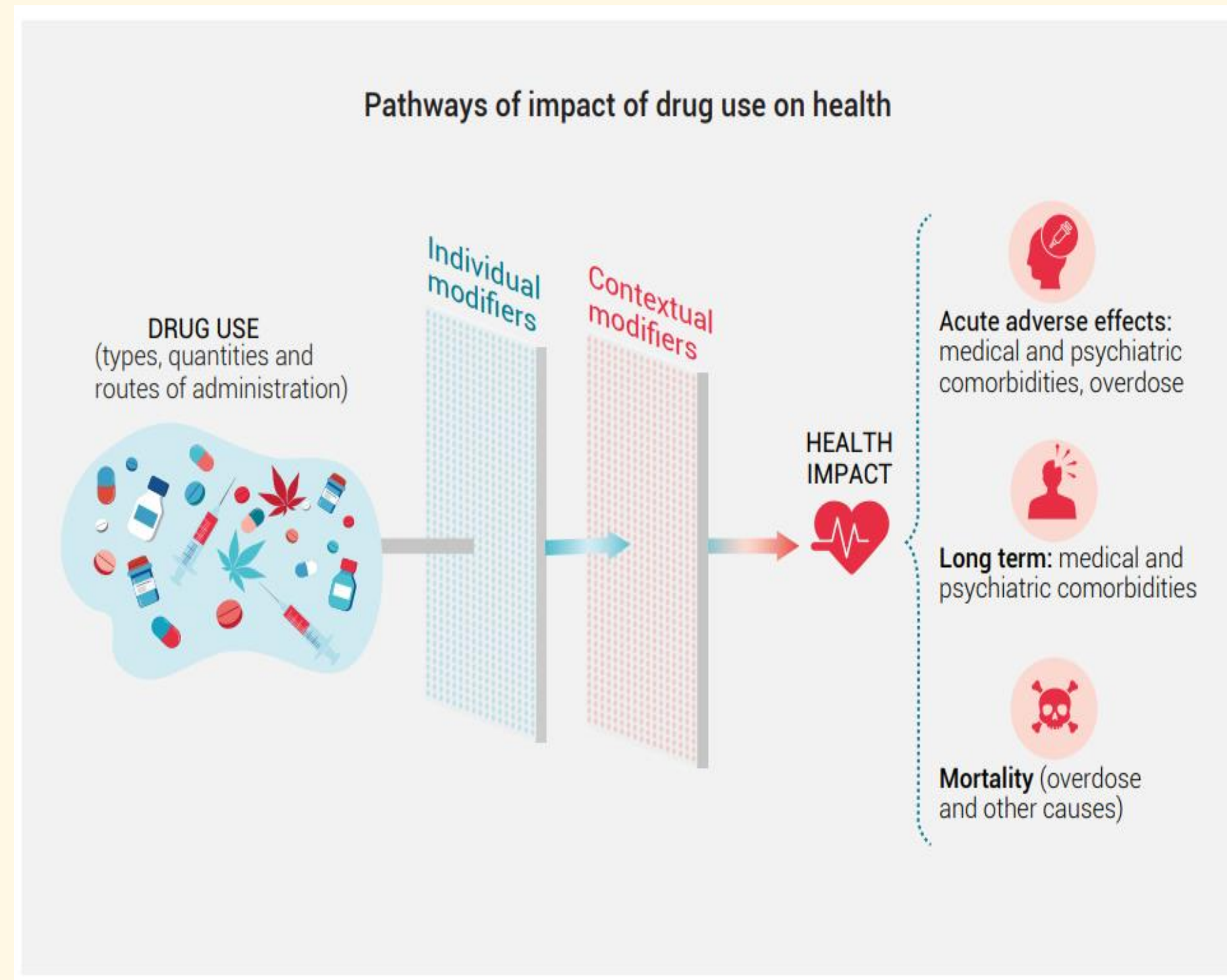
Individual modifiers eg

- Mood & anxiety disorders Trauma (particularly early/repeated) & PTSD
- Conduct & neurodevelopment disorders (e.g. ADHD)

associated with the initiation of drug use and development of drug use disorders

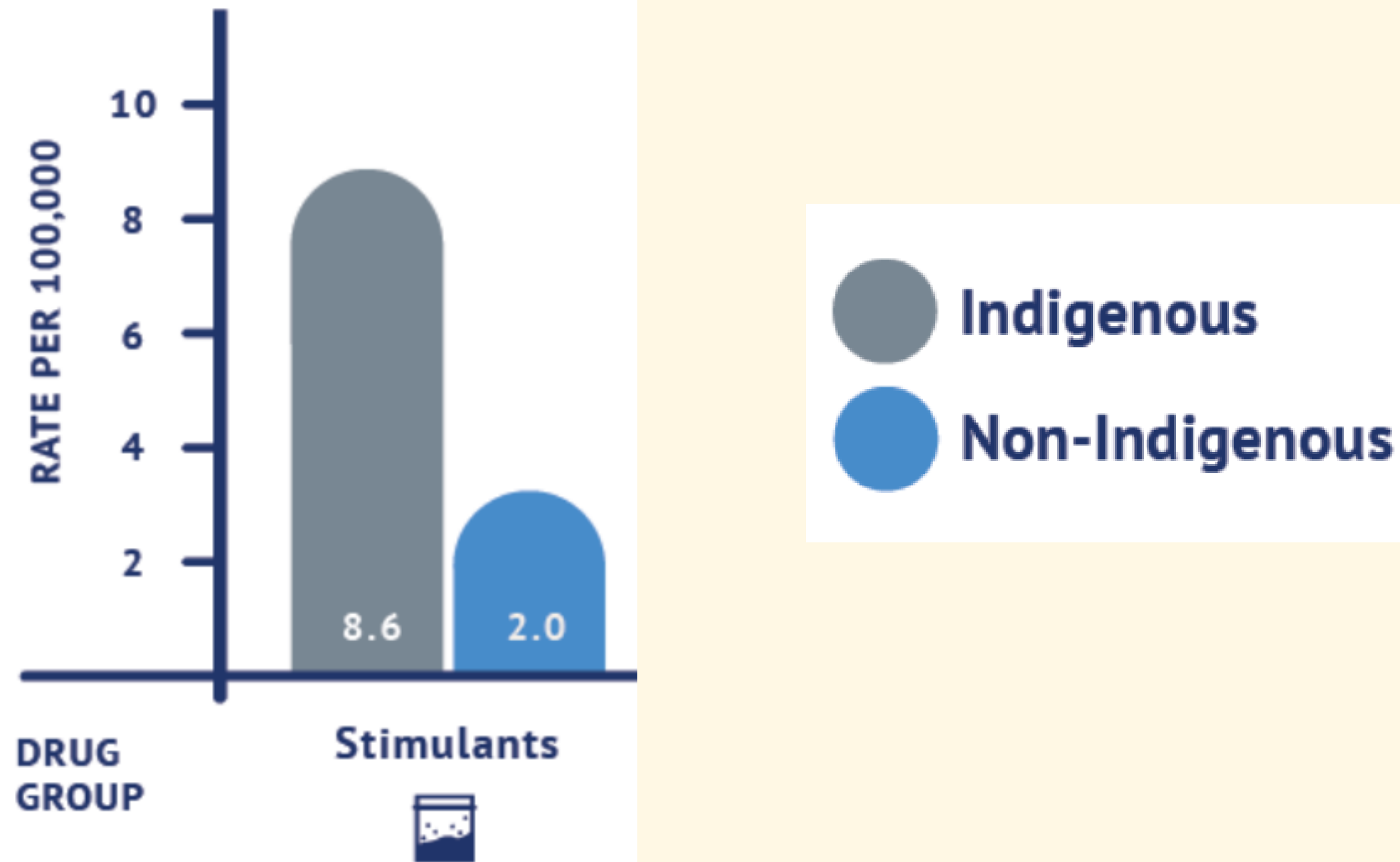
Contextual vulnerability and protective factors

Treatment access gap - delay (10 years), 1/18 women, 1/7 men globally

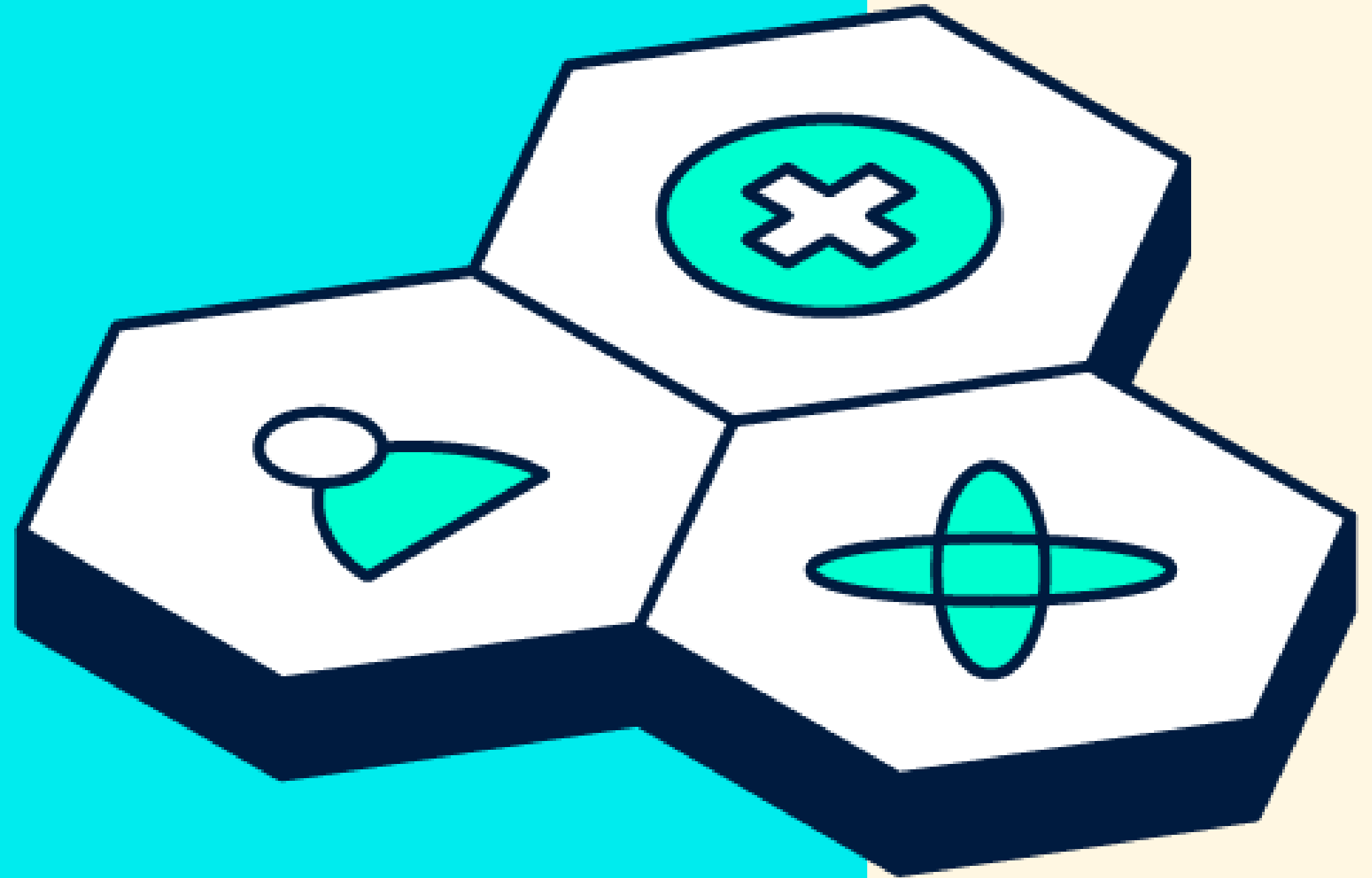




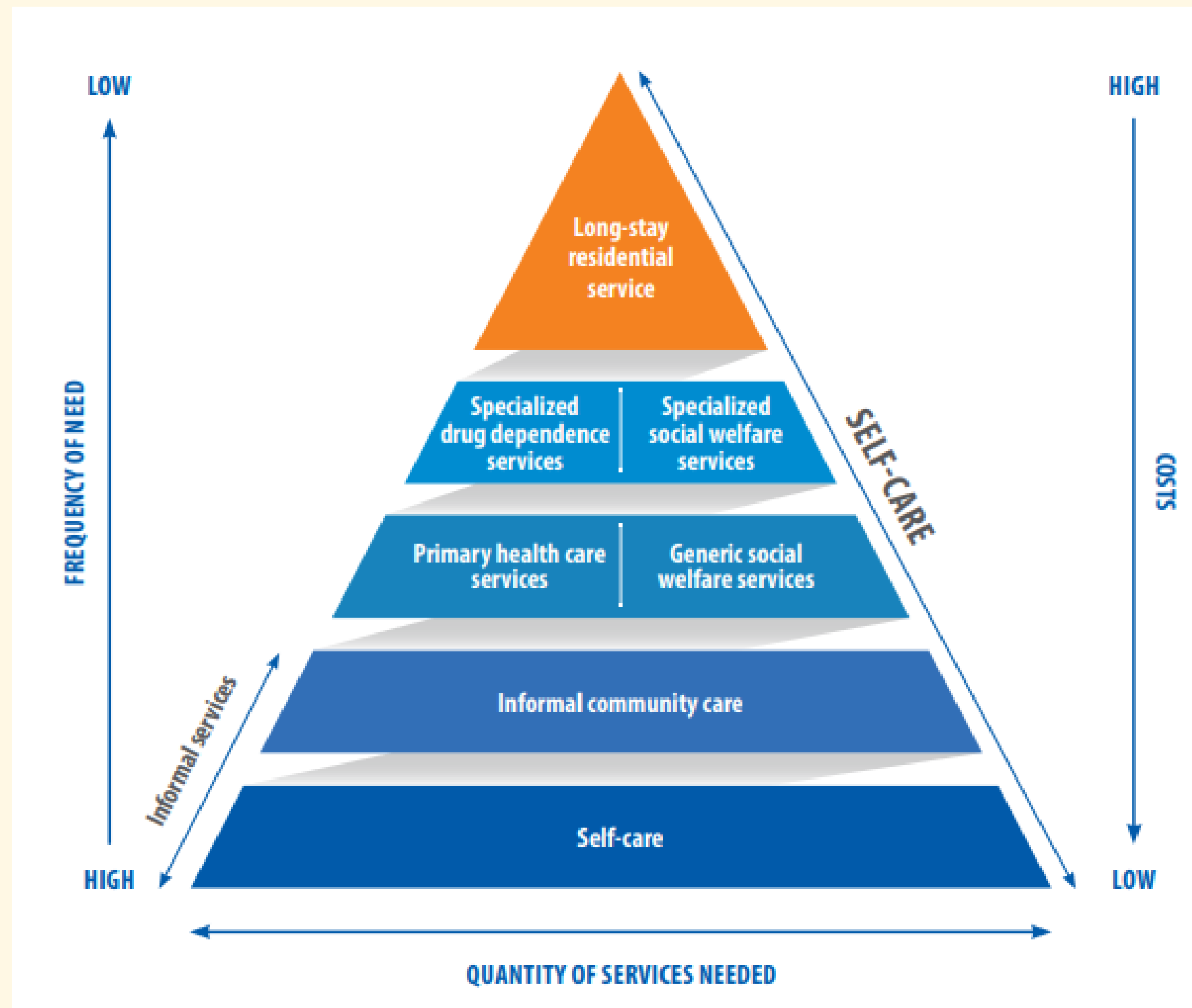
# Unintentional overdose deaths 2019-2023 Australia



# Treatment approaches

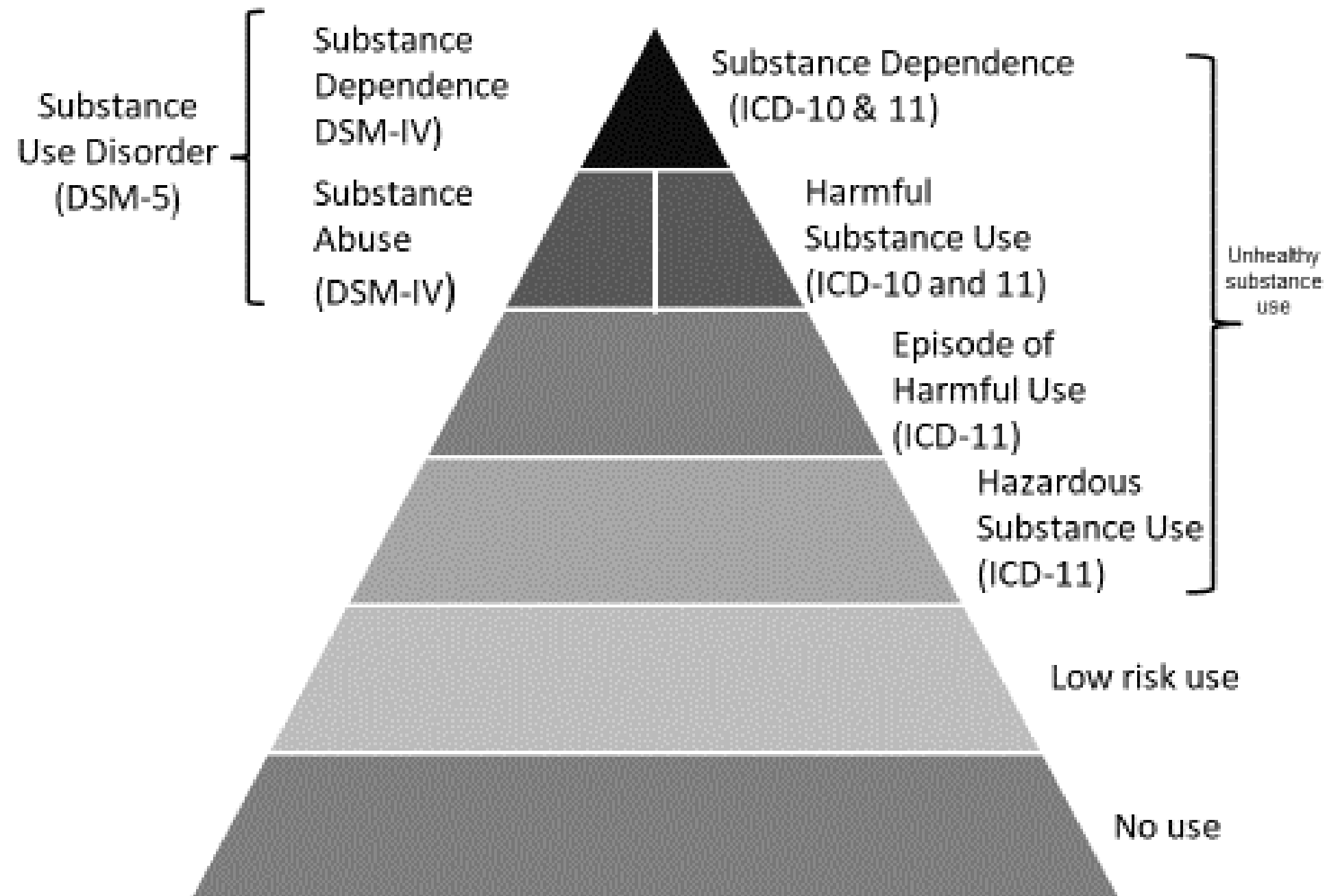


# Treatment frameworks: Current



- Service organisation pyramid for substance use disorder treatment and care
- Adapted from the Pyramid of Mental Health Services (WHO 2003)

# Treatment frameworks: Current



- Hierarchy of substance use disorder DSM and ICD (*with permission*)



# Harm reduction and supportive care

- Reduction of risks associated with route of administration (eg sterile injecting equipment, safer inhalation) and sexually transmitted infections (eg condoms)
- Reduction of risks associated with acute toxicity (including opioid eg drug consumption rooms, naloxone, access to emergency care)
- PrEP for HIV
- Low threshold access to primary care, treatment of co-existing conditions (eg STIs, HCV, hypertension)
- Welfare support, housing, income, family supports, access to quality childcare

# Non-pharmacological treatment

Standard of care involves psychosocial therapy to assist in reducing use, retention in treatment

Modest effect (better among those using fewer than half days of the month), not sustained following cessation

- Cognitive Behaviour Therapy (CBT)
- Motivational Interviewing (MI)
- Contingency management
  - Recommended in ASAM guidance & implemented in US DVA sites US; limited clinical uptake elsewhere
  - Provision of rewards (monetary) for achieving goals (usually verifiable abstinence); tend to begin at low value and increase as number of sequential goals achieved
  - Controversial (e.g. goals being rewarded); cost; fail to address social determinants of health; parallels to gambling if prize-draw based; justice surrounding payments; role of healthcare providers

# Pharmacological treatments



# Pharmacological treatments

Need for combination psychosocial and pharmacological interventions

Treatment of coexisting disorders

- Depression (one trial of mirtazapine positive for MAUD), anxiety
- High rates of coexisting ADHD (40% in our MAUD study)
  - Poorer outcomes among people with coexisting ADHD and SUD
  - Higher doses of stimulant medication may be required
  - Treatment of ADHD might improve treatment outcomes for SUD

No evidence-based pharmacotherapy for StUD in systematic reviews and meta-analyses

- Meta-analyses and systematic reviews - positive signals for prescription stimulants and bupropion
- Positive findings for one RCT bupropion-naltrexone, replication underway
- Cautious off-label use of bupropion-naltrexone and prescription stimulants recommended as second-line treatment by ASAM guidance



# Conclusions

- Increasing stimulant use and related harms globally
- Cocaine production rapidly increasing, methamphetamine availability spreading
- Important contribution to mortality
- Stimulant use disorder, physical, mental health conditions significant burden
- Comprehensive stepped care treatment frameworks including harm reduction, treatment of coexisting conditions, and psychosocial care
- Pharmacological treatment options remain second-line and off-label pending further research at scale

# Thank You

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