

# **Methamphetamine in the Murray Primary Health Network**

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## Executive Summary

Methamphetamine use is associated with societal, physical and psychological harms. Methamphetamine, particularly crystalline methamphetamine ('ice'), use and harm is a focus of community concern across the Murray Primary Health Network (PHN) catchment. However, there is little evidence regarding the patterns of methamphetamine use and harm in the region making health service planning particularly challenging. The aim of this review was to examine available evidence on the prevalence of methamphetamine use and related health service utilisation within the Murray PHN. In this context, the review includes an overview of the strengths and limitations of current data and studies that might inform health service planning in the Murray PHN catchment. Peer-reviewed and grey literature sources based on direct, indirect and modelling data were accessed from academic databases and a range of government and non-government agencies.

**The percentage of Australians who report using methamphetamine has decreased in recent years. Methamphetamine users report switching from powdered to crystal methamphetamine.**

To date, there is little evidence to suggest there has been a significant increase in the percentage of Australians who are using methamphetamine. However, a significant percentage of methamphetamine users report they have changed from methamphetamine powder to the crystalline form and there is evidence of a decline in the purity-adjusted price of methamphetamine. Little is known about patterns and trends in the route of methamphetamine administration or how the trajectory of methamphetamine smokers might differ (if at all) from that of injectors.

**There is no population data about methamphetamine use in the Murray PHN catchment.**

Estimates of the prevalence of methamphetamine use in non-metropolitan Victoria vary. There are no population data regarding patterns and prevalence of methamphetamine use in the Murray PHN catchment. It is not clear if the characteristics of methamphetamine users in rural areas are the same as those in capital cities. There is little evidence to support claims in media reports about methamphetamine use in the Murray PHN catchment. The 'ice epidemic' *may* be driven by increased harms, and not by an actual increase in the prevalence of methamphetamine use.

**Overall, the rate of methamphetamine-related health service presentations and methamphetamine drug offences has increased in the Murray PHN.**

Across the Murray PHN there has been an increase in the rate of methamphetamine-related ambulance attendances, AOD service presentations and drug offences. This is consistent with state-wide trends but within the PHN, these presentations are clustered in large regional centres.

**Current data is of limited value in assessing prevalence.**

There are a number of limitations of the existing data. Indirect data are of limited value in measuring prevalence and methamphetamine-related harm. Service utilisation data is one measure treatment demand but do not capture the number of unique users. Increased rates of service use may reflect (to varying degrees) reporting biases and/or underlying and unknown changes (increases) in the availability and purity of methamphetamine. Similarly, changes in police reported methamphetamine offences *may* reflect enhanced surveillance and/or reporting biases. There is no source of data that accurately measures other societal, physical and psychological harms to methamphetamine users and others.

Rural Australians demonstrate higher rates of risky health behaviour, including risky alcohol and illicit drug use. This *may* suggest more complex use trends of methamphetamine use amongst those living in rural and regional locations. Further research is needed to understand the characteristics of the Murray PHN population who use methamphetamine, their patterns of use, experiences of harms and service use.

**Studies to assist service planners.**

There are several prevalence and treatment studies underway that will inform service planning with the Murray PHN catchment. The Burnet Institute (in partnership with Monash University) is undertaking a study of 800 Victorians who use methamphetamine. The National Drug and Alcohol Research Centre is currently examining early warning systems for drug use surveillance as part of its 'Views' project. Clinical trials of pharmacotherapy for methamphetamine dependency are currently underway. The National Drug Policy Modelling Program population planning models for AOD treatment services highlight the need to take into account unmet need/demand and treatment effectiveness when planning services.

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## Abbreviations

ACIC	Australian Criminal Intelligence Commission
ADIS	Alcohol and Drug Information System
AOD	Alcohol and other drugs
ANSPS	Australian Needle and Syringe Program Survey
AODTS NMDS	Alcohol and Other Drug Treatment Services National Minimum Dataset
ASSAD	Australian Secondary Students Alcohol and Drug Survey
BBV	Blood-borne virus
DUMA	Drug Use Monitoring in Australia
EDRS	Ecstasy and Related Drugs Reporting System
GP	General practitioner
ICD-10	International Statistical Classification of Diseases and Related Health Problems
IDDR	Illicit Drug Data Report
IDRS	Illicit Drug Reporting System
LEAP	Law Enforcement Assistance Program
LGA	Local government area
MA	Methamphetamine
MATES	Methamphetamine Treatment Evaluation Study
MIX	Melbourne Injecting Drug User Cohort Study
NAC	N-Acetyl Cysteine
NCIS	National Coronial Information System
NDARC	National Drug and Alcohol Research Centre
NDSHS	National Drug Strategy Household Survey
NSPs	Needle and Syringe Exchange Programs
NWDMP	National Wastewater Drug Monitoring Program
PHN	Primary Health Network
PWID	People who inject drugs
SDRR	Sex, Drugs and Rock and Roll survey
UNODC	United Nations Office on Drugs and Crime
VEAD	Victorian Admitted Episodes Dataset
VEMD	Victorian Emergency Minimum Dataset
WWA	Wastewater analysis

## Introduction

The Murray PHN catchment includes, to varying degrees, 22 local government areas (LGAs) in the Goulburn Valley, North West, North East and Central Victoria regions with an estimated population of 644,500 (see Figure 1)<sup>1</sup>. Methamphetamine, particularly crystalline methamphetamine ('ice'), use and harm is of community concern within the Murray PHN<sup>2-7</sup>. However, there is little evidence regarding the patterns of methamphetamine use and harm in the region; making health service planning particularly challenging.



Figure 1– Murray PHN catchment map

## Aim

The aim of this review was to:

- Examine available evidence on the prevalence of methamphetamine use within the Murray PHN catchment;
- Identify current evidence regarding methamphetamine users' service-seeking behaviour and drug treatment utilisation within the Murray PHN catchment;
- Outline the limitations of using the available data to measure service demand and need; and
- Describe current research which may better help inform service planning in the catchment.

This review provides:

- 1) a summary of methamphetamine, its use and associated harms;
- 2) an overview of the known prevalence of methamphetamine use: nationally, in Victoria, and within the Murray PHN catchment;
- 3) a synthesis of the evidence regarding service demand and utilisation;
- 4) a detailed explanation of the limits of the available literature and data; and
- 5) an overview of principles and research studies in progress that might inform service planning in the Murray PHN.

Most of the data sources and reports applying to the Murray PHN catchment are embedded in national and state reports. Sources that identify areas within the Murray PHN catchment are specified.

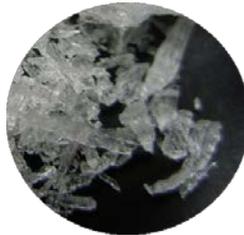
## Method

Peer-reviewed publications and grey literature reports were sourced from academic databases (including PubMed, Ovid Medline), leading alcohol and other drug research institutes (including National Drug Research Institute, National Drug and Alcohol Research Centre, Burnet Institute). These publications were generally based on three types of data; direct (primary) data<sup>a</sup>, indirect (secondary) data<sup>b</sup> and modelling data<sup>c</sup>. A more detailed description of each of these data sources (with specific reference to methamphetamine) is provided in Appendix 1.

### 1. Methamphetamine use and associated harms

Methamphetamine is a synthetically-produced psychostimulant drug which acts on the central nervous system generating the release of dopamine, norepinephrine and serotonin<sup>8</sup>. The acute effects of methamphetamine ingestion can include feelings of euphoria, well-being, self-confidence, increased alertness and sex drive, and reduced appetite<sup>9</sup>. Unlike the relatively short effects of other psychostimulants like cocaine (lasting 1-3 hours), the effects of methamphetamine can last 8-13 hours<sup>8</sup>. As the acute effects of methamphetamine begin to subside, users often experience a 'come down' or 'crash', at which time physical symptoms (fatigue, increased need for sleep) and mood changes (irritability and depression) are common<sup>8</sup>.

In Australia, the most widely available and used forms of methamphetamine are 'speed' powder and crystal/'ice', however it also comes in a paste form known as 'base' (see Figure 2).

POWDER	PASTE	CRYSTALLINE
APPEARANCE		
White or off-white powder 	Oily or waxy, brownish colour 	Translucent crystals or shards 
ALSO KNOWN AS		
Speed, goey, whizz	Base, pure, wax, point	Ice, crystal meth, meth, shabu, tina, glass, shard
COMMON ROUTES OF ADMINISTRATION		
Snorting, swallowing, injecting	Swallowing, injecting	Smoking, injecting (can also be snorted or swallowed)
POTENCY*		
Low to medium	Medium to high	High

\* This refers to 'typical' potency (purity). That is, powder can be the same potency as the crystalline form.

Figure 2: Types of methamphetamine (adapted from 'Cracks in the Ice')<sup>10</sup>

The route of administration effects the onset of methamphetamine's effects: oral ingestion has the slowest onset followed by snorting, while smoking and injecting have an almost instantaneous effect<sup>11</sup>.

Methamphetamine use is associated with societal, physical and psychological harms. In Australia, a *decade ago*, the societal costs of methamphetamine use were estimated to be \$3.7 billion annually<sup>12</sup> but, in recent

<sup>a</sup>Data collected for research purposes (e.g. cross-sectional and longitudinal general and drug-using (including methamphetamine-specific) population surveys).

<sup>b</sup>Data primarily collected for purposes other than research. (e.g. routinely collected drug treatment utilisation and drug-related crime data).

<sup>c</sup>Modelling here refers to analyses using parameters from surveys and other data sources to model dynamics of drug epidemics, such as using benchmark multiplier methods to estimate prevalence measures based on existing direct and indirect data sources.

years, these have increased dramatically<sup>13</sup>. Costs are associated with the criminal justice system (police arrests and seizures, prosecutions, courts and corrections)<sup>14</sup> road trauma (premature death; serious injury)<sup>15, 16</sup>; health service utilisation (hospital, mental health, drug treatment and other frontline services including ambulance attendances)<sup>17</sup> and welfare and labour market effects (reduced productivity, higher unemployment rates, resulting dependence on government benefits)<sup>12,18</sup>.

Methamphetamine users may experience physical harms including: poor oral health<sup>19</sup> cardiotoxicity and/or cardiovascular disease<sup>20</sup>; liver damage<sup>21</sup>; skin conditions<sup>22</sup>; acute injury, weight loss)<sup>15,20, 23-25</sup> and adverse mental outcomes including: anxiety, depression and psychosis<sup>20,26,27</sup>. Methamphetamine consumption can be fatal but the majority of methamphetamine-related deaths result from accidents, violence and suicide<sup>9,23</sup>. Use of methamphetamine may also precipitate social challenges including housing instability, financial problems, relationship breakdown<sup>26</sup>, criminal activity<sup>28,29</sup>; reduced work or school performance<sup>30</sup> and harm to others (e.g. use during pregnancy, environmental and health risks from 'meth labs'/waste)<sup>31-34</sup>.

### **Factors affecting severity of harms**

Methamphetamine use is not always 'problematic', nor do methamphetamine users necessarily experience harms: as with all illicit drug use, methamphetamine use can be normative and functional<sup>35</sup>. The likelihood of experiencing methamphetamine related harms is directly associated with increased levels of dependence, form (i.e. powder, paste or crystalline), purity, frequency of use and route of administration<sup>36-38</sup>. Traditionally, crystal methamphetamine use is associated with higher rates of harm than powder<sup>11,39</sup>. The typically higher purity form delivers a larger dose, is more likely to be smoked, tends to be used more frequently and is significantly more likely to be associated with methamphetamine dependence<sup>40, 41</sup>.

In general, people who inject drugs (PWID) having significantly poorer health and dependence-related psychosocial outcomes compared to those who use drugs via other routes<sup>42</sup>. Despite this, current evidence suggests that methamphetamine smokers experience similar levels of harms to those who inject (including comparable rates of psychosis and other mental health harms), with the exception of harms associated with needle-sharing behaviours (e.g. blood-borne virus (BBV) transmission)<sup>34,41</sup>.

Amongst those who use methamphetamine, poly-drug use (e.g. cannabis, alcohol, heroin, benzodiazepines and other psychostimulants)<sup>37</sup> is common and is associated with increased level of harms<sup>20</sup>. In addition to the risks inherent to poly-drug use (e.g. mental illness, risky sexual behaviours)<sup>43,44</sup>, concomitant use of methamphetamine and other drugs can pose an increased risk of methamphetamine toxicity and cardiac failure<sup>44</sup>.

## **2. Methamphetamine use**

This section provides a brief summary of the national prevalence of methamphetamine use and is followed by a description and synthesis of what is known about patterns of methamphetamine use in Victoria (with a focus on the Murray PHN catchment).

### **Australia**

Australia has one of the highest per capita rates of methamphetamine use in the world<sup>45</sup>. The 2016 National Drug Strategy Household Survey (NDSHS) found the percentage of Australians who reported using any type of methamphetamine for non-medical purposes had fallen compared to previous years. Amongst people aged 14 years or older, the percentage who reported 'ever' trying methamphetamine had significantly decreased from 7.0% in 2013 to 6.3% in 2016<sup>46,47</sup>. Similarly, the percentage who reported methamphetamine use in the previous 12 months had significantly decreased from 2.1% in 2013 to 1.4% in 2016; the lowest rate in nearly two decades (Figure 3)<sup>46, 47</sup>. In 2013, Australians with the lowest socioeconomic status were slightly more likely to report using methamphetamine (2.2% compared with 1.8%)<sup>46</sup>.

Recent findings from surveys of specific population sub-groups suggest that, amongst PWID, methamphetamine is now the most commonly reported drug last injected<sup>48</sup>. Similarly, amongst young Indigenous PWID, methamphetamine is the most commonly injected drug<sup>49</sup>. Amongst 2016 Illicit Drug Report System (IDRS) survey participants, 75% reported using methamphetamine in the previous six months<sup>50</sup>.

Detailed analysis from the 2013 NDSHS suggest people living in remote and very remote areas were twice as likely to have used methamphetamine as people in major cities (4.4% compared with 2.1%)<sup>46</sup>. However, there were no significant difference in the prevalence of use by people residing in inner/outer regional areas and major cities<sup>46</sup>. In contrast, secondary analyses of 2007-2013 NDSHS and Alcohol and Other Drug Treatment Services National Minimum Dataset (AODTS NMDs) suggest rates of lifetime and recent methamphetamine use are significantly higher amongst rural Australians than those in metropolitan areas<sup>51</sup>. The prevalence of

methamphetamine use in rural Australia *may* be higher than that in metropolitan areas but at the time of this review, detailed findings of 2016 NDSHS were not available.

Methamphetamine prevalence estimates have been generated using a 'multiplier method' applied to data from other sources. The estimated number of users for the year 2013-14 vary widely; the number of regular users ( $\geq$  monthly use in the last 6 months) ranged from 67,250-268,000, while the number of dependent users ranged from 43,232-160,000<sup>52,53</sup>. The vast differences in these findings reflect different approaches (i.e. multiplier data) used to estimate population prevalence.

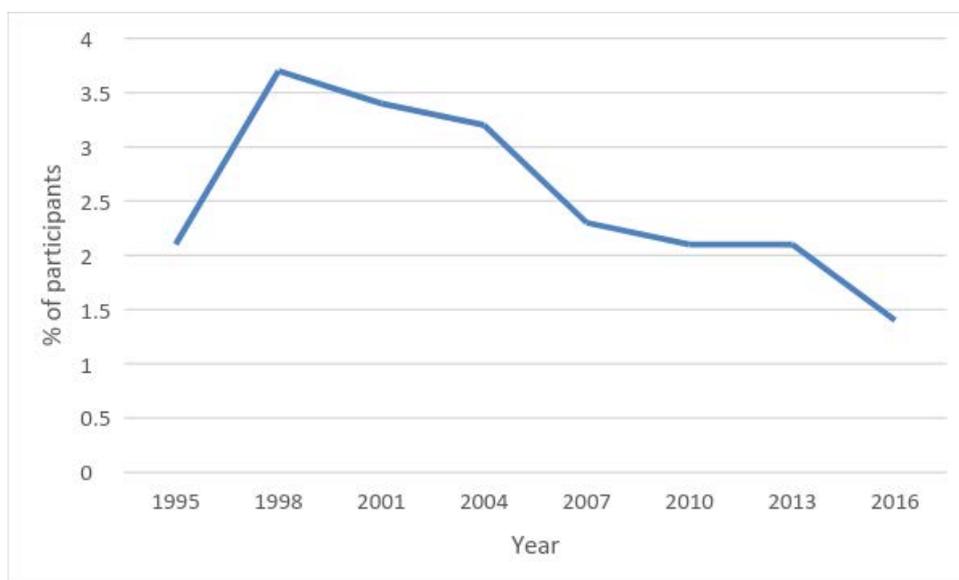


Figure 3 – Use of methamphetamine by Australians aged over 14 in the previous 12 months, 1995-2016 (National Drug Strategy Household Survey)

There is evidence that patterns of methamphetamine use have changed in Australia in recent years. The 2016 NDSHS found a significant decrease in the percentage of people reporting monthly methamphetamine (powder and crystal) use and a non-significant decrease in those using once or twice a year. In contrast, the percentage of people who reported using methamphetamine weekly or more frequently significantly increased from 9.3% in 2010 to 20.4% in 2016<sup>47,54</sup>. Similarly, 2015-16 IDRS participants reported a significant increase in the median number of days that any form of methamphetamine had been used in the past six months, from 24 days in 2015 to 36.5 days in 2016<sup>50</sup>. Amongst methamphetamine users, the increased frequency of use may be associated with reports of methamphetamine-related harms.

Despite NDSHS findings of an apparent decline in prevalence of methamphetamine use, there is evidence to suggest there has been a shift in the main form consumed by people using the drug. The percentage of 2016 NDSHS participants reporting powder/base as their main form had significantly decreased since 2013, with a concomitant increase in the percentage reporting crystal as the main form used from 50.4% in 2013 to 57.3% in 2016<sup>46,47</sup>. This finding is consistent with reports from the 2016 IDRS survey where the percentage of participants using crystal in the previous six months had significantly increased from 67% in 2015 to 73% in 2016 (see Figure 4)<sup>50</sup>. In addition, there was a significant decrease in the percentage who reported using powder (from 25% in 2015 to 20% in 2016)<sup>50</sup>. These findings are supported by other cross-sectional studies of methamphetamine users<sup>55</sup>.

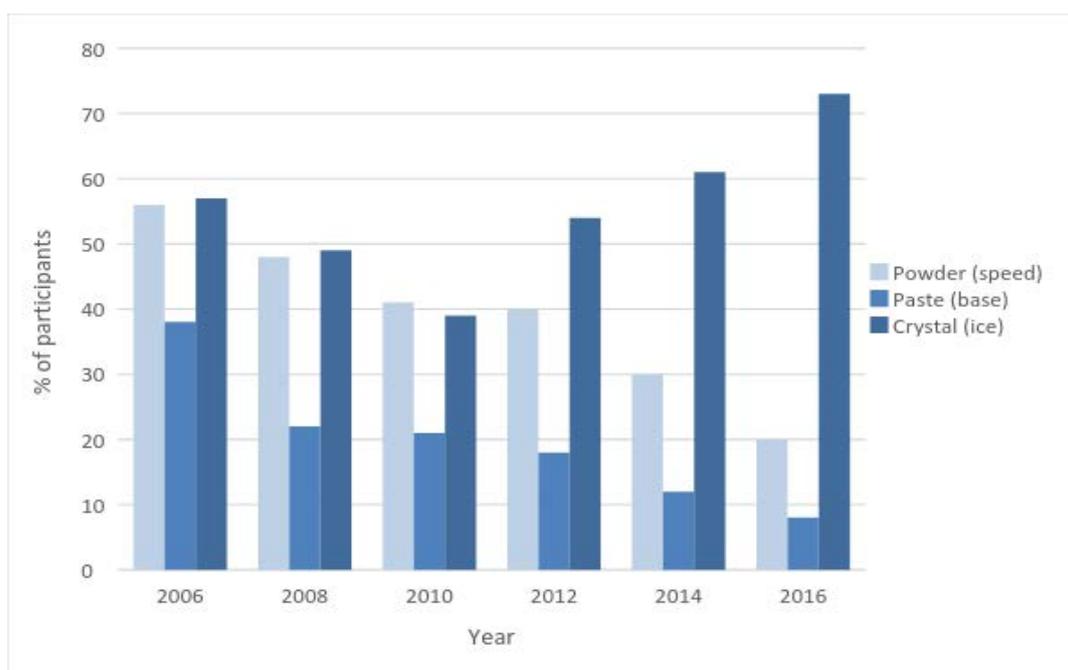


Figure 4: Form/s of methamphetamine used by Illicit Drug Reporting System participants in the preceding six months, 2006-2016

### Victoria

The percentage of Victorians using methamphetamine appears to have remained stable over the last decade. The 2013 NDSHS found 1.9% Victorians aged 14 years or older reported using methamphetamine for non-medical purposes in the previous 12 months<sup>46</sup>. These findings are consistent with the 2016 NDSHS national report (at the time of this review, the 2016 NDSHS state-level data were not available).

Consistent with the national profile, serial cross-sectional surveys with PWID suggests Victorian methamphetamine users have changed their frequency of use. IDRS participants reported the median number of days of any methamphetamine use, in the past six months, increased from 15 days to 19.5 days between 2015-2016<sup>50</sup>. The median number of days of crystal methamphetamine use among those reporting crystal methamphetamine use alone in the past six months was 22 days<sup>50</sup>. Similarly, Ecstasy and Related Drugs Reporting System (EDRS) participants reported the median number of days they had used crystal methamphetamine in the previous six months was 15 days; a significant increase since 2015<sup>56</sup>. Both of these amount to less than weekly use of methamphetamine.

There is also evidence to suggest Victorian users have shifted from their use of powder/base to crystal methamphetamine. The percentage of 2013 NDSHS Victorian participants reporting powder/base as their main form significantly decreased since 2010, while the percentage reporting crystal methamphetamine as their main form of use increased from 10.1% in 2010 to 43.9% in 2013<sup>46,54</sup>. This is consistent with reports from IDRS where the percentage of PWID who used methamphetamine powder and base significantly decreased since 2003<sup>50</sup>. In contrast, the percentage who reported using crystal methamphetamine in the preceding six months increased from 50% in 2003 to 73% in 2016<sup>50</sup>.

Community concerns about methamphetamine-related harms<sup>57</sup> could be (at least in part) attributed to the shift in methamphetamine form used, and further compounded by the dramatic increase in methamphetamine purity and decrease of purity-adjusted price. Victorian police seizure data suggests a dramatic increase in methamphetamine purity between 2009 and 2013<sup>58</sup>. At the same time the price of crystal methamphetamine has remained stable (and has more recently been in decline) despite the increase in purity, and has therefore resulted in a large fall in purity-adjusted price<sup>59,60</sup>.

### Rural Victoria (including Murray PHN catchment)

In 2013, the Pennington Institute was commissioned to undertake a community assessment of methamphetamine use in Victoria<sup>57</sup>. As part of this review, it was noted that there was a widely-held sentiment amongst frontline workers, particularly those in regional and rural areas, that there had been an increase in methamphetamine use from 2012 onwards<sup>57</sup>. In consideration of this, the report suggested that, "...the issue may not only be whether or not there is more or less methamphetamine use in regional or rural areas compared with Melbourne, but rather, its actual and perceived impacts upon communities"<sup>57</sup>.

Estimates of the prevalence of methamphetamine use in non-metropolitan Victoria vary. There are no direct data regarding patterns and prevalence of methamphetamine use in the Murray PHN catchment<sup>61</sup> and rural population prevalence estimates are typically based on generalisations from cross-sectional studies of existing methamphetamine users<sup>62</sup>, secondary data analyses<sup>51</sup> and wastewater analysis (WWA)<sup>63,64</sup>. A cross-sectional study of methamphetamine users in rural New South Wales found users were typically male, aged in their early thirties and unemployed<sup>62</sup>. Secondary analysis of the 2007-13 NDSHS data and 2006/07, 2009/10 and 2012/12 AODTS NMDS dataset suggested lifetime and recent use of crystal/methamphetamine was significantly higher among rural Australians than their metropolitan counterparts<sup>51</sup>. However, in contrast to Wallace et al., Roche et al. suggested these methamphetamine users in rural areas were likely to be aged 18-29 years and employed<sup>51</sup>.

Reports from WWA methamphetamine residue rates in rural areas are conflicting. Killian et al. (2016) reported significantly higher levels of residue in metropolitan Melbourne than in rural Victoria<sup>63</sup>, while the recent Australian Criminal Intelligence Commission (ACIC) report found the reverse was true<sup>64</sup>. The only published WWA findings within the Murray PHN (specifically Wodonga) found methamphetamine residue rates were lower than those found in metropolitan areas. These studies vary in the time and frequency of testing and generally, the sample sites are not disclosed<sup>57</sup>.

Compared to metropolitan populations, some rural communities are socially disadvantaged and this can be associated with higher levels of disease and mortality<sup>65</sup>. Overall, rural Australians also demonstrate higher rates of risky health behaviour, including risky alcohol and illicit drug use<sup>46</sup>. Together these trends *may* suggest more complex use trends amongst those living in rural and regional locations than those in metropolitan areas, but further research is required to understand whether this is indeed the case.

There are frequent reports of methamphetamine use and related harms in rural Victoria<sup>2,7,66</sup>. However, there is little evidence to support these claims. Overall, further research is needed to understand the characteristics of the Murray PHN population who use methamphetamine, their patterns of use, experiences of harms and service use.

### 3. Service demand/utilisation

Services utilised by methamphetamine users can be broadly categorised as 'specialist' alcohol and other drugs (AOD) treatment (including community-based, inpatient and residential care)<sup>67,68</sup> and 'generalist' health/social support services (including acute and community medical and psychological services)<sup>17,37</sup>. There is an absence of methamphetamine-specific pharmacotherapies available in Australia<sup>69,61,70</sup>. Harm reduction strategies are those traditionally utilised for alcohol or opiate dependence, including needle and syringe programs and safe use education programs<sup>67</sup>.

The following section provides an overview of methamphetamine users' service utilisation and specific data relating to service use in the Murray PHN catchment.

#### **Overall patterns of service use**

Reports of methamphetamine users' patterns of health service utilisation vary. In Sydney, young adult men reported frequent use of methamphetamine, in the previous 12 months, was associated with more frequent presentations to emergency departments and psychiatric hospitals but fewer presentations to general practitioners (GP) and psychological service providers<sup>17</sup>. In contrast, a Melbourne cohort with similar sociodemographic characteristics, reported they were most likely to use GPs followed by specialist drug counsellors/psychologists/psychiatrists<sup>37</sup>.

Nationally, the profile of clients captured in the AODTS NMDS reporting methamphetamine as their principle drug of concern is similar to that reported in methamphetamine user cohort studies. In 2013-14, the majority of methamphetamine treatment clients were male (68%) and aged 20-29 years (40%)<sup>60</sup>. Eleven percent reported being Indigenous. In the same year, the most common type of treatment provided to these people was counselling (45%) followed by assessment only (19%) and withdrawal management (11%). Most (70%) of this treatment took place in non-residential settings (13%) and nearly half (43%) were self/family-referred. Of those who used treatment services, injecting was the most common (44%) route of administration, followed by smoking (41%). Those presenting for treatment in 2013-14 were half as likely to inject methamphetamine and 12 times more likely to be a methamphetamine smoker than treatment users a decade earlier<sup>60</sup>. This *may* be indicative of users shifting from powder/base to crystal methamphetamine or alternatively, reflect a different group of treatment users.

Participants in the Methamphetamine Treatment Evaluation Study (MATES) and UnMET cohort studies are typically single, unemployed young adult men. Those who access specialist treatment typically report heavier

and riskier drug use patterns (dependence, polysubstance use and injecting drug use), higher levels of psychological distress and higher rates of methamphetamine-related harms<sup>37,71</sup>.

### Service use in the Murray PHN catchment

In the absence of direct data sources to determine the prevalence of methamphetamine use in the Murray PHN catchment, indirect data based on service utilisation *may* inform service planning. The Ambo Project (methamphetamine-related ambulance attendances) data is based on paramedics' reports of methamphetamine involvement (based on clinical assessment, patient or other person report). The Alcohol and Drug Information System (ADIS) data (meth/amphetamine-related episodes of care) is based on specialist drug and alcohol agencies (including community health centre) reports. Both the Ambo Project and ADIS provide service utilisation data by LGA.

### Ambulance attendances

As per Figure 5, overall there were increases in rates of methamphetamine-related ambulance attendances across six LGAs in the Murray PHN between 2011/12 and 2014/15. The data fluctuates across the four-year period and attendances are clustered in a few locations. There has been a consistent substantial increase in Greater Shepparton and Mitchell, higher than the increase observed in metropolitan Melbourne (average of data across 31 LGAs in Melbourne). Changes in the other reported LGAs are largely consistent with the trend but there was a decrease in Greater Bendigo and Campaspe in 2014/15.

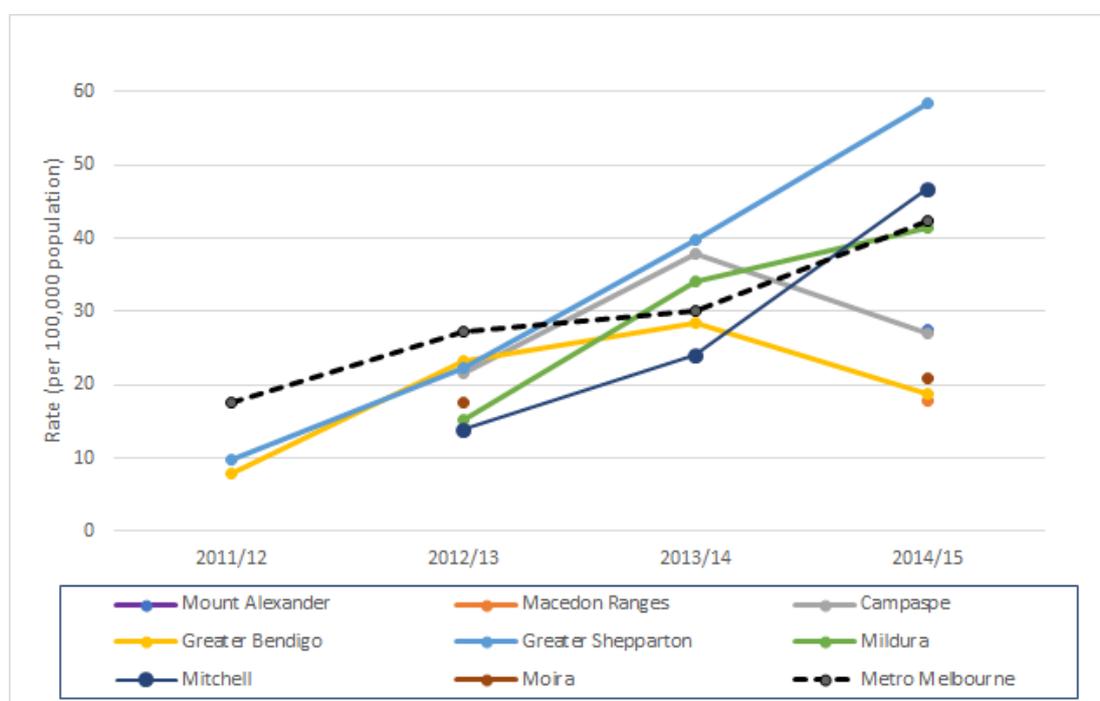


Figure 5: Methamphetamine-related ambulance attendances in 6 Murray PHN LGAs and metropolitan Melbourne (average) 2011/12 – 2014-15<sup>72</sup>

\* Data are not available for all years and not reported for LGAs with less than five cases

### Drug treatment services

Following a decrease through to 2010/11, there was an increase in the crude rate of people presenting for specialist AOD treatment nominating methamphetamine as their primary drug problem, mirroring the trend in ambulance data from 2011 through to 2015. Aggregated data from the 22 Murray PHN LGAs and the 31 metropolitan Melbourne LGAs, show similar increases in treatment use in the last decade (see Figure 6).

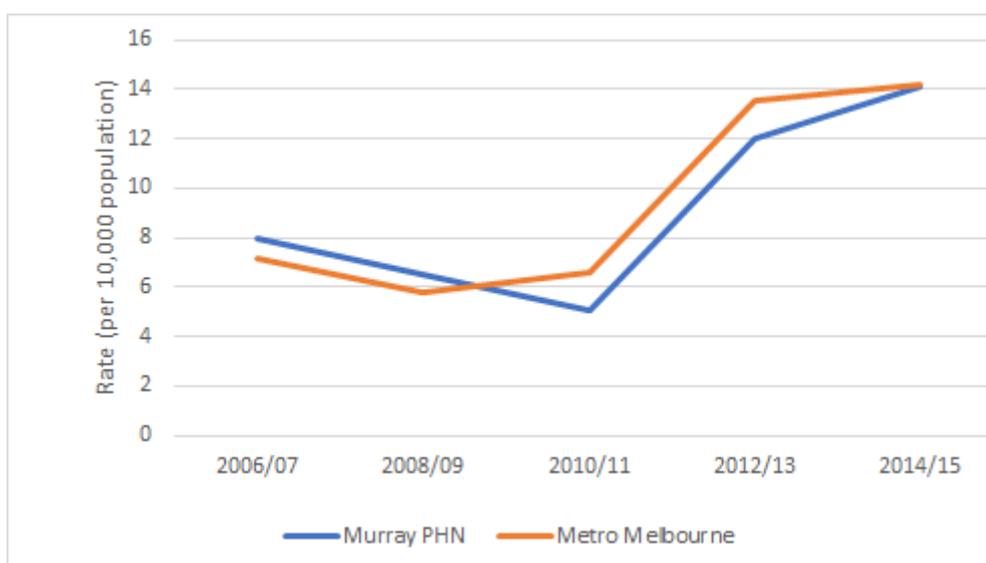


Figure 6: Amphetamine-related treatment episodes in Murray PHN and metropolitan Melbourne, 2006/07-2014/15<sup>\*73</sup>

\*Data was not available for six Murray PHN LGAs (Alpine, Buloke, Indigo, Loddon, Mansfield, Strathbogie, Towong)

The 2010/11-2014/15 ADIS data shows, where meth/amphetamine is the principle drug of concern, the number of episodes of treatment vary across the Murray PHN but again, are clustered in a few locations. Unsurprisingly, for the ten-year period, the highest percentage of treatment episodes were provided in Greater Shepparton (19%), Greater Bendigo (17%) and Mildura (19%)(see Table 1).

Number of meth/amphetamine treatment episodes by LGA in the Murray PHN 2010/11 -2014/15 <sup>a</sup>							
LGA	2010/ 2011	2011/ 2012	2012/ 2013	2013/ 2014	2014/ 2015	Total	% all episodes in PHN
Alpine	-	-	7	5	-	12	0.3
Benalla		10	14	17	6	47	1.3
Buloke	0	-	-	6	-	6	0.2
Campaspe	14	20	50	71	81	236	6.6
Central Goldfields	10	6	7	26	15	64	1.8
Gannawarra	8	-	7	29	34	78	2.2
Greater Bendigo	43	81	134	172	184	614	17.1
Greater Shepparton	70	99	182	204	139	694	19.3
Indigo	0	-	10	10	-	20	0.6
Loddon	-	-	-	-	-	0	0.0
Macedon Ranges	9	20	51	59	31	170	4.7
Mansfield		0	6	10	-	16	0.4
Mildura	58	78	143	200	200	679	18.9
Mitchell	12	41	72	95	58	278	7.7
Moira	7	17	26	33	19	102	2.8
Mount Alexander	14	-	24	30	16	84	2.3
Murrindindi	12	9	8	30	15	74	2.1
Strathbogie	0	8	8	5	-	21	0.6
Swan Hill	7	24	30	40	17	118	3.3
Towong	-	-	-	-	-	0	0.0
Wangaratta	12	23	14	42	9	100	2.8
Wodonga	23	33	57	48	15	176	4.9
<b>Total</b>	<b>299</b>	<b>469</b>	<b>850</b>	<b>1132</b>	<b>839</b>	<b>3589</b>	<b>100</b>

Table 1: Number of meth/amphetamine-related treatment episodes in Murray PHN LGAs 2010/11-2014/15<sup>\*73</sup>

a. Meth/amphetamine is the principle drug of concern

When this treatment data is presented as rates/10,000 population there is considerable variation across the LGAs. However, as noted above, the treatment episode numbers above are small in some LGAs so these rates should be interpreted with caution. In the LGAs with the highest *numbers* ( i.e.  $\geq 100$ /year) of treatment episodes, the 2014/15 treatment rates are higher than the Victorian average of 15/10,000; Greater Shepparton (22/10,000), Greater Bendigo (17/10,000) and Mildura (38/10,000) (see Table 2 below).

<b>Meth/amphetamine treatment Episodes/10,000 population by LGA in the Murray PHN 2010/11 - 2014/15<sup>a</sup></b>					
	<b>2010/2011</b>	<b>2011/2012</b>	<b>2012/2013</b>	<b>2013/2014</b>	<b>2014/2015<sup>b</sup></b>
Alpine	-	-	6.1	4.3	-
Benalla	-	7.4	10.1	12.4	4.4
Buloke	-	-	-	9.0	-
Campaspe	3.7	5.4	13.5	19.2	21.9
Central Goldfields	8.2	4.8	5.4	20.8	12.0
Gannawarra	7.5	-	6.7	28.1	33.4
Greater Bendigo	4.3	8	12.9	16.3	17.2
Greater Shepparton	11.3	16.1	29.3	32.5	22
Indigo	0.2	-	6.5	6.4	-
Loddon	-	-	-	-	-
Macedon Ranges	2.1	4.6	11.6	13.3	6.9
Mansfield	-	-	7.3	12.7	-
Mildura	11.2	15	27.4	38	37.7
Mitchell	3.5	11.6	20	25.3	15
Moira	2.5	5.9	9	11.6	6.6
Mount Alexander	8	-	13.4	16.9	8.7
Murrindindi	9.2	6.7	6	21.9	11
Strathbogie	0.1	8.4	8.3	5.3	-
Swan Hill	3.2	11.4	14.5	19.4	8.1
Towonga	-	-	-	-	-
Wangaratta	4.4	8.3	5.2	15.3	3.3
Wodonga	6.6	9	15.6	12.9	3.8
<b>Victoria</b>	<b>6.5</b>	<b>9.5</b>	<b>13.8</b>	<b>17.7</b>	<b>15.1</b>

Table 2: Amphetamine-related treatment episodes/10,000 population in Murray PHN LGAs, (compared to Victoria), 2010/11-2014/15\*<sup>73</sup>

- Meth/amphetamine is the principle drug of concern
- Where number of treatment episodes <100/year (all LGAs except Greater Bendigo, Greater Shepparton and Mildura) these rates should be interpreted with caution.

### Hospitalisations

There is little information about amphetamine-related hospitalisations across LGAs within the Murray PHN LGAs. In the period 2006/07 to 2014/15 hospital admissions across the catchment were <0.1/10,000 population<sup>73</sup>.

### Drug Offences

The number of police reported methamphetamine offences across the Murray PHN varies. For the period 2010-2016, the number of methamphetamine offences, across the PHN, ranged from 3 in 2010 to 488 in 2016. As per Table 3, the location of these offences varied with the highest number recorded in Shepparton (287), Mildura (194) and Greater Bendigo (159). Overall, for the period 2010-2016, 9.4% of all Victorian methamphetamine offences occurred in the 22 LGAs in the Murray PHN catchment.

Number and percentage of Victorian methamphetamine offences in Murray PHN LGAs and Victoria 2010-2016								
	2010	2011	2012	2013	2014	2015	2016	Total
Alpine	0	0	0	2	3	3	5	13
Benalla	0	0	0	3	9	10	6	28
Buloke	0	0	0	0	1	0	1	2
Campaspe	0	1	0	9	4	15	39	68
Central Goldfields	0	0	1	0	0	3	9	13
Gannawarra	0	0	0	0	2	4	8	14
Greater Bendigo	0	1	1	13	34	54	56	159
Greater Shepparton	0	0	12	30	66	70	109	287
Indigo	0	0	0	1	2	4	2	9
Loddon	0	0	1	1	0	1	2	5
Macedon Ranges	0	0	0	5	6	14	30	55
Mansfield	0	0	0	0	0	2	2	4
Mildura	1	1	1	6	48	58	79	194
Mitchell	0	0	1	3	10	16	40	70
Moira	0	0	0	1	8	5	17	31
Mount Alexander	0	0	0	1	3	9	11	24
Murrindindi	0	0	1	0	3	4	1	9
Strathbogie	0	1	0	1	2	3	0	7
Swan Hill	2	0	0	4	12	11	32	61
Towong	0	0	0	0	0	0	0	0
Wangaratta	0	2	3	4	15	18	19	61
Wodonga	0	4	3	4	10	14	20	55
<i>All offences in Murray PHN</i>	3	10	24	88	238	318	488	1,169
<b>All Victoria</b>	<b>79</b>	<b>130</b>	<b>351</b>	<b>1,007</b>	<b>1,932</b>	<b>3,075</b>	<b>5,492</b>	<b>12,377</b>
<b>% of Victorian offences in Murray PHN</b>	<b>3.8</b>	<b>7.7</b>	<b>6.8</b>	<b>8.7</b>	<b>12.3</b>	<b>10.3</b>	<b>8.9</b>	<b>9.4</b>

Table 3: Number and percentage of Victorian methamphetamine offences in Murray PHN LGAs 2010-2016<sup>74</sup>

The rate of police reported methamphetamine offences across the Murray PHN varies. As per Table 4, for the period 2010-2016, the rate of methamphetamine offences ranged from 9.5/100,000 in Swan Hill to 168/100,000 population in Greater Shepparton in 2016. For the period 2014-2016, the biggest rates of change were seen in Mildura (63%), Greater Shepparton (61%) and Greater Bendigo (60%). This compares to a statewide increase of 174% for the same period.

Rate of methamphetamine offences in Murray PHN LGAs and Victoria/100,000 population 2010-2016								
	2010	2011	2012	2013	2014	2015	2016	% change 2014-2016 <sup>a</sup>
Alpine	0.0	0.0	0.0	16.6	25.0	25.3	41.7	-
Benalla	0.0	0.0	0.0	21.9	66.2	74.1	43.7	-
Buloke	0.0	0.0	0.0	0.0	16.4	0.0	16.8	-
Campaspe	0.0	2.7	0.0	24.4	10.8	40.8	105.5	-
Central Goldfields	0.0	0.0	7.9	0.0	0.0	23.9	70.7	-
Gannawarra	0.0	0.0	0.0	0.0	19.7	39.9	81.9	-
Greater Bendigo	0.0	1.0	1.0	12.4	31.8	49.8	50.7	59.6
Greater Shepparton	0.0	0.0	19.2	47.8	104.5	110.5	168.2	60.9
Indigo	0.0	0.0	0.0	6.5	13.0	25.9	12.9	-
Loddon	0.0	0.0	13.3	13.5	0.0	13.7	27.0	-
Macedon Ranges	0.0	0.0	0.0	11.3	13.4	30.9	64.8	-
Mansfield	0.0	0.0	0.0	0.0	0.0	24.1	23.8	-
Mildura	1.9	1.9	1.9	11.4	90.5	109.4	147.1	62.5
Mitchell	0.0	0.0	2.8	8.0	26.0	40.9	98.2	-
Moira	0.0	0.0	0.0	3.5	27.8	17.3	-	-
Mount Alexander	0.0	0.0	0.0	5.6	16.6	49.6	-	-
Murrindindi	0.0	0.0	7.4	0.0	22.1	29.2	-	-
Strathbogie	0.0	10.4	0.0	10.3	20.4	30.5	-	-
Swan Hill	9.5	0.0	0.0	19.2	58.3	53.9	154.7	-
Towong	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-
Wangaratta	0.0	7.3	11.0	14.7	55.3	66.5	69.3	-
Wodonga	0.0	11.1	8.2	10.7	26.3	36.3	50.7	-
<b>All Victoria</b>	<b>1.4</b>	<b>2.3</b>	<b>6.2</b>	<b>17.6</b>	<b>33.1</b>	<b>51.8</b>	<b>90.7</b>	<b>174.2</b>

Table 4: Rate of methamphetamine offences in Murray PHN LGAs and Victoria 2010-2016<sup>74</sup>

a. In LGAs where the total number of offences for the period 2014-2016 is < 100, % change is not reported.

#### 4. Strengths and limitations of current studies/data sources

The findings outlined above are based on the best available evidence regarding the prevalence and related patterns of methamphetamine use and associated health service utilisation. However, there are a range of limitations that apply to this data and so the findings should be interpreted with caution. Similarly, the generalisability of the findings of many studies to sub-populations such as that in the Murray PHN catchment is limited.

Knowledge of the prevalence of methamphetamine use across the total population is limited to general population studies. The largest of these are the national NDSHS and the Australian Secondary Students Alcohol and Drug Survey (ASSAD) studies. These triennial cross-sectional studies are based on multi-staged random sampling and provide overviews of trends in alcohol and other drug use at a national and state level; however, the depth of information they provide about any given drug is limited. They are based on household and school populations that are limited to participants in those settings. As such, they generally do not include participants who are homeless, in prison or who have left school. Consistent with other studies of risky behaviours, there are also concerns regarding under-reporting; the 2016 NDSHS response rate was 51%<sup>75</sup>. In addition, the accuracy of methamphetamine prevalence data is limited by stigma of self-reporting of methamphetamine use (particularly in rural areas) due to social desirability and recall bias<sup>76</sup>.

Amongst existing users, there is evidence of a shift in the form of methamphetamine use but there is a dearth of information about patterns of use amongst methamphetamine smokers and their trajectory over time. Similarly, there is limited data about form or route of administration for those initiating methamphetamine use and how these might change over time.

Wastewater studies indicate increases in methamphetamine residues across Australia since 2009<sup>63, 64, 77-81</sup>. WWA measures total mass of metabolite excreted and from this doses of methamphetamine consumed per 1,000 people are estimated. While study authors' suggest this *may* indicate increased prevalence of use, these

calculations do not take into account changes in methamphetamine form (and purity), patterns of use (e.g. frequency). These analyses also can't account for sewerage residue where there are onsite septic tanks; as in many rural residences.

Indirect data are of limited value in measuring prevalence and methamphetamine-related harm. Service utilisation data measure treatment demand that has been met but do not capture the number of unique users. In addition, changes in service users' outcomes may not be related to treatment use but instead to a range of other factors (e.g. imprisonment). Increased rates of service use may reflect (to varying degrees) reporting biases and/or underlying and unknown changes (increases) in the availability and purity of methamphetamine. Similarly, data such as those available in the Illicit Drug Reporting System (IDDR) and Law Enforcement Assistance Program (LEAP) provides a useful but limited measure of methamphetamine-related harm. Changes in these data *may* reflect enhanced surveillance and/or reporting biases. One major limitation of indirect data is that these data have primarily been collected for another purpose so the sensitivity and rigour of data collection may not be as robust as that used when collecting direct data. There is no source of data that accurately measures other societal, physical and psychological harms to the user and others.

There is a need for more research to better understand the prevalence of methamphetamine use; particularly in rural areas. In addition, research is needed to identify interventions that optimise engagement with, and the effectiveness of treatment. Longitudinal studies and robust trials are needed to inform strategies to reduce the harm associated with methamphetamine use.

Further details about specific study strengths and limitations are provided in Appendix 1.

## 5. Informing Service Planning

In the absence of accurate estimates of prevalence of methamphetamine use in the Murray PHN catchment, nor evidenced-based treatment guidelines, priority must be given to enhancing the accessibility of existing services and promoting harm reduction strategies. The Final Report of the National Ice Taskforce highlighted the importance of PHNs and their need to engage and upskills GPs to improve pathways from general health/mental health care providers to specialist drug treatment sector<sup>82</sup>.

### *Studies that are underway that may inform service planning*

There are several prevalence and treatment studies underway that will inform service planning with the Murray PHN catchment.

The Burnet Institute (in partnership with Monash University) is undertaking a study of 800 Victorians who use methamphetamine. The project aims to determine the nature and extent of methamphetamine use in Melbourne, Bendigo, Shepparton and Latrobe including identifying the natural course of use over time and determine health and social factors that influence variations. By better understanding the key drivers of changes in methamphetamine use and harm, the VMAX study hopes to identify cost effective approaches to delivering treatment services and minimise the health, social and economic harms to individuals and communities.

The National Drug and Alcohol Research Centre is currently examining early warning systems for drug use surveillance as part of its 'Views' project. It is likely that a regional component will be built into any resultant system. Similarly, existing systems such as the IDRS are being expanded as part of a system re-design. It is possible that this re-design will include a regional component. Whether any of these systems produce information directly relevant to the Murray PHN is not known.

A randomised controlled trial of the safety and efficacy of N-Acetyl Cysteine (NAC) as a pharmacotherapy for methamphetamine dependency is currently underway. There is preliminary evidence of the efficacy of NAC in the treatment of addiction<sup>83</sup>. Similarly, the use of lisdexamfetamine in the treatment of methamphetamine dependence is currently being investigated<sup>84</sup>.

The National Drug Policy Modelling Program is a program of research focused on generating and translating evidence into policy-relevant information. One key area of the program has been on population planning models for AOD treatment services; particularly unmet need and demand.

### *Unmet need/demand*

Population health planning is underpinned by accurate prevalence data and measures of unmet need/demand. Unmet need is the proportion of consumers who meet a diagnostic criteria for dependence who are not receiving treatment<sup>85</sup> while unmet demand is defined as the proportion of the population who seek treatment but are not able to access it<sup>85</sup>.

Estimates of unmet need are typically overestimated because not everyone accesses treatment. In the case of methamphetamine, variations in estimates of unmet need would be exacerbated by the lack of accurate prevalence data and limited understanding of the probability of sub-populations' willingness to seek treatment.

Unmet demand is typically underestimated. While current treatment utilisation rates, waiting lists and intention-to-seek treatment surveys can inform measures of unmet demand, it is particularly difficult to quantify because these do not take into account the proportion of users who do not seek treatment but would if the treatment system was accessible (i.e. available, geographically accessible, acceptable, appropriate, timely, affordable, and accommodating)<sup>86</sup>. When making a decision to access a GP, rural Australians 'trade-off' these different dimensions of access; just having a service available is not enough to ensure utilisation<sup>87</sup>.

The number of required treatment places is not merely a function of unmet need or demand<sup>85</sup>. For methamphetamine users, the effectiveness of and retention time in treatment and the accessibility of services (both generalist and specialist) are important considerations. While there is some evidence of effective interventions to reduce methamphetamine use<sup>71,88,89</sup>, there remains a dearth of information about the accessibility of services; particularly in rural areas.

### *Effectiveness of treatment*

There is some evidence that engagement with specialist treatment results in reduced methamphetamine dependence and improved quality of life<sup>71,88,89</sup>. However, the relapse rates to methamphetamine use are relatively high both in the United States (61% used within 1 year and 25% within 2-5 years)<sup>90</sup> and in Australia (52% used at 3 months, 80% within 1 year and 88% within 3 years)<sup>71</sup>. Despite relapse, decision-analysis modelling suggests counselling interventions result in societal cost-savings compared to no intervention<sup>91</sup>.

In the absence of treatment, there is evidence to suggest methamphetamine dependence can resolve 'spontaneously'<sup>92</sup>. In the UnMET study, participants who had achieved remission from dependence at 12 month follow-up, 55% had not accessed professional support<sup>37</sup>. Similarly, the MATES study found that while remission from methamphetamine-dependence was significantly higher amongst the treatment group (in comparison to the quasi-control out-of-treatment group) at 3 months, there were no significant differences between the two groups at one year and three years<sup>71</sup>. Those who showed the poorest outcomes in the study had higher levels of use prior to treatment entry, injected methamphetamine, and experienced higher levels of psychological distress and psychotic symptoms<sup>71</sup>.

Predictors of relapse to methamphetamine use include parental drug use, ever having sold methamphetamine, having experienced less than three serious methamphetamine use related harms (e.g. serious mental health, violent behaviour) and non-participation in additional treatment/self-help in the follow-up period<sup>88,71</sup>. It has been suggested that these poor outcomes demonstrate the unsuitability of current treatment modalities for methamphetamine use and the AOD treatment sector's continued focus on alcohol and opiate use<sup>93,91</sup>.

### *Barriers to seeking treatment*

In comparison to other drugs, research suggests that methamphetamine users exhibit low levels of drug treatment utilisation, both in engagement and retention<sup>37</sup>. Barriers to accessing treatment include a preference for self-treatment<sup>94</sup>, adverse past treatment experience/s<sup>95</sup>, stigma<sup>96</sup>, concerns about confidentiality and lack of knowledge about available treatments<sup>41,72</sup>. Accessibility and availability<sup>97</sup>, lack of methamphetamine-specific treatments<sup>98</sup>, complex clinical presentations (eg. dual diagnosis)<sup>99</sup> and limited service provider knowledge also play a role<sup>100</sup>.

There is some evidence to suggest barriers to treatment utilisation differ between methamphetamine users in rural and metropolitan areas. A 2009 study of methamphetamine users in regional and rural New South Wales, found the primary reason for not seeking treatment was a lack of perceived need or motivation while the second most reported reason was concerns about confidentiality<sup>63</sup>. This study also identified other barriers to treatment utilisation including: limited available treatment options (including waitlists), lack of knowledge about services and financial and transport limitations<sup>63</sup>. These findings *may* be generalisable to methamphetamine users in rural Victoria.

## Conclusion

The percentage of Australians (and Victorians) who report using methamphetamine has declined in recent years. However, there is little evidence to confirm whether this trend holds for the population within the Murray PHN catchment. Service utilisation and drug possession data for the Murray PHN suggests there has been an increase in the rate of methamphetamine related presentations and offences, particularly in Greater Shepparton, Mildura and Greater Bendigo) and overall, this mirrors the picture seen across Victoria. However, existing data and research is limited; further research is needed to better understand the prevalence of methamphetamine use; particularly in rural areas where other factors (e.g. remoteness, socio-economic status, general and mental health, employment etc) may exacerbate the harms associated with methamphetamine use.

There are no data that accurately measures societal, physical and psychological methamphetamine-related harms to the user and others. Community concerns and media reports about methamphetamine use in rural

areas are well documented. However, it is not clear if these are the result of an increase in the actual or perceived impact of methamphetamine. Current methamphetamine users report increased frequency of use and there has been a decline in purity-adjusted price of methamphetamine. These changes are consistent with reports that the 'ice epidemic' is driven by increased harms, and not by an actual increase in the prevalence of methamphetamine use.

In the absence of prevalence data, health service planners may wish to consider how unmet need and demand, barriers to treatment seeking, access to existing services and the effectiveness of treatment can inform treatment planning models for methamphetamine users.

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## Appendix 1\*

PRIMARY/DIRECT DATA	Year	Location	Type	Sample	Recruitment	Methamphetamine (ma) Specific Measures	Limitations	Refs
<b>Population Surveys</b>								
National Drug Strategy Household Survey (NDSHS)	Triennial, 1985-	National, state	Cross-sectional	Multi-staged, stratified area random sample (aged 12+) from private-dwelling households N (2016) = 23772	Drop-and-collect questionnaire, (2016) mixed-mode: telephone, online and paper form offered	Lifetime and recent (12 months) use of MA, form and frequency of use	Changes in methodology and data collection; sampling bias (private-dwelling households); low response rate; only conducted every three years (cannot monitor annual changes); imprecise measure of illicit drug use (given low prevalence within general population); likely under-reporting of illicit drug use by respondents	46, 54
Australian Secondary School Students Alcohol and Drug Survey (ASSAD)	Triennial, 1996	National, state	Cross-sectional	Random, multi-staged sample of secondary school students (years 7-12) N (2014) = 23960	Permission from selected schools, parental consent	Ever and recent (year, month and week) use of amphetamines (included MA)	A/A; Low school response rate; participants often complete surveys in presence of teachers	101
<b>Drug Population Surveys</b>								
Illicit Drug Reporting System (IDRS)	Annual, 1999-	Australian state/territory capital cities	Cross-sectional	Convenience sample of PWID, aged 17+ N (2016) = 877	Advertisements, and peer referral	Lifetime and Recent (last 6 months) use of MA, form of MA used, frequency and quantity of use, MA market characteristics	Only conducted in capital cities, convenience samples of PWID used, designed to monitor trends of high-risk drug users in community; metropolitan-recruited samples	50
Ecstasy and Related Drugs Reporting System (EDRS)	Annual, 2003-	Australian state/territory capital cities	Cross-sectional	Convenience sample of people who regularly use ecstasy or other illicit psychoactive substance, aged 16+ N (2016) = 795	Multiple methods: advertising (including social media), snowballing	Lifetime and recent (6 months) MA use, form, route and frequency of use	Convenience sample of people who use ecstasy and related drugs – limited capacity to generalise findings to broader community, study designed to monitor trends and harms amongst those who 'party' drugs; metropolitan recruited samples	56
Melbourne Injecting Drug User Cohort Study (MIX)	Annual, 2008-	Melbourne, Vic	Longitudinal	Convenience sample, PWID, largely aged 18-30 and out-of-treatment N = 688 (baseline)	Respondent driven sampling, snowball and street outreach	MA ever and recently (last month) used, frequency	Cohort of people who inject drugs (PWID); only 27% of cohort report recent (previous month) use of methamphetamine; metropolitan-recruited cohort	102

	Year	Location	Type	Sample	Recruitment	Methamphetamine (MA) Specific Measures	Limitations	Refs
Big Day Out Survey: Sex, Drugs and Rock and Roll Survey (SDRR)	Annual 2005-	Melbourne, Vic	Cross-sectional	Convenience sample of Big Day Out attendees, aged 16-29 N (2017) = 1272	Market stall at music festival	Use of amphetamine (including MA) in last month	Convenience sample is not representative of any particular sub-population; limited MA-related findings	103
Drug Use Monitoring in Australia (DUMA)	Annual, 1999-	Number of sites across Australia	Cross-sectional	Adult police detainees, 2013/14 6 sites (Adelaide, Brisbane, Perth and 3 Sydney) N (2013/14) = 3456	All individuals detained by police at selected sites eligible to participate (urine samples collected only for detainees in custody <48 hours)	Self-reported recent MA use (12 months and 48 hrs), form of MA last used, MA-related harms, MA market characteristics, urinalysis of recent MA use	Footscray only Victorian site (data collected between 2006-12); males over-represented in samples; sample sizes vary between sites and collection dates; site and other methodology variations	104
Australian Needle and Syringe Program Survey (ANSPS)	Annual, 1995-	National, State	Cross-sectional	Convenience sample of NSP attendees (PWID), 50 sites across Australia N (2016) = 2210	All clients attending participating NSP sites invited to participate	Dug last injected (includes MA), injecting behaviours (including risks), sexual risk behaviour, blood sample for HIV and HCV testing	Study designed for the purpose of surveillance/monitoring of HIV/BBV amongst PWID; survey provides minimum MA-specific data; changes in recruitment sites; variation in sample size	48
<b>Methamphetamine Specific Surveys</b>								
McKetin et al. study	2004	Sydney, NSW	Cross-sectional	Convenience sample, MA users aged 16+ N= 309	Advertisements, word of mouth	Frequency of use of MA, form, route of administration, dependence, MA harms, mental health, drug treatment contact and other health service utilisation	Convenience sampling	17, 27, 41
McKetin et al. Methamphetamine Treatment Evaluation study (MATES)	2006-	Sydney and Brisbane	Longitudinal	In-treatment group and quasi-control out-of-treatment group, MA users, aged 16+ N = 500	In-treatment group recruited upon entry to residential rehab and detox facilities. Quasi-control participants recruited through community health services and NSP programs	MA use (frequency, form, route of administration), treatment exposure, motivation to reduce MA use, psychiatric disorders, recent use reported confirmed with hair toxicology	Convenience and largely in-treatment sample ('quasi-control' group recruited from health services, so likely does not represent out-of-treatment MA users); metropolitan based recruitment	71

	Year	Location	Type	Sample	Recruitment	Methamphetamine (MA) Specific Measures	Limitations	Refs
Quinn et al. 'UnMET' study	2010-11	Melbourne	Longitudinal	Out-of-treatment convenience sample of MA users, aged 18+ N = 255	Respondent driven sampling, street outreach, targeted advertising, snowball sampling	MA use (frequency, form, route of administration), MA-related harms (including dependence), physical and mental health, motivations for MA use, MA market characteristics, specialist and general treatment/health utilisation, injecting and sexual risk behaviours, incarceration and criminal behaviours,	PWID and concurrent heroin users over sampled (result of street outreach recruitment),	37, 69, 95
Wallace et al. (Methamphetamine users in Regional and Rural NSW)	2006	North Coast, NSW	Cross-sectional	Community-recruited convenience sample of regular methamphetamine users aged 16+ N = 140	Flyers, word of mouth, newspaper advertisement, NSP and direct approach	MA use (frequency, form, route of administration), demographics, general physical and mental well-being, MA dependence, MA treatment	Convenience sample of MA users (may not be representative); opioid injectors heavily represented in sample; self-reported measures only	62
<b>Wastewater</b>								
Lai et al.	2009/10 - 2015	Brisbane and regional QLD		Daily composite samples from two water treatment plants (1 metro, 1 regional)		Back calculation of MA consumption (mg/day/1000 people)	Analytical issues (degradation of drug compound in WW; variable excretion rates), Back calculation issues (populations contributing to samples of 'catchment' difficult to determine; can not differentiate between increased use (quantity, frequency and/or purity) and increased number of users)	78
Tscharke et al.	Dec 2011 - 15	Adelaide		4 metro treatment plants, sampled for one week, very two months		A/A	A/A	77
Westmore et al.	2014	Melbourne and regional Victoria		2 samples taken from 5 treatment plants (2 Melbourne, 1 Geelong, 2 regional Victoria)		A/A	A/A	57
Lloyd et al.	2014-15	Melbourne		2 treatment plants tested each day for one week in 2014 and 12 months later in 2015		A/A	A/A	63, 79

	Year	Location	Type	Sample	Recruitment	Methamphetamine (MA) Specific Measures	Limitations	Refs
National Wastewater Drug Monitoring Program (NWDMP)	August 2016 -	National, State, Regional		Sampling from 15 Metropolitan sites (bimonthly) and 22 regional (every four months) – located in all jurisdictions (except TAS and NT)		A/A	A/A	64, 81

SECONDARY/INDIRECT DATA	Years/s	Location	Description	Limitations	Refs
<b>Health</b>					
Victorian Emergency Minimum Dataset (VEMD)	Annual, 2000/01-	Victoria, LGA, postcode	Collection of information on emergency presentations at Victorian public hospitals	Data coded by ICD-10 categories, aggregated to broad categories and cannot distinguish specific substances; data relies on clinical observation and recording (often injury/outcome of cause/aetiology is recorded)	73
Victorian Hospital Admitted Episodes Data (VAED)	Annual, 1992/93-	Victoria, LGA	Hospital separations (statistical and actual) as a proxy measure for actual hospital admissions, those attributable to alcohol or other drugs calculated via aetiological fractions	A/A	73
Alcohol and drug related ambulance attendances (Ambo Project)	Annual, monthly, Metropolitan: 1998-Regional: 2011/12-	Victoria, LGA, postcode	Alcohol and drug related ambulance attendances across Victoria, coded by drug and drug sub-type (eg. MA, crystal MA)	Regional data only available from 2011; attribution of substance involvement recorded by paramedic and established through clinical assessment, patient self-report or by information at the scene (may not be reliable)	72
Directline telephone service	Annual, 2006-	Victoria, (postcode)	24-hour telephone counselling, information and referral service – dataset records received calls and identified drug of concern. Postcode not reliably collected, therefore presented at state level only	Only state-level data available (postcode not reliably recorded); telephone line services users and family/friends seeking support or other resources (data reflects use by users and others)	73
Alcohol and drug related treatment data (ADIS)	Annual	Victoria, LGA	Treatment from specialist alcohol and drug services, recorded as 'episode of care' by drug/s of concern (category of substance only)	Category of substance 'amphetamines' includes methamphetamines and other amphetamine type stimulants	73
National Coronial Information System (NCIS)	Annual, 2011-	National, Victoria	Database of Coronial information across Australia, Victorian data collated by the Victorian of Forensic Medicine, ICD coding, 'Drugs module' contains information about substance-related deaths (MA use can be a contributing factor of cause of death)	Varied criteria for reportable death between jurisdictions; MA-related death generally defined as death where MA-use a contributing factor (includes drug toxicity, natural disease, accident, suicide, homicide) therefore broad (may overestimate); cases where recent-MA use not recorded may underestimate deaths attributable to MA-use	16
<b>Crime</b>					
Illicit Drug Data Report (IDDR)	Annual, 1997/98 -	National, State	Produced by the Australian Crime Commission and provides analysis on Arrest, detection, seizure, purity and price data from Federal and State/Territory police, forensic laboratories and Department of Immigration and Border Protection	Not all illicit drugs seized are scientifically analysed to established drug type/sub-type (varies by jurisdiction); border detection data may exclude detections that are part of ongoing investigations; comparability of data across jurisdictions is problematic (different coding, extraction dates, counting rules); Victorian drug seizure weight data are estimates only	105

Law Enforcement and Assistance Program (LEAP)	Annual, 2005-	Victoria, LGAs	Drug use and possession incidents (consumer and provider) by drug type	Not necessarily accurate measure of offending (not convictions); changes in LGAs with small population may be inaccurate; rates can be affected by drug-targeted police policies	106
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OTHER - MULTIPLIER	Year	Population	Method	Limitations	Refs
McKetin et al (2005)	2003	National, Dependant methamphetamine users	Indirect prevalence measure using benchmark multiplier method. Uses data from MA-related service contact and 'multiplier' applied to generate estimates. Multipliers from MA-user surveys	Multipliers derived from community-based survey of MA users in Sydney in 2003/04, assumes this sample is representative of MA across Australia; sample also recruited through health services therefore may oversample in-treatment or problematic MA users	107
Degenhart et al (2016)	2013/14	National, Regular (monthly) and dependant MA users, aged 15-54	A/A	A/A	52
Dietze et al (2016)	2013/14	A/A	A/A	Multiplier derived from community-based MA users in Melbourne 2010/11, as above sample may not be representative of MA users across Australia	53

\*Not an exhaustive list of all methamphetamine related studies or data sources

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