Australian Government
Australian Institute of Criminology

AIC reports
Statistical Report 33

The DUMA Drug Market Indicator Framework: Methamphetamine

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ISSN 2206-7930 (Online)
ISBN: 978 1 925304 87 9 (Online)

Published by the Australian Institute of Criminology
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General editor: Dr Rick Brown, Deputy Director, Australian Institute of Criminology

Edited and typeset by the Australian Institute of Criminology

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Abstract

In this paper, we introduce the Drug Use Monitoring in Australia (DUMA) Drug Market Indicator Framework. We use the framework to examine Australian trends in methamphetamine supply, demand and related harms between 2013 and 2019 to provide a baseline for measuring the impact of the COVID-19 pandemic.

There were consistent increases in the prevalence, frequency and quantity of methamphetamine use, and corresponding increases in dependence, overdose and methamphetamine-related criminal offending. A brief but substantial decrease in methamphetamine availability occurred during 2017. Despite this, the methamphetamine market quickly recovered and continued to strengthen into 2019.

This paper highlights the importance of monitoring indicators relating to drug supply, demand and harm to understand the dynamics of illicit drug markets during the COVID-19 pandemic and beyond.

Introduction

Australia has experienced a major escalation in methamphetamine use over the past two decades, with the current national prevalence among the highest ever observed. In 2019, approximately 5.8 percent of the general population (1.2 million people) had ever used methamphetamine in their lifetime, and approximately 1.4 percent (340,000 people) had used the drug in the previous 12 months (Australian Institute of Health and Welfare 2020). According to wastewater analysis by the Australian Criminal Intelligence Commission (2020b), the estimated weight of methamphetamine consumed across Australia increased from 8,405 kg in 2016–17 to 11,516 kg in 2018–19, equivalent to 84 million doses in 2016–17 and 115 million doses in 2018–19. Further, the weight of amphetamine-type stimulants seized at the Australian border in 2018–19, which was primarily comprised of methamphetamine, was the highest on record (Australian Criminal Intelligence Commission (ACIC) 2020a). There are significant societal costs associated with methamphetamine use (Tait et al. 2018), and people who use methamphetamine experience worse outcomes than people who use other illicit drug types (Goldsmid et al. 2017).

There is evidence that well-designed and appropriately targeted supply reduction strategies are effective in reducing the harm associated with illicit drug use, including from methamphetamine (Mazerolle, Eggins & Higginson 2020; McKetin et al. 2011). Supply reduction aims to reduce the availability of methamphetamine in the illicit drug market, which in turn forces suppliers to compensate for lost product by raising prices or reducing quality (by adding cutting agents to the product). Expensive or low-quality methamphetamine is less appealing to potential buyers and, as such, price increases—or changes in the purity of drugs at a given price—can have a significant impact on demand (Payne et al. 2020). Further, a recent review of 36 Australian and international studies found an inverse relationship between the price of illicit drugs (adjusted for purity) and the rate of harms such as overdose, crime and treatment admissions among people who use drugs (Hughes, Hulme & Ritter 2020). Conversely, when supply exceeds demand, prices can fall—the median street price of crystal methamphetamine has decreased over the past decade, while purity has remained high and stable (ACIC 2020a), coinciding with longer-term increases in use among police detainees (Doherty & Sullivan 2020) and recent increases in total consumption (ACIC 2020b).

To properly understand changes in illicit drug markets over time (whether for methamphetamine or other drug types), and to measure the impact of efforts by law enforcement and their partners, we need to monitor a range of indicators of availability, use and harms. The Australian Institute of Criminology's (AIC) Drug Use Monitoring in Australia (DUMA) program routinely collects comprehensive data from police detainees on methamphetamine supply, demand and harm in Australia. Population-level indicators of consumption, such as wastewater analysis, have demonstrated broad increases in methamphetamine demand across Australia. The benefit of DUMA data is that they can be used to examine whether these fluctuations in consumption occur alongside changes in drug supply and harms, and whether rises in population-level consumption reflect increases in the number of first-time users, or the quantity and frequency of consumption among those who already use. Further, DUMA can provide unique insights into important market characteristics, including methamphetamine availability, quality and price. Police detainees are an important source of information about methamphetamine availability, use and harm because they are more likely than the general community or incarcerated offenders to have had recent and close contact with the illicit drug market (Doherty & Sullivan 2020).

In this paper, we introduce the DUMA Drug Market Indicator Framework, which comprises a suite of indicators relating to supply, demand and related harms. We use the framework to examine Australian trends in methamphetamine availability, use and harm from 2013 to 2019. These data provide important insights into street-level markets and can complement other collections based on wastewater analysis (ACIC 2020b), law enforcement seizure data (ACIC 2020a), interviews with people who use drugs (Peacock et al. 2019) and surveys of the general population (Australian Institute of Health & Welfare 2020).

This bulletin is particularly timely given the COVID-19 pandemic is expected to disrupt major methamphetamine and chemical precursor supply routes (UNODC 2020), which will disproportionately impact those individuals experiencing problematic drug use (Dietze & Peacock 2020). While there are important differences between the supply chains of heroin and methamphetamine, the experience of the heroin shortage two decades ago suggests that disruptions to supply could have significant implications for the price, purity and availability of methamphetamine (Hughes, Hulme & Ritter 2020). Early evidence from one DUMA site has already shown a dramatic impact on price, availability and quality of the drug and a corresponding decrease in the prevalence and frequency of use (Voce et al. 2020). The supply, demand and harm indicators reported here will be monitored closely over coming quarters to see how methamphetamine availability has been impacted by COVID-19, and the implications for people who use methamphetamine.

Method

This study uses data from the AIC's DUMA program, which collects quarterly data about drug use, criminal offending, and sociodemographic characteristics from individuals detained at selected police stations and watch houses in Perth, Brisbane, Adelaide and Sydney (Doherty & Sullivan 2020). Sydney was excluded from the current study as data collection occurs across two sites (Bankstown and Surry Hills) in alternating quarters, meaning that data are missing for one of the sites in each collection period. Data from these two sites cannot be combined as they have significantly different drug markets, Surry Hills representing the inner-city night-time economy and Bankstown representing a suburban area. Self-reported drug use is supplemented with voluntary urinalysis, which provides an objective measure of recent drug use. The current study uses a sample of 6,516 respondents who participated in DUMA from July–August 2013 to July–August 2019. In this time period, data was restricted to quarter one (January–February) and quarter three (July–August) of each year, as these were the periods when the program collected urine samples (see Table 1).

Table 1: Reported methamphetamine use by site, 2013–19

	Total sample	Past-year use[a]	Past-month use[a]
Perth	2,517	1,587	1,240
Brisbane	2,402	1,463	1,206
Adelaide	1,597	793	587
National data[b]	6,516	3,843	3,033

a: Based self-reported use in past 12 months (year) and past 30 days (month)

b: National figures in the current data only include Adelaide, Brisbane, Perth, and are not necessarily comparable to national figures in other DUMA publications, which include data from five sites (Adelaide, Brisbane, Perth, Bankstown and Surry Hills)

Source: AIC DUMA collection 2013–19 [computer file]

Respondents were mostly male (82%, *n*=5,355) and non-Indigenous (75%, *n*=4,864), and had a median age of 31 (interquartile range: 25–39 years). The most serious offence (MSO) for which detainees were arrested at the time of the interview included violent offences (30%, *n*=1,965), breaches (25%, *n*=1,587), property crime (23%, *n*=1,465), drug offences (9%, *n*=550), disorder (6%, *n*=418), traffic offences (4%, *n*=284), driving under the influence (1%, *n*=77), and other offences (2%, *n*=97). Almost half (47%, *n*=2,832) of detainees reported that they had been charged on another occasion in the 12 months before their current arrest. Sixty-eight percent (*n*=4,416) of eligible detainees provided a urine sample. (Detailed information about eligibility criteria can be found in Doherty & Sullivan 2020.) Of these detainees, 76 percent (*n*=3,346) tested positive to at least one illicit drug, 38 percent (*n*=1,677) tested positive to multiple classes of illicit drugs, and 46 percent (*n*=2,040) tested positive to methamphetamine. Across all quarters and sites, a vast majority of past-month users reported using crystal methamphetamine (89%, *n*=2,624) on their last occasion of use, as opposed to other forms of the drug (such as powder, paste, pills or liquid; 11%, *n*=334).

The variables used to measure methamphetamine demand, harms and supply during each data collection quarter are displayed in the DUMA Drug Market Indicator Framework for methamphetamine in Table 2. Statistically significant trends in these variables across 2013–19 were identified using Mann–Kendall non-parametric tests (presented in the notes of accompanying figures). Unfortunately, it was not possible to conduct trend testing for shorter periods of time (eg the brief increase in methamphetamine prices during 2017) due to insufficient data time-points.

Table 2: DUMA Drug Market Indicator Framework for methamphetamine

Methamphetamine demand
Urinalysis rate (%): The proportion of detainees who tested positive to methamphetamine at time of arrest, among those who provided a urine sample
Reported past-month use (%): The proportion of the total sample who reported using methamphetamine in the 30 days prior to arrest
Frequency of past-month use (median)[a]: The average number of days of methamphetamine use in the past 30 days, among past-month users
Quantity of past-month use (median)a: The average quantity of methamphetamine consumed per day among past-month users. This was calculated by multiplying (i) the number of times that detainees reported using methamphetamine on a typical day, and (ii) amount of methamphetamine in grams that detainees reported consuming in a typical dose/hit
Market segmentation: The proportion of past-year users who reported no use in the past month, past-month recreational use (1–5 days), regular use (6–20 days) or heavy use (21+ days) during the past month
Methamphetamine-related harm
Past-year overdose (%): The proportion of past-year users who reported methamphetamine overdose in the past 12 months
Past-year dependence (%): The proportion of past-year users who reported methamphetamine dependence in the past 12 months
Methamphetamine-related crime (%): The proportion of detainees who attributed their offending to methamphetamine use, relative to those who attributed their offending to alcohol or to drugs other than methamphetamine. This was calculated separately for those charged with property crime and violent crime

Table 2: DUMA Drug Market Indicator Framework for methamphetamine (cont.)
Methamphetamine supply
Changes in price (%): The proportion of past-month users who reported that the price of methamphetamine had increased (rather than decreased or remained stable) over the past 3 months
Changes in dealers (%): The proportion of past-month users who reported that the number of dealers selling methamphetamine increased (rather than decreased or remained stable) over the past 3 months
Current quality (mean): The average rating of current methamphetamine quality among past-month users, rated on a scale from one (extremely poor quality or purity) to 10 (excellent quality or purity)
Current availability (mean): The average rating of current methamphetamine availability among past-month users, rated on a scale from one (extremely hard or impossible to get) to 10 (readily available or overabundant)

a: The median (rather than mean) is compared as these data are not normally distributed

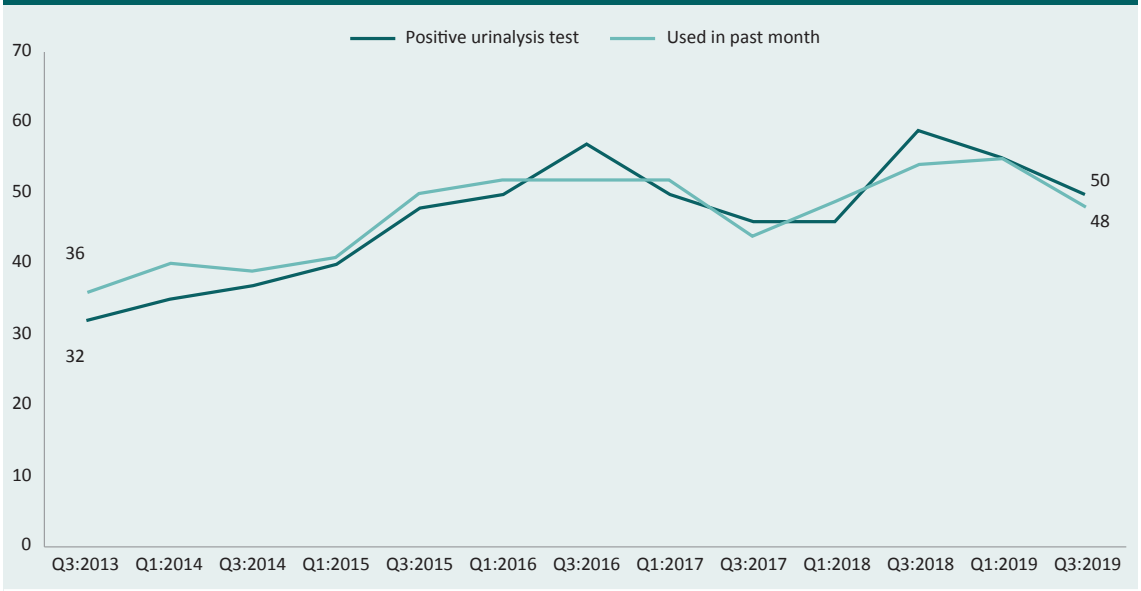
Results

National data

During 2013–19, there were significant increases in the proportion of detainees testing positive to methamphetamine (32%, *n*=111 vs 50%, *n*=181) and reporting methamphetamine use in the past 30 days (36%, *n*=181 vs 48%, *n*=258; Figure 1). There were also significant increases in the frequency of past-month methamphetamine use (median 8 days vs 17 days) and the quantity of methamphetamine used per day (median 0.5 grams vs 0.7 grams; Figure 2).

Across the same time period, the profile of methamphetamine users changed from mainly infrequent or recreational users to mostly regular or heavy users (Figure 3). From quarter three 2013 to quarter three 2019, there was a significant decrease in the proportion of recreational users (33%, *n*=81 vs 23%, *n*=73) and a significant increase in the proportion of heavy users (21%, *n*=51 vs 34%, *n*=110).

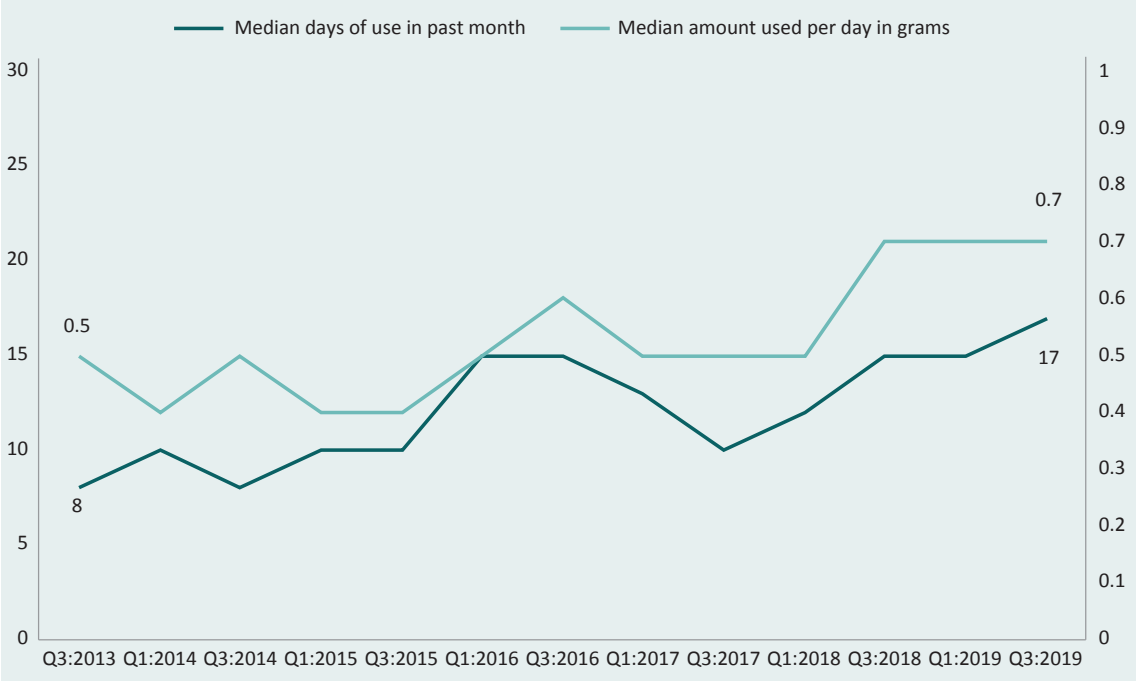
Figure 1: Methamphetamine use among national sample, 2013–19 (%) [demand]



Note: Past-month use (*n*=6,493) excludes those with these data missing (*n*=23). Urinalysis rate (*n*=4,412), excludes those who did not provide a urine specimen (*n*=2,104). There were significant increases in the urinalysis test positive rate (*tau-b*=0.56, score=44, *SE*=16.4, *p*=0.009) and the rate of past-month use (*tau-b*=0.58, score=45, *SE*=16.4, *p*=0.007) between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

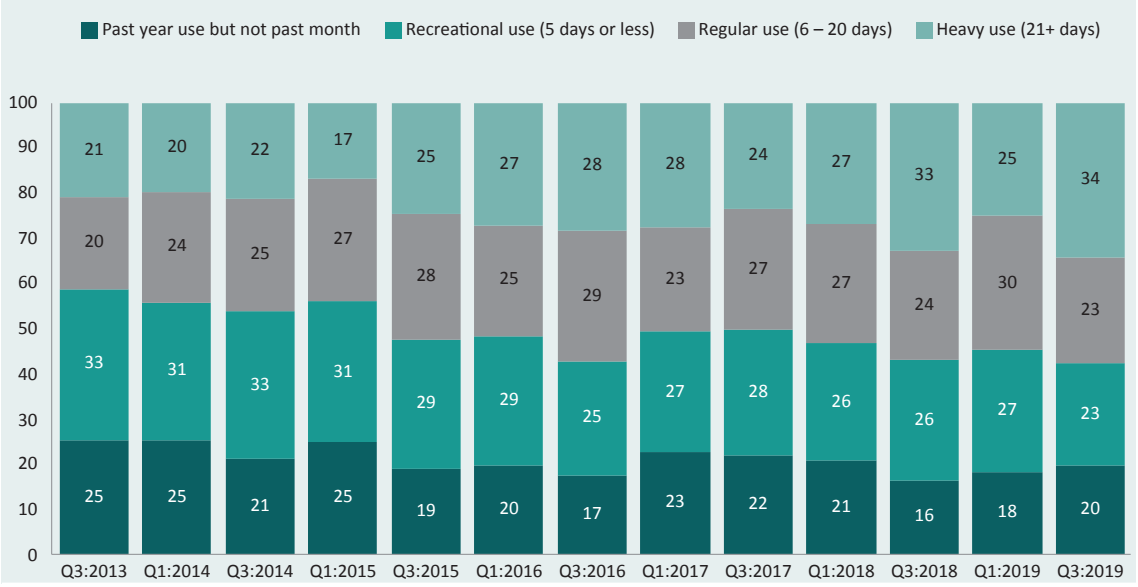
Figure 2: Median frequency and quantity of use among past-month users in national sample, 2013–19 [demand]



Note: Quantity (*n*=2,716) excludes past-month users with these data missing (*n*=317). Frequency (*n*=3,003) excludes past-month users with these data missing (*n*=30). There were significant increases in median quantity (*tau-b*=0.61, score=41, *SE*=15.3, *p*=0.009) and days of use (*tau-b*=0.66, score=47, *SE*=15.8, *p*=0.004) between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

Figure 3: National sample by frequency of methamphetamine use, 2013–19 (%) [demand]

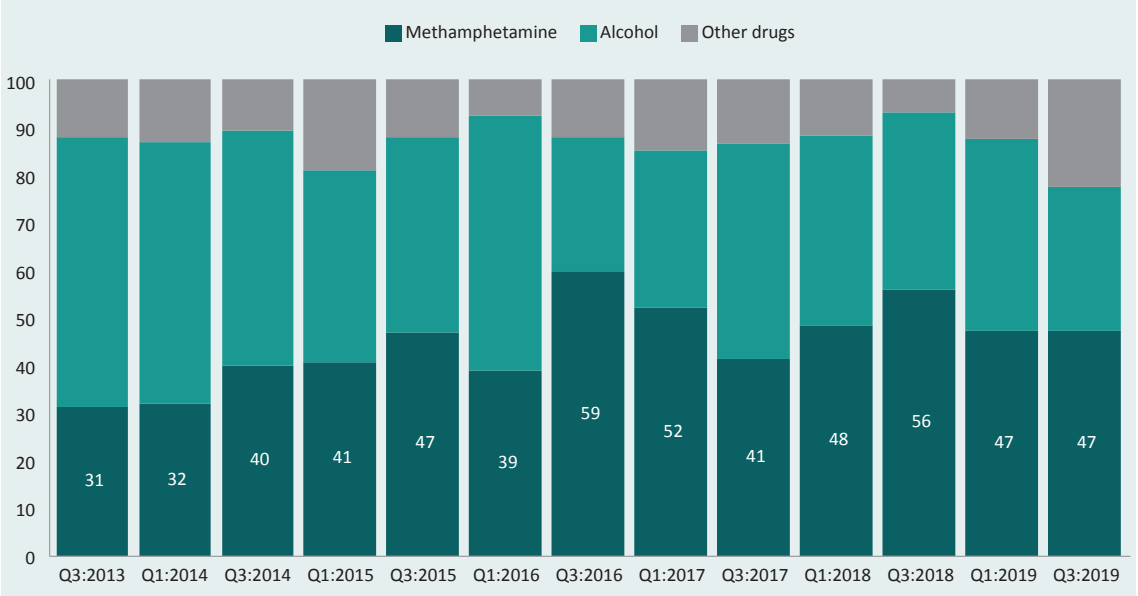


Note: Past-month use among detainees who had used methamphetamine in the last year (*n*=3,824) excludes 19 detainees for whom these data are missing. There was a significant increase in the proportion of heavy users (*tau-b*=0.56, score=43, *SE*=16.3, *p*=0.010) and a significant decrease in the proportion of recreational users (*tau-b*=–0.73, score=–55, *SE*=16.2, *p*<0.001) between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

These increases in methamphetamine consumption corresponded with increases in harms associated with use. From 2013 to 2019, the proportion of detainees who attributed their offending to methamphetamine use increased significantly, from 31 percent (*n*=21) to 47 percent (*n*=42) for offenders with a violent MSO, and from 54 percent (*n*=35) to 75 percent (*n*=78) for offenders with a property MSO (Figures 4 and 5).

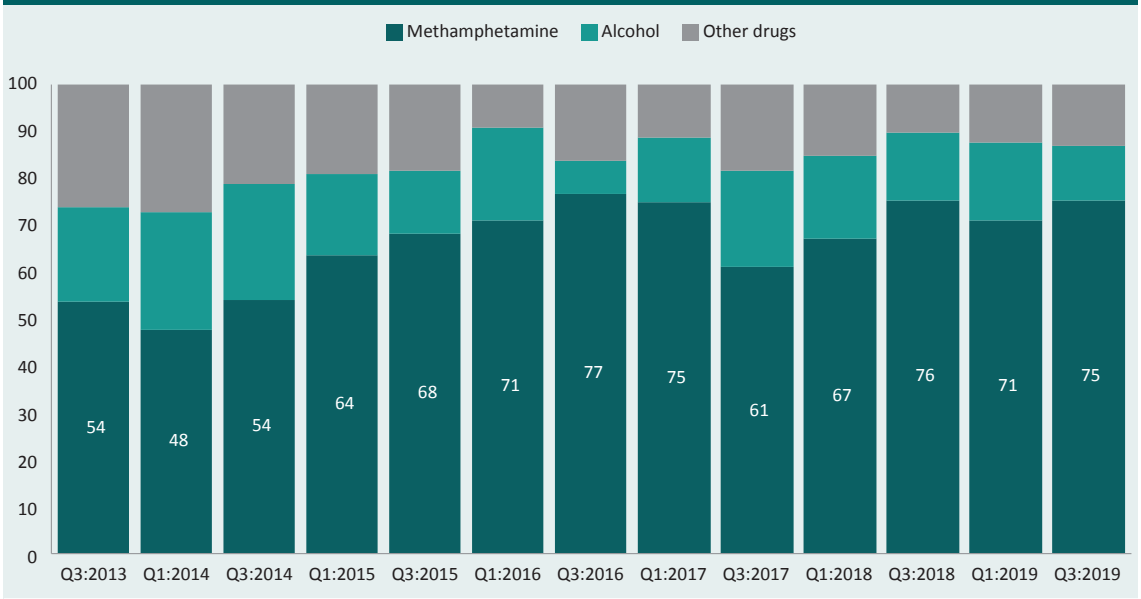
Figure 4: National rates of methamphetamine-attributed violent crime, 2013–19 (%) [harms]



Note: Violent crime attributions were calculated for detainees who had been charged with a violent MSO and had used drugs or alcohol in the preceding 30 days (*n*=937). There was a significant increase in the rate of methamphetamine-attributed violent crime (*tau-b*=0.51, score=40, *SE*=16.4, *p*=0.017) between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

Figure 5: National rates of methamphetamine-attributed property crime, 2013–19 (%) [harms]

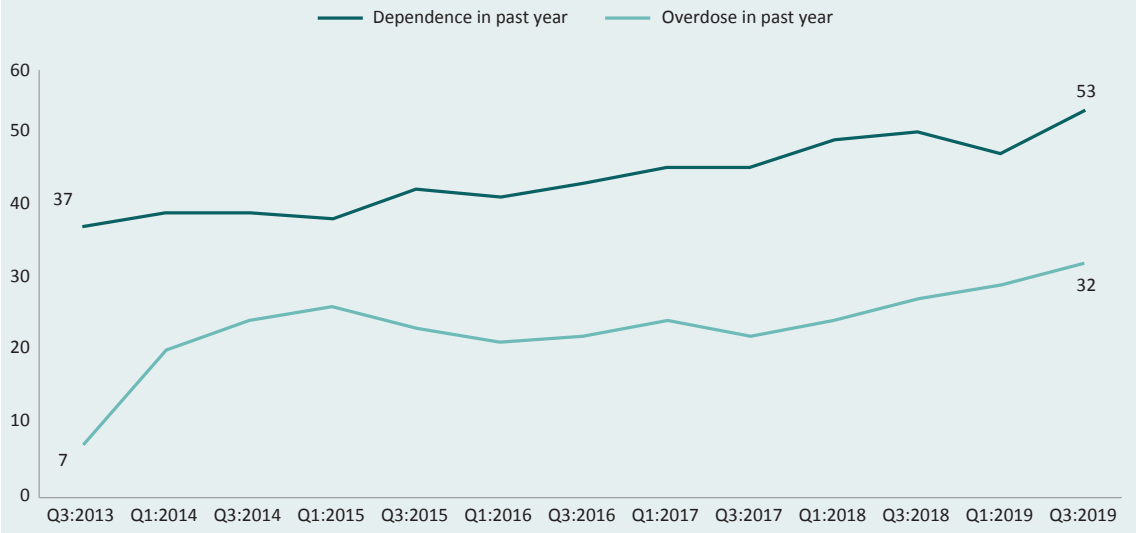


Note: Property crime attributions were calculated for detainees who had been charged with a property MSO and had used drugs or alcohol in the preceding 30 days (*n*=1,002). There was a significant increase in the rate of methamphetamine-attributed property crime (*tau-b*=0.55, score=43, *SE*=16.4, *p*=0.010) between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

Past-year dependence on methamphetamine increased significantly, from 37 percent (*n*=90) to 53 percent (*n*=169), while past-year overdose on methamphetamine increased significantly, from seven percent (*n*=17) to 32 percent (*n*=102; Figure 6).

Figure 6: Methamphetamine-related harms among past-year users in national sample, 2013–19 (%) [harms]

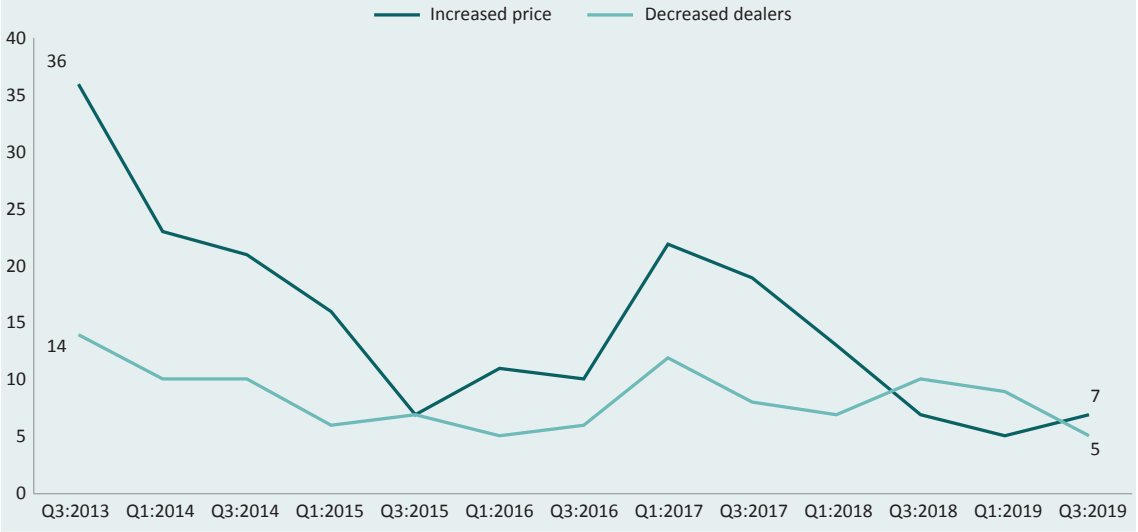


Note: Dependence (*n*=1,689) excludes those with these data missing (*n*=12). Overdose (*n*=900) excludes those with these data missing (*n*=16). There were significant increases in the rates of dependence (*tau-b*=0.82, score=64, *SE*=16.4, *p*<0.001) and overdose (*tau-b*=0.59, score=46, *SE*=16.4, *p*=0.006) between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

There was a significant decrease in the proportion of detainees reporting the price of methamphetamine had increased over the last three months (from 36% to 7%; Figure 7), but the proportion reporting a decrease in the number of dealers did not significantly change. Ratings of quality significantly declined between 2013 and 2019, whereas mean availability ratings remained relatively stable (see Figure 8).

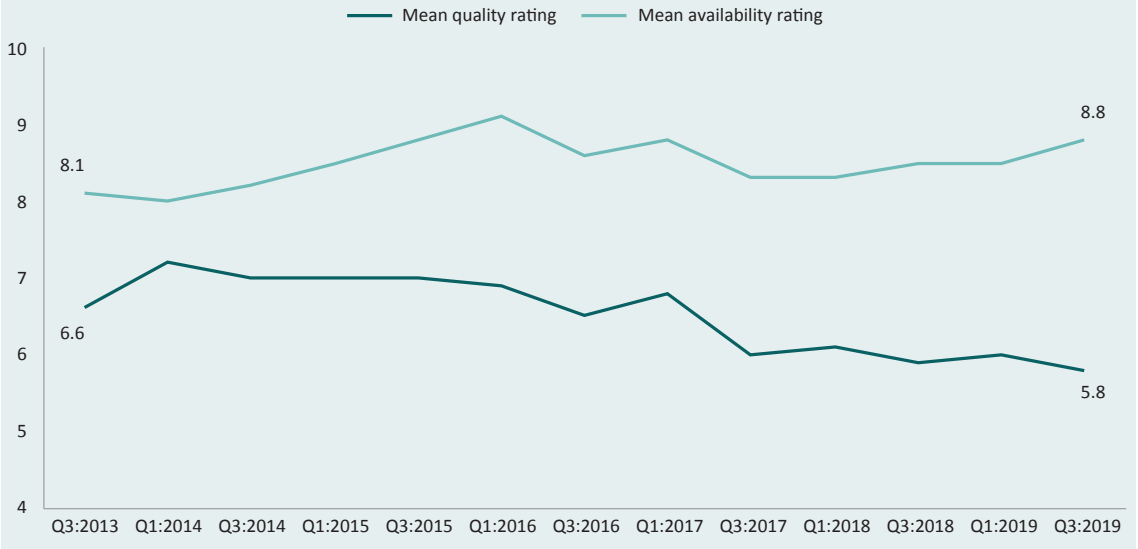
Figure 7: Changes in national market indicators for past-month users, 2013–19 (%) [supply]



Note: Changes in price (*n*=2,754) exclude past-year users with these data missing (*n*=276). Changes in dealers (*n*=2,512) excludes past-year users with these data missing (*n*=521). There was a significant decrease in the proportion of users who reported higher prices (*tau-b*=–0.54, score =–42, *SE*=16.4, *p*=0.012), but not a significant decrease in the proportion reporting a decrease in the number of dealers between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

Figure 8: Mean quality and availability ratings among past-month users in national sample, 2013–19 [supply]

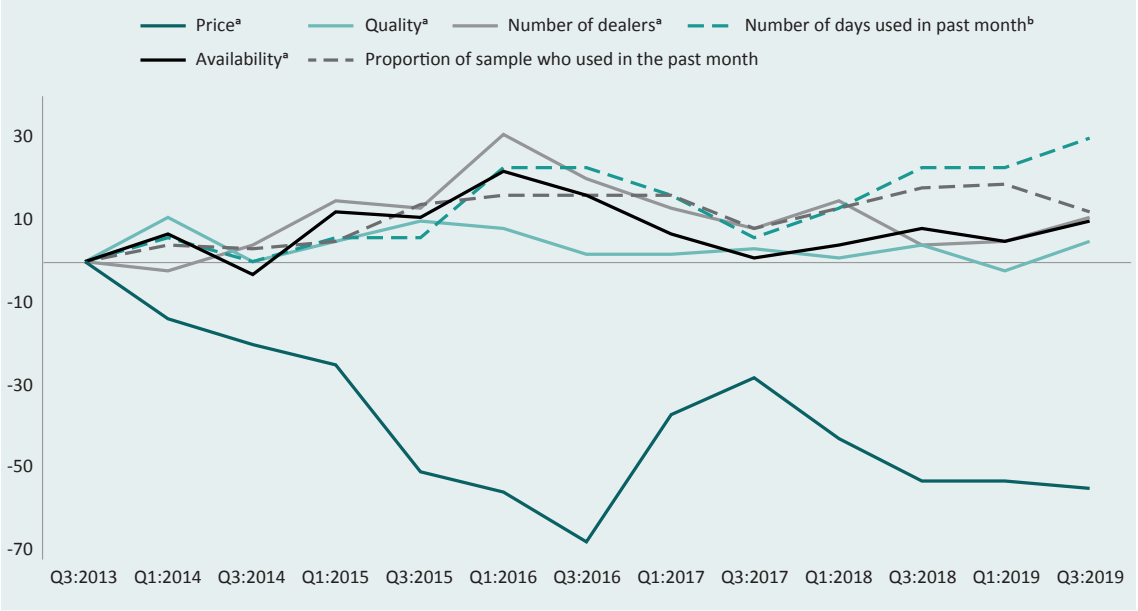


Note: Quality ratings (*n*=2,878) exclude those with these data missing (*n*=155). Availability ratings (*n*=2,943) exclude those with these data missing (*n*=90). There was a significant decrease in quality (*tau-b*=–0.74, score=–45, *SE*=14.4, *p*=0.002), but not availability, between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

Figure 9 shows how detainee reports of methamphetamine price, quality and number of dealers changed over the study period, along with reported consumption. Quarter three 2013 was set as the baseline and indexed to zero. The value for each subsequent quarter represents the percentage decrease or increase relative to this baseline.

Figure 9: National changes in price, quality, number of dealers and consumption, 2013–19 (%)



a: Participants were asked whether the price of methamphetamine had increased, decreased or remained stable over the past 3 months. They were asked the same questions for availability, quality and the number of dealers. For each of these figures, changes in price, quality, availability and dealers are calculated by subtracting the proportion of detainees who reported an increase from the proportion who reported a decrease

b: Number of days a detainee used methamphetamine in the last month was converted to a percentage (eg 15 days out of 30 would equal 50 percent of the month)

Note: Q3 2013 is used as the baseline and set to zero, where values that fall below zero represent a decline compared to the start of the study period, while values above zero represent an increase. Change is presented as difference in percentage points from the original starting point in Q3 2013. Statistically significant correlations: days of use and price, $r(11)=–0.840$, $p<0.001$; days of use and availability, $r(11)=–0.648$, $p<0.05$; price and availability, $r(11)=–0.062$, $p<0.05$; price and number of dealers, $r(11)=–0.619$, $p<0.05$; and price and proportion of past-month users, $r(11)=–0.902$, $p<0.001$

Source: AIC DUMA collection 2013–19 [computer file]

Increases in detainees' days of use in the past month were significantly correlated with decreased price and increased availability (see Figure 9 notes). Decreases in the price of methamphetamine were also significantly correlated with increases in availability, the number of dealers and the proportion of detainees who had used in the past month. These findings reflect the inverse relationships between methamphetamine price and methamphetamine demand (ie number of users and frequency of use) and between price and supply (ie reported number of dealers and availability).

This can be seen in 2017, when a short spike in prices (despite remaining lower than 2013 levels) coincided with a decrease in dealers, availability and consumption. Decreases in availability may have prompted detainees to use methamphetamine less frequently, as there were temporary declines in the number of days used in the past month (from a median 15 days in quarter three 2016 to median 10 days in quarter three 2017; Figure 2). Methamphetamine quality remained relatively stable throughout the study period, and had no statistically significant relationship with the other measures of supply and consumption.

Site-specific trends

Perth

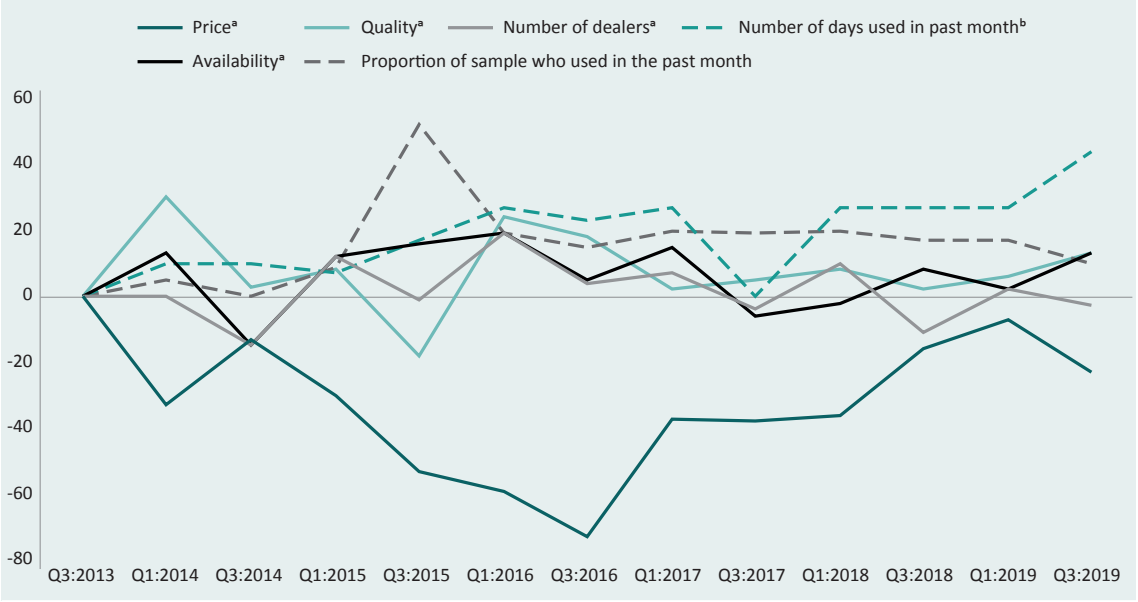
Trend testing from quarter three 2013 to quarter three 2019 in Perth indicated there were significant increases in the urinalysis test positive rate, frequency of use, the proportion of people who reported heavy methamphetamine use, methamphetamine-attributed property crime, methamphetamine-attributed violent crime, and the rate of dependence (refer to the *Appendix* for accompanying figures and statistical tests). Across this same time period, there were significant decreases in quality, the proportion of users reporting higher prices, and the proportion of people who reported recreational methamphetamine use. Statistical tests for these trend analyses are available in Figures A1–A8 in the *Appendix*.

Indicators of quantity and frequency of consumption in Perth were more volatile than the national trends, with sharp increases and decreases across the study period (see Figure 10). Availability of methamphetamine in Perth declined in 2017, consistent with national data (Figure A8), but there was no corresponding drop in consumption (Figures A1–A3).

During 2014, the proportion of detainees in Perth who reported higher methamphetamine prices briefly increased from 19 percent (quarter one) to 39 percent (quarter three), before declining to 23 percent in quarter one 2015 (Figure A7). Despite a dramatic increase in the first six months of the study period, the rate at which detainees in Perth reported methamphetamine overdose was stable across the study period (Figure A6).

Increases in the proportion of detainees who used methamphetamine in the past month and their days of use in the past month were significantly correlated with decreases in price (see Figure 10 notes). Increases in availability were also significantly correlated with increases in the number of dealers.

Figure 10: Changes in price, quality, number of dealers and consumption in Perth, 2013–19 (%)



a: Participants were asked whether the price of methamphetamine had increased, decreased or remained stable over the past 3 months. They were asked the same questions for quality and the number of dealers. For each of these figures, change in price is calculated by subtracting the proportion of detainees who reported an increase from the proportion who reported a decrease

b: Number of days a detainee used methamphetamine in the last month was converted to a percentage (eg 15 days out of 30 would equal 50 percent of the month)

Note: Q3 2013 is used as the baseline and set to zero, where values that fall below zero represent a decline compared to the start of the study period, while values above zero represent an increase. Change is presented as difference in percentage points from the original starting point in Q3 2013. Statistically significant correlations: proportion of past-month users and price, $r(11)=–0.678$, $p<0.05$; days of use and price, $r(11)=–0.731$, $p<0.01$; and availability and number of dealers, $r(11)=–0.575$, $p<0.05$

Source: AIC DUMA collection 2013–19 [computer file]

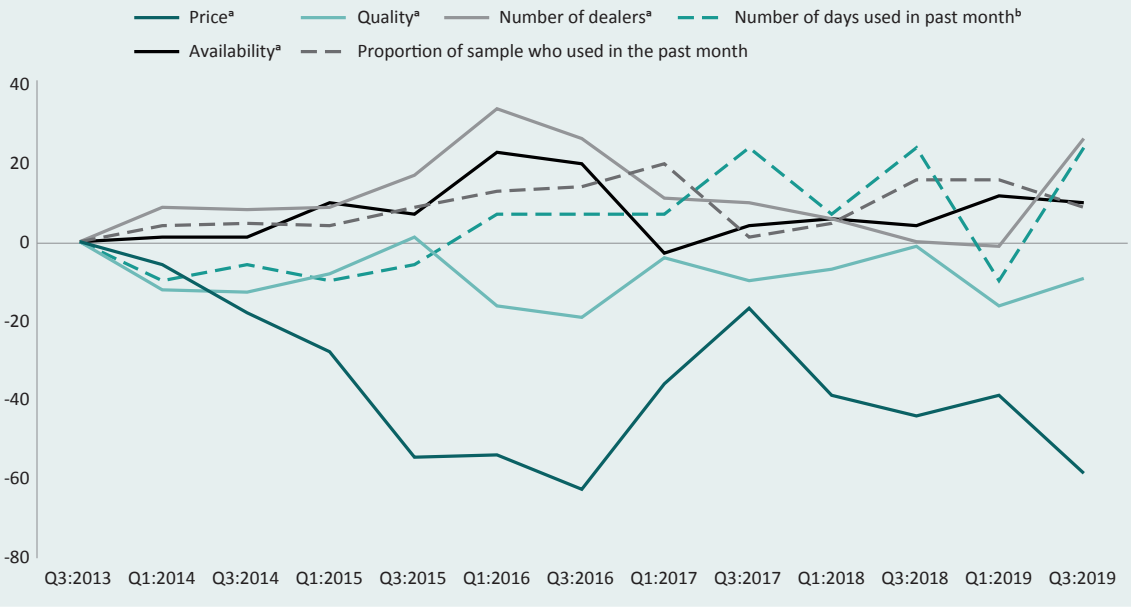
Brisbane

Trend testing from quarter three 2013 to quarter three 2019 in Brisbane indicated that there were significant increases in the urinalysis test positive rate, past-month methamphetamine use, frequency of past month use, the proportion of people who reported heavy methamphetamine use, the rate of dependence, and the rate of overdose. Reported methamphetamine quality and the proportion of users reporting higher prices significantly decreased (Figures A9–A16).

Detainees in Brisbane reported a brief yet substantial increase in the median quantity used, from 0.3 to 1.0 grams in quarter three 2014 (Figure A10). This increase was evident even after removing outliers. Frequency of past-month use decreased between quarter three 2018 (20 days) and quarter one 2019 (10 days), before rebounding to 20 days by the end of the study period (Figure A9). Methamphetamine-attributed property crime fluctuated across the six years and peaked in quarter three 2016 (86%, $n=36$).

Increases in the proportion of detainees who had used methamphetamine in the past month were significantly correlated with decreases in price (see Figure 11 notes). Increases in availability were significantly correlated with decreases in price and quality, and increases in the number of dealers.

Figure 11: Changes in price, quality, number of dealers and consumption in Brisbane, 2013–19 (%)



a: Participants were asked whether the price of methamphetamine had increased, decreased or remained stable over the past 3 months. They were asked the same questions for quality and the number of dealers. For each of these figures, change in price is calculated by subtracting the proportion of detainees who reported an increase from the proportion who reported a decrease

b: Number of days a detainee used methamphetamine in the last month was converted to a percentage (eg 15 days out of 30 would equal 50 percent of the month)

Note: Q3 2013 is used as the baseline and set to zero, where values that fall below zero represent a decline compared to the start of the study period, while values above zero represent an increase. Change is presented as difference in percentage points from the original starting point in Q3 2013. Statistically significant correlations: proportion of past-month users and price, $r(11)=-0.598$, $p<0.05$; availability and price, $r(11)=-0.677$, $p<0.05$; availability and quality, $r(11)=-0.622$, $p<0.05$; and availability and number of dealers, $r(11)=0.702$, $p<0.01$

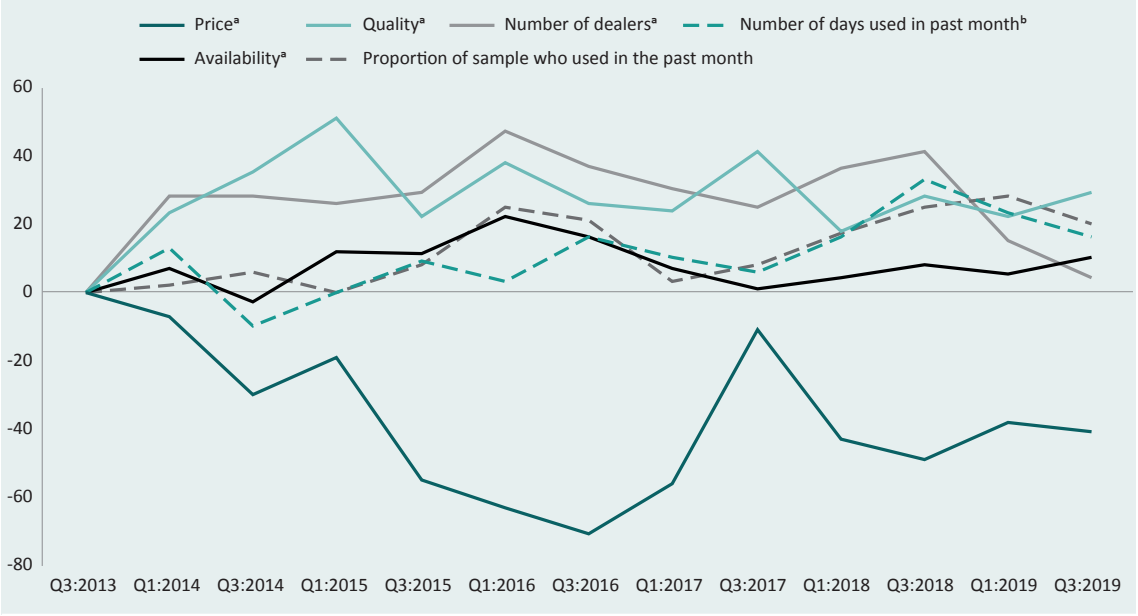
Source: AIC DUMA collection 2013–19 [computer file]

Adelaide

Trend testing from quarter three 2013 to quarter three 2019 in Adelaide indicated that there were significant increases in the urinalysis test positive rate, past-month methamphetamine use, frequency and quantity of past-month use, availability, and rates of dependence, overdose and methamphetamine-attributed violent crime. Across this same time period, there were significant decreases in the proportion of people who reported recreational methamphetamine use. Statistical tests for these trend analyses are available in Figures A17–A24 in the *Appendix*.

Methamphetamine-related violent crime in Adelaide was much lower than the national average, with the highest rates recorded in quarter three 2018 (48%, *n*=10; Figure A20). Unlike the national sample, the rate of methamphetamine-attributed property crime was stable across the study period in Adelaide (Figure A21). There was a spike in detainees reporting dependence on methamphetamine in quarter three 2016, followed by a spike in detainees reporting overdose on methamphetamine in quarter one 2017 (Figure A22). Availability in Adelaide sharply increased between quarter three 2013 (*M*=7.1) and quarter one 2014 (*M*=8.2), before fluctuating (between 7.5 and 9.3) over the rest of the study period (Figure A24). Interestingly, the quality of methamphetamine in Adelaide did not significantly decline over time, as seen in the national sample.

Figure 12: Changes in price, quality, number of dealers and consumption in Adelaide, 2013–19 (%)



a: Participants were asked whether the price of methamphetamine had increased, decreased or remained stable over the past 3 months. They were asked the same questions for quality and the number of dealers. For each of these figures, change in price is calculated by subtracting the proportion of detainees who reported an increase from the proportion who reported a decrease

b: Number of days a detainee used methamphetamine in the last month was converted to a percentage (eg 15 days out of 30 would equal 50 percent of the month)

Note: Q3 2013 is used as the baseline and set to zero, where values that fall below zero represent a decline compared to the start of the study period, while values above zero represent an increase. Change is presented as difference in percentage points from the original starting point in Q3 2013. Statistically significant correlations: proportion of past-month users and price, $r(11)=-0.567$, $p<0.05$; price and availability, $r(11)=-0.700$, $p<0.01$; price and number of dealers, $r(11)=-0.712$, $p<0.01$; and availability and number of dealers, $r(11)=0.824$, $p<0.001$

Source: AIC DUMA collection 2013–19 [computer file]

Discussion

The national increases in population-level consumption of methamphetamine (Australian Criminal Intelligence Commission 2020) reflect increases in the prevalence, frequency and quantity of use. It is likely that escalating rates of methamphetamine use are driven by the very high rates of methamphetamine availability in the Australian market, with researchers noting that the drug is often described as 'very easy' to obtain in most Australian regions (Doherty & Sullivan 2020). Across all sites, changes in price corresponded with inverse changes in the proportion of detainees consuming methamphetamine in the past month. Increased availability was correlated with increased numbers of dealers selling methamphetamine, and both were negatively related to price.

Despite increased use and stable availability, methamphetamine quality declined between 2013 and 2019. Methamphetamine quality was generally not correlated with consumption, availability or the number of dealers selling methamphetamine. This may be partly attributable to increasing rates of dependence and a shift from recreational or infrequent use to heavier methamphetamine use during this time period. Heavier and dependent users likely require increasingly high doses of a drug to achieve the same initial effect (American Psychiatric Association 2013). Declines in methamphetamine quality from 2015 to 2017 were also described in Queensland (Goulding et al. 2019), and this aligns with reports that methamphetamine suppliers are increasingly mixing the product with 'cutters' to make it go further and boost their profit (Cole et al. 2011).

Although not possible to test with trend analysis, there appears to be evidence of a brief disruption to the methamphetamine market during 2017, when a notable drop in the prevalence, frequency and quantity of methamphetamine use occurred across all sites. This corresponded with decreases in availability and increases in price, and a brief decrease in methamphetamine-related offending. Decreases in availability may have prompted detainees to use methamphetamine less frequently, as there were temporary declines in the number of days in the past month in which detainees used. National wastewater analyses also showed a decline in the average doses per day per thousand people in early 2017, following a large national seizure of methamphetamine (Australian Criminal Intelligence Commission 2019). By December 2018, though, consumption had risen and surpassed pre-seizure levels.

While most trends in methamphetamine use and the methamphetamine market were consistent across the three major sites, some interesting differences were observed. The pattern of methamphetamine-related harms in Adelaide differed from those observed nationally, with a higher proportion of detainees reporting past-year overdose, a lower proportion reporting methamphetamine-related violent crime, and no increase in methamphetamine-attributed property crime over the study period. Unlike the national trend, the quality of methamphetamine did not decline in Adelaide. Among Perth detainees, the frequency of past-month use and the quantity used were more volatile than the national trends, and there was a noticeable increase in methamphetamine prices during 2014. These variations among DUMA sites may be due to regional differences in drug manufacturing or trafficking processes, specific policing strategies, treatment access or awareness or the implementation of drug policies such as harm minimisation.

These data highlight the value of monitoring the full suite of indicators in the DUMA Drug Market Indicator Framework to provide a nuanced picture of changes in methamphetamine supply, demand and harms over time. In particular, these data allow for the close monitoring of major 'shocks' to the illicit drug market in Australia, which are expected during the COVID-19 pandemic (Dietze & Peacock 2020; Voce et al. 2020).

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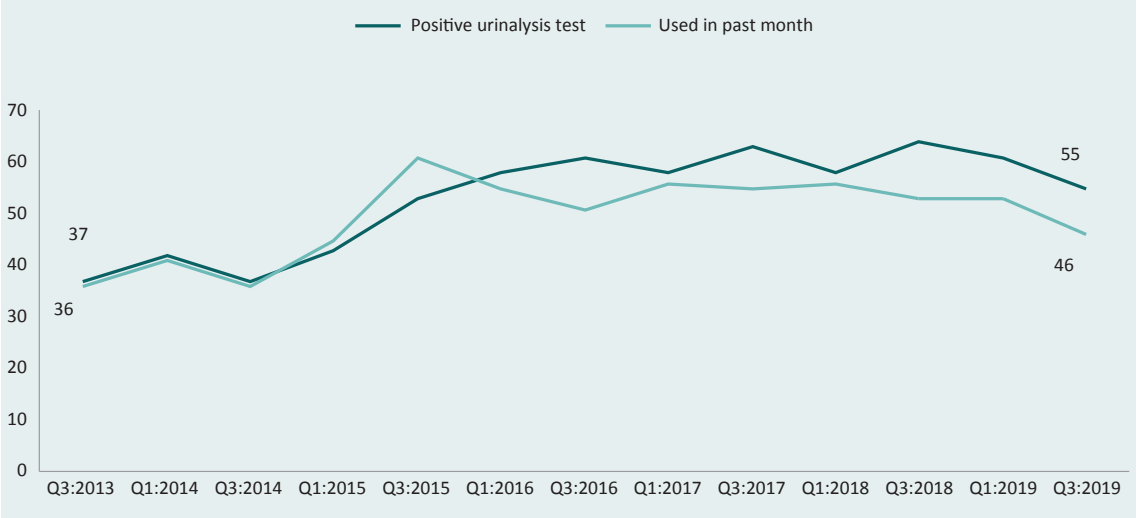
Appendix

Perth

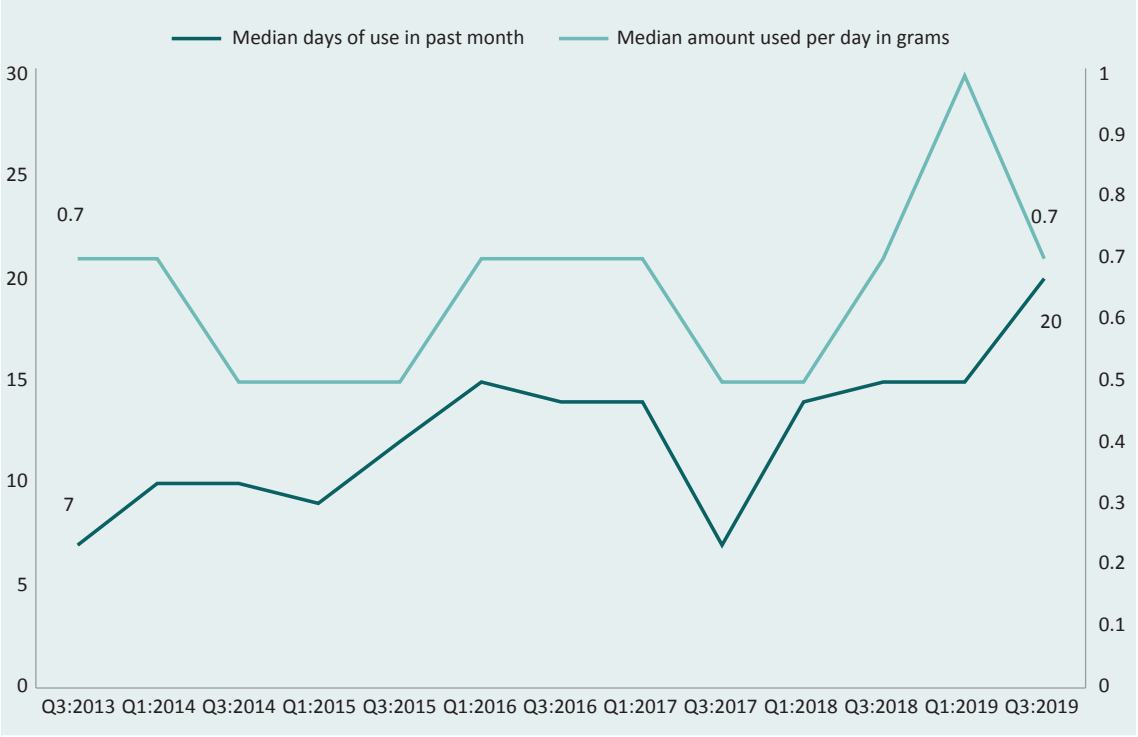
Figure A1: Methamphetamine use among Perth sample, 2013–19 (%) [demand]



Note: Past-month use (*n*=1,240) excludes those with these data missing (*n*=9). Urinalysis rate (*n*=864) excludes those who did not provide a urine specimen (*n*=892). There was a significant increase in the urinalysis test positive rate (*tau-b*=0.61, score=48, *SE*=16.4, *p*=0.004) between Q3 2013 and Q3 2019. There was no significant trend in the proportion who reported past-month use across this time

Source: AIC DUMA collection 2013–19 [computer file]

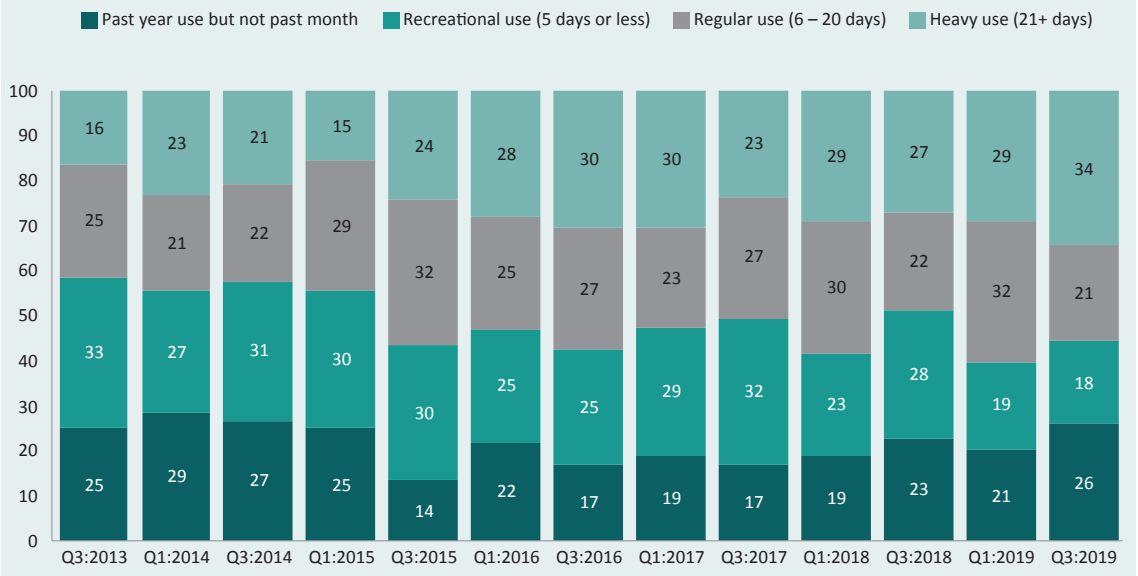
Figure A2: Median frequency and quantity of use among past-month users in Perth sample, 2013–19 [demand]



Note: Quantity (*n*=1,046) excludes those with these data missing (*n*=194). Frequency (*n*=1,216) excludes those with these data missing (*n*=24). There was a significant increase in the days of use (*tau-b*=0.62, score=46, *SE*=16.1, *p*=0.005), but not quantity, between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

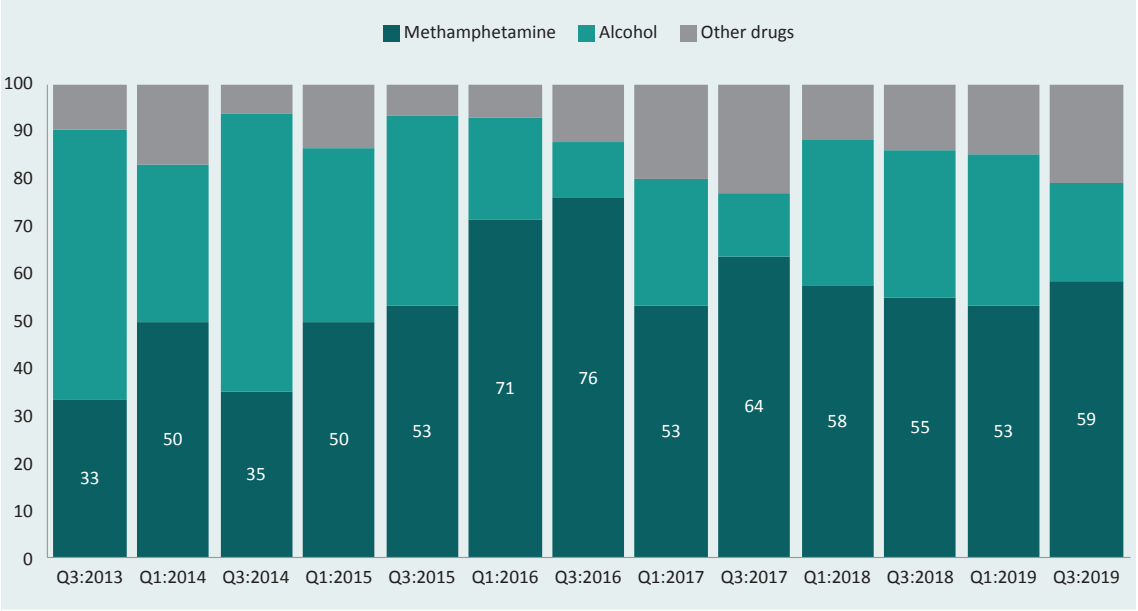
Figure A3: Perth sample by frequency of methamphetamine use, 2013–19 (%) [demand]



Note: Past-month use among detainees who had used methamphetamine in the last year (*n*=1,582). There was a significant increase in the proportion of heavy users (*tau-b*=0.56, score=43, *SE*=16.3, *p*=0.010), and a significant decrease in the proportion of recreational users (*tau-b*=–0.43, score=–33, *SE*=16.3, *p*=0.050) between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

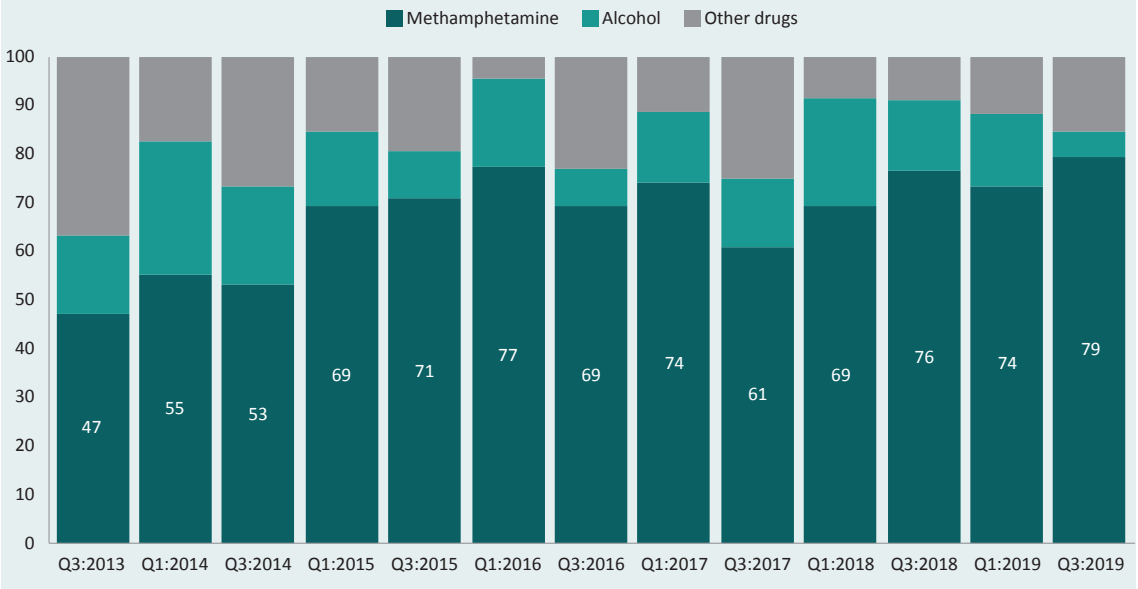
Figure A4: Methamphetamine-attributed violent crime among Perth sample, 2013–19 (%) [harms]



Note: Violent crime attribution (*n*=344), excludes those with missing violent crime attribution data (*n*=394). There was a significant increase in methamphetamine-attributed violent crime (*tau-b*=0.51, score=40, *SE*=16.4, *p*=0.017) between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

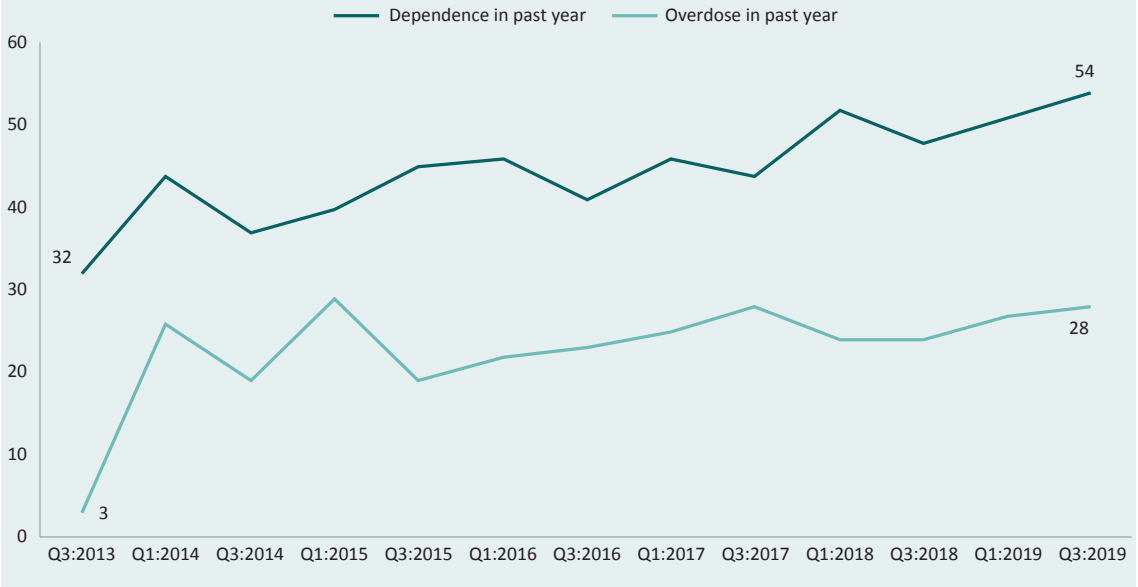
Figure A5: Methamphetamine-attributed property crime among Perth sample, 2013–19 (%) [harms]



Note: Property crime attribution (*n*=374), excludes those with missing property crime attribution data (*n*=436). There was a significant increase in methamphetamine-attributed property crime (*tau-b*=0.52, score=40, *SE*=16.3, *p*=0.017) between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

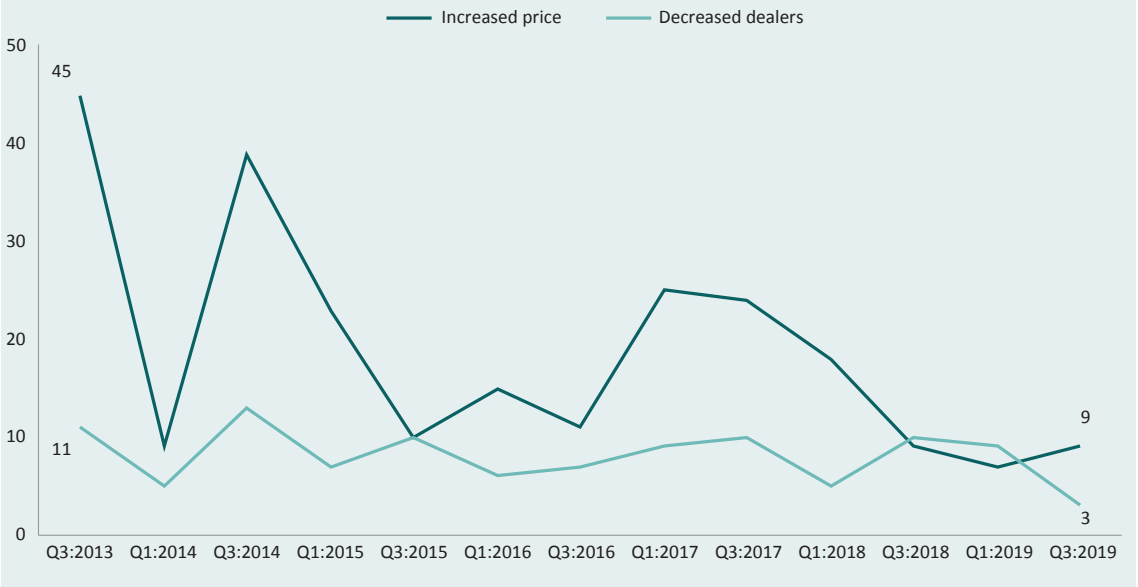
Figure A6: Methamphetamine-related harms among past-year users in Perth sample, 2013–19 (%) [harms]



Note: Dependence (*n*=715) excludes those with these data missing (*n*=8). Overdose (*n*=372) excludes those with these data missing (*n*=7). There was a significant increase in dependence (*tau-b*=0.72, score=56, *SE*=16.4, *p*<0.001), but not overdose, between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

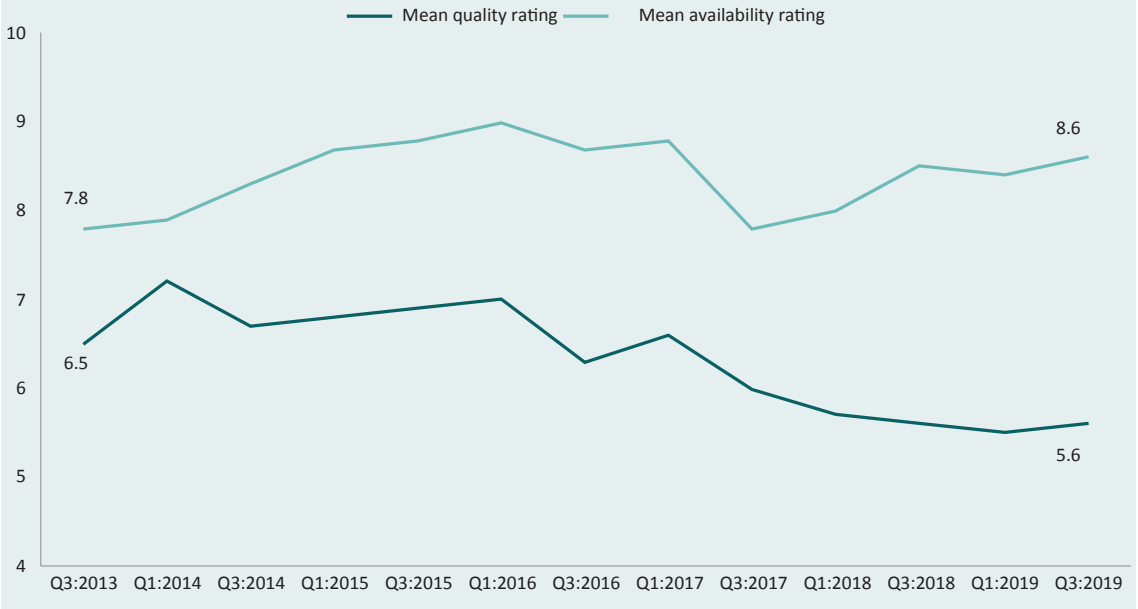
Figure A7: Changes in Perth market indicators for past-month users, 2013–19 (%) [supply]



Note: Changes in price (*n*=921) exclude those with these data missing (*n*=121). Change in number of dealers (*n*=932) excludes those with these data missing (*n*=288). There was a significant decrease in the proportion of users reporting higher prices (*tau-b*=–0.53, score=–41, *SE*=16.4, *p*=0.014), but not fewer dealers, between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

Figure A8: Mean quality and availability ratings among past-month users in Perth sample, 2013–19 [supply]

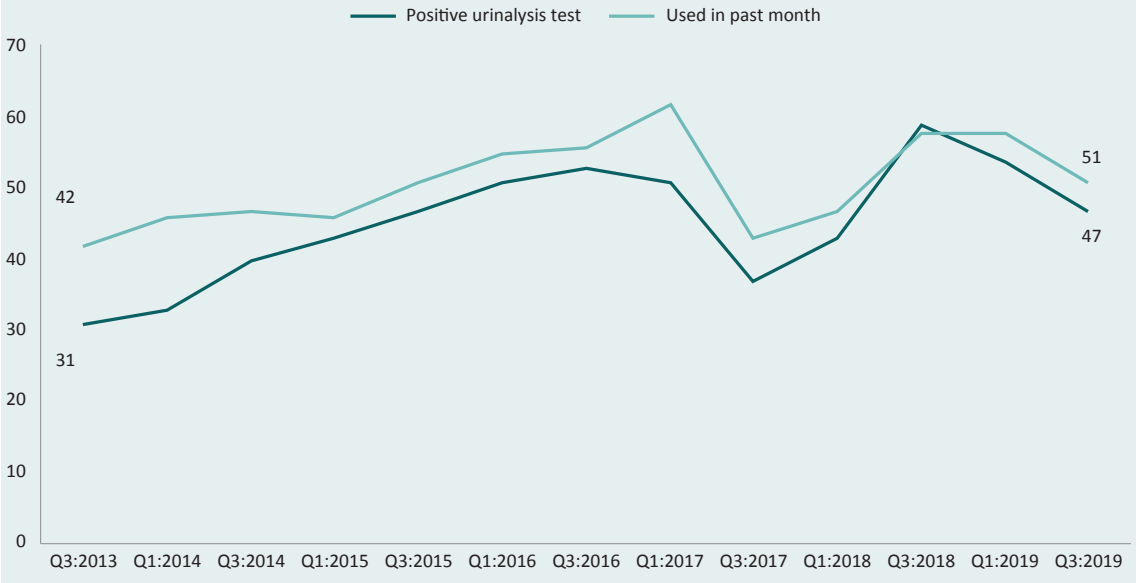


Note: Quality ratings (*n*=1,173) exclude those with these data missing (*n*=31). Availability ratings (*n*=1,186) exclude those with these data missing (*n*=18). There was a significant decrease in quality (*tau-b*=–0.73, score=–47, *SE*=14.8, *p*=0.002), but not availability, between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

Brisbane

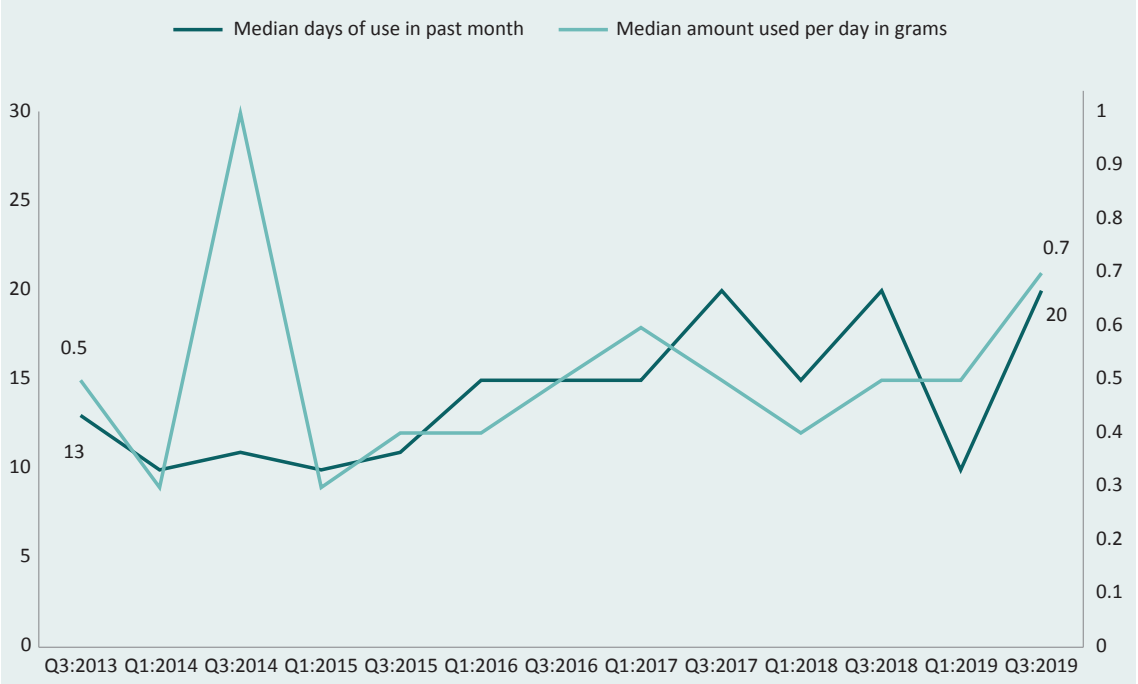
Figure A9: Methamphetamine use among Brisbane sample, 2013–19 (%) [demand]



Note: Past-month use (*n*=1,206) excludes those with these data missing (*n*=12). Urinalysis rate (*n*=883) excludes those who did not provide a urine specimen (*n*=423). There were significant increases in urinalysis test positive rates (*tau-b*=0.51, score=40, *SE*=16.4, *p*=0.017) and past-month use (*tau-b*=0.46, score=36, *SE*=16.4, *p*=0.033) between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

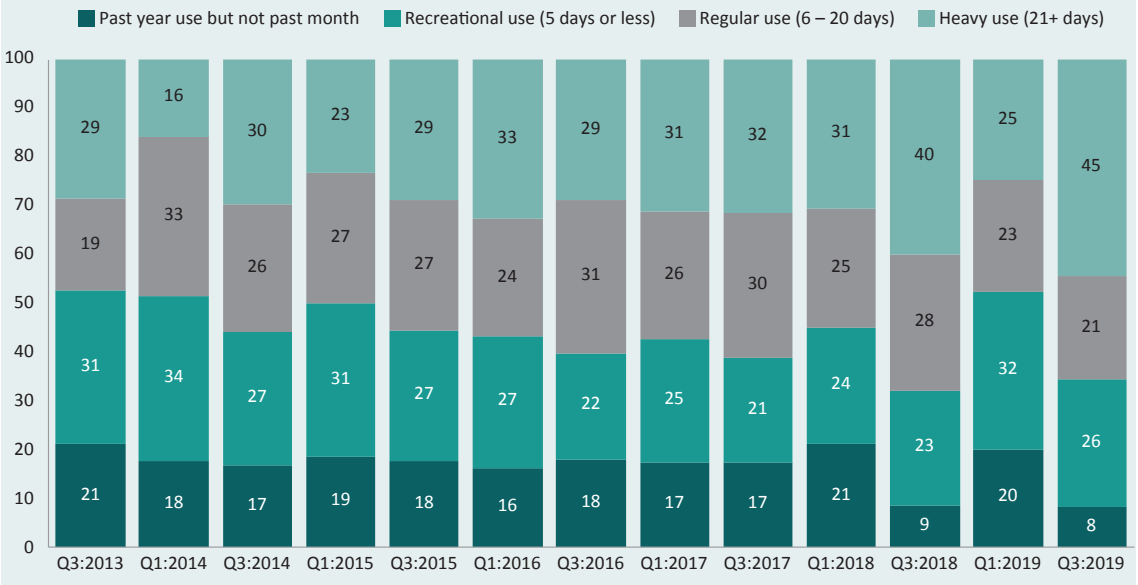
Figure A10: Median frequency and quantity of use among past-month users in Brisbane sample, 2013–19 [demand]



Note: Quantity (*n*=1,046) excludes those with these data missing (*n*=44). Frequency (*n*=1,202) excludes those with these data missing (*n*=4). There were significant increases in days of use (*tau-b*=0.49, score=35, *SE*=15.9, *p*=0.032), but not quantity, between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

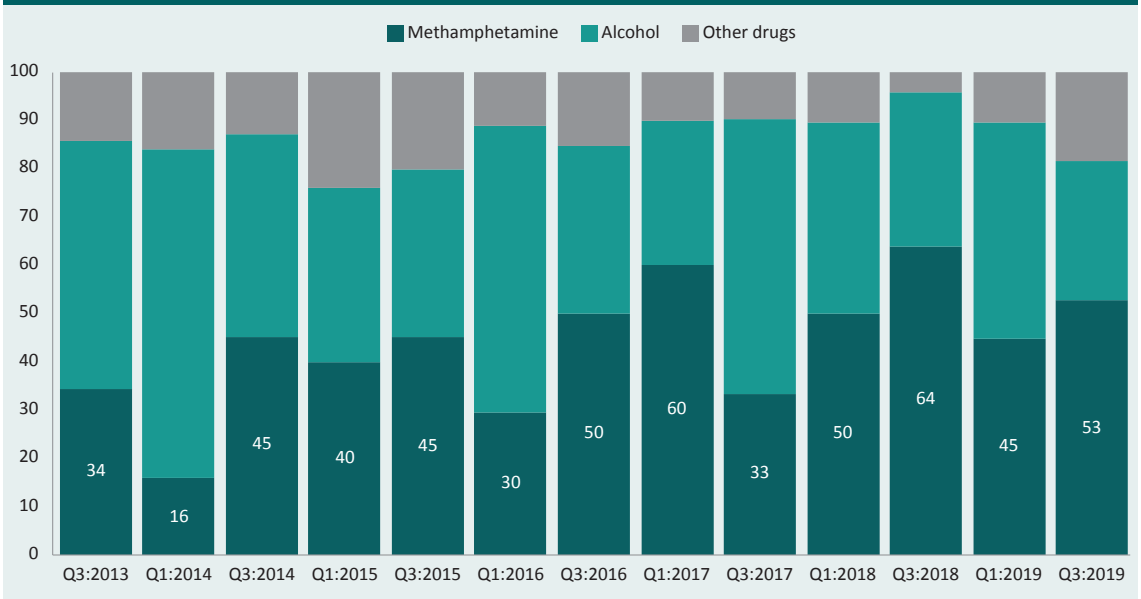
Figure A11: Brisbane sample by frequency of methamphetamine use, 2013–19 (%) [demand]



Note: Past-month use among detainees who had used methamphetamine in the last year (*n*=1,451). There was a significant increase in the proportion of heavy users (*tau-b*=0.45, score=34, *SE*=16.2, *p*=0.042) between Q3 2013 and Q3 2019. There was no significant change in the proportion of recreational users across this time

Source: AIC DUMA collection 2013–19 [computer file]

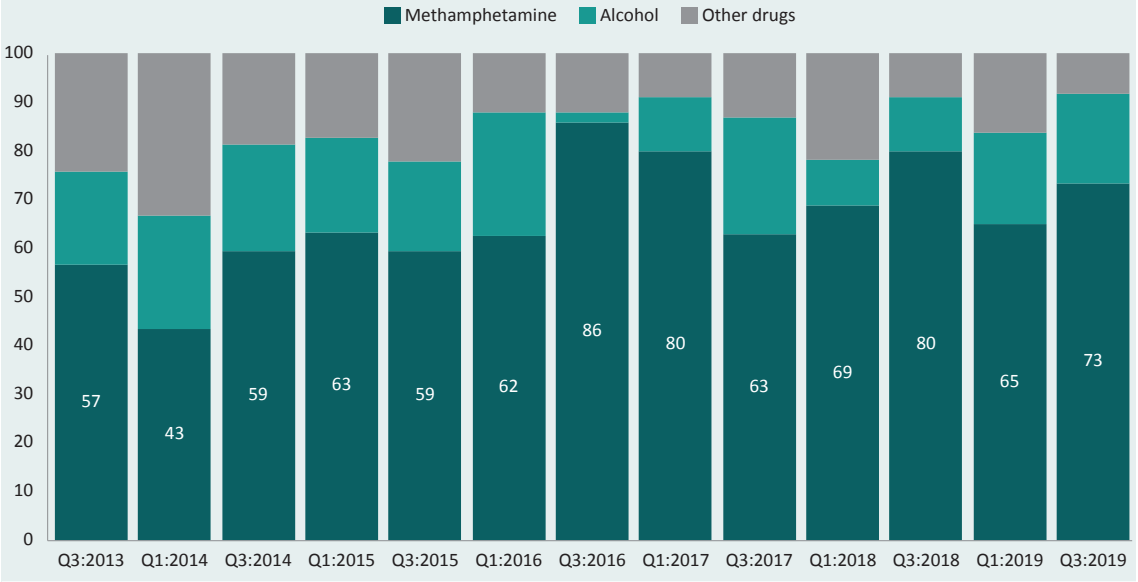
Figure A12: Methamphetamine-attributed violent crime among Brisbane sample, 2013–19 (%) [harms]



Note: Violent crime attribution (*n*=395) excludes those with missing violent crime attribution data (*n*=304)

Source: AIC DUMA collection 2013–19 [computer file]

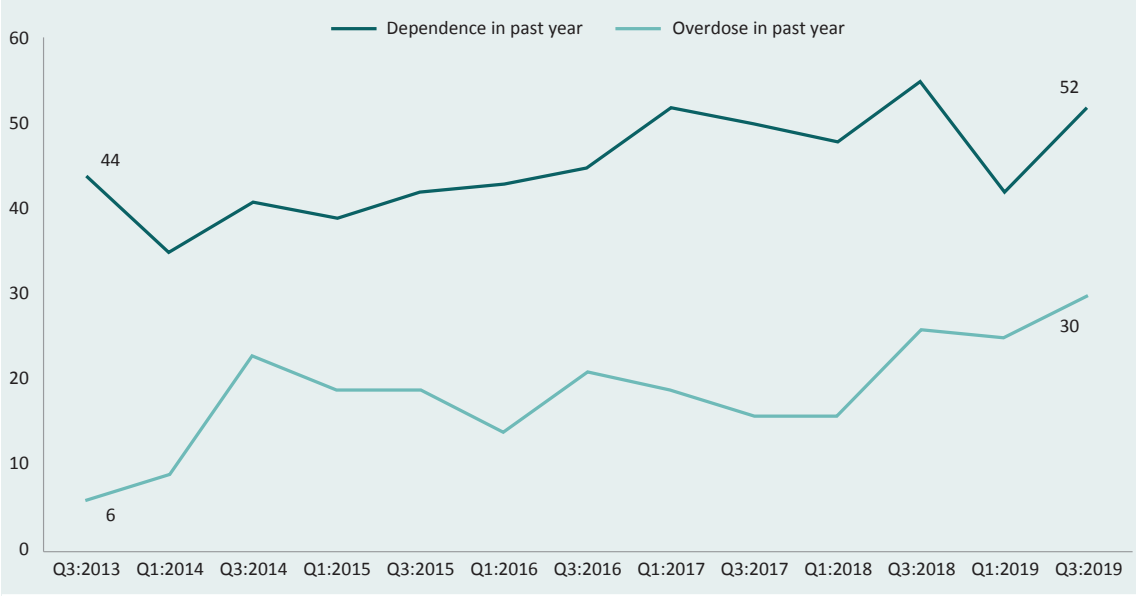
Figure A13: Methamphetamine-attributed property crime among Brisbane sample, 2013–19 (%) [harms]



Note: Property crime attribution (*n*=487) excludes those with missing property crime attribution data (*n*=362)

Source: AIC DUMA collection 2013–19 [computer file]

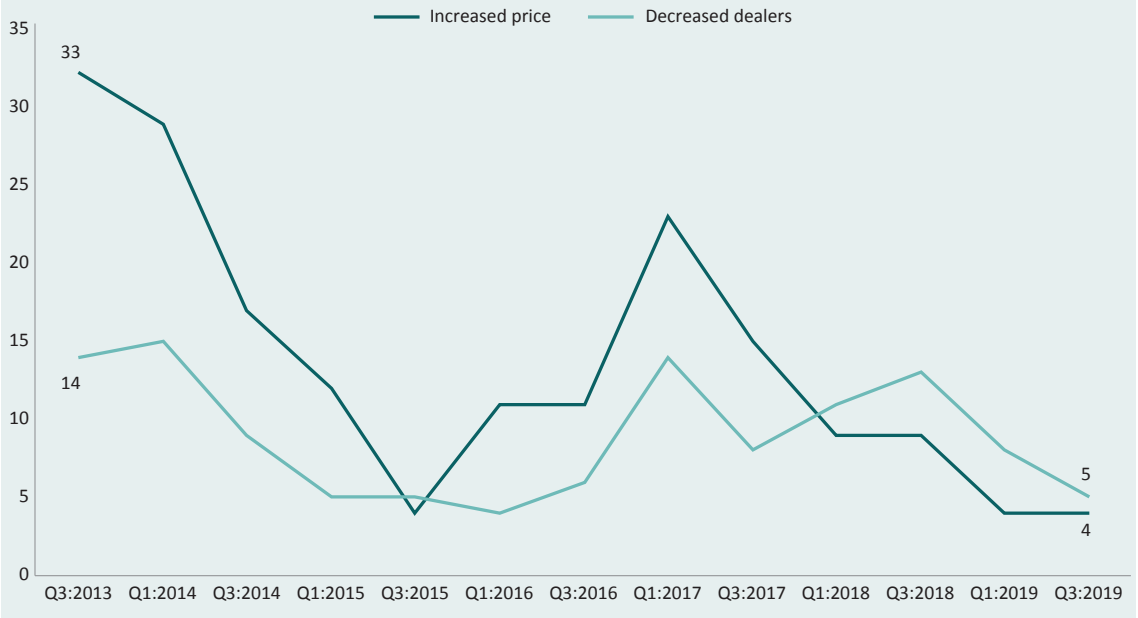
Figure A14: Methamphetamine-related harms among past-year users in Brisbane sample, 2013–19 (%) [harms]



Note: Dependence (*n*=2,398) excludes those with these data missing (*n*=4). Overdose (*n*=2,400) excludes those with these data missing (*n*=2). There were significant increases in rates of overdose (*tau-b*=0.50, score=39, *SE*=16.4, *p*=0.020) and dependence (*tau-b*=0.56, score=44, *SE*=16.4, *p*=0.009) between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

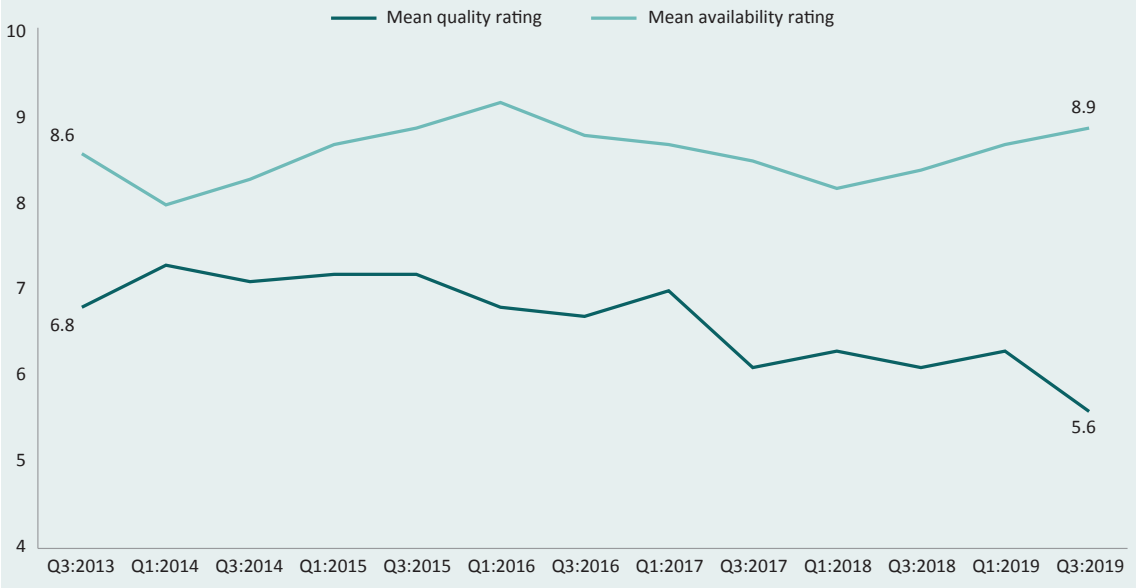
Figure A15: Changes in Brisbane market indicators for past-month users, 2013–19 (%) [supply]



Note: Changes in price (*n*=1,123) exclude those with these data missing (*n*=81). Changes in dealers (*n*=1,056) exclude those with these data missing (*n*=148). There was a significant decrease in the proportion of users reporting higher prices (*tau-b*=–0.61, score=–47, *SE*=16.4, *p*=0.005), but not fewer dealers, between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

Figure A16: Mean quality and availability ratings among past-month users in Brisbane sample, 2013–19 [supply]

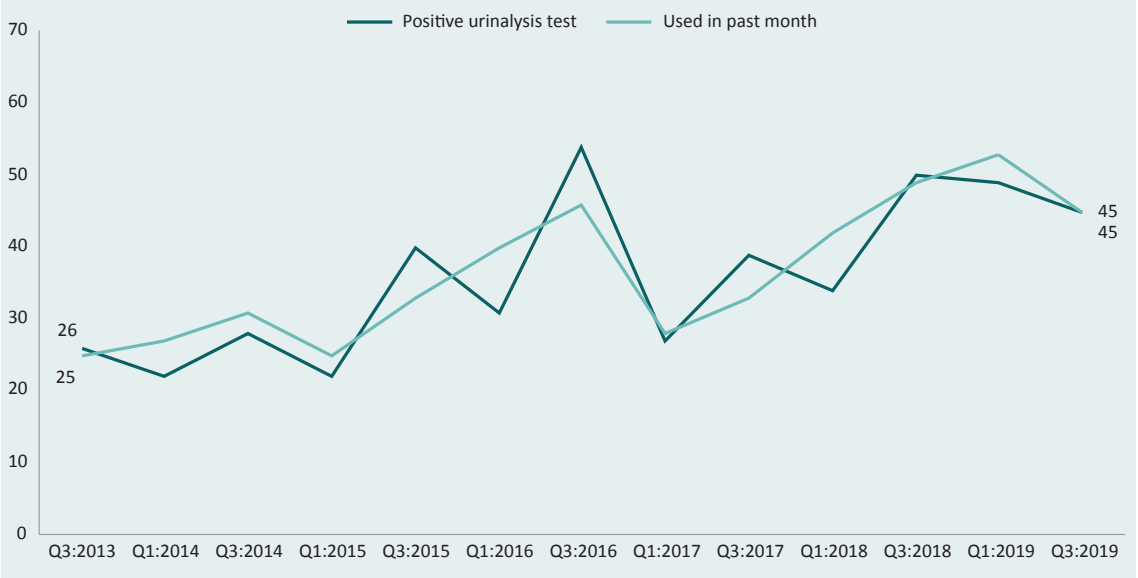


Note: Quality ratings (*n*=538) exclude those with these data missing (*n*=50). Availability ratings (*n*=560) exclude those with these data missing (*n*=28). There was a significant decrease in quality (*tau-b*=–0.58, score=–36, *SE*=14.6, *p*=0.017), but no change in availability, between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

Adelaide

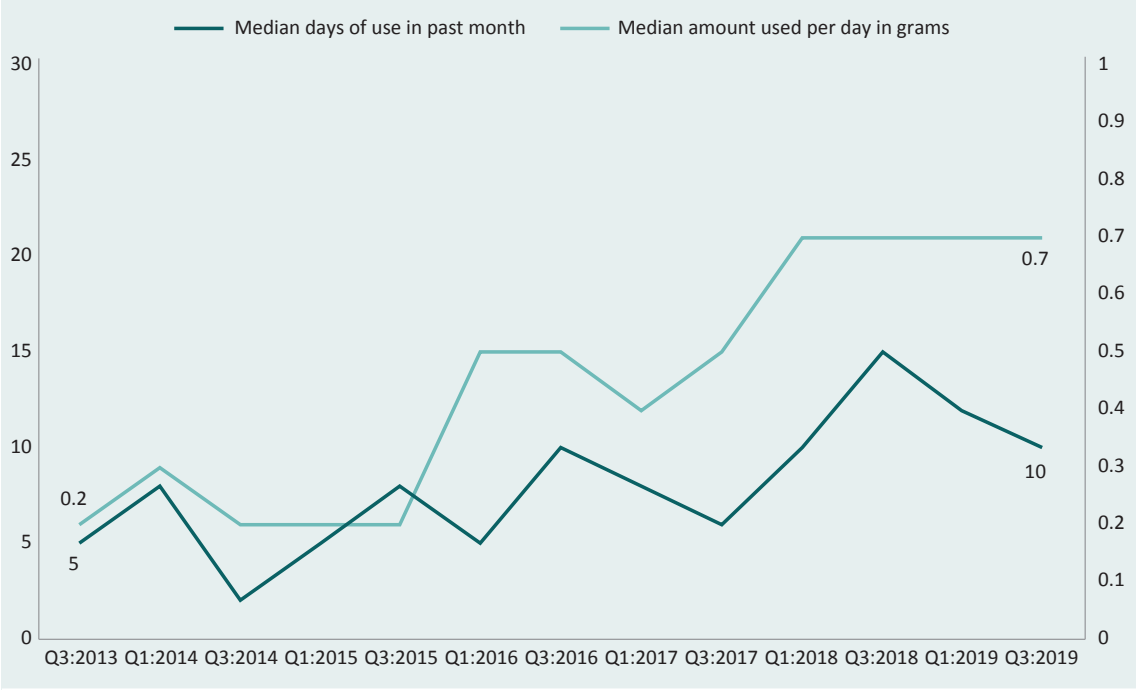
Figure A17: Methamphetamine use among Adelaide sample, 2013–19 (%) [demand]



Note: Past-month use (*n*=588) excludes those with these data missing (*n*=2). Urinalysis rate (*n*=809) excludes those who did not provide a urine specimen (*n*=789). There were significant increases in urinalysis test positive rates (*tau-b*=0.49, score=38, *SE*=16.4, *p*=0.024) and past-month use (*tau-b*=0.67, score=52, *SE*=16.4, *p*=0.002) between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

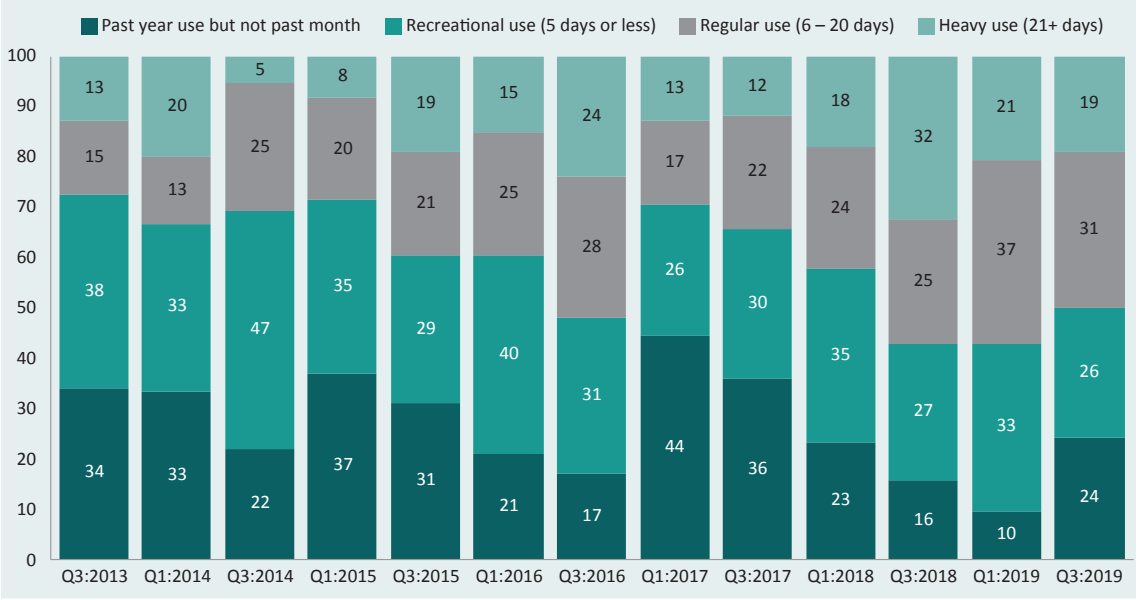
Figure A18: Median frequency and quantity of use among past-month users in Adelaide sample, 2013–19 [demand]



Note: Quantity (*n*=507) excludes those with these data missing (*n*=80). Frequency (*n*=586) excludes those with these data missing (*n*=2). There were significant increases in quantity used (*tau-b*=0.70, score=50, *SE*=15.9, *p*=0.002) and frequency of use (*tau-b*=0.59, score=43, *SE*=16.1, *p*=0.009) between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

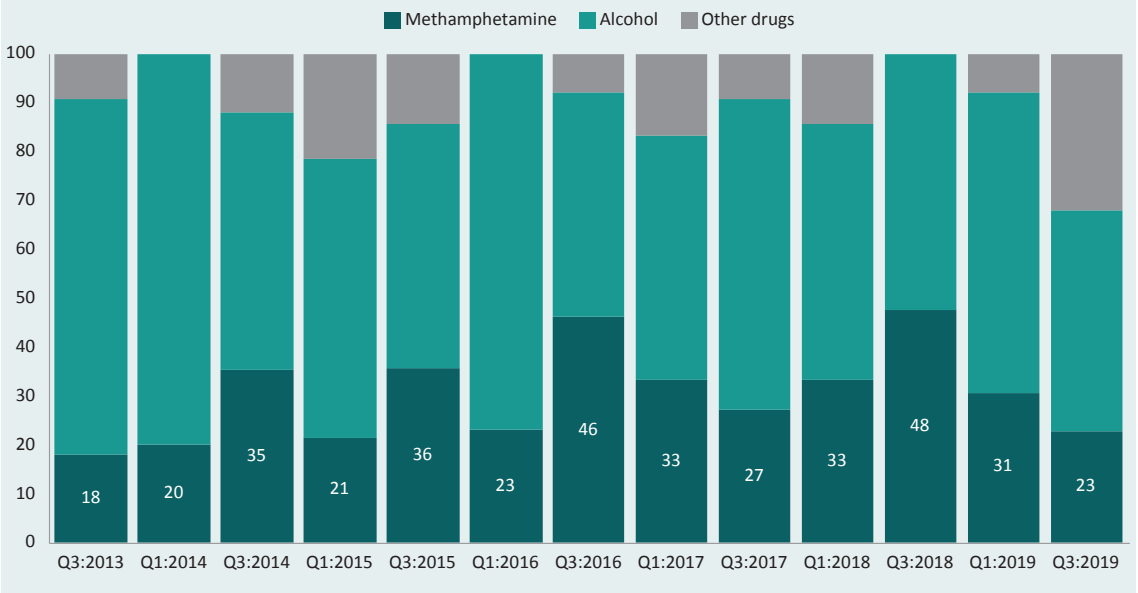
Figure A19: Adelaide sample by frequency of methamphetamine use, 2013–19 (%) [demand]



Note: Past-month use among detainees who had used methamphetamine in the last year (*n*=791). There was a significant decrease in the proportion of recreational users (*tau-b*=–0.43, score=–33, *SE*=16.3, *p*=0.050) between Q3 2013 and Q3 2019. There was no significant change in the proportion of heavy users across this time

Source: AIC DUMA collection 2013–19 [computer file]

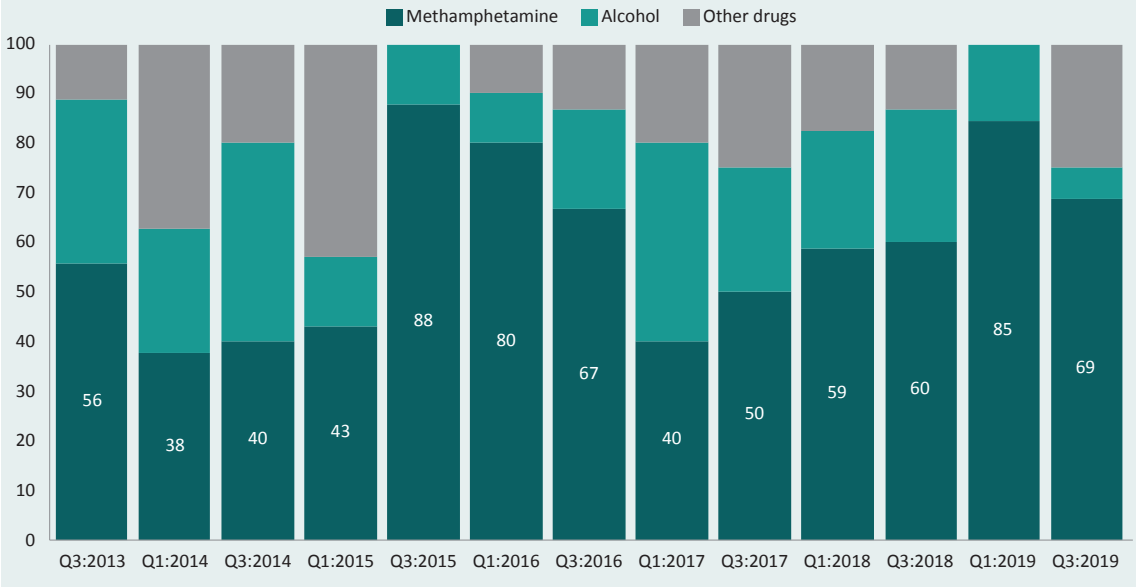
Figure A20: Methamphetamine-attributed violent crime among Adelaide sample, 2013–19 (%) [harms]



Note: Violent crime attribution (*n*=198) excludes those with missing violent crime attribution data (*n*=330). There was a significant increase in methamphetamine-attributed violent crime (*tau-b*=0.51, score=40, *SE*=16.4, *p*=0.017) between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

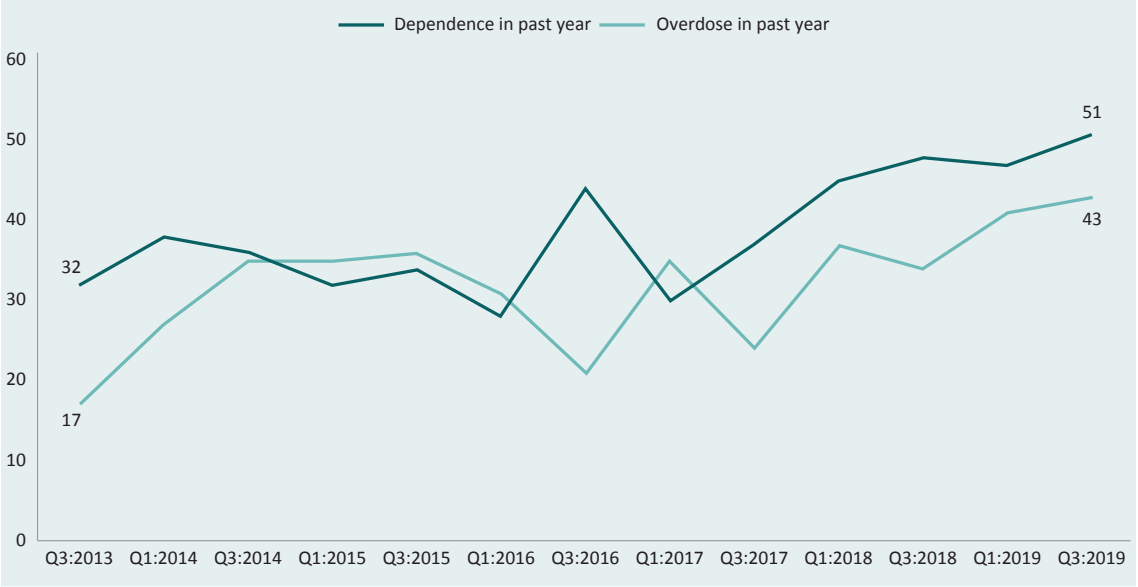
Figure A21: Methamphetamine-attributed property crime among Adelaide sample, 2013–19 (%) [harms]



Note: Property crime attribution (*n*=141) excludes those with missing property crime attribution data (*n*=205). There was no significant trend in methamphetamine-attributed property crime across this time

Source: AIC DUMA collection 2013–19 [computer file]

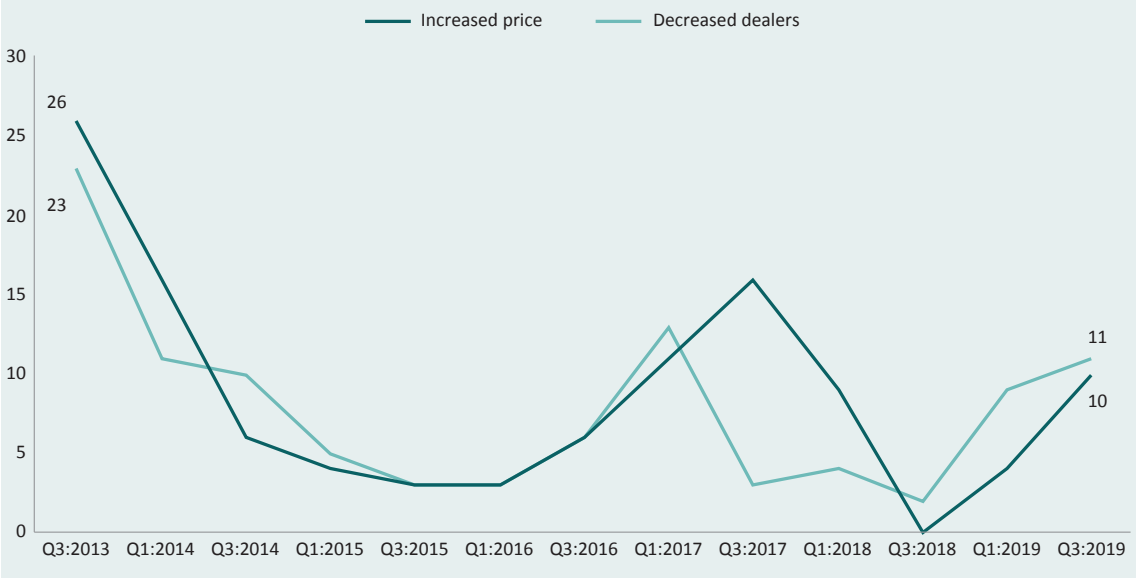
Figure A22: Methamphetamine-related harms among past-year users in Adelaide sample, 2013–19 (%) [harms]



Note: Dependence (*n*=314) excludes those with these data missing (*n*=2). Overdose (*n*=254) excludes those with these data missing (*n*=9). There were significant increases in overdose (*tau-b*=0.46, score=36, *SE*=16.4, *p*=0.033) and dependence (*tau-b*=0.51, score=40, *SE*=16.4, *p*=0.017) between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

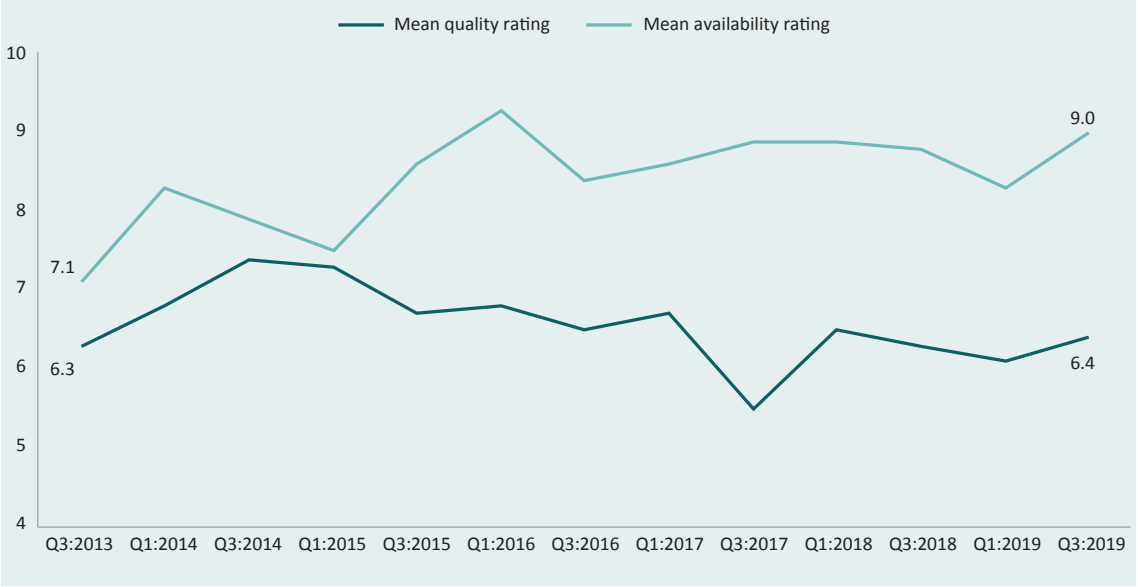
Figure A23: Changes in Adelaide market indicators for past-month users, 2013–19 (%) [supply]



Note: Changes in price (*n*=471) exclude those with these data missing (*n*=77). Changes in dealers (*n*=410) exclude those with these data missing (*n*=145). There were no significant trends in higher prices or fewer dealers across this time

Source: AIC DUMA collection 2013–19 [computer file]

Figure A24: Mean quality and availability ratings among past-month users in Adelaide sample, 2013–19 [supply]



Note: Quality ratings (*n*=538) exclude those with these data missing (*n*=50). Availability ratings (*n*=560) exclude those with these data missing (*n*=28). There were significant increases in availability (*tau-b*=0.53, score=27, *SE*=12.0, *p*=0.030), but no change in quality, between Q3 2013 and Q3 2019

Source: AIC DUMA collection 2013–19 [computer file]

AIC reports

Statistical Report

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