Trends in methamphetamine residues in wastewater in metropolitan and regional cities in south-east Queensland, 2009–2015

Over the past several years, the Australian media have reported increased use and harm arising from the use of crystal methamphetamine ("ice"),[1,2] a highly pure form of the drug that can be smoked or injected.[2] We used wastewater analysis to examine trends in methamphetamine residues in wastewater samples from the inlets of two treatment plants in south-east Queensland. One plant served a coastal metropolitan city that included entertainment precincts and the other a major inland regional city.

Wastewater analysis is an approach to monitoring illicit drug use in the population,[3] in which liquid chromatography and mass spectrometry are used to measure the concentrations of illicit drug residues in wastewater. We used drug-specific excretion factors and the de jure population from the Australian Bureau of Statistics 2011 census data for these catchments to estimate the amount of methamphetamine consumed by people who contributed to the wastewater samples.

We collected a total of 498 samples in the metropolitan city (2009–2015) and 712 samples in the regional city (2010–2015). Details of the sampling, analytical and back-calculation methods are described in the Appendix.

Methamphetamine consumption (measured in milligrams per day per 1000 inhabitants) was higher in the metropolitan city than in the regional city, and levels in both locations increased significantly between 2009–2010 and 2015 ($P < 0.001$) (Box 1). Consumption increased 4.8 times in the metropolitan area between 2009 and 2015, and 3.4 times in the regional city between 2010 and 2015 (Box 2).

Our results are similar to trends found in methamphetamine in wastewater in South Australia between 2010 and 2013.[4] They are also consistent with increases in the purity of methamphetamine seized by police, arrests for methamphetamine use and supply, and the number of people seeking treatment for methamphetamine-related problems.[3,5]

"We detected an almost fivefold increase in methamphetamine residues in wastewater in an urban city"

Some caveats apply to our findings. First, the populations contributing to the samples in each area could not be determined exactly. Second, our data do not allow us to decide whether methamphetamine consumption has increased because there are more new users, because current users are consuming higher doses of a purer drug, or as a result of a combination of these possibilities.

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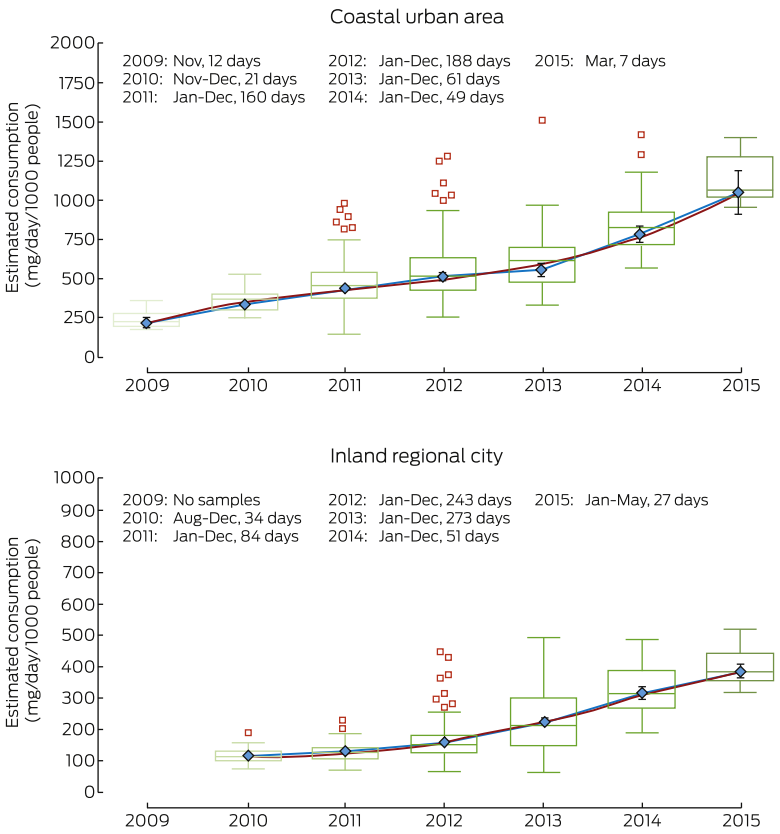
1 Estimated methamphetamine consumption (mg/day/1000 people) detected in wastewater in coastal urban and inland regional cities in south-east Queensland

	2009	2010	2011	2012	2013	2014	2015
Urban city							
Range	173–353	246–526	142–978	254–1279	330–1511	566–1416	952–1401
Median	222	343	452	514	615	825	1062
Mean	234	363	467	553	599	839	1126
Coefficient of variation	23%	22%	31%	32%	31%	21%	14%
Regional city*							
Range	–	73–188	69–229	64–448	61–492	188–485	318–518
Median	–	112	126	150	210	315	381
Mean	–	115	127	158	228	323	398
Coefficient of variation	–	20%	24%	33%	41%	23%	14%

* No samples taken in 2009. ◆

2 Estimated methamphetamine consumption (mg/day/1000 people) detected in wastewater in coastal urban and inland regional cities in south-east Queensland, plotted in box-and-whisker and fitted trend with 95% confidence intervals



We detected an almost fivefold increase in methamphetamine residues in wastewater in an urban city and a more than threefold increase in a regional city in south-east Queensland. These results demonstrate the potential value of wastewater analysis in providing timely data on trends in illicit drug consumption in the population of urban and regional cities.

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