

## **Age period cohort analysis: Twenty-one years of heroin-related mortality in Australia.**

*Amanda Roxburgh*<sup>1,2,3</sup>, *Oisin Stronach*<sup>1,2</sup>, *Michael Livingston*<sup>3</sup> and *Paul Dietze*<sup>1,2,3</sup>

<sup>1</sup> *Harm and Risk Reduction, Burnet Institute, Melbourne, Australia,* <sup>2</sup> *Monash Addiction Research Centre, Monash University, Melbourne, Australia,* <sup>3</sup> *Curtin University, Perth, Australia,*

Presenter's email: [amanda.roxburgh@burnet.edu.au](mailto:amanda.roxburgh@burnet.edu.au)

**Introduction:** Opioid-related deaths in Australia have continued to increase over the last 20 years, with increasing numbers of deaths attributed to pharmaceutical opioids throughout this period. Heroin deaths are also increasing. This paper sought to analyse trends over 21 years by age and sex.

**Method:** Analysis of deaths (2001-2022) attributed by the coroner to heroin (and other drug) toxicity extracted from the NCIS, an online database containing coronial deaths in Australia and New Zealand. Age-period-cohort analysis is conducted on total heroin deaths, and joinpoint regression conducted on heroin deaths by age and sex.

**Results:** There were 7,233 heroin-related deaths in Australia between 2001-2022. The majority (80%) of deaths occurred among males. Rates of deaths increased significantly from 1.2 per 100,000 population in 2001 to 2.5 per 100,000 in 2019. Joinpoint regression identified significant increases across the entire period, with an annual percentage change (APC) of 2.68%. Deaths increased significantly among males (APC, 3.3%) and females (APC, 4.94%). Age analysis showed deaths among Australians aged: i) 30 years and under have significantly declined across the period (APC, -3.79%); ii) 30-39 years and 40-49 years increased significantly to 2018 (APC, 3.79% & 9.46% respectively); and iii) 50 years and over increased significantly to 2018 (APC, 17.1%), and further accelerated among those 59-62 years (APC, 21.5%). Period effects showed an increasing contribution of methamphetamine to heroin deaths 2011-2020 (from 10.2%-37%). Cohort effects showed relative mortality risk was highest among Generation X (those born between 1965-1979).

**Conclusions:** Increasing attention needs to be given to older Australians using heroin, particularly in the context of other underlying (particularly cardiac) disease and increasing concurrent use of methamphetamine. Annual increases progressively accelerated from the age of 40 years upwards. Greater efforts to engage women who use heroin in health and harm reduction services is also warranted given deaths among women increased at a higher rate.

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