NCIS

OPIOID RELATED DEATHS

2, 454 opioid related deaths were reported to an Australian coroner between 2007 and 2009
The number of opioid related deaths increased by 21 per cent from 2007 to 2009

Opioid Type

☐ Heroin was the drug most frequently identified in opioid related deaths, followed by methadone and oxycodone (chart 1).

☐ Opioids were most frequently involved in deaths as part of a multiple drug toxicity, rather than as a sole drug (chart 3).

Age Range & Gender

☐ More than half of all opioid related deaths involved deceased aged between 25-44 years.

☐ Opioid related deaths in under 35 year olds most frequently involved heroin or methadone, while deaths in those aged over 54 years most frequently involved codeine, morphine, oxycodone or tramadol (chart 4).

☐ Two-thirds of opioid deaths involved males.

☐ Males out-numbered females for all types of opioid deaths apart from codeine and tramadol, where females numbered slightly higher (chart 5).

Intent

☐ Where intent was able to be determined, 80.6 per cent of opioid related deaths were unintentional (chart 6).

☐ Propoxyphene had the highest proportion of intentional self-harm deaths of all opioids identified (chart 7).

Jurisdiction

☐ The most prevalent opioid type differed across Australian States/Territories (charts 9a-g).

Opioids include:

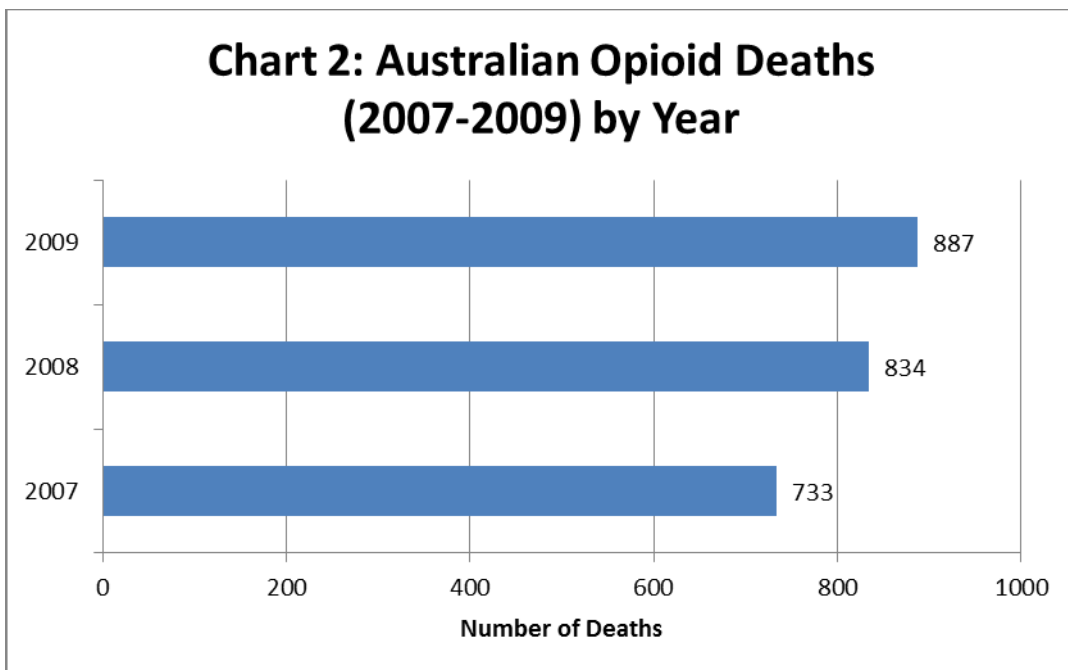|		
* Heroin	* Fentanyl	* (Dextro)methorphan
* Methadone	* Pethidine	* Hydromorphone
* Oxycodone	* Buprenorphine	* Dihydrocodeine
* Morphine	* (Dextro)propoxyphene	* Loperamide
* Codeine	* Hydrocodone	* Oxymophone
* Tramadol	* Pholcodine	* Remifentanil

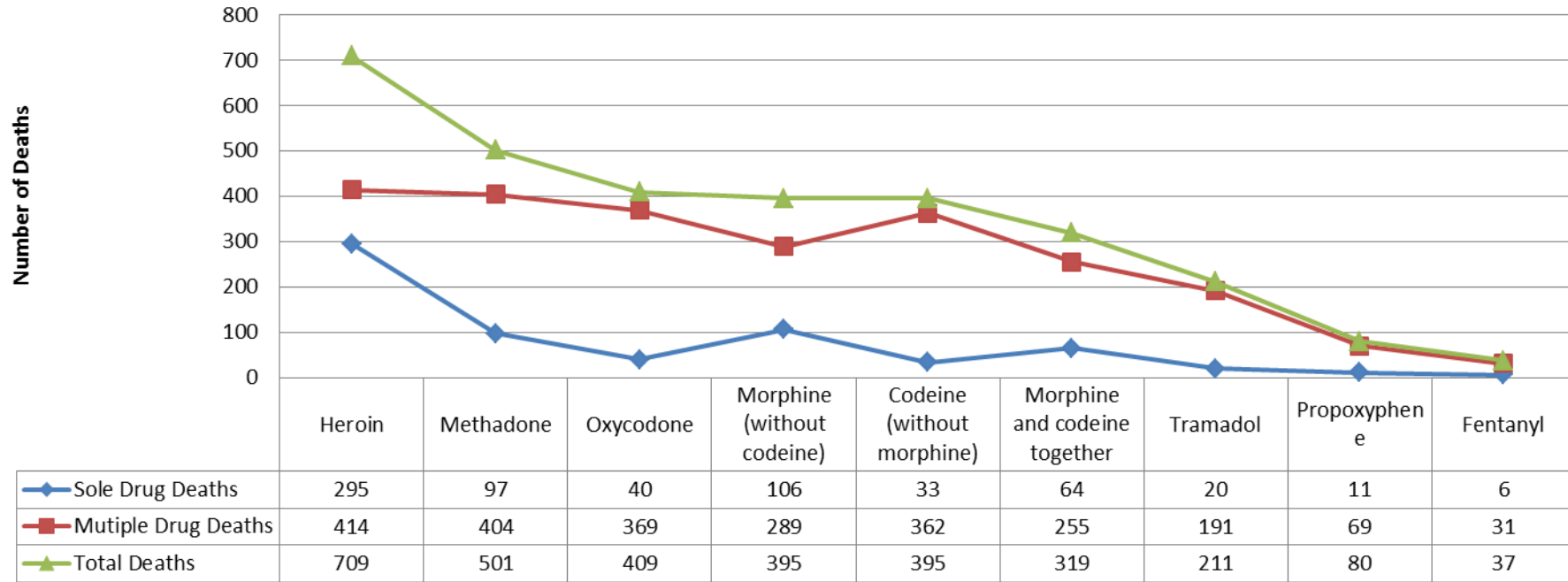## Chart 1: Australian Opioid Deaths (2007-2009) by Year and Opioid Type**

Number of Deaths
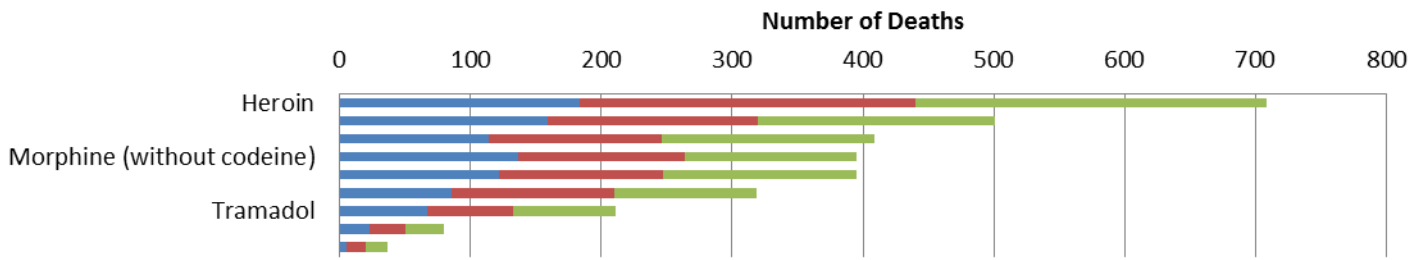
	Fentanyl	Propoxyphene	Tramadol	Morphine and codeine together	Codeine (without morphine)	Morphine (without codeine)	Oxycodone	Methadone	Heroin
2007	5	23	67	86	122	136	114	159	183
2008	15	27	66	124	125	128	132	161	257
2009	17	30	78	109	148	131	163	181	269

** Chart only displays opioid types where the total frequency of deaths across 2007-2009 was greater than 35

Chart 2: Australian Opioid Deaths (2007-2009) by Year

Year	Number of Deaths
2009	887
2008	834
2007	733

Chart 3: Australian Opioid Deaths (2007-2009) by Drug Involvement**

	Heroin	Methadone	Oxycodone	Morphine (without codeine)	Codeine (without morphine)	Morphine and codeine together	Tramadol	Propoxyphene	Fentanyl
Sole Drug Deaths	295	97	40	106	33	64	20	11	6
Mutiple Drug Deaths	414	404	369	289	362	255	191	69	31
Total Deaths	709	501	409	395	395	319	211	80	37

Y-axis: Number of Deaths

** Chart only displays opioid types where the total frequency of deaths across 2007-2009 was greater than 35*

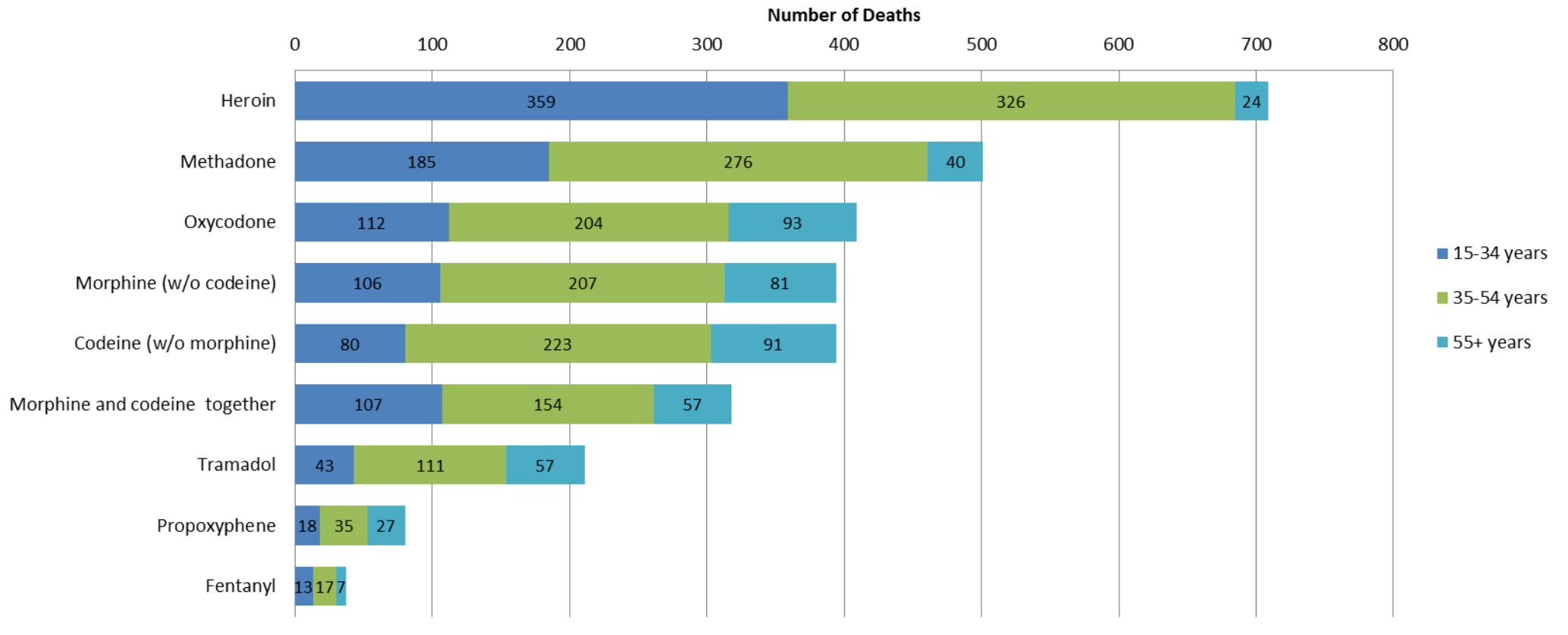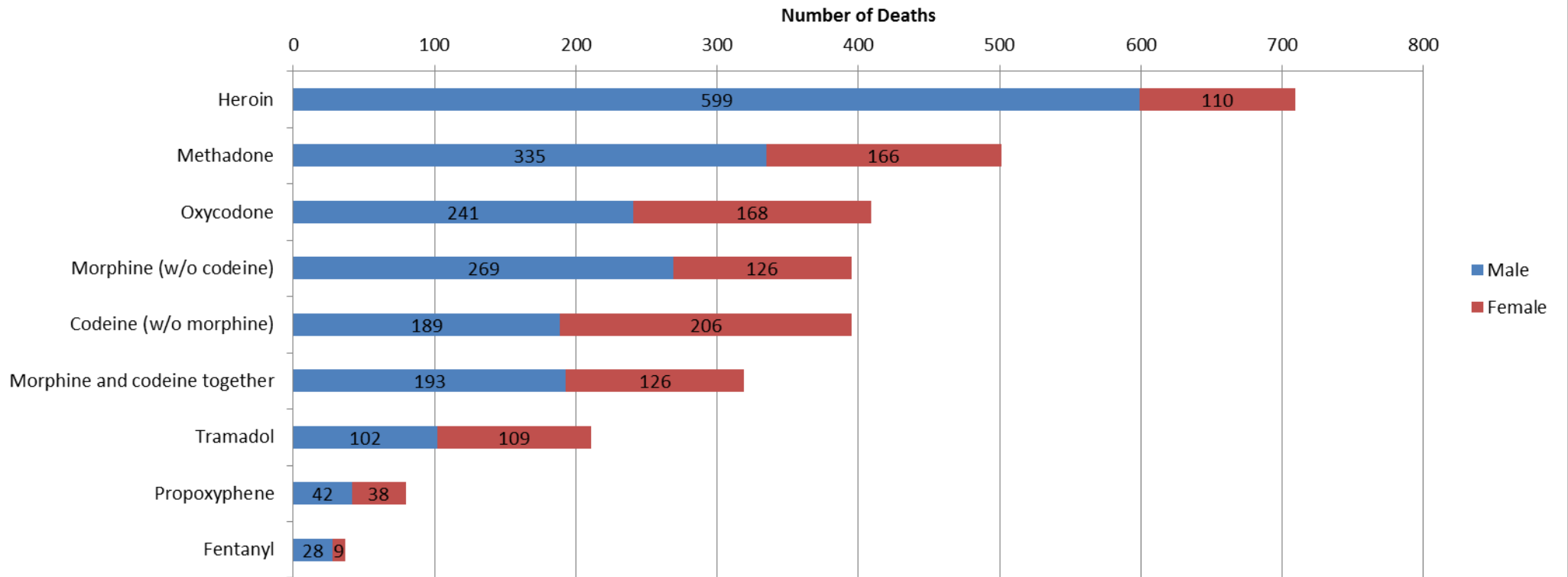# Chart 4: Australian Opioid Deaths (2007-2009) by Age of Deceased**

Number of Deaths

Opioid	15-34 years	35-54 years	55+ years
Heroin	359	326	24
Methadone	185	276	40
Oxycodone	112	204	93
Morphine (w/o codeine)	106	207	81
Codeine (w/o morphine)	80	223	91
Morphine and codeine together	107	154	57
Tramadol	43	111	57
Propoxyphene	18	35	27
Fentanyl	13	17	7

Legend:
- ■ 15-34 years
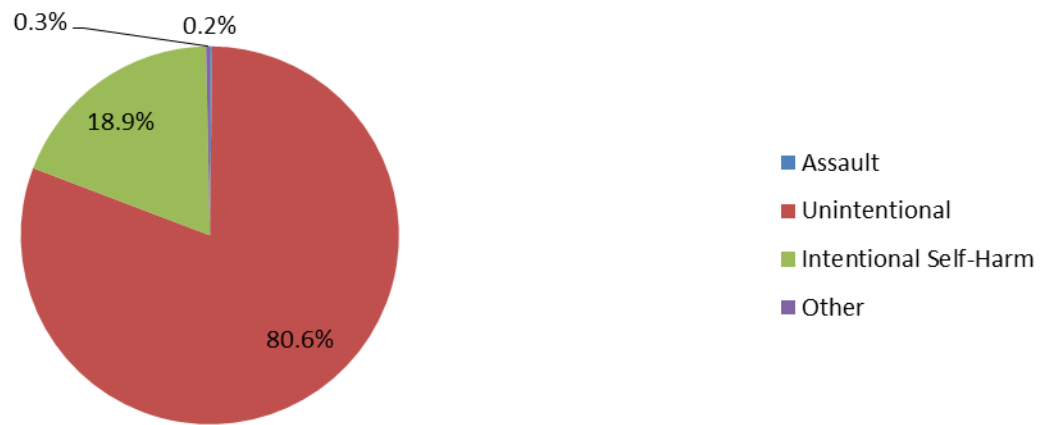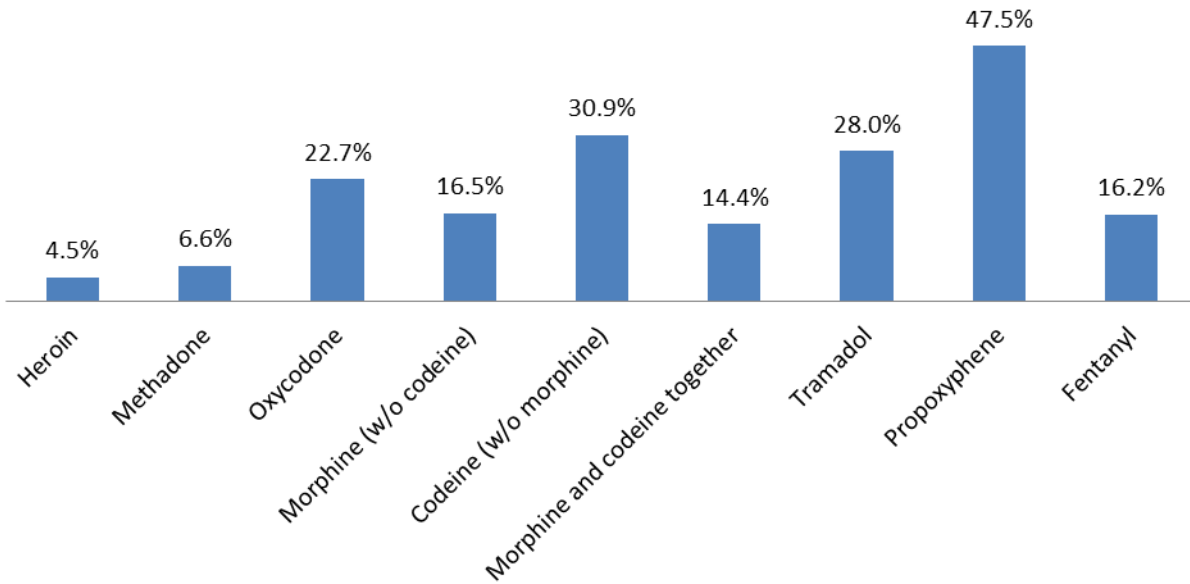- ■ 35-54 years
- ■ 55+ years

** Chart only displays opioid types where the total frequency of deaths across 2007-2009 was greater than 35

Chart 5: Australian Opioid Deaths (2007-2009) by Gender and Opioid Type**

Number of Deaths

Opioid Type	Male	Female
Heroin	599	110
Methadone	335	166
Oxycodone	241	168
Morphine (w/o codeine)	269	126
Codeine (w/o morphine)	189	206
Morphine and codeine together	193	126
Tramadol	102	109
Propoxyphene	42	38
Fentanyl	28	9

** Chart only displays opioid types where the total frequency of deaths across 2007-2009 was greater than 35

Chart 6: Australian Opioid Deaths (2007-2009) by determined intent**

Legend:
- Assault
- Unintentional
- Intentional Self-Harm
- Other

0.3%
0.2%
18.9%
80.6%

** Excludes the 289 deaths where the intent was either unknown/unable to be determined, or where death was determined to be primarily due to natural causes.

Chart 7: Australian Opioid Deaths (2007-2009) by proportion of intentional self harm deaths in each opioid type**

- Heroin: 4.5%
- Methadone: 6.6%
- Oxycodone: 22.7%
- Morphine (w/o codeine): 16.5%
- Codeine (w/o morphine): 30.9%
- Morphine and codeine together: 14.4%
- Tramadol: 28.0%
- Propoxyphene: 47.5%
- Fentanyl: 16.2%

** Chart only displays opioid types where the total frequency of deaths across 2007-2009 was greater than 35

Multiple drug combinations

☐ Opioids were most frequently involved in deaths as part of a multiple drug toxicity, rather than as a sole drug (79.1 per cent).

☐ Multiple types of opioids were identified in a quarter of all opioid related deaths.

☐ Oxycodone, methadone and codeine-containing products were most commonly identified in deaths involving multiple opioids.

☐ The most common opioid combinations involved:

◊ Oxycodone in combination with codeine, morphine or tramadol,
◊ Methadone in combination with heroin or morphine; and
◊ Tramadol in combination with codeine (Table 1).

☐ When opioids were found in combination with other drug classes, the most common of the classes examined[1] involved benzodiazepines (40.2 per cent) and alcohol (14.6 per cent).

Table 1. Australian Opioid Deaths (2007-2009) by common opioid combinations**

Opioid drug	Oxycodone	Methadone	Codeine (without morphine detected)	Heroin	Tramadol	Morphine (without codeine detected)	Morphine and codeine detected	(Dextro)-propoxyphene	Fentanyl
	224	221	197	165	146	124	119	45	25
Used with 1 other opioid drug	*172*	*183*	*165*	*142*	*104*	*109*	*95*	*36*	*15*
Used with 2 other opioid drugs	*44*	*33*	*26*	*19*	*35*	*15*	*19*	*6*	*8*
Used with 3 or more opioid drugs	*8*	*5*	*6*	*4*	*7*	*0*	*5*	*3*	*<3*
Oxycodone									
Methadone	39								
Codeine (without morphine detected)	70	33							
Heroin	17	61	39						
Tramadol	40	26	42	21					
Morphine (without codeine detected)	45	45	0	7	27				
Morphine and codeine detected	42	42	0	20	27	0			
Propoxyphene	11	5	15	9	6	4	4		
Fentanyl	7	<3	9	<3	4	5	4	<3	

*** table only displays opioid types where the total frequency of deaths across 2007-2009 was greater than 35*

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[1] Other drug classes examined included: alcohol, amphetamines, benzodiazepines, cocaine, cannabis.
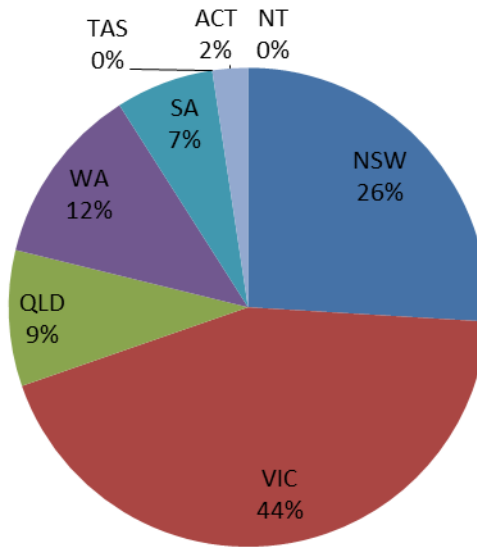
Jurisdiction

☐ An analysis of all opioid related deaths by jurisdiction is consistent with population proportions (chart 8).

☐ The most prevalent opioid type differed across Australian States/Territories.

   ☐ Heroin deaths were more commonly identified in Victoria (chart 9a).

   ☐ Queensland had a higher proportion of morphine and fentanyl deaths than would be expected based on population (chart 9d and 9e).

   ☐ Western Australia had a higher proportion of deaths involving tramadol than would be expected based on population (chart 9g).

Chart 8: Australian Opioid Related Deaths (2007-2009) by Jurisdiction

- TAS 3%
- ACT 2%
- NT 0%
- SA 8%
- NSW 29%
- WA 13%
- QLD 17%
- VIC 28%
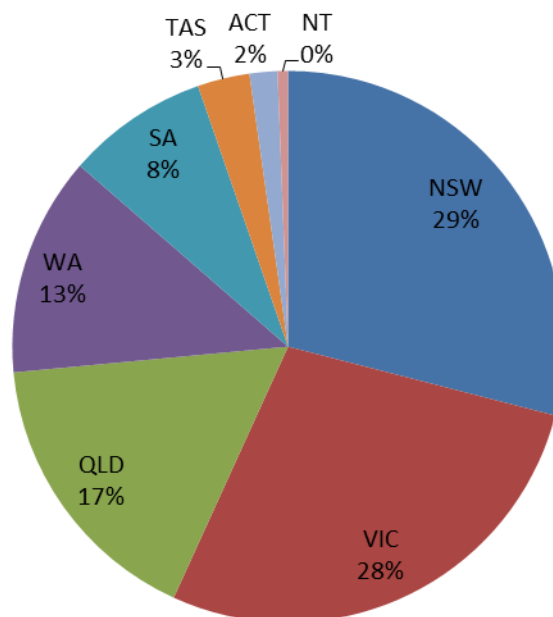
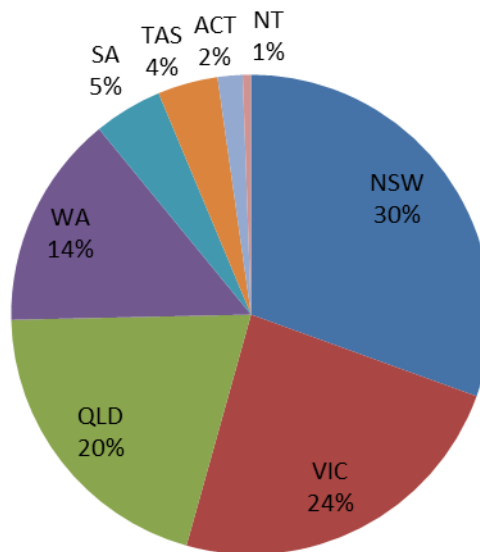## Chart 9a: Heroin Deaths (2007-2009) by Jurisdiction*

*Jurisdictional proportions of heroin deaths may have been influenced by the proportion of cases where police or finding reports were attached. This was due to the manner in which heroin deaths were determined (see method section). NSW had police report attachment rates of 40% around the time the data analysis was performed. As all other jurisdictions had police report attachment levels of more than 85%, this may have influenced the ability to identify heroin deaths in NSW in particular.
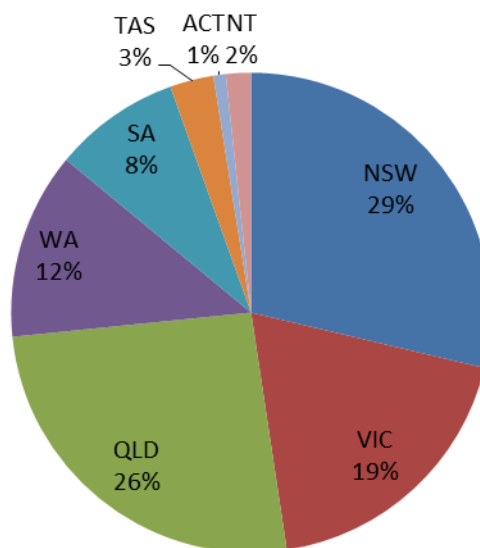
Chart 9b: Methadone Deaths (2007-2009) by Jurisdicion
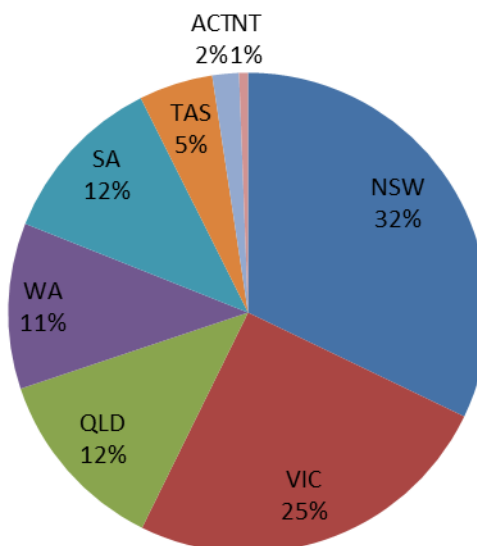
Chart 9c: Codeine Deaths^ (2007-2009) by Jurisdiction

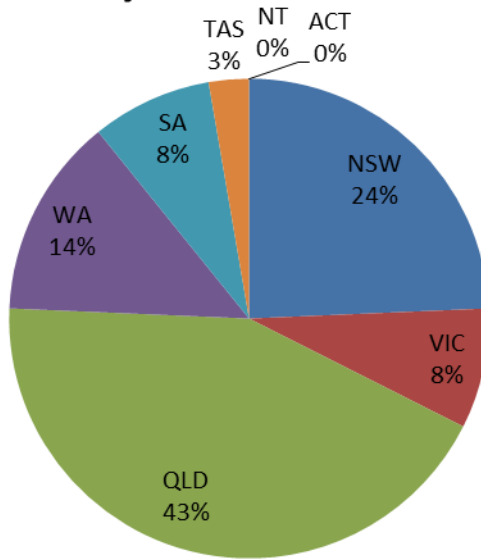^ Includes deaths classified as involving codeine (with and without morphine).

Chart 9d: Morphine Deaths# (2007-2009) by Jurisdiction

# Includes deaths classified as involving morphine (with and without codeine).

Chart 9e: Fentanyl Deaths (2007-2009) by Jurisdiction*

Pie chart segments:
- NSW 24%
- VIC 8%
- QLD 43%
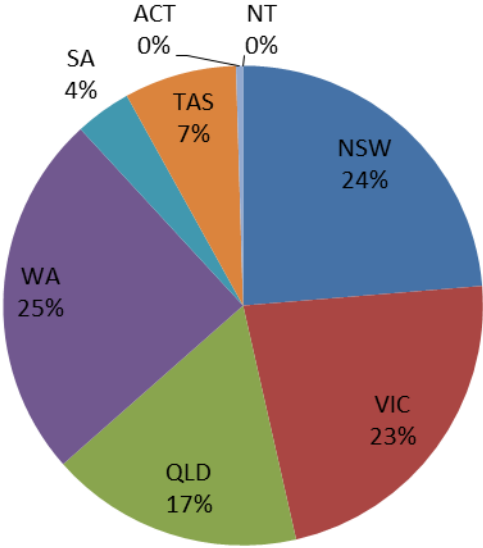- WA 14%
- SA 8%
- TAS 3%
- NT 0%
- ACT 0%

* As the number of identified fentanyl deaths during 2007-2009 is relatively small (n=37), caution should be taken when comparing the jurisdictional analysis for fentanyl deaths to other opioids. Small changes to the frequencies of fentanyl deaths may result in significant changes to proportions.

Chart 9f: Oxycodone Deaths (2007-2009) by Jurisdiction

Pie chart segments:
- NSW 27%
- VIC 24%
- QLD 19%
- WA 17%
- SA 6%
- TAS 5%
- ACT 2%
- NT 0%
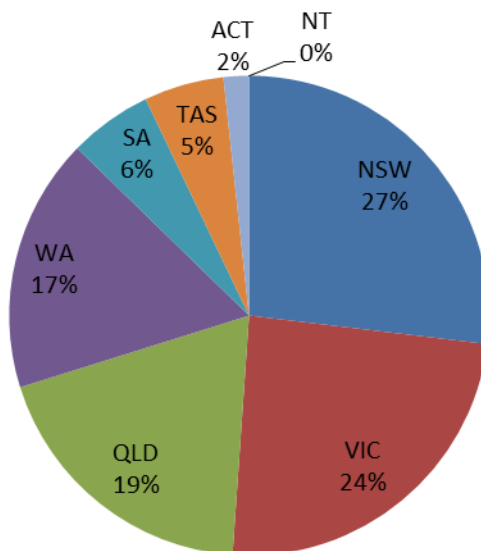
Chart 9g: Tramadol Deaths (2007-2009) by Jurisdiction

ACT 0%
NT 0%
SA 4%
TAS 7%
NSW 24%
WA 25%
QLD 17%
VIC 23%

Coronial recommendations about opioid related deaths

There were seventeen opioid related deaths reported during 2007-2009 where coroners made recommendations about opioid use. Common themes to these recommendations included:

♦ Improved recordkeeping, security and checking of opioid medication held in hospitals
♦ Increased oversight and training for doctors about the prescription of opioid drugs (including dangers and practices surrounding the prescription of take-away methadone)
♦ Medical practitioners such as registered clinical psychologists and emergency medicine staff being vigilant about identifying patients with possible overmedication
♦ Improved warnings on medication about the dangers of combining opioid drugs with each other
♦ Other mechanisms to reduce the abuse of Schedule 8 drugs such as:
    ◊ tightening and auditing the prescription of opioid drugs
    ◊ sharing of patient information amongst practitioners for patients who are suspected of abusing such prescriptions
    ◊ a real-time prescription monitoring system accessible to prescribers and disseminators
    ◊ a periodic review of patients with chronic non-malignant long term pain by a pain management specialist.

The NCIS

The National Coronial Information System (NCIS) is managed by the Victorian Department of Justice on behalf of the NCIS Board of Management.

NCIS is funded or supported by each State and Territory Justice / Attorney-General's Department, the New Zealand Ministry of Justice, and the following Australian federal agencies:

- Australian Department of Health and Ageing
- Australian Institute of Criminology
- Safe Work Australia
- Australian Competition and Consumer Commission
- Australian Department of Infrastructure and Transport

Data is provided by each of the Coronial Offices around Australia, the Australian Bureau of Statistics (ABS) and Safe Work Australia.

Method

To identify opioid related deaths on the NCIS, a search was undertaken of all closed cases that occurred between 1st January 2007 and 31st December 2009[2], where the object code was "Pharmaceutical Substances for Human Use" (PSHU).

Cases were manually reviewed and confirmed as an opioid related death either when an opioid was referred to within the cause of death, when the object coding involved an opioid drug type, or where the object free text field contained reference to an opioid.

Cases were only retained within the dataset when the opioid drug was considered to be a *primary contributor to death*. This was determined when:

- Drug toxicity was noted within sections 1a through to 1d of the cause of death, or
- Aspiration of gastric contents was noted within the cause of death AND drug toxicity was noted anywhere in the cause of death, or
- Carbon monoxide poisoning was noted within the cause of death AND drug toxicity was noted anywhere in the cause of death AND carbon monoxide saturation was measured at a level of less than 50%[3].

The dataset was then manually reviewed to determine which opioid drugs were involved in each case. Each case involving morphine and/or codeine was evaluated for the involvement of heroin in accordance with a flow-chart that was developed in consultation with Dr Dimitri Gerostamoulos of the Toxicology Department at the Victorian Institute of Forensic Medicine. This included a review of reports attached to case records to determine the likely source of any codeine/morphine combinations.

If the death was noted as being contributed to by a combination of multiple coded drugs (such as "mixed drug toxicity" or "multiple drug overdose"), the drugs that were part of the "multiple drug" combination were recorded (e.g.: heroin and alcohol toxicity).

For the purposes of this analysis, each opioid was considered as a separate drug (e.g.: heroin and tramadol toxicity would be classed as a multiple drug fatality). An exception to this rule was the detection of *both*

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[2] Obtained by searching both 'date of notification' and 'date of death'
[3] Baselt, R.C. (2004). Disposition of toxic drugs and chemical in man. 7th edition. Foster City, CA: Biomedical Publications. pp. 175-6.

morphine and codeine (without any other opioid drug), in which heroin involvement remained unproven, due to complex intertwining metabolic and toxicological profiles pertaining to morphine, codeine and heroin[4].

Limitations

Toxicological techniques
Rates and frequencies of these deaths may be influenced by whether a toxicological screen for specific opioid drugs was included in a standard screen, and whether toxicological techniques were sensitive enough to detect low levels of certain opioids.

Availability of case documentation
In some cases, reports associated with a death may not be available on the NCIS to confirm the details surrounding the fatality, and the level of detail contained in these reports can vary.

Open cases
The proportion of open cases on the NCIS may impact the dataset, especially for cases identified in more recent years. The percentage of open cases for each relevant calendar year at the time of data extraction was as follows:

Year	% open
2007	6.1
2008	6.9
2009	10.5

Acknowledgements

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[4] Konstantinova SV, Normann PT, Arnestad M, et al. Morphine to codeine concentration ratio in blood and urine as a marker of illicit heroin use in forensic autopsy samples. **Forensic Sci Int** 2012 Apr 10; 217(1-3): 216-21.