

# Geographic variations in prescription opioid dispensations and deaths among women and men in British Columbia, Canada

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- All inferences, opinions, and conclusions drawn in this presentation are those of the authors, and do not reflect the opinions or policies of Population Data BC or the Data Stewards
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- The authors have no conflicts of interest to declare



# Aims

1. Quantify patterns of prescription opioid dispensations to women and men whose deaths were related to the use of prescription opioids
2. Analyze the association between regional rates of prescription opioid dispensations and prescription opioid-related deaths

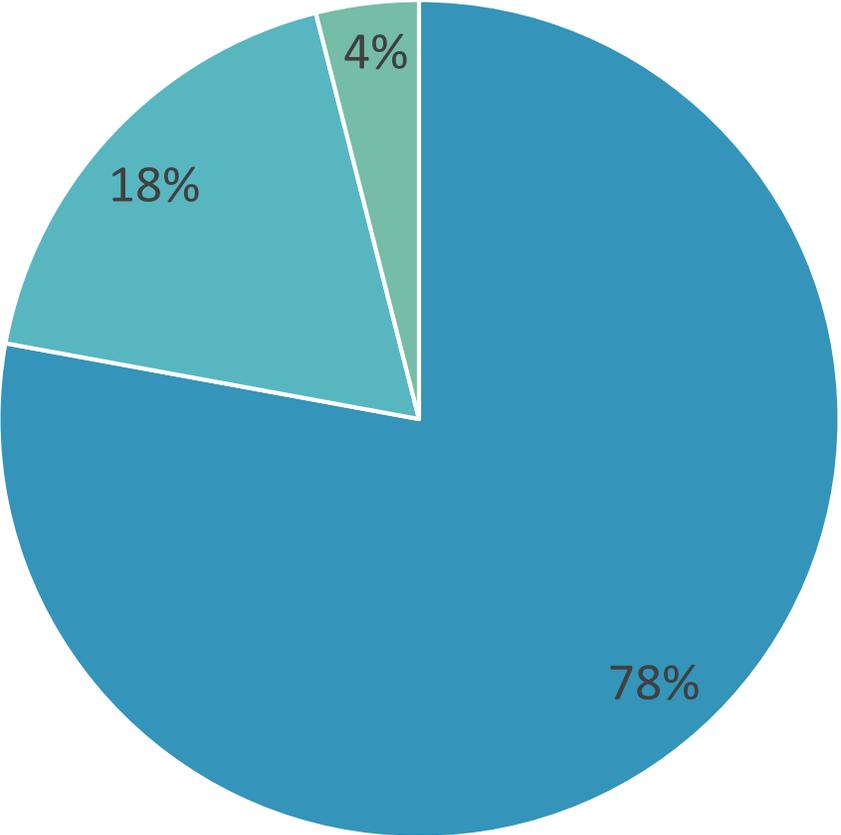
Data source	Relevant data	Exclusions
<p><b>BC PharmaNet</b>  <i>All prescriptions dispensed in community pharmacies (2004-2013)</i></p>	<ul style="list-style-type: none"> <li>Quantity and dose of opioid-based prescription drugs dispensed to each BC resident</li> </ul>	<ul style="list-style-type: none"> <li>Individuals whose prescriptions are covered by the federal government (i.e. First Nations, veterans, and federal inmates) (~4%)</li> <li>Methadone</li> <li>Prescriptions for which morphine equivalents could not be calculated</li> </ul>
<p><b>Vital Statistics Deaths</b>  <i>Deaths of BC residents (2004-2013)</i></p>	<ul style="list-style-type: none"> <li>Deaths with primary cause of death = drug poisoning and multiple cause of death = prescription opioid(s)</li> </ul>	<ul style="list-style-type: none"> <li>Deaths that involved methadone (n=396) or heroin (n=462) and no other prescription opioids</li> </ul>
<p><b>MSP Registration Files</b>  <i>Demographic information (2004-2013)</i></p>	<ul style="list-style-type: none"> <li>Sex and area of residence for all BC residents</li> </ul>	<ul style="list-style-type: none"> <li>Missing demographic information about sex or area of residence (&lt;1%)</li> </ul>
<p><b>Census</b>  <i>Area-level demographic information (2006)</i></p>	<ul style="list-style-type: none"> <li>Number of individuals with First Nations status in Local Health Areas (LHAs) in BC</li> </ul>	<ul style="list-style-type: none"> <li>LHAs with registered First Nations population &gt;30% (10/89 LHAs)</li> </ul>

# Analysis (Part 1)

- Identify individuals who died from prescription opioid-related causes
- Examine prescription history in year prior to date of death
- Use date of dispensation and quantity dispensed to determine timing of opioid dispensations.
  - Prescriptions were termed active between date of dispensation and end date
- Classify deceased individuals into 3 mutually exclusive groups
  1. No opioid dispensation in year prior to death
  2. Active opioid prescription within year of death but not within 60 days
  3. Active opioid prescription within 60 days of death

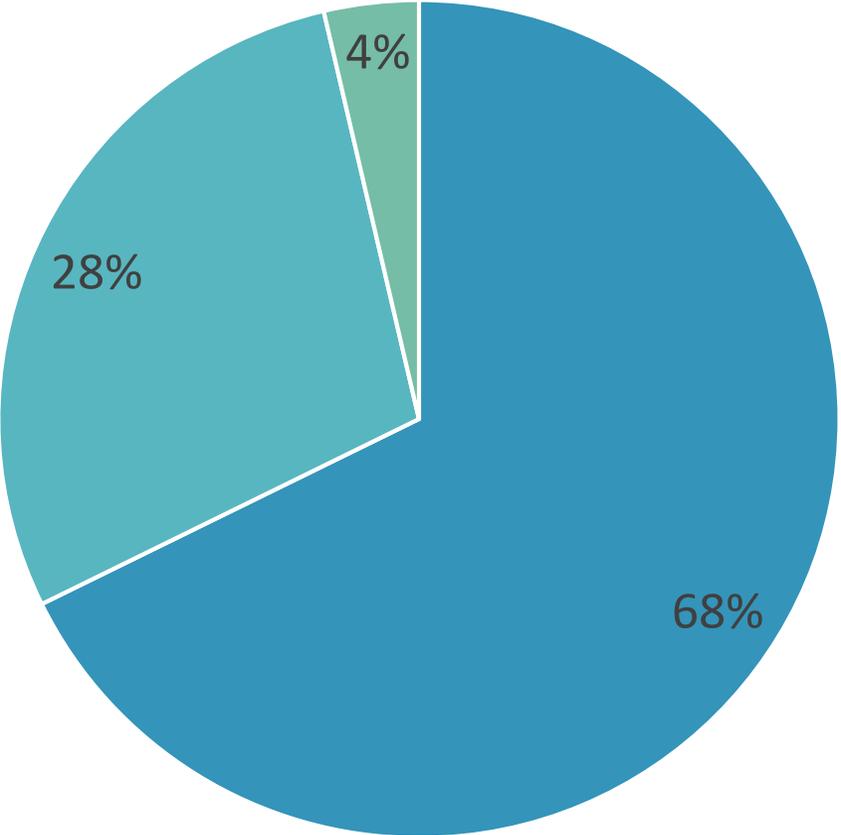
# Prescription opioid-related deaths by intent and sex (2004-2013)

Men  
N=760



■ Unintentional ■ Suicide ■ Unknown

Women  
N=412



■ Unintentional ■ Suicide ■ Unknown

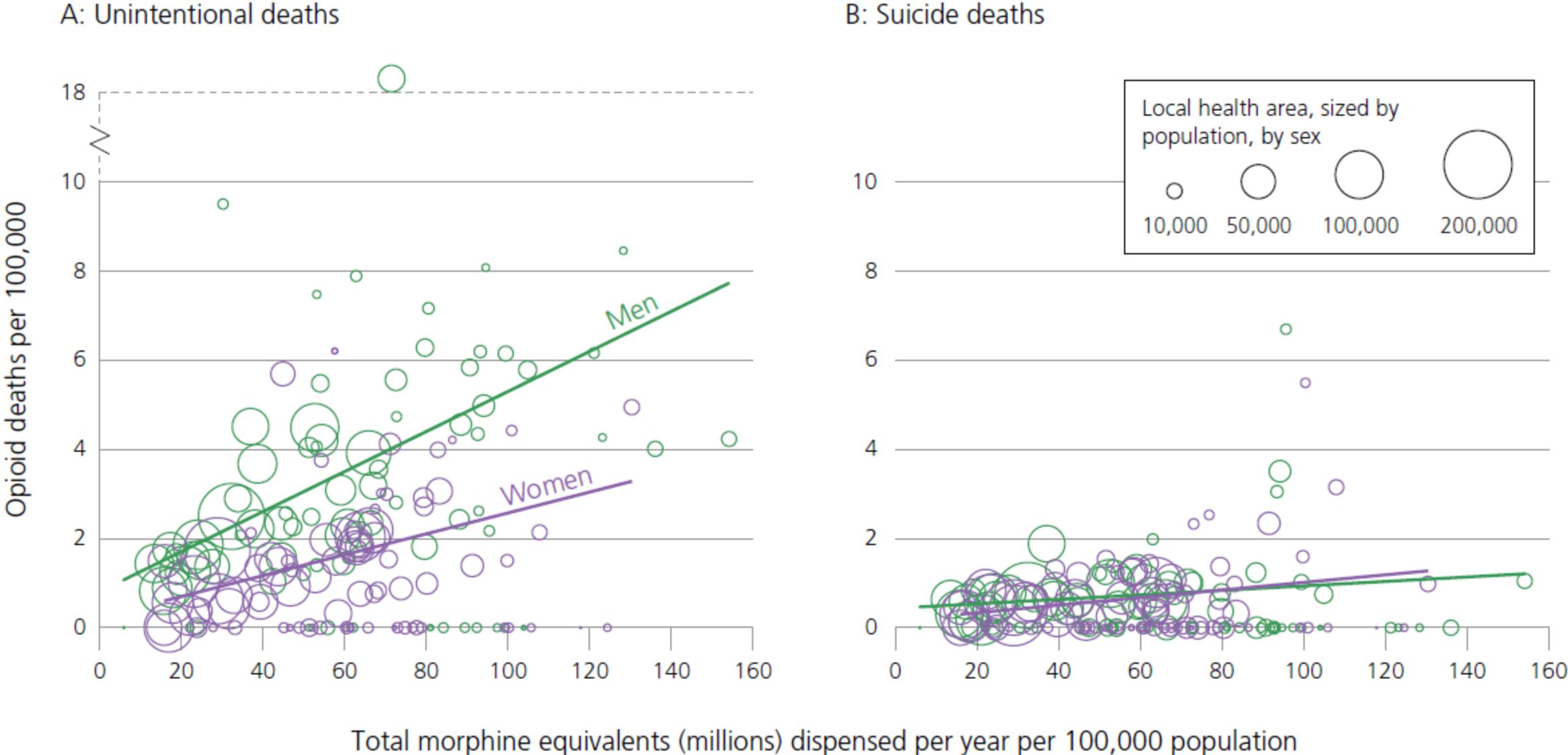
# Presence and timing of prescription opioid dispensations among individuals who died from prescription opioids in 2013

Exposure in year prior to death	Women (2013) N=41	Men (2013) N=78
No dispensation in 12 months prior to death	13 (32%)	48 (62%)
Dispensation more than 2 months prior to death and less than 12 months prior to death	6 (15%)	7 (9%)
Dispensation within 2 months of death	22 (54%)	23 (29%)

# Analysis (Part 2)

- Calculate the rate of prescription opioid dispensing (MEQs) in each LHA in each year (2004-2013) and compute average rate per 100,000
- Calculate the rate of prescription opioid deaths in each LHA in each year (2004-2013) and compute average rate per 100,000
- Run linear and Tobit regression analysis to investigate the area-level relationship between dispensing and death by intent of death and sex
  - Weighted by population size of each LHA
- Examine sensitivity to inclusion and exclusion of Downtown East Side

# The relationship between average yearly opioid dispensations and average yearly opioid-related deaths in BC Local Health Areas (2004 to 2013)



# Analysis (Part 3)

- Test if the area level association between dispensations and deaths differed by strength of opioid
- Estimate effect size of regression analyses by multiplying linear regression coefficients by the interquartile range of rates of prescription opioid dispensing across LHAs.

Drug Type	Male					Female				
	$\beta$	IQR	ES	LO	HI	$\beta$	IQR	ES	LO	HI
<b>Strong opioids</b>	<b>0.05*</b>	<b>46.11</b>	<b>2.17</b>	<b>1.21</b>	<b>3.70</b>	<b>0.03*</b>	<b>30.29</b>	<b>0.79</b>	<b>0.50</b>	<b>1.13</b>
Fentanyl	0.19*	8.30	1.60	0.41	2.39	0.05*	10.36	0.56	0.22	0.83
Hydromorphone	0.12*	7.70	0.94	0.16	1.81	0.09*	7.19	0.65	0.41	0.91
Oxycodone	0.12*	12.94	1.57	0.54	2.65	0.06*	7.82	0.49	0.12	0.76
Morphine	0.11*	23.25	2.54	1.29	4.08	0.09*	13.63	1.19	0.65	1.46
<b>Weak opioids</b>	<b>0.47*</b>	<b>7.27</b>	<b>2.01</b>	<b>1.09</b>	<b>3.21</b>	<b>0.17*</b>	<b>4.71</b>	<b>0.80</b>	<b>0.51</b>	<b>1.19</b>
Codeine	0.52*	3.60	1.88	1.17	3.28	0.19*	4.10	0.78	0.54	1.29
Tramadol	2.04	0.20	0.41	-0.56	1.17	1.70*	0.34	0.57	0.25	0.84
Pethidine	2.66	0.11	0.30	-0.63	1.12	1.97*	0.25	0.49	0.03	0.69
Dextropropoxyphene	3.19	0.06	0.19	-0.30	0.87	3.38*	0.12	0.42	0.26	0.83
<b>All opioids</b>	<b>0.04*</b>	<b>50.20</b>	<b>2.25</b>	<b>1.18</b>	<b>3.55</b>	<b>0.02*</b>	<b>30.87</b>	<b>0.72</b>	<b>0.52</b>	<b>1.14</b>

Estimated effect size (ES) of inter-quartile range (IQR) of opioid exposures on rates of prescription opioid-related death given correlations between area-level opioid dispensations and deaths among women and men in British Columbia.

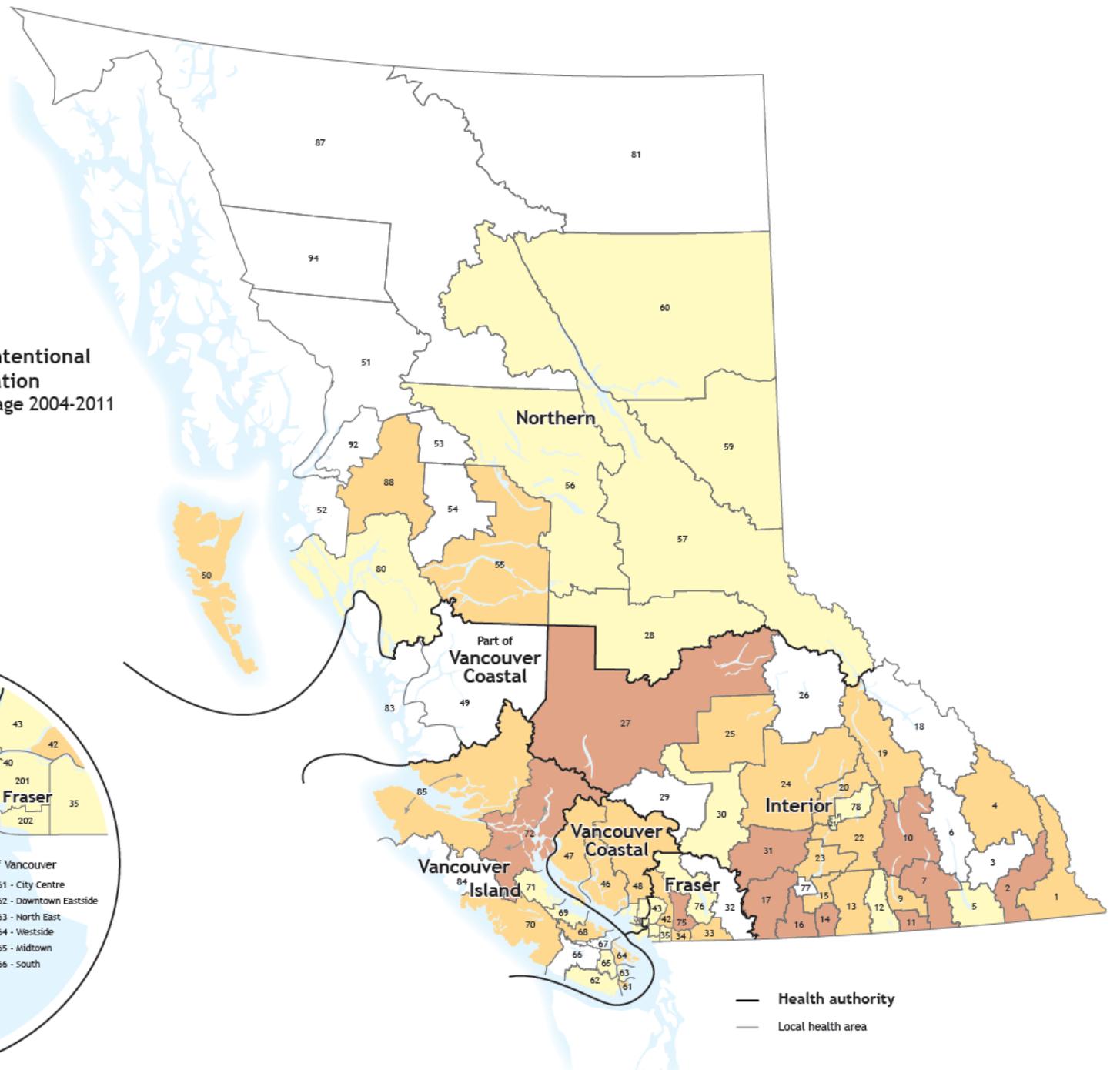
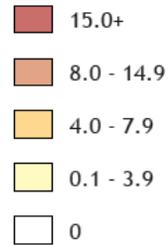
a. LO; HI = lower and higher limits of the 95% CI for the ES.

b.  $ES = IQR * \beta$

c. \* = significant at  $p = 0.05$

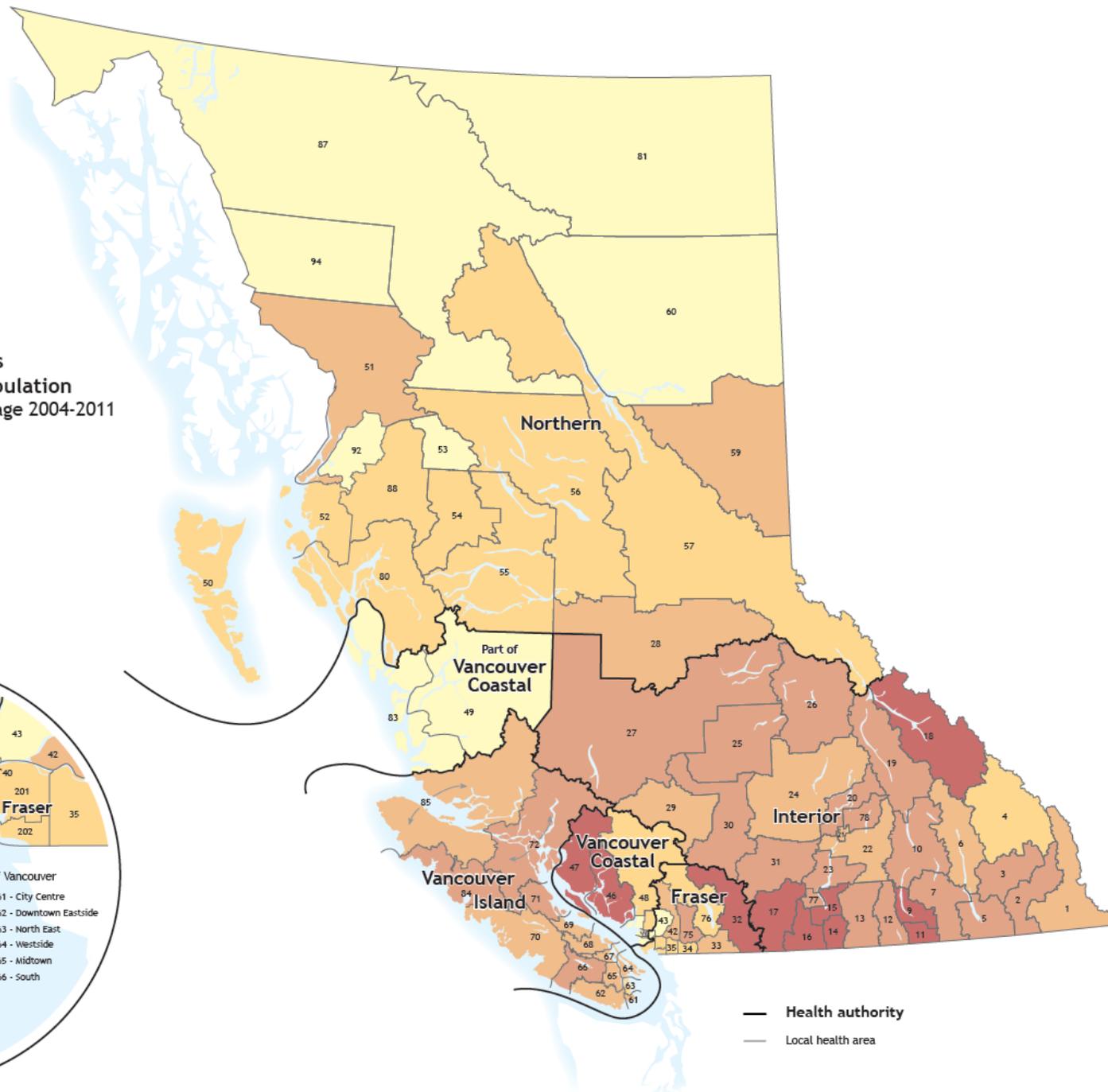
# Discussion

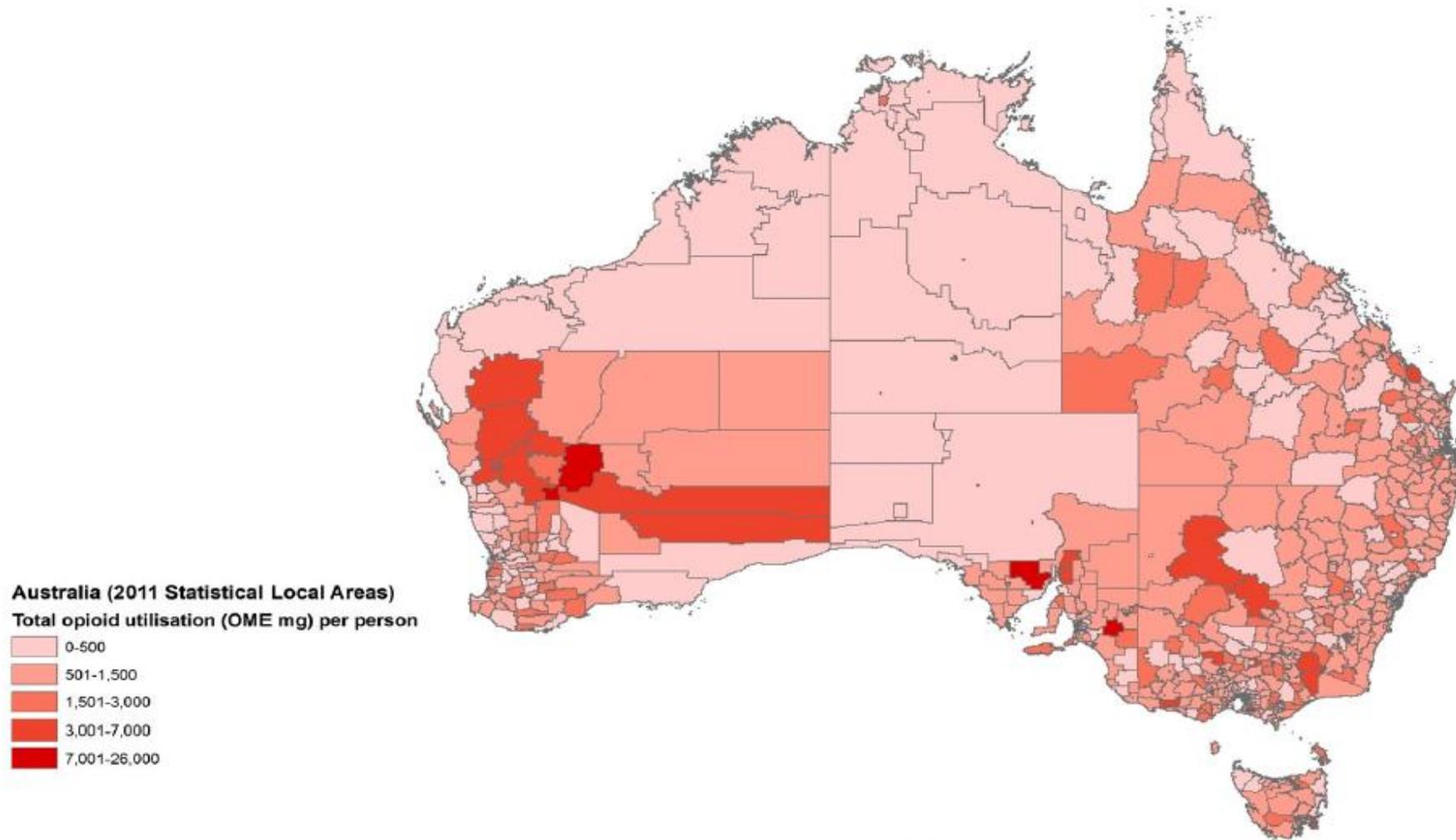
Rate of opioid-related unintentional deaths per 100,000 population  
Local health area, yearly average 2004-2011



**Total morphine equivalents dispensed per 100,000 population  
Local health area, yearly average 2004-2011**

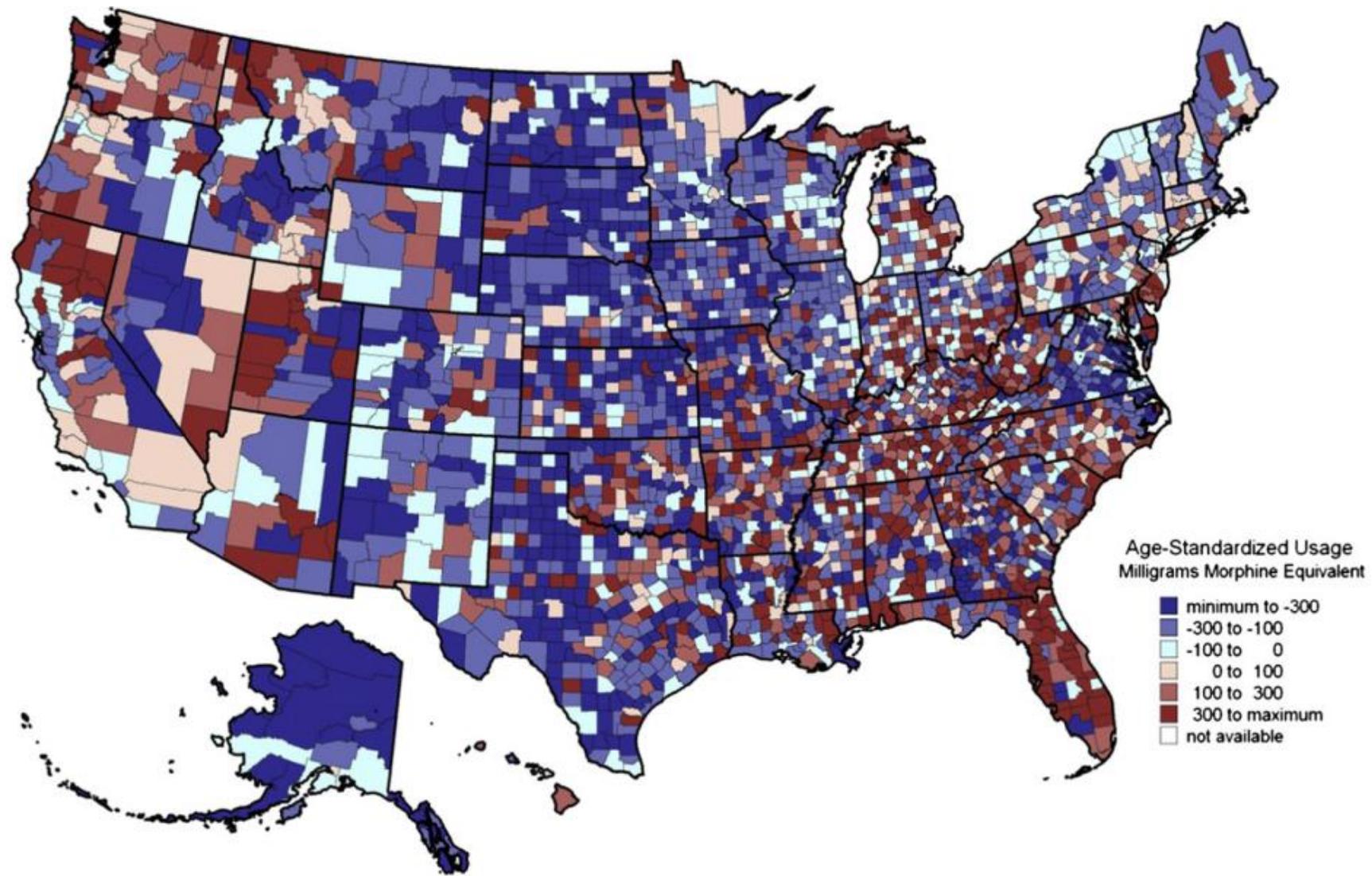
- 181,576,161 - 280,002,256
- 134,033,445 - 181,576,160
- 91,286,401 - 134,033,444
- 54,556,011 - 91,286,400
- 4,477,679 - 54,556,010





Note: This map shows sub-jurisdictional variation in utilisation at the unit of Statistical Local Areas (SLAs). As can be seen, although the tables show variation in opioid utilisation across jurisdictions, there is also considerable variation within jurisdictions in the extent of opioid utilisation.

Figure 1. Total opioid utilisation per person (oral morphine equivalent (OME) mg) by Statistical Local Area, 2013. Note: This map shows sub-jurisdictional variation in utilisation at the unit of Statistical Local Areas (SLAs). As can be seen, although the tables previously show in opioid utilisation across jurisdictions, there is also considerable variation within jurisdictions in the extent of opioid utilisation



**Figure 1.** Variation among counties in mean milligrams of opioids (in morphine equivalents) dispensed by retail pharmacies, per county resident, 2008. Note: Variation is measured as difference between mean amount in milligrams in all counties and amounts prescribed and dispensed in each single county. Milligrams per resident are standardized by age and gender. Sources: Prescription data LRx Data, 2008, obtained under license from IMS Health Incorporated. County location of prescribers' offices obtained from Physician Professional Data, 2008, American Medical Association. See Table 3 for sources of data on population characteristics.

# Limitations

- Underestimation of prescription opioid related deaths ~20%
- Other causes may explain relationship between dispensing and deaths
  - However, deaths not strongly correlated with other health status measures
- Ecological fallacy (exposure is not ubiquitous in each LHA)
  - Given indication of substantial non-medical use area-based analysis is appropriate

# Conclusion

- Large variation in opioid prescribing and related variation in prescription opioid-related deaths
- Targeted dissemination of interventions in high-risk prescribing areas may be cost-effective strategy
- Efforts to reduce high levels of prescribing of strong opioids as well as codeine may be particularly effective

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