Geozones: an area-based method for analysis of health outcomes

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Presentation Outline

1. Introduction and rationale for area-based methods
2. Geozones methodology for area-based measures
3. Examples:
   1. Health outcomes for Inuit Nunangat
   2. Mortality in high percentage First Nations areas
   3. Other examples
4. Limitations of area-based methods and discussion
Introduction

• Federal government focus on health inequalities

• 2010 Conference of FPT Ministers of Health
  • The health of the population is an important measure of - and an important contributor to - the overall well-being of society.

• International (World Health Organization 2008)
  • ...there needs to be an active research programme on the social determinants of health

• These statements are of course echoed throughout academic research
Introduction

• Data Gaps
  • Death certificates and cancer registry lack individual identifiers (ethnicity, Aboriginal identity) or characteristics
    • Inability to compare mortality/cancer differentials

• Data Approaches
  • Area-based approach
    • Geozones: Inuit, Aboriginal, Foreign-born, income
  • Record linkage approach
    • 1991 Canadian Census Cohort: mortality and cancer follow-up
Introduction

• Administrative datasets can be powerful tools in health research
  • However, they often lack information about population health-relevant determinants or individual characteristics

• Area-based methods are thus useful in monitoring social inequalities in health using administrative data
  • Characterise the entire population under study (area)
  • Produce reliable & consistent estimates
  • Can be tracked over time & geographic location

Introduction

• Area-based measures have shown consistent differences between income & health outcomes
  • Mortality, injury, life expectancy, etc...
  • Uses gradients of neighbourhood income levels
• Has also been extended for other population groups
  • Aboriginal areas
    • Hospitalization, mortality, injury
  • Immigrant terciles
    • Hospitalization & “healthy immigrant” effect

Carrière G, Sanmartin C, Peters PA. Description of area-based methods used to determine rates of acute-care hospitalization across terciles of the foreign-born population in Canada during 2005/06. Health Reports (Statistics Canada, 82-003); 23(3): 43-51.
Geozones methodology – introduction

• Calculates relative concentration of population groups for use in analysis of health outcomes
  • Uses census population characteristics as foundation
  • Can be calculated at different levels of geography (DA, CT)
  • Uses geographic identifier on administrative data
    • Often requires use of tools such as PCCF+ for geocoding
• Uses methods from residential segregation analysis for the calculation of threshold profiles of concentration

Geozones methodology – Geocoding

• Most health administrative data includes a postal code
  • PCCF+ provides automated geocoding between postal codes and the full range of standard geographic identifiers
  • Does so consistently with improved accuracy over manual geocoding methods, particularly for rural areas

• Aboriginal areas, income quintiles, and immigrant areas included as additional variables within PCCF+
  • Codes DA as either First Nations (F), Métis (M), or Inuit (I) using a 33% cut-off (includes underenumerated reserves)
Geozones methodology – process

Approach is computationally simple

1. Threshold tables
2. Concentration curves
   • Concentration-coverage curves
3. Quantile classification / threshold selection
   • Threshold selection / quantiles (quartile, tercile, etc...)
4. Analysis of health outcomes
   • Potential for mapping of outcomes
Geozones methodology – thresholds

• Show where subgroups form a majority, are dominant (modal), or exceed defined concentrations

• For each population group, calculate the proportion of the total population in each geographic unit
  • Concentration: proportion living in geographic areas with a given percentage of the *same group*
  • Exposure: proportion living in geographic areas with a given percentage of a *different group*
Geozones methodology – threshold tables

A) Income groups

Concentration of population by income quintile, by Dissemination Area (DA) decile thresholds, 2006

<table>
<thead>
<tr>
<th>Proportion of group</th>
<th>Percentage of same-group population of the total DA population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income quintile</td>
<td>0-10</td>
</tr>
<tr>
<td>Q1 - lowest</td>
<td>0.10</td>
</tr>
<tr>
<td>Q2</td>
<td>0.06</td>
</tr>
<tr>
<td>Q3</td>
<td>0.05</td>
</tr>
<tr>
<td>Q4</td>
<td>0.05</td>
</tr>
<tr>
<td>Q5 - highest</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Percentage of group population exposed to the highest income quintile (Q5)

<table>
<thead>
<tr>
<th>Proportion of group</th>
<th>Percentage of same-group population of the total DA population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 - lowest</td>
<td>0.55</td>
</tr>
<tr>
<td>Q2</td>
<td>0.43</td>
</tr>
<tr>
<td>Q3</td>
<td>0.34</td>
</tr>
<tr>
<td>Q4</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Source: 2006 Census of Population
B) Aboriginal identity groups

Concentration of Aboriginal identity groups and non-Aboriginal population, by Dissemination Area (DA) decile thresholds, 2006

<table>
<thead>
<tr>
<th>Proportion of group</th>
<th>Percentage of same-group population of the total DA population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-10</td>
</tr>
<tr>
<td>All areas</td>
<td></td>
</tr>
<tr>
<td>All Aboriginal</td>
<td>0.38</td>
</tr>
<tr>
<td>First Nations</td>
<td>0.38</td>
</tr>
<tr>
<td>Métis</td>
<td>0.68</td>
</tr>
<tr>
<td>Inuit</td>
<td>0.17</td>
</tr>
<tr>
<td>Non-Aboriginal</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Source: 2006 Census of Population
Geozones methodology – concentration curves

• Plot each row of the threshold table by column categories
  • Curves can help to visualize concentration or exposure

• This can be extended via concentration-coverage curves, which will be shown later
  • Can be used to test the validity of using area-based measures for a population of interest
Geozones methodology – concentration curves

A) Income groups

Concentration of population by income quintiles, by DA thresholds, 2006

Peters PA, Oliver LO, Carrière G. Geozones: an area-based method for analysis of health outcomes. *Health Reports* (Statistics Canada, 82-003); under review.
Geozones methodology – concentration curves

B) Aboriginal identity groups

Concentration of Aboriginal identity groups and non-Aboriginal population by DA thresholds, 2006

Proportion of group within threshold

Percentage of same group in Dissemination Area

- All Aboriginal
- First Nations
- Métis
- Inuit
- Non-Aboriginal

Peters PA, Oliver LO, Carrière G. Geozones: an area-based method for analysis of health outcomes. Health Reports (Statistics Canada, 82-003); under review.
Geozones methodology – quantile classification

• Quantile range influences the interpretation of results and depends on the analytic model to be used
• Each quantile contains an equal percentage of the subgroup, but an *unequal* number of geographic units
• Classified by:
  • Reverse ranking geographic areas by subgroups
  • Cumulative percentage of the subgroup is calculated
  • Each unit coded based on the percentage of the subgroup
  • Categorized on quantile cut-points (quartile, quintile)
Example 1 – Inuit areas

• Inuit-specific identifiers are not present on health administrative data (vital statistics, hospitalization)
• As such, it is not possible to calculate health indicators specifically for Inuit peoples
• However, the majority of Inuit-identity population live in the Inuit land claims area (Inuit Nunangat)
• The Geozones methodology provides a method by which the population in this area can be examined
## Example 1 – Inuit areas

*Threshold tables: Concentration of Inuit peoples*

Concentration of Aboriginal identity groups and non-Aboriginal population, by Dissemination Area (DA) decile thresholds, 2006

<table>
<thead>
<tr>
<th>Proportion of group</th>
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<tr>
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</tr>
<tr>
<td>Inuit</td>
<td>0.17</td>
</tr>
<tr>
<td>Non-Aboriginal</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Source: 2006 Census of Population

Peters PA, Oliver LO, Carrière G. Geozones: an area-based method for analysis of health outcomes. *Health Reports* (Statistics Canada, 82-003); under review.
Example 1 – Inuit areas

Concentration curves: Inuit peoples and non-Aboriginal population

Concentration of Inuit identity groups and non-Aboriginal population by DA thresholds, 2006

Peters PA, Oliver LO, Carrière G. Geozones: an area-based method for analysis of health outcomes. *Health Reports* (Statistics Canada, 82-003); under review.
## Example 1 – Inuit areas

### Quantile classification, Inuit identity population by DA

<table>
<thead>
<tr>
<th>Threshold quantile (vingtiles)</th>
<th>Number of DA with proportion of Inuit identity</th>
<th>Cumulative number of DA with proportion of Inuit identity</th>
<th>Cumulative proportion of population of Inuit identity</th>
<th>Cumulative proportion of total Inuit identity population</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Total) 0.00</td>
<td>52,973</td>
<td>52,973</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>0.05</td>
<td>52,475</td>
<td>52,973</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>0.10</td>
<td>232</td>
<td>498</td>
<td>0.18</td>
<td>0.95</td>
</tr>
<tr>
<td>0.15</td>
<td>145</td>
<td>266</td>
<td>0.31</td>
<td>0.90</td>
</tr>
<tr>
<td>0.20</td>
<td>50</td>
<td>121</td>
<td>0.58</td>
<td>0.85</td>
</tr>
<tr>
<td>0.25</td>
<td>13</td>
<td>71</td>
<td>0.81</td>
<td>0.80</td>
</tr>
<tr>
<td><strong>0.30</strong></td>
<td>4</td>
<td>58</td>
<td><strong>0.87</strong></td>
<td><strong>0.75</strong></td>
</tr>
<tr>
<td><strong>0.35</strong></td>
<td>4</td>
<td>54</td>
<td><strong>0.90</strong></td>
<td><strong>0.70</strong></td>
</tr>
<tr>
<td>0.40</td>
<td>5</td>
<td>50</td>
<td>0.92</td>
<td>0.65</td>
</tr>
<tr>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>1.00</td>
<td>3</td>
<td>3</td>
<td>0.98</td>
<td>0.03</td>
</tr>
</tbody>
</table>

*Source: 2006 Census of Population*
Example 1 – Inuit areas

Concentration-coverage curve, Inuit identity population, rural EA, 1996

Example 1 – Inuit areas

Threshold: 0.95
Proportion Inuit: 0.98
Proportion of Inuit: 0.03
Example 1 – Inuit areas

Threshold: 0.90
Proportion Inuit: 0.97
Proportion of Inuit: 0.09
Example 1 – Inuit areas

Threshold: 0.85
Proportion Inuit: 0.96
Proportion of Inuit: 0.14
Example 1 – Inuit areas

Threshold: 0.80
Proportion Inuit: 0.96
Proportion of Inuit: 0.20
Example 1 – Inuit areas

Threshold: 0.75
Proportion Inuit: 0.95
Proportion of Inuit: 0.25
Example 1 – Inuit areas

Threshold: 0.70
Proportion Inuit: 0.95
Proportion of Inuit: 0.29
Example 1 – Inuit areas

Threshold: 0.65
Proportion Inuit: 0.95
Proportion of Inuit: 0.34
Example 1 – Inuit areas

Threshold: 0.60
Proportion Inuit: 0.94
Proportion of Inuit: 0.39
Example 1 – Inuit areas

Threshold: 0.55
Proportion Inuit: 0.94
Proportion of Inuit: 0.44
Example 1 – Inuit areas

Threshold: 0.50
Proportion Inuit: 0.94
Proportion of Inuit: 0.50
Example 1 – Inuit areas

Threshold: 0.45
Proportion Inuit: 0.93
Proportion of Inuit: 0.55
Example 1 – Inuit areas

Threshold: 0.40
Proportion Inuit: 0.93
Proportion of Inuit: 0.58
Example 1 – Inuit areas

Threshold: 0.35
Proportion Inuit: 0.92
Proportion of Inuit: 0.65
Example 1 – Inuit areas

Threshold: 0.30
Proportion Inuit: 0.90
Proportion of Inuit: 0.70
Example 1 – Inuit areas

Threshold: 0.25
Proportion Inuit: 0.87
Proportion of Inuit: 0.75
Example 1 – Inuit areas

Threshold: 0.20
Proportion Inuit: 0.81
Proportion of Inuit: 0.80
Example 1 – Inuit areas

*Definition of Inuit Nunangat “Inuit homeland”*

<table>
<thead>
<tr>
<th>Geography</th>
<th>CSD</th>
<th>Population</th>
<th>Inuit</th>
<th>Non-Aboriginal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inuit Nunangat</td>
<td>52</td>
<td>48,015</td>
<td>39,475 (82%)</td>
<td>7,065 (15%)</td>
</tr>
<tr>
<td>Inuvialuit Region</td>
<td>6</td>
<td>5,705</td>
<td>3,115 (55%)</td>
<td>1,520 (27%)</td>
</tr>
<tr>
<td>Nunavut</td>
<td>27</td>
<td>29,325</td>
<td>24,635 (84%)</td>
<td>4,410 (15%)</td>
</tr>
<tr>
<td>Nunavik</td>
<td>14</td>
<td>10,570</td>
<td>9,565 (90%)</td>
<td>910 (9%)</td>
</tr>
<tr>
<td>Nunatsiavut</td>
<td>5</td>
<td>2,415</td>
<td>2,160 (89%)</td>
<td>215 (9%)</td>
</tr>
</tbody>
</table>

* The Inuit Nunangat settlement area recognises 53 communities, including the community of Killiniq, which is currently uninhabited

Source: Statistics Canada, 2006 Census of Population (Catalogue No. 89-636-X - No.001)
Inuit Nunangat
Inuit regions and communities within the Inuit Nunangat land claims area by population, 2006

- 0
- 250 or less
- 251 - 500
- 501 - 1000
- 1001 - 2500
- More than 2500

Source: 2006 Census Geography, Statistics Canada. Produced by the Health Analysis Division.
Example 1 – Inuit areas

**Difference in life expectancy**

- Lower life expectancy, increasing since 1996

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Example 1 – Inuit areas

*Difference in life expectancy*

- Males: 10.2 years
- Females: 9.2 years

![Bar chart showing years of contribution to LE difference for different causes of death between males and females. The causes include Malignant Neoplasms, Cardiovascular Diseases, Unintentional Injuries, Intentional Injuries, and Respiratory Diseases.](chart.png)
Example 2 – High percent First Nations areas

• First Nations peoples are not uniformly identifiable from health administrative data
• As such, it is not possible to calculate health indicators directly for this population group
• The Geozones approach can be used to identify areas with a high-percentage of First Nations peoples
## Example 2 – High percent First Nations areas

### Threshold tables

Concentration of Aboriginal identity groups and non-Aboriginal population, by Dissemination Area (DA) decile thresholds, 2006

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<tr>
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<td>0.17</td>
</tr>
<tr>
<td>Non-Aboriginal</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Source: 2006 Census of Population
Example 2 – High percent First Nations areas

Selection of quantiles & data visualization
## Example 2 – High percent First Nations areas

*Population characteristics, population aged 1-19*

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Low % Aboriginal identity areas</th>
<th>High % First Nations identity areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>26,370,008</td>
<td>322,321</td>
</tr>
<tr>
<td>Non-Aboriginal identity population (%)</td>
<td>97.4</td>
<td>5.2</td>
</tr>
<tr>
<td>Aboriginal identity population (%)</td>
<td>2.6</td>
<td>94.8</td>
</tr>
<tr>
<td>First Nations identity population (%)</td>
<td>1.3</td>
<td>91.4</td>
</tr>
<tr>
<td>Total population aged 1 to 19</td>
<td>7,112,250</td>
<td>140,779</td>
</tr>
<tr>
<td>Non-Aboriginal identity population aged 1 to 19 (%)</td>
<td>96.1</td>
<td>2.3</td>
</tr>
<tr>
<td>Aboriginal identity population aged 1 to 19 (%)</td>
<td>3.9</td>
<td>97.7</td>
</tr>
<tr>
<td><strong>First Nations identity population aged 1 to 19 (%)</strong></td>
<td><strong>2.0</strong></td>
<td><strong>94.7</strong></td>
</tr>
<tr>
<td>Population in lowest income quintile (%)</td>
<td>18.3</td>
<td>49.8</td>
</tr>
<tr>
<td>Average household income per person ($)</td>
<td>30,945</td>
<td>13,018</td>
</tr>
<tr>
<td>Dwellings in need of major repair (%)</td>
<td>7.2</td>
<td>38.7</td>
</tr>
<tr>
<td>Population in weak or non-Metropolitan-Influenced Zone (%)</td>
<td>6.7</td>
<td>72.1</td>
</tr>
</tbody>
</table>
## Example 2 – High percent First Nations areas

*Mortality rate-ratios, high percent First Nations areas versus low-percent Aboriginal areas, Population aged 1-19, 2005-2007*

<table>
<thead>
<tr>
<th></th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interval</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RR</td>
<td>from</td>
</tr>
<tr>
<td><strong>Group I: Communicable, maternal, perinatal, etc.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infectious and Parasitic</td>
<td>4.1</td>
<td>1.8</td>
</tr>
<tr>
<td>Respiratory infections</td>
<td>9.4</td>
<td>3.9</td>
</tr>
<tr>
<td>Conditions arising during the perinatal period</td>
<td>1.4</td>
<td>0.9</td>
</tr>
<tr>
<td><strong>Group II: Noncommunicable diseases</strong></td>
<td>1.9</td>
<td>1.4</td>
</tr>
<tr>
<td>Malignant neoplasms</td>
<td>1.6</td>
<td>0.8</td>
</tr>
<tr>
<td>Neuropsychiatric conditions</td>
<td>1.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Congenital anomalies</td>
<td>1.4</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>Group III: Injuries</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unintentional injuries</td>
<td>5.3</td>
<td>4.0</td>
</tr>
<tr>
<td>Road traffic accidents</td>
<td>3.9</td>
<td>2.7</td>
</tr>
<tr>
<td>Drowning</td>
<td>..</td>
<td>..</td>
</tr>
<tr>
<td>Intentional injuries</td>
<td>17.3</td>
<td>13.0</td>
</tr>
<tr>
<td>Self-inflicted injuries</td>
<td>21.9</td>
<td>16.1</td>
</tr>
<tr>
<td>Violence</td>
<td>5.8</td>
<td>2.5</td>
</tr>
</tbody>
</table>
Example 3 – Income quintiles

*Differences in years of life expectancy at birth between the highest and lowest neighbourhood income quintiles*

<table>
<thead>
<tr>
<th>Year</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>5.8</td>
<td>2.7</td>
<td>4.2</td>
</tr>
<tr>
<td>1986</td>
<td>5.7</td>
<td>2.3</td>
<td>4.0</td>
</tr>
<tr>
<td>1991</td>
<td>5.7</td>
<td>2.0</td>
<td>3.9</td>
</tr>
<tr>
<td>1996</td>
<td>5.2</td>
<td>2.1</td>
<td>3.7</td>
</tr>
<tr>
<td>2001</td>
<td>4.4</td>
<td>1.9</td>
<td>3.1</td>
</tr>
<tr>
<td>1971-2001</td>
<td>-1.4</td>
<td>-0.8</td>
<td>-1.1</td>
</tr>
</tbody>
</table>

Wilkins R, Oderkirk J. Presentation to the Subcommittee on Cities of the Standing Senate Committee on Social Affairs, Science and Technology. June 2009: Ottawa, ON
Example 3 – Income quintiles

Age-standardized breast cancer incidence rates, by neighbourhood income quintile, year of diagnosis and age group, Canada, 1992 to 2004

Example 3 – Income quintiles

*Age-standardized breast cancer incidence rates, by neighbourhood income Quintile, year of diagnosis and age group, Canada, 1992 to 2004*

Example 4 – Foreign-born population

*Distribution of Dissemination Areas, by percentage foreign-born in DA population, Canada, 2006*
Example 4 – Foreign-born population

*Cumulative distribution of percentage foreign-born in DA, by percentage of total national or total foreign-born population, Canada, 2006*

### Example 4 – Foreign-born population

**Age-sex standardized all-cause hospitalization rates, by tercile of percent Foreign-born, Canada, 2005/2006**

<table>
<thead>
<tr>
<th>Foreign-born concentration quantile</th>
<th>Foreign-born Number</th>
<th>% of quantile population</th>
<th>% foreign-born range</th>
<th>Hospitalization rate</th>
<th>95% confidence interval from</th>
<th>95% confidence interval to</th>
<th>Rate ratio</th>
<th>95% confidence interval from</th>
<th>95% confidence interval to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>4,600,320</td>
<td>34.1</td>
<td>...</td>
<td>616.2</td>
<td>614.9 - 617.6</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>1 (lowest)</td>
<td>814,030</td>
<td>14.0</td>
<td>27.0 or less</td>
<td>655.4</td>
<td>653.3 - 657.5</td>
<td>1.00</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>2</td>
<td>1,708,150</td>
<td>38.7</td>
<td>More than 27.0 to 51.8</td>
<td>607.9*</td>
<td>605.6 - 610.3</td>
<td>0.93</td>
<td>0.92</td>
<td>0.93</td>
<td>...</td>
</tr>
<tr>
<td>3 (highest)</td>
<td>2,078,140</td>
<td>63.9</td>
<td>More than 51.8</td>
<td>555.4*</td>
<td>552.8 - 558.1</td>
<td>0.85</td>
<td>0.84</td>
<td>0.85</td>
<td>...</td>
</tr>
<tr>
<td>Quintile</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 (lowest)</td>
<td>1,282,165</td>
<td>7.1</td>
<td>19.0 or less</td>
<td>840.7</td>
<td>839.4 - 842.0</td>
<td>1.00</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>2</td>
<td>1,270,545</td>
<td>24.4</td>
<td>More than 19.0 to 32.0</td>
<td>663.8*</td>
<td>661.6 - 666.0</td>
<td>0.79</td>
<td>0.79</td>
<td>0.79</td>
<td>...</td>
</tr>
<tr>
<td>3</td>
<td>1,277,825</td>
<td>38.3</td>
<td>More than 32.0 to 46.0</td>
<td>621.8*</td>
<td>619.1 - 624.5</td>
<td>0.74</td>
<td>0.74</td>
<td>0.74</td>
<td>...</td>
</tr>
<tr>
<td>4</td>
<td>1,278,465</td>
<td>53.8</td>
<td>More than 46.0 to 62.0</td>
<td>586.7*</td>
<td>583.6 - 589.9</td>
<td>0.70</td>
<td>0.69</td>
<td>0.70</td>
<td>...</td>
</tr>
<tr>
<td>5 (highest)</td>
<td>1,269,250</td>
<td>69.8</td>
<td>More than 62.0</td>
<td>539.0*</td>
<td>536.4 - 543.5</td>
<td>0.64</td>
<td>0.64</td>
<td>0.65</td>
<td>...</td>
</tr>
</tbody>
</table>

Notes:
- Excludes pregnancy-related conditions. Rates are age-sex standardized to 2006 national population. Foreign-born include those with landed immigrant status (ever) and non-permanent residents.
- Source: 2006 Census of Population, 2005/06 Hospital Morbidity Database.

Limitations

• Administrative data refers to all events occurring for geographic areas (also a benefit)
• Often uses national population distributions, this may highlight some parts of country over others
• Postal codes don’t correspond to statistical areas
  • Use of PCCF+ recommended for geocoding
• Uses census data as foundation, thus may be limited in coverage for underenumerated reserves
• Changes in reporting of Aboriginal self-identity
Discussion

• Area-based methods can be applied to existing health administrative data to provide information on relationship between health outcome and socio-economic characteristics
  • Methods can be used with data in RDCs
• Allow for comparison across time and between geographic areas
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Selected Publications


