GEOSPATIAL ANALYSIS OF DISADVANTAGE IN SYDNEY LOCAL HEALTH DISTRICT

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Research question

What is the geographical distribution of the “most vulnerable” families with intergenerational cycles of disadvantage and trauma in Sydney Local Health District?
Background
Figure 1: Sydney Local Health District and included LGAs
Objectives

- To take a spatial epidemiology approach to identifying the geographical distribution of the “most vulnerable” families with intergenerational cycles of disadvantage and trauma in Sydney LHD by:
  1. Identifying indicators of disadvantage and mapping them within SLHD
  2. Identifying clusters of disadvantage
  3. Analysing potential pockets or “hot spots” of extreme or complex disadvantage
## Included indicators of disadvantage

<table>
<thead>
<tr>
<th>2011 ABS Census</th>
<th>SLHD Clinical Data (Midwives data)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. High proportion of the population identifying as Aboriginal or Torres Strait Islander</td>
<td>1. High rates of teen mothers</td>
</tr>
<tr>
<td>2. Low rates of year 12 attainment</td>
<td>2. High rates of pregnant women without partners (sole mothers)</td>
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<td>3. Low median weekly household income</td>
<td>3. High rates of smoking during pregnancy</td>
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<td>4. High proportion of people reporting speaking English not well or not at all</td>
<td>4. High rates pregnant women with a high antenatal Edinburgh depression score (≥10)</td>
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<td>5. High proportion of people requiring assistance with activities of daily living (disability)</td>
<td>5. High rates of pregnant women reporting domestic violence (have either been hit or hurt by their partner, or report being frightened of their partner)</td>
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<td>6. High proportion of one-parent families</td>
<td>6. High rates of pregnant women reporting a history of child abuse</td>
</tr>
<tr>
<td>7. Large proportion of households with no access to a car</td>
<td>7. High rates of families known to Family and Community Services</td>
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<td>8. Large proportion of housing consisting of state housing</td>
<td>8. High rates of pregnant women who have other children in out-of-home care</td>
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<td>9. Large proportion of households with no internet access</td>
<td>9. High rates of women who report consuming alcohol during pregnancy</td>
</tr>
<tr>
<td>11. Low labour force participation rates</td>
<td>11. High rates of pregnant women with delayed antenatal care (first visit at ≥20 weeks)</td>
</tr>
</tbody>
</table>
SEIFA vs. family disadvantage

Included in 2011 SEIFA Index of Relative Socio-Economic Disadvantage (IRSD) only

- No educational attainment
- Labourers
- Machinery operators and drivers
- Low-skilled occupational services
- Low rent
- Overcrowding
- Separated or divorced
- Children in jobless families

Included in index of family disadvantage only

- Indigenous
- State housing
- Low labour force participation rates
- Teen mothers
- Sole mothers
- Smoking during pregnancy
- High antenatal EDS
- Domestic violence
- Child abuse
- Children in out-of-home care
- Known to Family and Community Services
- Alcohol consumption during pregnancy
- Low-birth-weight infants
- Delayed antenatal care

*Similar variables that have different derivations
Methodology
Routinely collected clinical data for SLHD (Midwives data)

2011 ABS census data

2013 maternal data
2014 maternal data
2013 infant data
2014 infant data

Combined maternal data
Combined infant data

Data preparation

Calculation of rate as a percentage of the total for each SA area:
- Proportion of the population aged under 15 years
- Percentage of the population identifying as Indigenous
- Percentage of the population >15 years completing year 12
- Percentage of the population who were born overseas
- Percentage of the population who report speaking English not well or not at all
- Percentage of the population volunteering
- Percentage of the population providing unpaid assistance
- Percentage of persons in a one-parent family
- Percentage of families that are one-parent families
- Percentage of dwellings with no car
- Proportion of housing that is state housing
- Proportion of households without an internet connection

Raw data for each SA area:
- Median total household weekly income
- Average number of persons per bedroom
- Average household size (persons)
- Percent unemployed persons
- Percent labour force participation

Maternal indicators:
- Teen mothers
- ATSI mothers
- Sole mothers
- Smoking during pregnancy
- High antenatal EDS (≥10)
- Physical domestic violence (hit or hurt)
- Emotional domestic violence (frightened of partner)
- Domestic violence (either/or)
- Maternal history of child abuse
- Family known to FACS
- Mother has another child in OOH
- Mother not breastfeeding on discharge
- Maternal alcohol use during pregnancy
- Mother from culturally/linguistically diverse background

Infant indicators:
- Low birth weight (<2.5kg)
- Delayed antenatal care (first antenatal visit at ≥20 weeks)

Creation of frequency tables using SPSS
Calculation of SMR
Mapping of rates for individual indicators using ArcGIS software (version 9.3)

Rate map

Spatial autocorrelation

Cluster analysis

Hotspot map

Hot-spot analysis

Extraction of attribute table from cluster analysis identifying statistically significant hotspots (HH) or cold spots (LL) by SA1

Compilation of hotspots into a numerical index of disadvantage

If the SA1 existed in a statistically significant hotspot for an individual indicator it was given a score of 1 (absence = 0) for that indicator

Each SA1 received a total score based on the number of indicators for which it was in a hotspot (range 0-16)

Spatial pattern

- Map of concentrated disadvantage
Mapping of rates for individual indicators using ArcGIS software (version 9.3)

- Spatial autocorrelation
- Cluster analysis
- Hot-spot analysis

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Spatial pattern
- Map of concentrated disadvantage
- Cluster analysis
- Rate map
- Hot spot map
FAMILY DISADVANTAGE
Number of times the SA1 was located in a hotspot for an indicator of disadvantage

0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

Results
Applications and Implications
Limitations/future directions

- Small numbers in the clinical data from the Midwives dataset
- Differing years for data collection between the two main datasets (2011 for the census vs. 2013/14 for the Midwives dataset)
- Weighting of indicators using Principle Component Analysis
References


Questions?
Routine collected clinical data for SLHD (Midwives data)

- 2013 maternal data
- 2014 maternal data
- 2013 infant data
- 2014 infant data

Combined maternal data

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  - Percentage of the population >15 years
  - Percentage of the population born overseas
  - Percentage of the population who report speaking English well or not at all
  - Percentage of the population volunteering
  - Percentage of the population providing unpaid assistance
  - Percentage of persons in one-parent family
  - Percentage of families that are one-parent families
  - Percentage of dwellings with no car
  - Proportion of housing that is stone housing
  - Proportion of households without an internet connection

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Maternal indicators:
- Teen mothers
- ATSI mothers
- Sole mothers
- Smoking during pregnancy
- High maternal RBS (≥10)
- Physical domestic violence (hit or hurt)
- Emotional domestic violence (threatened partner)
- Domestic violence (either)
- Maternal history of child abuse
- Family history of FASD
- Mother has another child in OHC
- Mother not breastfeeding on discharge
- Maternal alcohol use during pregnancy
- Mother from culturally linguistically diverse background

Infant indicators:
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