Analysing geographical variations of morbidity and mortality in relation to proximity from health services across Scotland

by

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Educational background

- B.E. in Civil Engineering (2003)
- MS in Environmental Engineering (2005)
- MSc in GIS (2007)
- PhD (first year) student in Geography
Sequence of presentation

- **Background** *(Scotland demography, definitions, health generally, health in Scotland, accessibility to health services)*
- Research Questions
- Methodology
- Deprivation in Scotland
- Spatial pattern of deprivation and mortality
- Discussion & moving forward
- Conclusions
Scotland Demography

- U.K.’s northernmost country
- Area: 78,387 Km²
- Population of 5.295 million (2011 census)
- Death rate: 10.3 deaths per 1000 population (NRS, 2011)
- Edinburgh (capital city)
Mortality

- The state of being subject to death

Morbidity

- The quality of being unhealthful
- The relative incidence of a disease (geographical locality)
Health generally

- Health differs by place

- Health determinants - factors affecting health

- Dahlgren & Whitehead model (1991)
Health in Scotland

- The lowest life expectancy in Western Europe
- The slowest rate of health improvement in Europe
- Very wide health inequalities

Health in Scotland is worse than its socio-economic profile might predict - "Scottish Effect"

so...
Accessibility to health Services

- One of the many possible influences on health
- Relates to access to services
- How far or near people live to important health services
- PhD research specifically concentrating
- The effect of spatial accessibility on health
Research Questions

- Do inequalities in mortality/morbidity (e.g. hospitalisations) vary with urban/rural areas categories?

- Are inequalities in mortality/morbidity between urban and rural areas associated with individuals socio-economic status/circumstances (social class, deprivation levels where they live)? and

- Are inequalities in mortality/morbidity associated with proximity to health services?
Methodology

- Data progress: confidentiality agreements for specific health data (cancer deaths) with ISD (Information Services Division), NSS & NRS

- Scotland Geography (geography levels, urban/rural) - preparation for GIS

- Roads network data (Edina digimap)

- GWR and ArcGIS spatial and network analysis techniques

- GIS Mapping for other domains of deprivation & overall SIMD
Deprivation in Scotland

- The Scottish Index of Multiple Deprivation (SIMD) identifies small area concentrations of multiple deprivation across all of Scotland.

- Ranking given to datazones in Scotland.

- 38 indicators across 7 aspects of deprivation (domains).

- Combine the rankings in each domain using the weightings:
  - Income: 28%
  - Employment: 28%
  - Crime: 5%
  - Housing: 2%
  - Health: 14%
  - Education: 14%
  - Access: 9%

  Domains based on counts of people.
  Domains constructed using ‘factor analysis’.

Source: http://www.scotland.gov.uk/Topics/Statistics/SIMD/Background-Data-2009
MALE LIFE EXPECTANCY AT BIRTH

Years

100
90
80
70
60
50
40
30
20
10
0

Calton (UK) 54
India 62
Washington DC (black) 63
Philippines 64
Lithuania 65
Poland 71
Mexico 72
US 75
Cuba 75
UK 77
Japan 79
Iceland 79
Montgomery Co (white) 80
Lenzie (UK) 82

Footnote: Calton, Lenzie both Glasgow (Scotland); Washington DC, Montgomery Co both US

SOURCE: WHO 2008
MALE LIFE EXPECTANCY AT BIRTH

Years

<table>
<thead>
<tr>
<th>Country</th>
<th>Life Expectancy</th>
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<td>Montgomery Co (white)</td>
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<tr>
<td>Lenzie (UK)</td>
<td>82</td>
</tr>
</tbody>
</table>

Footnote: Calton, Lenzie both Glasgow (Scotland); Washington DC, Montgomery Co both US

SOURCE: WHO 2008

www.st-andrews.ac.uk
Discussion & moving forward

- Descriptive analysis
- Empirical analysis
- GWR techniques for relationship of cancer mortality
- Spatial cluster analysis to identify hotspots
- Network analysis
- Individual level data (SLS)
Conclusions

- Spatial accessibility to healthcare is important because of high cancer mortality, especially in rural areas
- Empirical analysis will be carried out to find the relationships
- GIS spatial analysis will be used to analyse the spatial accessibility to health care across whole Scotland
- This will identify gaps for public health organisations
Thank You!

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