Population health across space & time:
geographical harmonisation of the ONS Longitudinal Study for England & Wales

Paul Norman & Mylène Riva
Centre for Spatial Analysis & Policy, School of Geography, University of Leeds
Institute of Hazard, Risk and Resilience, Department of Geography, University of Durham
(Axe Santé des Populations et Environnement Centre de Recherche du CHUQ Université Laval, Québec, Canada)

Acknowledgements
ONS LS data: Chris Marshall & CeLSIUS, a service funded by ESRC & ONS Microdata Analysis User Support: Final Clearance of results 30115
The research uses National Statistics Postcode Directory and GIS boundary data obtained via EDINA
UKBORDERS an academic service supported by ESRC and JISC
The Census and National Statistics Postcode Directory have been provided by ONS and the digital boundary data by OS. Data are Crown copyright and reproduced with the permission of the controller of HMSO and Queen's printer for Scotland and OPSI

Geographical harmonisation?

“You're the Cheshire cat, aren't you?”

“I was the Cheshire cat,” he replied with a slightly aggrieved air, “but they moved the county boundaries, so technically speaking I'm now the 'Unitary Authority of Warrington Cat', but it doesn't have the same ring to it.” (p. 164)

Population health across space & time:

Geographical inequalities in health over time
• Specific places: Regions, North-South, etc
• Generic types: deprivation, urban-rural, geodemographic
  – Outcome for individuals modelled in relation to area types in which people lived through their life course
  – Time-series of cross-sections or start-end comparison of survivors aggregated across area types

Investigating inequalities hampered by definitional changes
• Health outcome measures
• Sociodemographic data specification
• Geographical zone systems

Geographical harmonisation of the ONS LS for England & Wales

Health-related variables
• Mortality: All cause & by ICD
• Cancer registrations

Geography related variables
• Census, health, functional
• Area types: deprivation, urban-rural, geodemographic
  – Time-point specific
  – Any change hampers time-series or longitudinal analysis
Health geography change?

“The redisorganisation of the NHS”

Soon ...
All change!!

Census LA geography change?

1971 Skipton Urban & Rural Districts
1981 Craven District
1991 Craven District
2001 Craven District
Census ward geography change?

1971 Skipton 1981 Skipton

1991 Skipton 2001 Skipton

Census geography: availability in LS?

Nation (England & Wales)

Government Office Region

Local Government

Ward

Super Output Areas

Output Area (OA)

Re: 2001, different at other time points

Enumeration Districts (EDs) have been smallest geography

Info exists but not always available for analysis
Linking LS geographies?

For an LS member living in a particular ward in 1971, what 2001 OA would that be?

Following slides NOT using the LS …

Linking (LS) geographies?

Postcode points used to link geographies (Simpson 2002; Norman at al., 2003)
Within any polygon, population-weighted centroid best represents a single location for linkage
Address-weighted postcode locations estimates centroid
Linking (LS) geographies

Skipton, 1991
Enumeration Districts & postcode distribution

Skipton, 1991 EDs
Geometric (x) & population-weighted (+) centroids

Linking (LS) geographies

Skipton, 2001 OAs
1991 (+) & 2001 (+) population-weighted centroids
Linking LS geographies

Supply series of lookup tables

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SKIPTON UD NORTH</td>
<td></td>
<td>LS1267003</td>
<td>36UBGP0010</td>
<td>399464</td>
<td>451859</td>
</tr>
<tr>
<td>SKIPTON UD WEST</td>
<td></td>
<td>LS1267006</td>
<td>36UBGQ0009</td>
<td>398661</td>
<td>451961</td>
</tr>
<tr>
<td>SKIPTON UD CENTRAL</td>
<td></td>
<td>LS1267001</td>
<td>36UBGR0003</td>
<td>399189</td>
<td>451473</td>
</tr>
<tr>
<td>SKIPTON UD EAST</td>
<td></td>
<td>LS1267002</td>
<td>36UBGR0010</td>
<td>399445</td>
<td>451076</td>
</tr>
<tr>
<td>SKIPTON UD SOUTH WEST</td>
<td></td>
<td>LS1267005</td>
<td>36UBGS0005</td>
<td>397739</td>
<td>451373</td>
</tr>
<tr>
<td>SKIPTON UD SOUTH</td>
<td></td>
<td>LS1267004</td>
<td>36UBGS0006</td>
<td>398754</td>
<td>451157</td>
</tr>
</tbody>
</table>

If in 1971 an LS member lived in Skipton North Ward, then ‘most likely’ this would be 36UBGP0010 in 2001

‘Most likely’, but not necessarily …
Time-series using LS: mortality (aged <65)

Longitudinal using LS: LLTI in 2001
Summary

- Administrative boundary change hampers time-series & longitudinal analyses
- Established longitudinal and cohort studies can recover geographical consistency by estimating contemporary geographies for old records
  - Smaller source units are better & …
  - Reliability of linkage improves with increasing unit size
- Studies should retain postcodes
  - Otherwise, population-weighted centroids of smallest available geographical area provide linkages to alternative geographies
- Supply lookup table to CeLSIUS with link to OA or higher 2001 geography with your own geography or typology

Geographical names may change but the sign remains the same!

- In 1971 in Central Ward in Skipton Urban District, West Riding of Yorkshire (but pre-1974 might not have had a postcode)
- To date, at least 4 ward boundary change, 1 district change, 1 county change
- Smallest geography different every census
- Health geography, at least 8 changes
References


