Estimates of ethnic mortality in the UK
Phil Rees and Pia Wohland
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Session: Research Methods for Understanding Population Trends and Processes using secondary data

Outline of the Presentation

1. INTRODUCTION
   • Context and Aim
   • Review of previous work

2. METHODS
   • Life tables for local areas (plus SMRs, plus survivorship probabilities)
   • Estimating the Standardised Illness Ratios (SIRs) for ethnic groups
   • Predicting ethnic group SMRs from SIRs
   • Adjusting ethnic group SMRs to agree with local mortality

3. RESULTS
   • SMRs for ethnic groups for local areas in the UK
   • Life tables for ethnic groups for local areas in the UK

4. CONCLUSIONS
   • Robustness: check against geographically weighted method
   • Robustness: check against new infant mortality data
Context and aim

**ESRC Project: What happens when international migrants settle?**
**Ethnic group population trends and projections for UK local areas**

Aim: to develop projections of ethnic populations for all local areas in the UK

**Projection model:**

- Mortality component: survivorship probabilities
- Fertility component: age specific fertility rates
- International migration component: New Migrant database
- Internal migration component: census migration updated using Patient Registration Data

Review of work on ethnic mortality

- **United States**: Routine to project the population by race (three groups, White, Black, Other). Mortality statistics collected by race.
- **New Zealand**: Interesting model that project groups with inclusion of mixed origin persons included in both parental groups.
- **European countries**: Use nationality (foreign, native) as the classification variable (reviewed in Coleman 2006, PDR paper)
- **United Kingdom**: self-identified ethnic groups used in estimation or projection models but no ethnic mortality differences recognised
  - Coleman & Scherbov 2005: all group mortality rates only
  - Rees and Parsons 2006: all group survivorship probabilities only
  - Large and Ghosh 2006a, 2006b: all group mortality rates only
  - Some cause of death work uses country of birth data
  - In June 2008 ONS has begun publishing new statistics on infant mortality by ethnicity in England and Wales
Introduction

To project populations by ethnicity for local authorities we need to estimate the mortality rates and survivorship probabilities for ethnic groups.

Previous UK projections have only used all group mortality and survivorship probabilities.

But we know that mortality varies greatly between persons classified by country of birth and from work with the Longitudinal Study.

We use an indirect method to estimate ethnic group mortality by using SIRs to estimate SMRs for ethnic groups.

Methods

We use spreadsheets in a new way to compute life tables efficiently for a large number of local authorities by single year of age and sex. The LTs yield mortality rates ... survivorship probabilities and so SMRs.

We estimate SIRs for LAs using the Limiting Long Term Illness variable from the 2001 Census.

We then explore use of alternative sets of LAs for fitting regression models that predict SMR from SIR:
• All UK LAs
• LAs in England, Wales, Scotland and Northern Ireland separately
• LAs in England with & without high BME populations.
Method 1
Using illness data from the census

1. Introduction

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**Stage A**
compute life tables for all UK LAs: mortality rates

<table>
<thead>
<tr>
<th>Age Group</th>
<th>0-1</th>
<th>1-5</th>
<th>5-10</th>
<th>10-15</th>
<th>...</th>
<th>90+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: Table data is not shown in this text.*
Method 1
Using illness data from the census

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Stage A
compute life tables for all UK LAs: survivorship probabilities

Stage B
Estimate standardized illness ratios (SIRs) by ethnicity for local areas (LAs)

Stage B.1
Estimate SIRs by ethnic group and local area where there are enough ill people and total population

Map: SIRs for Indians
Stage B.2
Estimation of SIRs when numbers are small
We used the model
\[ SIR(i,e) = SIR(e) \times \frac{SIR(i)}{100} \]
which assumes independence of the national and local effects.

Stage C
The relationship between SIR and SMR across local authorities
Illness is linked to mortality at the individual and area scales.

Method:
Using illness data from the census

<table>
<thead>
<tr>
<th>Gender</th>
<th>Nation</th>
<th>( r^2 )</th>
<th>Intercept</th>
<th>Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>England</td>
<td>0.63</td>
<td>47.3</td>
<td>0.52</td>
</tr>
<tr>
<td></td>
<td>Wales</td>
<td>0.56</td>
<td>54.9</td>
<td>0.39</td>
</tr>
<tr>
<td></td>
<td>Scotland</td>
<td>0.75</td>
<td>28.3</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td>Northern-Ireland</td>
<td>0.40</td>
<td>59.9</td>
<td>0.36</td>
</tr>
<tr>
<td>Females</td>
<td>England</td>
<td>0.61</td>
<td>52.1</td>
<td>0.48</td>
</tr>
<tr>
<td></td>
<td>Wales</td>
<td>0.78</td>
<td>43.9</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>Scotland</td>
<td>0.69</td>
<td>60.5</td>
<td>0.64</td>
</tr>
<tr>
<td></td>
<td>Northern-Ireland</td>
<td>0.16</td>
<td>71.3</td>
<td>0.26</td>
</tr>
</tbody>
</table>
Method:
Using illness data from the census

1. Introduction
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1. Introduction

2. Methods

Stage D
Estimate mortality rates by age and sex for ethnic groups from estimated SMRs:

\[ M^i_{\text{exg}} = M^i_{\text{xg}} \times \frac{\text{SMR}^i_{\text{eg}}}{100} \]

We assume each ethnic group has the same mortality pattern by age.

Stage E
Adjust the estimated mortality rates so that they agree with the all group mortality rates

\[ M^i_{\text{exg}}[2] = M^i_{\text{exg}}[1] \times \frac{D^i_{\text{xg}}/\Sigma_e M^i_{\text{exg}}[1] P^i_{\text{exg}}}{\Sigma_e M^i_{\text{exg}}[1]} \]

3. Results

Method:
Using illness data from the census

SMRs for White British Males

SMRs for Indian Males

SMRs for Bangladeshi Males

SMRs for Chinese Males

Results: SMRs

SMRs for all groups
Conclusions: what has been done

• We have produced the **first estimates of ethnic group mortality** specific to local areas in England

We have produced the **first set of life tables** for ethnic groups by local area in England
Conclusions: checks need doing

1. Introduction

2. Methods

3. Results

4. Conclusions

• We will develop some estimates of the confidence intervals around selected key life table statistics

• We will compare the method presented here with an alternative based on geographical weighting:
  • Estimate the national mortality rates for an ethnic group by averaging the mortality rates for local areas weighted by the population of that group
  • Feed those estimates into the adjustment step described above

Conclusions: what is to be done

1. Introduction

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4. Conclusions

• Extend analysis to Wales, Scotland and Northern Ireland

• Develop better models of the SIR-SMR relationship

• Develop life tables for 2002-2006

• Analyse trends and develop projections, variants and scenarios