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A novel methodology for constructing ethnic majority life tables: their importance for measuring inequalities in survival

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Project funded by the National Awareness and Early Diagnosis Initiative: a partnership between

Improving health worldwide
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“...it is critical to use sub-population life-tables for estimating relative survival when those sub-populations have marked variation in background mortality rates. However, often only sex-specific life-tables are used.”

Inequalities in survival – the importance of background mortality (using the right life table)

- Affluent
- Deprived

- National LT
- Deprivation-specific LT

Relative survival (%) vs Years since diagnosis
Life tables examine mortality by age and sex

<table>
<thead>
<tr>
<th>Age</th>
<th>Deaths</th>
<th>Population</th>
<th>Mortality Rate</th>
<th>Life expectancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1327</td>
<td>279.8</td>
<td>0.00474</td>
<td>80.9</td>
</tr>
<tr>
<td>1</td>
<td>99</td>
<td>272.0</td>
<td>0.00037</td>
<td>80.3</td>
</tr>
<tr>
<td>2</td>
<td>57</td>
<td>272.4</td>
<td>0.00021</td>
<td>79.4</td>
</tr>
<tr>
<td>3</td>
<td>40</td>
<td>278.8</td>
<td>0.00015</td>
<td>78.4</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>286.1</td>
<td>0.00014</td>
<td>77.4</td>
</tr>
</tbody>
</table>

...
Age-specific mortality rate at each age

Mortality rate (log scale)

Age
Mortality varies by various sub-populations – life tables can be stratified

Inequalities in survival – the importance of background mortality

![Graph showing survival rates across socio-economic categories](image)
Measures of ethnicity are necessarily ecological

e.g. 97.0% White
    0.8% Black
    2.2% Asian

Proportion of each ethnicity in each Output Area (population ~350)

Round to nearest 1%

Maximum proportions:
  White 100%
  Asian 98%
  Black 73%
<table>
<thead>
<tr>
<th>sex</th>
<th>age</th>
<th>regional code</th>
<th>deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>sex</td>
<td>age</td>
<td>regional code</td>
<td>% Asian</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>sex</th>
<th>age</th>
<th>regional code</th>
<th>% Asian</th>
<th>deaths</th>
</tr>
</thead>
</table>

Total deaths age 65: 78
Constructing the life tables

1. Merge mortality data with population data from census
2. Collapse data: deaths grouped by age and proportion of ethnic group
3. Predict the mortality for each age and proportion of each ethnic group, adjusted for deprivation
4. Create life table for each ethnicity based on maximum proportion in any OA
The results: mortality rates by deciles of ethnic proportion in Black males, adjusted for deprivation.
The results: mortality rates by ethnicity, adjusted for deprivation

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Per 1000 pyrs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
</tr>
<tr>
<td>Asian</td>
<td>9.1</td>
</tr>
<tr>
<td>Black</td>
<td>16.3</td>
</tr>
<tr>
<td>White</td>
<td>10.1</td>
</tr>
</tbody>
</table>
The results: Life expectancy by ethnicity (from 1 to 80 years)

Life expectancy from age 1 to 80, by majority ethnic group, adjusted for deprivation

- 73% Black
- 98% Asian
- 100% White

Female:
- 73% Black

Male:
- 98% Asian
- 100% White

National males
National females

Life expectancy from age 1 to 80 (years)
Conclusions

- Novel ecological method of constructing ethnic majority life tables
- Shows differences in mortality experiences for the main ethnic groups beyond the impact of deprivation
- Diversity remains within these three broad ethnic groups
- Watch out for the ecological fallacy!
- Use to inform public health planning and in survival analysis for breast cancer project
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