Educational and Cross-National Differences in Health Expectancies

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Life Expectancy Increasing Linearly

- Are the extra years healthy or are we just extending time spent in poor health?

- Educational differences in L.E. are large and growing, but what about differences in healthy and unhealthy life expectancy?

- To what extent do behavioral factors contribute to differences in HLE and ULE?
By the time Americans are in their 50s....

NHANES
By the time Americans are in their 50s...
Objectives Today

(1) Starting with HRS, estimate HLE, ULE, TLE by:
   - educational level
   - behavioral status (obesity, smoking)
   - contributions of behaviors to educ disparities

(2) Compare estimates from HRS and SHARE-5
   - SHARE-5 (Netherlands, Spain, Italy, France, Denmark) (Solé-Auró et al. 2015)

(3) ELSA mortality in comparison with HMD
HRS: Data

- 1998-2010

- Ages 50-74 in 1998 (N=14,000; d=3,100)

- Healthy and Unhealthy States
  - Limitations in any ADL (walking, dressing, bathing, eating, getting in/out of bed, toileting)
Measures

• Educational groups
  – Less than HS
  – HS/GED
  – Some College+

• Behavioral Factors
  – Obesity (BMI>=30)
  – Smoking (current, former)
    – Physical activity (mod/vig physical activity < 3 per week)
    – Alcohol (heavy drinkers, 14+ [m] or 10+ [w] drinks per week)
Methods I

• Multinomial Logit Models
  – Behaviors fixed at 1998 levels
  – Transitions modelled between 2000-2010
  – Three states: healthy, disabled, dead
  – Adjusted for race/ethnicity

\[
\log \left( \frac{p_{ij}(x,t)}{p_{ii}(x,t)} \right) = a_{ij} + b_{ij} \text{age} + c_{ij} \text{education} + d_{ij}z
\]
Methods 2

• Matrix Population Models (Caswell 2006)
  - Closed-form analytical approach
  - State-specific transition probabilities by age
  - Initial distribution of individuals at age 50 by health state
## HRS: Descriptive Statistics

### Table 2. Deaths, person-years, and health state transitions, 2000-2010

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>ALL (N=13,978)</th>
<th>MEN (N=6,141)</th>
<th>WOMEN (N=7,837)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Deaths, N (%)</td>
<td>3,138</td>
<td>1,645</td>
<td>1,493</td>
</tr>
<tr>
<td>Person Years</td>
<td>106,507</td>
<td>45,655</td>
<td>60,852</td>
</tr>
</tbody>
</table>

**Health State Transitions, N**

<table>
<thead>
<tr>
<th>Transition</th>
<th>ALL (N=13,978)</th>
<th>MEN (N=6,141)</th>
<th>WOMEN (N=7,837)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Disabled to Disabled</td>
<td>4,123</td>
<td>1,642</td>
<td>2,481</td>
</tr>
<tr>
<td>Non-Disabled to Dead</td>
<td>1,836</td>
<td>1,045</td>
<td>791</td>
</tr>
<tr>
<td>Disabled to Dead</td>
<td>1,302</td>
<td>600</td>
<td>702</td>
</tr>
<tr>
<td>Disabled to Non-Disabled</td>
<td>2,736</td>
<td>1,024</td>
<td>1,712</td>
</tr>
</tbody>
</table>

*Note:* Disability defined as the presence of at least one activities of daily living limitation.

*Source:* Health and Retirement Study, 2000-2010
HRS: Life expectancy at age 50 by education, MEN

- High education associated with **9 more healthy** and **2 less disabled years** than lowest education
HRS: Life expectancy at age 50 by education, WOMEN

- High education associated with **11 more healthy and 4 less disabled years** than lowest education education.
• Obese have almost as many years as non-obese but more of these are disabled (7 vs 3)
HRS: Life expectancy at age 50 by smoking, WOMEN

• Smokers have 8 years shorter life expectancy than never-smokers (34 vs 26), all lost years healthy
## Contribution of behaviors to educational differences in health expectancies

<table>
<thead>
<tr>
<th></th>
<th>MEN</th>
<th>WOMEN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HLE</td>
<td>TLE</td>
</tr>
<tr>
<td>Some college vs. HS+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference in years</td>
<td>3.6</td>
<td>2.4</td>
</tr>
<tr>
<td>% explained by:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-- Smoking and obesity</td>
<td>28%</td>
<td>46%</td>
</tr>
<tr>
<td>-- + drinking and phys. activity</td>
<td>39%</td>
<td>71%</td>
</tr>
<tr>
<td>Some col. vs. &lt; HS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference in years</td>
<td>9.4</td>
<td>6.9</td>
</tr>
<tr>
<td>% explained by:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-- Smoking and obesity</td>
<td>15%</td>
<td>24%</td>
</tr>
<tr>
<td>-- + drinking and phys. activity</td>
<td>27%</td>
<td>44%</td>
</tr>
</tbody>
</table>
SHARE-5: Data

5 countries (Netherlands, Spain, Italy, France, Denmark)

Ages 50-74 in 2004

Wave 1 to Wave 4 (years 2004-2012 / varies by country)

N=16,500; d=1,040

Deaths identified through survivor reports (varies by country)
HRS, SHARE, HMD: e-50, women

U.S. HRS 1.5y < HMD
SHARE-5 3.0y > HMD
NET 6.6y > HMD
HRS, SHARE-5: Healthy and Unhealthy LE

- **Men-Hrs**: 24 HLE, 3 ULE
- **Men-Share**: 27 HLE, 4 ULE
- **Women-Hrs**: 29 HLE, 3 ULE
- **Women-Share**: 32 HLE, 6 ULE
Educational Differences, HRS and SHARE-5

Women

HRS <HS
HRS HS+
HRS Col
SHARE <HS
SHARE HS+
SHARE Col

<table>
<thead>
<tr>
<th></th>
<th>HLE</th>
<th>ULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRS &lt;HS</td>
<td>21</td>
<td>7</td>
</tr>
<tr>
<td>HRS HS+</td>
<td>25</td>
<td>5</td>
</tr>
<tr>
<td>HRS Col</td>
<td>32</td>
<td>3</td>
</tr>
<tr>
<td>SHARE &lt;HS</td>
<td>29</td>
<td>7</td>
</tr>
<tr>
<td>SHARE HS+</td>
<td>33</td>
<td>6</td>
</tr>
<tr>
<td>SHARE Col</td>
<td>39</td>
<td>4</td>
</tr>
</tbody>
</table>

TLE Difference: 7 years
Educational Differences, HRS and SHARE-5, Men

TLE Difference: 7 years
ELSA Mortality (?)

ELSA
Ages 50+ (N=6,500; d=450)

Wave 2 to Wave 6 (years 2004-2012) (no BMI in wave 1)

NHS and ONS mortality linkage (96%+ linked)

HMD
2000-2009 period
## ELSA/HMD Mortality Ratios

### Deaths per 1,000 PY

<table>
<thead>
<tr>
<th>Age Group</th>
<th>ELSA Females</th>
<th>Males</th>
<th>HMD Females</th>
<th>Males</th>
<th>Ratios Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>55-59</td>
<td>3.5</td>
<td>6.1</td>
<td>4.7</td>
<td>7.3</td>
<td>0.74</td>
<td>0.84</td>
</tr>
<tr>
<td>60-64</td>
<td>4.0</td>
<td>8.2</td>
<td>7.4</td>
<td>12.0</td>
<td>0.53</td>
<td>0.68</td>
</tr>
<tr>
<td>65-69</td>
<td>7.4</td>
<td>11.9</td>
<td>12.1</td>
<td>19.6</td>
<td>0.61</td>
<td>0.61</td>
</tr>
<tr>
<td>70-74</td>
<td>12.2</td>
<td>20.0</td>
<td>20.6</td>
<td>32.5</td>
<td>0.59</td>
<td>0.62</td>
</tr>
<tr>
<td>75-79</td>
<td>21.8</td>
<td>39.4</td>
<td>36.3</td>
<td>54.9</td>
<td>0.60</td>
<td>0.72</td>
</tr>
<tr>
<td>80-84</td>
<td>40.9</td>
<td>59.8</td>
<td>64.2</td>
<td>91.8</td>
<td>0.64</td>
<td>0.65</td>
</tr>
<tr>
<td>85-89</td>
<td>73.1</td>
<td>81.9</td>
<td>113.0</td>
<td>151.2</td>
<td>0.65</td>
<td>0.54</td>
</tr>
<tr>
<td>90-94</td>
<td>102.2</td>
<td>127.7</td>
<td>194.6</td>
<td>244.5</td>
<td>0.53</td>
<td>0.52</td>
</tr>
</tbody>
</table>
Next Steps

• Further evaluation of data quality – to what extent can these datasets be compared given levels of mortality?

• Estimate the contribution of behavioral factors to educational and cross-national differences for women and men

• Expanded measures of disability/health states

• Can we actually look at cohorts?
HRS, SHARE, HMD: e-50, men

U.S. HRS 1.9y < HMD
SHARE-5 2.3y > HMD
NET 5.4y > HMD