What can past trends in health expectancy tell us about the future?

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George Myers Lecture
George Myers

• REVES 8 Chicago (1995)

Individual or population health?

It is better to measure inaccurately something which is important than to measure accurately something which is unimportant.

Professor Stephen Evans
Plan

• Why do we need to monitor health expectancy trends?
• What are/have been the barriers/challenges?
• What does the evidence on past trends tell us?
• Will these trends continue in the future and if not why not?
• What is the future for REVES?
Why do we need to monitor HE trends?

- To answer question ‘We are living longer – are the years good ones?’
- To inform future policy to improve and plan resources
- REVES network set up to do this
  - Trends papers even in the earliest REVES!
- Increasing number of countries over time (Canada, UK, US, Netherlands, France, Belgium, Spain, Italy, China, …..)
- Tended to feel like there should be one trend we were all following – but all at different points in population ageing
- Now more sophisticated and looking at trends within subgroups – could we do more?
- Why compare countries
  - to learn from others
  - natural experiments for differences in health systems, economic shocks, etc
Trends - primary phase


• Mathers C, Jain S. Trends in Health Expectancies in Australia 1981-1998 and Preliminary Results From the Australian Burden of Disease Study. (REVES 11 1999)

Trends – secondary phase

- Cheung, SLK, Yip, SFP. Are we heading to the compression of disability? The case of Hong Kong SAR, 1984-2008. (REVES 21 2009)

Differential trends between subgroups

• Petterson H. Trends in health expectancy for **socio-economic groups** in Sweden (REVES 8 1995)


Why do we need monitor trends?

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Plan

• Why do we need to monitor trends?

• What are/have been the barriers/challenges?
  – Data availability
  – Data consistency
  – Case study – European Union

• What does the evidence on past trends tell us?

• Will these trends continue in the future and if not why not?

• What is the future for REVES?
Euro-REVES I 1995-7

Euro-REVES II 1997-2002

European Health Status Module 2002-3

EHEMU 2004-7

Lisbon Strategy

Health Monitoring Programme 1995-2002
Proposals for nine instruments dealing with:

- **Chronic morbidity**
  - Global
  - Detailed

- **Functional limitation**
  - Detailed (physical and sensory)

- **Activity restriction**
  - Global (GALI)
  - Detailed (personal care, household care, other activities)

- **Perceived health**
  - Global

- **Mental health**

*Minimum European Health Module* (Module 2000) for inclusion in all the European health and social surveys and included in Health Surveys (Eurobarometer, SILC)

In EU-SILC since 2004/2005
Timeline

- Euro-REVES I 1995-7
- Euro-REVES II 1997-2002
- European Health Status Module 2002-3
- EHEMU 2004-7
- EHLEIS 2007-10
- JA EHLEIS 2011-14
- BridgeHealth 2015-17

- Health Monitoring Programme 1995-2002
- Lisbon Strategy
- Healthy Life Years Indicator
- European Health Interview Survey 2008+

- 1995
- 1999
- 2003
- 2007
- 2011
- 2015
Key outputs
Plan

• Why do we need to monitor trends?
• What are/have been the barriers/challenges?
  – Data availability
  – Data consistency
  – Case study EU
• What does the evidence on past trends tell us?
• Will these trends continue in the future and if not why not?
• What is the future for REVES?
LE at birth: selected EU countries

Source: Jagger Foresight evidence review
Life expectancy (LE) and disability-free life expectancy (DFLE) at age 65 in 15 members of the European Union (EU15), by sex, from 1995 to 2012


Calculation: www.eurohex.eu
## Trends selected EU countries (men)

<table>
<thead>
<tr>
<th></th>
<th>Change in years between 2005 and 2010</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Birth</td>
<td>Age 65</td>
<td>Age 85</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LE</td>
<td>HLY</td>
<td>LE</td>
<td>HLY</td>
<td>LE</td>
</tr>
<tr>
<td>MEN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>1.4</td>
<td>1.7</td>
<td>1.0</td>
<td>0.9</td>
<td>0.8</td>
</tr>
<tr>
<td>France</td>
<td>1.5</td>
<td>-0.4</td>
<td>1.2</td>
<td>0.5</td>
<td>0.9</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1.7</td>
<td>-4.4</td>
<td>1.3</td>
<td>-1.1</td>
<td>0.6</td>
</tr>
<tr>
<td>Sweden</td>
<td>1.1</td>
<td>7.0</td>
<td>0.9</td>
<td>3.4</td>
<td>0.3</td>
</tr>
<tr>
<td>UK</td>
<td>1.5</td>
<td>0.9</td>
<td>1.2</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>EU25</td>
<td>1.6</td>
<td>1.1</td>
<td>1.1</td>
<td>0.3</td>
<td>0.7</td>
</tr>
</tbody>
</table>

- Compression of activity limitation (disability) for men in Belgium (birth) and Sweden (all ages)
- Compression of activity limitation (disability) for women in Sweden (all ages)

*Source: Jagger Foresight evidence review*
## Trends selected EU countries (women)

<table>
<thead>
<tr>
<th></th>
<th>Change in years between 2005 and 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Birth</td>
</tr>
<tr>
<td></td>
<td>LE</td>
</tr>
<tr>
<td><strong>WOMEN</strong></td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>1.1</td>
</tr>
<tr>
<td>France</td>
<td>1.4</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1.3</td>
</tr>
<tr>
<td>Sweden</td>
<td>0.7</td>
</tr>
<tr>
<td>UK</td>
<td>1.3</td>
</tr>
<tr>
<td>EU25</td>
<td>1.3</td>
</tr>
</tbody>
</table>

- Compression of disability for women in Sweden (all ages)

*Source: Jagger Foresight evidence review*
UK trends 2000-2 to 2009-11

- Some evidence of compression of disability and morbidity at younger ages
UK trends 2000-2 to 2009-11

- Some evidence of compression of disability and morbidity at younger ages

LE
DFLE (limiting long-standing illness)
HLE (self-rated health)
Change in HE at age 65: 1991 to 2011

Disability Free Life Expectancy

Severity of disability

Source: Jagger et al Lancet 2015
Change in HE at age 65: 1991 to 2011

Cognitive Impairment Free Life Expectancy

Men
- LE65: 4.5
- CIRLE65: 4.2
- CILE65: 3.6
- CIFLE65: 4.4
- CILE65: -0.7

Women
- LE65: 4.5
- HLE65: 3.8
- unHLE65: 0.7
- LE65: 3.6
- HLE65: 3.1
- unHLE65: 0.6

Healthy Life Expectancy

Source: Jagger et al Lancet 2015
FIGURE 3—Expected Number of Remaining Years Lived With Severe and Moderate Disability and Without Disability and Percentage of Remaining Years Expected to be Lived Without Disability Among (a) Men and (b) Women: United States, 1982 and 2011

Source: Freedman et al AJPH 2016
CIFLE USA 2000-2010

Table 2. Life Expectancy 2000 and 2010: total, with good cognition, with CIND, with dementia: Health and Retirement Study.

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th></th>
<th>Males</th>
<th></th>
<th>Females</th>
<th></th>
<th>Females</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>At age 65</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>16.1</td>
<td>17.7</td>
<td>1.6</td>
<td>19.1</td>
<td>20.3</td>
<td>1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With good cognition</td>
<td>10.7</td>
<td>12.5</td>
<td>1.8*</td>
<td>12.5</td>
<td>14.1</td>
<td>1.6*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(10.4–)</td>
<td>(12.3–)</td>
<td>(12.3–)</td>
<td>(10.9)</td>
<td>(12.7)</td>
<td>(12.7)</td>
<td>(13.9–)</td>
<td>(14.4)</td>
</tr>
</tbody>
</table>

Source: Crimmins et al SSM Popn Health 2016
DFLE Belgium 1997-2004

DFLE Denmark 1987-2005
Years with dependency

- Disability does not give real indication of care needs

- Interval of need (Isaacs and Neville, 1975):
  - **High (requires 24-hour care)**
    - bedbound or chairbound, or unable to get to or use the toilet without help, or need help feeding, or be often incontinent and need help dressing, or have severe cognitive impairment (MMSE < 10)
  - **Medium (requires help at regular times daily)**
    - need help preparing a meal, or dressing
  - **Low (requires help less than daily)**
    - need help to wash all over or bath, or cut toenails, or shop, or do light or heavy housework
  - **Independent**
Change in HE at age 65:1991 to 2011

Years with different care needs

Source: Kingston et al Lancet 2017
Explaining the trends

• Are the increases in years with disability due to:
  – Increases in incidence
  – Living longer with disability/reductions in mortality from disabled state

• Have the increases in years with disability been experienced by all social groups?

• How much has education contributed to the reductions in years with cognitive impairment?

Needs longitudinal data!
Plan

- Why do we need to monitor trends?
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  - Data consistency
  - Case study EU
- What does the evidence on past trends tell us?
- Will these trends continue in the future and if not why not?
- What is the future for REVES?
Future HE (1)

- European and individual country level
- Projections from 2010 to 2020
- Various scenarios explored:
  - HLY/LE constant
  - Variety of reductions in inequalities between countries
- Conclusions:
  - EIP-AHA target unlikely to be reached by EU as a whole though some countries would
  - Reaching target for EU would not reduce inequalities
Future HE (2)

- Dutch population
- Projections to 2030
- Future health expectancy from projecting transition probabilities (by age and calendar time)
Future HE (3)

- US population
- Projections from 1982 to 2040
- Future health expectancy from projecting transition rates incorporating cohort smoking and obesity
Future HE (4)

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Articles

Forecasted trends in disability and life expectancy in England and Wales up to 2025: a modelling study

Dr Maria Guzman-Castillo PhD a, b, c, Sara Ahmadi-Abhari PhD b, Piotr Bandosz PhD a, c, Prof Simon Capewell DSc a, Prof Andrew Steptoe DSc b, Prof Archana Singh-Manoux PhD b, d, Prof Mika Kivimaki PhD b, Martin J Shipley MSc b, Prof Eric J Brunner PhD b, †, Prof Martin O’Flaherty PhD a, †

• England population
• Projections to 2025
• Future DFLE from projecting transition probabilities conditional on dementia, cardiovascular disease, age and sex calculated from the English Longitudinal Study of Ageing
• Assumes declines in dementia and CVD will continue
• Dynamic microsimulation model
• England population
• Base population formed from 3 longitudinal studies (Understanding Society, ELSA, CFAS)
• ‘Ages’ individuals aged 35+ from 2014 to 2042 wrt range of characteristics:
  – Survival (qx from ONS population projections)
  – Sociodemography (education, marital status, occupation)
  – Lifestyle factors (smoking, physical activity, BMI)
  – Morbidity (cognitive impairment, CVD, hypertension, diabetes, arthritis, stroke, dementia, visual impairment, hearing impairment, respiratory disease, cancer, depression)
  – Dependency
Combine harmonised variables from 3 longitudinal studies

Calculate and store transition probabilities for each variable

Weight up to national population, clone (for unit weight), take 1% sample

Starting population of individuals (n=303,560)

Simulate:

- Individual data from month
- Calculate probability of each event
- Draw random number to determine whether event happens
- Update Status if Changed

Output Files
Multimorbidity

Between 2015 and 2035

• Numbers of older population (aged 65+) with 4+ diseases will double

• Around 1/3 of those with 4+ diseases will have mental ill-health: dementia, depression or cognitive impairment no dementia (CIND)

• Most of gain in LE at age 65 between 2015 and 2035 will be in years with 4+ diseases

Source: Kingston et al Age and Ageing 2018
PACSim: Years gained with disease 2015-2035

Source: Kingston et al Age and Ageing 2018
Prevalence of multi-morbidity (2+ diseases)

Source: Kingston et al Age and Ageing 2018
Conclusions

Past trends in health expectancy:
• Depend on measure of health used
• Vary between countries and within countries over time

Future trends:
• Need to take account of health of younger populations ageing in
Future of REVES – research areas

• Further comparative trends across countries
  – More robust analysis
  – Greater use of partial HE for trends within age groups
  – How do macro-level changes affect trends?
  – How do macro-level factors interact (Montez et al AJPH 2017)

• More innovative ways of presenting HE to policy makers – how do we get policy-makers and the public to understand health expectancies

• Estimating costs from times in health states
Future of REVES – network

• Raising the profile of REVES
• More cross-national collaborative work
• Rebirth of interest groups within the annual meeting:
  — Policy
  — Calculation methods
  — Harmonization
• An update of the book!
Acknowledgements

- Dr Andrew Kingston and Professor Fiona Matthews
- Colleagues in Newcastle University Institute of Health & Society
- Australian Centre of Excellence in Population Ageing Research (CEPAR)
- My REVES family – especially Jean-Marie Robine, Eileen Crimmins, Mark Hayward, Nicolas Brouard, and Yasuhito Saito
And finally ........

To be old? It’s to be young longer than the rest – that’s all.
Thank you

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