The toxic tail in apocalyptic demography
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LSE
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To produce high quality analysis to inform public debate and development of future long-term care and pensions policy up to 2030 by:
• projecting the numbers, disability status, family circumstances, income, savings and care needs of older people
• assessing the affordability and distribution of costs and benefits of combined policy options for pensions and long-term care
• accounting for links between care needs and economic resources in later life

MAP2030 Programme Objectives

MAP2030 Research Teams
Mike Murphy, Mariachiara di Chesare (LSE)
Carol Jagger, James Lindesay, Ruth Matthews (Leicester)
Emily Grundy & Sanna Read (LSHTM)
Ruth Hancock & Marcello Morciano (UEA)
Raphael Wittenberg, Adelina Comas-Herrera, Linda Pickard, Derek King, Juliette Malley & Megan Challis (PSSRU)
Chris Curry, John Adams, Sean James (PPI)

Supporting partner
Department for Work and Pensions

MAP2030 Structure

Mortality trends & implications linkages

- Mortality trends and their implications (WP1)
- Changing family units & kinship structure (WP2)
- Future disease patterns & their implications for disability in later life (WP3)
- Projections of pensions, incomes, savings, care (paid & unpaid); expenditure on pensions & long-term care (WP4)
- Household & family resources (WP4)
MAP2030 Work package 1: Mortality trends and their implications

**Outputs:**
Forecasts & cross-national analyses of mortality trends using a range of recently-developed statistical methods as inputs to other Work Packages
Elucidate processes by which cohort effects may work through particular diseases by analysing the role of cause-specific mortality

**Why looking at life expectancy matters**

“Dependency time-bomb: Britain must urgently take steps to prepare for the seismic impact of a rapidly ageing population”
George Magnus (senior economic adviser for UBS investment bank)
The Guardian, Wednesday 4 February 2009

Longevity Risk and the Grim Reaper’s Toxic Tail: The Survivor Fan Charts
Centre for Risk & Insurance Studies enhancing the understanding of risk and insurance
David Blake, Kevin Dowd, and Andrew J. G. Cairns
CRIS Discussion Paper Series – 2007.VI

The Chartered Institute of Management Accountants
The Pensions Institute

**Apocalyptic demography?**
Putting longevity risk in perspective
...if the life expectancy for a male currently aged 60 is understated by two years...this could underestimate the value of his pension by around 5%
The Pensions Regulator, December 2007
Life Expectancy at Birth, Males, Europe Latest Year

Life expectancy at birth, in years, male

WHO HFA Database

<= 80
<= 78
<= 74
<= 66
<= 60
No data
Min = 50

Life expectancy at birth, in years, female

WHO HFA Database

<= 90
<= 82
<= 74
<= 66
<= 58
No data
Min = 50

Work package 1: Mortality trends and their implications

Distribution of deaths out of 100,000 births, Females GB 2002-4 & Japan 2004

Accuracy of Office for National Statistics mortality assumptions; actual and projected period life expectancy at birth, UK males, 1966-2031
Projections of population aged 85 & over in 2011, 2031 and 2041, alternative projection base years, England & Wales

Source: author's calculations

Observed mean absolute error for life expectancy at birth for men in 14 countries

Rico Keilman. UK national population projections in perspective: How successful compared to those in other European countries? Population Trends 129, Table 3

England & Wales standardised mortality rate annual smoothed improvement (%) 1960-2050 (2006-based principal projection)

Author's calculations based on WHO European Standard

The choices

“There is the possibility of lower incidences of cancer, heart disease and strokes through changes in lifestyle and medical advances. On the other hand some demographers believe that … a law of diminishing returns will apply to death rate reductions at advanced ages” (Office for National Statistics, 2008, National Population Projections 2006-based Series PP2 No 26, ed. Helen Bray, p. 33)

Main drivers of past mortality - and future also?

- Medical Advances
- Smoking trends
- Obesity
- Infectious diseases
- Uncertainty at young ages


The “Golden generations”

“Those born during the period 1923–1940 (and centred around 1931) have exhibited greater rates of improvement over the last 25 years than those born on either side. There is currently no evidence that these differentials are declining. Similar cohort effects seen in other countries suggest that these differentials may persist well into the oldest ages.” (1931 Cohort assumed to improve 1.5% p.a. more than underlying 1% value: PP2, 2008, p. 26)

Actual and assumed overall average annual rates of mortality improvement, England & Wales (Per cent)

<table>
<thead>
<tr>
<th>Series PP2 No 26 Table 7.3</th>
<th>Males</th>
<th>Females</th>
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<tr>
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</table>
**The role of obesity**

**Obesity**
- Increasing trend
- Potentially important in substantially reducing $e_0$

**But**
- Extrapolation of trends is over-simplified
- Magnitudes of estimated effects are inconsistent
- Major route of obesity -> mortality is CVD

**The first generation to live less than its parents?**

The Government Actuary’s Department currently predicts that life expectancy will rise in the next 50 years by around eight years for men and seven years for women .... the role of the increase in obesity will have surprisingly little impact (less than a year) on the life expectancy of the population  

**Figure 5.2: The full obesity system map**

**Reasons to expect mortality improvements to decline**

**Negative**
- cohort effect dies out
- smoking cessation ‘bonus’ disappears
- early life factors less relevant

**Positive**
- obesity
- lack of blockbuster drugs
- evolution
- ...
Reasons to expect mortality improvements to increase

**Negative**
- smoking effects among older people over-rated
- early life effects

**Positive**
- improvements in prevention and treatment
- empirical lack of limits

Main drivers of past mortality - and future also?

Medical Advances ... medical advances and progress in preventive medicine will continue to lead to further mortality decline.

Smoking trends ... lung cancer rates for men in the UK have peaked and are falling with the highest rates for the cohort of men born in the early 20th century.

Obesity ... increased obesity levels are likely to lead to increased future morbidity, it is less clear how future mortality will be affected.

Infectious diseases ... the threat from new infectious diseases and the re-emergence of old ones, such as tuberculosis, which may prove resistant to existing antibacterial agents.

Uncertainty at young ages Mortality rates in the 1980s and 1990s increased for young ages as deaths related to AIDS, drug and alcohol abuse and violence more than offset improvements in health-related causes of death at these ages.

In the absence of clear consensus on empirical balance of competing future effects, why not retain current patterns?

- Accelerating rates of improvement
- Cohort "effects" not proven
- More attention to whether cohorts are "pseudo-cohorts"
- Sensible to investigate implications of populations with higher rates of mortality improvement
Life expectancy at birth, alternative variants, UK

“Users of the projections can gain some insight by considering the high and low life expectancy variants ... intended to represent plausible alternative assumptions and are far from reflecting the extremes of thinking on future mortality.”


Variants: underlying rate of improvement

Principal  1%
High        2%
Very high   3%

All include cohort term (maximum 1.5% p.a. improvement over underlying value in 1931)

(*Own projection, others are taken from PP2 No. 26)

Life expectancy projections: US (2008) and UK (2006-based) variant values (years)

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<th>Value 2020</th>
<th>Value 2030</th>
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<tr>
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Females

14.3 10.9 7.4 3.9 79.2 UK (V. high)
11.4 9.1 6.6 3.6 78.9 UK (High)
8.4 7.2 5.7 3.3 78.7 UK (Principal)
5.2 4.3 3.0 1.3 75.7 US (Principal)

National variability: scope for improvement?

Life expectancy at birth with 95% confidence intervals for Scottish Index Multiple Deprivation 2006 Decile area, 2004-2006 (Males & Females)


International & national context

British mortality projections are among the most optimistic in the World for in the next 40 years or so

The differences in life expectancy between 2010 and 2050 even for the high variant are similar to that between values in the top and bottom deprivation deciles in Scotland
The first generation to live less than its parents?

“The life expectancy of some of today’s children will be years shorter than their parents’ if current trends of poor diet and lack of exercise continue, Yvette Cooper, the Public Health minister, will warn today.”

(Independent Thursday, 19 October 2000)

“The truth is that children born today could become part of the first generation in American history to live shorter lives than their parents...”

(Bill Clinton The Times May 10, 2005)


Are sustained high rates of mortality improvement possible?

S. Jay Olshansky and Bruce A. Carnes, Demographic Perspectives on Human Senescence Population and Development Review, 20(1):57-80 (1994), Figure 8

US female single-year-of-age death probabilities, observed and under assumption of 2% p.a. improvement, with period from which particular causes would be eliminated

What alternative methods of estimating life expectancy are available?

Thank you for your attention