Emerging mortality and longevity research

12 June 2012

Agenda

- Mortality research steering committee
- IAA mortality working group
- ONS
Mortality Research Steering Committee

• Set up in 2006
• A group of actuaries and professionals from other disciplines
• Aim to advance mortality research through interaction and collaboration
• Mortality is one strand of the profession’s thought leadership
• [http://www.actuaries.org.uk/research-and-resources/pages/mortality](http://www.actuaries.org.uk/research-and-resources/pages/mortality)

Mortality Research Steering Committee

• Current members:
  – James Orr (FSA, chair)
  – Carol Jagger (Professor of Epidemiology of Ageing, Newcastle)
  – Madhavi Bajekal (Senior research fellow, UCL)
  – Myer Glickman (Office for National Statistics)
  – Brian Ridsdale (UK representative on IAA Mortality taskforce)
  – Angus McDonald (Heriot Watt)
  – Adrian Gallop (GAD)
  – Trevor Watkins (Head of learning, FloA)
  – Sally Grover (Librarian and Information services manager)
MRSC Initiatives

- An initial scoping study – presented in March 2008
- Sessional meetings
  - The impact of medical advances and lifestyle on mortality
  - Scoping mortality research
- Multidisciplinary conferences on mortality and longevity in October 2009 and September 2011
- A call for research proposals in 2010 in the area of mortality and longevity

MRSC – Call for Research

- 3 successful bidders:
  - Southampton University and Barnett Waddingham: Bayesian modelling of mortality projection uncertainty
  - Heriot-Watt University: Mortality models for multiple populations using covariates
  - King’s College London: Genetic risk profiling for common diseases
- These projects are now ending and the results will be presented later this year
Southampton University and Barnett Waddingham: Bayesian modelling of mortality projection uncertainty

- Main objective is to develop a statistical approach to quantifying mortality projection uncertainty
- Incorporates model uncertainty (i.e., model independent)
- Improved management of longevity risk
- Improved pricing and assessment of longevity risk transactions
- Greater understanding of and confidence in quantification of the tail of longevity risk

Heriot-Watt University: Mortality models for multiple populations using covariates

- Many mortality models are for whole populations or cohorts, not individuals
- Usually depend on age, gender, period of observation and birth cohort
- Life expectancies of individuals affected by life style and other socio-economic factors
- Produce model based on smoking prevalence – could extend to other covariates
- First results on link between national smoking prevalence and mortality rates presented at Emerging trends in mortality and Longevity symposium in 2011 and to be published in BAJ
Heriot-Watt University: Mortality models for multiple populations using covariates

- Currently working on two papers
  - One focusing on different aspects of link between mortality and smoking including different assumptions about relationship between smokers and non-smokers mortality and country-specific effect on mortality rates not explained by smoking prevalence
  - Second paper studies a model linking mortality and smoking prevalence for UK and how much this explains cohort effects in UK mortality. This suggests that including smoking prevalence has a statistically significant impact on model fitting but there are also significant residual cohort effects

King’s College London: Genetic risk profiling for common diseases

- Use knowledge of environmental and genetic factors that contribute to disease risk
- Develop statistical methods and software tools to integrate different sources of risk, provide statistical assessment of combined risk and allow interpretation of the risk conferred
- Produced an R package which calculates risks conferred by genetic factors and multilevel environment factors
- Allows user to input parameter estimates from different studies
- Assumes all genetic and environment risk factors are independent
- Performed at a population level
- Option to analyse individual level data
- Calculates confidence intervals for risk estimates
- Classifies population into different risk categories based on significant differences from baseline average population member
King’s College London: Genetic risk profiling for common diseases

• The first paper will be published in the European Journal of Human Genetics shortly
• A paper describing the methodology in detail and applying the methods to a range of disorders is in preparation

Longevity bulletin

• Published every 6 months
• Provides an overview of research into longevity trends
• Presents and explains actuarial perspectives on population longevity
• Looks beyond the actuarial world for statistics, research and the latest thinking on related subjects
• Third bulletin recently published
• Discusses variation in longevity
• Reviews research into the “golden cohort”, compression of morbidity among supercentenarians, the gap between male and female mortality and the latest ONS population projections for the UK
• The next bulletin will appear in November 2012
MRSC - Future events

• Currently considering next steps
• Presentation in Autumn 2012 on research sponsored by the actuarial profession
• Series of short events over next two years on topics such as dementia, social demographics, frailty and resource limitations
• A further residential conference (probably 2014)
• Possible follow up review paper building on original scoping document

IAA – Mortality Working group

• To monitor data collection efforts internationally and to facilitate continuous improvement in the quality and extent of data collection.
• To coordinate the work done by different Sections and Committees of the IAA in the area of mortality, especially when this involves cooperation with other international bodies.
• To extend the body of knowledge of the international actuarial community in respect of mortality through:
  – research, and the encouragement of actuarial research;
  – partnering with Full Member Associations to assist actuaries in various countries conduct and publish experience studies;
  – collection of research from both actuarial and non-actuarial sources;
  – making research accessible to actuaries globally;
  – presentations and papers at professional seminars, colloquia, conferences etc.; and
  – encouragement and co-ordination with other actuaries to produce presentations and papers at professional seminars, colloquia, conferences etc.
IAA – Mortality Working group

Information Base – work in progress
• Overview
• Sources of mortality data worldwide
• Society of Actuaries’ International Mortality Experience Study
• Mortality trends and uncertainty
• Pandemics
• Social and demographic stratification
• Mortality by cause of death

IAA – Mortality Working group

• Projection techniques
• Mortality of disabled people
• Mortality-related financial products
• Underwriting
• Mortality assumptions used in pensions and annuity reserving
• Health longevity
• Other sources of information
Website: www.actuaries.org/mortalityinfo
ONS – National population projections

- 2010-based published Oct 2010
- Long-term rate of mortality improvement from 2035
  - 1.2% pa for all ages
  - Higher for those born 1925 – 1938 (up to 2.5% pa)
  - Same long-term rates for males and females

Cohort life expectancy at age 65
UK 2010-based population projections

<table>
<thead>
<tr>
<th>Year</th>
<th>2012</th>
<th>2022</th>
<th>2032</th>
<th>2042</th>
<th>2052</th>
</tr>
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<tbody>
<tr>
<td>Males</td>
<td>21.3</td>
<td>22.5</td>
<td>23.7</td>
<td>24.8</td>
<td>26.0</td>
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<tr>
<td>Females</td>
<td>23.9</td>
<td>25.1</td>
<td>26.2</td>
<td>27.3</td>
<td>28.5</td>
</tr>
</tbody>
</table>

Source: ONS
For men aged 25-64, there was a mostly steady decrease in mortality rates between 2001 and 2010 for each class.

For women aged 25-59, there was a decrease in mortality rates between 2001 and 2010 for most classes.

Over the period 2001–2010, the actual difference in mortality rates between the least and most advantaged classes declined, but the ratio increased for both sexes.

The average annual decrease in male mortality rates for the 'Routine' class was more than double that of the 'Higher managerial and professional' class.

The average annual decrease in female mortality rates for the 'Routine' class was double that of the 'Higher managerial and professional' class.
Census – Provisional analyses plan

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Proposed publication date</th>
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<tbody>
<tr>
<td>Rebasings health and life expectancy time series following revisions to past mid-year estimates</td>
<td>Early 2015</td>
</tr>
<tr>
<td>Inequalities in mortality by ethnic group</td>
<td>Early 2015</td>
</tr>
<tr>
<td>Analysis of social inequalities in all-cause and cause-specific mortality of adults aged 20-64 by sex and NS-SEC 2010-12</td>
<td>Mid 2015</td>
</tr>
<tr>
<td>Multi source topic report including mortality analyses and survey-based analysis of lifestyle and behavioural determinants of health</td>
<td>Late 2015</td>
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Some areas of current mortality research

- Analysis of mortality by socio-demographic factors
    Sessional meeting Sept 2012, London
- Use of covariates in mortality forecasting
  - The future of death in America *Soneji & King*
- Modal age at death and variability
  - Changes in the age-at-death distribution in four low mortality countries *Ouellette & Bourbeau*
- Healthy and disability free life expectancy
  - Inequality in DFLE by area deprivation: England 2002-2009 *ONS*
Questions or comments?

Expressions of individual views by members of The Actuarial Profession and its staff are encouraged.
The views expressed in this presentation are those of the presenter.