

The Actuarial Profession
making financial sense of the future

Mortality & Longevity Seminar
Adrian Gallop



Emerging mortality and longevity research

12 June 2012

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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>

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

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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

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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 (ie is 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

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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

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

- Currently working on two papers
 - One focussing 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

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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

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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

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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

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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

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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

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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

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

Year	2012	2022	2032	2042	2052
Males	21.3	22.5	23.7	24.8	26.0
Females	23.9	25.1	26.2	27.3	28.5

Source: ONS

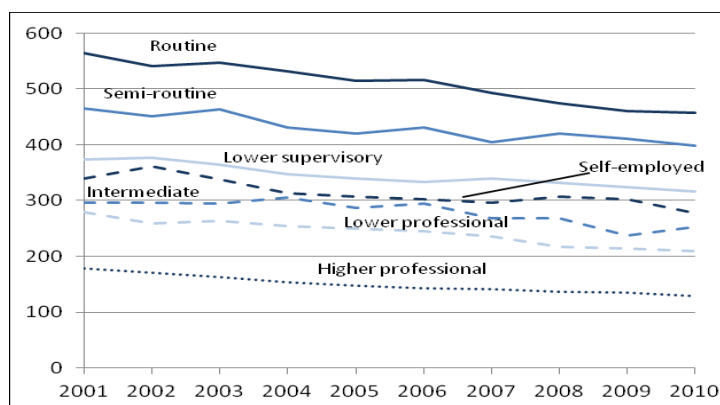
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Intercensal mortality rates by NS-SEC, 2001-10

Age-standardised mortality rates by NS-SEC for 2001-2010, men aged 25-64,
England and Wales

Rate per 1000,000 person years



Source: ONS

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Intercensal mortality rates by NS-SEC, 2001-10

- 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

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Census – Provisional analyses plan

Analysis	Proposed publication date
Rebasing health and life expectancy time series following revisions to past mid-year estimates	Early 2015
Inequalities in mortality by ethnic group	Early 2015
Analysis of social inequalities in all-cause and cause-specific mortality of adults aged 20-64 by sex and NS-SEC 2010-12	Mid 2015
Multi source topic report including mortality analyses and survey-based analysis of lifestyle and behavioural determinants of health	Late 2015

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Some areas of current mortality research

- Analysis of mortality by socio-demographic factors
 - Mortality improvement by Socio-economic circumstances in England (1982 to 2006) *Lu, Wong & Bajekal*
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*

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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.

