Institute and Faculty of Actuaries

Mortality Research Steering Committee

Hot topics in longevity & mortality research

Joseph Lu
Chair of MRSC

February 2016

Institute and Faculty of Actuaries

Agenda

MRSC
Research Focus
MRSC Programme

February 2016

Mortality Research Steering Committee

Members	Diverse background and network
Joseph Lu (Chair)	Actuary in life insurance
Madhavi Bajekal	Principal Researcher on socio-economic differences in morbidity and mortality
Matthew Edwards	Actuary in consultancy
Adrian Gallop	Actuary at the Government Actuary's Department and Office for National Statistics
Carol Jagger	Professor and expert in healthy ageing
Tony Jeffrey	Actuary at the Bank of England, IFoA Life Board
Jamie Marshall	Actuary in health insurance, IFoA Health and Care Board
Brian Ridsdale	Chair of IAA Mortality Group
Philip Simpson	Actuary in consultancy, RTLC member

Supported by IFoA executive staff:

Sarah Mathieson, Head of Research and Knowledge

Lorraine Atherton, Research & Knowledge Assistant, Kay Henderson, Research Programme Manager

Ivo Holanec, Research Project Manager, Aili Pello, Event Manager

Institute and Faculty of Actuaries

Purpose of MRSC on behalf of IFoA

On issues related to longevity, morbidity and mortality:

- Champion Thought Leadership
- Support and report into Research and Thought Leadership Committee (RTLC)
- Provide cross-disciplinary forum to raise and resolve issues and disseminate knowledge

Approach

- Assist RTLC in identifying gaps in research to
  - Fund academic-industry R&D consortia through competitive application
  - Advance R&D, adding to the current voluntary working party basis
- Publish Longevity Bulletin to highlight research hot topics
- Run conferences for leading experts to meet up, learn and discuss

Hot topics for research focus

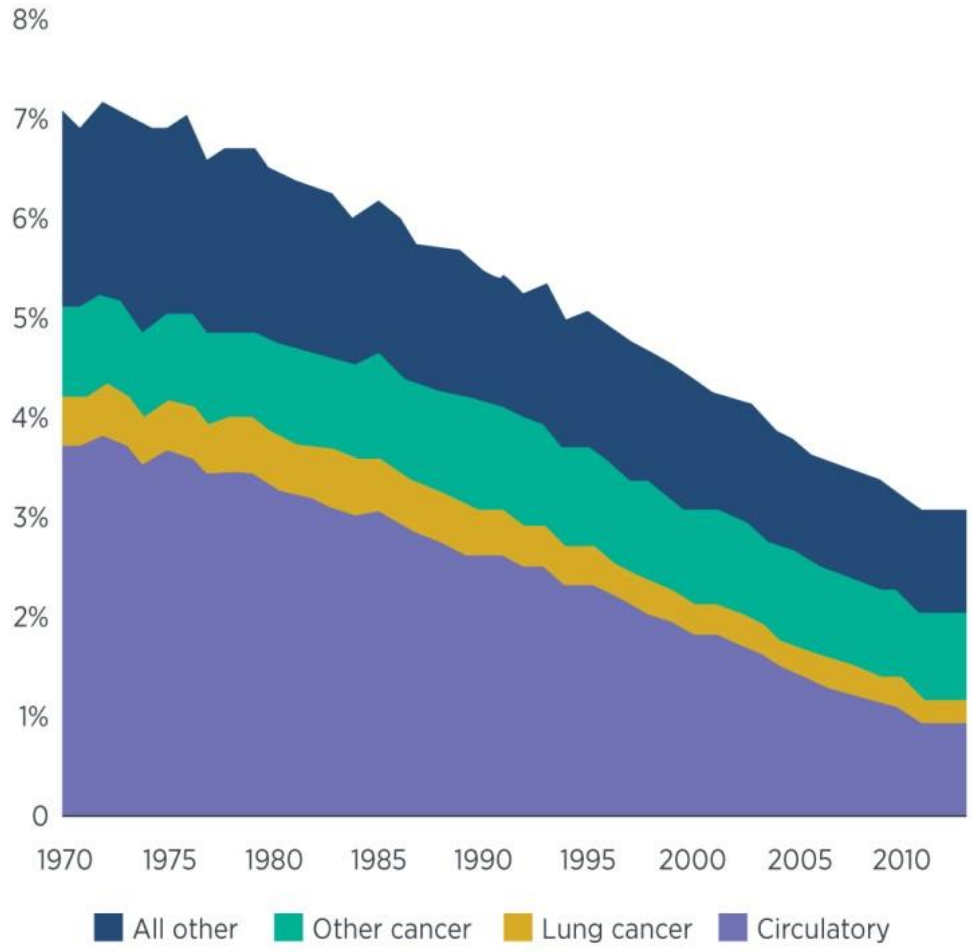
1. How will population longevity develop in the future in your defined countries or internationally?
2. New evidence or analyses of historical morbidity and mortality patterns.
3. What would disrupt current mortality trends?
4. How will Big Data contribute to understanding population health behaviours, trajectory and patterns; improving mortality analyses and forecasting?
5. New techniques for mortality and longevity analyses and forecasting.
6. Implication of mortality and morbidity trends for commercial, retirement and policy decisions.

How will population longevity develop in the future?

- Consider projection of future trends, learning from wider fields including statistics, medical sciences, epidemiology and demography.
- Consider differences in mortality rate and mortality improvement rates in sub-populations such as gender, socio-economic status and health.
- Consider causal processes of morbidity or mortality trends. Examples would include changes in health drivers, resources and environment.

Longevity Bulletin Highlights

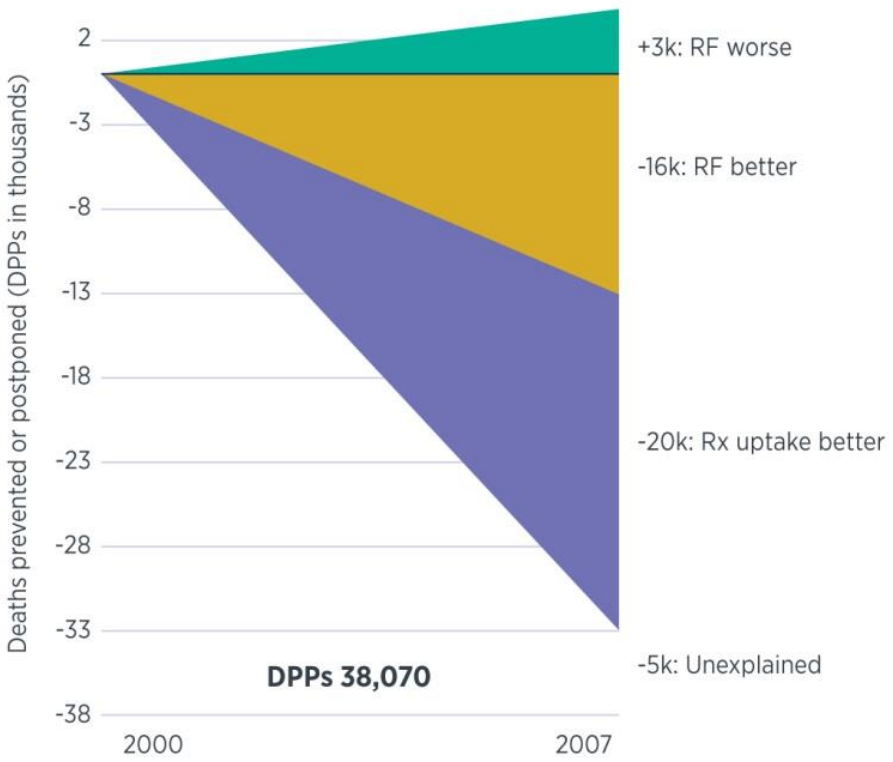
Age standardised mortality rate for ages 60-89, males in England & Wales, by cause of death group, 1970-2013.



Richard Willets, Longevity Bulletin 7
https://www.actuaries.org.uk/learn-and-develop/research-and-knowledge/our-journals-and-research-publications/longevity-bulletin

Longevity Bulletin Highlights

Contribution of risk factors and treatments to CHD deaths prevented in 2007, England



Risk Factors worse (increases)	**+ 9%**
BMI	+ 2%
Diabetes	+ 7%
Risk Factors better (falls)	**- 43%**
Smoking	- 3%
Cholesterol	- 5%
Blood pressure	- 29%
Physical inactivity	- 1%
More Fruit & Veg	- 5%
Treatments uptake better	**- 52%**
Heart Attack (hospital)	- 1%
2' post AMI & revasularisation	-11%
Stable Angina	- 13%
Heart failure	- 9%
Hypertension Rx	- 4%
Lipid lowering (statins)	- 14%
Unexplained	**14%**

Abbrevations: AMI = acute myocardial infarction (heart attack); BMI = body mass index;
Rx= Treatment; 2' = secondary prevention by drugs prescribed by GPs to prevent recurrence of heart attack

For references see:
Madhavi Bajekal, Longevity Bulletin 7
https://www.actuaries.org.uk/learn-and-develop/research-and-knowledge/our-journals-and-research-publications/longevity-bulletin

Longevity Bulletin Highlights

Biology of ageing

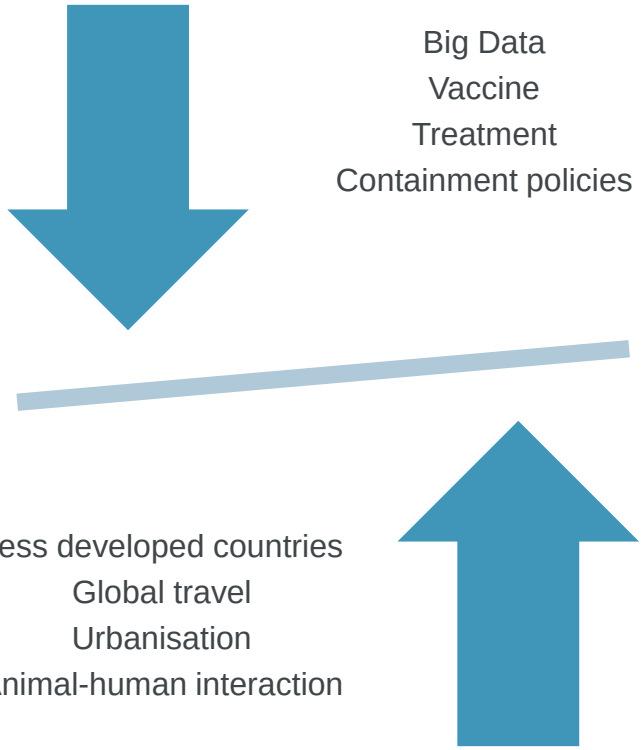
- As a ‘natural process’ ageing has historically not been recognised in law as a treatable condition (i.e. a ‘disease’), impeding the design of clinical trials which seek to extend health span.
- However a new clinical trial design is now being considered by the US Food and Drug Administration (FDA) the Targeting Ageing with Metformin (TAME) protocol.
- TAME proposes to look at duration from any of a range of initial pathologies to any second pathology.
- A compound which improves health span would be predicted to lengthen the time taken to develop a second pathology, keeping subjects healthier for longer.
- **Implication: Ageing may be a drug target, opening a flood gate of funding for drug development and R&D.**
- **Advancement in biology of ageing may be used for scenario testing for longevity risk management.**

Extrapolative & Explanatory Models

- Extrapolative Models
  - More well-known among actuaries and demographers
  - Fit historical data to project future trends
  - Allows for uncertainty
- Explanatory Models
  - Link risk factors and treatments to mortality rates of different causes of death have been used in medicine for various reasons.
  - Potential to be adopted for actuarial work for scenario testing.
  - Random events could be modelled.

Longevity Bulletin Highlights

Pandemic Risk



Anti-microbial resistance

- CMO Sally Davies to introduce
- Origins of anti-microbial resistance
- Impact on longevity assumptions
- Clinical and economic impact
- New drugs and alternatives
- Discussion
  - Staple Inn on 24 May
  - Round table on 19 May with *The British Society for Antimicrobial Chemotherapy*

http://bsac.org.uk/wp-content/uploads/2015/09/RoundtableSeries-2016-ProgrammeTwo1.pdf

Human Mortality Database (HMD) & MRSC

Goal of the HMD:

- To provide detailed mortality and population data free of charge to all persons interested in the history of human longevity
- Users of HMD data:

  Researchers, students

  Journalists

  Policy analysts

  Business world (market research, actuaries)

Publications - at the end of 2014, there were at least

- over 1,000 journal articles
- 142 books or book chapters
- 58 dissertations or theses
- 38 official reports or statistical compilations
- 300 technical reports and scientific working papers citing the HMD as a data source
- over the past 9 months: + 800 journal articles

HMD Development and Funding

Development – 2 teams of researchers:

- Max Plank Institute for Demographic Research (in Rostock, Germany) led by Vladimir Shkolnikov, Director
- UC Berkeley (Dept of Demography) led by Magali Barbieri, Associate Director (previously John Wilmoth, Founding Director)

Funding - National Institute on Aging, Center on the Economics and Demography of Aging (CEDA - Berkeley), Max Planck Society (via MPIDR - Rostock), French Institute of Demographic Studies (INED - Paris) and soon the Society of Actuaries

What is in the HMD?

Detailed historical data and supporting documentation for 38 national populations:

- Death counts and estimated population exposures (person-years lived) at the finest detail possible
- Original estimates of age-specific death rates and life tables in various formats (age x time)

Computed using various forms of input data:

- Death counts from national statistical offices
- Census counts
- Birth counts
- Official population estimates

International Longevity Mortality Symposium: 7-9 Sept 2016, Royal Holloway, near London

	Plenary
New Evidence	**How do you know if you're ageing faster than others?** •Scientific evidence that we age at different pace •Big Data opportunity to better understand the pace of ageing •Opportunities for the insurance sector **Longevity and health – can we have both?** •Developments in trends in healthy life expectancy •Implications for health and care providers
Disruption	**Can we live forever?** •Current key developments in biology of ageing •Current key developments in the intervention of the ageing process •Implications for population morbidity, mortality and longevity

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	Plenary
Big Data	**Public and Private Big Data for Actuarial Work** • How publicly held data can help tackle unprecedented challenges posed by the UK's ageing population. • How private data and the internet of things can change analyses and trends of morbidity, mortality and longevity.
New Techniques	**Causal Models for Longevity** •Data and analyses to understand relationships between medical information and mortality. •Case study to show features of causal models. •The use of causal models
Implication	**Economic and investment issues** •How economy affects longevity? •How would longevity or ageing population affect the UK economy? •How would longevity or ageing population affect the UK's health and social care cost? •Watch out for these emerging global demographic trends **Fiscal issues: Future of Retirement Income**

International Longevity Mortality Symposium:

	Plenary
New Evidence	How do you know if you're ageing faster than others? ***Jay Olshansky*** *Professor, University of Illinois at Chicago. Chief Scientist, Lapetus Solutions.* Longevity and health – can we have both? ***Carol Jagger*** *AXA Professor of Epidemiology of Ageing, Newcastle University*
Disruption	Can we live forever? ***Tom Kirkwood, CBE*** *Professor & Associate Dean for Ageing, Newcastle University*
Big Data	Public and Private Big Data for Actuarial Work ***Dame Karen Dunnell,*** *Chair of Longevity Science Panel* ***Daniel Ryan****, Head of R&D: Life & Health & Big Data, Swiss Re*
New Techniques	Causal Models for Longevity ***Matthew Edwards****, Senior Consultant, Willis Towers Watson* ***Joseph Lu****, Longevity Science Director, Legal & General* ***Chris Martin****, Clinical Modelling Consultant, Legal & General*
Implication	Fiscal issues: Future of Retirement Income ***Paul Johnson****, Director of Institute for Fiscal Studies* Economic and investment issues ***Amlan Roy****, MD and R&D Head, Credit Suisse*

Longevity in the 21st Century

Need to keep up with development

- 2004 paper was popular and set out research topics for the next decade
- But we must meet new needs:
  - International Pension Risk Transfer
  - Post-Budget in the UK
  - Regulatory changes
  - Fast pace of new research output

Discuss MRSC thoughts for IFoA thought leadership

- Web-based short review articles
- Possible headings
  - UK & international evidence
  - Future longevity drivers
  - Threat
  - Projecting the future
  - Implications
- Authors
  - Invited
  - Volunteer

Longevity in the 21st Century: Vote

Go or no-go?

- Web-based in principle
- Full paper, e.g. for BAJ
- Go ahead, but other format
- No-go

Will you be involved?

- Yes please
- No thanks
- I'll think about it