IAA Mortality Working Group – An overview

Martin Stevenson

Chairman,
IAA Mortality Working Group

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The Need

- Social Security
- Health care – public and private
- Pension funds – defined benefit and defined contribution
- Life insurers
- Financial products
- Work place practices
- Industries and infrastructures

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The Vision

Whenever insights are required in respect of mortality and trends in mortality, the body of knowledge produced by the IAA Mortality Working Group is sought for its valued and authoritative coverage.

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Terms of Reference

- 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;
  - encouraging actuarial research;
  - 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
  - encouraging and co-ordinating other actuaries to produce presentations and papers at professional seminars, colloquia, conferences etc.

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Areas of Investigation

- Collection of global mortality tables
- Mortality trends
- Pandemics
- Uncertainty
- Social and demographic stratification

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Areas of Investigation (cont'd)

- Analysis by cause of death
- Graduation techniques
- Data availability
- Mortality related financial products
- Society of Actuaries International Experience Study

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Collection of global data bases

- SOA Table Manager
- Human Mortality Data Base (HMD)
- Continuous Mortality Investigation (CMI) Library
- World Health Organisation

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SoA Table Manager

Description	• Some documentation
	• Ultimate or select
	• Subdivision by country and type
Strengths	• Free
	• Accessible
	• Uniform format
Weakness	• Infrequent updating
	• Does not utilise latest technologies

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Human Mortality Data Base

Description	• Population mortality for 37 countries
	• Information provided: Number of births, number of deaths, population size, qx, life tables, life expectancy at birth
	• Considerable background information also provided
Strengths	• Very detailed data control
	• Comprehensive information provided
	• High quality
Weakness	• Relatively limited range of countries
	• Any weaknesses of official statistics are duplicated

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Continuous Mortality Investigation (CMI) Library

Description	• Assured lives, annuitants, pensioners, income protection
	• Life offices and self-administered pension schemes
	• Mortality and monetary functions
	• Flexibility according to users' requirements
	• Base rates and projections
Strengths	• Very comprehensive set of tables and projection
	• Continuous process of improvement and innovation
	• Readily tailored to users' needs
Weakness	• UK centric

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World Health Organisation

Description	• Mortality statistics derived from annual reported deaths in civil registration systems
	• Sub-divided by cause of death
Strengths	• Wide range of countries covered
	• Information provided on cause of death
Weakness	• High variability in quality of data
	• Many countries with no data available

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Two approaches to mortality projections

- Spread Adjusted International Trend (SAINT) – Use of multiple geographies to eliminate “noise” in past short term mortality levels and trends of a single country
- Distinguish between short term trend and long term trend and combine both in the model. Long term effects can include expert opinion about future life expectancy.

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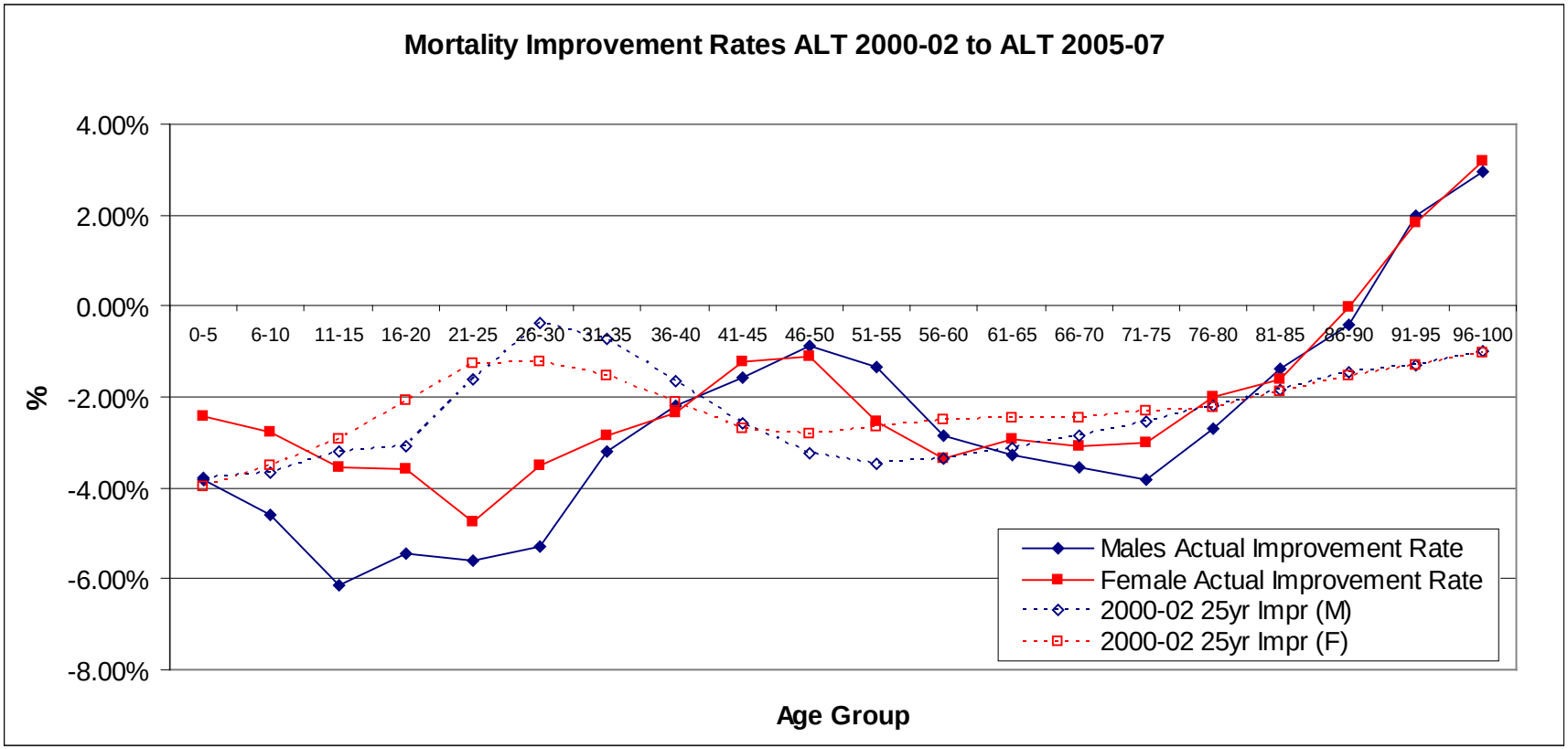
Comparison of ALT 2000-2002 with ALT 2005-2007

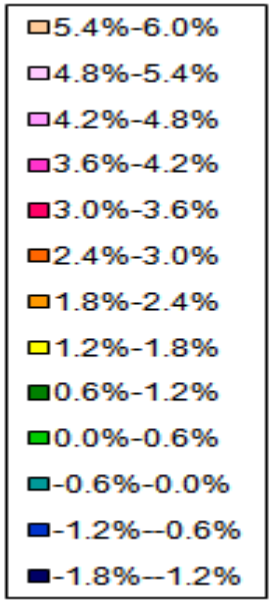


Cohort population models

- Source Tony Leandro Barnett Waddington LLP

Caveat: Some data limitations – the following is about the techniques more than the results

Heat maps used to illustrate the cohort effect



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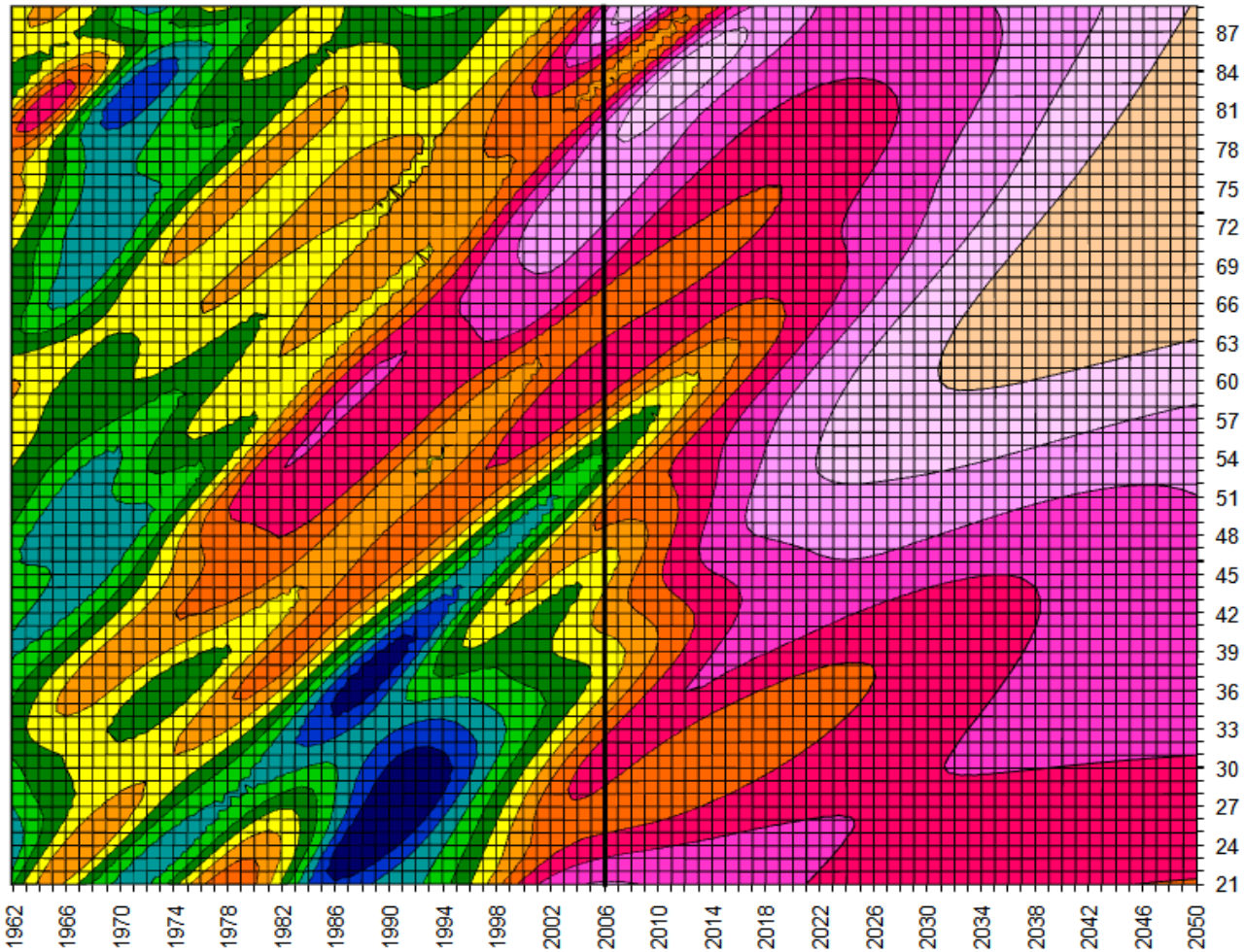
P-spline – UK population (ONS) – Projection from 2006



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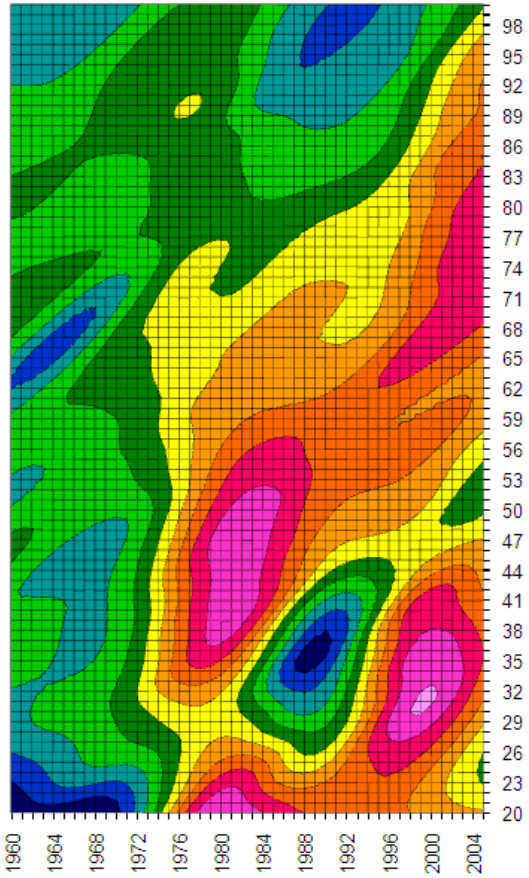
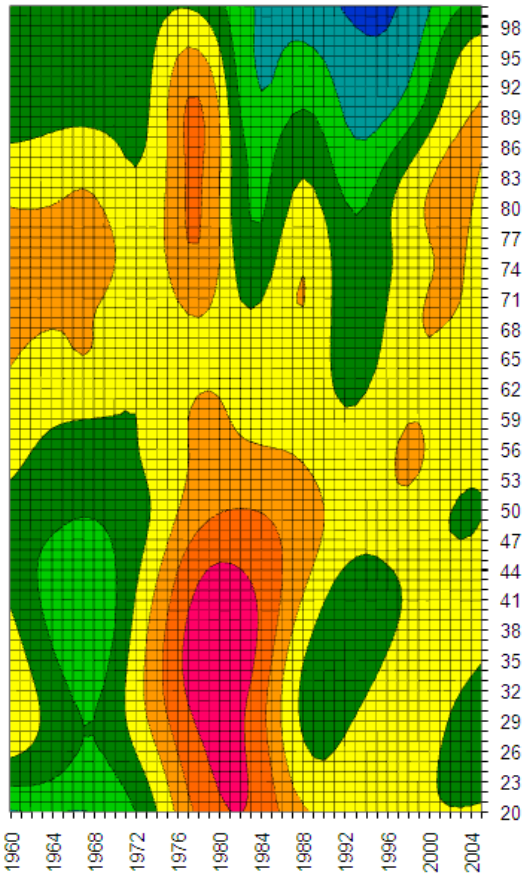
Canada, p-spline fitting

Males



Females



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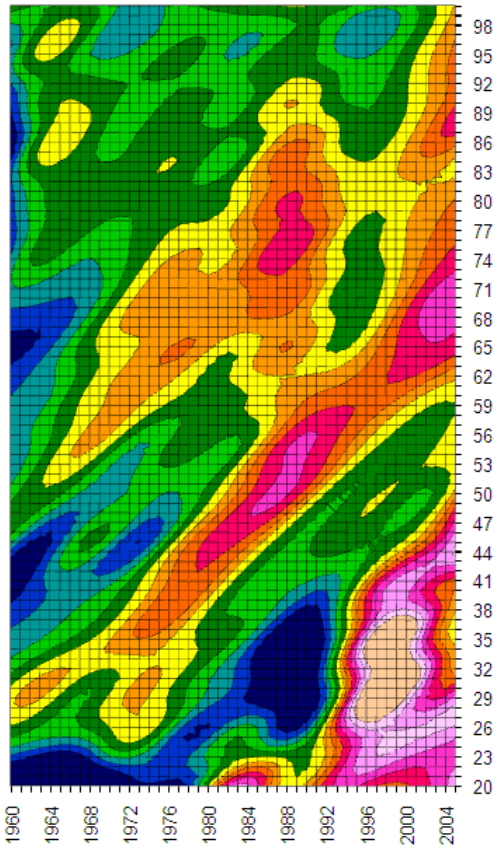
France, p-spline fitting

Males



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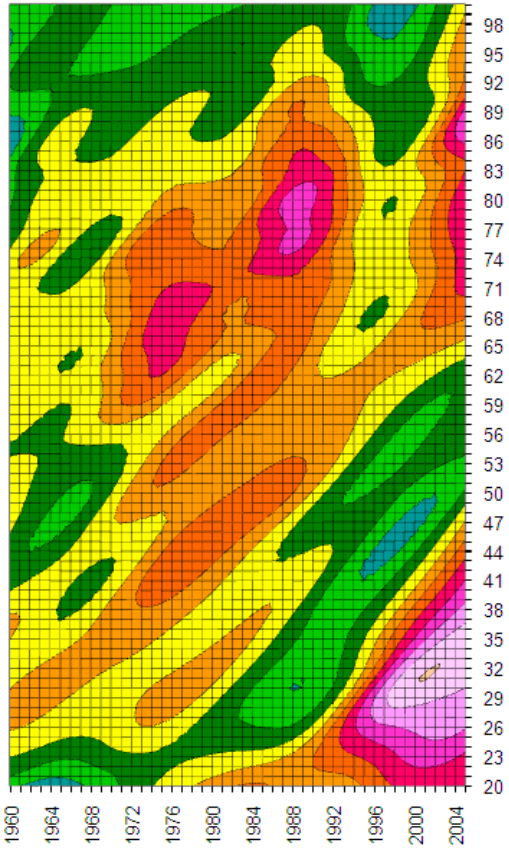

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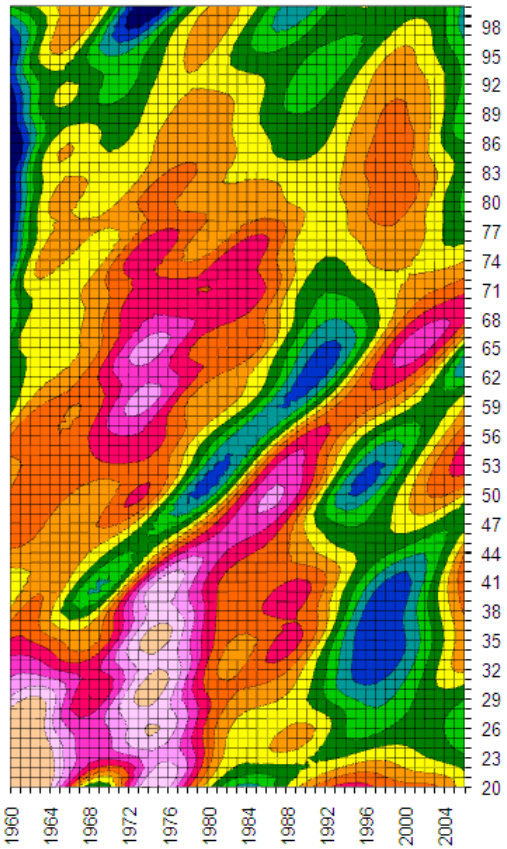
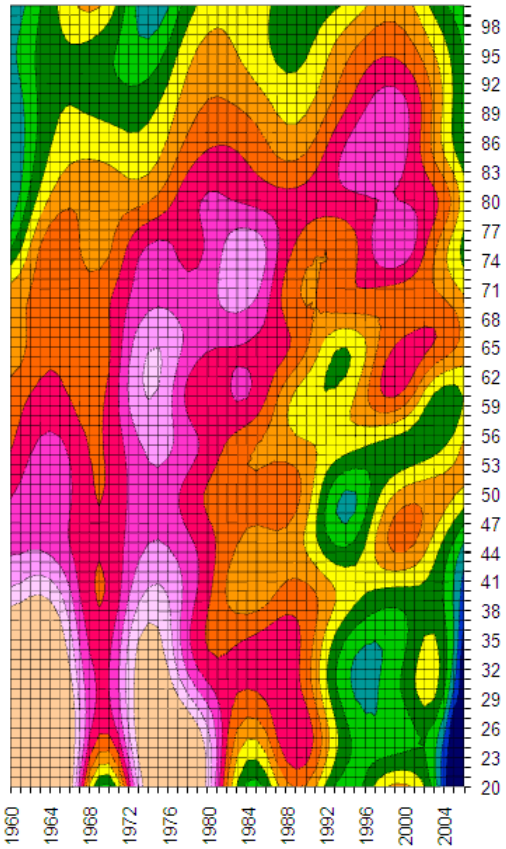
Japan, p-spline fitting

Males



Females



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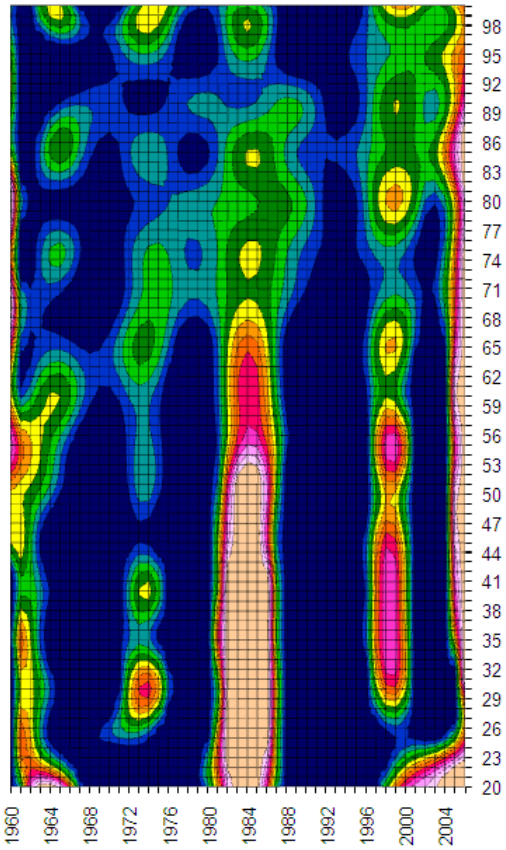
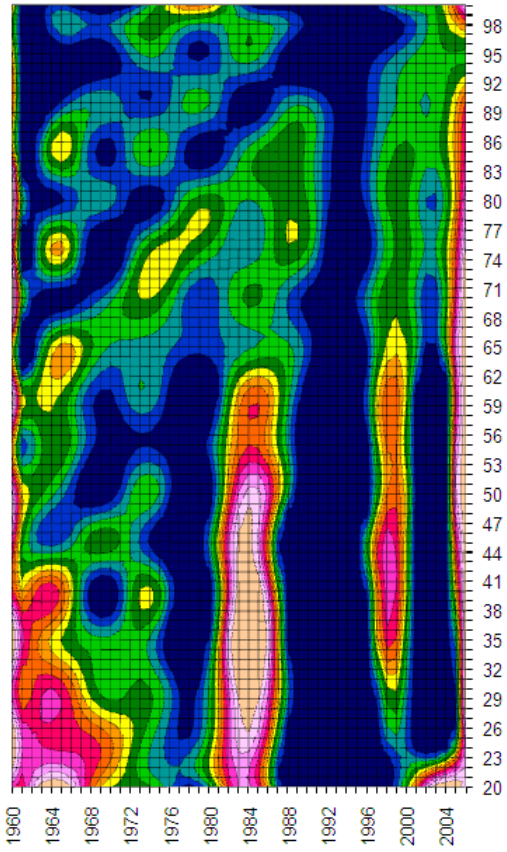
Russia, p-spline fitting

Males



Females



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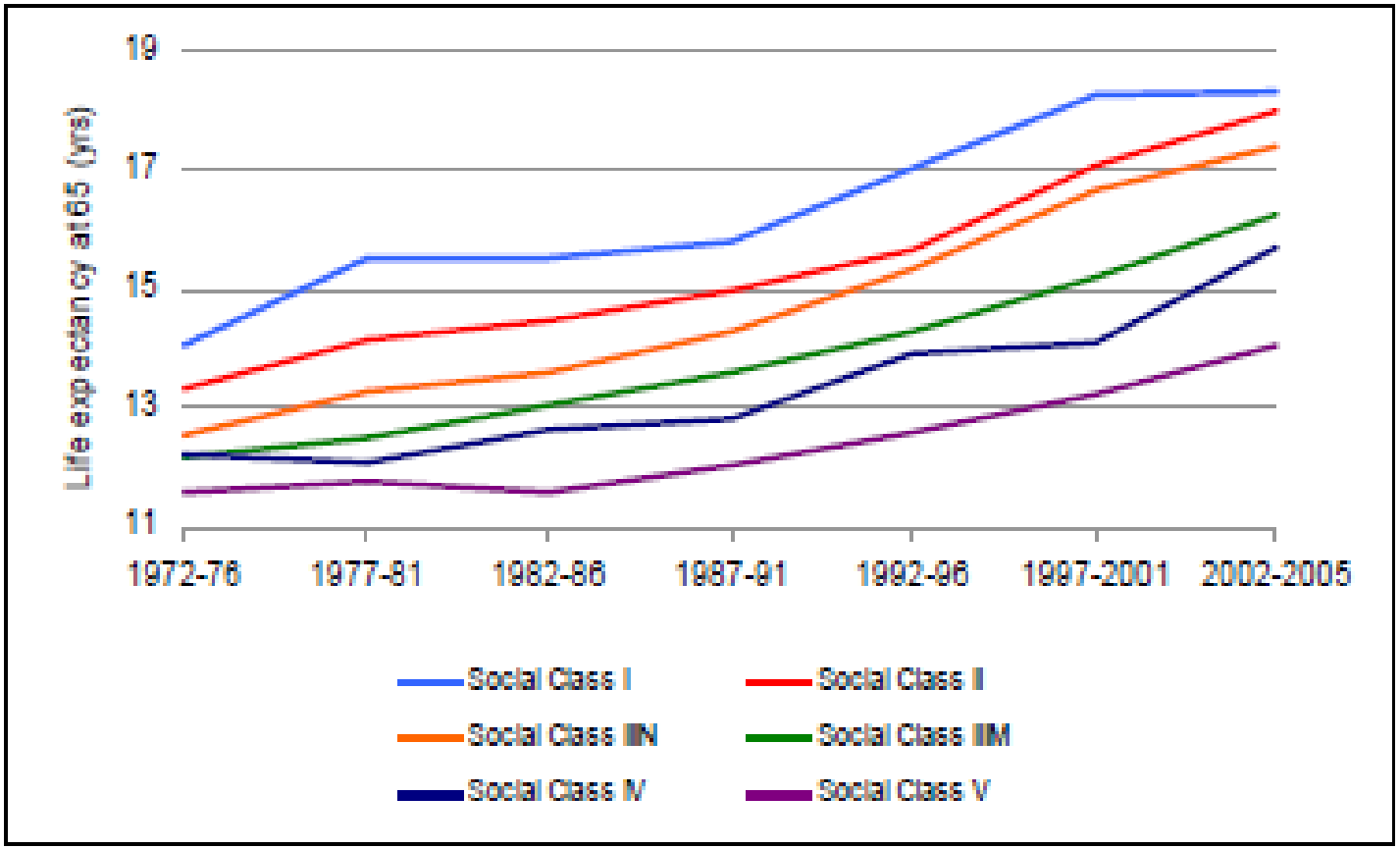
Social and demographic stratification

Trends in male period life expectancy at age, 1972-2005, England and Wales



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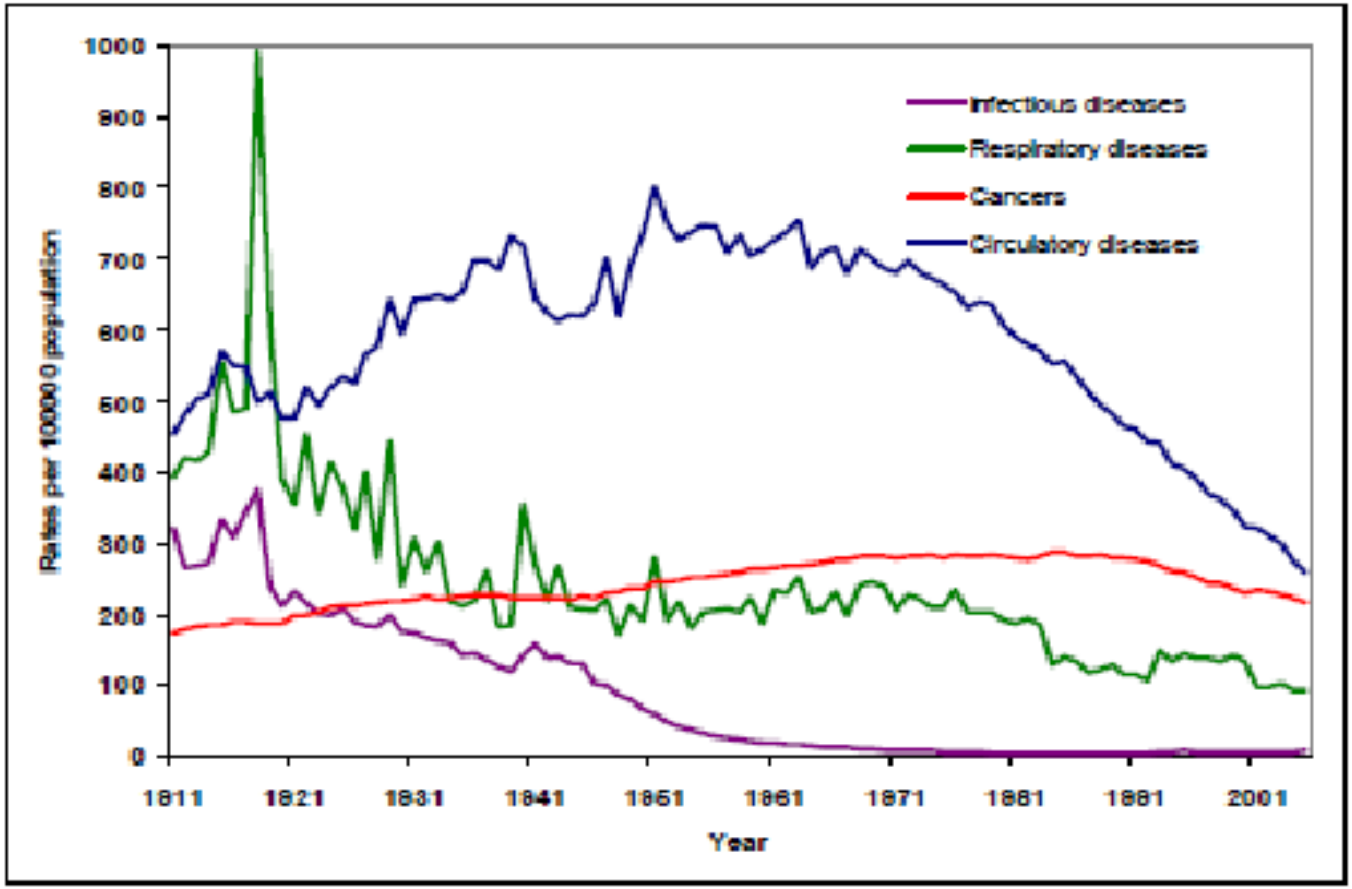
Mortality by cause of death

Overall mortality by major cause for males – England and Wales, 1911-2005 age-standardised



Source: BAS based on ONS figures

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SoA International Experience Analysis

- Assists developing countries to produce credible actuarial experience
- The SoA and the country actuaries jointly share responsibilities to successfully complete a mortality and persistency study of life insurance experience
- Also applicable to Social Security mortality studies
- No charge provided permission for combined results to be published.

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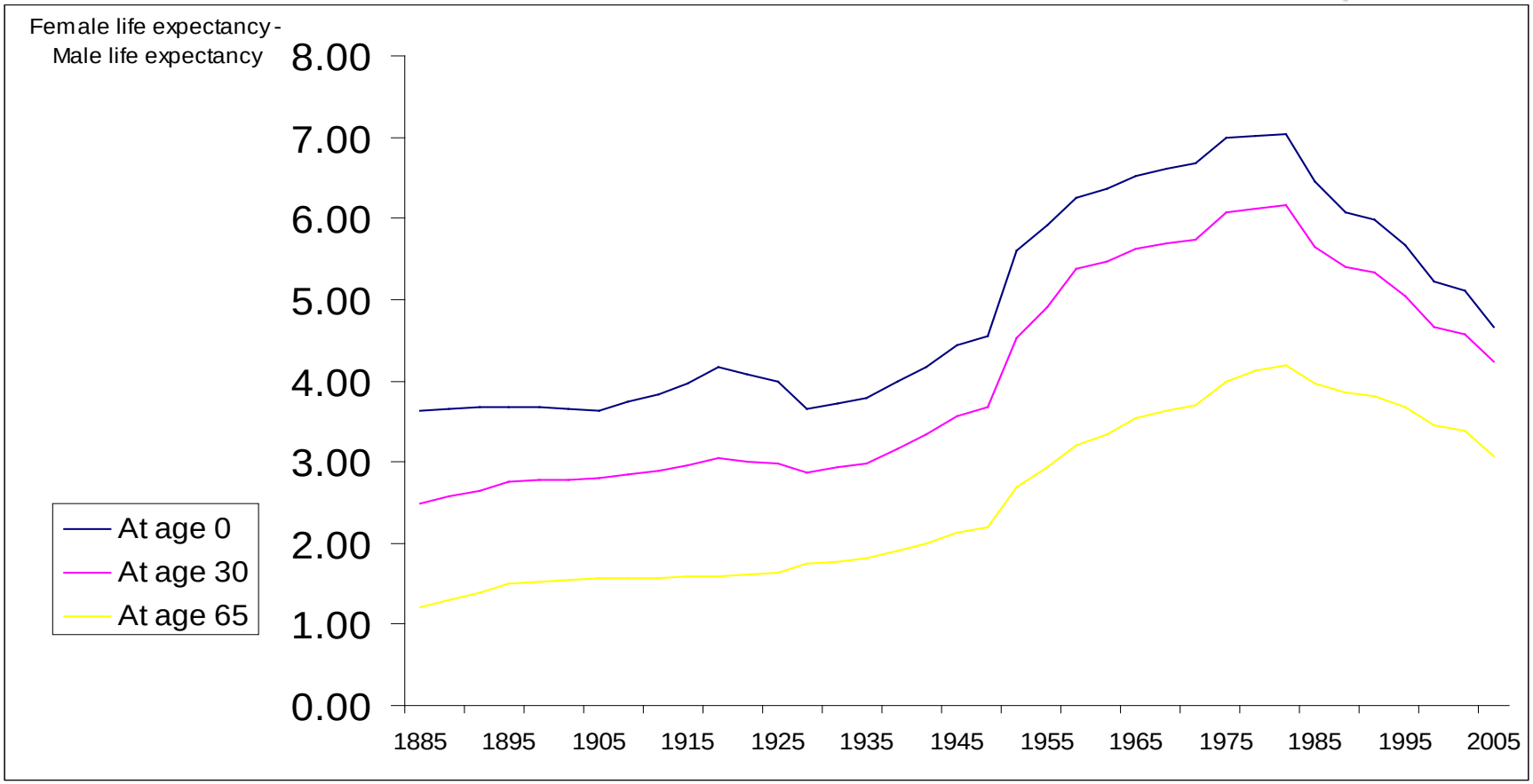
Pandemics

- What is a pandemic?
- Pandemics of the past
- Present day pandemics and the role of WHO
- Implications of pandemics for insurance business
- Influenza A (HINI)

Gender differences

Figure 8: Gender differentials in life expectancy at selected ages



Source: Australian Life Tables 2005-2007
Australian Government Actuary

Gender difference in animal mortality

(Presentation by Erik Alm, General Manager
Hannover Life Re Sweden)

Animal category	Females mortality/male mortality
Apes	66%
Small primates	109%
Carnivores	95%
Hoofstock	62%
Kangaroos	67%
Crocodiles	61%
Ratites (Emu, Rhea)	125%
Raptors (Eagle etc)	95%

Reasons for gender differences

- Men's behaviour is more risky
- Immune system weakened by level of testosterone
- Men are larger – uses up the metabolic system more quickly
- Men have only one X-chromosome
  - Y is much smaller than X
    - Females have reserve capacity in the extra X chromosome
  - Male birds have two chromosomes of the same type (Z-chromosomes)
    - Female birds have two different chromosomes (WZ)
    - Compares the Ratites

The membership

Chairperson	Martin Alexander Stevenson
Co-Vice-Chairpersons	William R Horbatt H.W.M. Van Broekhoven
Members	Erik T Alm (Svenska Aktuarieföreningen) John Stephen Armstrong (Society of Actuaries in Ireland) Chresten Dengsoe (Den Danske Aktuarforening) Paul Lewis (Actuarial Society of South Africa) Mika Mäkinen (Suomen Aktuaariyhdistys) Ksenia Orekhova (Russian Guild of Actuaries) Thierry Poincelin (Institut des Actuaires) Brian Philip Ridsdale (Faculty of Actuaries) Yoshihiro Takahashi (Institute of Actuaries of Japan) Marc Tardif (Canadian Institute of Actuaries) Thomas S Terry (Conference of Consulting Actuaries) Peter Ying (Actuarial Institute of Chinese Taipei) Helge-Ivar Magnussen

Other matters

- Web developments
- Mortality professionals welcome to join

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