

UK Mortality and Longevity Update #12 2, September 2017

Final version 24 Sept 2017.

Introduction

- A. This is the 12th Edition of the UK Update, prepared for the IAA Mortality Working Group, members of the IFoA and other people interested in mortality research. Thank you to the many contributors who have sent me references – especially Adrian Gallop, Maddy Bajecal, Stephen Richards, David Raymont but many more.
- B. I would like to pass the production of future UK Updates to a person or a small team who would be able to continue the tradition of producing information about UK research and developments in mortality for an international audience and also for UK actuaries. Please contact me if you might be interested in forming or being part of a small team to take this on: br@ridsdales.com
- C. Hyperlinks are embedded in the titles of papers. This may give problems for certain browsers: if you have problems I suggest either using another browser or copying the hyperlink into your browser.

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1. Institute and Faculty of Actuaries

1.1 Mortality Research Steering Committee

Longevity Bulletin Issue 10, July 2017: [Is the tide turning?](#) In high-income countries, life expectancy has increased steadily for decades, with only a few exceptions – for example, during times of war or pandemics. However, the rate at which life expectancy is improving in the United Kingdom has slowed significantly in recent years. The Bulletin contains articles on current changes in life expectancy in the UK, the US (from the Society of Actuaries in the US) and in Canada (from the Canadian Institute of Actuaries). It also covers aspects of health spending and antibiotic resistance, and an article on the new CMI Mortality Projections Model.

Proceedings of the MRSC's International Mortality and Longevity Symposium available [here](#). Summarises presentations from international experts from a variety of disciplines including Prof. Tom Kirkwood, Jay Olshansky, Prof Carol Jagger, Dame Karen Dunnell, Paul Johnson and Dr Amlan Roy, together with papers from UK actuaries and professionals from other disciplines.

1.2 Continuous Mortality Investigation

CMI news is at [here](#). A selection of items appearing since my last UK Update is below.

Income Protection experience: [CMI Working Paper 102](#) was published in August 2017. This paper provides supplementary analyses to those included in [Working Paper 96](#) and considers individual income protection experience in 2003-2010 by benefit amount and policy duration, two factors not included in regular analyses. Note: this paper is available to [Authorised Users](#) only but the [executive summary](#) is available to all.

Annuitant mortality: [Working Paper 101](#) was published in July 2017. This paper describes the experience of pension annuities in payment over the period 2011 to 2014. Accompanying spreadsheets show summary and detailed results. The paper and accompanying spreadsheets are available to [Authorised Users](#) only. An [Executive Summary](#) of the paper is available to all.

Income protection: Individual IP "All offices" experience results for the 2007-2010 quadrennium were released in March 2017 alongside [Working Paper 96](#). The working paper describes the experience and updates some of the analysis by cause of sickness contained in [Working Paper 72](#). A database of individual IP experience by cause of sickness, spanning 1991-2010, was also released. The paper and accompanying spreadsheets are available to [Authorised Users](#) only. An [executive summary](#) of the paper is available to all.

Supplementary analyses to those included in Working Paper 96 were released in [Working Paper 102](#) in August 2017. These consider IP experience in 2003-2010 by benefit amount and policy duration, two factors not included in regular analyses. The paper is available to [Authorised Users](#) only. An [executive summary](#) of the paper is available to all.

High Age Mortality: [CMI Working Paper 100](#) was published in June 2017. The working paper illustrates alternative methods of estimating population exposures at high ages, presents analysis of mortality at the oldest ages and describes a framework for setting mortality rates at high ages for portfolio graduations. This paper has been made publicly available.

1.3 Actuarial Research Centre

ARC News is [here](#). The ARC has published three webinars, covering its first main research programmes (click on hyperlinks to view):

- [Modelling, Measurement and Management of Longevity and Morbidity Risk](#), Professor Andrew Cairns (Heriot-Watt University) introduces the research programme and presents a case study based on Danish Data.
- [Use of Big Health and Actuarial Data for understanding Longevity and Morbidity](#), Professor Elena Kulinskaya (University of East Anglia) and Nigel Wright (Aviva) outline the objectives of the research programme and present a case study on statins and life expectancy.
- [Minimising Longevity and Investment Risk while optimising Future Pension Plans](#), Professor Jens Perch Nielsen (Cass Business School) introduces the research programme and presents some early research exploring the 'Communication and self-control of a pension saver's financial risk'.

2. Other UK institutions, papers, presentations and articles

2.1 Office for National Statistics

The [statistical bulletin on deaths registered in E&W](#) in 2016 shows a decrease in the number of deaths of 0.9% compared to 2015 and decreases in ASMR of 3.0% for males and 2.4% for females, similar to the general trend prior to 2012.

The latest [quarterly mortality report for England](#) (Q1 Jan-Mar 2017) suggests that the deaths in the first quarter of 2017 are higher than the average for the quarter over the last 5 years and higher than Q1 2016 but lower than Q1 2015.

Report on [inequalities in avoidable mortality](#) by 2015 deprivation deciles, for England and Wales. Avoidable mortality is split into preventable and amenable (to medical intervention). These are calculated only for deaths under 75.

The ONS is investigating its ability to move to an Administrative Data Census in the next decade. Doing this will require a combination of administrative data held by government, survey data and other non survey data sources. Its second review is [here](#).

2.2 Slackening growth in life expectancy and healthy life expectancy

[Mortality improvements in decline](#), Jon Palin on behalf of the CMI. Reviews the growing evidence for a slowing down of mortality improvements in the UK, discusses possible causes and notes that the trend for pension scheme members is less clear.

[Austerity and the new age of population health](#), M A Green *Scandinavian Journal of Public Health*. "The slowing down of improvements in life expectancy, correlated to the level of austerity, raises uncomfortable questions as to whether we are beginning to transition from the era of consistently improving population health to a new age characterised by an instability in population health largely dictated by the social and political determinants of health."

Public Health England (PHE)'s [report](#) on the health of the population in England in 2017 suggests that while life expectancy has been steadily increasing – now 79.5 years for men and 83.1 years for women – more of those extra years are now spent in poor health.

Since 2001, death rates from heart disease and stroke have halved for both males and females. Over the same time period deaths from dementia and Alzheimer's have increased by 60% in males and have doubled in females. This partly reflects the fact that the population is ageing and that two-thirds of deaths now occur among those aged 75 and over, but also an increased awareness of dementia.

In 2015, heart disease was the most common cause of death for males. It was the cause of 1.8 times as many deaths as the second leading cause of death: dementia and Alzheimer's disease. For females, dementia and Alzheimer's was the most common cause of death, followed by heart disease.

Sir Michael Marmot, a former government adviser, highlights 'miserly' levels of spending on health and social care as implicit in the stalling of growth in life expectancy in the UK since 2010. Article [here](#). The Department of Health played down Marmot's findings. A spokesman pointed out that the NHS had just last week been judged to be [the best, safest and most affordable healthcare system](#) out of 11 rich countries analysed in a major review published by the Commonwealth Fund.

[Longevity turbulence – are higher mortality rates a blip?](#) Club Vita cautions against changing course in response to recent data points, and releases *provisional* findings from their analysis of improvement rates of members of DB pension schemes.

[Trend not blip: life expectancy slowdown](#), Alison O’Connell on the slowing longevity improvements in the UK.

The Association of the British Pharmaceutical Industry [reported](#) that the UK is trailing behind the rest of Europe in the treatment of cancer. It claims that British patients have worse survival rates after five years compared to the European average in nine out of ten cancers, and that the UK spends over 20 per cent less per person on cancer than the top five EU economies.

2.3 Other papers and articles

[Longevity Science in Business](#) Joseph Lu

[Changing patterns of mortality](#) Stephen Richards presents some animations showing the development of mortality data in the UK since 1961

Using the concept of [frailty models in mortality](#) Iain Currie

[Are pension-scheme funding bases fit for purpose?](#) Stephen Richards

[The mortality implications of your position in a hierarchy](#) Gavin Ritchie (Sir Michael Marmot again).

[A stochastic implementation of the APCI model for mortality projections](#) Stephen Richards and Torsten Kleinow, presentation and paper

[Recent developments in mortality research Helsinki May 2017](#) Brian Ridsdale

3. IAA Mortality Working Group

The last meeting of the [IAA Mortality Working Group](#) was in Budapest in April 2016. Minutes (with all papers) are [here](#) and an Update in 11 languages is [here](#). The information Base is [here](#).

Seminar [Current developments in aging and mortality](#), Budapest. Click on the titles to see the slide presentations.

The next meeting is in Chicago on 3 October and the Agenda is [here](#). The MWG is jointly-sponsoring a seminar: [International Insights on Mortality, Population and the Public Interest](#) in Chicago on 3 October.

Actuarial Educators Network [members newsletter](#) containing an article on the IAA MWG Information Base

4. International papers, presentations, articles and websites

[Rising Inequality in Life Expectancy by Socioeconomic Status](#), Sanzenbacher et al USA

[Recent Mortality Trends by Cause of Death](#), SCOR, April 2017. Summarises US Cause of death figures for population and their own policyholders. Highlights an earlier finding that “between 2001 and 2014, individuals in the top five percent of the income distribution gained around three years of life expectancy, whereas individuals in the bottom five percent experienced no gains”. Warns that “as more companies broaden their focus to increase penetration in the middle income market, there will likely be a shift in the drivers of insured mortality towards that of the general population”.

[Reliability issues in the construction of national mortality tables for the general population: What you should know](#), Boumezoued et al. false cohort effects, etc.

[The effect of physical activity on mortality and cardiovascular disease in 130 000 people from 17 high-income, middle-income, and low-income countries: the PURE study](#), Dr Scott A Lear et al. Lancet, Sept 2017. Concludes “Higher recreational and non-recreational physical activity was associated with a lower risk of mortality and CVD events in individuals from low-income, middle-income, and high-income countries. Increasing physical activity is a simple, widely applicable, low cost global strategy that could reduce deaths and CVD in middle age.”

WHO reports that the [world is running out of antibiotics](#). It launched two new reports: [Antibacterial agents in clinical development – an analysis of the antibacterial clinical development pipeline, including tuberculosis](#) and [Prioritization of pathogens to guide discovery, research and development of new antibiotics for drug-resistant bacterial infections, including tuberculosis](#)

5. Conferences etc

Actuarial Teachers’ and Researchers’ Conference, July 2017 University of Kent. Papers and presentations available [here](#).

[2017 Living to 100 Monograph](#) collects sessions, papers, panels and transcripts from the 2017 Living to 100 Symposium.

[Thirteenth International Longevity Risk and Capital Markets Solutions Conference](#) September 2017, Taipei

6. Forthcoming events

[31st International Congress of Actuaries](#), Berlin, Germany, 4 - 8 June 2018

[IFoA Life Conference 2017 Birmingham](#): 22 - 24 November 2017.

.....About this note.....

This is a note **for** the UK Actuarial profession and others, and **for** the International Actuarial Association (IAA). The last six-monthly report is [here](#)

The most recent UK version of the report **from** the IAA Mortality Working Group is [here](#)

The web page for the Institute and Faculty of Actuaries Mortality Research Hub is [here](#), for the CMI is [here](#) and for the ARC is [here](#).

The web page for the IAA Mortality Working Group is [here](#), and for the MWG Information Base is [here](#).

Courtesy of the Librarian of the IFoA, a reading list on mortality, longevity and life expectancy is given below.

Brian Ridsdale 24 September 2017
br@ridsdales.com

INSTITUTE AND FACULTY OF ACTUARIES LIBRARY SERVICES

Reading list on Mortality/Longevity/Life expectancy: journal articles 2017

Please search the IFoA Library catalogue: <http://library.actuaries.org.uk> or contact libraries@actuaries.org.uk citing the Library Reference Number

ANNALS OF ACTUARIAL SCIENCE

Huang, Fei; Browne, Bridget (2017). **Select Mortality forecasting using a modified Continuous Mortality Investigation Mortality Projections Model for China I: methodology and country-level results.** *Annals of Actuarial Science* (2017) **11(1)**: 20-45. [Library reference no. 49371]

DOI: <https://doi.org/10.1017/S1748499516000142>

Huang, Fei (2017). **Mortality forecasting using a modified CMI Mortality Projections Model for China II: cities, towns and counties.**

Annals of Actuarial Science (2017) **11(1)**: 46-66. [Library reference no. 49372]

DOI: <https://doi.org/10.1017/S174849951600018X>

ASTIN BULLETIN: THE JOURNAL OF THE INTERNATIONAL ACTUARIAL ASSOCIATION

Blackburn, Craig; Hanewald, Katja; Olivieri, Annamaria; Sherris, Michael (2017). **Longevity risk management and shareholder value for a life annuity business.**

ASTIN Bulletin (2017) **47(1)**: 43-77. [Library reference no. 49421]

DOI: <https://doi.org/10.1017/asb.2016.32>

Liu, Yanxin; Li, Johnny Siu-Hang (2017). **The locally linear Cairns-Blake-Dowd model: a note on Delta-Nuga hedging of longevity risk.**

ASTIN Bulletin (2017) **47(1)**: 79-151. [Library reference no. 49422]

DOI: <https://doi.org/10.1017/asb.2016.33>

Biessy, Guillaume (2017). **Continuous-time semi-markov inference of biometric laws associated with a long-term care insurance portfolio.** *ASTIN Bulletin* (2017) **47(2)**: 527-561. [Library reference no. 49437]

DOI: <https://doi.org/10.1017/asb.2016.41>

Li, Hong; Lu, Yang (2017). **Coherent forecasting of mortality rates: a sparse vector-autoregression approach.**

ASTIN Bulletin (2017) **47(2)**: 563-600. [Library reference no. 49438]

DOI: <https://doi.org/10.1017/asb.2016.37>

Hunt, Andrew; Blake, David (2017). **Modelling mortality for pension schemes.**

ASTIN Bulletin (2017) **47(2)**: 601-629. [Library reference no. 49439]

DOI: <https://doi.org/10.1017/asb.2016.40>

Villegas, Andrés M; Haberman, Steven; Kaishev, Vladimir K; Millosovich, Pietro (2017). **A comparative study of two-population models for the assessment of basis risk in longevity hedges.**

ASTIN Bulletin (2017) **47(3)**: 631-679. [Library reference no. 49440]

DOI: <https://doi.org/10.1017/asb.2017.18>

van Berkum, Frank; Antonio, Katrien; Vellekoop, Michel (2017). **A Bayesian joint model for population and portfolio-specific mortality.**

ASTIN Bulletin (2017) **47(3)**: 681-713. [Library reference no. 49441]

DOI: <https://doi.org/10.1017/asb.2017.17>

Leng, Xuan; Peng, Liang (2017). **Testing for a unit root in Lee-Carter mortality model.**

ASTIN Bulletin (2017) **47(3)**: 715-735. [Library reference no. 49442]

DOI: <https://doi.org/10.1017/asb.2017.24>

Lu, Yang (2017). **Broken-heart, common life, heterogeneity: analyzing the spousal mortality dependence.**

ASTIN Bulletin (2017) **47(3)**: 837-874. [Library reference no. 49446]

DOI: <https://doi.org/10.1017/asb.2017.8>

AUSTRALIAN JOURNAL OF ACTUARIAL PRACTICE

URL: <http://www.actuaries.asn.au/knowledge-bank/australian-journal-of-actuarial-practice>

Li, Jackie; Aw, Grace; Teo, Kok Lay (2017). **Reverse mortgages – risks, pricing, and market development.**

Australian Journal of Actuarial Practice (2017) **5**: 55-66. [Library reference no. 49392]

Hutchinson, Timothy Paul (2017). **Average and standard deviation of remaining lifetime.**

Australian Journal of Actuarial Practice (2017) **5**: 93-96. [Library reference no. 49394]

Cumpston, Richard; Sarjeant, Hugh; Service, David (2017). **Australian life expectancy estimates, allowing for education, partnership and employment.**

Australian Journal of Actuarial Practice (2017) 5: 97-106. [Library reference no. 49395]

BRITISH ACTUARIAL JOURNAL

Morgan, Lesley-Ann; Lothian, Scott Alan (2017). **Designing successful post-retirement solutions by blending growth, income and protection.**

British Actuarial Journal (2017) 22(1): 177-206. [Library reference no. 46337]

Paper presented to IFoA, Edinburgh on 23 May 2016.

DOI: <https://doi.org/10.1017/S1357321717000034> (access via Athens login <http://www.openathens.net/>)

URL: <https://www.actuaries.org.uk/documents/designing-successful-post-retirement-solutions-blending-growth-income-and-protection>

EUROPEAN ACTUARIAL JOURNAL

Chen, Liang; Cairns, Andrew J G; Kleinow, Torsten (2017). **Small population bias and sampling effects in stochastic mortality modelling.**

European Actuarial Journal (2017) 7(1): 193-230. [Library reference no. 49385]

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DOI: <https://doi.org/10.1007/s13385-016-0143-x>

GENEVA PAPERS ON RISK AND INSURANCE

Fong, Joelle H (2017). **Old-age frailty patterns and implications for long-term care programmes.**

Geneva Papers on Risk and Insurance (2017) 42(1): 114-128. [Library reference no. 49338]

DOI: <https://doi.org/10.1057/s41288-016-0006-3>

Bräutigam, Marcel; Guillén, Montserrat (2017). **Facing up to longevity with old actuarial methods: a comparison of pooled funds and income tontines.**

Geneva Papers on Risk and Insurance (2017) 42(3): 406-422. [Library reference no. 49410]

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DOI: <https://doi.org/10.1057/s41288-017-0056-1>

Auerbach, Alan J; Charles, Kerwin K (2017). **How the growing gap in life expectancy may affect retirement benefits and reforms.**

Geneva Papers on Risk and Insurance (2017) 42(3): 475-499. [Library reference no. 49413]

DOI: <https://doi.org/10.1057/s41288-017-0057-0>

NORTH AMERICAN ACTUARIAL JOURNAL

Chi-Liang, Cary; Lin, Tzuling (2017). **A Bühlmann credibility approach to modeling mortality rates.**

North American Actuarial Journal (2017) 21(2): 204-227. [Library reference no. 49487]

DOI: <https://doi.org/10.1080/10920277.2016.1246253>

Mavros, George; Cairns, Andrew J G; Streftaris, George; Kleinow, Torsten (2017). **Stochastic mortality modeling: key drivers and dependent residuals.** *North American Actuarial Journal* (2017) 21(3): 343-368. [Library reference no. 49495]

Andrew J G Cairns and Torsten Kleinow acknowledge financial support from Netspar under project LMVP 2012.03. Andrew J G Cairns, Torsten Kleinow and George Streftaris acknowledge financial support from the [Actuarial Research Centre of the Institute and Faculty of Actuaries](#)

DOI: <https://doi.org/10.1080/10920277.2017.1286992>

Gbari, Samuel; Pouliot, Louise-Philippe; Dal, Luc; Denuit, Michel M (2017). **Extreme value analysis of mortality at the oldest ages: a case study based on individual ages at death.**

North American Actuarial Journal (2017) 21(3): 397-416. [Library reference no. 49499]

DOI: <https://doi.org/10.1080/10920277.2017.1301260>

SCANDINAVIAN ACTUARIAL JOURNAL

Fong, Joelle H; Sherris, Michael; Yap, James (2017). **Forecasting disability: application of a frailty model.**

Scandinavian Actuarial Journal (2017) 2: 125-147. [Library reference no. 49330]

DOI: <https://doi.org/10.1080/03461238.2015.1092168>

Enchev, Vasil; Kleinow, Torsten; Cairns, Andrew J G (2017). **Multi-population mortality models: fitting, forecasting and comparisons.**

Scandinavian Actuarial Journal (2017) 4: 319-342. [Library reference no. 49456]

Available via Athens: Taylor & Francis Online -- Vasil Enchev acknowledges financial support from Heriot-Watt University through the award of a James Watt scholarship and from the [Actuarial Research Centre of the Institute and Faculty of Actuaries](#). Torsten Kleinow and Andrew J. G. Cairns acknowledge financial support from Netspar under project LMVP 2012.03..

DOI: <https://doi.org/10.1080/03461238.2015.1133450>

De Rosa, Clemente; Luciano, Elisa; Regis, Luca (2017). **Basis risk in static versus dynamic longevity-risk hedging.**
Scandinavian Actuarial Journal (2017) 4: 343-365. [Library reference no. 49457]
DOI: <https://doi.org/10.1080/03461238.2015.1134636>

Tsai, Cary Chi-Liang; Lin, Tzuling (2017). **Incorporating the Bühlmann credibility into mortality models to improve forecasting performances.**
Scandinavian Actuarial Journal (2017) 5: 419-440. [Library reference no. 49461]
DOI: <https://doi.org/10.1080/03461238.2016.1167115>

Jarner, Søren Fiig; Preisel, Michael (2017). **Long guarantees with short duration: the rolling annuity.**
Scandinavian Actuarial Journal (2017) 6: 471-494. [Library reference no. 49464]
DOI: <https://doi.org/10.1080/03461238.2016.1174732>

Lledó, Josep; Pavia, Jose Manuel; Morillas, Francisco G (2017). **Assessing implicit hypotheses in life table construction.**
Scandinavian Actuarial Journal (2017) 6: 495-518. [Library reference no. 49465]
DOI: <https://doi.org/10.1080/03461238.2016.1177585>

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