

Longevity Risk: Challenges and Opportunities

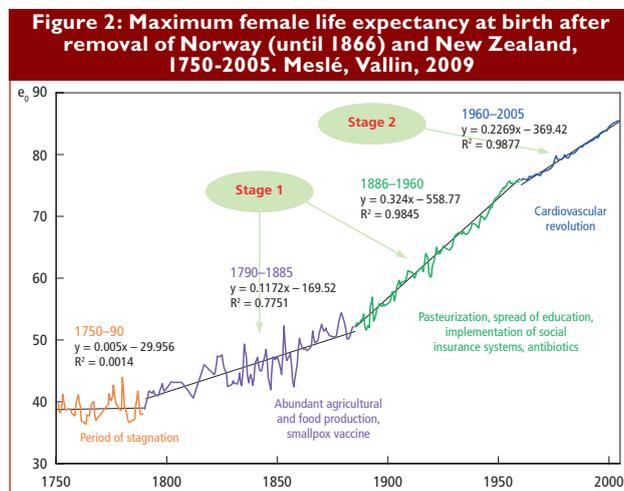
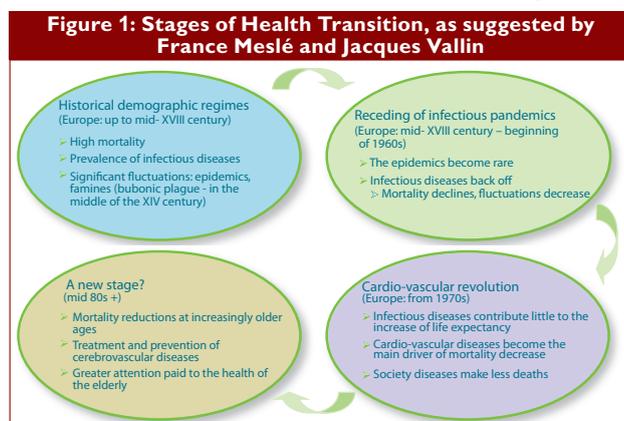


Unprecedented increases in life expectancy over the last two and a half centuries have had a significant impact on society and also the insurance industry as a whole. Better understanding of this critical area is vital to facilitate economic stability and ensure that the funding challenges of the future can be met. In this article¹, **Dr Daria Kachakhidze** of **SCOR Global Life** discusses the causes of mortality improvements in the past, the effect of health transition on life expectancy and what will happen next and the impact on life and health insurance.

What impacts mortality improvement?

The health transition concept² presents a series of stages of health transformation process reflecting changes in epidemiological characteristics (the health status of society) and the ways in which society is responding to its health status. In particular, the time it takes for medical or lifestyle improvements to benefit society at large depends on social policy and economic conditions (refer Figure 1).

From the middle of the 18th century, mortality in Europe began to decrease. Initially this was achieved as a result of better quality foods and hygiene and later due to the discovery of antibiotics. This was followed by the cardiovascular revolution where medical innovation and improved diet and lifestyle contributed to the increase in life expectancy.



Health transition and life expectancy

Figure 2 represents the evolution of record country-level female life expectancy at birth. The segments of this line correspond to various stages of health transition. The slope of life expectancy increase depends on the age group most affected by the current mortality decrease – thus if health gains are obtained at younger ages; there is a higher increase in life expectancy at birth.

Rectangularisation of the survival curve

The increase of life expectancy was caused by mortality reductions at increasingly older ages as populations are passing through different stages of health transition. This caused so called “rectangularisation” of the survival curve. Cheung³ et al distinguish three dimensions driving this phenomenon:

- “Horizontalisation” corresponding to the fall of childhood mortality: the survival curve becomes flatter;
- “Verticalisation” due to a certain concentration of ages at death for the adults, and
- Longevity extension which corresponds to a possible increase in human longevity.

What is going to happen next?

Three possible scenarios of future evolution of the survival curve can be envisaged:

1. Complete rectangularisation

The survival curve becomes more and more rectangular. The probability to die becomes extremely small at ages before the limiting age. Everyone lives up to the human “ideal life duration”, and then quickly dies. In this case there is nearly no uncertainty as to the duration of human life. Annuities would lose interest in favour of the pure saving products



2. Shifting mortality scenario or delay of ageing

This is the scenario where the whole survival curve is shifted towards higher ages. The age at death is increasing, but without further compression of life durations. This would result



¹ Full paper available at SCOR's Global Risk Centre: www.scor.com/en/sgrc/home.html

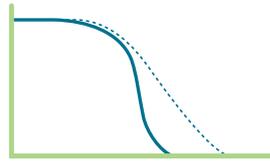
² Health Transition (see Figure 1 & 2), introduced by Julio Frenk and extended by France Meslé and Jacques Vallin

³ Cheung S. L. K., Robine, J.-M., Tu E.J.C, and Caselli G. “Three dimensions of the Survival Curve: Horizontalisation, Verticalisation and Longevity Extension”, *Demography* 42(2)

in continuing uncertainty in the individual's life duration and continuing demand for insurance products, especially annuities and long-term care as the number of oldest-old would increase continuously

3. An extension of limiting age and “de-rectangularisation”.

A certain number of people survive much longer. This creates a greater heterogeneity in life durations. People would become more “unequal” in relation to their life span: either because of life style, access to healthcare, or some genetic predispositions. This would result in an increased demand for mortality products at older ages, as well as for annuities and long-term care. Of course this scenario would create a real problem to pension funds, especially the pay-as-you go schemes.



What seems most plausible?

The distribution of ages at death (Figure 3) provides some additional insight into the potential future development of longevity. The modal age at death (M) and the standard deviation of ages at death above the mode (SD(M+)) corresponding to the height and the slope of the curve represent the degree of mortality compression or convergence of the ages at death.

The evolution of the two measures, modal age at death and standard deviation of ages at death above the mode

was studied for a large number of developed countries⁵. This study has revealed that lifespans are becoming more homogeneous as the decrease in the standard deviation (SD(M+)) confirms the strong compression of mortality, although this rate of compression has decelerated significantly in the recent years for most countries.

The Japanese data is somewhat different: the compression seems to have stopped in the 1980s-1990s, and Japan has probably switched to a new pattern – that of the second scenario, “the shifting mortality scenario”. Some other European countries seem to be following the Japanese trend with a few years lag.

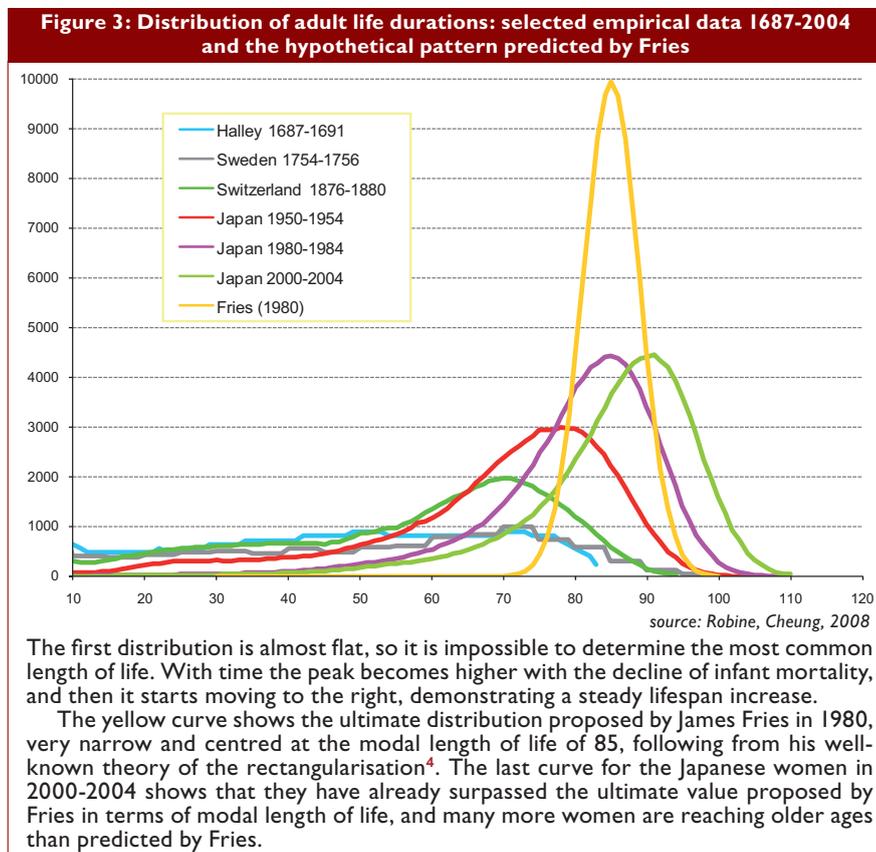
From the above results, one may conclude that there seems to be no looming limit to human longevity on the horizon yet and that the near future lies in between scenario 1 (rectangularisation) and 2 (shifting mortality). This intermediate scenario can be called a relative compression of mortality. Life duration continues to rise, while human lifespans become a bit more homogeneous.

However, even if the dispersion of the lifespans at the national level seems to be decreasing, there is still a huge difference in mortality levels for different social class subpopulations. Whilst this gives some comfort that the situation painted in scenario 3 is not likely to happen at least in the near future, it does not however address another important issue of whether the increase in life duration will be accompanied by an increase in healthy life duration?

There is currently no common view on this subject and various studies have produced conflicting results as “health” is difficult to measure.

In conclusion, It has become clear that the demographic future is going to be very different to what we have seen in the past. While further research continues in the areas of forecasting longevity trends and trends in the “healthy life duration”, it is clear that the number of older people is growing and the demand for living insurance benefits like Long-Term Care coverage, Disability, Health and Critical Illness will increase. This will bring both opportunities and also challenges for insurers and reinsurers alike. 

Dr Daria Kachakhidze is Head of Research and Development Centre on Longevity and Mortality Insurance at SCOR Global Life. She will be a guest speaker at the Insurance Risk and Finance Research Centre's annual seminar on 25 June 2012 that will be held in Singapore. The Centre sponsors and directs primary research on insurance and insurance-related risk in the Asia Pacific. Through research, industry collaborations and seminars, it aims to provide a critical foundation to create knowledge and support the growing role of the insurance industry in the economic development of the region. For more information contact: Valerie De Souza vdesouza@ntu.edu.sg or Janice Cowley jcowley@scor.com



⁴ Rectangularisation of the survival curve and the compression of mortality (Fries, 1980)
⁵ Cheung S. L.K et Robine, J.-M “Increase in common longevity and the compression of mortality: the case of Japan”, Population Studies, 61(1).
 Robine, J.-M, Cheung, S. L.K “Nouvelles observations sur la longévité humaine”, Revue économique, vol 59.
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