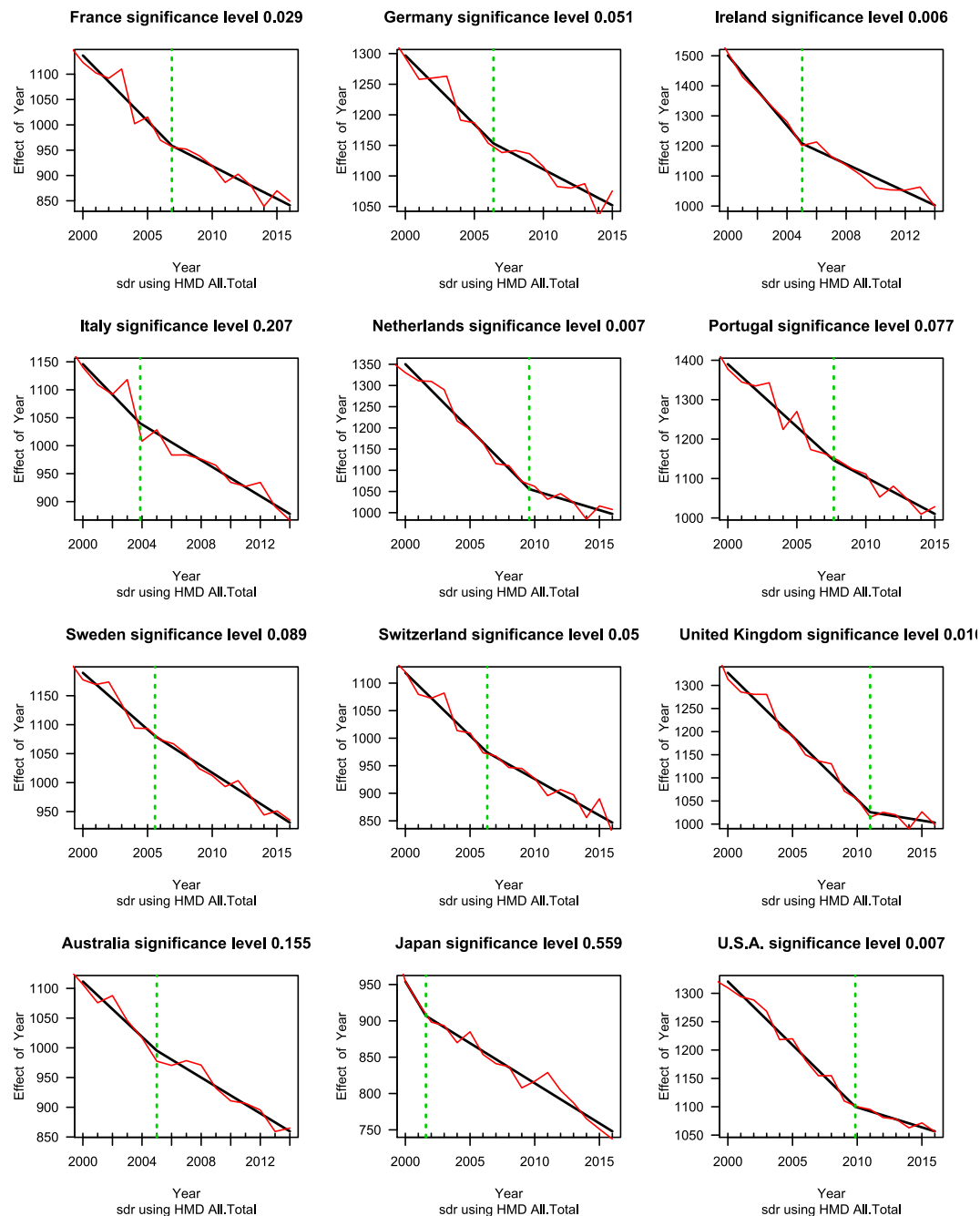


Stalling of Mortality in the United Kingdom and Europe: Trends and Explanations

Michael Murphy, Marc Luy and Orsola Torrissi

Extended Abstract

There has been widespread and sometimes substantial reductions in underlying mortality improvement in much of Western Europe and in other high income countries in the past 10 years or so as compared with the early 2000s (Figure 1) (ONS 2018a).



Source: HMD, Europe 2013 Standard used.

31Oct19

Figure 1 Change point analysis of SDR, selected high income countries from 2000

Almost all countries have exhibited mortality stalling, especially pronounced in UK, US and Netherlands (although even here underlying trends in this decade are still positive), but less substantial in Scandinavia. This is in strong contrast to the early 2000s, when, for example, the UK exhibited the fastest-ever rates of mortality improvement for the past 70 years.

Overall trends are primarily determined by those groups in which deaths are most common, i.e. people above about age 70. Trends in mortality for different age groups above age 40 are similar, although since levels of improvement for older people (above age 85) are generally lower and at some ages death rates actually have been increasing. Downturns in improvements have also been noted at younger adult ages, especially in UK (Figure 2).

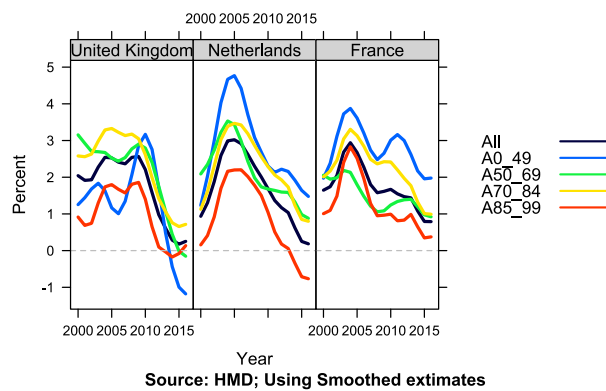


Figure 2 SDR annual percentage mortality change (SDR), UK, Netherlands & France by age

Trends for males and females are similar. Although male improvement levels remain higher as they have for many decades, trend differentials have remained largely constant, so that changes in life expectancy for women are tending towards zero in countries such as UK and France in recent years (ONS 2018b; Le Bourg 2019). While declines in mortality improvement from the very high levels of the early 2000s have been built into most forecasts, the speed of decline has been unexpected. A number of explanations for these trends have been advanced, such as data artefacts (including accuracy of base numbers and substantial increases in deaths

recorded as dementias), population ageing and international migration, but these cannot provide more than a small proportion of explanation for the observed patterns.

Some stalling of mortality improvement has been expected and built into most forecasts, but the similarity of timing but different pace of deterioration across countries suggests that explanations should include both common patterns and cross-national differentials. Four main areas have been identified, which we assess in this paper, principally using UK where most analysis to date has been undertaken:

1. Increased epidemic mortality, especially seasonal influenza
2. Austerity: government responses to the consequences of the 2008 banking crisis
3. Reduction in rates of improvement in CVD
4. Tempo changes in mortality affecting period mortality indicators

Short-term fluctuations and Influenza

There have been substantial short-term fluctuations in annual deaths largely driven by those in winter months. The mortality “spike” in winter 2014-15 resulted in life expectancy at birth declining in 19 of the then 28 member states (Ho & Hendi 2018); the increase in annual number of deaths was the largest in Britain for 70 years and large numbers of winter excess deaths were seen in other recent years, especially in 2018 (PHE 2018). Since there had been a long-term tendency for excess winter deaths to decline, it attracted considerable attention as possibly signifying an emerging new mortality regime (Jasilionis 2018). However, the period since 2010 also exhibited particularly low levels of excess winter mortality across Europe; for example, the 2014 value in Britain was the smallest value for 50 years so the difference between 2014 and 2015 was particularly high (PHE 2018).

Table 1. Excess SDR (per 100,000) in Winter Quarter compared with surrounding values, England & Wales, periods 2005-10 and 2011-16

Mean level		Standard deviation	
2005-10	2011-16	2005-10	2011-16
145.6	125.6	28.9	42.7

While, levels of excess winter mortality in the UK show a long-term decline, there has been some levelling-off in this decade. In particular, values in the period 2011-2016 have been very similar to the

immediately preceding period. Comparing the levels and variability of excess winter mortality in the periods before and after around 2010 shows that levels were lower in the latter period, but year-to-year variability was much higher (Table 1).

Influenza has been identified as the main cause of excess winter mortality (PHE 2018), which is the major contributor to year-to-year variability in mortality. However, the impact of flu and other seasonal respiratory infections does not appear to be any greater than in earlier periods and estimates of long-

term trends are in any case insensitive to fluctuations in deaths. We therefore conclude that influenza has made little contribution to the recent mortality stalling although it has sometimes been given high emphasis (PHE 2018; Raleigh 2019).

Austerity

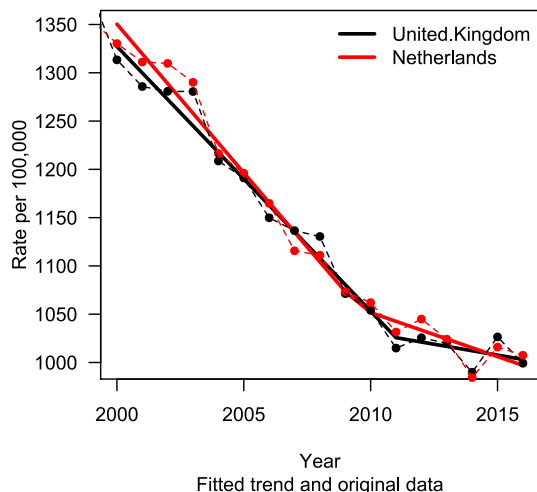


Figure 3 SDR Change point analysis 2000-16, UK & Netherlands

However, a similar explanation would not appear to hold for neighbouring countries such as the Netherlands that have similar mortality trends, but less austerity (Figure 3). However, stalling is generally more pronounced in the UK than in a number of comparator countries and specific UK patterns, including the increase in mortality differentials between social groups observed since around 2011, need to be explained by UK-specific contextual factors. The explanations for mortality trends need to consider more than just the latter period.

We discuss the evidence for austerity as a potential explanation in the light of an earlier review article (Parmer et al 2016) that concluded that most studies on this topic has problems which made them an unreliable basis for drawing firm conclusions. International studies have been particularly difficult to undertake given the difficulty in defining austerity, lack of cross-national comparative disaggregated data and the difficulty of controlling for a wide range of potential confounders with only a small number of annual data values and lack of theory to identify how mortality is expected to respond to austerity.

Reduction in rates of improvement in CVD

The decline of CVD mortality rates has been a major long-term influence on overall mortality trends across developed countries and this continues into the most recent period. The sharp reduction in improvement in CVD mortality in recent years, especially when compared with the early years of the 21st century has had a substantial effect on the slowdown in mortality improvement (Lopez & Adair 2019). The question of how the determinants of CVD trends lead to an apparently sharp change in the underlying trend remains unanswered. The scope for further CVD improvement to influence overall mortality is becoming less since CVD deaths now form a smaller proportion of the total than hitherto, although there is still space for reducing the social gradient in CVD mortality.

There are problems of interpretation in cause of death statistics due to the increasing propensity to record Alzheimer's Disease/dementias as the underlying cause rather than CVD or other causes and, in addition, influenza deaths are under-recorded. The fact that many older people have a number of health problems with multiple chronic conditions, high vulnerability to infectious diseases, differing lifecourse risk profiles between cohorts and changing quantity and quality of care services need to be jointly analysed, whereas individual deaths are allocated to a single underlying cause.

Tempo changes in mortality affecting period mortality indicators

Part of the change for observed period life expectancy and SDR values in the UK appear to be linked to underlying tempo-effects – which arise when substantial numbers of deaths are postponed as a result of changing mortality patterns. Tempo effects are potential distorters of period life expectancy (Bongaarts and Feeney, 2002). This can lead to paradoxical situations in which the conventional demographic indicators, such as life expectancy, provide a misleading picture of actual mortality

Most UK studies have identified austerity as the main reason for mortality stalling (e.g. Hiam et al. 2017) since the UK exhibited high levels of mortality improvement around 2006-2011 compared with European comparators when expenditure on health and local authority services was increasing rapidly, but particularly low rates in period 2011-16 when UK funding increases were relatively low with substantial cuts in a range of welfare, social care and health services (IFS et al. 2018). However, a similar explanation would not appear to hold for neighbouring countries such as the Netherlands that have similar mortality trends, but less austerity (Figure 3). However, stalling is generally more pronounced in the UK than in a number of comparator countries and specific UK patterns, including the increase in mortality differentials between social groups observed since around 2011, need to be explained by UK-specific contextual factors.

trends (Luy 2010). We discuss how this affects the interpretation on period indicators such as the 2014 to 2015 decrease in life expectancy.

Note also that the SDR changes over period 2006 to 2011 in Figure 1 are much more similar (typically around 250 per 100,00) than changes in each of the separate periods 2006-11 and 2011-16, suggesting that differential shifting of deaths within the overall period may be influential, and we consider how far cohort effects such as smoking patterns can cause sharp period changes in trend levels.

Conclusions

The assumption that the explanation for recent mortality patterns is monocausal – either influenza or austerity or CVD reduction – and that these are mutually exclusive is unhelpful and potentially misleading. A number of other components are contributing, including positive or negative effects on different cohorts due to changes on a range of factors such as smoking, use of statins and obesity. In addition, the result of the simultaneous occurrence of reductions in quantity and possibly quality of services due to austerity, an influenza outbreak and low vaccine effectiveness will be potentially very different than if only one or two of these were to occur, i.e. there is an interaction between these variables. Last, but not least, tempo effects may add to a biased picture resulting from monocausal perspectives.

With the information available today, it is not possible to get a definitive analysis of causes. The lack of clear evidence for the drivers of recent trends implies no clear guidance on whether current trends reflect short-term adjustments and mortality rates will resume steady improvement (although probably not at the high rates of the early 2000s), or a secular long-term change. There are some encouraging signs of strong mortality improvement in England in the past 12 months or so, which will need to be closely monitored (Murphy 2019).

Selected References

- Bongaarts J, Feeney G. (2002). How long do we live? *Population and Development Review* 28(1): 13-29.
- Hiam L, Dorling D, Harrison D, McKee M. (2017a). Why has mortality in England and Wales been increasing? An iterative demographic analysis. *Journal of the Royal Society of Medicine*, 4, 110(4), pp. 153-162.
- Ho JY, Hendi A. (2018). Recent trends in life expectancy across high-income countries: retrospective observational study. *British Medical Journal*. 362:k2562
- Institute for Fiscal Studies and the Health Foundation, in association with NHS Confederation. (2018) *Securing the future: funding health and social care to the 2030s*. eds. Charlesworth, Anita and Johnson, Paul (eds) <https://www.ifs.org.uk/uploads/R143.pdf>
- Jasilionis D. (2018). Reversals in life expectancy in high-income countries? Warning signs must not be ignored. *British Medical Journal*.
- Le Bourg E. (2019). Is Life Expectancy of French Women Going to Plateau and Oscillate? *Gerontology* 2019;65:288–293 DOI: 10.1159/000497179
- Lopez AD, Adair T. (2019). Is the long-term decline in cardiovascular-disease mortality in high-income countries over? Evidence from national vital statistics. *Int J Epidemiol*. 2019 Aug 5. pii: dyz143. doi: 10.1093/ije/dyz143.
- Luy M. (2010). Tempo effects and their relevance in demographic analysis. *Comparative Population Studies - Zeitschrift für Bevölkerungswissenschaft* 35(3): 415-446.
- Murphy M. (2019). The data behind mortality trends: explaining the recent improvement in mortality in England, LSE Politicsandpolicy Blog, 16 October 2019 available at , <https://blogs.lse.ac.uk/politicsandpolicy/explaining-the-recent-improvement-in-mortality-in-england/>.
- ONS (2018a). *Changing trends in mortality: an international comparison: 2000 to 2016* Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/articles/changingtrendsintortalityaninternationalcomparison/2000to2016>
- ONS (2018b). *Changing trends in mortality: a cross-UK comparison, 1981 to 2016*. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/articles/changingtrendsintortalityacrossukcomparison1981to2016#how-is-uk-mortality-changing-across-different-ages>
- Parmar D, Stavropoulou C, Ioannidis JP. (2016). Health outcomes during the 2008 financial crisis in Europe: systematic literature review. *BMJ*. 2016 Sep 6;354:i4588. doi: 10.1136/bmj.i4588.
- PHE (2018). *A review of recent trends in mortality in England*. Public Health England, 2018. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/762623/Recent_trends_in_mortality_in_England.pdf
- Raleigh V. (2019). Trends in life expectancy in EU and other OECD countries: Why are improvements slowing?, *OECD Health Working Papers*, No. 108, OECD Publishing, Paris.