Life Expectancy Plateau in the United States and Divergence from Peers: The Impact of Changing Mortality Timing

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1 Introduction

Over the past century, life expectancy in high-income countries has increased steadily, reflecting improvements in public health, medical care and living conditions. However, in recent decades, this upward trend has slowed or even reversed in several nations, and this was the case even prior to the onset of the global pandemic. Slowdowns or declines in life expectancy have been documented in countries such as the United States, the United Kingdom, Greece, Portugal, France, Canada, Germany, Sweden, Australia, and the Netherlands (Dowd et al., 2025; Ho and Hendi, 2018; Luy et al., 2020; Murphy et al., 2019).

Of these countries, the United States is of particular concern. Life expectancy declined between 2015 and 2017, followed by modest gains of around one month per year in 2018 and 2019 (Beltrán-Sánchez et al., 2015; Preston and Vierboom, 2021). Consequently, the United States has not surpassed its 2014 peak of 78.9 years. This limited improvement in mortality places the United States among the lowest-ranked high-income nations for life expectancy, diverging from broader OECD trends (Crimmins, 2025).

Several studies have investigated the causes of the recent stagnation and decline in life expectancy in the United States, as well as the increasing mortality gap between the United States and other high-income countries. Contributing factors identified include higher rates of motor vehicle accidents, drug overdoses and firearm-related deaths than in other comparable countries (Fenelon et al., 2016; Kalesan et al., 2019), the ongoing opioid epidemic (Barbieri, 2019; Case and Deaton, 2015; Ho, 2019) and persistently high infant and maternal mortality rates (Chen et al., 2016; Collier and Molina, 2019). The United States also has a higher prevalence of chronic conditions such as diabetes and heart disease (Acosta et al., 2022; Crimmins, 2025; Glei, 2022), as well as slower progress in improving cardiovascular disease outcomes (Abrams et al., 2023; Acosta et al., 2022; Crimmins, 2025).

One factor that has largely been overlooked is the influence of tempo effects on recent US trends in life expectancy at birth. Recent research has recognised that tempo biases can create short-term fluctuations that obscure underlying mortality trends, thereby complicating efforts to identify the causes of stalled progress (Bongaarts, 2006; Dowd et al., 2025; Luy et al., 2020). Only a few studies have examined the effect of tempo bias on life expectancy trends. These studies have focused on Belgium, France, the Netherlands, the United Kingdom and the gap between East and West Germany (Luy, 2006; Luy et al., 2020; Murphy et al., 2019; Peters et al., 2014). Their findings revealed that tempo effects distort life expectancy trends, leading to an under- or overestimation of the pace of improvement in underlying mortality conditions. For instance, the decline in life expectancy in Belgium, France, the Netherlands and the United Kingdom in 2015 suggests an overall deterioration in health. However, once the tempo effects were removed, life expectancy continued to rise. The 2015 decline in life expectancy was a consequence of the exceptionally high life expectancy recorded in 2014, largely due to unusually low mortality that year. This decline in mortality occurred during a mild influenza season in winter 2013/14 (Euromomo, 2014), meaning a greater-than-usual number of frail individuals survived to reach 2015. The subsequent increase in deaths among these individuals in 2015, known as the 'harvesting effect', contributed to a sharp rise in mortality despite no deterioration in health conditions occurring. This pattern is a classic example of a tempo effect, whereby shifts in the timing of deaths from one year to the next impact life expectancy trends. This evidence highlights the importance of accounting for tempo effects when comparing life expectancy across populations or time periods, particularly when the degree of tempo distortion varies between groups or over time.

This study examines the impact of tempo effects on the recent stagnation of life expectancy in the US by analysing trends from 2003 to 2019. For comparison, we also examine Japan and Switzerland, two other high-income countries with consistently high and rapidly improving life expectancy (Dowd et al., 2025). Adopting a cross-national perspective enables us to evaluate the extent to which tempo effects have contributed to the stagnation observed in the United States and the divergence in mortality trends across these countries.

2 Background

Tempo effects refer to distortions in period-based demographic indicators caused by shifts in the timing of life events, such as births or deaths, without any change in their overall frequency over a lifetime. These timing shifts can temporarily inflate or deflate annual measures such as fertility rates or life expectancy, creating trends that do not accurately reflect long-term demographic patterns. For instance, if individuals postpone having children or if deaths are increasingly postponed to older ages, the number of events recorded in a given year may decrease, even though the lifetime totals remain unchanged.

Paul Ryder first introduced the concept in the context of fertility in 1964, showing that delayed childbearing could temporarily depress the total fertility rate (TFR) despite stable completed fertility. (Bongaarts and Feeney, 1964) later formalised this insight by proposing a tempo-adjusted total fertility rate (TFR), and in 2002 they extended the framework to mortality. They argued that delayed deaths could similarly distort period life expectancy, leading to misinterpretations of mortality trends.

Although tempo effects are well recognized in fertility research, they remain largely overlooked in mortality analysis. The period life expectancy (PLE) indicator is based on the assumption that current mortality rates accurately reflect current mortality conditions. However, as noted by (Vaupel, 2002), this assumption often fails because observed mortality rates are influenced by various factors, including tempo effects. When the timing of deaths shifts between periods, mortality rates for a given calendar year can change even if the underlying mortality risks remain unchanged. These timing shifts violate the assumption that mortality rates remain constant over time within the observed period and affect the rates' numerator more strongly than their denominator. Consequently, tempo effects can artificially inflate or deflate mortality rates, resulting in biased estimates of period indicators—such as the PLE—when these rates are aggregated over the life course. This dynamic has been clearly demonstrated using simple mortality models by(Bongaarts and Feeney, 1964) and (Luy, 2008).

3 Data & Methods

3.1 Data

Data on deaths and exposure (person-years lived) by single year of age, sex, and calendar year (2010–2016), as well as cohort deaths, for the United States, Japan, and Switzerland are taken from the Human Mortality Database (HMD).

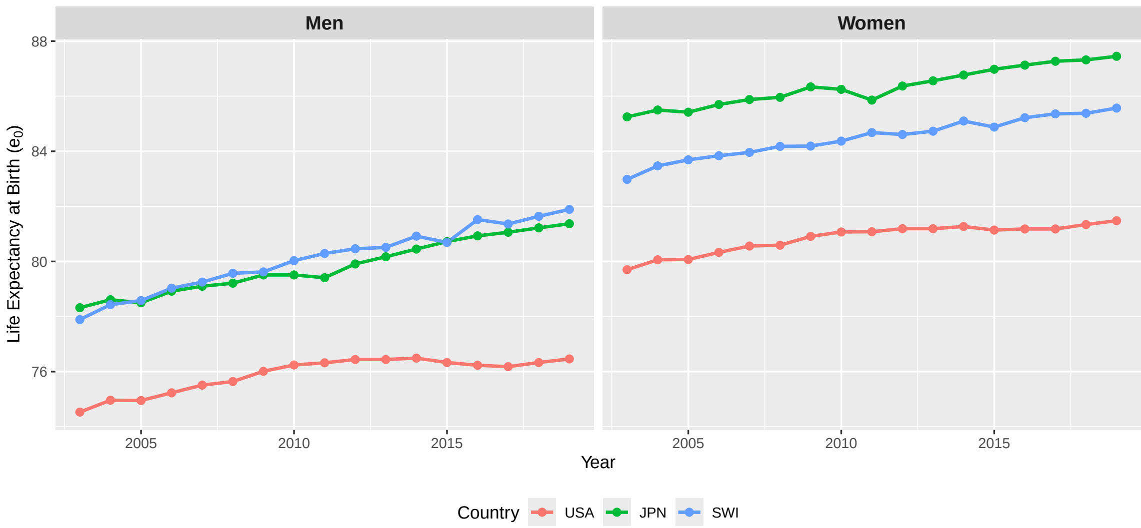
3.2 Methods

To assess how tempo effects contribute to the stagnation of life expectancy in the United States, we first examine trends in the total mortality rate (TMR). While the TMR is not commonly employed, it serves as a valuable tool for identifying shifts in the timing of deaths, whether these occur earlier or are postponed. The TMR is calculated as the sum of all cohort deaths in a given year, normalized by the size of the respective cohorts. When mortality patterns are stable and the timing of deaths remains constant, the TMR equals 1.0. A TMR below 1.0 indicates that deaths are occurring sooner than expected, whereas a TMR above 1.0 signals that deaths are being delayed. After examining TMR trends, we compare them to changes in life expectancy. The key feature of the TMR is that its fluctuations capture how changes in the timing of deaths affect life expectancy over a given period (Murphy et al., 2019; Luy, 2006). Therefore, under the proportional shift assumption, TMR can be used directly to adjust period life expectancy for timing effects. Once evidence of shifting deaths has been found, tempo-adjusted life expectancy (LE*) is calculated following the method introduced by Bongaarts and Feeney. This adjustment removes distortions caused by timing shifts, yielding a more accurate representation of underlying mortality conditions. In addition to LE*, we also calculate two complementary indicators: the cross-sectional average length of life (CAL) and the mean age at death (MAD). All methods are described in detail by Bongaarts (2005). Finally, we compare trends across these measures to evaluate the impact of tempo effects on US period life expectancy and the growing gap with peer countries during the study period.

3.3 Preliminary Results

Figure 1 illustrates trends in life expectancy at birth by sex for the US, Japan, and Switzerland from 2003 to 2019. It shows that US males and females consistently had a lower life expectancy than their counterparts in Japan and Switzerland. While the gap widened over time for males, it remained relatively stable for females. In 2019, Swiss males had the highest life expectancy, reaching at nearly 82 years—about 5.5 years longer than US males. In 2019, Japanese women outlived their US peers by almost 6 years, with a life expectancy of 87.4 years.

Figure 1: Trends in life expectancy at birth by sex in the US, Japan, and Switzerland (2003-2019)



Source: Human Mortality Database (2025).

4 Future work

This is study is ongoing and currently working on estimating the tempo-adjusted indicators and comparing results across the United States, Japan, and Switzerland.

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