

Life expectancy losses and bounce-backs during the COVID-19 pandemic

Life expectancies diverged in 2021, approaching pre-pandemic levels in Western Europe and further worsening in Eastern Europe, USA and Chile. Life expectancy deficits in 2021 are almost solely explained by premature deaths due to COVID-19. Correspondingly, countries with a higher share of vaccinated individuals suffered the least life expectancy deficit.

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The question

The COVID-19 pandemic disrupted long-standing trends of improvements in global mortality¹. Analysis of mortality data confirmed that excess deaths in 2020 were predominantly the direct result of COVID-19 (ref. ²). Fortunately, by early 2021, vaccination campaigns had begun, and one could remain optimistic that 2020 was just a short-term shock to population health. Indeed, tracing back the development of life expectancy over the past century shows that, despite drastic temporary disruptions due to wars or pandemics, the overall trend continued to rise³. Thus, we asked whether 2021 indeed saw a recovery of improvements in global mortality, or whether we were headed for a longer period of stagnation in life expectancy.

The observation

Life expectancy is a widely used measure of population health in a given year. In times of elevated mortality, life expectancy declines; in times of falling burden of death, it increases. Because of the long-run tendency for life expectancy to rise from year to year, drops in life expectancy are a robust, cross-nationally comparable indicator of deteriorating population health.

We estimated life expectancy across Europe, the USA and Chile from 2020 through 2021. Our results showed diverging pandemic trajectories in 2021. While most countries in Western Europe experienced bounce-backs from previous life expectancy losses, life expectancy for most of Eastern Europe, the USA and Chile dropped even further below their pre-pandemic values (Fig. 1). However, throughout the pandemic, all 29 countries in our analysis have had lower life expectancy than expected had pre-pandemic trends continued. This 'life-expectancy deficit' can be attributed almost solely to additional deaths registered 'due to COVID-19'. Notably, those countries that had higher proportions of people fully vaccinated by October 2021 saw smaller life expectancy deficits in winter 2021.

Protecting the older and younger populations is key to limiting life expectancy losses. In 2021, Sweden, Switzerland, Belgium and France saw their life expectancy levels return

to pre-pandemic levels after suffering record losses the previous year (Fig. 1). These countries achieved this by reducing mortality among people aged >80 years back to 2019 levels, while avoiding a shift in the mortality burden towards younger generations. Conversely, the USA successfully normalized the risk of death among those aged >80 years in 2021 but failed to bounce back from their record life expectancy losses in 2020. The reason for this was that mortality in the USA in 2021 increased among the working-age population. In many Eastern European countries, a bad pandemic year was followed by a worse one as mortality increased across the age spectrum, from young to older adults.

The implications

Optimism in 2021 was certainly not unjustified, as some countries in Western Europe witnessed a bounce-back to pre-pandemic life expectancies following an acute mortality crisis in 2020. Yet, at the same time, a record drop in life expectancy in 2020 in other countries was followed by further losses in 2021, especially in Eastern Europe. Crucially, these opposite developments fall along the line of pre-existing inequalities in population health. At least in the short term, the pandemic triggered a 'Matthew effect' of cumulative disadvantage leading to mortality divergence between European regions.

We are still early in the process of explaining the relative successes of different countries in containing and reversing the mortality effects of COVID-19. Although it is unsurprising that the least vaccinated populations suffered the largest life expectancy deficits, this finding will need to be expanded by taking into account additional factors, such as regional differences in health system capacity, pre-existing population morbidity and non-pharmaceutical interventions.

Demographers around the world will continue to monitor the effect of COVID-19 on mortality. Eventually, we will know whether COVID-19 was temporarily disruptive – like other events throughout the last century – or changed the long-standing trend of population health improvements.

Jonas Schöley and Maxi S. Kniffka

Max Planck Institute for Demographic Research, Rostock, Germany.

EXPERT OPINION

“This study documents substantial variation in life expectancy in 2021 across largely high-income countries, with some countries experiencing additional reductions on top of their 2020 losses and others returning to their

pre-pandemic levels. This is an important study and one of the first to examine the continued impact of the pandemic in 2021.”

Theresa Andrasfay, University of Southern California, Los Angeles, CA, USA.

FIGURE

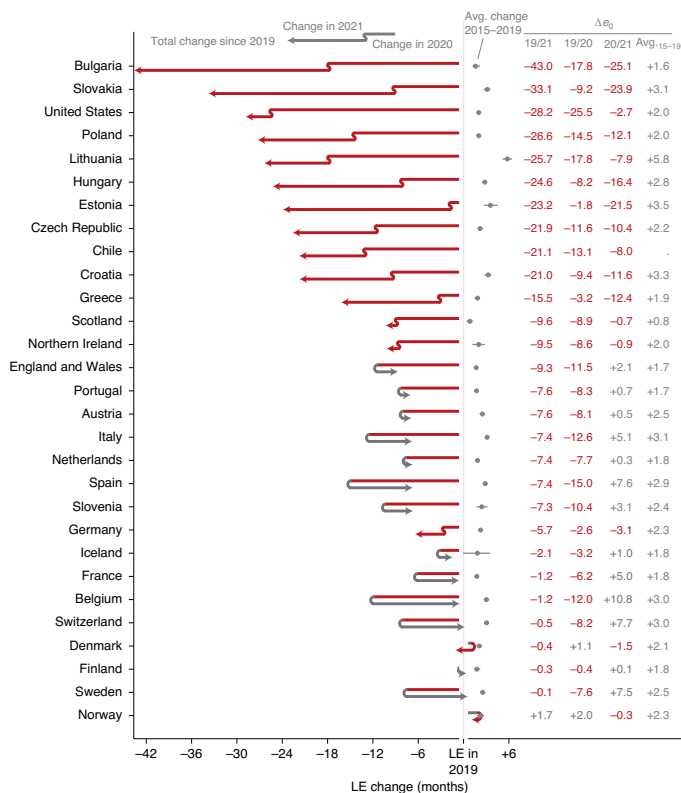


Fig. 1 | Life expectancy changes since 2019 across Europe, USA and Chile. Longstanding trends of increasing life expectancy have been disrupted by the COVID-19 pandemic. Whereas some countries quickly recovered to pre-pandemic levels, others suffered compound losses in life expectancy two years into the pandemic. The change in period life expectancy over time is denoted as Δe_0 . Countries are ordered by increasing cumulative losses in life expectancy since 2019. Grey dots indicate the average annual changes in life expectancy over the years 2015 through 2019 (95% uncertainty interval). © 2022, Schöley, J. et al., [CC BY 4.0](#).

BEHIND THE PAPER

Calculating a life expectancy is straightforward – the hard part is to build reliable vital statistics registration systems; to ensure that weekly death counts are published in a timely manner; and to gather and harmonize the data published by dozens of statistical agencies in different languages and different formats. Our ability to estimate the toll of COVID-19 on the level of whole populations is the result of immense, often decentralized, and largely uncredited data collection efforts

by national statistical systems. Without all these foundational data, the very real large-scale impact of the pandemic could all too easily be buried under a bunch of anecdotes. This paper came about because a lot of the crucial data harmonization work is being performed at the Max Planck Institute where we work. Without the timely work by the Laboratory for Demographic Data and the Population Health group, this paper would have taken another year to write. **J.S. & M.S.K.**

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FROM THE EDITOR

“The world saw a rise in mortality following the advent of the COVID-19 pandemic. This paper shows us how, during two years of the pandemic, different countries around the world saw life expectancy change significantly. It highlights disparities between countries, and considers the impacts of vaccine rollouts. It also shows us the life expectancy impacts of COVID-19 in stark historical context, allowing comparison with past mortality shocks.” **Charlotte Payne, Senior Editor, Nature Human Behaviour.**