

LIFE EXPECTANCY DRIVES U.S. AND WORLD POPULATION GROWTH

An NPG Forum Paper
by Edwin S. Rubenstein

In the latest *New York Times* Health Issue, author Steven Johnson notes that **“Between 1920 and 2020, the average human life span doubled,”** adding that **“...the spike in global population has not been caused by some worldwide surge in fertility. What changed is people stopped dying.”**¹

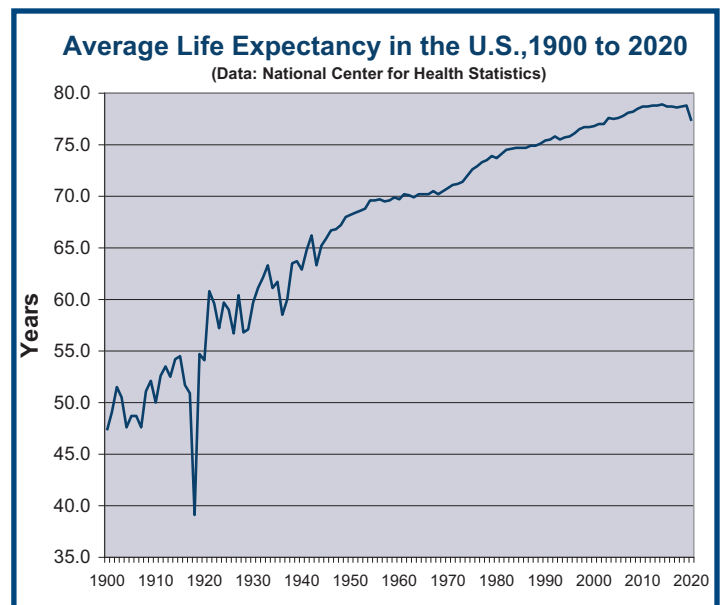
Ironically, Johnson’s historical narrative starts at a moment in time when it seemed people would never **“stop dying.”** In September 1918, a flu virus began spreading through Camp Devon, a crowded military base outside Boston. By the end of the second week, one in five soldiers came down with the illness. But the real shock, as described in the camp physician’s notes, was its lethality: **“It is only a matter of a few hours then until death comes,”** he wrote. **“It is horrible. One can stand it to see one, two or 20 men die, but to see these poor devils dropping like flies sort of gets on your nerves. We have been averaging about 100 deaths per day.”**²

Sound familiar?

In fact, the 1918 flu pandemic was worse than COVID-19. The best estimates suggest as many as 100 million people died from the Spanish Flu that eventually circled the world. To put that in context, as of January 14, 2022, 5.5 million people have died from

all COVID variants, on a planet with four times as many people.

A graphic may be the best way to appreciate the over-sized impact of the 1918 flu on U.S. life expectancy:



The 1918 pandemic saw a terrifying slash in U.S. life expectancy. Practically overnight expectancy plunged by 12 years, from 51 in 1917 to 39 in 1918. At its peak, from 1918 to 1919, nearly half of all U.S. deaths were attributed to the Spanish flu. Yet no one, except for a few Federal statisticians, knew the full extent of the calamity. There was no panic. Parents sent their children to school as before.

And – most amazingly – by 1919, life expectancy was at pre-pandemic highs. Think about it: No mask mandates, no flu vaccines, no public service announcements, and a government that never publicly acknowledged the problem. But the country was far less densely populated, our air was clearer, and extreme weather events were less frequent.

By comparison, COVID's impact on life expectancy is barely perceptible. Look at the two points at the far right of the graphic. They are from a Federal report released last summer, and show life expectancy fell from 78.8 years in 2019 to 77.3 years in 2020, a decline of 1.5 years.³ But it has changed our lives completely – perhaps forever.

Two flu pandemics; two radically different reductions in life expectancy. Why?

Hint: It's *not* just because of advances in medical knowledge between 1918 and 2020. The answer lies in the viruses themselves. They were different. The 1918 flu variant was unusually lethal among young adults, while deaths among older people were rare. By contrast, an older demographic – the nursing home population, for example – was more likely to succumb to the 2020 COVID variant.

Life expectancy in a given year is calculated as the average age of individuals who die in that year. When abnormal numbers of young people perish, life expectancy falls dramatically. **Statistically, a 20-year-old victim of the 1918 pandemic could have lived another 31 years, had they spent their entire lives under the conditions of 1917.**⁴

When otherwise healthy older people die from COVID, average life expectancy also declines – though not nearly as much. **An 85-year-old COVID victim in 2020, for example, would have lived an additional six years, on average, under the conditions of 2019.**

THE DELTA DIFFERENCE

A study published in the BMJ (formerly the *British Medical Journal*) assessed premature deaths in 37 countries, comparing life expectancy in 2020 with what would have been if the historical trends from 2005-2019

remained in place.⁵ Life expectancy dropped in 31 of those countries during the pandemic.

The U.S. decline was among the worst. (U.S. men saw life expectancy decline by nearly 2.3 years.) Only Russia fared worse.

One surprise: the most recent drop in U.S. life expectancy was driven mainly by deaths of young people. In the U.S. **“...we have lost a huge amount of people at a young age. That's really, really sobering,”** Dr. Nazrul Islam, an Oxford University researcher and the study's lead author, is quoted as saying.⁶

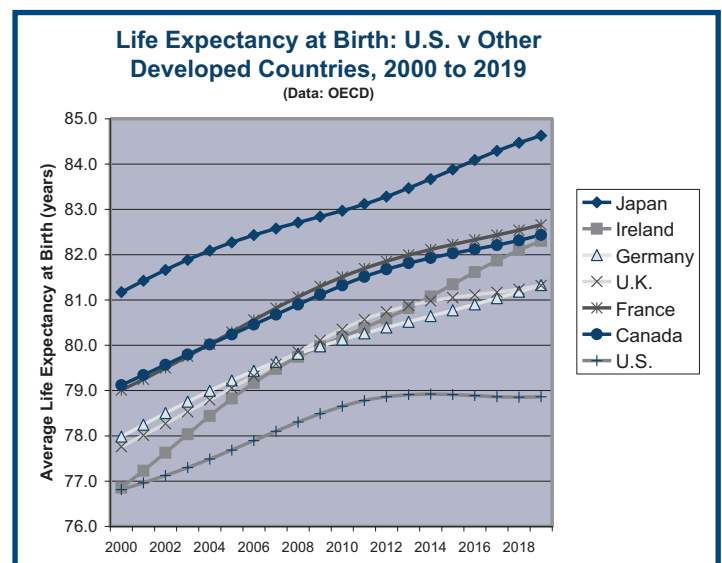
“Early in 2020, COVID primarily killed older U.S. adults in densely populated hot spots. But since the delta variant took hold [in the summer of 2021] the disease has shifted its burden to those who have not gotten the shot... Data says younger, Southern, rural, and white populations are now more at risk.”⁷

The BMJ paper suggests that the U.S. did a relatively poor job of protecting young people during the pandemic and that the country's life expectancy has dropped at a faster pace since at least World War II.

Since December 2021 the Omicron variant has infected more people than Delta and early COVID combined, but its death rate appears to be considerably lower. Young people are still dying, however, and as a result, U.S. life expectancy could well be lower in 2021 than it was in 2020.

THE U.S. FALLS BEHIND

Despite spending far more on health care per capita than other rich countries, our average life expectancy is shorter – and the gap is growing larger:



Since the data are all pre-COVID, the rising gap reflects non-COVID causes of death that affect young people. Among them:

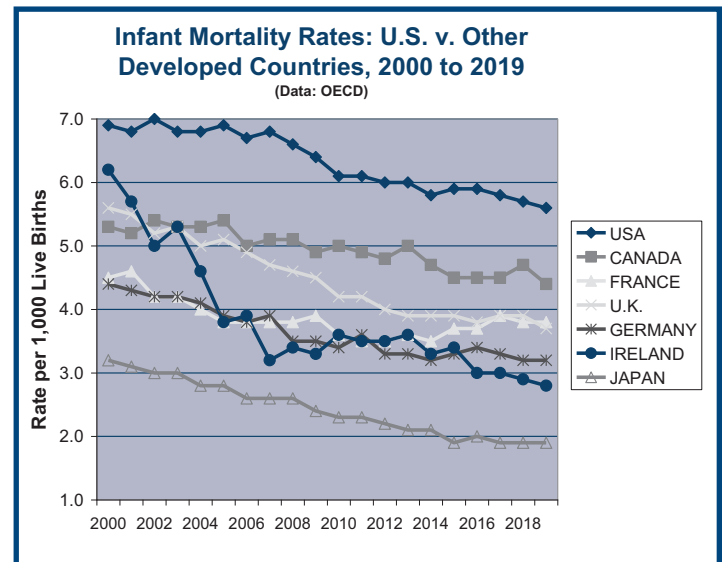
Opioid Overdoses No country saw a surge in opioid deaths as large as the U.S. Though still a relatively rare cause of death – about 1.7% of Americans die from it annually – it proportionately lowers life expectancy because victims are relatively young.⁸ In 2019 the opioid death rate in the U.S. was 2.6-times the average for all high income countries, and 12.6-times the average for all countries.⁹ The pandemic appears to have re-kindled the opioid overdose crisis: More than 40 states have reported increases in opioid related deaths since the pandemic began, according to the American Medical Association (AMA).¹⁰

Suicides While world suicide rates have fallen substantially in recent years, they are rising here. The U.S. stands out in particular in suicides from firearms, which are much rarer in most countries around the world. Suicides are also among the few causes of death that are a high risk for younger people.¹¹ The relative youth of suicide victims, and the fact that suicides are rising here and falling in many other rich countries, make it a powerful explanation for the burgeoning life expectancy gap between us and other wealthy countries.

Homicides There is good news and bad news. The good news: since 1990 murder rates have declined substantially here. Bad news for the U.S.: Other rich countries have experienced even larger declines. (See graphic.)

Because most murder victims are young, this contributes to the widening life expectancy gap between the U.S. and other rich countries. **More bad news:** during the pandemic homicides have spiked dramatically in the U.S. International data for 2020 and 2021 will likely show U.S. murder rates higher relative to other rich countries, and our life expectancy lower.

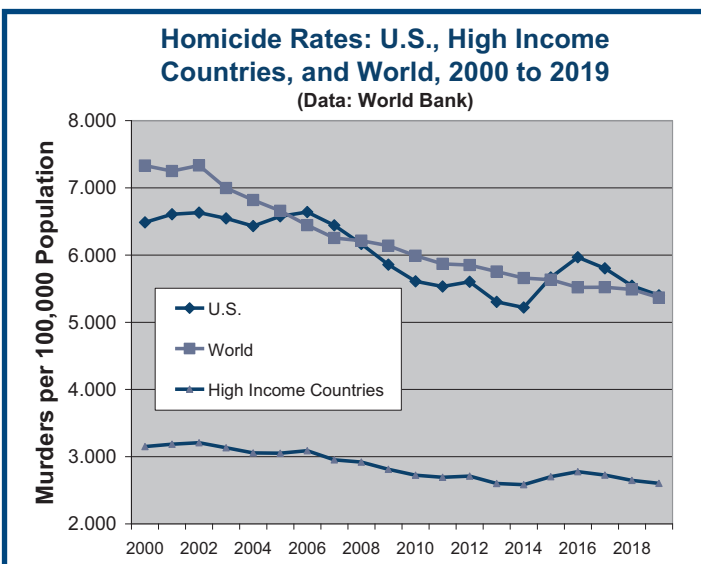
Infant Mortality The 900-pound gorilla among explanations for our lagging life expectancy is infant mortality — the share of newborns that do not survive their first year of life. It is higher here than in just about every other rich country:



High infant mortality reduces life expectancy more than any other factor, as the very short life span pulls the average age of death down immensely.

Steven Johnson’s take on this is enlightening: **“In a society with very high infant mortality, life expectancy at birth might be 20, because so many people die in the first days of life, pulling the overall number down, while life expectancy at 20 might easily be in the 60s. The doubling of life expectancy over the past century is a result of progress at both ends of the age spectrum: Children are dying far less frequently, and the elderly are living much longer. Centenarians are projected to be the fastest-growing age group worldwide.”**¹²

Not just infants, but their mothers are also more likely to die in the U.S. And while the rate at which new mothers are dying is falling in almost all countries in the world, it is increasing here.¹³



THE DOWNSIDE OF HIGHER LIFE EXPECTANCY

It is frequently assumed by the general public, and even population “experts,” that the replacement level Total Fertility Rate (TFR) is everywhere an average of 2.1 lifetime births per woman. **“Nothing could be further from the truth,”** writes Thomas J. Espenshade, an emeritus professor of sociology at Princeton University’s Office of Population Research.¹⁴

By his reckoning, replacement level fertility in East Africa – a region of exceptionally high infant mortality, was 2.94 births per woman. Pushing the rate down to 2.1 could lead to long-term population decline – a highly undesirable outcome, according to the professor.

Espenshade’s warning dates from 2003, a time when rapid growth in population and GDP were unquestioned **“Holy Grails”** for international policymakers. He would be even more fearful today. A study published in *The Lancet* in 2020 predicts global TFR will fall steadily, from 2.37 in 2017 to 1.66 in 2100, with rates falling to around 1.23 in Italy and Spain, and as low as 1.17 in Poland.¹⁵

Even slight changes in TFR translate to huge differences in future population: a rise by as little as 0.1 births per woman translates to around 500 million more individuals on the planet in 2100.¹⁶ The 2020 study finds that access to modern contraception and the education of girls and women are generating widespread, sustained declines in fertility and population.

The table presents population scenarios for selected countries, as projected in the *Lancet* study:

| Population Scenarios for Selected Countries, 2017 to 2100 | | | | | |
|--|--------------------|---------------------------|--------------------|-------------------------------|-------------------------------|
| (population in millions; ranked on projected 2100 population) | | | | | |
| | Population 2017 | Population (PEAK YEAR) | Population 2100 | Total Fertility Rate, 2017 | Total Fertility Rate, 2100 |
| World | 7,640.5 | 9,732.9 (2064) | 8,785.6 | 2.37 | 1.66 |
| India | 1,380.6 | 1,605.6 (2048) | 1,093.2 | 2.14 | 1.29 |
| Nigeria | 206.1 | 790.7 (2100) | 790.7 | 5.11 | 1.69 |
| China | 1,412.5 | 1,431.9 (2024) | 731.9 | 1.53 | 1.47 |
| U.S. | 324.8 | 363.8 (2052) | 335.8 | 1.81 | 1.53 |
| Pakistan | 214.3 | 314.1 (2062) | 248.4 | 1.40 | 1.31 |
| Indonesia | 258.1 | 300.5 (2047) | 228.7 | 1.97 | 1.51 |
| Russia | 146.2 | 146.2 (2017) | 106.5 | 1.61 | 1.43 |
| Japan | 128.4 | 128.4 (2017) | 59.7 | 1.33 | 1.32 |
| Ukraine | 44.7 | 44.7 (2017) | 17.6 | 1.40 | 1.32 |

Data: The Lancet, *Fertility, mortality, and population scenarios for 195 countries, July 2020.*

The (Relatively) Good News: World population will likely peak at 9.7 billion in 2064, and then decline to about 8.8 billion by 2100 – about 2 billion lower than the latest UN projection. The difference in population forecasts is attributed to faster declines in sub-Saharan African fertility, and lower TFRs in countries with below-replacement fertility, especially China and India.¹⁷

Nevertheless, the population of sub-Saharan Africa is forecast to triple over the course of the century – from 1.03 billion in 2017 to 3.07 billion in 2100 – as death rates decline and the number of women entering child bearing age rises.

Warning: What happens in Africa does not stay in Africa. For years sub-Saharan African countries have ranked among the top sources of U.S. refugee resettlements. Top refugee senders include Somalia, Republic of the Congo, Central African Republic, and Eritrea. It's a vicious cycle: their rapid population growth nourishes economic and political instability, producing still more refugees.

The Bad News: Two billion fewer humans by 2100 is not even close to what's needed. Sustainable development goals require a global population of 6.29 billion in 2100 – 2.5 billion, or 28%, below the latest forecast, according to authors of the *Lancet* study. **(We note here that the entire world population in 1972, when Don Mann founded NPG, was 2.5 billion.)**

The Really Bad News: Rising life expectancy and higher than anticipated increases in population of women in child bearing years could postpone, or even reverse, the population declines forecast in the study.

The Russia/Ukraine Connection Both countries are projected to lose population by 2100 – Russia down by 27% from 2017, while Ukraine will experience a 61% fall. Should Putin succeed in annexing the entire country, the combined population in 2100 would be smaller than Russia alone was in 2017. Bottom Line: Putin's war does not appear to offer long-term population benefits. One must wonder: Is Poland next?

A “**Population is Power**” mindset permeates the worldview of demographers – the professionals who conduct research on population issues. We should not be surprised: professional researchers often “**fall in love**” with the subjects they research: energy economists invariably see higher energy prices as a sign of national economic strength. Businessmen are subject to the same delusions: Charlie Wilson, President of GM in the 1950s, famously proclaimed “**What's good for GM is good for the country.**”

So we can excuse Professor Stein Emil Vollset, the lead author of the *Lancet* study, for warning that “**...our findings suggest that the decline in the numbers of working-age adults alone will reduce GDP growth rates that could result in major shifts in global economic power by the century's end. Responding to population decline is likely to become an overriding policy concern in many nations...**”

And understand why Dr. Richard Horton, Editor in Chief of *The Lancet*, concluded that: “**.... The 21st century will see a revolution in the story of our human civilisation. Africa and the Arab World will shape our future, while Europe and Asia will recede in their influence. By the end of the century, the world will be multipolar, with India, Nigeria, China, and the US the dominant powers. This will truly be a new world, one we should be preparing for today.**”¹⁸

But the evidence linking high population growth to lower standards of living is overwhelming.¹⁹ So if Vollset and Horton are right, the future will be increasingly “shaped” by countries suffering from diminished standards of living. That conclusion seems counter-intuitive at best, and utter nonsense at worst.

A BRIEF HISTORY OF LIFE EXPECTANCY

Life expectancy tables did not exist until the 1600s, stimulated by the desire of English elites to know how they were doing health-wise relative to people in more modest circumstances. It was the dawn of statistical

measurement and analysis. Those tables, it turned out, were “...**one of those advances in measurement that transform the thing being measured.**”²⁰

By tracking changes in life expectancy over time, and comparing expected life times among different groups, it became possible to detect inequalities in health outcomes, uncover long-term threats, and decipher which treatments worked best for each group.

One amazing thing about the life expectancy story is how steady the number was for most of human history. Until the mid-1700s, the figure appears to have hit a ceiling of about 35 years, rising or falling with a good harvest or the outbreak of a disease, but never showing a long-term improvement.

High child mortality – two in five children died before adolescence – was key to the lack of progress. **“Human beings had spent 10,000 years inventing agriculture, gunpowder, double-entry accounting, perspective in painting-...”** Steven Johnson observes, **“- but these undeniable advances in collective human knowledge failed to move the needle in one critical category: how long the average person could expect to live.”**²¹

Around 1750 the average life expectancy of British aristocrats began to rise at a steady rate, year after year. By the 1770s, they were living into their mid-40s, on average; by the middle of Queen Victoria’s reign (roughly the 1860s to 1890s) they were approaching a life expectancy at birth of 60.

The watershed event during this period was Edward Jenner’s invention of the smallpox vaccine. Like many technological breakthroughs – Franklin’s kite, Newton’s apple – it was serendipitous:

“...After noticing that exposure to a related illness called cowpox — often contracted by dairy workers — seemed to prevent more dangerous smallpox infections, Jenner scraped some pus from the cowpox blisters of a milkmaid and then inserted the material, via incisions made with a lancet, into

the arms of an 8-year-old boy. After developing a light fever, the boy soon proved to be immune to variola, the virus that causes smallpox.²²

Higher life expectancies for British elites did not trickle down to ordinary folks until the late 19th and early 20th centuries, when – thanks to mass political and legal campaigns – vaccination spread through the rural poor and the industrial working classes.

Unfortunately, a powerful countervailing force – industrialization – negated much of the gain. As Steven Johnson puts it **“...the overall balance sheet of scientific and technological advances was a net negative in terms of human health: The life-span benefits of one technological advance (...vaccines) were quickly wiped out by the costs of another (industrialization).”**²³

Mortality trends in the U.S. were equally stark. Despite widespread adoption of vaccination, overall life expectancy dropped in the first half of the 19th century. Child mortality skyrocketed: in 1815 about 30% of all reported deaths in New York were children under 5; by the middle of the century, it was more than 60%.

The brutal child killer, fingered by a progressive New York journalist named Frank Leslie for what he called **“...the wholesale slaughter of the innocents,”** was **“...neither a mobster or a drug peddler, but a more surprising nemesis: milk.”**²⁴

Drinking animal milk – a practice as old as domestication itself – presents health risks, from spoilage to infections passed down from the animal itself. The size and density of industrial cities like New York made cow’s milk far deadlier than it was in earlier times.

Before the age of refrigeration, milk would spoil in summer months. It was usually transported in large metal containers stacked in non-refrigerated rail cars. The nearest pastures were in upstate New York or New Jersey.

How did milk go from being a **“liquid poison”** – as Leslie called it – to the epitome of health and vitality that it became in the 20th century? You can thank a scientific breakthrough - **pasteurization** - and an organizational advance – a network of **“milk laboratories”** where pasteurized milk could be mass produced and distributed to working-class families.

Once again, serendipity played a role. Louis Pasteur was looking for ways to kill bacteria in wine when he discovered it worked for milk also.

Public acceptance of pasteurized milk took time: **“By the early 1920s, three decades after the [first milk laboratory]... [and] more than half a century after Pasteur made his namesake breakthrough – unpasteurized milk had been outlawed in almost every major American city.”**²⁵

Another universally consumed liquid – water – served as a vehicle for another egalitarian rise in lifespan. In the first decades of the 20th century cities around the world began putting microscopic amounts of chlorine in drinking water. In high dosages, chlorine is a poison. In very small doses it is harmless to humans, but lethal to bacteria that cause typhoid fever and cholera. Within a few years chlorination cut death rates from those water-borne diseases by a factor of 10.²⁶

A plethora of vaccines – for whooping-cough, tuberculosis, diphtheria, and most famously, for polio in the early 1950s, triggered higher life expectancy in developed countries.

THE MAGIC BULLET

Vaccines could protect you from future infections, but if you actually got sick – or developed an infection from a cut or surgical procedure – there was very little that medical science could do for you. There were plenty of pills, but they treated symptoms rather than causes – and the vast majority were ineffective.

Not until the mid 20th century did medical drugs have a significant impact on life expectancy. Antibiotics, including the most famous “magic bullet” of all –

penicillin –triggered a revolution in human health. Mass killers like tuberculosis were almost completely eliminated. Physicians had useful drugs to prescribe. **“Hospitals are no longer places we go to die, offering nothing but bandages and cold comfort. Routine surgical procedures rarely result in life-threatening infections.”**²⁷

The mass production of antibiotics, the Green Revolution, the rise of international health organizations, lifted global life expectancy – especially in the world’s poorest countries. **“India nearly doubled life expectancy in just 70 years; many African nations have done the same, despite the ravages of the AIDS epidemic. In 1951, the life-span gap that separated China and the United States was more than 20 years; now it is just two.”**²⁸

THE THREAT OF POPULATION GROWTH

The last century was marked by nearly unbroken increases in life expectancy. This century may not be as kind. The problem, Steven Johnson warns, is human population growth:

“All those brilliant solutions we engineered to reduce or eliminate threats like smallpox created a new, higher-level threat: ourselves. Many of the key problems we now face as a species are second-order effects of reduced mortality. For understandable reasons, climate change is usually understood as a byproduct of the Industrial Revolution, but had we somehow managed to adopt a lifestyle powered by fossil fuels without reducing mortality rates – in other words, if we had invented steam engines and coal-powered electrical grids and automobiles but kept global population at 1800 levels – climate change would be much less of an issue. There simply wouldn’t be enough humans to make a meaningful impact on carbon levels in the atmosphere.

Runaway population growth – and the environmental crisis it has helped produce – should remind us that continued advances in life expectancy are not inevitable...”²⁹

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