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# Death Gets in the Way of Old-Age Gains



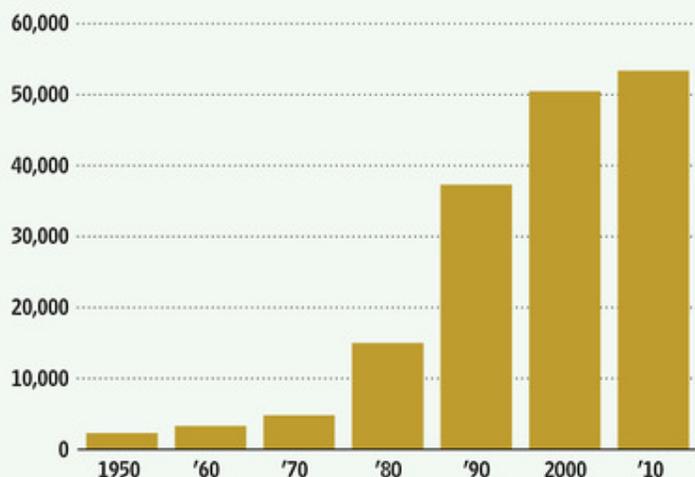
By CARL BIALIK

A new research paper, and a census surprise, are calling into question some long-held beliefs about a morbid bit of math: how much mortality rates increase with age.

It's no surprise that the older a group of people get, the higher the percentage of them who will die in any given time period. Benjamin Gompertz, a 19th-century British mathematician, charted the increase in mortality rates as very regular. His Gompertz law of mortality says that each additional period brings a constant percentage increase in mortality rates.

### Survivors

The increase in the number of centenarians in the U.S. has begun to slow, raising questions about gains in old-age survival.



Note: Numbers prior to 1990 are estimates, revised from census counts to fix flaws in data.

Source: U.S. Census Bureau

The Wall Street Journal

In the 20th century, though, as the world population aged and demographers' data improved, Gompertz started to look fallible. Researchers have found that, starting around age 80, mortality keeps increasing, but more slowly. More 100-year-olds die before turning 101 than 80-year-olds do before their 81st birthday, but the difference was less than Gompertz predicted.

But Gompertz may be right after all. In a study published last year and publicized last month, two longtime researchers of aging and believers in the late-life mortality slowdown reported that they and others were wrong. Death rates among Americans born between 1875 and 1895 kept on climbing steadily as they aged, they found, all the way through age 106, when their numbers got too sparse to follow.

This is bad news for anyone who wants to reach the century mark, but could provide an odd measure of relief for pensions, retirement programs and medical insurers, whose costs rise as people live longer.

The result came as a surprise to the study's authors, Leonid Gavrilov and Natalia Gavrilova, a husband-and-wife team at the Center on Aging, part of the research center NORC at the University of Chicago. They married in 1975 after he proposed—with a promise he would discover how to halt aging if she would accept.

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In their jointly written papers and books over the past three-plus decades, they have advanced what they call a reliability theory of aging. This suggests that the body, like a machine, amasses more flaws as it ages. Redundancies in design meant to keep it from failing become more heavily loaded with time, increasing the probability of breakdown, or death. Past a certain point, these layers of defense have fallen away and mortality approaches a constant rate.

Their model therefore predicted a slowdown in mortality increases with age, which their new study calls into question. "We are confronted with inconvenient truth for our theory, and we have to accept what the data say," the authors wrote in a response to questions, that, like most of their writing, was a collaborative effort. "Now we are trying to reconcile the reliability theory of aging with our new observations."



Getty Images

Senior citizens in Chicago protesting last November against cuts to federal safety net programs, including Social Security, Medicare and Medicaid.

Their findings have created a stir among demographers and others who study the very oldest people. Some hail the findings as offering important insight into how people age, and in explaining an unexpected slowdown in the rise in the ranks of American centenarians.

In 2004, the Census Bureau projected that there would be 114,000 people aged 100 or older by 2010 and 1.1 million centenarians by 2050. But the 2010 census counted just 53,364, a slender 5.8% increase from 2000. And now the Census Bureau is projecting there will be 592,000 Americans age 100 or older by 2050.

"Centenarian data have a long history of being affected by various data-quality issues," says Julie A. Meyer, an analyst in the Census Bureau's population division. She adds that the bureau's projections staff "is continuing to improve the accuracy of mortality estimates."

Robert Young, who administers the database of the Gerontology Research Group, which tracks the world's oldest people, says the new study "helped to explain why this error was made." He adds, "It seems that predictions of future centenarian counts are often unnecessarily rosy."

However, other researchers question the findings. Underlying the controversy is that many other studies have documented the plateau in death rates the new study rebuts.

"There is actually a very deep controversy underlying the results presented," says Laurence Mueller, a professor of ecology and evolutionary biology at the University of California, Irvine.

One aspect of how the latest study was conducted may help explain some of the discrepancy. Dr. Gavrilov and Dr. Gavrilova used a data set of deaths from the Social Security Administration that allowed them to track all Americans born between 1875 and 1895 who died before 2011—presumably, all of them. This presents two advantages over other data sets. One is that birth and death dates are derived from the same source, rather than potentially inconsistent data. Another is they can track monthly rather than annual changes in mortality, which can help correct for understated death rates.

It remains to be seen, though, if this pattern will apply to other sets of aging populations. Dr. Gavrilov and Dr. Gavrilova say they will be watching. "For people born after the 1940s, there is only one way to get mortality data above age 80 years," they write. "That is to wait."

Learn more about this topic at [WSJ.com/NumbersGuy](http://WSJ.com/NumbersGuy). Email [numbersguy@wsj.com](mailto:numbersguy@wsj.com).

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