

# The disproportionate burden of multi-morbidity at death in the US

Magali Barbieri, Aline Désesquelles, Viviana Egidi, Luisa Frova, Francesco Grippo, France Meslé, Marilena Pappagallo, Sergi Trias-Llimós | February 16, 2026



*Using multiple cause-of-death data from the United States, France, Italy, and Spain, Magali Barbieri and colleagues show that multi-morbidity at death contributes disproportionately to the US disadvantage in life expectancy at birth compared with peers, especially for working age adults.*

Excess mortality in the United States (US) is significantly higher than in other countries at similar levels of socioeconomic development (National Research Council, 2013). The US is also disadvantaged in terms of morbidity and, more generally, the prevalence of risk factors for major diseases (Chowdhury, 2023). In a recent article, we measured the contribution of multi-morbidity at death to the mortality gap between the US and three other high-income countries with comparable data, namely France, Italy, and Spain, using multiple cause of death data for 2017 (Barbieri et al., 2025).

## **An original approach to identify multi-morbidity contribution to death**

Unlike most previous studies on multi-morbidity based on survey data, we used information from routinely collected vital statistics data on mortality. This approach has the advantage of providing widespread, systematic, cost-efficient, and highly comparable information on multi-morbidity at death, given that all high-income countries now use unified definitions and the same data collection instruments, i.e. the World Health Organization recommended death certificate with all causes of death coded to the International Classification of Diseases.

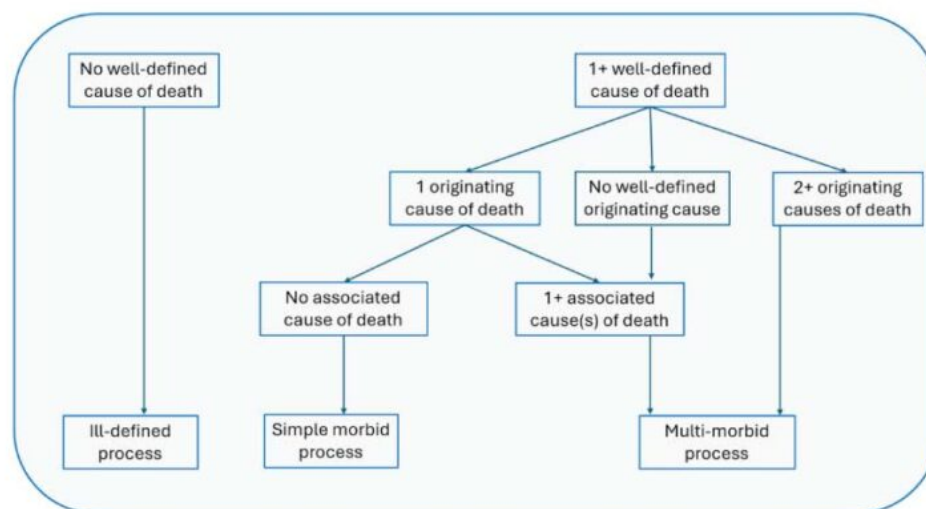
Causes of death are listed on two different sections of the certificate. In Part 1, certifiers report all the medical causes involved in the sequence of health conditions that led directly to death. In Part 2, they record all other causes that were not part of the sequence(s) listed in Part 1, but that nonetheless contributed to death by influencing the course of the morbid

process, for instance by eroding an individual's overall health status. These conditions are called associated causes of death. Our study analyzed these multiple causes of death, which include all the causes and conditions reported on both sections of the death certificate, to classify deaths according to the type of morbid process.

Using all death certificates in the year 2017 (the most recent for which we could access the data in all four study countries at the time of the analysis), we grouped deaths into three categories, depending on whether the morbid process could be considered as 1) simple, 2) multi-morbid, or 3) ill-defined. Following Grippo et al. (2024), we identified all the originating causes, i.e. the conditions that initiated a chain of morbid events. Our definitions are as follows:

- **Simple:** processes that characterize deaths with a single originating cause and no associated cause listed on Part 2 of the death certificate;
- **Multi-morbid:** processes that characterize deaths with more than one originating cause or with associated causes; and
- **Ill-defined:** processes that characterize deaths with no well-defined causes, meaning that the death certificate did not list any known cause of death or only symptoms, signs or poorly informative conditions (e.g. "respiratory arrest") (Figure 1).

Figure 1. Classifying deaths according to the morbid process



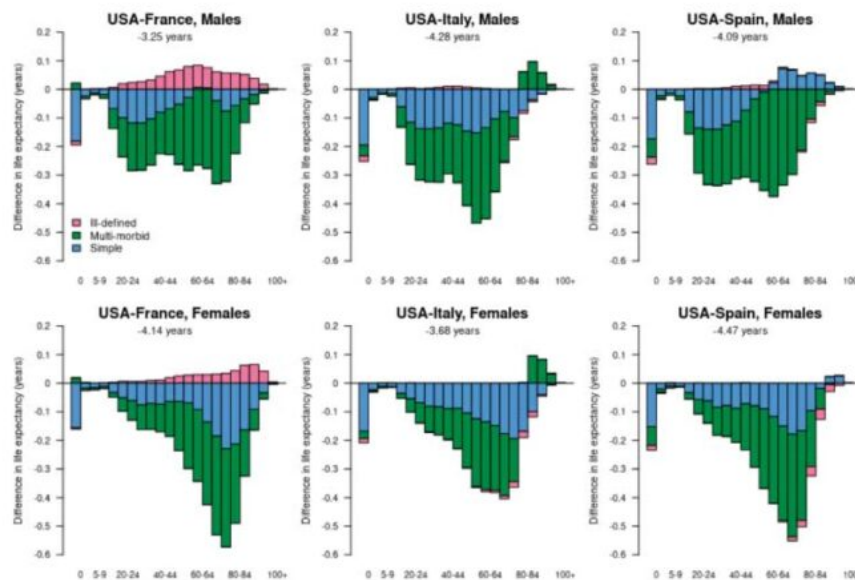
We calculated mortality rates by sex and age for each of the three types of morbid processes in the four study countries and assessed the contribution of multi-morbidity to excess mortality by sex and age group and to the gap in life expectancy at birth between the US and the three comparison countries.

## The major contribution of multi-morbidity to US excess mortality

Our analysis demonstrates that multi-morbid processes contribute disproportionately to the large mortality and life expectancy gaps between the US on the one hand, and France, Italy and Spain on the other, for both men and women. In 2017, life expectancy at birth was 78.7 years for both sexes combined in the US, much lower than in the other three countries (82.4 years in France, 82.7 years in Italy, and 83.0 years in Spain). Multi-morbid processes contributed 51% of the gap in life expectancy at birth with Italy, 73% of the gap with Spain,

and 75% of the gap with France (Figure 2). This is all the more striking because multi-morbid processes in the US contribute to a smaller share of the age-standardized death rate (46%) than simple processes (50%; the remaining 4% being attributed to ill-defined processes). This result suggests that the US disadvantage arises disproportionately from the excess mortality linked to complex, multi-condition health profiles.

Figure 2. Contribution (in years) of the three morbid processes to the difference in life expectancy at birth between the US and peer countries in 2017, each sex



As regards overall mortality, the US disadvantage in multi-morbidity is particularly concentrated among working-age adults (20 to 64-year-olds). In this age group, most of the loss is attributable to multi-morbid processes. Among men, this type of process accounted for 63% of the difference with Italy, 77% with Spain, and 88% with France; among women, the corresponding figures were 59%, 66%, and 71%.

Between one fifth and one quarter of all deaths would have been averted in the US if the country had experienced the mortality rates of Italy (20%), France (23%), or Spain (23%), with a very large proportion attributable to multi-morbid processes. Excess US deaths from multi-morbid processes represented 17-19% of the total number of deaths in the US, depending on the comparison country, versus 4-11% for those resulting from simple morbid processes. The average number of years of life lost by Americans whose deaths would have been averted if they had experienced the mortality risks of their more advantaged peers was found to be 23 years with respect to the mortality rates of France (27 years for men and 20 years for women), 27 years with respect to Spain (31 years for men and 24 years for women), and 30 years with respect to Italy (32 years for men and 28 years for women). These large values reflect the fact that excess US deaths tend to be concentrated at relatively young adult ages, when the potential for additional years of life is high.

## Implications

Multi-morbidity creates multiple challenges for medical infrastructures which, in most countries, are still designed to manage a single disease with a highly segmented system of care. Multi-morbidity is associated with increased mortality risks, disability, reduced functional status, poor quality of life, complicated treatment options, and adverse drug events

due to incompatibilities, calling for coordinated and comprehensive health care (Fortin et al., 2007). The disproportionate burden of multi-morbidity at death in the US certainly explains in part why the US spends, on average, 60% more per inhabitant on health care than other high-income countries. Because each disease comes with its own risk factors and determinants, the high prevalence of multi-morbidity in the US suggests that no single factor is likely to explain the gap with peers. It is thus unlikely that a unique intervention, program, or policy will be sufficient to close the life expectancy gap between the US and other countries. In the meantime, the disproportionate burden of multi-morbidity in the US will continue to complicate efforts to sustain progress in longevity and to improve health and quality of life of the general population.

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