Research Letter

ANTICIPATING RACIAL/ETHNIC MORTALITY DISPLACEMENT FROM COVID-19

In 2020, life expectancy in the United States decreased by an estimated 1.5 years, mainly due to the coronavirus disease 2019 (COVID-19) pandemic (1). The decline was sharper for non-White Americans (1). Life expectancy is a key metric for determining overall well-being and disparities in risks borne by different populations. To place life-expectancy statistics in the appropriate context in the coming years, we need to anticipate how they will vary due to the pandemic and account for mortality displacement (2).

Mortality displacement occurs when a catastrophic event, such as a heat wave or an infectious disease outbreak (2, 3) temporarily increases mortality rates in a population and is followed by a period of lower mortality rates. Such events usually pose the greatest risk to the most vulnerable members of the population. Mortality in these groups is thus accelerated by the event. After the event, the expected life span of the surviving population may increase, not because the well-being of any individual within the population has improved, but instead because the impact on life-expectancy

calculations of vulnerable individuals who died prematurely has been "displaced" to the event. Life-expectancy statistics therefore must be interpreted with caution.

COVID-19 results in higher mortality in those who might otherwise have had few life-years remaining—for example, those with obesity, diabetes, and heart disease, all of which are associated with lower life expectancy. Mortality displacement may thereby skew the surviving population toward those with longer remaining life spans, resulting in a rebound in life expectancy even above the prepandemic baseline, and invite the erroneous conclusion that health and life expectancy have not only recovered but improved.

We estimated the size and duration of this artificial rise in life expectancy through 2030 (Figure 1). Life tables from 2014–2018 and excess mortality statistics for 2020 were obtained from the National Center for Health Statistics, Centers for Disease Control and Prevention (4, 5). Baseline life spans were assigned to a theoretical cohort according to the expected number of remaining life-years by age and
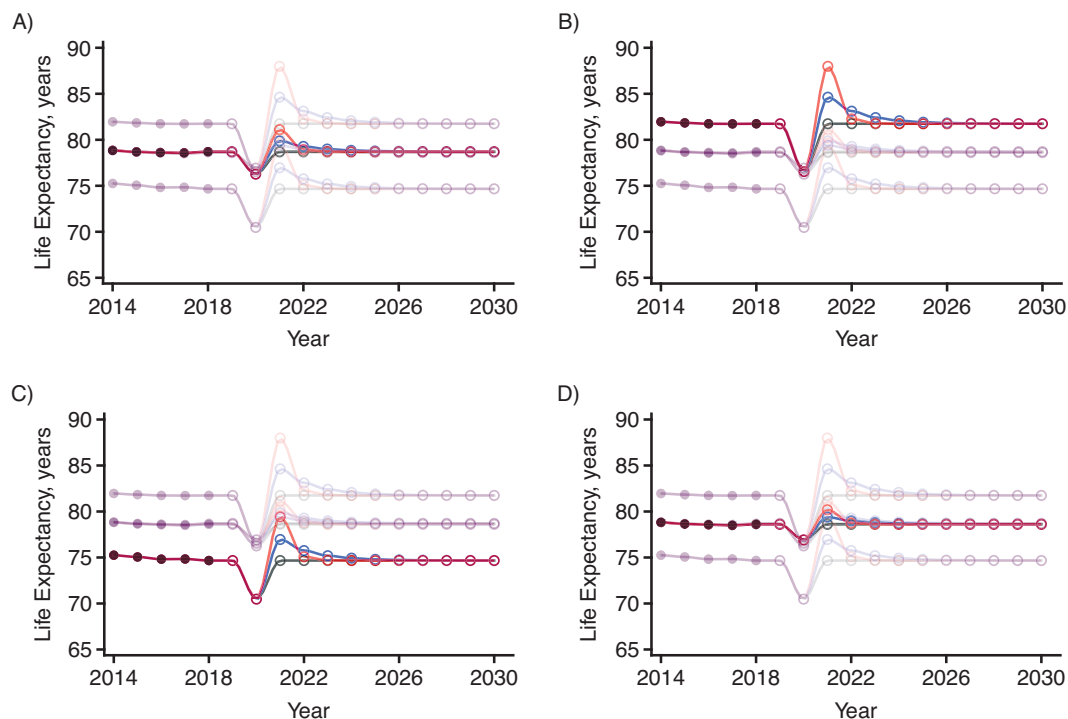

Figure 1. Decline and anticipated rebound in US life expectancy due to excess mortality in 2020 by race/ethnicity. Solid lines depict the estimated life expectancy for the following populations: A) US overall; B) Hispanic; C) non-Hispanic Black; D) non-Hispanic White. Lighter lines depict life expectancies for the other populations for reference. Colors represent a range of risk reduction coefficients k, where k = 1 (black) represents no difference in 2020 mortality risk across expected future life-years, k = 2 (blue) represents a 2-fold decline in 2020 mortality risk for each additional future expected life-year, and k = 10 (red) represents a 10-fold decline in 2020 mortality risk for each additional future expected life-year. Solid points represent life expectancies calculated from existing life tables, and open points represent projected life expectancies.

race/ethnicity in 2018, the most recent year with available data. Then, for each age and race/ethnicity group, excess mortality in 2020 was distributed among those with varying numbers of future life-years remaining according to a risk reduction constant k. Each additional future life-year at baseline came with a k-fold reduction in the probability of death in 2020, such that $k = 1$ yielded no difference in risk and $k = 2$ yielded a 2-fold reduction (halving) of mortality risk for each additional future life-year. After removing the excess deaths, we followed the cohort forward through 2030, calculating life expectancy in each year. Full details are in the Web Appendix and Web Table 1 (available at https://doi.org/10.1093/aje/kwac079).

We found that any nonuniform distribution of excess mortality ($k > 1$) yielded an artificial increase in life expectancy after 2020 (Figure 1A). Larger values of k yielded larger but shorter-lasting increases. For fixed values of k, the artificial increase was larger and more durable for the Hispanic (Figure 1B) and non-Hispanic Black (Figure 1C) populations than for the non-Hispanic White (Figure 1D) population.

This artificial increase in life expectancy from mortality displacement could lead to incorrect claims about the extent to which health improved in the wake of the pandemic, especially for non-White populations. This could funnel resources away from populations that still urgently need them. The rebound may be counteracted by further declines in life expectancy due to continued transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and long-term medical, social, and economic effects from the pandemic (6). Reporting multiyear life expectancies that incorporate the sharp decline in 2020 could give a more realistic view of collective well-being.

This study complements others that have documented declines in life expectancy due to the pandemic (6) and that have attributed mortality displacement effects to other acute infectious diseases (3). The declines we estimated are somewhat larger than those reported in a provisional report by the Centers for Disease Control and Prevention (1), possibly because those figures are adjusted for multiple biases in reported mortality for which data are not publicly available. Nevertheless, our figures are roughly in line with other estimates, and we anticipate that the overall patterns in future life expectancy will hold.

Code and data are available at https://github.com/gradlab/LifeExpectancy.

A preprint of this article has been posted on *medRxiv*: https://www.medrxiv.org/content/10.1101/2021.09.09.21263351v2.

The findings, conclusions, and views expressed are those of the author(s) and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Conflict of interest: none declared.

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