American Journal of Epidemiology

Vol. 193, No. 1
https://doi.org/10.1093/aje/kwad180
Advance Access publication:
September 1, 2023

## Original Contribution

# Life Expectancy Changes During the COVID-19 Pandemic, 2019–2021: Highly Racialized Deaths in Young and Middle Adulthood in the United States as Compared With Other High-Income Countries

**Ryan K. Masters*, Laudan Y. Aron, and Steven H. Woolf**

* Correspondence to Dr. Ryan K. Masters, University of Colorado Population Center, University of Colorado, Boulder, 483 UCB, Boulder, CO 80309-0483 (e-mail: ryan.masters@colorado.edu).

*Initially submitted November 8, 2022; accepted for publication August 29, 2023.*

We estimated changes in life expectancy between 2019 and 2021 in the United States (in the total population and separately for 5 racial/ethnic groups) and 20 high-income peer countries. For each country's total population, we decomposed the 2019–2020 and 2020–2021 changes in life expectancy by age. For US populations, we also decomposed the life expectancy changes by age and number of coronavirus disease 2019 (COVID-19) deaths. Decreases in US life expectancy in 2020 (1.86 years) and 2021 (0.55 years) exceeded mean changes in peer countries (a 0.39-year decrease and a 0.23-year *increase*, respectively) and disproportionately involved COVID-19 deaths in midlife. In 2020, Native American, Hispanic, Black, and Asian-American populations experienced larger decreases in life expectancy and greater losses in midlife than did the White population. In 2021, the White population experienced the largest decrease in US life expectancy, although life expectancy in the Native American and Black populations remained much lower. US losses during the pandemic were more severe than in peer countries and disproportionately involved young and middle-aged adults, especially adults of this age in racialized populations. The mortality consequences of the COVID-19 pandemic deepened a US disadvantage in longevity that has been growing for decades and exacerbated long-standing racial inequities in US mortality.

coronavirus disease 2019; COVID-19; health disparities; life expectancy; mortality; systemic racism; United States

Abbreviations: COVID-19, coronavirus disease 2019; NCHS, National Center for Health Statistics; UR, uncertainty range.

Decreases in life expectancy in 2020 and 2021, due primarily to excess deaths from the global coronavirus disease 2019 (COVID-19) pandemic, were larger in the United States than in other high-income countries (1–8). The US declines were driven by COVID-19 mortality in midlife and at older ages and by increases in non–COVID-19 deaths in young adulthood and midlife (9–11). Overall, loss of US life was characterized by a much younger age profile of deaths as compared with loss of life in peer countries (3).

Increases in US death rates in 2020 were highly racialized, disproportionately affecting the country's Native American, Hispanic, and Black populations. Racialization refers to "the process by which societies construct races as real, different and unequal in ways that matter to economic, political and social life" (12, p. 11), and by extension health and survival. These populations experienced elevated risks of viral exposure, infection, hospitalization, and death from COVID-19 (13–18). Further, US life expectancy declines in 2020 among US Native American, Hispanic, and Black populations were much larger than those for the White population, with disproportionately large increases in death occurring at younger ages (4, 18, 19).

The National Center for Health Statistics (NCHS) reports that US life expectancy declined further in 2021, with the largest increases in mortality occurring among US adults aged 25–54 years (20). The literature to date has therefore firmly established that US declines in life expectancy in 2020 and 2021 were larger than those in peer countries and that racialized groups and younger US adults were disproportionately affected. However, to our knowledge, no study to date has examined the intersection of age and race/ethnicity in understanding US mortality trends during

the COVID-19 pandemic. Our aim in this study was to estimate changes in life expectancy between 2019 and 2021 by age group in the United States and 20 other high-income countries and, in the US population, to examine age-specific changes within racialized groups. We also examined how these findings for US populations varied for COVID-19 and non–COVID-19 deaths.

## METHODS

### Data sources

Official US death counts for 2019 and 2020 were obtained from NCHS Restricted-Use Vital Statistics Data, and information on US life expectancy in 2019 and 2020 was obtained from official life tables (21). For 2020, we identified COVID-19 deaths using *International Classification of Diseases, Tenth Revision*, code U071 on the death record axis. Provisional counts of deaths occurring in 2021 (in total and separately by COVID-19 status) were obtained from the December 21, 2022, data release of the NCHS provisional mortality file, *AH Excess Deaths by Sex, Age, and Race and Hispanic Origin* (22). Data were collected by race/ethnicity for Hispanic and non-Hispanic Asian (hereafter called Asian-American), non-Hispanic American Indian/Alaska Native (Native American), non-Hispanic Black (Black), and non-Hispanic White (White) populations.

Midyear population estimates for 2020 were obtained by age and race/ethnicity from the US Census Bureau (23). Midyear populations for 2021 were estimated from trends in age-specific midyear populations between the years 2017 and 2020. Midyear populations for 2020 were summed at ages $<1$, 1–4, 5–9, . . . , 95–99, and $\geq 100$ years, and midyear populations for 2021 were summed at ages $\leq 14$, 15–19, . . . , 80–84, and $\geq 85$ years to match the age structure of death counts in provisional NCHS data.

Death counts for 2019, 2020, and 2021 were obtained by age for 20 high-income peer countries (see Web Appendix 1, available at https://doi.org/10.1093/aje/kwad180, for a list) from the January 9, 2023, release of the Human Mortality Database Short-Term Mortality Fluctuations file (24). Population counts for 2019, 2020, and/or 2021 were obtained by age from each country's central statistical agency.

Life tables for peer countries for the years 2019–2021 were obtained from the Human Mortality Database (25). Life tables for Israel were not available for years after 2016 and were therefore obtained directly from central statistical agencies (26). The Human Mortality Database does not include any data on race/ethnicity.

### Calculating life expectancy

Life expectancy at birth in 2019, 2020, and 2021 is reported for each country. US life expectancy was further stratified by race/ethnicity. If available, life expectancy for countries' populations during the years 2019–2021 was obtained from existing life tables made available by the Human Mortality Database or a country's central statistical agency (e.g., NCHS official life tables). When a country's life expectancy for a given year was not available, life tables were constructed in 4 steps: First, death rates at age $x$ ($m_{x_t}$) for 2021 or 2020 were estimated using death counts (numerator) and midyear populations (denominator). Second, the estimated $m_{x_t}$ for the desired year, $t$, and the year with the most recently available life table were used to generate age-specific mortality rate ratios ($\mathrm{RR}_{x_t}$). For example, for 2021, $\mathrm{RR}_{x_{2021}}$ would be estimated as $m_{x_{2021}}/m_{x_{2020}}$ if the most recently available life table was for 2020. Third, to estimate $M_{x_{2021}}$, used to generate life tables for 2021, the official $M_{x_t}$ appearing in each country's most recently released life table (e.g., 2019 for Canada and 2020 for Belgium) was multiplied by the $\mathrm{RR}_{x_{2021}}$. Fourth, the probability of death at age $x$ in 2021, $q_{x_{2021}}$, was calculated as

$$\left(M_{x_{2021}} \times n\right) \Big/ \left(1 + \left[\left(n - a_{x_{2021}}\right) \times M_{x_{2021}}\right]\right),$$

where $n$ was the width of the age interval and $a_{x_{2021}}$ values (the average amount of time lived by the deceased in age interval $x + n$) were obtained from the country's most recently available life table (see Web Appendix 2 for validation of the method's accuracy).

Due to the use of provisional data to estimate 2021 life expectancy, Python (version 3.10.2) (27) was used to simulate 50,000 life tables by adding 10% random uncertainty to $q_{x_{2021}}$ and $a_{x_{2021}}$. Estimates of 2021 life expectancy are reported as the median $P$ value ($P_{50}$) bounded by a "90% uncertainty range" (UR) composed of values at the fifth ($P_5$) and 95th ($P_{95}$) percentiles.

### Decomposing life expectancy changes

We used Arriaga techniques (28) to estimate each country's 2019–2020 and 2020–2021 life expectancy changes by age and to estimate US racial/ethnic population groups' life expectancy changes by age and COVID-19 deaths (see Web Appendix 3 for methodological details and Web Appendix 4 for examples of analytical scripts in Stata and Python).

## RESULTS

### Changes in US life expectancy during 2019–2021 in an international context

Life expectancy in 2019, 2020, and 2021 for the United States (in total and by race/ethnicity) and mean life expectancy for the 20 peer countries are presented in Table 1. Total US life expectancy fell from 78.85 years in 2019 to 76.99 years in 2020 and to 76.44 years (90% UR: 76.27–76.62) in 2021. This reflected a 1.86-year decrease between 2019 and 2020 and an additional decrease of 0.55 years (90% UR: 0.36–0.71) between 2020 and 2021 (Figure 1). Mean life expectancy among the 20 high-income peer countries fell from 82.54 years in 2019 to 82.15 years in 2020 and then increased to 82.38 years (90% UR: 82.22–82.54) in 2021 (Table 1). On average, life expectancy among the 20 peer countries decreased by 0.39 years between 2019 and 2020 and then increased by 0.23 years (90% UR: 0.06–0.39) between 2020 and 2021 (Figure 1).

**Table 1.** Mean Life Expectancy at Birth in the United States and 20 High-Income Peer Countries, Overall and by Race/Ethnicity, 2019–2021

| Population | Life Expectancy, years | | | |
|---|---|---|---|---|
| | 2019 | 2020 | 2021 | 2021 UR[a] |
| Peer mean | 82.54 | 82.15 | 82.38 | 82.22–82.54 |
| US total | 78.85 | 76.99 | 76.44 | 76.27–76.62 |
| Hispanic | 81.85 | 77.93 | 77.77 | 77.60–77.95 |
| NH AI/AN | 71.75 | 67.14 | 66.86 | 66.64–67.09 |
| NH Asian | 85.56 | 83.64 | 84.18 | 84.02–84.35 |
| NH Black | 74.78 | 71.55 | 71.01 | 70.82–71.21 |
| NH White | 78.78 | 77.40 | 76.67 | 76.50–76.85 |

Abbreviations: AI/AN, American Indian/Alaska Native; NH, non-Hispanic; UR, uncertainty range; US, United States.
[a] Life expectancy generated from 10% random error in 2021 life tables.

Life expectancy changes between 2019 and 2021 differed across peer countries (Figure 2). The largest decreases in 2020 occurred in Spain (−1.25 years) and Italy (−1.18 years), and the largest increases in 2021 occurred in Spain (0.94 years; 90% UR: 0.77–1.10) and Belgium (0.86 years; 90% UR: 0.70–1.02). The 2019 US–peer country life expectancy gap of 3.69 years grew to 5.16 years in 2020 and to 5.94 years in 2021 (90% UR: 5.60–6.27) (Figure 2).

The contributions by age to changes in life expectancy differed between the United States and its peer countries (Figure 3). In 2020, most (87.6%) of the mean decline in life expectancy among peer countries resulted from increases in deaths after age 65 years. In contrast, the 2020 decline in US life expectancy reflected increases in deaths across a wider age range, with deaths above age 65 accounting for only 50.0% of the decline. Increases in deaths in young adulthood (i.e., ages 15–39 years) and midlife (i.e., ages 40–64 years) accounted for 16.3% and 33.1% of the 2020 decline in US life expectancy, respectively.

In 2021, the 0.23-year mean increase in peer countries' life expectancy was driven by reductions in death rates at older ages, with 0.19 years of this increase from reduced death rates at ages 75 and above. The US population experienced comparable gains in life expectancy (0.21 years) from reduced rates of death at older ages, but these improvements were offset by decreases of 0.10 years at ages 65–74 years, 0.45 years in midlife (ages 40–64 years), and 0.21 years at younger ages (ages ≤39 years)—for a net loss of 0.55 years (Figure 3).

### Changes in US life expectancy during 2019–2021 by race/ethnicity

Life expectancy in 2019, 2020, and 2021 for US racial/ethnic populations is presented in Table 1, and life expectancy changes during 2019–2020, 2020–2021, and 2019–2021 by US racial/ethnic population are shown in Figure 1. In 2020 and 2021, the decreases in US life expectancy differed across racial and ethnic populations but followed a distinctly different pattern from one year to the next. In 2020, the largest decreases in life expectancy occurred in Native American (4.61 years), Hispanic (3.92 years), Black (3.23 years), and Asian-American (1.92 years) populations, whereas the smallest decrease occurred in the White population (1.38 years). In 2021, by contrast, decreases in life expectancy were largest in the White population (0.73 years; 90% UR: 0.55–0.90), exceeding losses in Black (0.54 years; 90% UR: 0.34–0.73) and Native American (0.28 years; 90% UR: 0.05–0.50) populations. Life expectancy did not change significantly in the Hispanic population (90% UR: −0.33 to 0.02), and life expectancy increased by 0.54 years (90% UR: 0.38–0.71) in the Asian-American population. Overall, decreases in US life expectancy between 2019 and 2021 were largest among the Native American (4.89 years; 90% UR: 4.66–5.11), Hispanic (4.08 years; 90% UR: 3.90–4.25), and Black (3.77 years; 90% UR: 3.57–3.96) populations, greatly exceeding the declines experienced by the Asian-American (1.38 years; 90% UR: 1.21–1.54) and White (2.11 years; 90% UR: 1.93–2.28) populations.

The contributions of age to life expectancy changes in 2020 and 2021 among US racial/ethnic populations are shown in Figure 4. Compared with peer countries, the younger age distribution of US deaths in 2020 was observed across all US racial/ethnic populations, but it was especially pronounced among racialized groups. For example, increases in deaths at ages 40–64 years accounted for life expectancy declines in the Native American (−2.09 years), Hispanic (−1.18 years), and Black (−1.08 years) populations that vastly exceeded the mean *total* decline in life expectancy among peer countries (−0.39 years; Table 1). In 2021, all US racial/ethnic populations gained life expectancy from reductions in death rates at ages 75 years or more, but gains in the White population (0.15 years) were much smaller than gains among the Native American (0.48 years), Asian-American (0.47 years), Hispanic (0.40 years), and Black (0.38 years) populations at these ages. The improved mortality conditions among older US populations in 2021 were more than offset by worsening

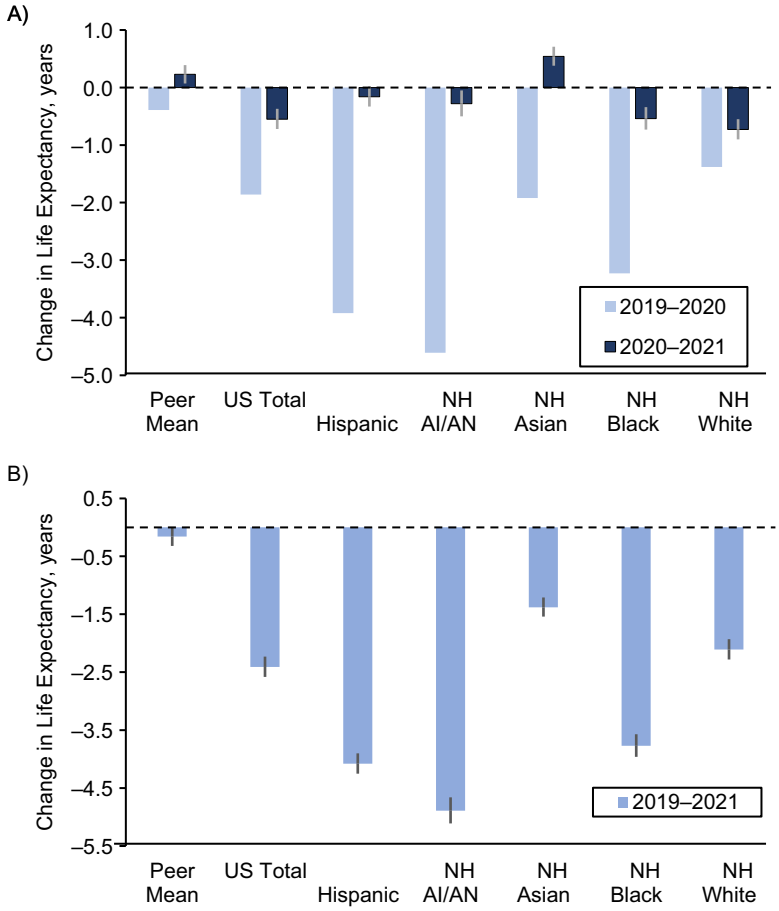


**Figure 1.** Changes in life expectancy (years) in aggregate for the United States and 20 high-income peer countries and by race/ethnicity in the United States, 2019–2020 and 2020–2021 (A) and 2019–2021 (B). Gray vertical lines indicate the "90% uncertainty range" based on 10% random error in 2021 mortality risks.

mortality conditions in young adulthood and midlife. In 2021, increases in death rates between ages 40 and 64 years contributed to life expectancy declines of 0.68 years (Native Americans), 0.54 years (Whites), 0.45 years (Blacks), and 0.32 years (Hispanics), and increases in death rates between ages 15 and 39 years contributed life expectancy declines of 0.39 years (Blacks), 0.32 years (Native Americans), 0.26 years (Hispanics), 0.17 years (Whites), and 0.03 years (Asian Americans) (Figure 4).

Figure 5 shows the age contributions of COVID-19 and non–COVID-19 deaths to changes in life expectancy among US racial/ethnic populations. In 2020, COVID-19 deaths above age 40 years caused substantial losses in life expectancy in all US racial/ethnic populations. In the Native American population, COVID-19 deaths at ages 25–39 years also contributed to substantial losses. Increases in non–COVID-19 deaths also contributed relatively large life expectancy declines among the Native American, Black, and Hispanic populations, especially at younger ages. In 2021, all US populations experienced reductions in COVID-19 deaths at older ages that led to life expectancy gains at these ages, but the increases in White life expectancy were much smaller than in other racial/ethnic populations (Figure 5). In all racial/ethnic populations except Asian Americans, increases in COVID-19 deaths at younger ages and in midlife, albeit smaller than in 2020, still led to substantial life expectancy declines in 2021.

## DISCUSSION

Existing cross-national studies of the COVID-19 pandemic have documented 3 important features of the 2020 US mortality experience: Increases in US death rates and resulting decreases in life expectancy 1) greatly exceeded those of other high-income countries, 2) involved deaths occurring among much younger populations, and 3) exhibited stark racial/ethnic inequalities. This study adds to these features in important ways.

In 2020, the United States' young mortality profile occurred disproportionately among racialized groups. Declines in life expectancy in 2020 due to deaths at ages 15–64 years among the Black and Hispanic populations were vast, exceeding the *entire* decrease in US White life expectancy from deaths at *all ages*. Even greater losses in midlife

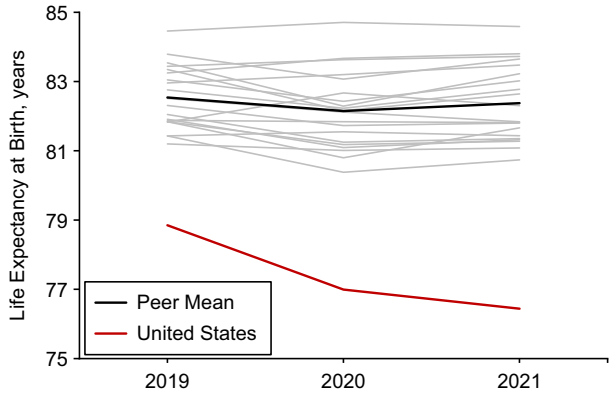


**Figure 2.** Life expectancy at birth (years) in the United States (red) and 20 high-income peer countries (gray) and the peer country mean (black), 2019, 2020, and 2021.

occurred in the Native American population, which experienced the largest declines. The decline in life expectancy among Native Americans resulting from deaths at ages 15–64 years was 8.1 times the mean decrease in life expectancy in peer countries from deaths at *all ages*.

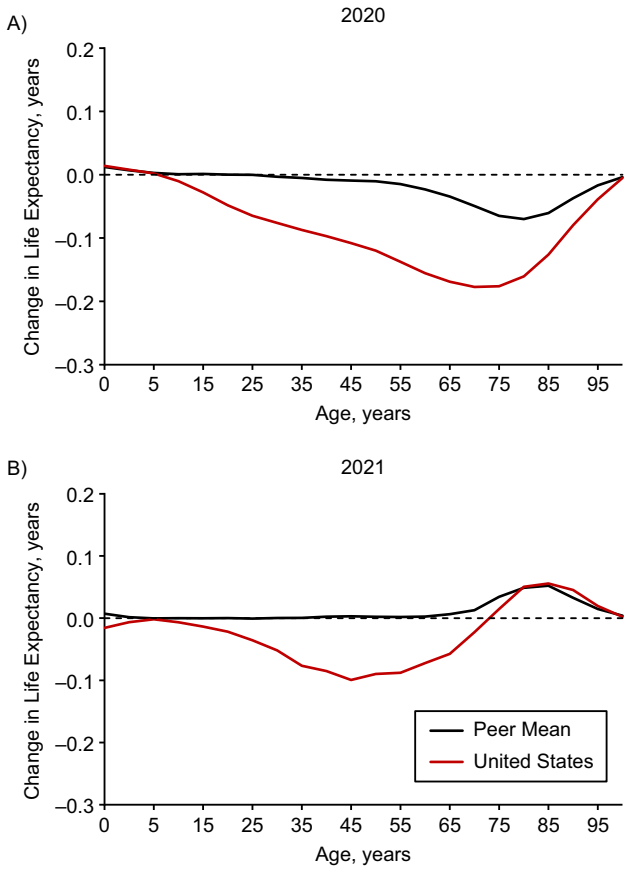


**Figure 3.** Contribution of age to changes in life expectancy at birth (years) in the United States and 20 high-income peer countries (mean), 2019–2020 (A) and 2020–2021 (B).

COVID-19 was overwhelmingly responsible for these early-life deaths among US racialized populations in 2020. COVID-19 deaths at ages 15–64 years, for example, produced a 1.53-year decline in 2020 Native American life expectancy, exceeding the total 1.38-year decline experienced by the White population from *all causes* of death across *all ages*. Explanations for the greater losses among young and middle-aged adults in racialized groups include their greater likelihood of being "essential workers," more hazardous living and working conditions, and comorbid risk factors (which also reflect adverse social determinants of health) that put them at greater risk of exposure, infection, illness, disability, and death from COVID-19 (29).

We document a noteworthy reversal in 2021, in which the White population experienced the largest decreases in US life expectancy. The NCHS reported similar results—greater decreases in life expectancy during 2021 in the White population than in the Hispanic, Asian, and Black populations—but found that losses in the Native American population remained higher than in the White population (20). The fact that Hispanic and Black populations facing higher risks of COVID-19 complications and deaths nonetheless experienced smaller decreases in life expectancy during 2021 than the White population could have multiple explanations, among them greater uptake of COVID-19 vaccination (especially at older ages) and adherence to pandemic control measures (30), but further research on this finding is needed.

Although declines in US life expectancy in 2021 were greatest in the White population, the mortality consequences from the first 2 years of the COVID-19 pandemic greatly exacerbated long-standing racialized health inequities in the United States. Life expectancy in the Black and Native American populations—even after smaller declines in 2021—remained much lower than in the White population. Further, midlife mortality rates increased in all populations but Asian Americans, further exacerbating a multidecade US health and survival disadvantage relative to other high-income countries.

Finally, we show that the distinct mortality experience of the United States in 2020 and 2021 was not driven by COVID-19 alone. Many causes of death, among them deaths associated with the US obesity and opioid epidemics, have long contributed to the large and growing US disadvantage in health and survival and to recent increases in midlife deaths (31). In 2020 and 2021, they continued to claim American lives at alarming rates. The US opioid epidemic intensified, causing a record number of overdose deaths during the pandemic, and compounding an increasingly dangerous drug environment in the United States, especially for Native American, Hispanic, and Black communities (4, 32).

The United States has a long history of poorer health and survival among racialized groups, the product of structural racism and the enactment of policies of marginalization and exclusion that, across the life course and over generations, systematically and unfairly advantage people and places with power while disadvantaging others (33–35). Higher death rates and comorbidity among racialized groups are often misattributed to biological factors, behavioral choices, or cultural norms. More fundamentally, they reflect the ways in which US society distributes health-related assets,

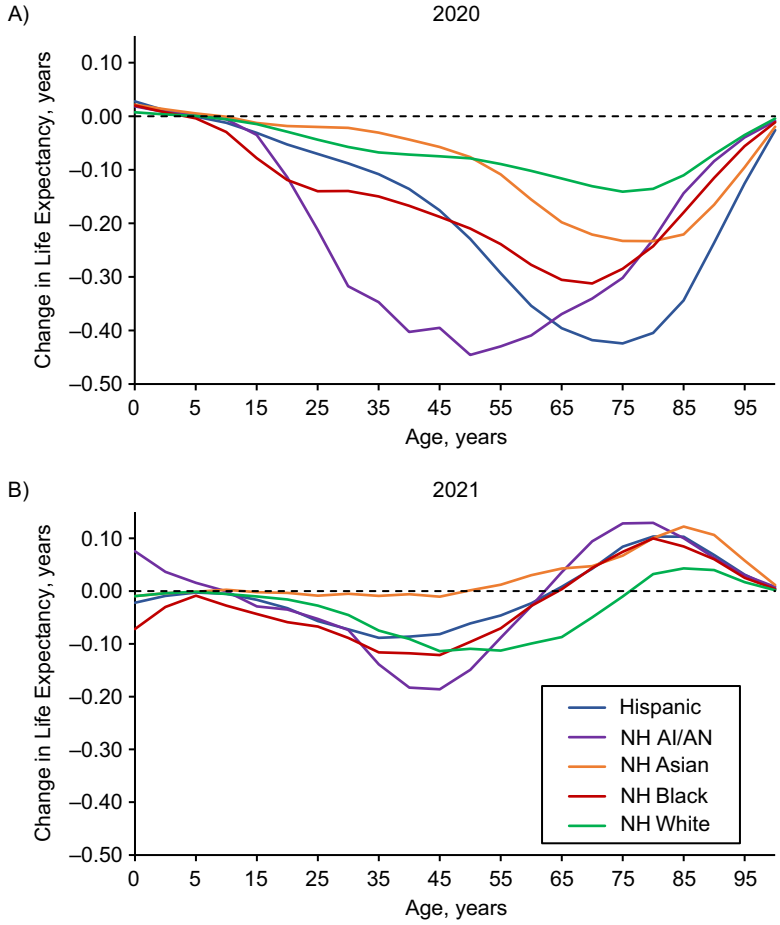


**Figure 4.** Contribution of age to changes in US life expectancy at birth (years), by race/ethnicity, 2019–2020 (A) and 2020–2021 (B). AI/AN, American Indian/Alaska Native; NH, non-Hispanic.

risks, and opportunities (36, 37)—a legacy that predates the COVID-19 pandemic by centuries. The root causes are certainly tied to historical and contemporary forms of systemic racism, which extended to COVID-19 mitigation policies and further racialized the exposures, vulnerabilities, and mortality consequences of the pandemic (38, 39). The findings of this study underscore the need to expand and target resources toward racialized and marginalized populations, including those relating to public health, primary care, and the social determinants of health.

The US health and survival disadvantage relative to peer countries also extends to White Americans and even the nation's most privileged communities (40), underscoring the reality that deep-seated sociopolitical and structural factors are undermining the health and well-being of all Americans, against a backdrop of growing economic inequality and precarity.

The death toll in young and middle-aged adults reported here has profound societal implications, including not only the tragic loss in years of life, caregiving, and productivity but also the grieving children, family, and community members left in its wake. Bereavement itself, especially following an untimely death, may predict poor health and mortality risks across the life course (41). For US Native American, Hispanic, and Black communities, these premature deaths in midlife—ages when family formation, child-rearing, and family support often peak—exacerbate a long-standing and pervasive pattern of racialized erosion of social supports and kinship in the United States (42, 43).

This study's estimate of a 0.55-year decline in US life expectancy in 2021 is consistent with that of the NCHS, which estimated that US life expectancy decreased by 0.6 years (20). However, the NCHS reported that the Native American population experienced the largest increases in mortality in 2021, whereas our study found that life expectancy in the White population was most affected. Explanations for discrepancies between our estimates and those of the NCHS are provided in Web Appendix 5. Other researchers have reported racialized decreases in US life expectancy during the COVID-19 pandemic. For example, Andrasfay and Goldman (19) also reported large decreases in life expectancy between 2019 and 2021 in the Hispanic and Black populations (3.7 and 3.5 years, respectively) and even larger decreases in the Native population (6.4 years) (44). Our estimates of life expectancy declines were larger in the Hispanic and Black populations (4.08 and 3.77 years,

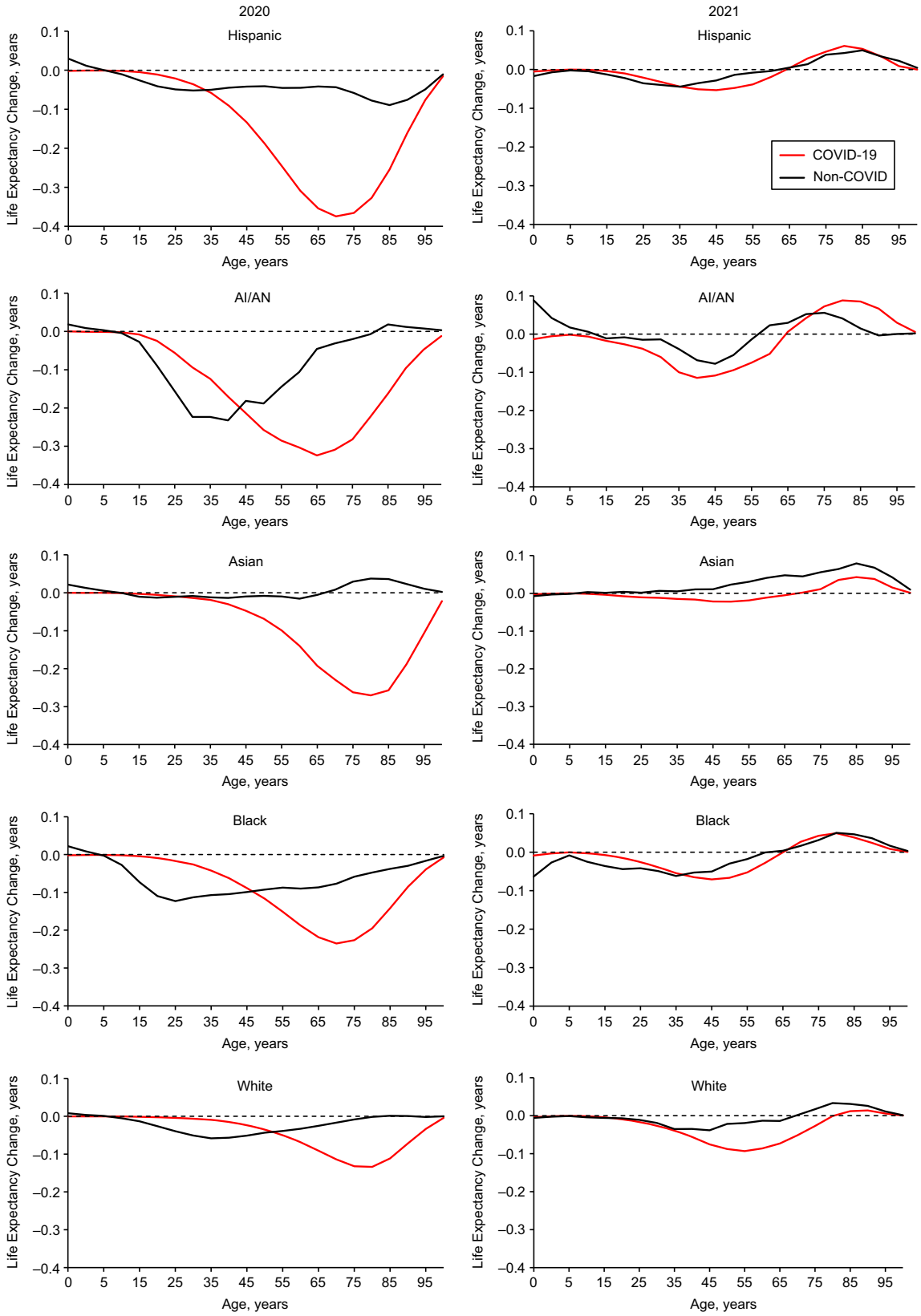


**Figure 5.** Contributions of age and coronavirus disease 2019 (COVID-19) deaths to changes in US life expectancy at birth (years), by race/ethnicity, 2019–2020 (left column) and 2020–2021 (right column). AI/AN, American Indian/Alaska Native.

respectively) but smaller in the Native population (4.89 years). Andrasfay and Goldman used the NCHS death count adjustments for possible racial misclassification of Native American racial/ethnic identity (19) (see Web Appendix 5 for comparison of 2020 and 2021 death rates).

This study's life expectancy estimates for peer countries in 2020 and 2021 are comparable to other studies' estimates (7, 8). Those studies' inclusion of low- and middle-income countries accounts for most of the discrepancy with this study's averages for peer countries. They estimated larger decreases in US life expectancy in 2020 (2.13 years) and smaller decreases in 2021 (0.23 years) than were observed here. Even so, those investigators reported that no countries other than Bulgaria and Slovakia exceeded US losses in life expectancy between 2019 and 2021 (7, 8). They also identified the United States as being among the countries with disproportionate losses of life among adults under age 60 years.

Cross-national and within-country mortality comparisons help shed light on the profound impact of the COVID-19 pandemic on the health and survival of different populations. They reveal important proximal causes and consequences of the pandemic, but also bring into focus the broader societal conditions within which pandemics and other major public health events occur. For at least 4 decades, life expectancy improvements in the United States have failed to keep pace with those in other high-income countries.

The United States entered the pandemic in a fundamentally weakened state due to an expanding obesogenic environment, an ongoing opioid epidemic, rising economic inequality and precarity, entrenched systemic racism, and other structural drivers of poor health and vulnerability. During the pandemic, these realities were coupled with a flawed pandemic response by the US government and individual states that included inconsistent public health guidance and messaging; disjointed policies on social distancing, masking, ventilation, and protections in workplaces and residential facilities; and inadequate distribution of personal protective equipment, rapid tests, and vaccines (45, 46). The data reported here reveal that, compared with its peers, US loss of life in both 2020 and 2021 occurred at much younger ages, especially in communities of color, and was heavily shaped by COVID-19 deaths. Evidence of a US disadvantage in health and survival has existed for decades and has only grown in the wake of the global COVID-19 pandemic. For the United States to remain an advanced nation that protects the health and well-being of its people, US policy-makers and society at large will need to improve everyday conditions of life and survival in ways that extend far beyond COVID-19 and public health (47). Critically, these efforts must prioritize the root causes of population health, well-being, and equity, with a particular focus on protecting the health and improving the life conditions of younger Americans in communities of color.

## ACKNOWLEDGMENTS

Author affiliations: University of Colorado Population Center, University of Colorado Boulder, Boulder, Colorado, United States (Ryan K. Masters); Health Policy Center, Urban Institute, Washington, DC, United States (Laudan Y. Aron); and Center on Society and Health, Virginia Commonwealth University, Richmond, Virginia, United States (Steven H. Woolf).

Funding for this research was provided by the National Institute on Aging (grant P30AG012846), the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (grant 2P2CHD066613), and the National Center for Advancing Translational Sciences (grant UL1TR002649).

Data for peer countries are publicly available from the Human Mortality Database (HMD) (https://www.mortality.org/), the HMD Short-Term Mortality Fluctuations data series (24), and individual countries' central statistical agencies. Official US life tables for 2019 and 2020 are publicly available from the National Center for Health Statistics (NCHS). Provisional death counts for 2021 are publicly available in the NCHS December 21, 2022, data release of the *AH Excess Deaths by Sex, Age, and Race and Hispanic Origin* (22) files, and population estimates are publicly available from the US Census Bureau (48). Multiple-cause-of-death files for US populations for the years 2019 and 2020 are available via application to the NCHS for access to restricted-use data files.

A previous version of this work was published in medRxiv (https://www.medrxiv.org/content/10.1101/2022.04.05.22273393v1).

Conflict of interest: none declared.

## REFERENCES

1. Woolf SH, Masters RK, Aron LY. Effect of the covid-19 pandemic in 2020 on life expectancy across populations in the USA and other high-income countries: simulations of provisional mortality data. *BMJ.* 2021;373:n1343.
2. Organisation for Economic Cooperation and Development. COVID-19 pandemic underlines need to strengthen resilience of health systems, says OECD. https://www.oecd.org/health/covid-19-pandemic-underlines-need-to-strengthen-resilience-of-health-systems-says-oecd.htm. Published September 11, 2021. Accessed January 10, 2022.
3. Masters RK, Woolf SH, Aron LY. Age-specific mortality during the 2020 COVID-19 pandemic and life expectancy changes in the United States and peer countries, 1980–2020. *J Gerontol B Psychol Sci Soc Sci.* 2022;77(suppl 2):S127–S137.
4. Woolf SH, Masters RK, Aron LY. Changes in life expectancy between 2019 and 2020 in the U.S. and 21 peer countries. *JAMA Netw Open.* 2022;5(4):e227067.
5. Mazzuco S, Campostrini S. Life expectancy drop in 2020. Estimates based on human mortality database. *PloS One.* 2022;17(1):e0262846.
6. Islam N, Jdanov DA, Shkolnikov VM, et al. Effects of covid-19 pandemic on life expectancy and premature mortality in 2020: time series analysis in 37 countries. *BMJ.* 2021;375:e066768.
7. Aburto JM, Schöley J, Kashnitsky I, et al. Quantifying impacts of the COVID-19 pandemic through life-expectancy losses: a population-level study of 29 countries. *Int J Epidemiol.* 2022;51(1):63–74.

8. Schöley J, Aburto JM, Kashnitsky I, et al. Life expectancy changes since COVID-19. *Nat Hum Behav.* 2022;6(12):1649–1659.
9. Islam N, Shkolnikov VM, Acosta RJ, et al. Excess deaths associated with covid-19 pandemic in 2020: age and sex disaggregated time series analysis in 29 high income countries. *BMJ.* 2021;373:n1137.
10. World Health Organization. Global excess deaths associated with COVID-19, January 2020–December 2021. https://www.who.int/data/stories/global-excess-deaths-associated-with-covid-19-january-2020-december-2021. Published May 2022. Accessed June 8, 2022.
11. COVID-19 Excess Mortality Collaborators. Estimating excess mortality due to the COVID-19 pandemic: a systematic analysis of COVID-19-related mortality, 2020-21. *Lancet.* 2022;399(10334):1513–1536.
12. Ontario Human Rights Commission. *Policy and Guidelines on Racism and Racial Discrimination*. Toronto, ON, Canada: Ontario Human Rights Commission; 2005. https://www.ohrc.on.ca/en/policy-and-guidelines-racism-and-racial-discrimination. Accessed January 12, 2023.
13. Lopez L, Hart LH, Katz MH. Racial and ethnic health disparities related to COVID-19. *JAMA.* 2021;325(8):719–720.
14. Feldman JM, Bassett MT. Variation in COVID-19 mortality in the U.S. by race and ethnicity and educational attainment. *JAMA Netw Open.* 2021;4(11):e2135967.
15. Ahmad FB, Cisewski JA, Miniño A, et al. Provisional mortality data—United States, 2020 [published correction appears in *MMWR Morb Mortal Wkly Rep.* 2021;70(24):900]. *MMWR Morb Mortal Wkly Rep.* 2021;70(14):519–522.
16. Rossen LM, Ahmad FB, Anderson RN, et al. Disparities in excess mortality associated with COVID-19—United States, 2020. *MMWR Morb Mortal Wkly Rep.* 2021;70(33):1114–1119.
17. Cronin CJ, Evans WN. Excess mortality from COVID and non-COVID causes in minority populations. *Proc Natl Acad Sci U S A.* 2021;118(39):e2101386118.
18. Luck AN, Preston SH, Elo IT, et al. The unequal burden of the Covid-19 pandemic: capturing racial/ethnic disparities in US cause-specific mortality. *SSM Popul Health.* 2022;17:101012.
19. Andrasfay T, Goldman N. Reductions in US life expectancy during the COVID-19 pandemic by race and ethnicity: is 2021 a repetition of 2020? *PloS One.* 2022;17(8):e0272973.
20. Xu J, Murphy SL, Kochanek KD, et al. Mortality in the United States, 2021. *NCHS Data Brief.* 2022;456:1–8.
21. National Center for Health Statistics. National Vital Statistics System. Restricted-Use Vital Statistics Data. https://www.cdc.gov/NCHS/NVSS/NVSS-RESTRICTED-data.htm. Reviewed March 25, 2022. Accessed January 19, 2022.
22. National Center for Health Statistics. AH excess deaths by sex, age, and race and Hispanic origin. https://data.cdc.gov/NCHS/AH-Excess-Deaths-by-Sex-Age-and-Race-and-Hispanic-/m74n-4hbs. Published December 21, 2022. Updated April 26, 2023. Accessed January 9, 2023.
23. National Center for Health Statistics. National Vital Statistics System. Vintage 2020 bridged-race postcensal population estimates. https://www.cdc.gov/nchs/nvss/bridged_race/data_documentation.htm#vintage2020. Accessed March 13, 2022.
24. Max Planck Institute for Demographic Research; University of California, Berkeley; French Institute for Population Studies. Short-Term Mortality Fluctuations. https://www.mortality.org/Data/STMF. Published January 9, 2023. Accessed January 9, 2023.
25. Max Planck Institute for Demographic Research; University of California, Berkeley; French Institute for Population Studies. Human Mortality Database. Reliability and accuracy matter. https://www.mortality.org/Home/Index. Published 2022. Accessed January 18, 2023.
26. State of Israel. Central Bureau of Statistics. Complete Life Tables of Israel 2015–2019. https://www.cbs.gov.il/en/publications/Pages/2021/Complete-Life-Tables-of-Israel-2015-2019.aspx. Published July 26, 2021. Accessed March 7, 2022.
27. Python Software Foundation. *The Python Language Reference*. Version 3.10.2. Wilmington, DE: Python Software Foundation; 2022. http://www.python.org. Accessed March 3, 2022.
28. Arriaga EE. Measuring and explaining the change in life expectancies. *Demography.* 1984;21(1):83–96.
29. Mackey K, Ayers CK, Kondo KK, et al. Racial and ethnic disparities in COVID-19–related infections, hospitalizations, and deaths: a systematic review. *Ann Intern Med.* 2021;174(3):362–373.
30. Johnson A, Keating D. Whites now more likely to die from covid than blacks: why the pandemic shifted. *Washington Post*. October 19, 2022. https://www.washingtonpost.com/health/2022/10/19/covid-deaths-us-race/. Accessed November 10, 2022.
31. National Academies of Sciences, Engineering, and Medicine. *High and Rising Mortality Rates Among Working-Age Adults*. Washington, DC: The National Academies Press; 2021.
32. Hedegaard H, Miniño AM, Spencer MR, et al. Drug overdose deaths in the United States, 1999–2020. *NCHS Data Brief.* 2021;426:1–8.
33. Jones CP. Toward the science and practice of anti-racism: launching a national campaign against racism. *Ethn Dis.* 2018;28(suppl 1):231–234.
34. Bailey ZD, Feldman JM, Bassett MT. How structural racism works—racist policies as a root cause of US racial health inequities. *N Engl J Med.* 2021;384(8):768–773.
35. Williams DR, Lawrence JA, Davis BA. Racism and health: evidence and needed research. *Annu Rev Public Health.* 2019;40:105–125.
36. Marmot M. Recreating society for better health. *Am J Public Health.* 2022;112(4):535–537.
37. Krieger N. *Ecosocial Theory, Embodied Truths, and the People's Health*. New York, NY: Oxford University Press; 2021.
38. Lee H, Andrasfay T, Riley A, et al. Do social determinants of health explain racial/ethnic disparities in COVID-19 infection? *Soc Sci Med.* 2022;306:115098.
39. Aschmann HE, Riley AR, Chen R, et al. Dynamics of racial disparities in all-cause mortality during the COVID-19 pandemic. *Proc Natl Acad Sci U S A.* 2022;119(40):e2210941119.
40. Barbieri M. Socioeconomic disparities do not explain the U.S. international disadvantage in mortality. *J Gerontol B Psychol Sci Soc Sci.* 2022;77(suppl 2):S158–S166.
41. Mulheron J, Chapman A, Smith-Greenway E, et al. *America's Forgotten Orphans: An Urgent Call for the White House and Congress to Address Childhood Bereavement*. Washington, DC: Evermore; 2022. https://evermore.org/wp-content/uploads/2023/01/Evermore-Childhood-Report.pdf. Accessed October 20, 2022.
42. Umberson D, Olson JS, Crosnoe R, et al. Death of family members as an overlooked source of racial disadvantage in the United States. *Proc Natl Acad Sci U S A.* 2017;114(5):915–920.

43. Daw J, Verdery AM, Margolis R. Kin count(s): educational and racial differences in extended kinship in the United States. *Popul Dev Rev.* 2016;42(3):491–517.
44. Goldman N, Andrasfay T. Life expectancy loss among Native Americans during the COVID-19 pandemic. *Demogr Res.* 2022;47:233–246.
45. Sachs JD, Karim SSA, Aknin L, et al. The Lancet commission on lessons for the future from the COVID-19 pandemic. *Lancet.* 2022;400(10359):1224–1280.
46. Shah A, Seervai S, Schneider EC. How can the U.S. catch up with other countries on COVID-19 vaccination? [Web log post]. https://doi.org/10.26099/961a-9039. Published December 15, 2021. Accessed December 21, 2021.
47. Abbey EJ, Khalifa BAA, Oduwole MO, et al. The Global Health Security Index is not predictive of coronavirus pandemic responses among Organization for Economic Cooperation and Development countries. *PloS One.* 2020; 15(10):e0239398.
48. US Census Bureau. Vintage 2020 bridged-race postcensal population estimates. https://www.cdc.gov/nchs/nvss/bridged_race/data_documentation.htm#vintage2020. Published 2020. Accessed March 13, 2022.