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Mortality Among Persons With HIV in the United States During the COVID-19 Pandemic: A Population-Level Analysis

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Abstract

Background: Whether the COVID-19 pandemic has had a disproportionate impact on mortality among persons with diagnosed HIV (PWDH) in the United States is unclear. Through our macroscale analysis, we seek to better understand how the COVID-19 pandemic affected mortality among PWDH.

Methods: We obtained mortality and population data for the years 2018–2020 from the National HIV Surveillance System for the US PWDH population and from publicly available data for the general population. We computed mortality rates and excess mortality for both the general and PWDH populations. Stratifications by age, race/ethnicity, and sex were considered. For each group, we determined whether the 2020 mortality rates and mortality risk ratio showed a statistically significant change from 2018 to 2019.

Results: Approximately 1550 excess deaths occurred among PWDH in 2020, with Black, Hispanic/Latino, and PWDH aged 55 years and older comprising the majority of excess deaths. Mortality rates increased in 2020 from 2018–2019 across the general population in all groups. Among PWDH, mortality rates either increased or showed no statistically significant change. These increases were similar to, or smaller than, those observed in the general population, resulting in a 7.7% decrease in the mortality risk ratio between PWDH and the general population.

Conclusions: While mortality rates among PWDH increased in 2020 relative to 2018–2019, the increases were smaller, or of similar magnitude, to those observed in the general population. We thus do not find evidence of elevated mortality risk from the COVID-19 pandemic among PWDH. These findings held across subpopulations stratified by age, sex, and racial/ethnic group.

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Keywords

HIV surveillance; COVID-19; COVID-19 and HIV; HIV mortality

INTRODUCTION

The outbreak of COVID-19 in late 2019 has had an unprecedented impact on all facets of life worldwide. Both the disease itself and its associated disruptions have led to widespread damage in terms of human well-being. These costs are varied and include serious mental health and economic effects; however, the most immediately apparent effect of COVID-19 has been on human life. In the United States alone, the age-adjusted mortality rate in the general population increased 16.8% in 2020, with life expectancy decreasing a full 1.8 years when compared with that in 2019. This burden has not been evenly shared because many groups showed a disproportionately high mortality risk from COVID-19, with the most vulnerable group being people older than 65 years.[1]

Despite many studies on the subject, whether persons with diagnosed HIV (PWDH) are among the groups at higher risk of mortality from COVID-19 remains unclear. Results from meta-analyses and clinical studies have been mixed, with some concluding that PWDH demonstrate an elevated risk of death from COVID-19 compared with the general population[2–7] and others finding no such increased risk.[8–11] Such studies are difficult to interpret for many reasons, including sample size limitations, differences in the age and biological sex distribution of the PWDH population when compared with that of the general population, and the fact that mortality is higher among PWDH generally. Notably, the population-level analysis[6] found an increased risk of adverse COVID-19 outcomes among PWDH but, given the differences in population characteristics between PWDH and the general population, the authors were unable to determine whether HIV infection itself contributed to the observed disparities.

In addition, it is also important to note that excess mortality due to the COVID-19 pandemic is not solely the result of COVID-19 itself; the direct and indirect effects of lockdowns and other factors perhaps not yet completely understood led to statistically significant increases in other leading causes of death, including heart disease, diabetes, and unintentional injuries.[1,12] We may call such deaths *second-order* COVID-19 deaths because this increased mortality, though not directly caused by COVID-19, is likely related to the systemic disruption caused by the pandemic. Given previously discussed demographic differences between the PWDH and general populations, such mortality may have affected the respective groups differently.

A clear understanding of the larger trends involving COVID-19–related mortality on PWDH is therefore of great importance for future modeling and intervention efforts. Many lines of evidence suggest that COVID-19 and its related second-order effects had significant impacts on the HIV continuum of care.[13–16] To design and evaluate the necessary interventions to address these effects, a detailed knowledge of changes in the misortality patterns among PWDH is necessary.

We offer in this work an analysis based on mortality data among both PWDH and the general population in the United States, both before and during the COVID-19 pandemic. Such an analysis is not inherently affected by the differences in population composition of PWDH and the general population because such differences may be assumed to be equally present both before and during the COVID-19 pandemic. Analyzing changes in mortality patterns in both PWDH and the general population groups will allow us to better understand whether COVID-19 and the associated second-order effects resulted in disproportionate mortality among PWDH compared with the general population. This knowledge is fundamental for understanding both the present and future of HIV in the United States.

METHODS

Data reported to the Center for Disease Control and Prevention's (CDC) National HIV Surveillance System (NHSS) through December 2021 were used for population and mortality data for PWDH aged 13 years or older.[17] NHSS is the primary source for population-based information about HIV in the United States. All states, the District of Columbia, and US territories report cases of HIV infection and associated demographic and clinical information to NHSS. Population and mortality data for the general US population were taken from the National Center for Health Statistics' (NCHS) National Vital Statistics System, accessed through the publicly available CDC WONDER database.[18]

NCHS mortality data are based on all death certificates filed in the United States. Deaths among PWDH can only be identified from the NCHS mortality data if HIV is listed as a cause of death. By contrast, NHSS mortality data include all deaths among diagnosed PWDH in the United States, regardless of cause.[17] Death certificate data are a primary source for reporting death data to NHSS. While the data sources are generally comparable for demographic information collected, 1 notable difference for this study is that NCHS data report sex determined at death, while the NHSS data report sex assigned at birth.[17,18]

We also calculated mortality rates across the 13–24, 25–34, 35–44, 45–54, 55–64, and older than 65 years age groups. Persons younger than 13 years were not considered among PWDH nor in the general population. We computed mortality rates by assigned sex (male/female) and race/ethnicity, considering White, Hispanic/Latino, and Black or African American (hereafter referred to as Black) populations. Owing to small PWDH population sizes, other racial/ethnic groups were not considered. We further examined 2-way (race/ethnicity and age, and sex and age) and 3-way (race/ethnicity, sex, and age) stratifications of these population groupings.

Mortality rates were calculated as follows: let d_p^i be the number of deaths in a population p in the year (or group of years) i and n_p^i the total population, denoted analogously. Then mortality rates μ for a population p a year (or group of years) i are given by:

$$\mu_p^i = \frac{d_p^i}{n_p^i} \times 100,000.$$

To reduce sensitivity to single-year effects, we considered a combined mortality rate for 2018 and 2019, $\mu_p^{2018-2019}$, computed as follows:

$$\mu_p^{2018-2019} = \frac{d_p^{2018} + d_p^{2019}}{n_p^{2018} + n_p^{2019}} \times 100,000.$$

Because the analysis focused on sudden changes over a short time, we did not consider years before 2018 to limit the effects of long-term trends, such as declining mortality among PWDH, on our conclusions. For readability, all reported rates are per 100,000 population, even if not explicitly denoted. For all populations, p denotes percent change in mortality rate in 2020 from the 2018–2019 rate as δ_p, computed as:

$$\delta_p = \frac{\mu_p^{2020} - \mu_p^{2018-2019}}{\mu_p^{2018-2019}}.$$

We obtained a 95% confidence interval (CI) $\left[\delta_p^{.025}, \delta_p^{.975}\right]$ for δ_p as follows. Note that a trivial manipulation of the abovementioned expression shows the following:

$$\delta_p + 1 = \frac{\mu_p^{2020}}{\mu_p^{2018-2019}}.$$

As the right-hand side is a rate-ratio, we computed a 95% CI using the approach advocated in[19]:

$$e^{\ln\left(\frac{\mu_p^{2020}}{\mu_p^{2018-19}}\right) - / + 1.96 \cdot SE\left(\ln\left(\frac{\mu_p^{2020}}{\mu_p^{2018-19}}\right)\right)},$$

where

$$SE\left(\ln\left(\frac{\mu_p^{2020}}{\mu_p^{2018-2019}}\right)\right) = \sqrt{\frac{1}{n_p^{2020}} - \frac{1}{d_p^{2020}} + \frac{1}{n_p^{2018-2019}} - \frac{1}{d_p^{2018-2019}}}.$$

In turn, this yields:

$$\left[\delta_p^{.025}, \delta_p^{.975}\right] = \left[e^{\ln\left(\frac{\mu_p^{2020}}{\mu_p^{2018-2019}}\right) - 1.96 \cdot SE\left(\ln\left(\frac{\mu_p^{2020}}{\mu_p^{2018-2019}}\right)\right)}, e^{\ln\left(\frac{\mu_p^{2020}}{\mu_p^{2018-2019}}\right) + 1.96 \cdot SE\left(\ln\left(\frac{\mu_p^{2020}}{\mu_p^{2018-2019}}\right)\right)}\right].$$

Finally, we note that a CI for the absolute change in mortality rate is obtained by multiplying the abovementioned interval by $\mu_p^{2018-2019}$.

For each considered group, we then computed the relative mortality risk ratio (RR) between the general population and the PWDH population for each year 2018–2019 and 2020 as follows:

$$RR^i = \frac{\mu^i_{PWH}}{\mu^i_{general\ \ pop.}}, i = 2018 - 2019, 2020.$$

Or, equivalently:

$$RR^i = \frac{d^i_{PWH}/n^i_{PWH}}{d^i_{general\ \ pop.}/n^i_{general\ \ pop.}}, i = 2018 - 2019, 2020.$$

To determine statistical significance, we examined the changes in RR from 2018–2019 (years combined) to 2020. If PWDH showed increased mortality risk due to COVID-19, or its second-order effects, we would expect the RR to be higher in 2020. On the contrary, no change (or decrease) in the RR would imply the opposite. CIs for the RR are calculated under the assumption of a log-normal distribution.[19]

To determine whether changes in RR during 2020 were statistically significant, we compute:

$$RR^{change} = \frac{RR^{2020}}{RR^{2018-2019}},$$

and then determine a P value p by assuming RR_{change} follows a log-normal distribution and computing the z score as follows:

$$z = \frac{\ln\left(RR^{change}\right)}{SE\left(\ln\left(RR^{change}\right)\right)} = \frac{\ln\left(RR^{2020}\right) - \ln\left(RR^{2018-2019}\right)}{\sqrt{\left[SE\left(\ln\left(RR^{2020}\right)\right)\right]^2 + \left[SE\left(\ln\left(RR^{2018-2019}\right)\right)\right]^2}}.$$

Then p is recovered as:

$$p = 2 \times (1 - P(X < abs(z))), X \sim N(0, 1),$$

where SE denotes the standard error of the estimated RR, defined here as:

$$SE\left(\ln\left(RR^i\right)\right) = \sqrt{\frac{1}{n^i_{general\ \ pop.}} - \frac{1}{d^i_{general\ \ pop.}} + \frac{1}{n^i_{PWH}} - \frac{1}{d^i_{PWH}}}$$

Excess deaths among PWDH during 2020 $\overline{d^{2020}_{PWH}}$ were estimated as:

$$\overline{d^{2020}_{PWH}} = n^{2020}_{PWH} \times \mu^{2018-2019}_{PWH} \times \delta_p.$$

A CI for $\overline{d^{2020}_{PWH}}$ was obtained by replacing δ_p in the abovementioned expression with the lower and upper bounds ($\delta_p^{.025}$ and $\delta_p^{.975}$, respectively) of the associated CI for δ_p. Because

excess mortality among the general population during 2020 has been studied extensively elsewhere,[1,12] we do not compute this quantity here.

RESULTS

Among the general population, mortality rates increased notably from 2018–2019 to 2020 across all groups (Table 1). The largest relative increases were among groups aged 54 years and younger in the general population, due to the lower initial mortality rates (increases of 19.9% or more among the age groups 13–24, 25–34, 35–44, and 45–54 years in the general population, compared with increases of 17.4% or less among groups aged 55 years and older). However, the largest absolute mortality rate increases occurred among groups aged 55 years and older. Among PWDH (Table 2), the largest absolute increases in mortality rates also occurred in the groups aged 55 years and older. Mortality rates increased from 2018–2019 to 2020 among PWDH for all groups examined except for White female individuals with diagnosed HIV and PWDH aged 13–24 years and 45–54 years, who did not show statistically significant change in mortality rate in 2020.

Black and Hispanic/Latino populations showed larger increases in mortality rates from 2018–2019 to 2020, in both absolute and relative terms, compared with White populations, in the general population (295.2% and 29.7% for Black, 191.5% and 44.1% for Hispanic/Latino, 176.7% and 14.0% for White). Among PWDH, absolute increases were largest for Black and Hispanic/Latino PWH (180.0 for Black, 140.9 for Hispanic/Latino, and 78.8 for White), while the relative changes were similar among the different racial/ethnic groups (CIs overlap).

Absolute and relative mortality rate increases were larger among men in the general population (215.6% and 20.0% compared with 156.9% and 16.1% for women); however, this was not clearly observed in the PWDH population (CIs for the 2 rates overlap).

Among the entire populations, the absolute increase in mortality among PWDH was 21% smaller than the general population (an increase of 147.1 for PWDH compared with 185.6 for the general population). Absolute mortality increases were smaller for PWDH across each examined racial/ethnic group and among all groups aged 45 years and older. Among female PWDH (both overall and for each race/ethnicity), Hispanic/Latino PWDH, PWDH younger than 45 years, and PWDH aged 55–64 years, absolute mortality increases showed no statistically significant difference from corresponding increases in the general population.

We estimate approximately 1550 excess deaths occurred among PWDH in 2020 (Table 3). Excess deaths were particularly concentrated among Black PWDH and PWDH aged 55 years or older. All groups showed positive excess mortality besides White female individuals, PWDH aged 13–24 years, and PWDH aged 45–54 years, for whom overall mortality levels were consistent with prepandemic trends. We note these numbers are consistent with those found in Zhu W et al.[20]

Statistically significant decreases in RR from 2018–2019 to 2020 were observed in most populations (Tables 4–5). RR drops were highest among Hispanic/Latino PWDH (particularly pronounced among male individuals), Black male individuals, and persons aged

45–54 years. Female individuals, persons aged 13–24 years, and persons aged 65 years and older showed no statistically significant change in RR (Table 5). No statistically significant increases in RR were found.

In Appendices A, B, and C (see Supplemental Digital Content, http://links.lww.com/QAI/C182, http://links.lww.com/QAI/C183, http://links.lww.com/QAI/C184), we provide further analyses based on 2-way stratifications considering age and sex (see Appendix A, Supplemental Digital Content, http://links.lww.com/QAI/C182) and age and race/ethnicity (Appendix B, Supplemental Digital Content, http://links.lww.com/QAI/C183). Three-way stratification of age, sex, and race/ethnicity is given in Appendix C (see Supplemental Digital Content, http://links.lww.com/QAI/C184). The results do not generally differ from the trends shown here, with most groups showing decreases in RR. Only 1 statistically significant increase was observed, among women aged 65 years and older.

DISCUSSION

The results of this study found no evidence of disproportionate mortality among PWDH during the COVID-19 pandemic in 2020. While mortality increased for PWDH in 2020 across nearly all age, sex, and racial/ethnic groups, such increases were usually lower, or of a similar magnitude, than mortality increases in the general population. These findings are in line with several meta-analyses and clinical studies,[8–11] suggesting that, after controlling for underlying differences in mortality between PWDH and the general population, HIV did not exert a significant influence on mortality during the COVID-19 pandemic. Because this study considered all mortality causes, and not just direct COVID-19 mortality, we also found no evidence that second-order COVID-19 deaths were more frequent among the PWDH population, and in fact may have had a lesser effect.

The results of this analysis are useful for future analyses of HIV in the United States. For modeling, surveillance, and intervention efforts, having a clear understanding of how COVID-19 changed mortality patterns in PWDH, and how such changes may influence future PWDH mortality and transmission, is of critical importance. We believe the analyses given here provide compelling evidence that the increases in PWDH mortality were generally smaller than those in the overall population and that future changes in mortality among PWDH due to the COVID-19 pandemic may be expected to follow this pattern.

The smaller relative increase in mortality rates among PWDH compared with that in the general population may be explained partly by the higher baseline mortality rates among PWDH, making the impact of COVID-19 proportionally less significant. While this is an important factor, it does not explain the entirety of the decreases in RR observed because *absolute* mortality increases were generally smaller among PWDH than the general population, with the exceptions of female individuals (driven primarily by Hispanic/Latino female individuals), and persons younger than 45 years.

The reasons why such mortality increases were smaller among PWDH are not immediately obvious and there are likely many. However, the proportion of PWDH who received HIV medical care in 2020 remained similar to previous years.[21] By contrast, several studies

suggest that access to health care during 2020 among general population was delayed or reduced.[22,23] Our findings could also be explained partly by lower COVID-19 morbidity among PWDH, as suggested by some studies.[6,24] We do not believe vaccination played a significant role in the current analysis because vaccines were not widely available during the considered period.

Our analysis of excess mortality among PWDH showed that nearly half of the excess mortality in 2020 occurred among PWDH older than 55 years and that more than half of excess deaths occurred among the Black and Hispanic/Latino PWDH populations. Nonetheless, a substantial share of excess mortality among PWDH occurred among younger age groups, who may be particularly at risk of overdose deaths, which increased sharply in 2020.[12] Going forward, it will be important to monitor mortality trends among these younger cohorts.

We acknowledge that this study is limited in several ways. Examining overall mortality, as was done here, does not distinguish cause of death. While this has some advantages, because we are interested not only in direct COVID-19 deaths but also second-order deaths due to the pandemic, it also presents some issues. Particularly, we acknowledge possible problems as explained. For instance, if direct COVID-19 mortality was disproportionately high among PWDH, but second-order mortality disproportionately low, these effects may mask each other. While this may not be a problem for backward-facing analyses of PWDH mortality (where overall mortality is more important), it may affect future projections because the rates of direct and second-order deaths from COVID-19 may change. In such a case, the stable RR shown here may no longer be reliable. Furthermore, COVID-19, even if not fatal, may nonetheless result in severe adverse health outcomes, which are not considered with the current methodology. Our study period of 2018–2019 may also represent a limitation because the small time window, in addition to considering the 2018–2019 rate as an aggregate over 2 years, may not account for long-term trends. In addition, an analysis with more detailed age structuring may help further understanding, particularly among the 65+ age group. Finally, we acknowledge that prevalence and mortality data for PWDH in Kansas and Mississippi (for 2019) and North Carolina, Kansas, South Carolina, and Vermont (in 2020) were not complete.

Future studies should concentrate on exploring possible factors that may further explain our findings and particularly vaccine uptake and efficacy among PWDH and prevalence of long-term COVID-19–related complications. In addition, similar analyses for other countries, in addition to being useful in and of themselves, may help with understanding the US-based results shown here.

Although mortality rates increased among PWDH from 2018–2019 to 2020, these increases were generally smaller, or of similar magnitude, compared with those observed in the general population, in both relative and absolute terms. This resulted in decreases in the relative mortality RR. While the extent to which the RR changed varied across different populations, nearly all populations showed a decrease. Female individuals and persons aged 13–24 years and aged 65 years and older showed no statistically significant change in RR. A statistically significant increase was only observed in 1 group (women aged 65

years and older). Our findings do not provide evidence of elevated mortality risk from COVID-19, or its indirect effects, among PWDH when compared with that among the general population. For backward-facing analyses, such as estimating costs incurred due to COVID-19 or modeling the effect of COVID-19 on HIV transmission in 2020 (still very much an open problem), the findings of this study are significant because the overall mortality rate is relevant in such cases. Nonetheless, this study does not definitively establish whether PWDH show an elevated risk of COVID-19 mortality on a per-person basis. Finally, we emphasize that while our findings did not show elevated mortality among PWDH *when compared with that among the general population*, they did show significantly elevated mortality among PWDH generally, indicating that COVID-19 represents a serious health risk for PWDH, and particularly those aged 55 years and older.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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TABLE 1.

Mortality Rates [*] Among the General Population Aged 13 Years or Older, by Age, Race/Ethnicity, and Sex, [†] 2018–2020—United States

Age	Race/Ethnicity	Sex[†]	Mortality Rate, 2018–2019	Mortality Rate, 2020	Change, 2018–2019 to 2020 (Absolute)	Change, 2018–2019 to 2020 (%)	Change, 2018–2019 to 2020 (%), 95% CI
All	All	All	1023.6	1209.2	185.6	18.1	18.0–18.3
All	All	M	1077.0	1292.6	215.6	20.0	19.8–20.2
All	All	F	972.5	1129.3	156.9	16.1	15.9–16.4
All	Black/African American	All	993.7	1288.9	295.2	29.7	29.2–30.2
All	Hispanic/Latino[‡]	All	434.1	625.6	191.5	44.1	43.4–44.8
All	White	All	1266.4	1443.1	176.7	14.0	13.8–14.1
All	Black/African American	M	1097.4	1442.8	345.4	31.5	30.8–32.2
All	Black/African American	F	900.9	1151.2	250.3	27.8	27.1–28.5
All	Hispanic/Latino	M	477.0	714.8	237.8	49.9	48.9–50.8
All	Hispanic/Latino	F	390.7	535.4	144.6	37.0	36.0–38.0
All	White	M	1315.4	1514.6	199.2	15.1	14.9–15.4
All	White	F	1219.3	1374.4	155.1	12.7	12.5–13.0
13–24	All	All	61.6	73.8	12.2	19.9	18.3–21.4
25–34	All	All	128.8	159.5	30.7	23.9	22.7–25.0
35–44	All	All	197.0	248.0	51.0	25.9	24.9–26.9
45–54	All	All	394.2	473.5	79.3	20.1	19.5–20.8
55–64	All	All	885.0	1038.9	154.0	17.4	17.0–17.8
65+	All	All	3959.6	4508.5	548.9	13.9	13.7–14.0
65–74	All	All	1773.8	2072.3	298.4	16.8	16.5–17.2
75–84	All	All	4346.5	4997.0	650.5	15.0	14.7–15.3
85+	All	All	13,339.1	15,210.9	1871.7	14.0	13.8–14.3

[*] Rates calculated by dividing deaths in a group by overall group population. All rates are per 100,000 population.

[†] Refers to sex determined at death. M denotes “male,” and F denotes “Female.”

[‡] Hispanic/Latino persons can be of any race.

TABLE 2.

Mortality Rates[*] Among PWDH Aged 13 Years or Older, by Age, Race/Ethnicity, and Sex,[†] 2018–2020—United States

Age	Race/Ethnicity	Sex[†]	Mortality Rate, 2018−2019	Mortality Rate, 2020	Change, 2018–2019 to 2020 (Absolute)	Change, 2018–2019 to 2020 (%)	Change, 2018–2019 to 2020 (%), 95% CI
All	All	All	1575.6	1722.7	147.1	9.3	7.4–11.3
All	All	M	1560.3	1693.0	132.7	8.5	6.3–10.8
All	All	F	1625.8	1821.5	195.7	12.0	8.0–16.2
All	Black/African American	All	1667.3	1847.3	180.0	10.8	7.8–13.9
All	Hispanic/Latino[‡]	All	1178.7	1319.6	140.9	12.0	7.2–16.9
All	White	All	1723.8	1802.6	78.8	4.6	1.2–8.0
All	Black/African American	M	1705.3	1891.0	185.7	10.9	7.3–14.6
All	Black/African American	F	1592.1	1759.2	167.0	10.5	5.3–16.0
All	Hispanic/Latino	M	1152.8	1268.5	115.7	10.0	4.8–15.5
All	Hispanic/Latino	F	1290.6	1546.7	256.1	19.8	9.2–31.6
All	White	M	1677.7	1767.3	89.6	5.3	1.7–9.1
All	White	F	2030.1	2034.8	4.7	0.2	−7.8 to 8.9
13−24	All	All	419.7	506.9	88.4	21.1	−1.1 to 48.3
25−34	All	All	663.5	727.5	64.0	9.6	2.1–17.7
35−44	All	All	928.2	998.4	70.3	7.6	1.8–13.6
45−54	All	All	1426.2	1429.2	3.0	0.2	−3.6 to 4.2
55−64	All	All	2089.8	2192.5	102.7	4.9	1.7–8.2
65+	All	All	3531.0	3898.8	367.8	10.4	6.6–14.3

[*] Rates calculated by dividing deaths in a group by overall group population; in this case, PWDH deaths divided by diagnosed HIV prevalence in the specified group. All rates are per 100,000 population.

[†] Refers to assigned sex assigned at birth. M denotes “male,” and F denotes “female.”

[‡] Hispanic/Latino persons can be of any race.

TABLE 3.

Excess Mortality in 2020 (When Compared With 2018–2019 Levels) * Among PWDH Aged 13 Years or Older, by Age, Race/Ethnicity, and Sex, † United States

Age	Race/Ethnicity	Sex†	Excess Deaths, 2020	95% CI
All	All	All	1551	1229–1877
All	All	M	1075	796–1365
All	All	F	477	317–643
All	Black/African American	All	772	558–995
All	Hispanic/Latino‡	All	347	209–490
All	White	All	241	63–422
All	Black/African American	M	533	357–714
All	Black/African American	F	238	120–363
All	Hispanic/Latino	M	232	111–359
All	Hispanic/Latino	F	116	54–184
All	White	M	238	76–405
All	White	F	2	−64 to 73
13–24	All	All	25	−1 to 58
25–34	All	All	104	23–191
35–44	All	All	138	33–249
45–54	All	All	8	−131 to 152
55–64	All	All	290	100–484
65+	All	All	475	301–652

* Excess mortality in a group is calculated by multiplying the total population size, the 2018–2019 mortality rate, and the calculated percent change in the mortality rate in 2020 from 2018 to 2019.

† Refers to assigned sex assigned at birth. M denotes “male,” and F denotes “female.”

‡ Hispanic/Latino persons can be of any race.

TABLE 4.

Relative Mortality Risk (RR)* Among PWDH Aged 13 Years or Older, by Age, Race/Ethnicity, and Sex, † 2018–2020—United States

Age	Race/Ethnicity	Sex†	RR, 2018–2019	95% CI	RR, 2020	95% CI
All	All	All	1.5	1.5–1.6	1.4	1.4–1.5
All	All	M	1.5	1.4–1.5	1.3	1.3–1.3
All	All	F	1.7	1.6–1.7	1.6	1.6–1.7
All	Black/African American	All	1.7	1.7–1.7	1.4	1.4–1.5
All	Hispanic/Latino‡	All	2.7	2.6–2.8	2.1	2.0–2.2
All	White	All	1.4	1.3–1.4	1.3	1.2–1.3
All	Black/African American	M	1.6	1.5–1.6	1.3	1.3–1.4
All	Black/African American	F	1.8	1.7–1.8	1.5	1.5–1.6
All	Hispanic/Latino	M	2.4	2.4–2.5	1.8	1.7–1.8
All	Hispanic/Latino	F	3.3	3.1–3.5	2.9	2.7–3.1
All	White	M	1.3	1.3–1.3	1.2	1.1–1.2
All	White	F	1.7	1.6–1.8	1.5	1.4–1.6
13–24	All	All	6.8	6.0–7.7	6.9	5.8–8.1
25–34	All	All	5.2	4.9–5.4	4.6	4.3–4.8
35–44	All	All	4.7	4.6–4.9	4.0	3.9–4.2
45–54	All	All	3.6	3.5–3.7	3.0	2.9–3.1
55–64	All	All	2.4	2.3–2.4	2.1	2.1–2.2
65+	All	All	0.9	0.9–0.9	0.9	0.8–0.9

*Relative mortality risk (abbreviated RR) for a group is determined by dividing the group PWDH mortality rate by the rate among the general population group.

†Refers to assigned sex assigned at birth among PWDH and sex determined at death. M denotes “male,” and F denotes “female.”

‡Hispanic/Latino persons can be of any race.

TABLE 5.

Change in Relative Mortality Risk (RR)* Among PWDH Aged 13 Years or Older, by Age, Race/Ethnicity, and Sex,† 2018–2020—United States

Age	Race/Ethnicity	Sex†	RR2020/RR2018–2019	95% CI	*P*
All	All	All	0.93	0.91–0.94	0.00
All	All	M	0.90	0.89–0.92	0.00
All	All	F	0.96	0.93–1.00	0.05
All	Black/African American	All	0.85	0.83–0.88	0.00
All	Hispanic/Latino‡	All	0.78	0.74–0.81	0.00
All	White	All	0.92	0.89–0.95	0.00
All	Black/African American	M	0.84	0.82–0.87	0.00
All	Black/African American	F	0.86	0.82–0.91	0.00
All	Hispanic/Latino	M	0.73	0.70–0.77	0.00
All	Hispanic/Latino	F	0.87	0.80–0.96	0.01
All	White	M	0.91	0.88–0.95	0.00
All	White	F	0.89	0.82–0.97	0.01
13–24	All	All	1.01	0.82–1.23	0.94
25–34	All	All	0.89	0.82–0.95	0.00
35–44	All	All	0.85	0.81–0.90	0.00
45–54	All	All	0.83	0.80–0.87	0.00
55–64	All	All	0.89	0.87–0.92	0.00
65+	All	All	0.97	0.94–1.00	0.09

*Change in relative mortality risk (abbreviated RR) for a group is determined by dividing the relative mortality risk in 2020 by the relative mortality risk in 2018–2019.

†Refers to assigned sex assigned at birth among PWDH and sex determined at death. M denotes “male,” and F denotes “female.”

‡Hispanic/Latino persons can be of any race.