

# COVID-19 mortality: The past, present, and future

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## Introduction

As many of you know, Milliman has been studying the COVID-19 (COVID) pandemic since it started, and continues to do so today. In this article, the focus will be on the mortality data related to COVID, by looking at both the numbers and causes of death in the COVID era. Before diving into the numbers, it must be pointed out that the numbers are “wrong” for various reasons, including but not limited to different definitions by states as to what is considered a COVID death, whether it was known if the individual had COVID at death, and whether COVID was considered the primary cause of death. Despite the numbers being “wrong,” it is also important to understand that the data still provides meaningful and useful information.

This article will explore the past, present, and future mortality due to COVID in the United States. It shows how mortality has changed for both the general population and the life insurance industry and explores the causes of death that increased the most during the pandemic.

Our hope is that the article provides you with some new insights and touches on the questions that are or should be of interest to you. We also hope that this article leads us to further discussions on some of the important topics covered.

## The past

Leading up to the COVID era, overall U.S. mortality saw a deterioration in 2015 and again in 2017, before improving in 2018 and 2019.<sup>1</sup> Elsewhere around the world a slowing of mortality improvement (vs. the U.S. deterioration) was observed over this time period, also beginning in 2015.<sup>2</sup> COVID began in the United States in early 2020.

Shortly after COVID began and life insurance companies began collecting data focused on COVID, Milliman began to collect U.S. industry-wide COVID data. This was called the Milliman COVID-19 Claims Survey and covered COVID claims in 2020 and 2021. We began by collecting COVID claims on a weekly basis and eventually switched to a monthly collection as the volume grew. At our peak, we had 45 companies participating in the survey, but the number of companies participating varied over the two years. We collected information on over 90,000 industry COVID claims.

There were several key findings from the survey:

- Insurance company death claims attributed to COVID followed a similar pattern over time as the United States reported COVID deaths.
- Industry results varied company to company, with the type of business written (i.e., traditional vs. final expense/preneed) being more of a predictor than the size of the company.
- COVID claims varied by sex, age, product, policy size, state, and more.

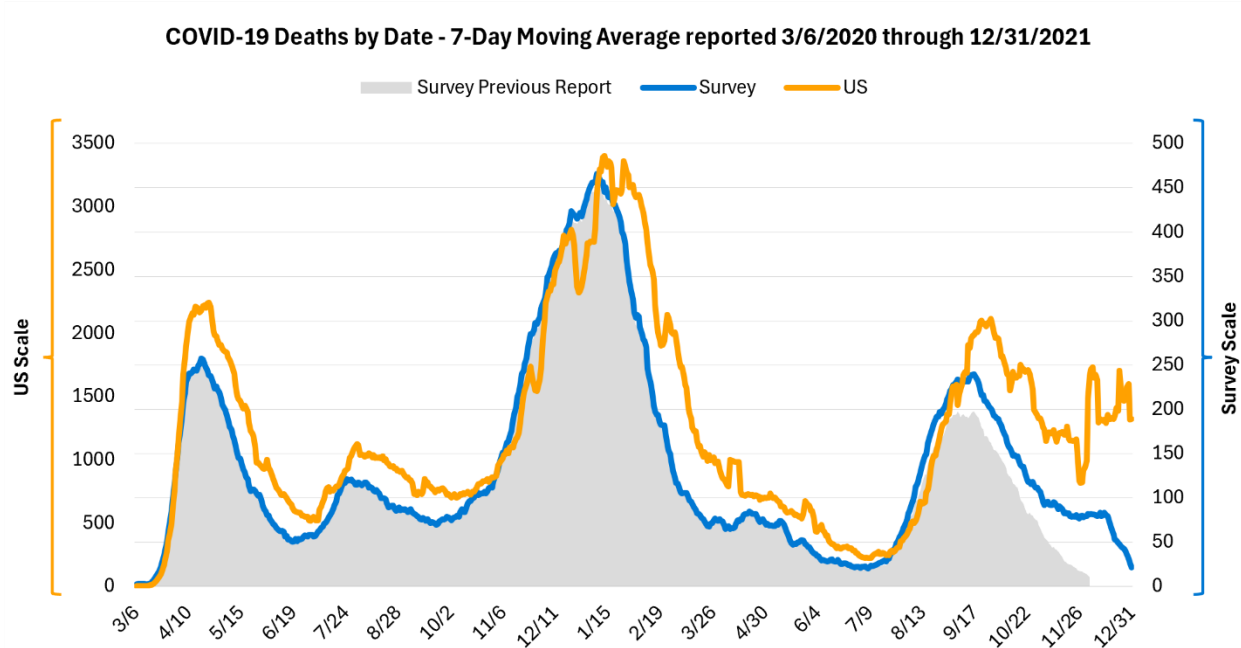
We provided tables and graphs to the participating companies that evolved throughout the two years of the study. One graph compared the industry results (from our survey) to the U.S. population. The final version of this information is shown in Figure 1.

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1. Xu, J. et al. (July 26, 2021). Deaths: Final Data for 2019. National Vital Statistics Report. Retrieved August 14, 2024, from <https://www.cdc.gov/nchs/data/nvsr/nvsr70/nvsr70-08-508.pdf>. See page 23, age-adjusted death rate for all races and origins.

2. Murphy, M.J. & Grundy, E.M.D. (May 2022). Slowdown in Mortality Improvement in the Past Decade: A US/UK Comparison. J Gerontol B Psychol Sci Soc Sci. Retrieved August 14, 2024, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9154273/>.

**FIGURE 1: U.S. COVID-19 DEATHS VS. MILLIMAN COVID-19 CLAIMS THROUGH 12/31/2021**



Source: Milliman COVID-19 Claims Survey

Figure 1 shows a remarkably similar pattern in the timing between the reported U.S. COVID deaths (orange line) and COVID claims from our survey (blue line). The similar pattern lasted until the end, where the difference is due to a lag in reporting. This lag in reporting included the lag of the reporting deaths to the company and the lag of the company reporting to us. To give you an idea of the lag, the gray shaded area represents the prior month results and can be compared to the blue line, which shows the most recent month of industry results. The difference between them represents the claims reported in December 2021 for claims occurring in November 2021 and earlier.

One way to better understand the impact of COVID is to compare the deaths that occurred during the pandemic to those before the pandemic or to an expected number of deaths. One can compare the results to a single past year or to an average of past years, e.g., 2017-2019 or 2015-2019, two common examples. “Expected” number of deaths can be defined in different ways, which are beyond the scope of this paper. This paper uses a single year, 2019, to quantify the increase or decrease in deaths compared to the year immediately preceding the pandemic. Thus “excess mortality” is defined as the percentage increase over 2019 deaths.

Figures 2 and 3 show the excess mortality for total U.S. deaths in individual years 2020 to 2023. Figure 2 shows the results including and excluding COVID deaths and Figure 3 shows the results split by sex and age. The death data came from the Human Mortality Database (HMD) weekly results and the COVID deaths came from Johns Hopkins.<sup>3</sup>

**FIGURE 2: U.S. EXCESS MORTALITY FOR YEAR 2020- 2023 OVERALL AND EXCLUDING COVID-19 DEATHS OVER 2019**

| Year | Overall | Overall Excluding COVID-19 |
|------|---------|----------------------------|
| 2020 | 15.9%   | 4.2%                       |
| 2021 | 16.5%   | 0.3%                       |
| 2022 | 10.3%   | 1.3%                       |
| 2023 | 3.8%    | N/A                        |

3. See [https://github.com/CSSEGISandData/COVID-19/blob/master/csse\\_covid\\_19\\_data/csse\\_covid\\_19\\_time\\_series/time\\_series\\_covid19\\_deaths\\_global.csv](https://github.com/CSSEGISandData/COVID-19/blob/master/csse_covid_19_data/csse_covid_19_time_series/time_series_covid19_deaths_global.csv).

Figure 2 shows that U.S. mortality (based on number of deaths) increased by about 16% (from 2019) in both 2020 and 2021, the first two years of the pandemic. In 2022 and 2023, there were drops to 10% and 4%, respectively.

Note that if COVID deaths are removed, mortality still increased, but only by 4% in 2020, less than 1% in 2021, and over 1% in 2022. Other causes of death creating these increases will be explored shortly.

Note also that Johns Hopkins stopped publishing COVID death data during 2023, so a comparable percentage, excluding COVID deaths in 2023 could not be provided.

Figure 3 shows the results broken down independently by sex and age.

**FIGURE 3: U.S. EXCESS MORTALITY FOR YEARS 2020-2023 BY SEX AND AGE OVER 2019**

| Year                    | Male  | Female | Ages |       |       |       |     | Total Deaths<br>(in '000s) |
|-------------------------|-------|--------|------|-------|-------|-------|-----|----------------------------|
|                         |       |        | 0-14 | 15-64 | 65-74 | 75-84 | 85+ |                            |
| 2020                    | 17%   | 14%    | -6%  | 17%   | 19%   | 17%   | 13% | 3,434                      |
| 2021                    | 20%   | 13%    | -5%  | 28%   | 25%   | 16%   | 3%  | 3,449                      |
| 2022                    | 12%   | 8%     | -1%  | 12%   | 16%   | 15%   | 2%  | 3,269                      |
| 2023                    | 5%    | 2%     | -5%  | 2%    | 8%    | 11%   | -3% | 3,075                      |
| 2019 Deaths (in 's000s) | 1,529 | 1,433  | 31   | 733   | 576   | 714   | 908 | 2,962                      |

Figure 3 shows that the increase in mortality for males was larger than for females in all four years analyzed (2020-2023).

The age splits shown are those provided in the HMD data. By age, there was mortality improvement for ages 0-14 in all years despite COVID. However, there were large increases in mortality for ages 15-84. The worst year for ages 15-74 was 2021. For ages 75-84, mortality was also higher than 2020, but mortality improved each year, 2021 through 2023, for these ages. Mortality actually improved for ages 85+ in 2023.

Overall results from the Milliman COVID-19 Claims Survey are shown in Figure 4. Results are shown by claims count. Twenty-one companies participated in this analysis.

**FIGURE 4: MILLIMAN COVID-19 CLAIMS SURVEY EXCESS MORTALITY (BY CLAIMS COUNT) OVERALL AND EXCLUDING COVID-19 CLAIMS FOR YEARS 2020 AND 2021 OVER 2019**

| Year | Overall | Overall Excl. COVID-19 |
|------|---------|------------------------|
| 2020 | 17%     | 6%                     |
| 2021 | 22%     | 7%                     |

The Milliman COVID-19 Claims Survey showed higher results in 2021 than 2020, consistent with the U.S. population results for the main insurance ages. The overall and the overall excluding COVID results were higher than those from the U.S. population (comparing back to Figure 2 above). This is not necessarily inconsistent with the results shown in Figure 1 because the graphs in Figure 1 were based on different scales.

In addition to what is shown here, the Milliman COVID-19 Claims Survey has information by age, sex, claim amount, product (traditional vs. final expense/preneed), and state over the two years the survey was completed.

Another item to explore over this period is cause of death. While cardiovascular and cancer deaths remained the top two causes of death in the United States, COVID became the third-leading cause of death. That said, there are some interesting observations that can be made by age and year by year of the pandemic.

Figure 5 shows the top 5 causes of death by age group for 2019 (the baseline) and for individual years 2020-2023.

The following data comes from the Centers for Disease Control and Prevention (CDC) Rapid Release data through the fourth quarter of 2023. Note that, as this data was recently released, it is possible the 2023 results may change in the next release. Also, some causes (specifically accident, firearm, suicide, homicide, falls  $\geq 65$ , and drug OD) only had data through the third quarter 2023. Some of these causes, with only three quarters of data, were still among the top 5 causes of death.

Finally, please note that there is likely overlap in the results between the following causes:

- Accident
- Drug OD
- Firearm
- Homicide
- Suicide

**FIGURE 5: TOP 5 CAUSES OF DEATH BY AGE (YEARS 2019-2023)**

| Ages  | Rank | 2019       | 2020     | 2021     | 2022     | 2023     |
|-------|------|------------|----------|----------|----------|----------|
| 1-4   | 1    | Accident   | Accident | Accident | Accident | Accident |
|       | 2    | Homicide   | Cancer   | Homicide | Homicide | Cancer   |
|       | 3    | Cancer     | Homicide | Cancer   | Cancer   | Homicide |
|       | 4    | Heart      | Heart    | Firearm  | Drug OD  | Pneu/Flu |
|       | 5    | Pneu/Flu   | Pneu/Flu | Heart    | Firearm  | Drug OD  |
| 5-14  | 1    | Accident   | Accident | Accident | Accident | Accident |
|       | 2    | Cancer     | Cancer   | Cancer   | Cancer   | Cancer   |
|       | 3    | Suicide    | Suicide  | Firearm  | Firearm  | Firearm  |
|       | 4    | Firearm    | Firearm  | Suicide  | Homicide | Homicide |
|       | 5    | Homicide   | Homicide | Homicide | Suicide  | Suicide  |
| 15-24 | 1    | Accident   | Accident | Accident | Accident | Accident |
|       | 2    | Firearm    | Firearm  | Firearm  | Firearm  | Firearm  |
|       | 3    | Suicide    | Drug OD  | Drug OD  | Drug OD  | Drug OD  |
|       | 4    | Drug OD *  | Suicide  | Homicide | Homicide | Homicide |
|       | 5    | Homicide * | Homicide | Suicide  | Suicide  | Suicide  |
| 25-34 | 1    | Accident   | Accident | Accident | Accident | Accident |
|       | 2    | Drug OD    | Drug OD  | Drug OD  | Drug OD  | Drug OD  |
|       | 3    | Firearm    | Firearm  | Firearm  | Firearm  | Firearm  |
|       | 4    | Suicide    | Suicide  | Suicide  | Suicide  | Homicide |
|       | 5    | Homicide   | Homicide | Homicide | Homicide | Suicide  |
| 35-44 | 1    | Accident   | Accident | Accident | Accident | Accident |
|       | 2    | Drug OD    | Drug OD  | Drug OD  | Drug OD  | Drug OD  |
|       | 3    | Cancer     | Heart    | Heart    | Heart    | Heart    |
|       | 4    | Heart      | Cancer   | COVID    | Cancer   | Cancer   |
|       | 5    | Suicide    | Suicide  | Cancer   | COVID    | Suicide  |

| Ages  | Rank | 2019                | 2020        | 2021        | 2022        | 2023        |
|-------|------|---------------------|-------------|-------------|-------------|-------------|
| 45-54 | 1    | Cancer              | Cancer      | Heart       | Heart       | Cancer      |
|       | 2    | Heart               | Heart       | Cancer      | Cancer      | Heart       |
|       | 3    | Accident            | Accident    | Accident    | Accident    | Accident    |
|       | 4    | Drug OD             | Drug OD     | COVID       | COVID       | Drug OD     |
|       | 5    | Liver * / Suicide * | Liver       | Drug OD     | Drug OD     | Liver       |
| 55-64 | 1    | Cancer              | Cancer      | Cancer      | Cancer      | Cancer      |
|       | 2    | Heart               | Heart       | Heart       | Heart       | Heart       |
|       | 3    | Accident            | Accident    | COVID       | COVID       | Accident    |
|       | 4    | Lower Resp          | COVID       | Accident    | Accident    | Diabetes    |
|       | 5    | Diabetes            | Lower Resp  | Diabetes    | Drug OD     | Lower Resp  |
| 65-74 | 1    | Cancer              | Cancer      | Cancer      | Cancer      | Cancer      |
|       | 2    | Heart               | Heart       | Heart       | Heart       | Heart       |
|       | 3    | Lower Resp          | COVID       | COVID       | COVID       | Lower Resp  |
|       | 4    | Stroke              | Lower Resp  | Lower Resp  | Lower Resp  | Stroke      |
|       | 5    | Diabetes            | Stroke      | Diabetes    | Stroke      | Diabetes    |
| 75-84 | 1    | Cancer              | Heart       | Heart       | Heart       | Heart       |
|       | 2    | Heart               | Cancer      | Cancer      | Cancer      | Cancer      |
|       | 3    | Lower Resp          | Lower Resp  | COVID       | COVID       | Lower Resp  |
|       | 4    | Stroke              | COVID       | Lower Resp  | Lower Resp  | Stroke      |
|       | 5    | Alzheimer's         | Stroke      | Stroke      | Stroke      | Alzheimer's |
| 85+   | 1    | Heart               | Heart       | Heart       | Heart       | Heart       |
|       | 2    | Cancer              | Cancer      | COVID       | Cancer      | Cancer      |
|       | 3    | Alzheimer's         | Alzheimer's | Cancer      | Alzheimer's | Alzheimer's |
|       | 4    | Stroke              | Stroke      | Alzheimer's | Stroke      | Stroke      |
|       | 5    | Lower Resp          | COVID       | Stroke      | COVID       | Lower Resp  |

\*Indicates a tie.

While there are many observations that can be made, here are two interesting items. The first, highlighted in green, shows when COVID deaths were among the top 5 causes of death. This occurred in 2020 for ages 45 and older, and in 2021 and 2022 for ages 35 and older. It is surprising that COVID would be a leading cause of death at the younger ages, as this is the typically healthier population who would generally be more capable of resisting an infection.

Also, with respect to COVID, in 2023 COVID was the ninth-leading cause of death for ages 65-74, the seventh-leading cause of death for ages 75-84, and the sixth-leading cause of death for ages 85+. The point here is that COVID was still prevalent in 2023 at the older ages.

The second observation, highlighted in blue, is that heart-related deaths increased in rank from 4 (2019) to 3 (2020-2023) for ages 35-44, from 2 (2019-2020) to 1 (2021-2022) for ages 45-54, and from 2 (2019) to 1 (2020-2023) for ages 75-84. Most other cause rankings were generally consistent with those in 2019. It is not clear whether this was due to COVID or what might be driving this change in ranks for heart-related deaths at these ages.

Figure 6 shows the top 3 causes of death by percentage increase from 2019. The results are color-coded to assist the reader in better observing where the top causes were distributed by year and age.

**FIGURE 6: TOP 3 PERCENTAGE INCREASES IN CAUSE OF DEATH FROM 2019 BY AGE (YEARS 2020-2023)**

| Ages  | Rank | 2020        | 2021         | 2022         | 2023        |
|-------|------|-------------|--------------|--------------|-------------|
| 1-4   | 1    | Kidney      | Drug OD      | Drug OD      | Drug OD     |
|       | 2    | Firearm     | Firearm      | Firearm      | Firearm     |
|       | 3    | Drug OD     | Stroke       | Accident     | Pneu/Flu    |
| 5-14  | 1    | Drug OD     | Drug OD      | Drug OD      | Drug OD     |
|       | 2    | Homicide    | Firearm      | Homicide     | Heart       |
|       | 3    | Lower Resp. | Homicide     | Firearm      | Homicide    |
| 15-24 | 1    | Drug OD     | Drug OD      | Drug OD*     | Drug OD     |
|       | 2    | Homicide    | Homicide     | Homicide     | Homicide    |
|       | 3    | Pneu/Flu    | Firearm      | Firearm      | Firearm     |
| 25-34 | 1    | Liver       | Liver        | Liver        | Liver       |
|       | 2    | Lower Resp. | Hypertension | Hypertension | Pneumonitis |
|       | 3    | Pneu/Flu    | Pneumonitis  | Drug OD      | Drug OD     |
| 35-44 | 1    | Liver       | Liver        | Liver        | Drug OD     |
|       | 2    | Drug OD     | Drug OD      | Drug OD      | Accident    |
|       | 3    | Pneu/Flu    | Accident     | Accident     | Liver       |
| 45-54 | 1    | Drug OD     | Drug OD      | Drug OD      | Drug OD     |
|       | 2    | Pneu/Flu    | Homicide     | Homicide     | Accident    |
|       | 3    | Homicide *  | Accident     | Accident     | Homicide    |
| 55-64 | 1    | Drug OD     | Drug OD      | Drug OD      | Drug OD     |
|       | 2    | Pneu/Flu    | Accident     | Accident     | Accident    |
|       | 3    | Accident    | Hypertension | Hypertension | Homicide    |
| 65-74 | 1    | Drug OD     | Drug OD      | Drug OD      | Drug OD     |
|       | 2    | Pneu/Flu    | Hypertension | Accident     | Accident    |
|       | 3    | Alzheimer's | Liver        | Hypertension | Liver       |
| 75-84 | 1    | HIV         | Drug OD      | Drug OD      | Drug OD     |
|       | 2    | Parkinson's | Diabetes     | Homicide     | HIV         |
|       | 3    | Pneu/Flu    | Hypertension | Falls ≥ 65   | Falls ≥ 65  |
| 85+   | 1    | HIV         | Diabetes     | Diabetes     | HIV         |
|       | 2    | Diabetes    | Falls ≥ 65   | Falls ≥ 65   | Liver       |
|       | 3    | Parkinson's | Hypertension | Hypertension | Falls ≥ 65  |

The causes with at least four top 3 rankings by percentage increase were color-coded and are listed below:

- Drug overdose (33) – blue ■
- Accident (14) – orange ■
- Homicide (14) – emerald green ■
- Pneumonia, pneu./flu, lower resp., pneumonitis (12) – turquoise ■
- Liver (11) – yellow ■
- Firearm (9) – red ■
- Hypertension (9) – gray ■
- Falls (5) – brown ■
- Diabetes (4) – sky blue ■
- HIV (4) – light green ■

The following provides comments on each of these causes:

- Drug overdoses are mostly related to the opioid epidemic, which increased again during COVID. Drug overdoses were one of the top 3 causes by percentage increase for all ages except 85+. Drug overdoses were the top cause of death by percentage increase in all years for ages 15-24 and 45-74. The percentage increase in drug overdoses for ages 1-4 was also high. This bears mentioning because it was also noticed by the National Institute of Health.<sup>4</sup>
- Accidental deaths are typically from traffic fatalities, which were up during the pandemic.<sup>5</sup> Despite more open roads with fewer people driving, traffic fatalities were up due to alcohol-impaired driving, nonuse of seat belts, and speeding, listed in order of prevalence. Traffic accidents did not rank in the top 3 causes by percentage increase for ages 5-34 and 75+.
- Homicides were at least one of the top 3 causes by percentage increase in all ages, except 1-4, 25-44, 65-74, and 85+. Homicides could be partially due to the disruptions of routine activities due to the pandemic.<sup>6</sup>
- In 2020, at all ages except 1-4 and 85+, pneumonia, “pneu/flu,” or “lower resp.” were top causes of death by percentage increase. In the other years, pneumonitis or pneu/flu were top causes only for ages 1-4 and 25-34. There has been some literature<sup>7</sup> indicating respiratory/flu causes of death were lower due to more people staying home during COVID, masking, and social distancing, and it appears that this is true from the data for years 2021 and later. However, it seems that the rise in respiratory/flu in 2020 may have been before some of these measures took place. Therefore, it seems like this increase in 2020 may be due to some COVID deaths being categorized as respiratory/flu deaths in 2020. I researched this further and found a study that looked into this issue and supports this observation/conclusion.<sup>8</sup>
- Liver deaths were one of the top causes of death by percentage increase at ages 25-44, 65-74, and 85+ and were the top cause across all but one year at ages 25-44. There was a notable increase in deaths during COVID among those with liver disease.<sup>9</sup>
- Firearm deaths were in the top 3 percentage increases for ages 1-24. There has been an increase in firearm deaths since the pandemic began.<sup>10</sup>
- Hypertension deaths are likely due to the extra stress caused by the COVID pandemic.<sup>11</sup> They ranked as one of the top 3 causes by percentage increase for all ages except 1-24 and 35-54.
- Falls (“Falls  $\geq$  65” in the underlying data) were in the top 3 percentage increases for ages 75 and higher.

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4. Sandelich, S. et al. (April 2024). Acute opioid overdose in pediatric patients. *J Am Coll Emerg Physicians Open*. Retrieved August 14, 2024, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10920943/#:~:text=In%201%E2%80%90%20to%204%E2%80%90year,many%20with%20histories%20of%20maltreatment>.

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7. Harvard T.H. Chan School of Public Health. A sharp drop in flu cases during COVID-19 pandemic. Retrieved August 14, 2024, from <https://www.hsph.harvard.edu/news/hsph-in-the-news/a-sharp-drop-in-flu-cases-during-covid-19-pandemic/>.

8. Alegria, C. & Nunes, Y. (May 2024). Estimate of the COVID-19 over-reporting bias as underlying cause of death in the USA. *RsearchGate*. Retrieved August 14, 2024, from [https://www.researchgate.net/publication/380538521\\_Estimate\\_of\\_the\\_COVID-19\\_over-reporting\\_bias\\_as\\_underlying\\_cause\\_of\\_death\\_in\\_the\\_USA](https://www.researchgate.net/publication/380538521_Estimate_of_the_COVID-19_over-reporting_bias_as_underlying_cause_of_death_in_the_USA).

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10. Adams, D. (June 29, 2023). Is gun violence an epidemic in the U.S.? Experts and history say it is. *NPR*. Retrieved August 14, 2024, from <https://www.npr.org/2023/06/29/1184731316/gun-violence-epidemic-suicide-mass-shooting-public-health-emergency-chicago>.

11. Mirza, H. et al. (July 2022). Hypertension as an Independent Risk Factor for In-Patient Mortality in Hospitalized COVID-19 Patients: A Multicenter Study. *Cureus*. Retrieved August 14, 2024, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9275529/#:~:text=In%20one%20study%2C%20hypertension%20was,patients%20who%20died%20%5B7%5D>.

- Diabetes deaths were one of the top percentage increases for ages 75 and higher and the top percentage increase in 2021 and 2022 for ages 85+.
- HIV had the highest percentage increase in deaths for ages 75-84 (2020) and ages 85+ (2020 and 2023). This is not likely related to COVID, but rather due to more older people with HIV (according to the CDC, 53% of HIV cases were age 50 and older) and many with heart disease and/or cancer, restricting treatment.<sup>12</sup>

Another observation of the broader data is that cancer deaths were lower than in 2019 for each individual year 2020-2023 and all ages, with a few exceptions. This could have been due to delays in care, delays in diagnosis, or other reasons. The exceptions included ages 1-4 (in 2022 and 2023), 25-44 (in 2020, 2022, and 2023), and 85+ (in 2022 and 2023), where there were either the same or slightly more cancer deaths than in 2019.

Finally, because many of these more prevalent causes are likely at least somewhat related to the COVID pandemic, it may be worthwhile to continue to monitor them in the future.

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## The present

Borrowing from the last section, 2023 showed an improvement in overall mortality from the prior years of the pandemic, but there are still excess deaths when compared to 2019. Also, there are people still having issues from the pandemic, e.g., those with what is called Long COVID.

There are many reasons to have stress, e.g., politics (even if you are not political), family divides on issues, continued concern about health, increasing pollution, multiple wars. If you do not have any concerns, just turn on the news! Stress is discussed here because it is one of the leading causes of future illness and ultimately death.<sup>13</sup>

COVID is still out there and, according to the CDC,<sup>14</sup> it is increasing in most states. Based on the CDC wastewater surveillance program as of July 23, 2024, COVID-19 is growing or likely growing in 36 states and territories, declining or likely declining in one state or territory, and is stable or uncertain in five states and territories. Data was not available for eight states. Fortunately, there does not appear to be a corresponding increase in deaths. As of this writing, it appears that COVID cases may be on the rise again.

A potentially bigger concern is that other causes of death are increasing.

It will likely take another couple of years before we know what the mortality was like in both 2023 and 2024, as all of the databases used in this paper update past data over time. Therefore, while this article includes the most recent data available at the time of publication, future versions of this same data will likely be different. The one exception to this is the Johns Hopkins database because it is no longer updated.

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13. PsychCentral. Can Stress Cause Death? Retrieved August 14, 2024, from <https://psychcentral.com/stress/is-stress-the-number-one-killer>.

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## The future

In managing your future mortality expectations, here are some of the questions and issues to think about. While we may not have definitive answers for these questions, and don't think anyone does, we can potentially provide you with some unique considerations.

- How long will the impact of the COVID pandemic last?
- Long COVID
  - Will those with Long COVID have a normal life expectancy and, if not, what should be expected?
  - Will a “cure” be found for Long COVID?
- What will overall mortality look like in the next few years and longer-term?
  - Will it be higher or lower than the most recent year levels?
  - Will it be higher or lower or return to the pre-COVID year levels?
- Other current issues
  - Will drug overdoses continue at the same pace, slow, or increase?
  - Will social media continue to cause serious anxiety and deaths (murder/suicide)?
  - What impact will the increasing prevalence of mental illness have on mortality?
  - How will access to healthcare affect future mortality?
  - How will current and future wars impact U.S. mortality, including that of our policyholders? Will it spread COVID and/or other diseases? If so, to what extent?
  - How will “supply chain” issues, particularly related to drug delivery, affect future mortality?
- Will we see increases or decreases in the two leading causes of death, cardiovascular and cancer, short- and longer-term?
  - What other causes of death may increase or decrease in the future?
  - What are the driving factors, both positive and negative?
- What can we expect to see in the way of medical advances near-term and longer-term?
- Will artificial intelligence (AI) help improve or increase mortality? How and to what extent?
- Will the next pandemic be less impactful or worse than COVID?
- How should future mortality be modeled?

These questions are just the start of a deeper discussion that can impact life insurers in general and more specifically your business. Feel free to reach out with comments on this paper and/or if you would like to discuss any of the above topics or anything else related to the COVID-19 pandemic.

## Limitations and Reliances

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For the Milliman COVID-19 Claims Survey referenced in this report, we relied on the data and information provided by the participating companies. We reviewed the data for general reasonability and consistency. Beyond this, we did not perform any additional reviews or detailed audits of the data. We have relied upon each company to provide accurate and complete data. If the underlying data or other information provided by the company to us was inaccurate or incomplete, then the results of this analysis will likewise be inaccurate or incomplete. We also relied on the data provided by the outside sources of data. These sources sometimes get updated over time, so numbers you see in the future may not match what was provided in this report.

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