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Mortality and Longevity

Group Life COVID-19 Mortality Survey Report

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Group Life COVID-19 Mortality Survey Report

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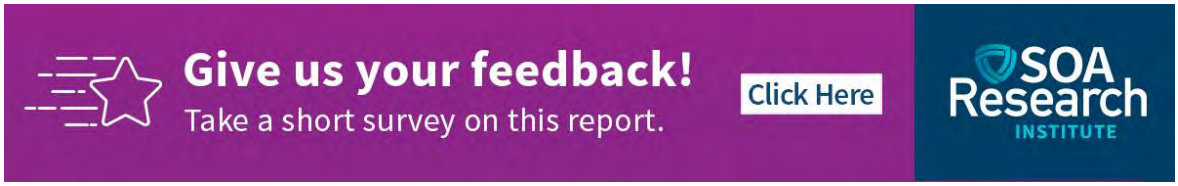

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Section 1: Purpose of the Survey

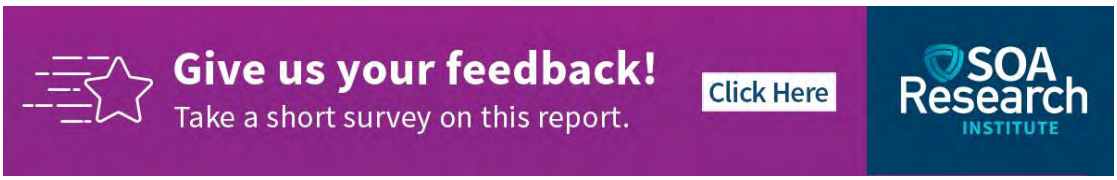
The purpose of this survey was to gather a high-level view of U.S. Group Term Life Insurance mortality results during the COVID-19 pandemic, as compared to prior period baseline mortality results. COVID-19 is caused by the novel coronavirus SARS-CoV-2, which was identified in 2019. As of the writing of this document, complications from COVID-19 have resulted in more than 1.1 million deaths in the U.S. alone, and more than 6.8 million worldwide.

This report is an update to the previous Group Life COVID-19 Mortality Survey published in November 2022, which included pandemic data from April 2020 through June 2022. This update includes Group Life mortality results from April 2020 through December 2022 (referred to in this report as the "pandemic period"), representing 33 months of Group Life mortality experience during the COVID-19 pandemic.

The survey was conducted by the Group Life Experience Committee (the Committee) of the Society of Actuaries and has been structured as a recurring monthly data collection and compilation process from U.S. Group Term Life insurers. The datasets for this report encompass all Group Term Life claims for the calendar years 2017–2022 reported to participating carriers as of December 31, 2022, and include more than 2.7 million claims and more than $120 billion in earned premium. The Committee is grateful that 20 of the top 21 U.S. Group Term Life insurers focused on employer groups are participating in this survey, with market share representing roughly 90% of the employer-based Group Term Life industry. Thus, the Committee believes the findings herein are representative of the COVID-19 mortality impact on the U.S. Group Term Life industry as a whole.

Guiding principles for the survey include the following:

- Providing timely information on total high-level Group Life mortality results versus baseline expectations during the pandemic is the most important goal. Thus, the survey is *not* a seriatim mortality study. Rather, it is a synopsis of monthly Group Life exposures, death counts and amounts.
- It is critical for this survey to compare current Group Life mortality from all causes of death to the baseline expected all-cause mortality levels. The Committee recognizes the existence of limitations in the ability to code deaths as COVID-19 related, within both the general population and Group Life exposures. Also, the survey seeks to analyze whether the pandemic has had indirect impacts on population mortality, beyond deaths associated directly with the COVID-19 virus. Thus, tracking just Group Life deaths coded with a cause of COVID-19 may not accurately measure the total impact of the pandemic.
- The Committee asked carriers to provide segmentation data when feasible. However, the Committee did not want the additional detailed data request to become so onerous that it materially delayed the survey reporting process or shrank the number of carriers willing and able to participate. Thus, the survey includes high-level exposure and claims data for all 20 carriers, but many of the segmentation data are based on results for just subsets of carriers.



Section 2: Overview

2.1 BACKGROUND

Carriers provided a complete set of monthly Group Life exposures dating back to January 2017, along with all Group Life death claims reported in January 2017 or later. The reported death claims also identified the months of death, that is, incurred months.

Exposures and deaths during the three-year period of 2017–2019 were used to set baseline mortality expectations. The dataset for this report encompasses all Group Life claims reported to participating carriers as of December 31, 2022. Reported claims are easier to measure than incurred claims, but they do not tell the full story about Group Life mortality through December 2022 because the reported claims in a given month include deaths from prior periods. Therefore, claim reporting patterns from prior periods have been analyzed to develop completion factors, which are used to estimate incurred but not yet reported claims for each month. This enabled the Committee to estimate incurred claims for each month up through December 2022.

As in prior reports, the most recent one-to-two incurral months should not be fully relied upon because of the maturity of the completion of reported claims, with the completion percentages for the most recent two months falling in the 30%–35% and 70%–75% ranges, respectively. The Committee has observed significant reporting lag volatility over the course of the study, resulting in volatility of incurred incidence development over time, especially in the most recent incurred months.

2.2 SCOPE

The following specifications were used to define claims and exposures within the survey:

- Include Group Term Life only; exclude Group Whole Life, Group Universal Life, Company-Owned Life Insurance and 10- or 20-year Group Term, etc.
- Include both list billed and self-administered business.
- Include employee, spouse and child exposures and deaths.
- Include both active and retired lives and claims.
- Include death benefits only; exclude riders, interest payments and claims expenses.
- Include only the life insurance benefit for accidental deaths; exclude any additional Accidental Death and Dismemberment rider amounts.
- Exclude Waiver of Premium disabilities but include deaths from persons on Waiver of Premium status.
- Portability and Conversion exposures and claims may be either included or excluded based on each company's internal reporting procedures.

2.3 SURVEY HIGHLIGHTS

Tables 2.1 through 2.4[1] display high-level incidence results for the second quarter of 2020 through the fourth quarter of 2022 compared to the 2017–2019 baseline period for each combination of (a) incurred/reported basis and (b) count/amount basis as of December 31, 2022. In these tables, the number of COVID-19 claims has not been adjusted for seasonality, but the ratios to baseline have been adjusted for seasonality.

Table 2.1

COUNT-BASED INCURRED INCIDENCE RESULTS RELATIVE TO 2017–2019 BASELINE

Count-Based	Q2 2020–Q4 2020	2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	2022	Q2 2020–Q4 2022
Total/Baseline	119.5%	121.8%	116.5%	98.6%	102.7%	105.0%	105.7%	115.2%
COVID-19 Claims	45,702	77,382	19,031	2,167	3,117	1,891	26,205	149,290
COVID/Baseline	*14.4%*	*18.2%*	*16.6%*	*2.0%*	*3.0%*	*1.7%*	*5.8%*	*12.6%*
Non-COVID/Baseline	*105.1%*	*103.6%*	*99.9%*	*96.6%*	*99.7%*	*103.3%*	*99.9%*	*102.6%*

Table 2.2

AMOUNT-BASED INCURRED INCIDENCE RESULTS RELATIVE TO 2017–2019 BASELINE (CLAIMS IN MILLIONS)

Amount-Based	Q2 2020–Q4 2020	2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	2022	Q2 2020–Q4 2022
Total/Baseline	125.8%	139.8%	128.6%	111.5%	117.7%	118.7%	119.1%	128.4%
COVID-19 Claims	1,691	3,954	842	73	105	56	1,077	6,723
COVID/Baseline	*14.6%*	*25.6%*	*20.1%*	*1.9%*	*2.8%*	*1.4%*	*6.5%*	*15.6%*
Non-COVID/Baseline	*111.2%*	*114.2%*	*108.5%*	*109.6%*	*114.9%*	*117.3%*	*112.6%*	*112.8%*

Table 2.3

COUNT-BASED REPORTED INCIDENCE RESULTS RELATIVE TO 2017–2019 BASELINE

Count-Based	Q2 2020–Q4 2020	2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	2022	Q2 2020–Q4 2022
Total/Baseline	115.6%	123.6%	123.0%	102.3%	106.5%	102.5%	108.6%	115.9%
COVID-19 Claims	33,799	80,155	22,869	5,103	3,558	2,257	33,787	147,741
COVID/Baseline	11.0%	19.0%	19.7%	4.6%	3.4%	2.2%	*7.5%*	*12.6%*
Non-COVID/Baseline	*104.6%*	*104.6%*	*103.3%*	*97.7%*	*103.1%*	*100.3%*	*101.1%*	*103.3%*

Table 2.4

AMOUNT-BASED REPORTED INCIDENCE RESULTS RELATIVE TO 2017–2019 BASELINE (CLAIMS IN MILLIONS)

Amount-Based	Q2 2020–Q4 2020	2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	2022	Q2 2020–Q4 2022
Total/Baseline	124.0%	140.7%	137.7%	111.3%	120.9%	114.3%	121.0%	128.9%
COVID-19 Claims	1,345	3,936	1,058	175	119	64	1,416	6,696
COVID/Baseline	12.1%	26.0%	25.2%	4.3%	3.1%	1.7%	*8.6%*	*15.8%*
Non-COVID/Baseline	*111.9%*	*114.7%*	*112.5%*	*107.0%*	*117.8%*	*112.6%*	*112.4%*	*113.1%*

[1] A small number of COVID-19 claims received were dated before 2020. The Committee assumes these dates are data errors. They were not assigned to a particular date in 2020 or later, and so these claims are excluded from Tables 2.1–2.4. They are, however, included in the total COVID claims in Section 5.

Group Life carriers generally started receiving a small number of COVID-19 death claims during March 2020, but April 2020 was the first month in which the Group Life industry saw a material number of reported COVID-19 death claims. This drove April 2020 Group Life reported incidence to be measurably larger than baseline expected reported incidence. Reported incidence has remained materially higher than baseline in almost all months during the pandemic period. The lone exceptions were May 2021, May 2022 and October 2022, during which reported incidence was approximately 1%, 2% and 4% lower than baseline, respectively.

It is important to note that incurred estimates for the most recent months lack credibility because of the low level of completion of the data used at the time of this analysis. Group Life claim completion has been especially volatile during the pandemic waves, driven both by the ultimate incurred levels fluctuating from month to month and by company-specific claim-processing speeds fluctuating up and down because of increases or decreases in staffing levels and build-up or build-down of claim backlogs.

From an incurred mortality viewpoint, 30 of the 33 months from April 2020 through December 2022 showed excess mortality[2] versus baseline expectations. The lone exceptions were March, April and October 2022, during which mortality was 1%, 4% and 1% lower than baseline, respectively. December 2020, January 2021, August 2021 and September 2021 each had very high incurred excess mortality spikes of 40% or more.

The 33-month period of April 2020 through December 2022 showed the following Group Life mortality results:

- Estimated reported Group Life claim incidence rates were up 15.9% on a seasonally adjusted basis compared to 2017–2019 reported claims.
- Estimated incurred Group Life incidence rates were 15.2% higher than baseline on a seasonally adjusted basis. As noted above, the incurred incidence rates in November and December 2022 are based on fairly incomplete data, so they are subject to change and should not be fully relied upon at this point.

Additional highlights include the following:

- Approximately 11% of all reported Group Life claims with death dates in the pandemic period were determined to have a cause of death (COD) of COVID-19.
- The Gray-Collar group had the lowest actual-to-expected ratios (A/E's) relative to baseline over the pandemic period at around 10%, followed by the Blue-Collar group at 14%. The White-Collar group continues to have the highest mortality A/E relative to baseline at 19% during the pandemic period.

[2]For the purposes of this report, "excess mortality" refers to the percentage change in incidence rates observed during the pandemic compared to the 2017–2019 baseline period.

- Group Life mortality patterns by region have changed over time during the COVID-19 pandemic. The Midwest had the highest excess mortality for the most recent quarter included in this update. The following regions had the highest excess mortality in each quarter shown:
    - Q2 2020: Northeast (41%)
    - Q3 2020: Southeast (27%)
    - Q4 2020: Midwest (33%)
    - Q1 2021: Southeast (33%)
    - Q2 2021: Southeast (11%)
    - Q3 2021: Southeast (62%)
    - Q4 2021: Midwest (32%)
    - Q1 2022: Southeast (19%)
    - Q2 2022: Northeast (2%)
    - Q3 2022: Southeast (6%)
    - Q4 2022: Midwest (14%)
- Starting with the June 2022 data submission, companies began supplying much more granular COD data. Initial findings show incurred mortality increases in several causes during the pandemic period, including cardiovascular, liver, diabetes and drug overdoses. Cancer and influenza/pneumonia incurred mortality levels have been down during the pandemic period as compared to baseline. Additional details are shown in Section 6.
- Early quarters of the pandemic period (Q2 and Q3 2020) showed the Group Life insured population studied within this survey experienced a lower percentage of excess deaths than the U.S. population, as shown in Table 2.5. Each quarter in 2021 showed higher excess mortality in the U.S. population than the Group Life population. However, in 2022, this comparison reversed, and the Group Life has shown lower excess mortality than the U.S. population in the most recent three quarters.

Table 2.5
GROUP LIFE AND U.S. POPULATION EXCESS MORTALITY PERCENTAGES BY QUARTER

Age	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022
Group Life	15%	15%	28%	22%	7%	33%	25%	16%	-1%	3%	5%
U.S. Population	20%	16%	26%	16%	5%	24%	18%	15%	2%	7%	7%
Difference	**-5%**	**-1%**	**2%**	**6%**	**2%**	**9%**	**7%**	**1%**	**-3%**	**-4%**	**-2%**

- In the third quarter of 2021, a moderate negative correlation was seen between vaccination rate and excess mortality by state. However, this correlation has considerably weakened in subsequent periods. Other factors potentially influencing this relationship are climate, seasonality, preventative measures (e.g., social distancing and masking), deaths from causes other than COVID-19, varying degrees of vaccine effectiveness against different variants of the virus, and a higher degree of natural immunity due to past infections in the later period. This is explained in further detail in Section 9.5.
- Section 9 includes a comparison of proportional excess deaths in the Group Life market to the U.S. population, segmented by sex and age and cause of death. This feature was not present in previous iterations of this report. Overall, the experience between the two populations was quite similar, but in several instances the experience differs:

    - For the older ages (over age 65) the Group Life mortality has improved in 2022 relative to 2020–2021 significantly more than in the U.S. population.
    - Group Life mortality for major cardiovascular disease has also improved in 2022 relative to 2020–2021 more than in the U.S. population.

- More improvement relative to 2020–2021 was observed in cancer morality within the Group Life market than in the U.S. population, but the improvement extends over the entire pandemic period.
- The proportional impact of death due to liver disease was much higher within the total U.S. population than within the Group Life market through the entire pandemic period.

Section 3: Group Life Mortality Results—Reported Death Claims

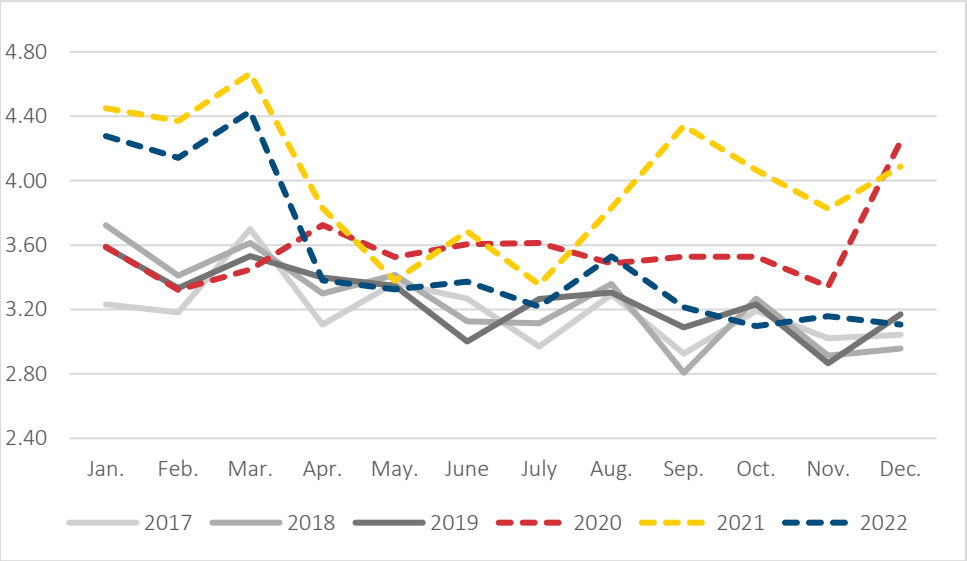
3.1 REPORTED CLAIM INCIDENCE BY COUNT—ALL CAUSES

On a seasonally adjusted basis, Q4 2022 reported incidence by count was 102.5% of baseline levels, with October 2022 being 3.8% below baseline and November and December being both above baseline.

Reported overall Group Life claim incidence rates during the pandemic period, as shown in Figure 3.1, are up approximately 16% compared to 2017–2019 reported claims. Reported claims are easier to measure than incurred because no estimation of completeness is required. However, reported claims do not explain the true economic impact of what is happening in the claim experience of a particular reported period because those reported claims include deaths associated with prior periods, which may or may not have been accurately expected and accrued in prior period claim liabilities.

Figure 3.1

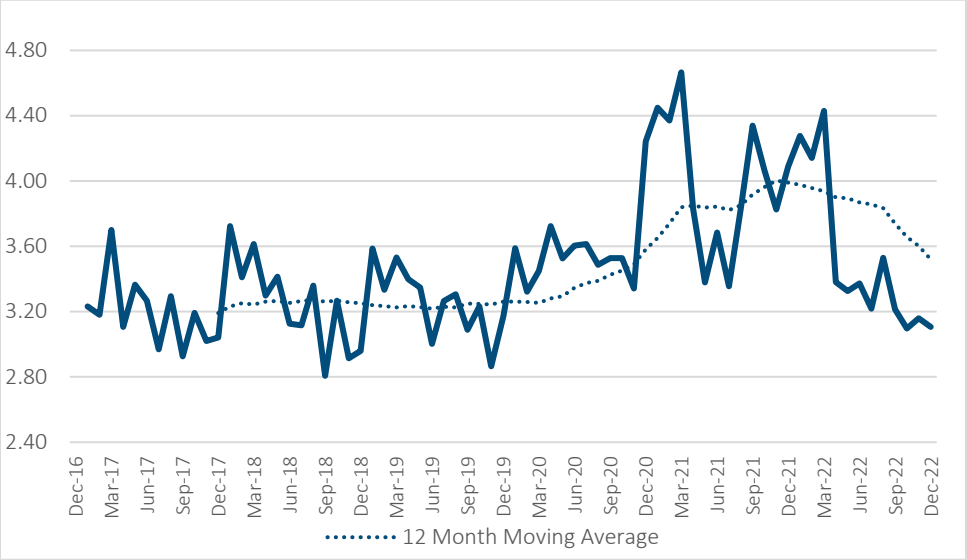
AGGREGATE REPORTED CLAIM INCIDENCE PER 1,000 BY CALENDAR YEAR AND MONTH



Note: Incidence rates in Figure 3.1 have not been adjusted for seasonality.

Figure 3.2 is a different view of the data displayed in Figure 3.1 to illustrate the flow of excess reported mortality over the entire pandemic period.

Figure 3.2
AGGREGATE REPORTED CLAIM INCIDENCE PER 1,000 BY CALENDAR MONTH



Note: Incidence rates in Figure 3.2 have not been adjusted for seasonality.

3.2 REPORTED CLAIM INCIDENCE BY COUNT—COVID-19 VERSUS ALL OTHER CAUSES

A total of 147,741 COVID-19 death claims were reported during the pandemic period. Roughly 74% of the COVID-19 claims were for Basic Group Life coverage and roughly 26% for Supplemental/Voluntary coverage, with both figures including active employees and retirees. Note that the exposures and claim counts for insureds with both Basic and Supplemental/Voluntary coverage were included in both product lines. Thus, some deaths were counted as both Basic and Supplemental/Voluntary deaths, so the total number of Group Life insureds with COVID-19 deaths is less than 147,741.

Table 3.1 shows the total death claim incidence level (mortality rate) for each quarter during the pandemic relative to the baseline period metric. The table also shows a relativity for COVID-19 claims and non-COVID claims. As the table illustrates, COVID-19 claims do not fully explain the increase in reported claim incidence over the baseline period.

Table 3.1
COUNT-BASED REPORTED INCIDENCE RESULTS RELATIVE TO 2017–2019 BASELINE

Count-Based	Q2 2020–Q4 2020	2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	2022	Q2 2020–Q4 2022
Total/Baseline	115.6%	123.6%	123.0%	102.3%	106.5%	102.5%	108.6%	115.9%
COVID-19 Claims	33,799	80,155	22,869	5,103	3,558	2,257	33,787	147,741
COVID/Baseline	11.0%	19.0%	19.7%	4.6%	3.4%	2.2%	*7.5%*	*12.6%*
Non-COVID/Baseline	*104.6%*	*104.6%*	*103.3%*	*97.7%*	*103.1%*	*100.3%*	*101.1%*	*103.3%*

Reported claim details by month are shown in Table 3.2, along with calculated monthly reported incidence rates. Note that a small number of COVID-19 claims have reported dates of death in 2019 or prior, which are likely due to data errors.

Table 3.2
REPORTED CLAIMS AND INCIDENCE RATES, 2017 THROUGH Q4 2022

Report Date	Raw Submitted Numbers			Calculated Amounts				
	Reported Claims		Premium ($ 000)	Life Years Exposed (000)		Annual Incidence per 1,000 (Lives Basis)	Adjusted for Seasonality	
	Total	COVID		By Month	Yrly Avg		Total	Total/Baseline
12/1/22	34,699	564	1,808,601	11,252	11,171	3.11	3.35	103.5%
11/1/22	35,288	808	1,768,521	10,976	11,171	3.16	3.49	107.8%
10/1/22	34,592	885	1,802,898	11,157	11,171	3.10	3.11	96.2%
9/1/22	35,895	1,101	1,812,394	11,191	11,171	3.21	3.55	109.7%
8/1/22	39,425	1,286	1,805,362	11,189	11,171	3.53	3.43	105.9%
7/1/22	35,939	1,171	1,815,764	11,158	11,171	3.22	3.36	103.9%
6/1/22	37,671	1,217	1,811,223	11,229	11,171	3.37	3.47	107.4%
5/1/22	37,152	1,523	1,814,863	11,198	11,171	3.33	3.16	97.7%
4/1/22	37,764	2,363	1,817,438	11,251	11,171	3.38	3.30	101.8%
3/1/22	49,487	6,024	1,807,962	11,116	11,171	4.43	3.96	122.3%
2/1/22	46,259	8,321	1,806,888	11,189	11,171	4.14	4.06	125.6%
1/1/22	47,771	8,524	1,803,089	11,148	11,171	4.28	3.92	121.2%
12/1/21	44,441	6,925	1,764,082	11,201	10,871	4.09	4.41	136.2%
11/1/21	41,578	6,949	1,706,630	10,782	10,871	3.82	4.22	130.5%
10/1/21	44,193	9,437	1,719,315	10,817	10,871	4.07	4.09	126.3%
9/1/21	47,177	10,004	1,708,856	10,749	10,871	4.34	4.79	148.1%
8/1/21	41,655	4,816	1,702,905	10,815	10,871	3.83	3.72	115.0%
7/1/21	36,470	1,818	1,722,550	10,792	10,871	3.35	3.51	108.3%
6/1/21	40,044	2,723	1,727,118	10,893	10,871	3.68	3.80	117.3%
5/1/21	36,718	3,487	1,736,159	10,893	10,871	3.38	3.21	99.2%
4/1/21	41,631	4,872	1,739,930	10,919	10,871	3.83	3.73	115.4%
3/1/21	50,717	8,077	1,729,518	10,877	10,871	4.67	4.17	128.8%
2/1/21	47,507	10,201	1,722,700	10,872	10,871	4.37	4.29	132.5%
1/1/21	48,371	10,846	1,718,064	10,836	10,871	4.45	4.08	126.1%
12/1/20	46,541	7,884	1,686,456	10,944	10,969	4.24	4.59	141.7%
11/1/20	36,657	3,628	1,666,391	10,861	10,969	3.34	3.70	114.4%
10/1/20	38,703	2,753	1,668,879	10,776	10,969	3.53	3.56	109.9%
9/1/20	38,689	3,108	1,672,493	10,853	10,969	3.53	3.91	120.7%
8/1/20	38,245	3,384	1,674,390	10,893	10,969	3.49	3.40	104.9%
7/1/20	39,640	2,899	1,693,214	10,968	10,969	3.61	3.79	117.0%
6/1/20	39,540	3,124	1,685,726	10,963	10,969	3.60	3.72	115.1%
5/1/20	38,675	3,953	1,739,235	11,202	10,969	3.53	3.36	103.9%
4/1/20	40,853	3,066	1,696,977	10,900	10,969	3.72	3.64	112.5%
3/1/20	37,831	150	1,699,364	10,978	10,969	3.45	3.09	95.5%
2/1/20	36,434	3	1,726,142	11,304	10,969	3.32	3.16	97.5%
1/1/20	39,369	4	1,683,276	10,984	10,969	3.59	3.30	102.0%
2017–2019 Baseline	**34,663**	**0**	**1,592,974**	**10,717**	**10,717**	**3.23**	**3.24**	**100.0%**
2019 Monthly	35,500	1	1,647,707	10,888	10,888	3.26	3.26	100.9%
2018 Monthly	34,742	1	1,589,360	10,688	10,688	3.25	3.25	100.4%
2017 Monthly	33,747	0	1,541,855	10,575	10,575	3.19	3.20	98.7%

3.3 REPORTED CLAIM INCIDENCE BY AMOUNT—ALL CAUSES

Reported overall Group Life claim incidence rates by amount during the pandemic period were up roughly 29% compared to 2017–2019 reported amounts. This increase in incidence rates by amount is notably higher than the corresponding incidence rate increase by count. The difference is likely driven by salary and face amount inflation over the five-year period, changes in age and gender mix, and the relatively higher excess mortality being reported at typical working ages (where face amounts are greater).

3.4 REPORTED CLAIM INCIDENCE BY AMOUNT—COVID-19 VERSUS ALL OTHER CAUSES

Table 3.3

AMOUNT-BASED REPORTED INCIDENCE RESULTS RELATIVE TO 2017–2019 BASELINE (CLAIMS IN MILLIONS)

Amount-Based	Q2 2020–Q4 2020	2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	2022	Q2 2020–Q4 2022
Total/Baseline	124.0%	140.7%	137.7%	111.3%	120.9%	114.3%	121.0%	128.9%
COVID-19 Claims	1,345	3,936	1,058	175	119	64.1	1,416	6,696
COVID/Baseline	12.1%	26.0%	25.2%	4.3%	3.1%	1.7%	*8.6%*	*15.8%*
Non-COVID/Baseline	*111.9%*	*114.7%*	*112.5%*	*107.0%*	*117.8%*	*112.6%*	*112.4%*	*113.1%*

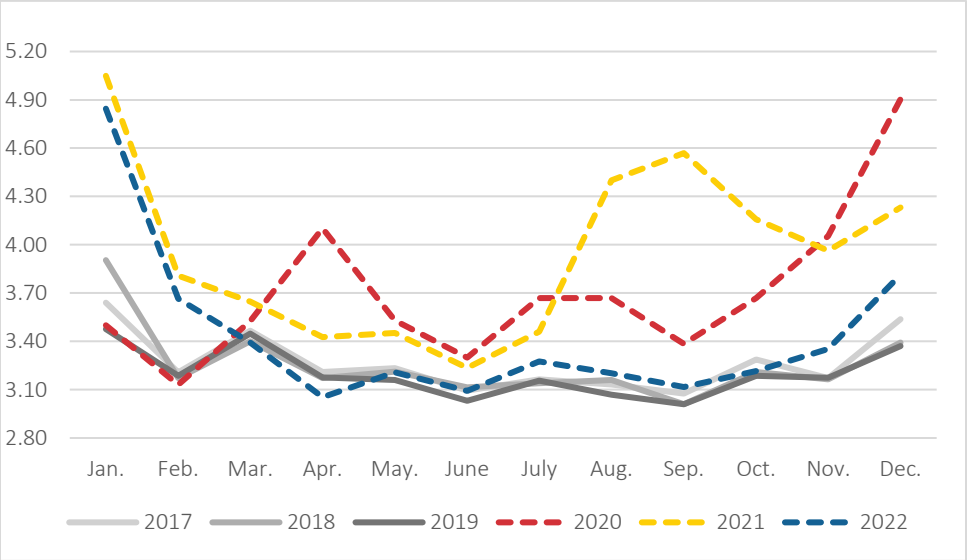
Section 4: Group Life Mortality Results—Estimated Incurred Death Claims

4.1 INCURRED CLAIM INCIDENCE BY COUNT—ALL CAUSES

A completed estimate of incurred incidence rates by count indicates that excess mortality for the pandemic period was approximately 15% higher than the 2017–2019 baseline incurred incidence. Figure 4.1 displays the various monthly estimated incurred incidence rates.

Figure 4.1

AGGREGATE INCURRED CLAIM INCIDENCE PER 1,000 BY CALENDAR YEAR AND MONTH



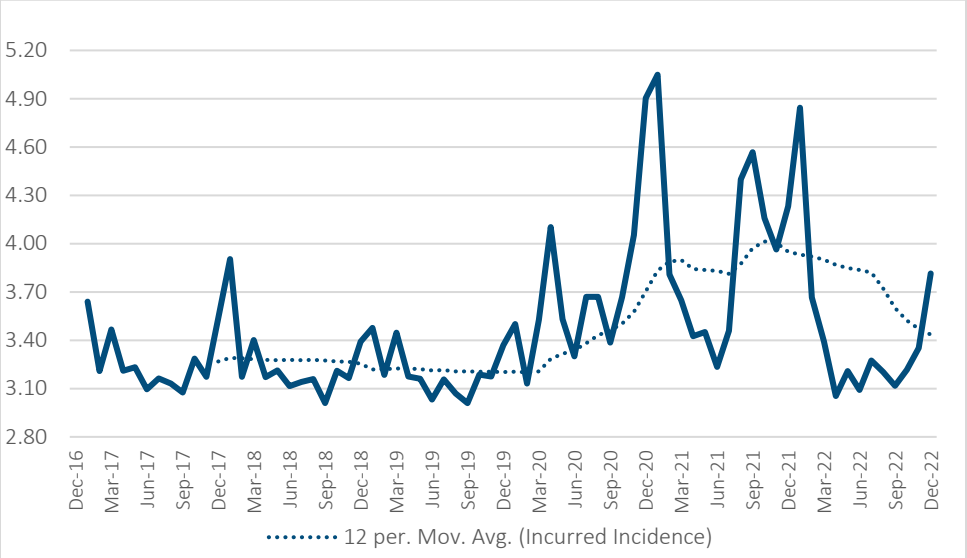
Note: Adjusted for assumed completion.

The initial estimates of Q4 2022 incurred incidence rates indicate that mortality was 105% of baseline on a seasonally adjusted count basis. The monthly results within Q4 show October 2022 estimated incurred mortality of 1% below baseline, whereas November and December were above baseline. The November and December results are still highly incomplete and likely to change as more months of reported claims are revealed.

The current view of Q3 2022 results indicate excess incurred mortality of 2.7%, with all three months of the quarter within 1% of the overall quarterly average.

Figure 4.2 is a different view of the data displayed in Figure 4.1 to illustrate the flow of estimated excess incurred mortality over the entire pandemic period.

Figure 4.2
AGGREGATE INCURRED CLAIM INCIDENCE PER 1,000 BY CALENDAR MONTH



Note: Adjusted for assumed completion. Incidence rates in Figure 4.2 have not been adjusted for seasonality.

4.2 INCURRED CLAIM INCIDENCE BY COUNT—COVID-19 VERSUS ALL OTHER CAUSES

Similar to reported claim metrics, Table 4.1 shows that COVID-19 claims do not fully explain the increase in incurred claim incidence on a count basis. COVID-19 claims account for roughly 83% of the excess incurred Group Life mortality during the second quarter of 2020 through the fourth quarter of 2022, with the other 17% coming from claims that were not coded with COVID-19 as cause of death.

Table 4.1
INCURRED EXCESS MORTALITY BY CLAIM COUNT COMPARED TO 2017–2019 BASELINE

Count-Based	Q2 2020–Q4 2020	2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	2022	Q2 2020–Q4 2022
Total/Baseline	119.5%	121.8%	116.5%	98.6%	102.7%	105.0%	105.7%	115.2%
COVID-19 Claims	45,702	77,382	19,031	2,167	3,117	1,891	26,205	149,290
COVID/Baseline	*14.4%*	*18.2%*	*16.6%*	*2.0%*	*3.0%*	*1.7%*	*5.8%*	*12.6%*
Non-COVID/Baseline	*105.1%*	*103.6%*	*99.9%*	*96.6%*	*99.7%*	*103.3%*	*99.9%*	*102.6%*

Incurred claim details by month are shown in Table 4.2, along with calculated monthly incurred incidence rates. Note that a small number of COVID-19 claims have incurred dates of death in 2019 or prior, which are likely due to data errors.

Table 4.2

INCURRED CLAIM COUNTS AND INCIDENCE RATES, 2017 THROUGH Q4 2022

Incurral Date	Raw Submitted Numbers			Calculated Amounts				
	Average Incurred Claim Counts		Average Premium ($ 000)	Average Life Years Exposed (000)	Average Completed Claim Counts	Annual Incidence per 1,000 (Lives Basis)	Adjusted for Seasonality	
	Total	COVID					Total	Total/Baseline
12/1/22	11,434	141	1,808,601	11,252	42,918	3.81	3.60	111.0%
11/1/22	25,170	421	1,768,521	10,976	36,795	3.35	3.41	105.1%
10/1/22	30,594	605	1,802,898	11,157	35,878	3.22	3.21	99.0%
9/1/22	31,679	764	1,812,394	11,191	34,885	3.12	3.32	102.4%
8/1/22	33,480	1,074	1,805,362	11,189	35,833	3.20	3.31	102.2%
7/1/22	34,679	1,068	1,815,764	11,158	36,545	3.28	3.36	103.6%
6/1/22	33,291	837	1,811,223	11,229	34,722	3.09	3.25	100.3%
5/1/22	34,669	683	1,814,863	11,198	35,926	3.21	3.24	100.0%
4/1/22	33,306	568	1,817,438	11,251	34,353	3.05	3.10	95.6%
3/1/22	36,690	1,610	1,807,962	11,116	37,706	3.39	3.20	98.8%
2/1/22	40,021	5,847	1,806,888	11,189	41,011	3.67	3.73	115.1%
1/1/22	52,843	11,139	1,803,089	11,148	54,011	4.84	4.39	135.5%
12/1/21	46,485	7,851	1,764,082	11,201	47,399	4.23	3.99	123.2%
11/1/21	41,989	5,611	1,706,630	10,782	42,732	3.96	4.03	124.2%
10/1/21	44,270	7,733	1,719,315	10,817	44,986	4.16	4.15	128.0%
9/1/21	48,388	12,416	1,708,856	10,749	49,102	4.57	4.87	150.1%
8/1/21	46,941	9,882	1,702,905	10,815	47,581	4.40	4.55	140.5%
7/1/21	36,873	1,925	1,722,550	10,792	37,337	3.46	3.55	109.4%
6/1/21	34,840	1,336	1,727,118	10,893	35,243	3.24	3.40	105.0%
5/1/21	37,201	2,447	1,736,159	10,893	37,599	3.45	3.49	107.6%
4/1/21	37,045	3,009	1,739,930	10,919	37,409	3.43	3.48	107.3%
3/1/21	39,323	3,272	1,729,518	10,877	39,677	3.65	3.44	106.3%
2/1/21	41,061	6,668	1,722,700	10,872	41,401	3.81	3.88	119.6%
1/1/21	54,299	14,247	1,718,064	10,836	54,711	5.05	4.58	141.2%
12/1/20	53,307	13,040	1,686,456	10,944	53,674	4.90	4.64	143.1%
11/1/20	43,756	7,040	1,666,391	10,861	44,029	4.05	4.13	127.4%
10/1/20	39,309	3,039	1,668,879	10,776	39,531	3.67	3.67	113.3%
9/1/20	36,549	2,349	1,672,493	10,853	36,737	3.39	3.61	111.5%
8/1/20	39,780	3,627	1,674,390	10,893	39,964	3.67	3.81	117.5%
7/1/20	40,077	3,676	1,693,214	10,968	40,245	3.67	3.77	116.4%
6/1/20	36,032	1,926	1,685,726	10,963	36,169	3.30	3.48	107.3%
5/1/20	39,410	3,812	1,739,235	11,202	39,540	3.53	3.58	110.3%
4/1/20	44,585	6,958	1,696,977	10,900	44,717	4.10	4.17	128.8%
3/1/20	38,608	1,057	1,699,364	10,978	38,706	3.53	3.34	103.0%
2/1/20	35,312	22	1,726,142	11,304	35,389	3.13	3.09	95.2%
1/1/20	38,428	63	1,683,276	10,984	38,449	3.50	3.18	98.2%
2017–2019 Baseline	**34,724**	**2**	**1,592,974**	**10,717**	**34,743**	**3.24**	**3.24**	**100.0%**
2019 Monthly	34,864	2	1,647,707	10,888	34,883	3.20	3.20	98.9%
2018 Monthly	34,762	2	1,589,360	10,688	34,781	3.25	3.25	100.3%
2017 Monthly	34,545	1	1,541,855	10,575	34,564	3.27	3.27	100.8%

4.3 INCURRED CLAIM INCIDENCE BY AMOUNT—ALL CAUSES

Overall, seasonally adjusted incurred Group Life claim incidence rates by amount during the pandemic period were up roughly 28% compared to the 2017–2019 baseline. This increase in incidence rates by amount is notably higher than the corresponding increase in incidence rates by count. The difference is likely driven by salary and face amount inflation over the five-year period, changes in age and gender mix, and the relatively higher excess mortality being incurred at typical working ages (where face amounts are greater).

4.4 INCURRED CLAIM INCIDENCE BY AMOUNT—COVID-19 VERSUS ALL OTHER CAUSES

Similar to Table 4.1, Table 4.3 shows that COVID-19 claims do not fully explain the increase in incurred claim incidence on an amount basis.

Table 4.3

AMOUNT-BASED INCURRED INCIDENCE RESULTS RELATIVE TO 2017–2019 BASELINE

Amount-Based	Q2 2020–Q4 2020	2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	2022	Q2 2020–Q4 2022
Total/Baseline	125.8%	139.8%	128.6%	111.5%	117.7%	118.7%	119.1%	128.4%
COVID-19 Claims	1,691	3,954	842	73	105	56	1,077	6,723
COVID/Baseline	*14.6%*	*25.6%*	*20.1%*	*1.9%*	*2.8%*	*1.4%*	*6.5%*	*15.6%*
Non-COVID/Baseline	*111.2%*	*114.2%*	*108.5%*	*109.6%*	*114.9%*	*117.3%*	*112.6%*	*112.8%*

Section 5: Estimated Incurred Mortality Results by Segment

Analysis of results by segment will focus on claim count experience for simplicity and credibility. In general, results by claim amount follow similar patterns as results by claim count.

The following notes apply to the data presented in this section:

- Claims and A/E ratios are presented on an incurred basis. The "expected" basis is the 2017–2019 baseline.
- Although most companies were able to provide segment detail, some did not. Results by Company Size reflect all companies. Results for Industry reflect approximately 97% of total company claims, results for Geography reflect 98% of total company claims, and results by Age/Sex reflect approximately 91% of total company claims. Note that these percentages are expressed relative to baseline claim counts.
- The total claim counts and A/E ratios in each subsection include only the data from companies that produced the breakout being analyzed. For example, the "All Industries" row in Table 5.2 includes only data from companies that were able to supply claims data by Industry. This can result in differences in the total A/E ratios across the various tables.
- The "% COVID" columns in the tables below show the monthly average COVID claims during the pandemic period as a percentage of the average total monthly claims from the 2017–2019 baseline period. The "% Non-COVID" column in the Age and Sex tables reflects excess mortality due to non-COVID claims.
- The "% Count" columns in the tables below show the proportion of baseline claims in each segment. For some segments, claims were submitted with "Unknown" segmentation value. The unknowns and their ratios were omitted from the tables but are included in the totals. Unknowns also tend to account for a small percent of the total.
  For formatting purposes, the information for Q2 2020 no longer appears in the charts for this section; see prior iterations of this report for information on excess mortality in Q2 2020.

5.1 INDUSTRY

Table 5.1 displays quarterly A/E mortality ratios by industry collar. The White-Collar category has experienced a higher A/E ratio than the Blue- and Grey-Collar industries over the entire pandemic period, and this relationship has been relatively consistent across time. All three categories showed peak excess mortality in the third quarter of 2021. Grey-Collar has had the lowest A/E ratio throughout all of 2022, including ratios below 100% for 3 consecutive quarters.

Table 5.1
EXCESS MORTALITY BY INDUSTRY COLLAR

Industry Collar	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	4/20-12/22	% COVID	% Count
Blue	110%	127%	123%	107%	129%	126%	115%	97%	100%	104%	114%	13.3%	40%
Gray	115%	127%	117%	104%	133%	121%	107%	88%	92%	94%	110%	13.3%	19%
White	119%	129%	123%	107%	138%	126%	121%	103%	109%	110%	119%	12.5%	40%
All Collars[a]	**115%**	**128%**	**122%**	**107%**	**134%**	**125%**	**116%**	**99%**	**103%**	**106%**	**115%**	**13.0%**	**100%**

a. Includes only companies that provided Industry splits; see second bullet at the beginning of Section 5.

Tables 5.2 and 5.3 show more detailed industry results for the top 10 industry segments by number of COVID claims. These are the same top 10 industry groupings and in the same order from the prior public report. Public Administration (White-Collar), Manufacturing–Auto, Airplanes (Blue-Collar), Misc. Services (Grey-Collar) and Educational Services (White-Collar) have had the highest A/E ratios since April 2020. Manufacturing–Heavy, Steel (Blue-Collar) had the lowest A/E ratio of the top 10 industries. In these tables, "B," "W", and "G" refer to Blue-Collar, White-Collar, and Grey-Collar, respectively.

Table 5.2
EXCESS MORTALITY FOR TOP 10 INDUSTRIES BY NUMBER OF COVID CLAIMS

Industry	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	4/20-12/22
W-Public Administration	120%	133%	122%	107%	146%	136%	134%	113%	116%	116%	124%
B-Transport; Communication; Utilities	111%	126%	120%	103%	129%	121%	113%	98%	99%	102%	112%
B-Manufacturing - Auto, Airplanes	106%	126%	130%	118%	132%	140%	129%	108%	112%	131%	122%
B-Manufacturing - Heavy; Steel	104%	126%	111%	96%	113%	115%	99%	85%	86%	82%	102%
W-Educational Services	118%	124%	122%	106%	135%	116%	108%	97%	115%	113%	115%
W-Doctors Offices	119%	122%	118%	103%	132%	113%	109%	95%	99%	111%	113%
G-Manufacturing - Paper; Drugs	110%	127%	123%	106%	127%	121%	109%	85%	88%	83%	108%
G-Retail - Trade	106%	113%	118%	101%	137%	121%	103%	81%	90%	96%	107%
G-Wholesale Trade	121%	138%	103%	95%	119%	115%	97%	86%	87%	99%	108%
G-Misc. Service/Data Processing	122%	128%	127%	114%	153%	130%	120%	106%	108%	104%	121%
All Industries[a]	**115%**	**128%**	**122%**	**107%**	**134%**	**125%**	**116%**	**99%**	**103%**	**106%**	**115%**

a. Includes only companies that provided Industry splits; see second bullet at the beginning of Section 5.

Table 5.3
COVID CLAIMS FOR TOP 10 INDUSTRIES BY NUMBER OF COVID CLAIMS

Industry	4/20-12/22	% COVID	% Count	# COVID
W-Public Administration	124%	12.2%	14%	19,867
B-Transport; Communication; Utilities	112%	13.3%	13%	19,666
B-Manufacturing - Auto, Airplanes	122%	13.6%	9%	13,872
B-Manufacturing - Heavy; Steel	102%	12.0%	9%	11,753
W-Educational Services	115%	12.4%	6%	8,997
W-Doctors Offices	113%	13.6%	6%	8,771
G-Manufacturing - Paper; Drugs	108%	12.0%	6%	8,005
G-Retail - Trade	107%	14.5%	4%	7,143
G-Wholesale Trade	108%	12.5%	5%	6,497
G-Misc. Service/Data Processing	121%	15.0%	3%	5,412
All Industries[a]	**115%**	**13.0%**	**100%**	**146,798**

a. Includes only companies that provided Industry splits; see second bullet at the beginning of Section 5.

It should be noted that the high A/E ratios for Public Administration are driven by experience in the Executive, Legislative and General Government segment (Standard Industry Classification [SIC] codes 9100–9199). This segment does not include police and fire and represents more than 80% of recent claims in the broader Public Administration segment.

5.2 GEOGRAPHY

Results by Geography appear to be consistent with broad population results in terms of timing of regional spikes across the country, as shown in Table 5.4. The Southeast shows the highest overall A/E ratio since April 2020, as well as the highest percentage of claims identified as COVID. Smaller differences are seen in A/E ratio by region in early 2022, but the fourth quarter of 2022 saw more material differences, with the West region being favorable and the Midwest being unfavorable.

Table 5.4
EXCESS MORTALITY BY GEOGRAPHIC REGION

Region	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	4/20-12/22	% COVID	% Count
Northeast	106%	123%	123%	108%	116%	124%	118%	102%	102%	105%	115%	11.0%	21%
West	121%	129%	130%	105%	132%	126%	113%	100%	100%	90%	114%	12.6%	15%
Midwest	107%	133%	108%	105%	117%	132%	117%	97%	102%	114%	113%	12.2%	28%
Southeast	127%	129%	133%	111%	162%	123%	119%	99%	106%	105%	120%	15.5%	35%
All Regions[a]	**115%**	**128%**	**122%**	**107%**	**134%**	**125%**	**117%**	**99%**	**103%**	**106%**	**116%**	**13.0%**	**100%**

a. Includes only companies that provided Geography splits; see second bullet at the beginning of Section 5.

A closer look at the states with the highest number of COVID claims in Tables 5.5 and 5.6 shows results that are consistent with the regional results in Table 5.4. Three Southeast states (Georgia, Tennessee and Florida) are contributing to the high A/E for the Southeast since April 2020. The high A/E ratios in Michigan and Illinois contributed to the deterioration in Midwest results in the fourth quarter of 2022. Similarly, the low A/E ratio for California is in line with the favorable West result for the quarter.

Table 5.5
EXCESS MORTALITY FOR TOP 10 STATES BY NUMBER OF COVID CLAIMS

State	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Apr. 2020–Dec. 2022
TX - Southeast	134%	135%	137%	104%	159%	118%	117%	97%	104%	90%	118%
CA - West	125%	135%	150%	103%	129%	114%	115%	99%	100%	83%	115%
FL - Southeast	129%	117%	127%	117%	186%	118%	114%	100%	108%	104%	121%
MI - Midwest	103%	130%	109%	116%	110%	144%	115%	99%	104%	119%	116%
OH - Midwest	105%	130%	111%	100%	115%	136%	114%	89%	96%	105%	110%
PA - Northeast	106%	130%	121%	108%	114%	135%	116%	99%	101%	108%	114%
GA - Southeast	136%	131%	146%	118%	179%	133%	121%	104%	112%	114%	128%
IL - Midwest	107%	134%	108%	102%	112%	118%	116%	95%	98%	113%	111%
NY - Northeast	108%	117%	131%	108%	112%	118%	115%	100%	98%	101%	116%
TN - Southeast	122%	134%	131%	116%	159%	136%	126%	100%	111%	124%	124%
All States[a]	**115%**	**128%**	**122%**	**107%**	**134%**	**125%**	**117%**	**99%**	**103%**	**106%**	**116%**

a. Includes only companies that provided Geography splits; see second bullet at the beginning of Section 5.

Table 5.6
COVID CLAIMS FOR TOP 10 STATES BY NUMBER OF COVID CLAIMS

State	Apr. 2020–Dec. 2022	COVID (%)	Count (%)	No. COVID
TX - Southeast	118%	18.6%	8%	17,429
CA - West	115%	12.8%	6%	9,285
FL - Southeast	121%	13.0%	6%	9,135
MI - Midwest	116%	13.2%	6%	8,535
OH - Midwest	110%	12.9%	5%	7,219
GA - Southeast	114%	11.7%	5%	6,573
PA - Northeast	128%	16.3%	3%	6,331
IL - Midwest	111%	10.9%	5%	6,277
NY - Northeast	116%	10.2%	4%	5,200
TN - Southeast	124%	16.3%	3%	4,830
All States[a]	**116%**	**13.0%**	**100%**	**149,417**

a. Includes only companies that provided Geography splits; see second bullet at the beginning of Section 5.

5.3 AGE AND SEX

For the Age and Sex segments, excess mortality for the pandemic period was also split between COVID and non-COVID claims. For example, for the 45–64 age group, the 18.2% COVID and 6.8% Non-COVID total 25.0% excess mortality, which equates to the 125% A/E ratio since April 2020. The 65+ age band continues to have lower A/E ratios than younger age bands, and all of the excess mortality for this age group (which includes retirees) can be explained by claims coded as COVID. The 0–44 age band exhibited the highest A/E ratio across the pandemic period and has consistently shown the highest A/E by quarter since the middle of 2021. The 45–64 age band has the highest excess mortality directly attributable to COVID (18.2%), whereas the 0–44 age band has the highest excess mortality from non-COVID causes (18.8%), as shown in Table 5.7.

Table 5.7
EXCESS MORTALITY BY AGE BAND

Age	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Apr. 2020–Dec. 2022	COVID (%)	Non-COVID (%)	Count (%)
0-44	131%	121%	121%	130%	180%	143%	125%	119%	125%	126%	131%	12.3%	18.8%	8%
45-64	124%	129%	130%	116%	162%	143%	125%	103%	107%	118%	125%	18.2%	6.8%	28%
65+	109%	129%	120%	100%	116%	116%	113%	96%	99%	100%	110%	10.9%	-0.7%	64%
All Ages[a]	**115%**	**128%**	**123%**	**107%**	**134%**	**126%**	**117%**	**99%**	**104%**	**107%**	**116%**	**13.0%**	**2.9%**	**100%**

a. Includes only companies that provided Age splits; see second bullet at the beginning of Section 5.

The greater age band detail in Table 5.8 provides further insight on excess mortality by age. The working-age population continues to see the highest A/E ratios. The 35–44 age band continues to have the highest cumulative A/E during the pandemic and has the highest non-COVID excess mortality as well. It is worth noting that "non-COVID" claims could include claims that are an indirect result of COVID but are not coded as such in the data.

Table 5.8

EXCESS MORTALITY BY DETAILED AGE BAND

Age	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Apr. 2020 –Dec. 2022	COVID (%)	Non-COVID (%)	Count (%)
0-24	124%	104%	101%	119%	128%	112%	99%	104%	119%	108%	112%	2.8%	9.3%	2%
25-34	131%	120%	118%	132%	179%	137%	126%	121%	127%	123%	131%	9.9%	21.1%	2%
35-44	133%	127%	129%	134%	201%	158%	134%	123%	126%	134%	139%	17.2%	21.3%	4%
45-54	126%	129%	132%	119%	179%	151%	128%	107%	112%	123%	130%	19.9%	10.0%	9%
55-64	122%	129%	129%	114%	152%	139%	123%	100%	105%	116%	122%	17.4%	5.1%	18%
65-74	115%	132%	130%	108%	130%	124%	116%	95%	100%	104%	116%	14.0%	1.5%	17%
75-84	113%	133%	123%	105%	119%	122%	121%	102%	107%	107%	115%	11.3%	3.8%	20%
85+	103%	124%	111%	92%	105%	107%	105%	91%	93%	92%	103%	8.6%	-5.5%	27%
All Ages[a]	**115%**	**128%**	**123%**	**107%**	**134%**	**126%**	**117%**	**99%**	**104%**	**107%**	**116%**	**13.0%**	**2.9%**	**100%**

a. Includes only companies that provided Age splits; see second bullet at the beginning of Section 5.

Tables 5.9 and 5.10 have been added to separate out each quarter's excess mortality by age band into the COVID and non-COVID components. These views show that the Q3 2021 Delta wave onset had significant excess mortality across all typical working age bands from 25 to 64, due to both COVID and non-COVID causes. Q4 2021 continued to show very high COVID deaths in the 25 to 64 age bands, whereas the non-COVID excess mortality moderated. Starting in Q2 2022, COVID deaths across all age groups have been relatively less, but non-COVID mortality continues to be elevated in several age groups, including 25–44. Note that Q3 and Q4 2022 deaths may continue to shift from non-COVID to COVID as COD coding becomes more complete.

Table 5.9

EXCESS MORTALITY BY DETAILED AGE BAND—COVID ONLY

Age	Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Apr. 2020–Dec. 2022
0-24	0%	2%	2%	3%	3%	2%	8%	5%	4%	1%	1%	1%	3%
25-34	1%	7%	7%	8%	10%	6%	35%	21%	12%	1%	1%	0%	10%
35-44	2%	9%	11%	16%	18%	11%	61%	40%	19%	2%	2%	1%	17%
45-54	2%	13%	13%	22%	28%	13%	58%	42%	26%	2%	2%	1%	20%
55-64	1%	13%	13%	24%	30%	11%	38%	33%	24%	2%	2%	1%	17%
65-74	1%	13%	10%	26%	29%	7%	21%	21%	21%	2%	3%	1%	14%
75-84	1%	12%	8%	24%	23%	5%	11%	13%	18%	3%	4%	2%	11%
85+	1%	13%	6%	21%	17%	2%	6%	8%	12%	3%	4%	3%	9%
Unknown	1%	1%	1%	4%	2%	1%	9%	2%	4%	3%	4%	3%	3%
All Excl Unknown	**1%**	**12%**	**9%**	**22%**	**23%**	**7%**	**23%**	**21%**	**19%**	**2%**	**3%**	**2%**	**13%**
All Ages[a]	**1%**	**12%**	**9%**	**22%**	**23%**	**7%**	**23%**	**21%**	**18%**	**2%**	**3%**	**2%**	**13%**

a. Includes only companies that provided claims split by age; see second bullet at the beginning of Section 5.

Table 5.10

EXCESS MORTALITY BY DETAILED AGE BAND – NON-COVID ONLY

Age	Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Apr. 2020–Dec. 2022
0-24	93%	113%	123%	101%	98%	117%	120%	107%	95%	103%	118%	107%	109%
25-34	100%	119%	125%	112%	108%	126%	145%	116%	114%	120%	126%	122%	121%
35-44	105%	113%	122%	112%	112%	123%	140%	118%	116%	121%	124%	133%	121%
45-54	98%	110%	114%	107%	105%	106%	121%	109%	102%	105%	110%	122%	110%
55-64	97%	104%	110%	105%	99%	103%	115%	105%	99%	99%	103%	114%	105%
65-74	98%	103%	105%	107%	101%	101%	109%	103%	95%	93%	97%	102%	102%
75-84	100%	102%	105%	108%	99%	101%	108%	109%	103%	99%	103%	105%	104%
85+	96%	99%	97%	103%	94%	89%	98%	99%	93%	88%	89%	90%	95%
Unknown	56%	55%	61%	51%	59%	45%	62%	76%	53%	68%	87%	99%	65%
All Excl Unknown	98%	104%	106%	106%	99%	100%	110%	105%	99%	97%	101%	105%	103%
All Ages[a]	98%	103%	106%	106%	99%	100%	110%	105%	99%	97%	101%	105%	103%

a. Includes only companies that provided claims split by age; see second bullet at the beginning of Section 5.

By sex, A/E ratios have generally been higher for males during the study period, as has the cumulative excess mortality due to claims identified as COVID. However, that trend has not been as apparent in the two most recent quarters. A recent uptick is also seen in the A/E ratio for exposures that do not have an indicator of Male or Female, although it remains a small percentage of the overall data. We have included the "Unknown" row in Table 5.11 to demonstrate this and to help see its impacts on the overall totals.

Table 5.11

EXCESS MORTALITY BY SEX

Sex	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Apr. 2020–Dec. 2022	COVID (%)	Non-COVID (%)	Count (%)
Female	114%	123%	119%	105%	130%	121%	113%	97%	102%	103%	113%	11.3%	1.5%	32%
Male	115%	130%	124%	107%	135%	128%	118%	99%	99%	99%	115%	13.8%	1.6%	66%
Unknown	148%	161%	149%	135%	179%	160%	162%	169%	319%	581%	209%	16.4%	92.2%	1%
All Excl. Unknown	**115%**	**128%**	**122%**	**106%**	**133%**	**125%**	**117%**	**98%**	**100%**	**100%**	**115%**	**13.0%**	**1.6%**	**99%**
All[a]	**115%**	**128%**	**123%**	**107%**	**134%**	**126%**	**117%**	**99%**	**104%**	**107%**	**116%**	**13.0%**	**2.9%**	**100%**

a. Includes only companies that provided claims split by age; see second bullet at the beginning of Section 5.

5.4 COMPANY SIZE

Contributing companies were assigned a size indicator of Large, Medium or Small per the criteria described in Appendix C.2.5. Results since April 2020 have indicated higher excess mortality (and higher percentage claims identified as COVID) by decreasing company size. However, the results by Company Size are generally of the same magnitude and are usually consistent in pattern from quarter to quarter. Ratios for Large Companies have tended to be lower than those of other companies for most quarters. The spread by Company Size has narrowed during 2022, and Q4 2022 was only the second quarter during the study period in which Medium companies exhibited the lowest A/E ratio (102%).

Table 5.12

EXCESS MORTALITY BY COMPANY SIZE

Company Size	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Apr. 2020–Dec. 2022	COVID (%)	Count (%)
Large	113%	127%	122%	106%	132%	124%	116%	98%	102%	106%	115%	12.9%	79%
Medium	122%	132%	121%	108%	139%	129%	118%	101%	104%	102%	118%	13.1%	16%
Small	123%	136%	132%	110%	146%	134%	123%	103%	103%	107%	121%	15.0%	4%
All	**115%**	**128%**	**122%**	**107%**	**133%**	**125%**	**116%**	**99%**	**103%**	**105%**	**115%**	**13.0%**	**100%**

Section 6: Detailed Cause of Death

Beginning with the June 2022 data submission, participating companies were asked to expand the study's three previous cause of death (COD) groups (COVID-19, Accident, Illness) into 12 COD groupings. The December 2022 data request expanded the number of categories to 15 by adding Respiratory, Cerebrovascular (including stroke) and Alzheimer's. A survey of the companies was completed prior to these requests to identify what groupings would be feasible to provide dating back to 2017. This survey, along with CDC cause of death groupings, informed the groupings presented in this report. The mapping of these COD groups can be found in Appendix E.

Despite expansion of the COD categories, approximately 30% of claims still fall into the "All Other/Unknown" group, and it would be ideal to decrease this number further. One challenge is that three of the 20 companies were not able to provide more detailed COD information back to 2017 than what was part of the original survey, and other companies did not track one or more ICD-10 diagnosis codes consistently over the course of the study period, so some claims that otherwise would have been allocated to one of the new COD categories were labeled as "Unknown."

The graphs in Figures 6.1 and 6.2 show excess mortality relative to baseline (2017–2019), ranked by the COD with the most claim counts at the top (All Other/Unknown) and the fewest at the bottom (Alzheimer's). The graphs have been split into two parts, with the top seven COD in the first and the bottom seven COD categories in the second. Note that the COVID-19 COD is not a shown in these figures because there is no baseline mortality for COVID-19 from 2017 to 2019. Also, the 2022 incurred periods are incomplete with respect to COD; it is expected that the All Other/Unknown category will decrease in excess mortality and other categories will increase in the 2022 periods as COD reporting matures over time.

Figure 6.1

GROUP LIFE ACTUAL TO EXPECTED INCURRED MORTALITY—TOP SEVEN CAUSES OF DEATH

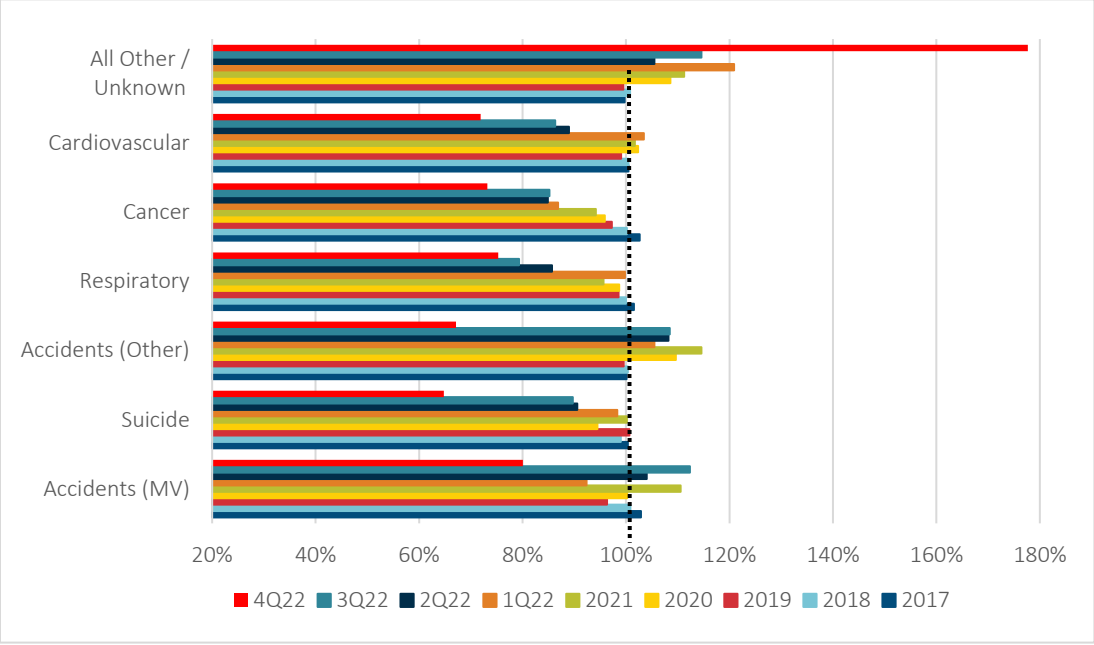
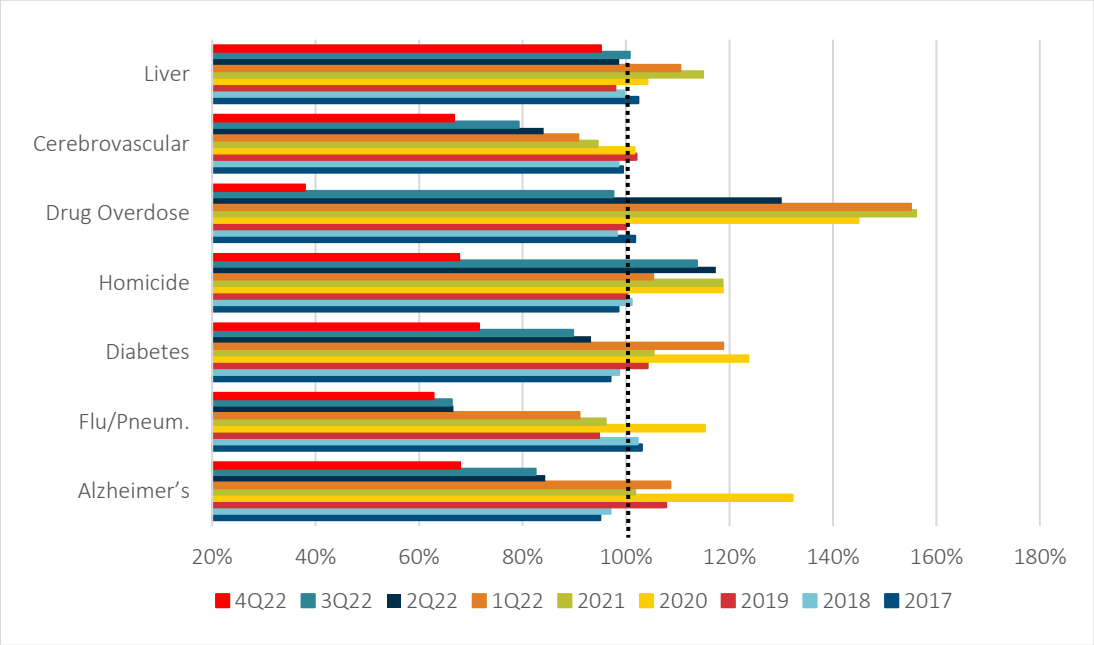


Figure 6.2
GROUP LIFE ACTUAL TO EXPECTED INCURRED MORTALITY—BOTTOM SEVEN CAUSES OF DEATH



Note: As a result of the addition of the Respiratory category to the data request, many claims previously categorized as Flu/Pneumonia were recategorized by study contributors as Respiratory.

The Committee notes that Cancer mortality rates continue to drop throughout the observation period of 2017–2022. Excess mortality for accidents, both Motor Vehicle and Other, was 10%–15% higher than baseline in 2021. The 2022 excess mortality for accidents appears to be developing above baseline as well, though the data are still too incomplete to determine the degree to which it is higher. Diabetes and Liver deaths, often cited comorbidities with COVID-19 deaths, appear to be elevated 5%–20% during the entire pandemic period; however, early indications from the 2022 data suggest diabetes may be improving. Last, "deaths of despair," particularly Drug Overdose and Homicides, have increased around 55% and 20%, respectively.

Figure 6.3 displays the COD distribution in the 2017–2019 baseline period by count. Approximately half of the 2017–2019 baseline Group Life claims were Cardiovascular or Cancer. The top 10 COD groupings (excluding All Other/Unknown) covered approximately two-thirds of all Group Life baseline claims. Although Figure 6.2 shows substantial percentage increases in the Liver, Diabetes, Drug Overdose and Homicide causes of death during the pandemic period, Figure 6.3 indicates that these causes constituted a relatively low percentage of overall deaths.

Figure 6.3

GROUP LIFE CAUSE OF DEATH DISTRIBUTION, 2017–2019 BASELINE, BY COUNT

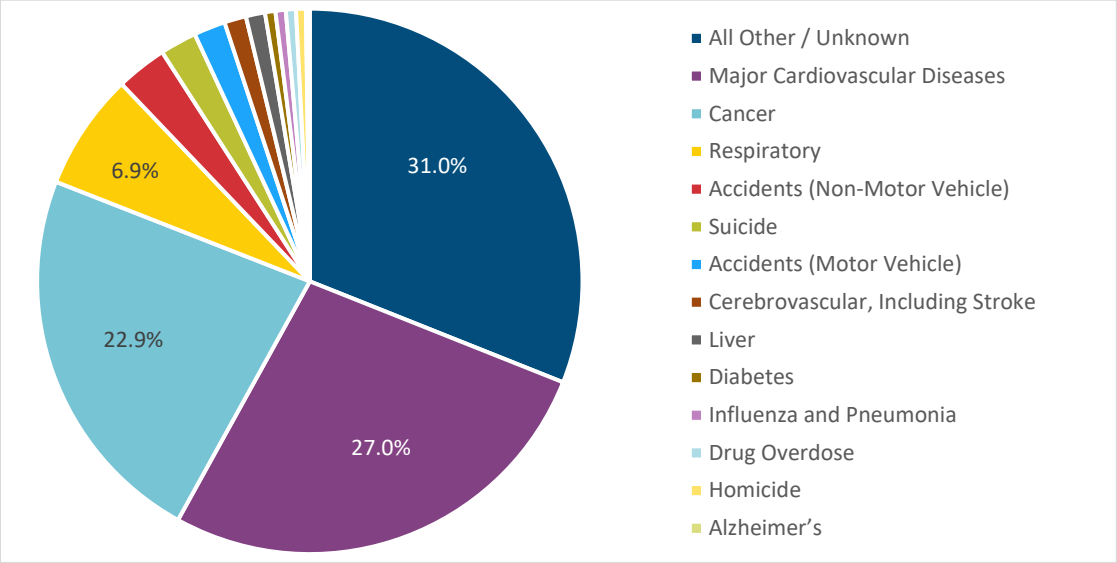
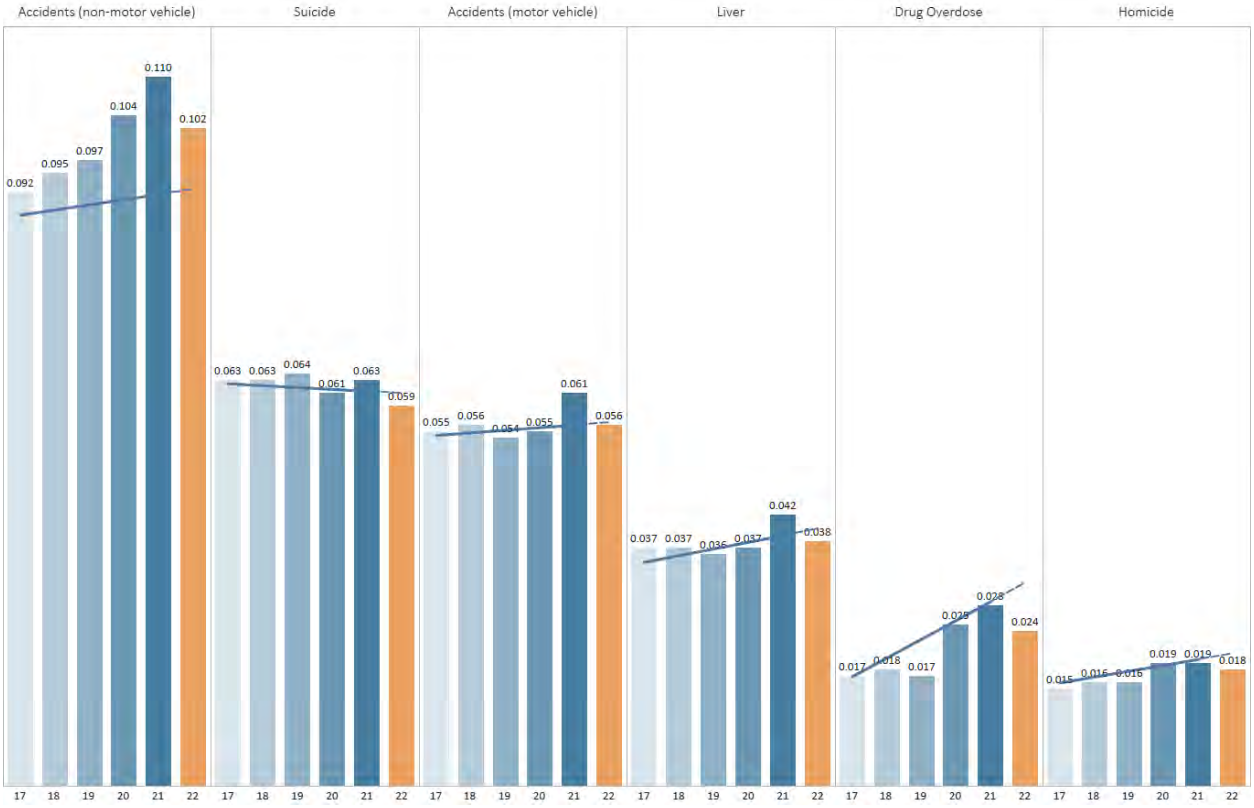


Figure 6.4 displays the annual incidence trend of various CODs over the period of 2017–2021, with current estimates for 2022 (not included in the trend). The trend for drug overdose has been steeply increasing over the five years, with more modest but still noticeable upward patterns for Liver and Homicide. The trend for Suicide has been flat, if not decreasing, over the five-year period. Accidents have also shown a significant uptick in 2021, particularly for motor vehicle accidents. Although claims for 2022 are shown, it is expected that COD assignment for 2022 is not yet fully complete, which contributes to the orange bar appearing lower than the incidence rates for prior periods for some causes of death.

Figure 6.4

ANNUAL INCIDENCE RATES FOR SELECT CAUSES OF DEATH FOR 2017–2022



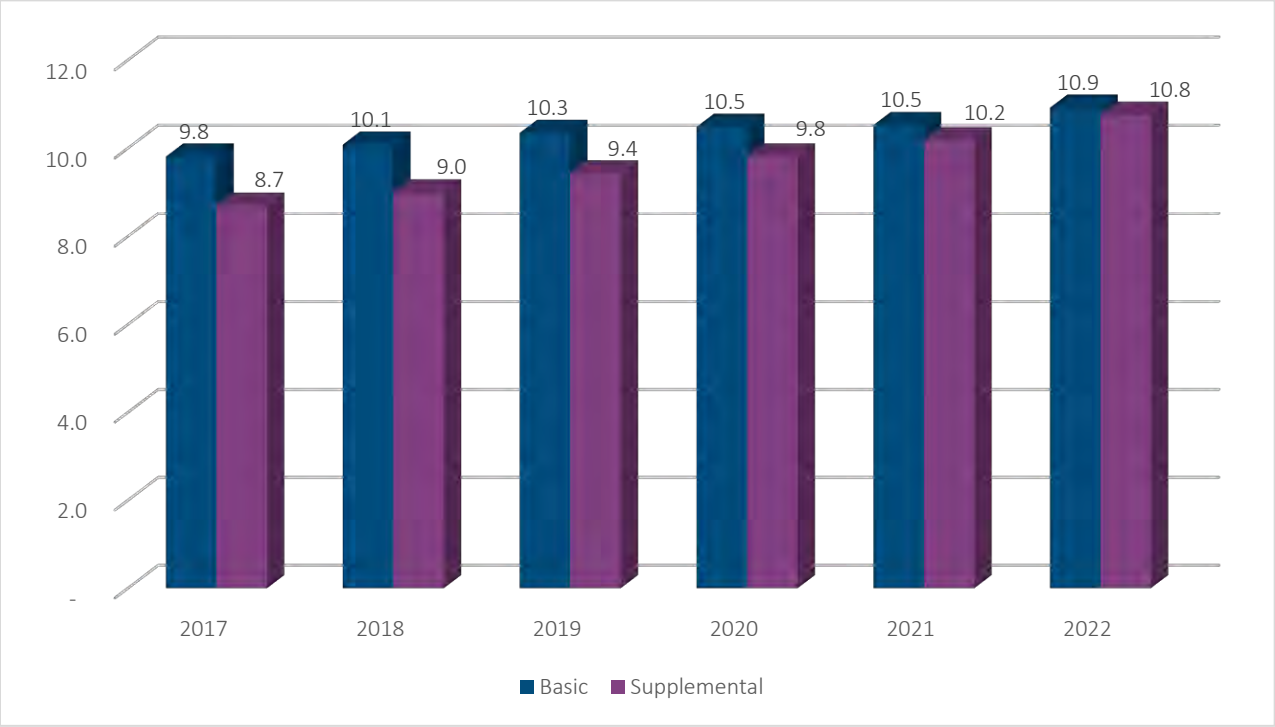
Section 7: Exposure Trends

7.1 PREMIUMS

The Committee reviewed the premiums submitted for the study to determine if the premium exposure was stable or exhibited volatility during the experience period. Figure 7.1 indicates a gradual increase in premium exposure during the experience period, as expected when wage inflation is considered. Supplemental premium is growing at a faster rate, and if current trends continue, supplemental premium will become the majority in the next few years. The 2022 premiums in Figure 7.1 are reported premiums through December 2022. The overall trends in premium by year shown below are consistent, which is helpful for validating the premium data used for calculating premium per life (PPL) metrics and estimating covered lives when carriers could not provide this information.

Figure 7.1

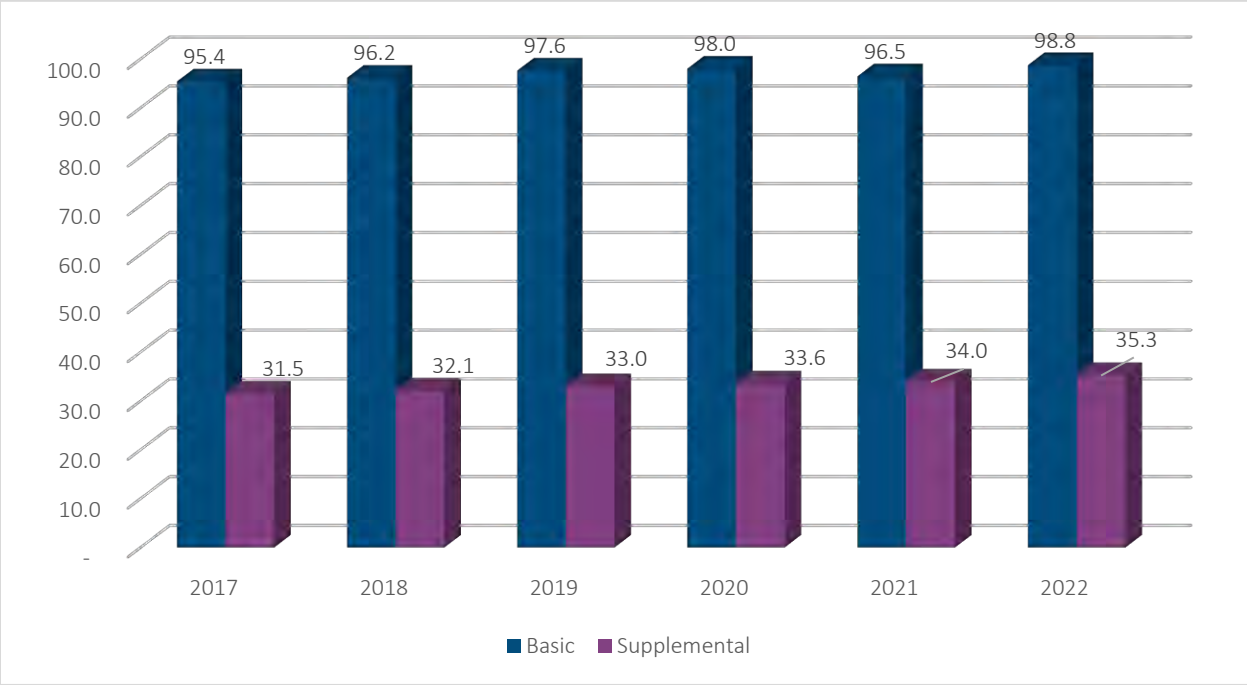
REPORTED PREMIUM ($ BILLIONS) BY YEAR, 2017–2022



7.2 LIVES

The Committee also reviewed life-years of exposure (LYE) reported for the study. Figure 7.2 shows LYE from 2017 through 2022. A slight drop in LYE occurred in 2021, possibly because of disruptions from the COVID-19 pandemic. Otherwise, basic LYE was relatively stable during the experience period, and supplemental LYE has been increasing gradually.

Figure 7.2
LIFE-YEARS OF EXPOSURE (MILLIONS) BY YEAR, 2017–2022



Note: Previous iterations of this report displayed only LYE from companies that submitted life counts. This chart includes "filled in" LYE using PPL estimates for companies that provided premiums but not lives.

Table 7.1 shows average premium per LYE based on the data provided for the study along with the change from the prior year. In 2020 the average premium per LYE increased by 0.9% for Basic coverages, which is lower than any other period and likely related to the sharp increase in unemployment. All other Basic annual percentage changes are between 1% and 2%. Supplemental has outpaced Basic in growth in all periods with the highest in 2020 and 2021 because consumers may have elected for additional coverage as the pandemic was at its peak.

Table 7.1
AVERAGE PREMIUM PER LIFE-YEARS OF EXPOSURE BY YEAR AND COVERAGE TYPE

Year	Average Premium per LYE		Change in Average Premium per LYE	
	Basic	Supplemental	Basic	Supplemental
2017	$102.8	$276.1	NA	NA
2018	$104.8	$280.3	1.9%	1.5%
2019	$106.0	$285.5	1.1%	1.9%
2020	$106.9	$292.0	0.9%	2.3%
2021	$109.1	$299.5	2.0%	2.5%
2022	$110.6	$304.7	1.4%	1.8%

Note: Previous iterations of this report included only LYE from companies that submitted life counts. This table includes "filled in" LYE using premium-per-life estimates for companies that provided premiums but not lives.

Table 7.2 shows average exposure per LYE and the change from the prior year. In 2021 the average exposure per LYE decreased by 1.6% for Basic coverages but increased 1.2% for Supplemental coverages. Before 2021 the changes in average premium per LYE were limited with most of the exposure growth coming from the Supplemental line. The 3.9% increase in the Supplemental average exposure per LYE in 2022 may be attributed to employees increasing their Supplemental benefit amounts because of the COVID-19 pandemic and above-average wage growth.

Table 7.2

AVERAGE EXPOSURE PER LIFE-YEARS OF EXPOSURE BY YEAR AND COVERAGE TYPE

Year	Average Exposure per LYE		Change in Average Exposure per LYE	
	Basic	Supplemental	Basic	Supplemental
2017	$7,950.6	$2,624.2	NA	NA
2018	$8,013.8	$2,673.8	0.8%	1.9%
2019	$8,135.9	$2,752.0	1.5%	2.9%
2020	$8,169.7	$2,799.1	0.4%	1.7%
2021	$8,039.0	$2,831.6	-1.6%	1.2%
2022	$8,222.8	$2,941.0	2.3%	3.9%

Section 8: Company Variations

8.1 VARIATIONS IN COVID-19 MORTALITY RESULTS

The survey showed that all participating companies had elevated Group Life mortality experience during the pandemic. However, the level of excess mortality varied between carriers. To provide insight into the dispersion of industry experience, Tables 8.1 and 8.2 provide the quartile baseline and pandemic experience, ranked by highest implied excess mortality percentage (by claim count) to lowest over the full pandemic period. The quartile incidence rates and excess mortality ratios are the weighted average of the five contributing companies' incidence rates in each quartile.

Table 8.1

QUARTERLY SEASONALLY ADJUSTED INCURRED INCIDENCE RATES (BY COUNT)—COMPANY QUARTILES

Quartile	Baseline	Q2 2020–Q4 2020	2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	2022	Q2 2020–Q4 2022
Quartile 1	2.373	3.052	3.206	2.962	2.506	2.587	2.626	2.670	2.966
Quartile 2	2.621	3.279	3.361	3.088	2.586	2.672	2.658	2.749	3.109
Quartile 3	3.609	4.256	4.307	4.271	3.621	3.826	3.961	3.919	4.150
Quartile 4	4.094	4.562	4.524	4.185	3.566	3.629	3.706	3.771	4.261
Total	**3.242**	**3.873**	**3.949**	**3.777**	**3.198**	**3.331**	**3.405**	**3.427**	**3.736**

Table 8.2

QUARTERLY SEASONALLY ADJUSTED INCURRED A/E RATIOS (BY COUNT)—COMPANY QUARTILES

Quartile	Baseline	Q2 2020–Q4 2020	2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	2022	Q2 2020–Q4 2022
Quartile 1	2.373	128.6%	135.1%	124.8%	105.6%	109.0%	110.7%	112.5%	125.0%
Quartile 2	2.621	125.1%	128.3%	117.8%	98.7%	102.0%	101.4%	104.9%	118.6%
Quartile 3	3.609	117.9%	119.3%	118.4%	100.3%	106.0%	109.7%	108.6%	115.0%
Quartile 4	4.094	111.4%	110.5%	102.2%	87.1%	88.7%	90.5%	92.1%	104.1%
Total	**3.242**	**119.5%**	**121.8%**	**116.5%**	**98.6%**	**102.7%**	**105.0%**	**105.7%**	**115.2%**

8.2 VARIATIONS IN COVID-19 CLAIM CODING PROCEDURES

Participating carriers were asked about the data sources and procedures they used to determine whether a claim should be coded as a COVID-19 cause of death. Eighteen of the 20 carriers in the survey provided details on their claim coding procedures, and the Committee learned the following:

- Seventeen of the 18 respondents included the claim as a COVID-19 death if COVID-19 appeared anywhere on the death certificate.
    - Eight of the 18 appeared to do everything in their power to research all available sources to create an exhaustive tracking of all claims where COVID was a contributing cause. These companies used five or more of the following sources to identify whether a death was caused by COVID-19:
        - Primary cause of death on death certificate
        - Secondary cause of death on death certificate
        - Claim form
        - Communication with employer or beneficiary
        - Obituary
        - Communication with medical examiner or funeral home
    - One carrier coded claims with cause of COVID-19 only when COVID-19 was identified as the primary cause of death on the death certificate.
    - The other nine participating carriers generally classified a death as COVID-19 if it appeared anywhere on the death certificate.

8.3 VARIATIONS IN CLAIM REPORTING PATTERNS

Appendix D.4 documents that incurred claim completion rates varied significantly from company to company. Upon analyzing the differences, the 20 contributing companies were grouped into five “reporting speed” groups based on similar reporting patterns.

The Committee investigated whether the company reporting speed groupings would be correlated to company size. However, this was not the case. The Large, Medium and Small companies are well dispersed among the five reporting speed categories.

Section 9: Comparisons to General U.S. Population Mortality Results

9.1 AGGREGATE EXCESS MORTALITY COMPARISONS

From April 2020 through December 2022, 149,290 incurred COVID claims were estimated to be in the Group Life survey data, compared with approximately 1.1 million COVID deaths in the U.S. population during the same time span according to the Centers for Disease Control and Prevention (CDC).[3]

Past studies that have compared insured mortality to population mortality have found that mortality among insured lives tends to be lower. In particular, the SOA's 2016 Group Term Life Mortality Study[4] found that, in the key working ages, insured mortality is between 30% and 40% of general population mortality. This is often considered to be a function of the fact that an employee generally is in good health to be actively at work, often has access to health care and tends to have a higher level of income (which is correlated with better health). Because the mortality rates between the two populations tend to differ, the Committee analyzed the relative impact of the COVID-19 pandemic on the Group Life data and the U.S. population by considering excess death percentages, defined as the percentage increase in mortality rate over a baseline expectation.

The excess deaths in the Group Life data were determined via a comparison to average death rates in the Group Life data from the 2017–2019 baseline, adjusted for seasonality. For the U.S. population, the Committee considered two different expectation bases. The first basis was expected deaths published by the CDC,[5] which were developed using Farrington surveillance algorithms and historical data[6] (CDC method). For the second method, the Committee estimated expected deaths by computing the average CDC deaths from 2017 through 2019 and adjusting this average for changes in U.S. population size, changes in the U.S. population demographic mix by age and sex, and the trend for death rates by age group (Committee method).

Table 9.1 shows the evolution of this comparison by quarter using the Committee method for U.S. population results. The results for Q2 2022 show substantially lower excess mortality in the Group Life population than the U.S. population. The Q1 2022 Group Life excess mortality completed downward from the 20% shown in the previous iteration of this report, and it is now approximately equal to the U.S. population excess mortality for the first quarter of 2022. Also, note that a CDC methodology change resulted in a restatement of the excess mortality for the U.S. population for the first quarter of 2022.

Table 9.1

GROUP LIFE AND U.S. POPULATION EXCESS MORTALITY PERCENTAGES BY QUARTER

Age	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022
Group Life	15%	15%	28%	22%	7%	33%	25%	16%	-1%	3%	5%
U.S. Population	20%	16%	26%	16%	5%	24%	18%	15%	2%	7%	7%
Difference	**-5%**	**-1%**	**2%**	**6%**	**2%**	**9%**	**7%**	**1%**	**-3%**	**-4%**	**-2%**

[3] National Center for Health Statistics, Provisional Death Counts for Coronavirus Disease 2019 (COVID-19), https://www.cdc.gov/nchs/nvss/vsrr/covid19/index.htm.
[4] Society of Actuaries, 2016 Group Term Life Mortality Study & Tables, https://www.soa.org/resources/experience-studies/2016/2016-group-life-mortality-study/.
[5] National Center for Health Statistics. Excess Deaths Associated with COVID-19, https://www.cdc.gov/nchs/nvss/vsrr/covid19/excess_deaths.htm.
[6] More information can be found in the technical notes on the National Center for Health Statistics website, where the CDC publishes excess deaths: https://www.cdc.gov/nchs/nvss/vsrr/covid19/excess_deaths.htm#techNotes.

9.2 EXCESS MORTALITY COMPARISON BY SEX AND AGE

Most participants in the Group Life Survey provided a distribution of claims by sex and age, but most were not able to provide a distribution of exposure by sex and age. For this reason, the comparisons below show claim counts unadjusted by any changes in exposure. The seasonality adjustment has also been removed to show a more direct comparison.

Table 9.2 shows the actual-to-baseline ratios by sex and broad age group. These excess percentages have been adjusted for overall changes in exposure, but not for seasonal differences, either in total or by sex and age.

Table 9.2
EXCESS DEATH PERCENTAGES BY SEX AND BROAD AGE GROUP

Sex Age	Population	Q2–Q4 2020	Q1–Q2 2021	Q3–Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q1–Q4 2022
F 00-44	Group Life	19.0%	25.3%	55.3%	30.8%	9.3%	17.7%	31.2%	22.3%
F 00-44	U.S. Pop.	18.1%	21.4%	40.0%	24.7%	11.6%	15.4%	14.9%	16.7%
F 00-44	**Difference**	**0.9%**	**4.1%**	**15.3%**	**6.1%**	**-2.3%**	**2.3%**	**16.3%**	**5.6%**
M 00-44	Group Life	23.2%	27.4%	61.6%	31.8%	18.7%	19.3%	23.4%	23.3%
M 00-44	U.S. Pop.	27.4%	27.4%	44.8%	25.4%	20.8%	24.4%	18.2%	22.2%
M 00-44	**Difference**	**-4.2%**	**0.0%**	**16.8%**	**6.4%**	**-2.1%**	**-5.1%**	**5.2%**	**1.1%**
F 45-64	Group Life	16.1%	19.4%	38.5%	24.6%	-2.7%	1.6%	19.5%	10.8%
F 45-64	U.S. Pop.	15.0%	16.0%	32.0%	23.7%	-1.3%	0.4%	5.1%	7.0%
F 45-64	**Difference**	**1.1%**	**3.4%**	**6.5%**	**0.9%**	**-1.4%**	**1.2%**	**14.4%**	**3.8%**
M 45-64	Group Life	23.7%	27.6%	56.0%	34.8%	0.6%	1.9%	15.1%	13.1%
M 45-64	U.S. Pop.	20.7%	21.7%	35.2%	25.6%	1.1%	2.8%	5.9%	8.9%
M 45-64	**Difference**	**3.0%**	**5.9%**	**20.8%**	**9.2%**	**-0.5%**	**-0.9%**	**9.2%**	**4.2%**
F 65-99	Group Life	11.9%	9.7%	12.2%	14.9%	-7.9%	-5.9%	-6.9%	-1.4%
F 65-99	U.S. Pop.	16.8%	11.8%	15.6%	24.0%	0.7%	3.6%	14.4%	10.7%
F 65-99	**Difference**	**-5.1%**	**-2.1%**	**-3.4%**	**-9.1%**	**-8.6%**	**-9.5%**	**-21.3%**	**-12.1%**
M 65-99	Group Life	14.1%	12.2%	15.1%	19.5%	-8.1%	-9.7%	-8.0%	-1.5%
M 65-99	U.S. Pop.	22.1%	19.5%	22.8%	33.6%	4.2%	7.6%	17.5%	15.7%
M 65-99	**Difference**	**-8.0%**	**-7.3%**	**-7.7%**	**-14.1%**	**-12.3%**	**-17.3%**	**-25.5%**	**-17.2%**

At the younger ages, the proportional impact on the Group Life Market was worse than in the U.S. population, but at the older ages the relationship is reversed. In particular, in 2022 the older ages with the Group Life market had significantly better experience.

Please note also that the Q4 2022 Group Life results were as of December 31, 2022, and therefore include a significant completion assumption. This assumption is determined in aggregate and may not be appropriate by sex and age. For example, the Committee suspects that deaths for younger ages are reported more quickly than for older ages, and, thus, the Q4 2022 results will likely not end up as unfavorable.

One of the observations from both the Group Life Survey and the U.S. population results is that the deaths have been higher than expected, even after excluding explicit COVID-19 deaths. This comparison is captured in Table 9.3.

Table 9.3

EXCESS DEATH PERCENTAGES, EXCLUDING COVID-19, BY SEX AND BROAD AGE GROUP

Sex Age	Population	Q2–Q4 2020	Q1–Q2 2021	Q3–Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q1–Q4 2022
F 00-44	Group Life	10.7%	15.1%	21.4%	17.0%	7.4%	15.7%	29.8%	17.5%
F 00-44	U.S. Pop.	12.7%	15.0%	20.5%	14.4%	10.6%	14.1%	14.0%	13.3%
F 00-44	**Difference**	**-2.0%**	**0.1%**	**0.9%**	**2.6%**	**-3.2%**	**1.6%**	**15.8%**	**4.2%**
M 00-44	Group Life	15.2%	17.3%	25.3%	18.0%	17.3%	18.1%	22.6%	19.0%
M 00-44	U.S. Pop.	22.3%	21.9%	28.4%	17.5%	20.1%	23.4%	17.7%	19.6%
M 00-44	**Difference**	**-7.1%**	**-4.6%**	**-3.1%**	**0.5%**	**-2.8%**	**-5.3%**	**4.9%**	**-0.6%**
F 45-64	Group Life	3.2%	2.4%	5.8%	5.1%	-4.1%	-0.8%	18.3%	4.6%
F 45-64	U.S. Pop.	3.1%	1.9%	6.4%	3.9%	-3.0%	-2.1%	3.2%	0.5%
F 45-64	**Difference**	**0.1%**	**0.5%**	**-0.6%**	**1.2%**	**-1.1%**	**1.3%**	**15.1%**	**4.1%**
M 45-64	Group Life	6.9%	5.7%	11.6%	8.2%	-1.0%	0.2%	14.1%	5.4%
M 45-64	U.S. Pop.	7.0%	6.5%	9.6%	6.7%	-0.2%	0.9%	4.5%	3.0%
M 45-64	**Difference**	**-0.1%**	**-0.8%**	**2.0%**	**1.5%**	**-0.8%**	**-0.7%**	**9.6%**	**2.4%**
F 65-99	Group Life	0.1%	-1.3%	2.0%	2.4%	-9.8%	-8.9%	-8.7%	-6.2%
F 65-99	U.S. Pop.	2.1%	-0.2%	4.4%	9.1%	-1.4%	-0.1%	11.0%	4.7%
F 65-99	**Difference**	**-2.0%**	**-1.1%**	**-2.4%**	**-6.7%**	**-8.4%**	**-8.8%**	**-19.7%**	**-10.9%**
M 65-99	Group Life	-0.1%	-1.8%	2.0%	2.7%	-10.5%	-13.3%	-10.0%	-7.8%
M 65-99	U.S. Pop.	4.2%	3.5%	8.3%	13.4%	1.7%	3.2%	13.5%	8.0%
M 65-99	**Difference**	**-4.3%**	**-5.3%**	**-6.3%**	**-10.7%**	**-12.2%**	**-16.5%**	**-23.5%**	**-15.8%**

For the older ages, the Group Life experience excluding COVID-19 is actually below expectations, whereas the U.S. population remains above expectations. For the younger ages, both populations show elevated mortality, although this trend is worse for the under-age-45 population than for ages 45–64.

To visualize the differences by sex and age and over time, Figures 9.1 through 9.6 show ratios of actual deaths to baseline expectations by month and by sex and age group. Because of the heavy reliance on completion factors in the most recent month of data, December 2022 has been omitted from these charts.

Figure 9.1
EXCESS DEATH PERCENTAGES, EXCLUDING COVID-19, FEMALES UNDER AGE 45

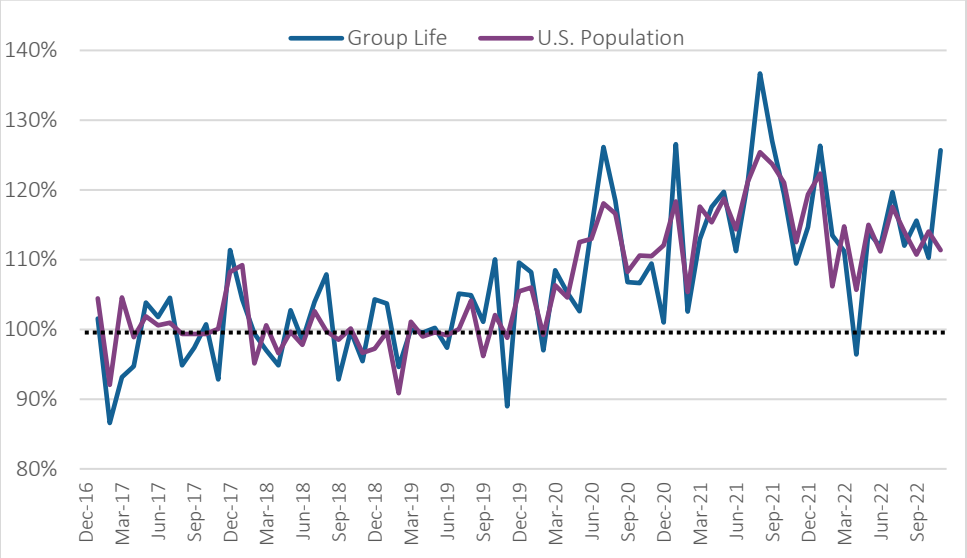
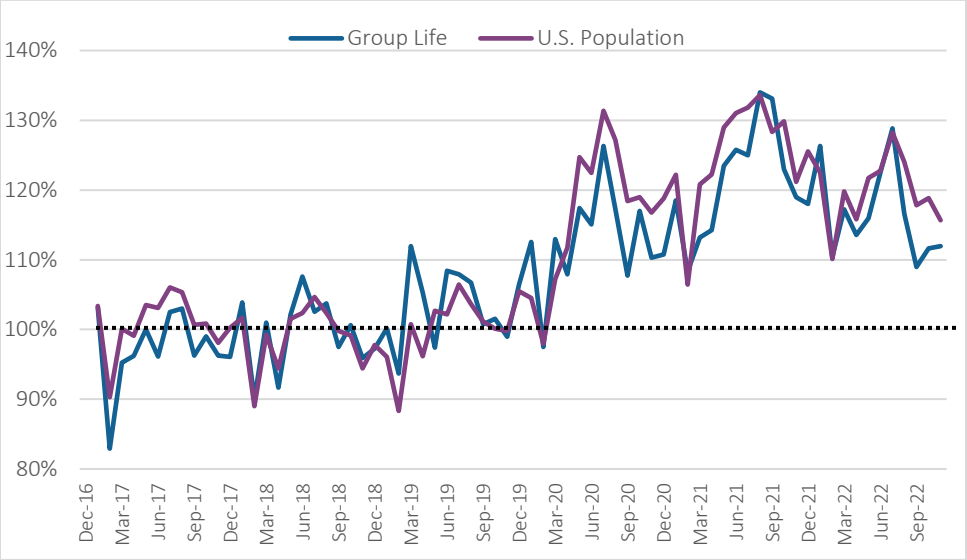


Figure 9.2
EXCESS DEATH PERCENTAGES, EXCLUDING COVID-19, MALES UNDER AGE 45



Males show a little more consistent elevated deaths in both populations than do females.

Figure 9.3
EXCESS DEATH PERCENTAGES, EXCLUDING COVID-19, FEMALES AGES 45–64

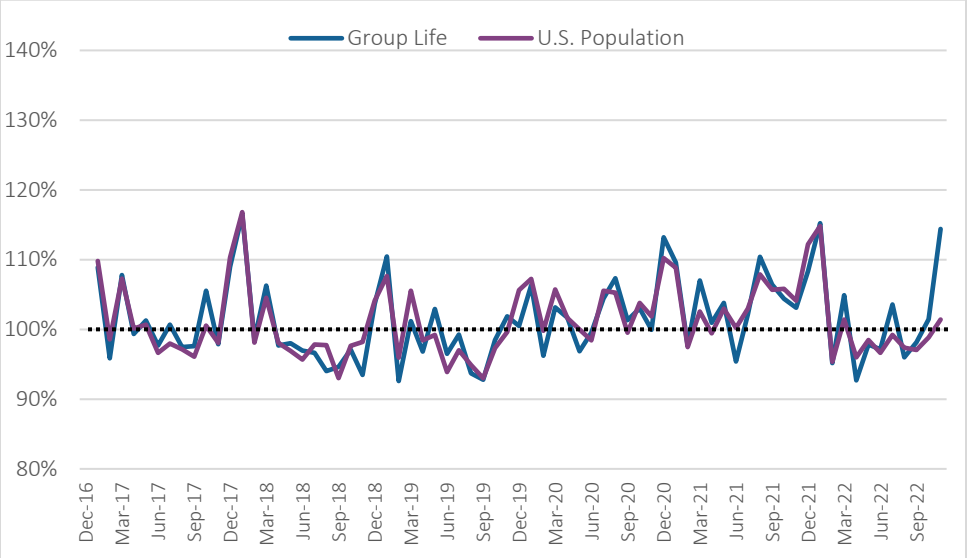
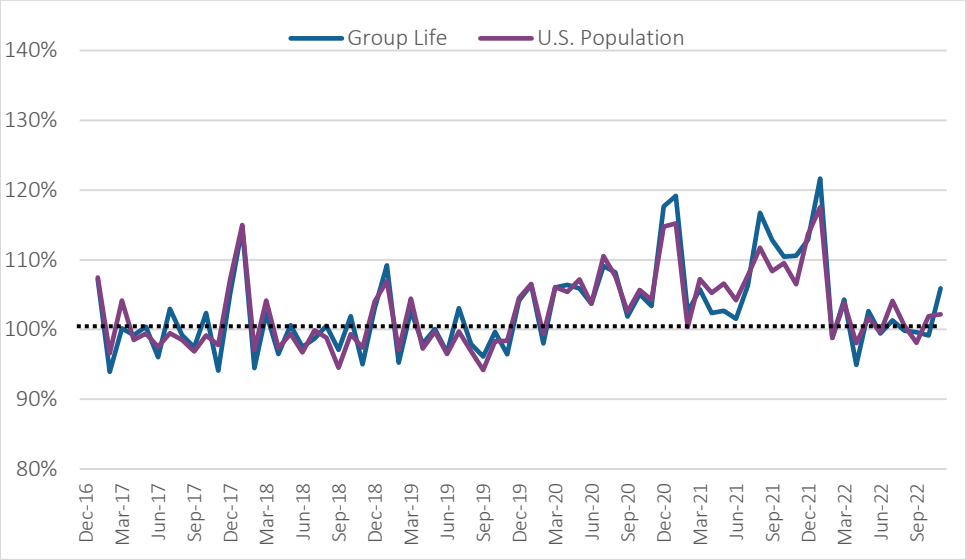


Figure 9.4
EXCESS DEATH PERCENTAGES, EXCLUDING COVID-19, MALES AGES 45–64



For this age group also, males show somewhat more elevated mortality in both populations.

Figure 9.5
EXCESS DEATH PERCENTAGES, EXCLUDING COVID-19, FEMALES AGES 65–99

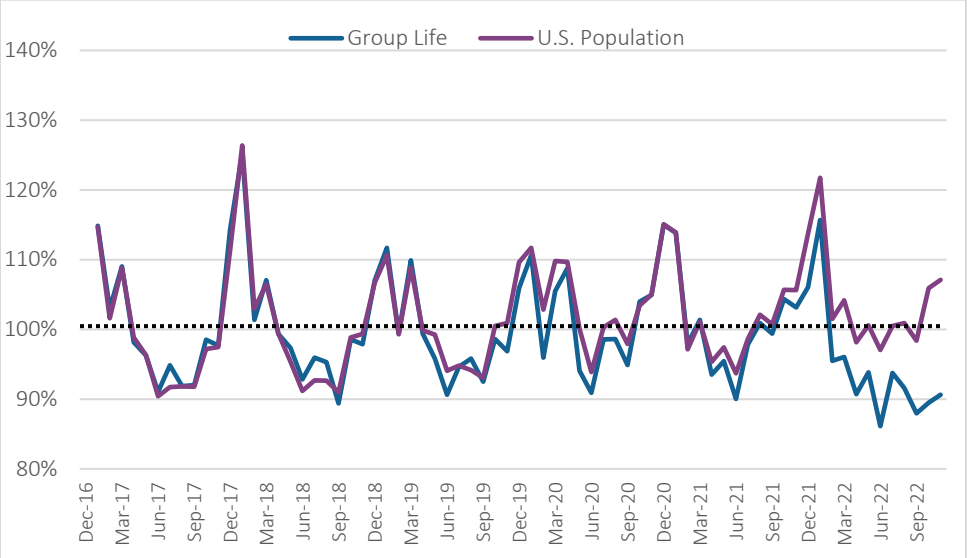
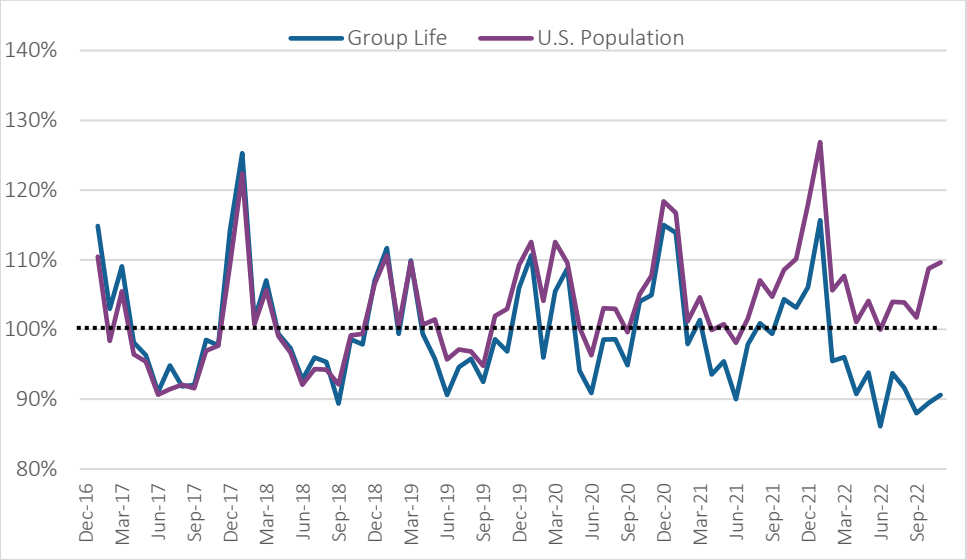


Figure 9.6
EXCESS DEATH PERCENTAGES, EXCLUDING COVID-19, MALES AGES 65–99



For older males, the Group Life experience has been consistently better than the U.S. population throughout the pandemic, but for females this trend began to emerge more significantly in late 2021 into 2022.

Table 9.4 adjusts the U.S. population overall ratio of actual-to-baseline deaths to match what it would have been if the distribution of baseline deaths were to match the Group Life distributions by sex and age.

Table 9.4
GROUP LIFE AND U.S. POPULATION EXCESS MORTALITY PERCENTAGES BY QUARTER WITH ADJUSTMENT FOR SEX-AGE DEMOGRAPHICS (NO SEASONAL ADJUSTMENT)

Population	Q2–Q4 2020	Q1–Q2 2021	Q3–Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q1–Q4 2022
Group Life	117.3%	116.2%	127.5%	122.7%	95.9%	96.5%	101.7%	104.2%
U.S. Population	122.5%	118.8%	125.5%	130.3%	105.2%	108.2%	116.4%	115.0%
Difference	**-5.2%**	**-2.6%**	**2.0%**	**-7.6%**	**-9.3%**	**-11.7%**	**-14.7%**	**-10.8%**
Adjusted U.S. Pop.	123.1%	120.3%	128.0%	131.3%	105.7%	108.6%	116.0%	115.4%
Adjusted Difference	**-5.8%**	**-4.1%**	**-0.5%**	**-8.6%**	**-9.8%**	**-12.1%**	**-14.3%**	**-11.2%**

When adjusting for sex and age, very little change is seen in the comparison of Group Life results to U.S. population results. This suggests that differences in the sex-age demographics do not explain much of the difference in the excess mortality.

9.3 EXCESS MORTALITY COMPARISON BY CAUSE OF DEATH

Carriers were asked to provide 15 different causes of death, including COVID-19. The CDC provides detailed cause of death (ICD-10 Code), which can be mapped to the 15 Group Life CODs using the definitions listed in Appendix E.

Using information furnished by the Group Life survey participants and the CDC, the Committee investigated differences in excess mortality by cause of death. Both the CDC and Group Life datasets tend to have a high level of unknown causes for more recent deaths because it often takes time to investigate the actual causes. The CDC suppresses deaths due to external causes for six months to allow time to do a full assessment. For this reason, this section includes only the first six months of deaths in 2022.

Seasonality can be very important for causes of death, so rather than rely on the overall seasonal adjustments describe earlier in this report, the Committee compared deaths in the years 2020–2022 to the same months in the baseline period. For example, 1Q 2021 is be compared to the average from the first quarters of the years 2017 through 2019.

Table 9.5 compares the causes of deaths between the two populations. These excess percentages have been adjusted for overall changes in exposure, but not for seasonal differences, either in total or by diagnosis.

Table 9.5

GROUP LIFE AND U.S. POPULATION EXCESS MORTALITY PERCENTAGES BY QUARTER, ALL AGES

Cause of Death	Baseline Percent of Claims		Percent Change in Claim Counts					
			2020		2021		2022: First 6 Months	
	Group Life	U.S. Population	Group Life	U.S. Population	Group Life	U.S. Population	Group Life	U.S. Population
All Other / Unknown	31.1%	23.2%	8.6%	10.9%	11.2%	12.5%	10.9%	14.2%
Major Cardiovascular Diseases	27.0%	23.1%	2.3%	6.5%	1.7%	6.3%	-6.1%	5.0%
Cancer	22.9%	21.1%	-4.1%	0.5%	-5.9%	1.0%	-14.1%	0.4%
Respiratory	6.9%	7.8%	-1.4%	-2.5%	-4.3%	-6.2%	-12.8%	-10.5%
Accidents (Non–Motor Vehicle)	3.0%	3.2%	9.7%	8.9%	14.6%	17.1%	8.5%	10.2%
Suicide	2.2%	1.7%	-5.5%	-3.6%	0.2%	1.1%	-5.3%	4.4%
Accidents (Motor Vehicle)	1.9%	1.4%	0.3%	6.6%	10.6%	18.6%	2.3%	13.6%
Cerebrovascular, Stroke	1.3%	5.2%	1.7%	8.2%	-5.5%	9.9%	-12.5%	10.9%
Liver	1.1%	1.5%	4.2%	20.1%	14.9%	31.6%	2.1%	27.1%
Drug Overdose	0.6%	1.8%	45.0%	42.0%	56.1%	67.7%	42.0%	68.5%
Diabetes	0.6%	3.0%	23.7%	19.6%	5.4%	20.9%	3.6%	17.5%
Influenza and Pneumonia	0.6%	1.9%	15.2%	-2.4%	-3.9%	-23.6%	-30.5%	-34.7%
Homicide	0.6%	0.7%	18.8%	28.6%	18.7%	36.1%	15.3%	30.9%
Alzheimer's	0.2%	4.3%	32.4%	10.4%	1.7%	-1.8%	-2.0%	-2.9%
COVID-19			11.0%	12.4%	18.3%	14.7%	9.6%	9.6%

There is no baseline expectation for COVID-19, so these are compared to the total deaths across all causes. The causes are sorted by total baseline claims for Group Life. The All Other/Unknown category is higher for Group Life because some carriers were not able to provide all causes of death consistently back to 2017, as described in Section 6. All U.S. population deaths have an established cause except for those listed as ill-defined (ICD-10 R99). The higher proportion in the category in the first half of 2022 are likely due to deaths for which the cause is not yet established.

The distributions of causes of excess deaths are fairly similar between the two populations. Group Life excess deaths are generally lower for drug overdoses, liver disease, cerebrovascular, homicides and cancer, and relatively higher for Alzheimer's, non–motor vehicle accidents, and flu and pneumonia.

The percentage change can be misleading because a high percentage increase can be caused by relatively few excess deaths when the overall death level in the category is small. Table 9.6 gives a similar view, except that the excess deaths for each cause are divided by the total baseline death expectations. For example, in the Group Life data, the excess deaths due to major cardiovascular disease in 2021 was 0.5% of the baseline expectation.

Table 9.6

GROUP LIFE AND U.S. POPULATION EXCESS MORTALITY PERCENTAGES BY QUARTER

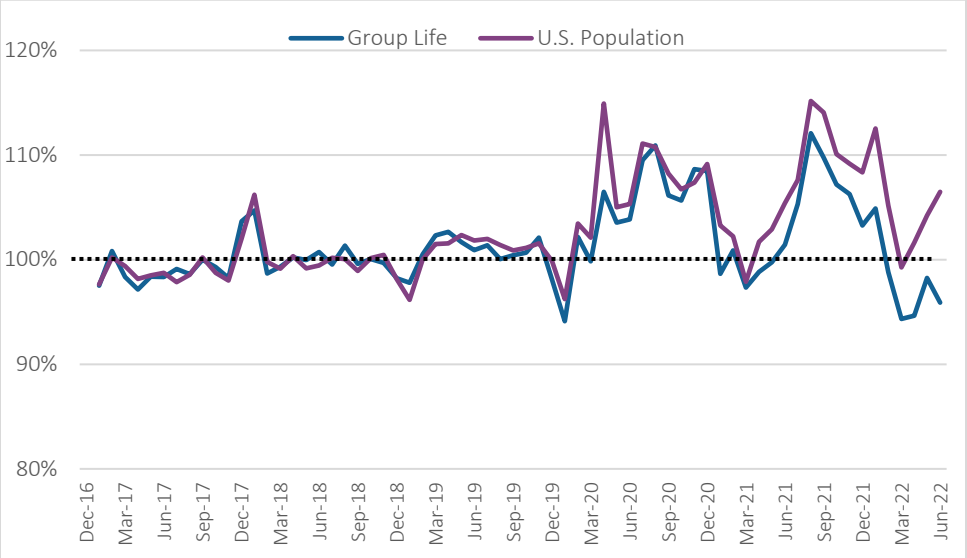
Cause of Death	Baseline Percent of Claims		Number of Extra Deaths Divided by Total Baseline					
			2020		2021		2022: First 6 Months	
	Group Life	U.S. Population	Group Life	U.S. Population	Group Life	U.S. Population	Group Life	U.S. Population
All Other / Unknown	31.1%	23.2%	2.7%	2.5%	3.5%	2.9%	3.4%	3.3%
Major Cardiovascular Diseases	27.0%	23.1%	0.6%	1.5%	0.5%	1.5%	-1.7%	1.2%
Cancer	22.9%	21.1%	-0.9%	0.1%	-1.3%	0.2%	-3.2%	0.1%
Respiratory	6.9%	7.8%	-0.1%	-0.2%	-0.3%	-0.5%	-0.9%	-0.9%
Accidents (Non-Motor Vehicle)	3.0%	3.2%	0.3%	0.3%	0.4%	0.6%	0.2%	0.3%
Suicide	2.2%	1.7%	-0.1%	-0.1%	0.0%	0.0%	-0.1%	0.1%
Accidents (Motor Vehicle)	1.9%	1.4%	0.0%	0.1%	0.2%	0.3%	0.0%	0.2%
Cerebrovascular, Stroke	1.3%	5.2%	0.0%	0.4%	-0.1%	0.5%	-0.2%	0.6%
Liver	1.1%	1.5%	0.0%	0.3%	0.2%	0.5%	0.0%	0.4%
Drug Overdose	0.6%	1.8%	0.3%	0.7%	0.3%	1.2%	0.3%	1.2%
Diabetes	0.6%	3.0%	0.1%	0.6%	0.0%	0.6%	0.0%	0.5%
Influenza & Pneumonia	0.6%	1.9%	0.1%	0.0%	0.0%	-0.5%	-0.2%	-0.8%
Homicide	0.6%	0.7%	0.1%	0.2%	0.1%	0.2%	0.1%	0.2%
Alzheimer's	0.2%	4.3%	0.1%	0.4%	0.0%	-0.1%	0.0%	-0.1%
COVID-19			11.0%	12.4%	18.3%	14.7%	9.6%	9.6%

Aside from COVID-19, we see that All Other/Unknown is the largest contributor to excess deaths in all three years and for both populations. The Committee does not have any details on these claims from the Group Life survey, but these details are available for the U.S. population (see Table 9.7 below).

The next highest category is major cardiovascular disease, but this has decreased within the Group Life results within 2022. The increase in drug overdoses is more significant within the U.S. population than Group Life, whereas liver disease (cirrhosis) is elevated in both populations. Diabetes deaths are elevated in both populations but represent a much smaller proportion of deaths for Group Life.

To help visualize the dynamics, Figures 9.7 through 9.12 show deaths relative to the baseline by cause and by month for the two populations. The deaths are compared to the same month in the baseline period.

Figure 9.7
DEATHS RELATIVE TO BASELINE—MAJOR CARDIOVASCULAR DISEASE



The drop-off in cardiovascular deaths in the Group Life data is evident. The low level in the last few months is likely due to claims with causes that are not yet established, but the decrease in early 2022 is likely to persist after all the causes have been established.

Figure 9.8
DEATHS RELATIVE TO BASELINE—DRUG OVERDOSES

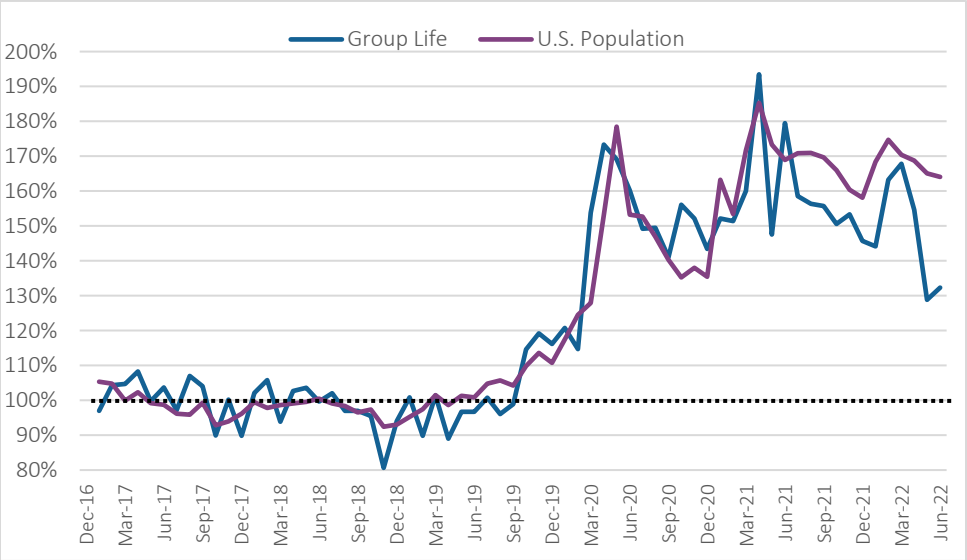
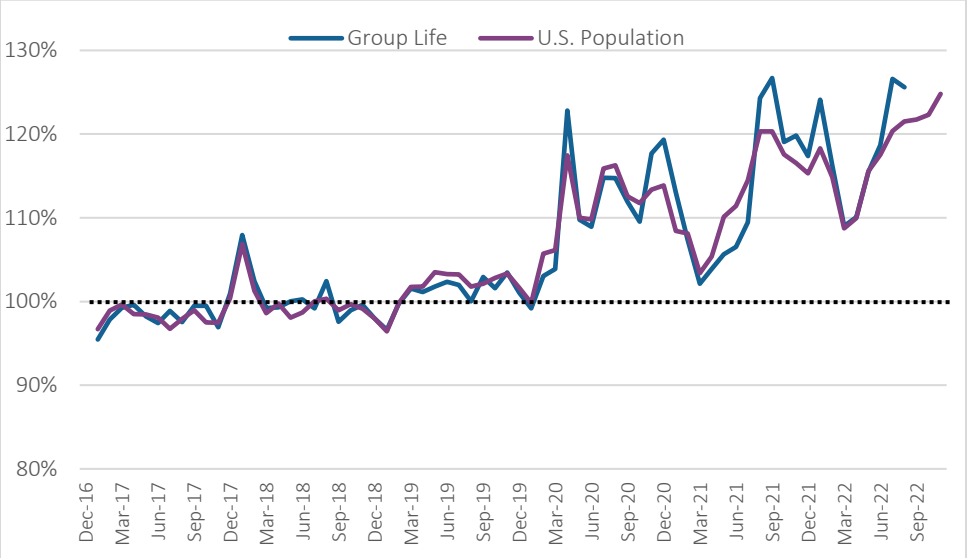


Figure 9.9
DEATHS RELATIVE TO BASELINE—ALL OTHER/UNKNOWN



Because the unknown numbers are so high in recent months we have excluded the last three months for the U.S. population and the last six months for Group Life.

Figure 9.10
DEATHS RELATIVE TO BASELINE—LIVER DISEASE

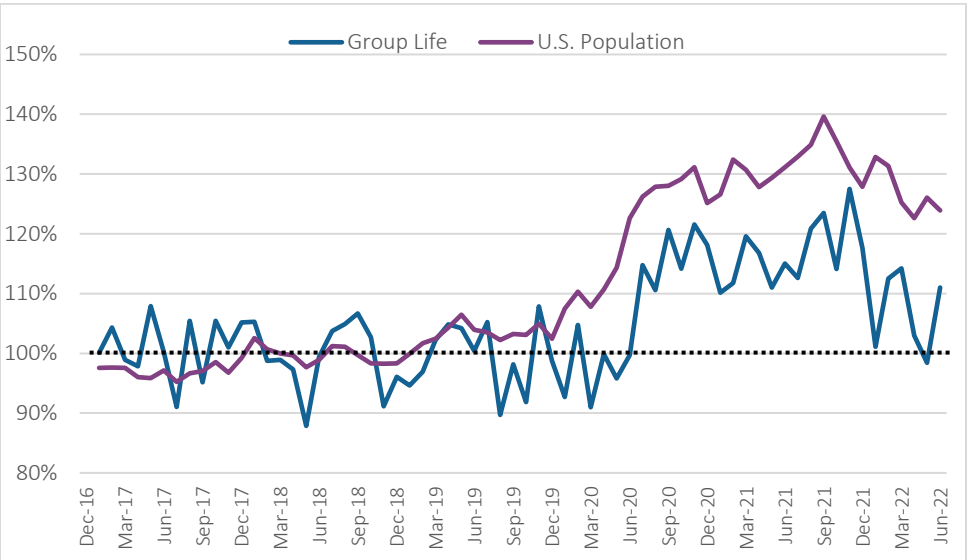
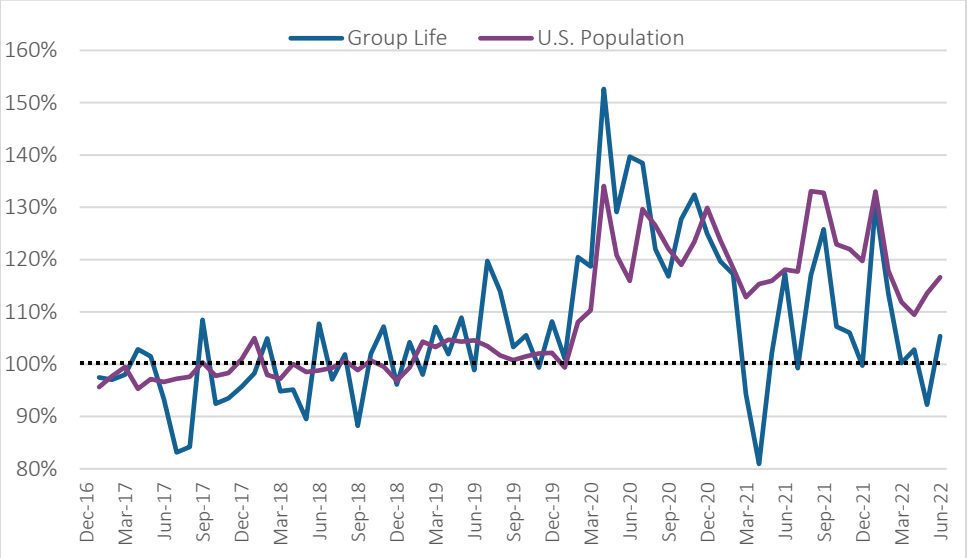


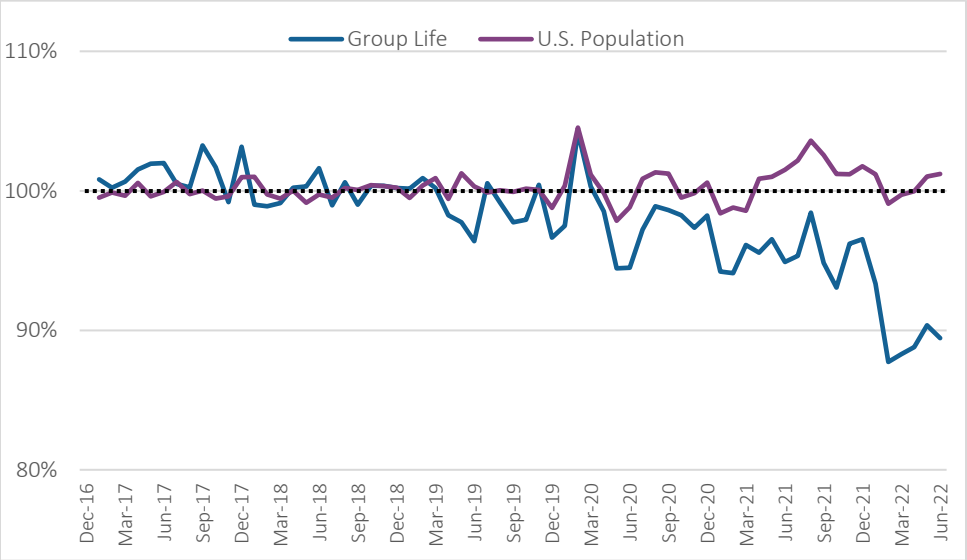
Figure 9.10 shows that the proportional impact of liver disease was more significant for the U.S. population than for Group Life.

Figure 9.11
DEATHS RELATIVE TO BASELINE—DIABETES



Diabetes deaths remain elevated for the U.S. population but have recently declined for Group Life.

Figure 9.12
DEATHS RELATIVE TO BASELINE—CANCER



Here we see cancer declining fairly significantly for Group Life, but not for the U.S. population.

Since the All Other/Unknown category is significantly elevated, the Committee researched the most prominent ICD-10 codes that make up this group in the U.S. population. Table 9.7 shows the top 20 codes for excess deaths, sorted by excess deaths in 2020 and 2021. 2022 was not included because the cause for some deaths may not yet be determined.

Table 9.7
U.S. POPULATION EXCESS MORTALITY BY ICD-10 CODE FOR "ALL OTHER/UNKNOWN"

ICD-10 Description	Excess Deaths 2020	Excess Deaths 2021
Senile degeneration of brain, not elsewhere classified	13,589	18,480
Parkinson's disease	6,538	4,807
Essential (primary) hypertension	3,931	4,237
Unspecified severe protein-energy malnutrition	2,821	4,631
Hyperlipidemia, unspecified	3,136	4,007
Vascular dementia, unspecified	3,355	2,641
Mental and behavioral disorders due to use of alcohol, harmful use	2,117	2,827
Mental and behavioral disorders due to use of alcohol, dependence syndrome	2,063	2,631
Hypertensive renal disease with renal failure	1,822	2,290
Unspecified protein-energy malnutrition	1,692	2,294
Chronic kidney disease, stage 5	1,616	2,107
Metabolic disorder, unspecified	1,090	2,046
Urinary tract infection, site not specified	902	1,975
Other obesity	1,246	1,547
Coronavirus infection, unspecified	1,887	708
Obesity, unspecified	972	1,586
Other specified degenerative diseases of nervous system	1,375	1,136
Acute renal failure, unspecified	395	2,097
Gastrointestinal hemorrhage, unspecified	1,009	1,405
Fatty (change of) liver, not elsewhere classified	796	1,229

Many of these conditions appear to be due to general poor health that may have been exacerbated by COVID-19.

9.3 EXCESS MORTALITY COMPARISON BY GEOGRAPHIC REGION

The CDC method described above for U.S. population expected deaths enables a comparison of excess death percentages by month and geographic region. Tables 9.8 and 9.9 display the excess death percentages by quarter and region for the U.S. population and the Group Life survey data, respectively. The "Total Excl. Other" row shows the weighted average A/E ratio for claims that could be allocated to the four regions.

Table 9.8
U.S. POPULATION EXCESS DEATH PERCENTAGE BY QUARTER AND GEOGRAPHIC REGION

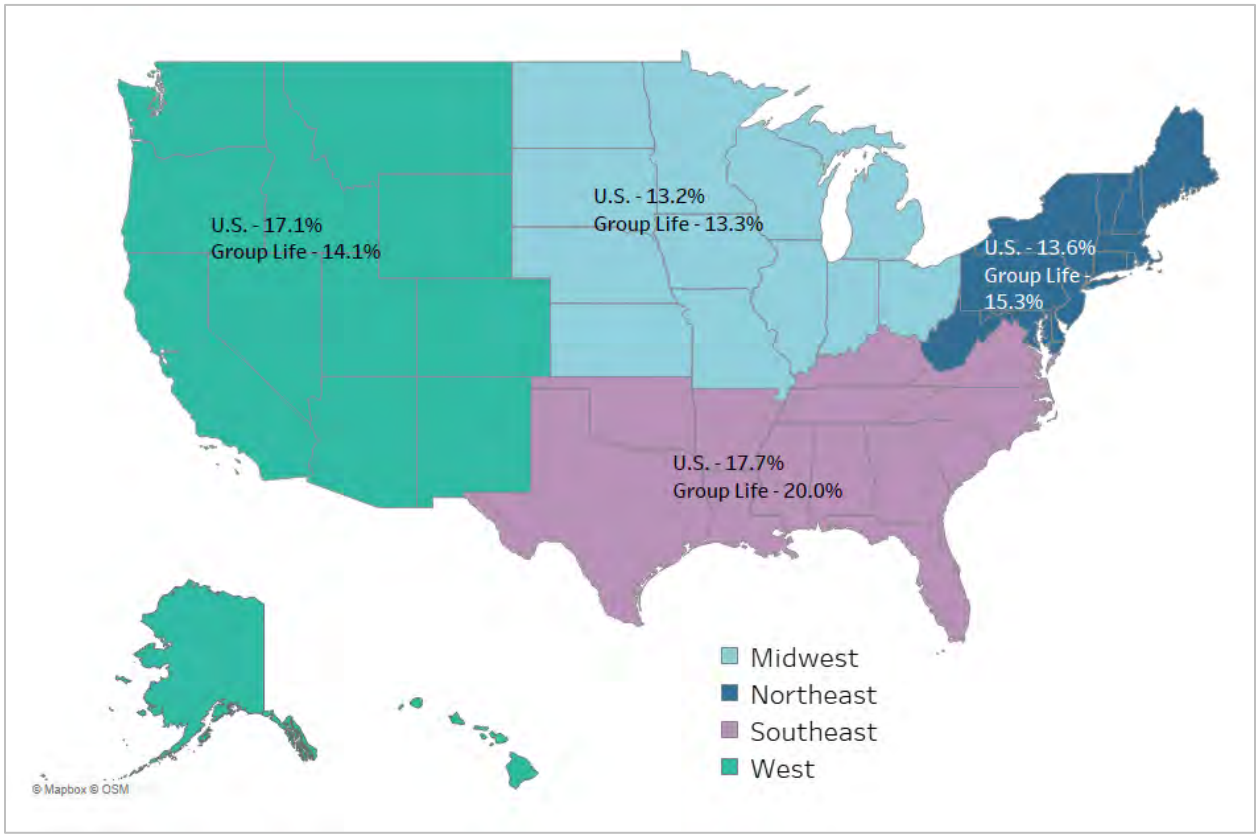
Region	Q2–Q4 2020	Q1–Q2 2021	Q3–Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q2 2020–Q4 2022	% of Total COVID Deaths
Midwest	20.9%	7.0%	18.3%	19.3%	-0.4%	4.3%	8.7%	**13.2%**	21.1%
Northeast	25.0%	10.9%	11.6%	17.6%	-0.1%	3.6%	8.5%	**13.6%**	21.4%
Southeast	20.6%	17.2%	27.9%	22.7%	2.5%	9.7%	8.8%	**17.7%**	38.2%
West	18.7%	17.9%	23.6%	21.0%	3.6%	11.2%	13.1%	**17.1%**	19.3%
Total Excl. Other	**21.2%**	**13.8%**	**21.6%**	**21.0%**	**3.6%**	**11.2%**	**13.1%**	**15.7%**	**99.6%**
Total	**21.1%**	**13.7%**	**21.5%**	**20.5%**	**1.6%**	**7.7%**	**9.6%**	**15.7%**	**100.0%**

Table 9.9
GROUP LIFE COVID-19 SURVEY EXCESS DEATH PERCENTAGE BY QUARTER AND GEOGRAPHIC REGION

Region	Q2-Q4 2020	Q1-Q2 2021	Q3-Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022	Q2 2020–Q4 2022	% of Total COVID Deaths
Midwest	18.0%	6.6%	24.4%	17.1%	-2.7%	2.0%	13.6%	**13.3%**	25.9%
Northeast	23.5%	15.1%	19.9%	18.4%	1.6%	2.0%	5.3%	**15.3%**	17.5%
Southeast	21.2%	21.7%	42.5%	18.7%	-1.2%	6.1%	4.9%	**20.0%**	41.1%
West	19.5%	17.6%	29.2%	13.4%	0.2%	0.5%	-10.4%	**14.1%**	15.0%
Total Excl. Other	**20.5%**	**15.4%**	**30.6%**	**17.4%**	**-0.8%**	**3.2%**	**5.0%**	**16.2%**	**0.4%**
Total	**19.5%**	**14.5%**	**29.2%**	**16.5%**	**-1.4%**	**2.7%**	**5.0%**	**15.3%**	**100.0%**

Figure 9.13 shows excess death percentages by region for both the Group Life data and the U.S. population data.

Figure 9.13
EXCESS DEATH PERCENTAGES BY GEOGRAPHIC REGION, APRIL 2020 THROUGH DECEMBER 2022



For the April 2020 through December 2022 period, the Southeast shows the highest excess mortality for both the Group Life data and the U.S. population. The Midwest experienced the lowest excess mortality for both datasets during the pandemic period, though significant variations by season have been seen. For the Group Life data, the Southeast is the only region with higher-than-average excess mortality. The largest contrast between the Group Life data and the U.S. population data is in the West, where the U.S. population has excess mortality 3.0% (additive) higher than the U.S. population.

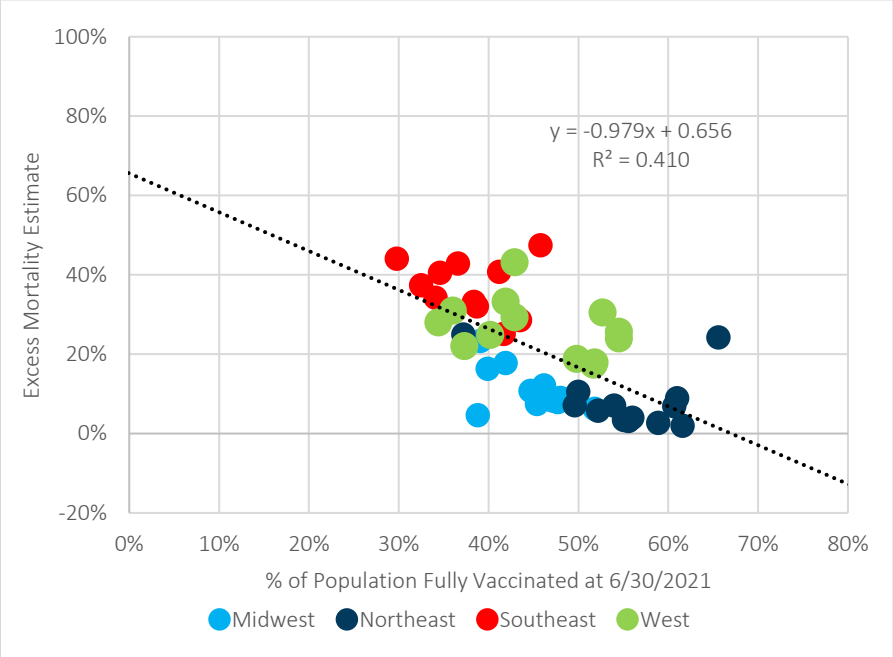
9.4 EXCESS MORTALITY COMPARISON BY VACCINATION UPTAKE

The Committee researched vaccination uptake statistics by state using data furnished by the CDC.[7] Using this information, the Committee analyzed excess mortality percentages by statewide vaccination rates[8] in the Group Life population and the U.S. population (using the CDC method for expected deaths).[9]

The scatterplots in Figures 9.14 through 9.19 show the correlation between the statewide percent of the population with a completed primary vaccine series as of June 30, 2021, and excess mortality in the U.S. population and the Group Life data. Figures 9.14 and 9.15 present true-ups of the third quarter of 2021 plots shown in previous versions of this report. Figures 9.16 and 9.17 present the analysis for the subsequent period of October 2021 through December 2022. Figures 9.18 and 9.19 show the correlation for the entire period of July 2021 through December 2022. The scatterplots in Figures 9.20 and 9.21 show the correlation between the statewide percent of the population with a completed primary vaccine series and an additional dose (booster) as of December 31, 2021, and excess mortality in the U.S. population and the Group Life data for the period of January 2022 through December 2022.

Figure 9.14

U.S. POPULATION EXCESS MORTALITY BY STATEWIDE VACCINATION RATE, JULY THROUGH SEPTEMBER 2021



[7]Centers for Disease Control and Prevention, COVID-19 Vaccinations in the United States, Jurisdiction: https://data.cdc.gov/Vaccinations/COVID-19-Vaccinations-in-the-United-States-Jurisdi/unsk-b7fc. In these CDC data, the percent fully vaccinated means the percent of people who have had the second dose of a two-dose vaccine or one dose of a single-dose vaccine.

[8]Although COVID-19 vaccines were approved only for ages 12 and older as of June 30, 2021, the denominators for the vaccination rates shown in this subsection are total state populations including all ages.

[9]National Center for Health Statistics, Excess Deaths Associated with COVID-19: https://www.cdc.gov/nchs/nvss/vsrr/covid19/excess_deaths.htm. Note that the CDC excess deaths are reported on a weekly basis. In this section of the report, for the population graphs, actual and excess deaths for a particular reporting period are for weeks that ended in that reporting period.

Figure 9.15

GROUP LIFE EXCESS MORTALITY BY STATEWIDE VACCINATION RATE, JULY THROUGH SEPTEMBER 2021

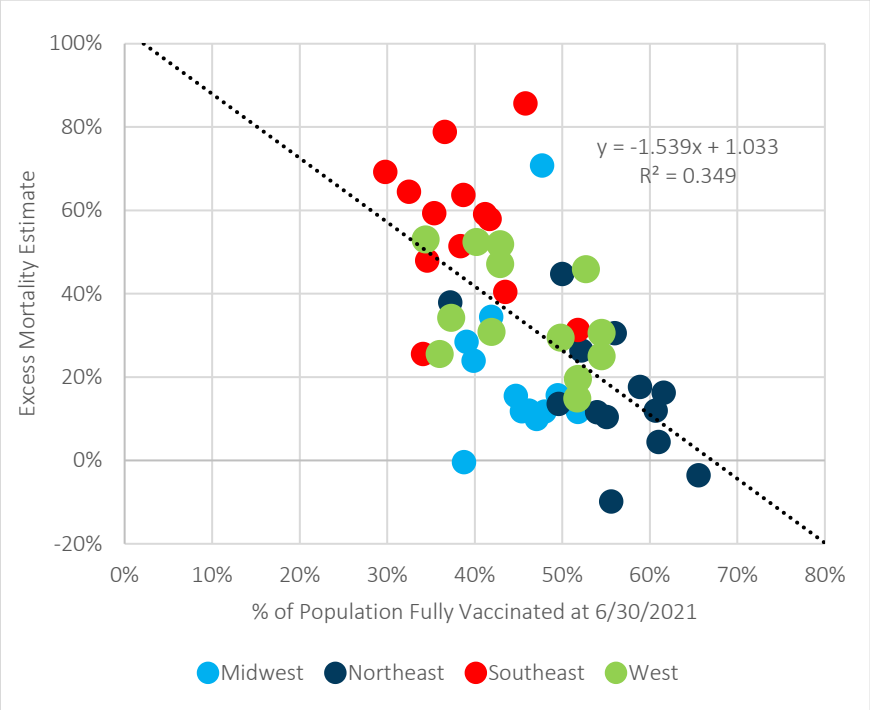


Figure 9.16

U.S. POPULATION EXCESS MORTALITY BY STATEWIDE VACCINATION RATE, OCTOBER 2021 THROUGH DECEMBER 2022

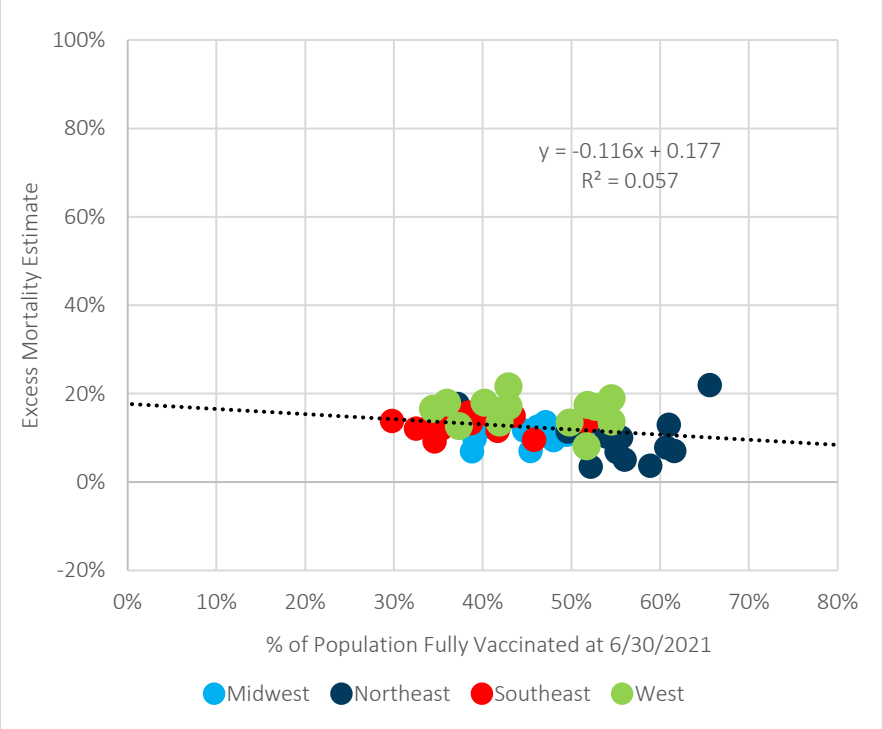


Figure 9.17

GROUP LIFE EXCESS MORTALITY BY STATEWIDE VACCINATION RATE, OCTOBER 2021 THROUGH DECEMBER 2022

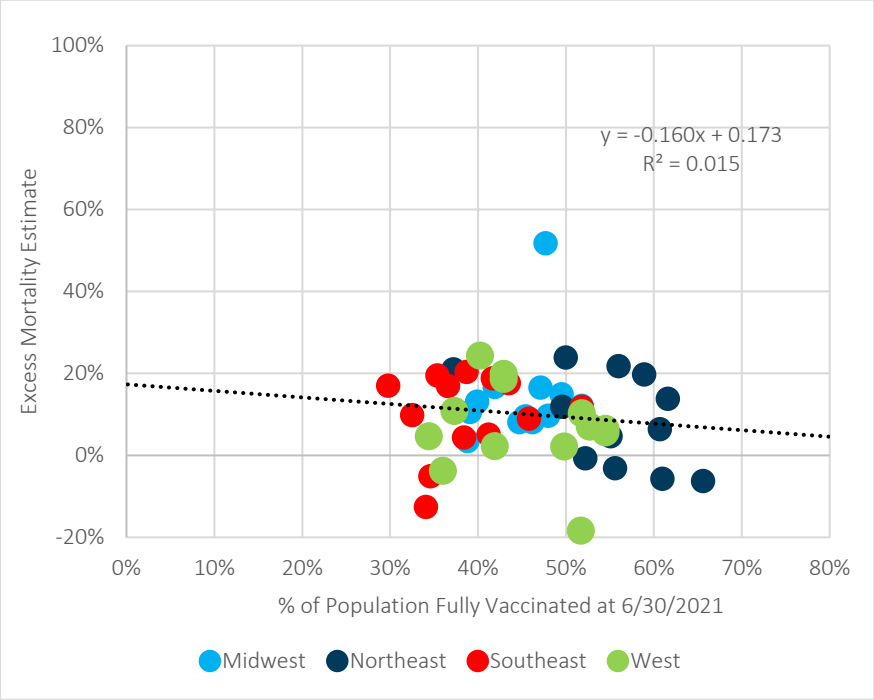


Figure 9.18

U.S. POPULATION EXCESS MORTALITY BY STATEWIDE VACCINATION RATE, JULY 2021 THROUGH DECEMBER 2022

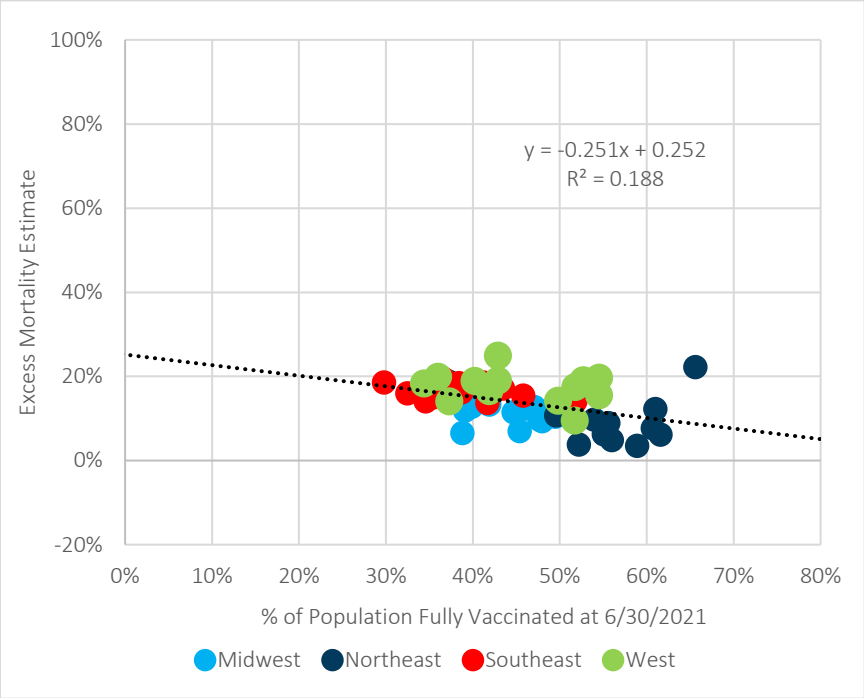


Figure 9.19

GROUP LIFE EXCESS MORTALITY BY STATEWIDE VACCINATION RATE, JULY 2021 THROUGH DECEMBER 2022

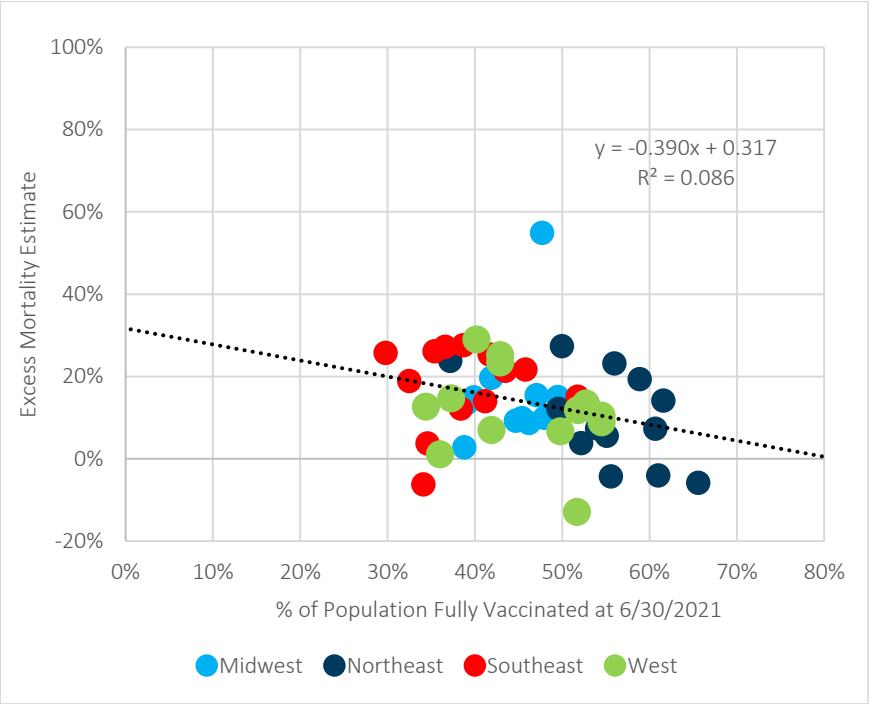


Figure 9.20

U.S. POPULATION EXCESS MORTALITY BY STATEWIDE VACCINATION RATE WITH PRIMARY SERIES AND ADDITIONAL DOSE, JANUARY 2022 THROUGH DECEMBER 2022

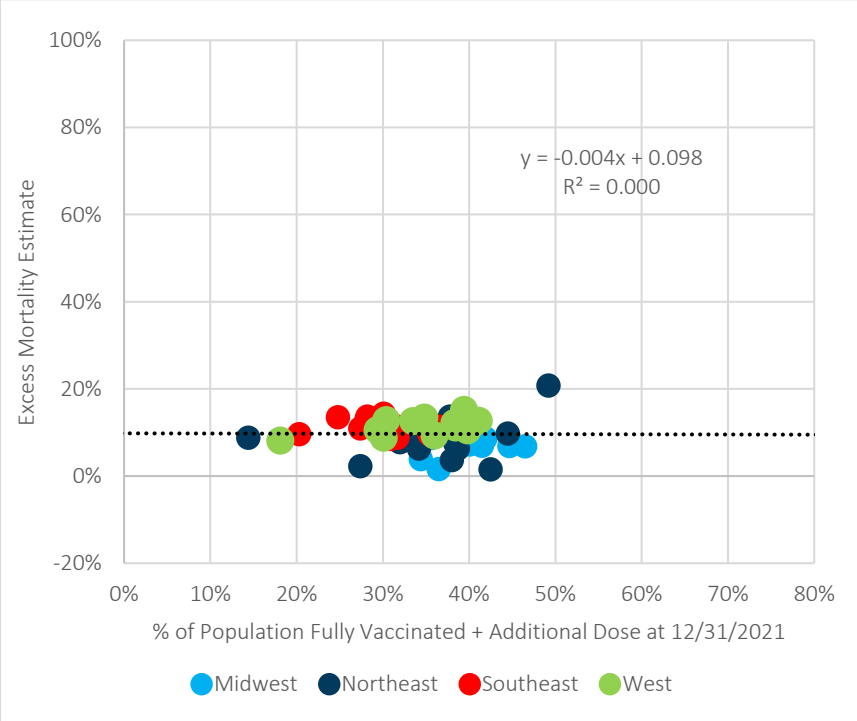
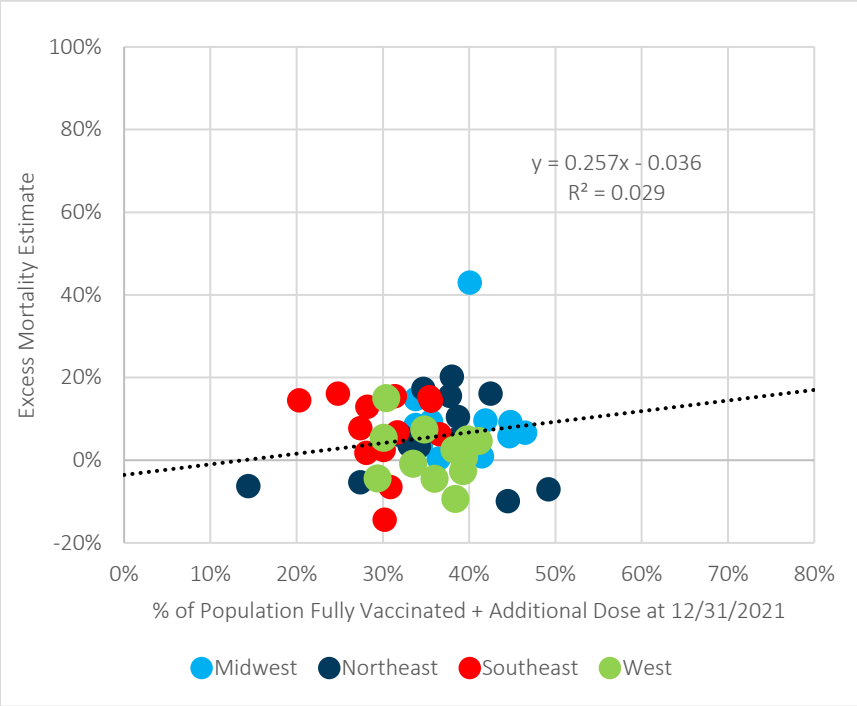


Figure 9.21
GROUP LIFE EXCESS MORTALITY BY STATEWIDE VACCINATION RATE WITH PRIMARY SERIES AND ADDITIONAL DOSE, JANUARY 2022 THROUGH DECEMBER 2022



Comparing state-level excess mortality percentage estimates to estimated COVID-19 vaccinated percentages shows a moderate negative correlation for both the U.S. population and the Group Life data for the third quarter of 2021. For subsequent periods, although some negative correlation was still seen in most periods, it was less pronounced than the third quarter of 2021. Note that Figure 9.21, which looks at the correlation based on the percent of the population with a completed primary vaccine series and an additional dose (booster) as of December 31, 2021, shows a small positive correlation for the Group Life data for the 2022 period, but with a very low R^2 statistic, which indicates that vaccination rate does not explain much of the variation in excess mortality. Other variables in addition to COVID-19 vaccination rates are certainly relevant for explaining the excess mortality trends observed in the United States, and various potential reasons likely can be identified for the lower degree of negative correlation in the later period relative to the earlier period. Contributing factors for this shift might include varying degrees of vaccine effectiveness against different variants of the virus or a higher degree of natural immunity because of past infections in the later periods.

The color-coded geographic regions in Figures 9.14 through 9.21 show some clustering of excess mortality results regardless of vaccination percentage, especially in the U.S. population data. Climate and seasonality are possible contributing factors to this observation because weather patterns in broad geographic regions may contribute to similar behavior patterns and levels of viral transmission for states within the same region, which may lead to different waves of the pandemic affecting different geographic regions at different times. State-level differences may also be seen in preventative measures (e.g., social distancing and masking) that produce different transmission and death rates. Finally, COVID-19 deaths do not explain all of the excess mortality observed in the datasets presented here, and mortality patterns for other CODs may also influence the patterns shown above.

The data collected for the Group Life survey do not include county-level information to allow for a similar analysis at the county level for the Group Life population. However, enough county-level information is available from the CDC for at least a portion of the counties in the U.S. to allow for a similar analysis at the county level for the U.S. population. Roughly 3,143 counties and county equivalents are found in the U.S. After filtering out counties with missing data or gaps in data, roughly 1,950 remaining counties had sufficient data to complete this analysis.

Expected mortality was determined by applying the 2017–2019 county-specific population mortality rate from the CDC[10] to the estimated July 1, 2021, and July 1, 2022, populations for each county from the U.S. Census Bureau.[11] Actual mortality was based on the CDC provisional mortality by county and by month.[12] Actual mortality was adjusted for seasonality and the number of days in each calendar month.[13] The counties were then sorted and separated into 50 bins by vaccination rate with an excess mortality percentage determined for each bin. The analysis was completed only through the end of September 2022 to account for the lag in CDC reporting of deaths at the county level.

The scatterplots in Figures 9.22 and 9.23 show the correlation between the countywide percent of the population with a completed primary vaccine series as of June 30, 2021, and the excess mortality in the U.S. population. Figure 9.22 shows the third quarter of 2021 for comparison to the state-level analysis in Figure 9.14. Figure 9.23 shows the subsequent period of October 2021 through September 2022. The scatterplot in Figure 9.24 shows the correlation between the countywide percent of the population with a completed primary vaccine series and an additional dose (booster) as of December 31, 2021, and excess mortality in the U.S. population for the period of January 2022 through September 2022.

[10]CDC WONDER, https://wonder.cdc.gov.

[11]County Population Totals and Components of Change: 2020–2022, https://www.census.gov/data/tables/time-series/demo/popest/2020s-counties-total.html.

[12]About Provisional Mortality Statistics, 2018 through Last Month, https://wonder.cdc.gov/mcd-icd10-provisional.html.

[13]The seasonality factors were developed using the same logic as outlined in the SOA paper "2020 Excess Deaths in the U.S. General Population by Age and Sex," https://www.soa.org/resources/research-reports/2021/excess-deaths-gen-population/. As a simplifying assumption, the same set of countywide seasonality factors were applied to all counties rather than developing a separate set of seasonality factors for each county based on the demographic mix within each county.

Figure 9.22

U.S. COUNTY-SPECIFIC POPULATION EXCESS MORTALITY BY VACCINATION RATE, JULY THROUGH SEPTEMBER 2021

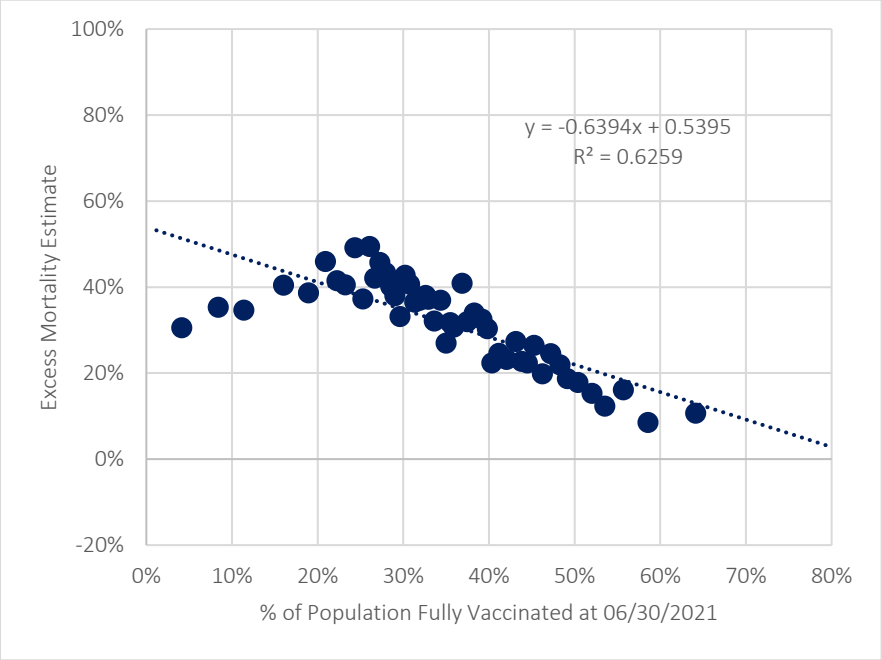


Figure 9.23

U.S. COUNTY-SPECIFIC POPULATION EXCESS MORTALITY BY VACCINATION RATE, OCTOBER 2021 THROUGH SEPTEMBER 2022

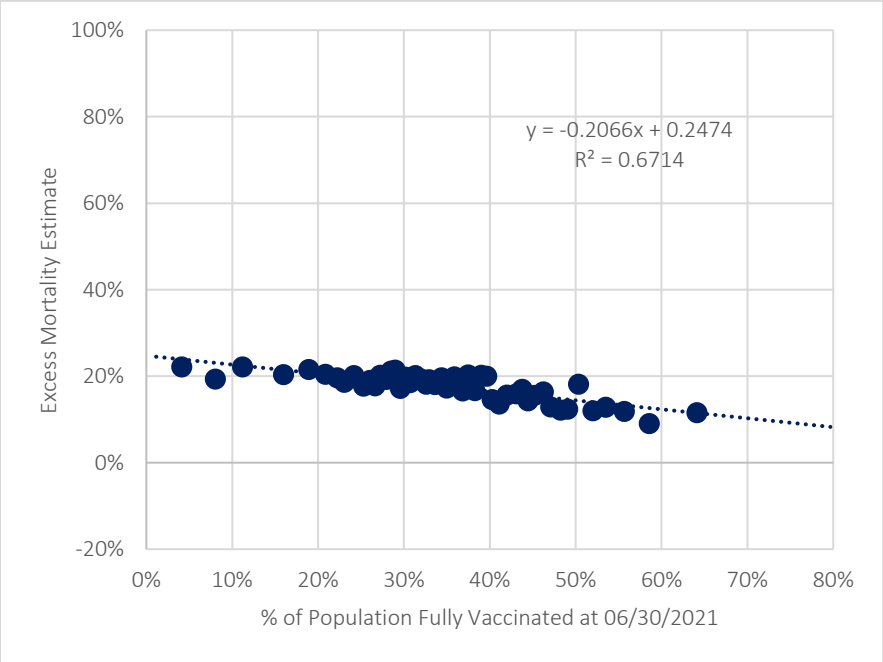
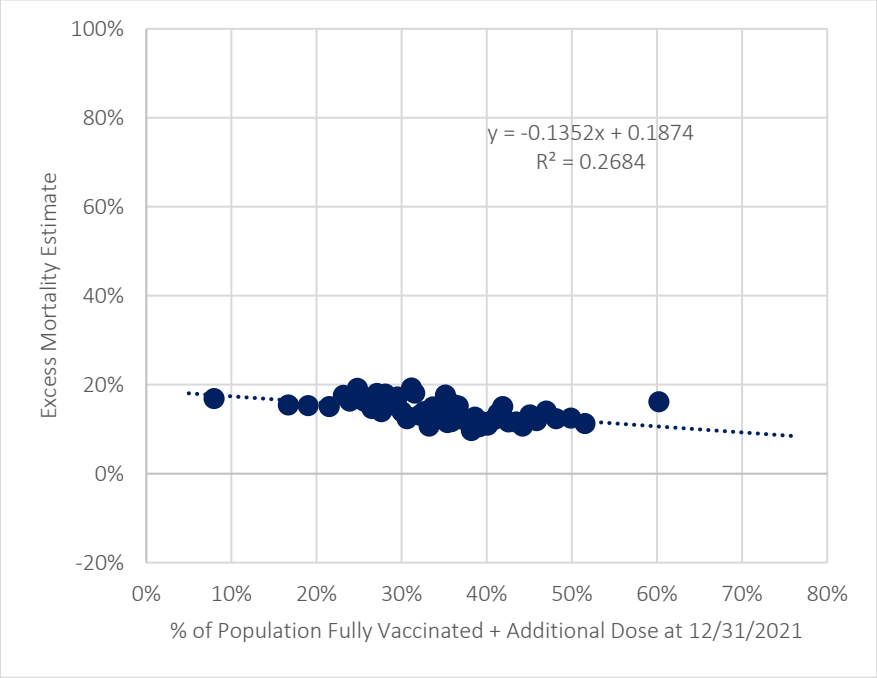


Figure 9.24

U.S. COUNTY-SPECIFIC POPULATION EXCESS MORTALITY BY VACCINATION RATE WITH PRIMARY SERIES AND ADDITIONAL DOSE, JANUARY 2022 THROUGH SEPTEMBER 2022



Similar to the state-level analysis for the U.S. population, the county-level analysis shows negative correlation between the excess mortality percentage estimates and the percentages of the population that are fully vaccinated. As was the case with the state-level analysis, the third quarter of 2021 shows a steeper slope than the subsequent periods. In comparing the county-level and state-level graphs, the R^2 statistics suggest a stronger fit at the county level relative to the state level. However, the steeper slopes on the state-level graphs relative to the county-level graphs suggest a larger change in excess mortality per percentage change in vaccination rate at the state level.

Given the range of potential contributing factors for the shifting level of correlation between the vaccination rate and excess mortality, and for the clustering of results by geographic region, the Committee urges caution in drawing definitive conclusions regarding the degree of causation between the vaccination rate and excess mortality or the geographic clustering. Note that given the significant decline in correlation between mortality and state-level and county-level vaccination rates as time has passed from the initial uptake of the COVID-19 vaccines, the Committee will likely omit this subsection from future reports unless a significant statistical relationship reemerges.

Section 10: Reliance and Limitations

In producing this report, the Committee relied upon data furnished by contributing companies and data published by the CDC. The Committee would like to stress that the data presented in this survey are emerging. Contributing companies may true up these data over time. The Committee also notes that carriers submitted data in different formats; it is possible that the homogenization of data submissions could introduce some unintended distortion in the survey results. The reader should review the limitations noted throughout the report.

Section 11: List of Participating Companies

The Committee would like to thank the following companies that submitted data and made this COVID-19 mortality survey possible:

Aflac
Dearborn National
Elevance
Guardian
The Hartford
Lincoln Financial Group
MetLife
Mutual of Omaha
New York Life Group Benefit Solutions
OneAmerica
Principal Financial
Reliance Standard
Renaissance
Securian Financial Group
Standard Insurance Group
SunLife Financial Group
Symetra
Unum
USAble
Voya

Appendix A: 2020 SOA Group Term Life COVID-19 Mortality Survey Data Request

Purpose

This is the data request for a Group Term Life Claim study intended to allow a quick assessment of the impact of the COVID-19 pandemic on the Group Life industry—primarily by measuring the extra mortality occurring during the pandemic as compared to prior periods. This high-level study will become a valuable data source for Group Life insurers, since the industry wide COVID-19 claims will be significantly more credible than the claims experience for any one carrier.

Timing

We are requesting the initial data submission be provided by **Friday, June 19th**. We acknowledge that this is a tight turnaround, but due to the rapidly changing environment, time is of the essence. Please let us know ASAP if you have a problem with this date or any element of this request. We plan to act quickly on the data—releasing an initial summary report to participating carriers the week of July 6th.

The initial data request is for data from January 2017 through May 2020. We also plan to update the study monthly throughout the duration of the pandemic. Please consider this when you build your queries for the initial request, so that the monthly updates are easier to produce. We request that updates be submitted by the 3rd Friday of each month. Contributors will receive a detailed summary report of their submitted data with some analysis of all the contributed data after each monthly submission. The SOA will also be releasing summary reports of the aggregated results periodically throughout the duration of the study.

General Comments

Our goal is to measure patterns and trends rather than actual mortality rates. For the data request, this means we are more interested in how things change by month than whether they are 100% accurate or even consistent with other carrier submissions. We understand this data assembly will take some effort, and want to minimize unnecessary data manipulation. To this end, please develop your submission as best you can to align with our request, but more importantly, please ensure it is consistent over subsequent monthly updates.

Claim Data Request

Broadly, we are requesting summarized death claim information for your group life business with limited segmentation. The limited segmentation will support further analysis/validation of observed trends. We hope all carriers will be able to provide the Baseline data below. Please also provide the Segmentation if feasible, but we can include your submission in the study even if these components are not readily available.

1. Baseline—The essential data requested is claim counts by incurred month, reported month, product segment, and limited cause of death. Ideally, claim amounts can also be provided.
    - Product Segment = Basic Life, Supp/Optional/Voluntary Life, and Retiree Life
    - Cause of Death = COVID, Accident, and All Other

2. Segmentation—We are also requesting claim counts and amounts for three separate segments—industry, state, and age/sex. Data for each requested segment would be further split into the product and cause of death categories referenced above.
    - Industry = 2-digit SIC code is ideal
    - State = Based on residence, or work location if residence not available
    - Age/Sex = M/F/U, and 10-year age bands

Claim Data Specifics

Again, as we will be looking at trends and patterns rather than actual mortality, it is most important that your submission be consistent month to month. Nevertheless, the ideal submission should consider the following specific criteria:

- Include only group term life business. Exclude any GUL/GVUL, COLI/BOLI, 10/20-year group term, etc.
- Include both self-administered and list-billed business
- Include employee, spouse, and child claims
- Include or exclude portability and conversion claims—whichever is easier—based on your company reporting.
- Include deaths from persons on waiver of premium; exclude active waivers
- Include only death claims; exclude counts or amounts for various riders, especially living benefit riders or critical illness riders
- Include only the life insurance amount for accidental deaths
- Exclude any interest payments or expenses

Exposure Data Request

As stated, this is not a mortality rate study, and we do not intend to calculate mortality rates. The purpose of exposure data is to help explain and validate any observed trends. As with claims, we are requesting both high-level exposure data, as well as exposure data by segment. However, the most critical information is exposures by month.

1. Baseline—The essential data requested is earned premium by report month and product segment. Optional data would include exposed lives by month.
    - Product Segment = Basic Life, Supp/Optional/Voluntary Life, and Retiree Life

2. Segmentation—We are also requesting exposure data for the segments—industry, state, and age/sex. Data for each requested segment would be further split by product.
    - Industry = 2-digit SIC code is ideal
    - State = Based on residence, or work location if residence not available
    - Age/Sex = M/F/U, and 10-year age bands

Exposure Data Specifics

We recognize that it can be difficult to provide exposed lives data, which is why we have selected earned premium as the primary exposure metric. Exposed lives is certainly a valuable addition, if it is available. As with claims, we stress the importance of consistency month to month, and reiterate that we are interested in the information you can provide with relative ease. Some specific (ideal) considerations include:

- Include only group term life business. Exclude any GUL/GVUL, COLI/BOLI, 10/20-year group term, etc.
- Include or exclude premium for accident riders depending on how they are handled in your system; just be consistent and identify what is included.
- Include both self-administered and list-billed business.
- For exposed lives, we recognize that some data (list billed groups, for example) may be more current and accurate than other data. Please provide your best representation of exposed lives, and identify any particular limitations or special considerations in your submission.

Final Notes on Requested Data

We intend to turn around results rapidly to maximize value on internal decision-making for participating carriers. With that in mind, we have tried to keep the request as simple as possible. We have tried to define exactly what we are requesting, but if your own tracking does not align and the customization is difficult, then please provide what you normally track rather than trying to match our definitions. The period-over-period change will be most valuable,

so consistency is more important than precise definitions. We understand there can be nuances in how carriers count claims and track exposures, but we think the recently observed changes will be valuable. If you have any questions at all about what we are asking, please reach out.

PLEASE NOTE: YOUR DATA SUBMISSIONS SHOULD NOT CONTAIN ANY INDIVIDUAL POLICY LEVEL INFORMATION. PLEASE SEND ONLY THE AGGREGATED SUMMARY INFORMATION REQUESTED.

SOA staff will be receiving and compiling your submissions and the SOA is not able to receive any personal information on your policyholders.

Reports

Our minimal request is for the monthly results without industry, geographic, or demographic segmentation. Please provide the additional segment data as you are able, and we will return cross-industry information consistent with your submission. We do not plan to provide individual carrier-level experience.

We plan to show cross-industry extra mortality by calendar month. We will compare the most recent months to the prior periods, including prior months, and the same month a year ago.

We will not show individual carrier experience, but may comment on the consistencies of changes across carriers.

Technical Notes

The accompanying Excel workbook contains specific templates for the data submission. You can use the Excel templates or submit data in a format of your choosing. The workbook includes an "Outline" tab to guide your submission.

Please return the submission via e-mail to Korrel Crawford at kcrawford@soa.org. If you have concerns about file security, please contact her and she will provide you with an alternate means of submitting data in a more secure fashion.

Appendix B: Geography and Industry Code Mappings

Table B.1

GEOGRAPHY CODE MAPPINGS

Abbreviation	State/Province Name	Division	Region
AA	U.S. Armed Forces–Americas	Division 11: Unknown	Other
AB	Alberta	Division 10: Canada	Other
AE	U.S. Armed Forces–Europe	Division 11: Unknown	Other
AK	Alaska	Division 09: Pacific	West
AL	Alabama	Division 06: East South Central	Southeast
AP	U.S. Armed Forces–Pacific	Division 11: Unknown	Other
AR	Arkansas	Division 07: West South Central	Southeast
AS	American Samoa	Division 09: Pacific	Other
AZ	Arizona	Division 08: Mountain	West
BC	British Columbia	Division 10: Canada	Other
CA	California	Division 09: Pacific	West
CO	Colorado	Division 08: Mountain	West
CT	Connecticut	Division 01A: Southern New England	Northeast
DC	District of Columbia	Division 02: Middle Atlantic	Northeast
DE	Delaware	Division 02: Middle Atlantic	Northeast
FL	Florida	Division 05: South Atlantic	Southeast
FM	Micronesia	Division 09: Pacific	Other
GA	Georgia	Division 05: South Atlantic	Southeast
GU	Guam	Division 09: Pacific	Other
HI	Hawaii	Division 09: Pacific	West
IA	Iowa	Division 04: North Central	Midwest
ID	Idaho	Division 08: Mountain	West
IL	Illinois	Division 03: Great Lakes	Midwest
IN	Indiana	Division 03: Great Lakes	Midwest
KS	Kansas	Division 04: North Central	Midwest
KY	Kentucky	Division 06: East South Central	Southeast
LA	Louisiana	Division 07: West South Central	Southeast
MA	Massachusetts	Division 01A: Southern New England	Northeast
MB	Manitoba	Division 10: Canada	Other
MD	Maryland	Division 02: Middle Atlantic	Northeast
ME	Maine	Division 01B: Northern New England	Northeast
MH	Marshall Islands	Division 09: Pacific	Other
MI	Michigan	Division 03: Great Lakes	Midwest
MN	Minnesota	Division 04: North Central	Midwest
MO	Missouri	Division 04: North Central	Midwest
MP	Northern Mariana Islands	Division 09: Pacific	Other
MS	Mississippi	Division 06: East South Central	Southeast
MT	Montana	Division 08: Mountain	West

Abbreviation	State/Province Name	Division	Region
NB	New Brunswick	Division 10: Canada	Other
NC	North Carolina	Division 05: South Atlantic	Southeast
ND	North Dakota	Division 04: North Central	Midwest
NE	Nebraska	Division 04: North Central	Midwest
NH	New Hampshire	Division 01B: Northern New England	Northeast
NJ	New Jersey	Division 02: Middle Atlantic	Northeast
NL	Newfoundland and Labrador	Division 10: Canada	Other
NM	New Mexico	Division 08: Mountain	West
NS	Nova Scotia	Division 10: Canada	Other
NU	Nunavut	Division 10: Canada	Other
NV	Nevada	Division 08: Mountain	West
NW	Northwest Territories	Division 10: Canada	Other
NY	New York	Division 02: Middle Atlantic	Northeast
OH	Ohio	Division 03: Great Lakes	Midwest
OK	Oklahoma	Division 07: West South Central	Southeast
ON	Ontario	Division 10: Canada	Other
OR	Oregon	Division 09: Pacific	West
Other	Other	Division 11: Unknown	Other
PA	Pennsylvania	Division 02: Middle Atlantic	Northeast
PE	Prince Edward Island	Division 10: Canada	Other
PR	Puerto Rico	Division 05: South Atlantic	Other
PW	Palau	Division 09: Pacific	Other
QC	Quebec	Division 10: Canada	Other
RI	Rhode Island	Division 01A: Southern New England	Northeast
SC	South Carolina	Division 05: South Atlantic	Southeast
SD	South Dakota	Division 04: North Central	Midwest
SK	Saskatchewan	Division 10: Canada	Other
TN	Tennessee	Division 06: East South Central	Southeast
TX	Texas	Division 07: West South Central	Southeast
UN	Unknown	Division 11: Unknown	Other
Unknown	Unknown	Division 11: Unknown	Other
UT	Utah	Division 08: Mountain	West
VA	Virginia	Division 05: South Atlantic	Southeast
VI	U.S. Virgin Islands	Division 05: South Atlantic	Other
VT	Vermont	Division 01B: Northern New England	Northeast
WA	Washington	Division 09: Pacific	West
WI	Wisconsin	Division 03: Great Lakes	Midwest
WV	West Virginia	Division 02: Middle Atlantic	Northeast
WY	Wyoming	Division 08: Mountain	West
YK	Yukon	Division 10: Canada	Other

Table B.2
INDUSTRY CODE MAPPINGS

Two-Digit Standard Industrial Code	Industry Group	Collar Color
00	Unknown/Invalid	Unknown
01	Agricultural; Forestry; Fishing	Blue
02	Agricultural; Forestry; Fishing	Blue
03	Agricultural; Forestry; Fishing	Blue
04	Agricultural; Forestry; Fishing	Blue
05	Agricultural; Forestry; Fishing	Blue
07	Agricultural; Forestry; Fishing	Blue
08	Agricultural; Forestry; Fishing	Blue
09	Agricultural; Forestry; Fishing	Blue
10	Mining	Blue
11	Mining	Blue
12	Mining	Blue
13	Mining	Blue
14	Mining	Blue
15	Construction	Blue
16	Construction	Blue
17	Construction	Blue
18	Construction	Blue
19	Construction	Blue
20	Manufacturing—Food	Blue
21	Manufacturing—Food	Blue
22	Manufacturing—Clothes; Textile; Wood	Blue
23	Manufacturing—Clothes; Textile; Wood	Blue
24	Manufacturing—Clothes; Textile; Wood	Blue
25	Manufacturing—Clothes; Textile; Wood	Blue
26	Manufacturing—Clothes; Textile; Wood	Blue
27	Manufacturing—Paper; Drugs	Gray
28	Manufacturing—Paper; Drugs	Gray
29	Manufacturing—Paper; Drugs	Gray
30	Manufacturing—Paper; Drugs	Gray
31	Manufacturing—Paper; Drugs	Gray
32	Manufacturing—Paper; Drugs	Gray
33	Manufacturing—Heavy; Steel	Blue
34	Manufacturing—Heavy; Steel	Blue
35	Manufacturing—Heavy; Steel	Blue
36	Manufacturing—Heavy; Steel	Blue
37	Manufacturing—Auto, Airplanes, Precision Equipment	Blue
38	Manufacturing—Auto, Airplanes, Precision Equipment	Blue
39	Manufacturing—Auto, Airplanes, Precision Equipment	Blue

Two-Digit Standard Industrial Code	Industry Group	Collar Color
40	Transport; Communication; Utilities	Blue
41	Transport; Communication; Utilities	Blue
42	Transport; Communication; Utilities	Blue
43	Transport; Communication; Utilities	Blue
44	Transport; Communication; Utilities	Blue
45	Transport; Communication; Utilities	Blue
46	Transport; Communication; Utilities	Blue
47	Transport; Communication; Utilities	Blue
48	Transport; Communication; Utilities	Blue
49	Transport; Communication; Utilities	Blue
50	Wholesale Trade	Gray
51	Wholesale Trade	Gray
52	Retail—Trade	Gray
53	Retail—Trade	Gray
54	Retail—Trade	Gray
55	Retail—Trade	Gray
56	Retail—Trade	Gray
57	Retail—Trade	Gray
58	Retail—Trade	Gray
59	Retail—Trade	Gray
60	Banks and Securities	White
61	Banks and Securities	White
62	Banks and Securities	White
63	Insurance; Other Finance	White
64	Insurance; Other Finance	White
65	Insurance; Other Finance	White
66	Insurance; Other Finance	White
67	Insurance; Other Finance	White
68	Insurance; Other Finance	White
69	Insurance; Other Finance	White
70	Hotels/Personal Services	Grey
71	Hotels/Personal Services	Grey
72	Hotels/Personal Services	Grey
73	Misc. Service/Data Processing	Grey
74	Misc. Service/Data Processing	Gray
75	Misc. Service/Data Processing	Gray
76	Misc. Service/Data Processing	Gray
78	Misc. Service/Data Processing	Gray
79	Misc. Service/Data Processing	Gray
80	Doctors' Offices	White
81	Legal Services	White

Two-Digit Standard Industrial Code	Industry Group	Collar Color
82	Educational Services	White
83	Social Services	White
84	Museums and Membership Organizations	White
85	Museums and Membership Organizations	White
86	Museums and Membership Organizations	White
87	Engineering, Architecture, Business Consulting	White
88	Engineering, Architecture, Business Consulting	White
89	Engineering, Architecture, Business Consulting	White
90	Public Administration	White
91	Public Administration	White
92	Public Administration	White
93	Public Administration	White
94	Public Administration	White
95	Public Administration	White
96	Public Administration	White
97	Public Administration	White
99	Unknown/Invalid	Unknown
Unknown	Unknown/Invalid	Unknown

Appendix C: Survey Methodology and Documentation

C.1 DOCUMENTATION

Participating companies provided both claims and exposure data on a monthly basis. The initial data request can be found in Appendix A. For claims information, the following fields were requested:

- Incurred Month
- Reported Month
- Product Type
- Cause of Death
- Number of Claims
- Total Claim Amount Covered/Paid

For exposure information, the following fields were requested:

- Exposure Month
- Product Type
- Exposed Premium
- Number of Inforce Lives

In addition to the above "core" request, participants were also optionally asked to provide the above information split by state, age/sex grouping and industry (two-digit SIC code). The lone exception is that Reported Month was not requested for the claims portion of these three more granular cuts of the data.

Below is a summary of the key processing assumptions and decisions for each of these fields.

Claims–Incurred Month

Incurred Months were generally used as provided without adjustment. The primary exception was that data with an Incurred Month after the as-of-date were excluded. For example, for the December 2022 data submissions, claims with an Incurred Month of January 2023 were excluded.

Claims–Reported Month

Claims with a Reported Month before the Incurred Month were adjusted by setting the Reported Month equal to the Incurred Month.

Claims–Product Type

Carriers were asked to provide data with one of three Product Types: Employee Basic, Employee Supplemental/Voluntary and Retiree Life. All alternative codes received for the Product Type field were sent as data questions to carriers and ultimately mapped to one of these three principal product types. Notably, dependent claims were mapped to one of the two employee types, depending on the code received.

Claims–Cause of Death

Contributors were asked to identify claims as due to one of the 15 cause of death groupings shown in Appendix E.

Claims–Number of Claims and Total Claim Amount Covered/Paid

Claims by Reported Date were processed as is without adjustment. However, on an incurred basis, the claims needed to be adjusted with completion factors as described in Section C.2.1; otherwise, the incidence rates in recent periods would be understated.

Exposure–Exposure Month and Product Type

Processing for these fields was analogous to the corresponding claims fields.

Exposure–Exposed Premium

The proximity of the survey request to the reporting dates of the data requested presented some challenges in the monthly collection process because recent exposure data may be unavailable. For example, one carrier indicated that their premium information for December 2022 was incomplete; therefore, the average premiums for July through September 2022 were imputed for December 2022 for this carrier.

Exposure–Number of Inforce Lives

Not all carriers provided the Number of Inforce Lives. For these carriers, this field was imputed using the average premium per life (PPL) from carriers that supplied both premiums and lives. A separate PPL was calculated for each year and product type, and the missing Number of Inforce Lives was populated by dividing the provided premium by the PPL appropriate to the year and product type for which the premium was earned. The Committee acknowledges that PPL varies by company and that the exposure completion methodology may result in an aggregate incidence rate that differs materially from the actual level of incidence, but the Committee does not expect that it distorted the trends monitored in this study.

Segment Information–State Code

State codes that did not match a listing of valid U.S. state, U.S. overseas territory or Canadian province codes were sent as data questions to the contributors. Some records with indeterminate codes after this questioning process were mapped to an “unknown” category.

Segment Information–Age and Sex

Companies provided age information according to the following categories: 0–24, 25–34, 35–44, 45–54, 55–64, 65–74, 75–84 and 85+. These age groupings were then lumped into the following broader groupings: 0–44, 45–64 and 65+. Sex information was collected as male, female and unknown.

Segment Information–Industry

For the Industry field, contributors were asked to provide two-digit SIC codes. Codes that did not match a list of valid two-digit SIC codes were sent as data questions to the contributor for resolution. Some records with indeterminate codes after this questioning process were mapped to an “Unknown” category.

C.2 RESULTS PROCESSING AND REVIEW

C.2.1 COMPLETION OF CLAIMS

A table of claim counts by Incurred Month and Reported Month was compiled to develop completion factors. Month-to-month completion factors were estimated using the accumulated totals for a particular incurred month in consecutive reported months. Some seasonal variation was observed in the completion factors, so adjustments to the factors for calendar month were incorporated.

The total completion factors were computed by cumulatively applying the month-to-month completion factors to all subsequent months. For example, the total completion factor for a claim in month 0 is the factor for month 0 to 1, times the factor for month 1 to 2, times the factor for month 2 to 3, and so forth. In total, 36 months of completion were used.

Completion factors vary by calendar month, reflecting the seasonal nature of claim reporting and claim processing speeds. The Committee also incorporated factor variation by reporting speed groups. The rate at which the contributing companies' claims were completed was analyzed and categorized into five groups, with three to five companies in each reporting speed group.

C.2.2 BROADER CLASSIFICATION OF SEGMENT INFORMATION

For credibility and confidentiality reasons, the industry codes and state codes were grouped into broader segments for analysis. State codes were mapped to one of 11 divisions, with the New England division split into northern and southern portions. The state codes were also mapped to four broader U.S. regions (Northeast, Midwest, Southeast, West), with Canada, overseas territories and unknown codes grouped into a fifth "Other" region.

The two-digit SIC codes were organized into 23 different groupings, and then more broadly into one of four codes by collar color (White, Gray, Blue, Unknown).

A table showing the details of these mappings can be found in Appendix B.

C.2.3 UNKNOWN CLAIM DIAGNOSIS

The Unknown claim diagnosis category is artificially large for September 2022 through December 2022. This is primarily because of the newness of these claims and a reflection of the claim adjudication lifecycle. It is not uncommon to find an additional time lag between the claim reporting date and the point in the claim adjudication process when the COD is known, allowing for the claim to be categorized. As claims data have been collected and refreshed each month, the Committee has observed that the concentration of claims with an unknown COD decreases as the number of months between the original reporting date and the data collection date increases.

C.2.4 COVID-19 CLAIMS FROM 2019 OR EARLIER

The data show a handful of COVID-19 claims with dates of death in 2019 or earlier. The Committee believes that these are coding errors where incorrect COD codes were supplied. These claims remain in the data as submitted without adjustment.

C.2.5 GROUPINGS BY COMPANY SIZE

To review results by company size (see Section 5.4), contributors were split into three groups based on annualized premium amounts from 2019. The Small group consists of companies with less than $300 million in 2019 premiums, the Medium group consists of companies with between $300 million and $1 billion, and the Large group consists of

companies with more than $1 billion. The breakpoints were chosen to ensure at least six companies in each group. The Small group contains six companies, and the Medium and Large groups contain seven companies each.

Appendix D: Completion Factor Development

D.1 BY CLAIM COUNT

Historic Group Life claim reporting patterns by claim count have been studied to develop completion factors, which were then used to translate reported claims through August 2020 by incurral month into estimated ultimate incurred claims for each month. The completion factors for this report are based on the total set of claims by all causes from all 20 participating carriers, with incurred dates of January 2017 or later and reported dates up through September 2020. Since that time, completion factors have been reviewed periodically, and no changes were made to them.

Claims were batched into a claim triangle with incurred month on the horizontal axis and reported month on the vertical axis. Lag is defined as the number of months between when a death occurs and when the claim is reported to a carrier. Thus, a death that was both incurred and reported in August 2020 would have a lag of zero, whereas a death incurred in June 2020 but reported in August 2020 would have a lag of two, and so on. A subset of the claim triangle is displayed in Table D.1.

Table D.1
2020 INCURRED CLAIMS BY INCURRED MONTH AND REPORTING LAG

Months of Reporting Lag	Incurred Month							
	Jan. 2020	Feb. 2020	Mar. 2020	Apr. 2020	May 2020	June 2020	July 2020	Aug. 2020
0	11,887	10,137	10,932	13,971	11,276	10,786	13,014	12,826
1	14,647	14,412	15,443	16,559	16,158	14,850	15,686	
2	5,822	4,961	5,713	6,916	6,109	5,517		
3	2,159	1,867	2,656	2,785	2,249			
4	1,350	1,242	1,283	1,386				
5	910	623	732					
6	559	374						
7	438							

Month-to-month completion factors were developed using the accumulated totals for a particular incurred month in consecutive reported months. Seasonal variations were observed during the first two months of lag, so adjustments to the factors for calendar month were incorporated. The total completion factors, as displayed in Table D.2, were computed by cumulatively applying the month-to-month completion factors to all subsequent months. The data presented in both Tables D.1 and D.2 have not been changed since the July 2021 publication of this report.

Table D.2

ESTIMATED COMPLETION FACTORS BY NUMBER OF MONTHS OF LAG AND CALENDAR MONTH

Lag	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
0	3.5594	3.7656	3.4405	3.4405	3.4405	3.4405	3.3387	3.1129	3.3387	3.2384	3.5594	4.0150
1	1.4808	1.4313	1.4313	1.4313	1.4313	1.4313	1.3890	1.4313	1.3890	1.4313	1.4808	1.4313
2	1.1752	1.1752	1.1752	1.1752	1.1752	1.1752	1.1752	1.1752	1.1752	1.1752	1.1752	1.1752
3	1.1015	1.1015	1.1015	1.1015	1.1015	1.1015	1.1015	1.1015	1.1015	1.1015	1.1015	1.1015
4	1.0697	1.0697	1.0697	1.0697	1.0697	1.0697	1.0697	1.0697	1.0697	1.0697	1.0697	1.0697
5	1.0530	1.0530	1.0530	1.0530	1.0530	1.0530	1.0530	1.0530	1.0530	1.0530	1.0530	1.0530
6	1.0430	1.0430	1.0430	1.0430	1.0430	1.0430	1.0430	1.0430	1.0430	1.0430	1.0430	1.0430
7	1.0363	1.0363	1.0363	1.0363	1.0363	1.0363	1.0363	1.0363	1.0363	1.0363	1.0363	1.0363
8	1.0314	1.0314	1.0314	1.0314	1.0314	1.0314	1.0314	1.0314	1.0314	1.0314	1.0314	1.0314
9	1.0277	1.0277	1.0277	1.0277	1.0277	1.0277	1.0277	1.0277	1.0277	1.0277	1.0277	1.0277
10	1.0248	1.0248	1.0248	1.0248	1.0248	1.0248	1.0248	1.0248	1.0248	1.0248	1.0248	1.0248
11	1.0221	1.0221	1.0221	1.0221	1.0221	1.0221	1.0221	1.0221	1.0221	1.0221	1.0221	1.0221
12	1.0197	1.0197	1.0197	1.0197	1.0197	1.0197	1.0197	1.0197	1.0197	1.0197	1.0197	1.0197
13	1.0177	1.0177	1.0177	1.0177	1.0177	1.0177	1.0177	1.0177	1.0177	1.0177	1.0177	1.0177
14	1.0162	1.0162	1.0162	1.0162	1.0162	1.0162	1.0162	1.0162	1.0162	1.0162	1.0162	1.0162
15	1.0148	1.0148	1.0148	1.0148	1.0148	1.0148	1.0148	1.0148	1.0148	1.0148	1.0148	1.0148
16	1.0136	1.0136	1.0136	1.0136	1.0136	1.0136	1.0136	1.0136	1.0136	1.0136	1.0136	1.0136
17	1.0126	1.0126	1.0126	1.0126	1.0126	1.0126	1.0126	1.0126	1.0126	1.0126	1.0126	1.0126
18	1.0116	1.0116	1.0116	1.0116	1.0116	1.0116	1.0116	1.0116	1.0116	1.0116	1.0116	1.0116
19	1.0107	1.0107	1.0107	1.0107	1.0107	1.0107	1.0107	1.0107	1.0107	1.0107	1.0107	1.0107
20	1.0098	1.0098	1.0098	1.0098	1.0098	1.0098	1.0098	1.0098	1.0098	1.0098	1.0098	1.0098
21	1.0090	1.0090	1.0090	1.0090	1.0090	1.0090	1.0090	1.0090	1.0090	1.0090	1.0090	1.0090
22	1.0083	1.0083	1.0083	1.0083	1.0083	1.0083	1.0083	1.0083	1.0083	1.0083	1.0083	1.0083
23	1.0076	1.0076	1.0076	1.0076	1.0076	1.0076	1.0076	1.0076	1.0076	1.0076	1.0076	1.0076
24	1.0069	1.0069	1.0069	1.0069	1.0069	1.0069	1.0069	1.0069	1.0069	1.0069	1.0069	1.0069
25	1.0062	1.0062	1.0062	1.0062	1.0062	1.0062	1.0062	1.0062	1.0062	1.0062	1.0062	1.0062
26	1.0056	1.0056	1.0056	1.0056	1.0056	1.0056	1.0056	1.0056	1.0056	1.0056	1.0056	1.0056
27	1.0051	1.0051	1.0051	1.0051	1.0051	1.0051	1.0051	1.0051	1.0051	1.0051	1.0051	1.0051
28	1.0046	1.0046	1.0046	1.0046	1.0046	1.0046	1.0046	1.0046	1.0046	1.0046	1.0046	1.0046
29	1.0042	1.0042	1.0042	1.0042	1.0042	1.0042	1.0042	1.0042	1.0042	1.0042	1.0042	1.0042
30	1.0038	1.0038	1.0038	1.0038	1.0038	1.0038	1.0038	1.0038	1.0038	1.0038	1.0038	1.0038
31	1.0033	1.0033	1.0033	1.0033	1.0033	1.0033	1.0033	1.0033	1.0033	1.0033	1.0033	1.0033
32	1.0030	1.0030	1.0030	1.0030	1.0030	1.0030	1.0030	1.0030	1.0030	1.0030	1.0030	1.0030
33	1.0025	1.0025	1.0025	1.0025	1.0025	1.0025	1.0025	1.0025	1.0025	1.0025	1.0025	1.0025
34	1.0022	1.0022	1.0022	1.0022	1.0022	1.0022	1.0022	1.0022	1.0022	1.0022	1.0022	1.0022
35	1.0006	1.0006	1.0006	1.0006	1.0006	1.0006	1.0006	1.0006	1.0006	1.0006	1.0006	1.0006

D.2 BY FACE AMOUNT

Our analysis showed that larger face amount claims report faster than lower face amount claims. Thus, over time the average face amount for an incurral month decreases as claims continue to be reported in later months. For example, the average face amount of claims reported in the first month of an incurral period may be $40,000, but three years later, it may be $36,000. This would imply that an adjustment factor of 90% is needed to more accurately complete the total claim amounts.

The development of average claim amounts over time was studied from 2017 to 2019 for each month, and a set of factors were developed to adjust the projected claim amounts in future reports. Table D.3 shows a summarized version of the resulting adjustment factors. These adjustment factors have since been incorporated into the completion factors used within this report.

Table D.3

AVERAGE CLAIM AMOUNT ADJUSTMENT FACTORS BY REPORTING LAG MONTH (ILLUSTRATIVE)

Reporting Lag Month	Adjustment to Average Size
0	86.0%
1	92.7%
2	95.8%
3	97.2%
10	99.1%
20	99.7%
35	100.0%

D.3 BY CAUSE OF DEATH

It was unknown early in the pandemic whether COVID-19 claims would be reported more quickly or slowly than other claims. Assignment of the COD is typically later in the claim adjudication cycle then reporting of the claim, so COVID claims in general were expected to complete a bit more slowly than average claims because of the need to complete that step in the adjudication cycle. For deaths in June 2020 through February 2021, it appears that COVID-19 claims were being reported at roughly the same rate as the non-COVID-19 set of claims (see Table D.4). The Committee has reviewed the relative reporting speed of COVID-19 claims at multiple intervals during the pandemic and has concluded that it is not materially different than average; for this reason, the analysis has not been revisited for this report.

Table D.4

CHAIN-LINK FACTORS FOR DEATHS IN JUNE 2020–FEBRUARY 2021

Lag Months	COVID	All Other Causes	COVID/All Other Causes
0	2.188	2.202	99.3%
1	1.203	1.198	100.4%
2	1.062	1.068	99.4%
3	1.031	1.034	99.7%
0–3	2.888	2.916	99.1%

D.4 BY COMPANY REPORTING SPEED

The Committee observed that incurred claim completion rates vary significantly from company to company. Upon analyzing the differences, the 20 contributing companies were grouped into five "reporting speed" groups based on similar reporting patterns. The completion ratios were studied from 2017 through 2020 for these five groups, but more significant weight was placed on data from 2020 as was the case for the base completion factor development. The completion patterns for the five groups were compared to the aggregate completion factors and expressed as adjustments in Table D.5. The Committee observed that the differential in completion time was material for the first six reporting months for each incurred period. Further, the Committee did not discern any credible difference in the speed by incurral calendar month; hence only one vector of adjustments is provided for each group. These adjustments provide a more representative picture for the individual company reports and, to a lesser extent, improve the predictive fit of completed claims in total. Thus, the current speed group factors have been updated as compared to Section 9.3 of the December 2020 publication.

Table D.5

COMPLETION ADJUSTMENT FACTORS BY REPORTING SPEED GROUP

Lag	Group 1	Group 2	Group 3	Group 4	Group 5	Aggregate
0	64.8%	81.6%	111.2%	122.0%	250.0%	100.0%
1	86.1%	94.6%	100.7%	101.4%	125.7%	100.0%
2	94.3%	98.5%	100.5%	100.9%	107.1%	100.0%
3	96.9%	99.3%	100.3%	100.7%	103.7%	100.0%
4	98.0%	99.6%	100.2%	100.5%	102.5%	100.0%
5	98.5%	99.8%	100.1%	100.4%	101.9%	100.0%

Groups 1 and 2 reported claims faster than the aggregate completion factors, evidenced by reducing the magnitude of completion factors for the first six months of reporting. Groups 3 through 5 reported claims slower than the aggregate completion factors.

Appendix E: Cause of Death Mapping

Table E.1
CAUSE OF DEATH MAPPING

COD Group No.	Group Name	ICD10 Codes	ICD-9 Codes
1	Cancer	C00–C97	140–239
2	Diabetes	E10–E14	249–250
3	Influenza and Pneumonia	J09–J18	480–488 (pneumonia and influenza) or 487–488 (just influenza)
4	Major Cardiovascular Diseases	I00–I09, I11, I13, I20–I51	393–429
5	COVID-19	U07.1, U07.2, B97.29, B97.26, Z03.818, Z20.828, Underlying Cause of Death	Not applicable
6	Accidents (Motor Vehicle)	V02–V04, V09.0, V09.2, V12–V14, V19.0–V19.2, V19.4–V19.6, V20–V79, V80.3–V80.5, V81.0–V81.1, V82.0–V82.1, V83–V86, V87.0–V87.8, V88.0–V88.8, V89.0, V89.2	E810–E829
7	Accidents (Non–Motor Vehicle)	W00–X59, Y86, V01, V05–V06, V09.1, V09.3–V09.9, V10–V11, V15–V18, V19.3, V19.8–V19.9, V80.0–V80.2, V80.6–V80.9, V81.2–V81.9, V82.2–V82.9, V87.9, V88.9, V89.1, V89.3, V89.9, V90–V99, Y85	Subset of 800–959 and 978–999, along with supplemental E-codes
8	Suicide	U03, X60–X84, Y87.0	E950–E959
9	Homicide	U01–U02, X85–Y09, Y87.1	E960–E969
10	Liver	K70, K73–K74	570–573
11	Drug Overdose	This is a subset of accident, assault, suicide and undetermined and requires more than the primary COD to identify: X40–44, X60–64, X85 or Y10–Y14 in combination with any of the following multiple COD codes: T40.9, T40.1, T40.2, T40.3, T40.4 or T40.6	960–977 and E930–E949
12	All Other/ Unknown	All claims not in groups 1–11 or 13–15	All claims/codes not in groups 1–11 or 13—15
13	Respiratory	J00–J08, J19–J98	460–479 and 489-–519
14	Cerebrovascular, Including Stroke	I60–I69	430–438 and V12.54
15	Alzheimer's	G30	331

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