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2020 Excess Deaths in the U.S. General Population by Age and Sex

February 2021

2020 Excess Deaths in the U.S. General Population by Age and Sex

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CONTENTS

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Executive Summary

This document describes an effort to measure the deaths in the U.S. population relative to pre-pandemic expectations. The actual deaths used are as reported by the U.S. Centers for Disease Control and Prevention (CDC) and several different methods are considered for setting expected deaths, adjusting for the estimated mix by age, sex, and time of the year (seasonality). Since the CDC provides deaths on an incurred basis, completion factors are considered based on delays in reporting, but the analysis also considers lagged actual-to-expected ratios (A/E ratios), which diminish the importance of completion.

Understanding the impact of the SARS-CoV-2 (COVID-19) pandemic provided the primary motivation for this study, but another goal was to facilitate comparisons between the U.S. general population results and the U.S. Group Life Insurance market experience, which is being captured by the SOA-sponsored COVID-19 Group Term Life Mortality Survey. The impact of COVID-19 deaths, as captured by the CDC, are measured directly, but the total mortality is also considered.

Excluding the first two and a half months of 2020 before COVID-19 deaths were prevalent, the total U.S. mortality A/E ratio ranged between 119% and 121%, with about 84% of the excess deaths identified as due to COVID-19. Considering the full year of 2020, the A/E ranged between 114% and 116%.

Deaths for people under age 15 were lower than expected, but all older ages showed excess mortality. The following table considers the A/E ratios for the period after the emergence of COVID-19 and uses a five-year trend on death rates by ages and sex to set the expected deaths.

Table 1

Actual to Expected Deaths: Mar 22 2020 to Dec 26 2020[1]

Age	Total	COVID	Exc. COVID
< 15	93.1%	0.5%	92.6%
15-34	120.2%	4.2%	116.1%
35-64	125.2%	12.7%	112.5%
> 64	119.8%	17.8%	102.0%
All Ages	120.0%	16.8%	103.2%

Using the full 52 weeks of experience from 2020, the A/E ratio was 114.9%, with 12.7% excess due to COVID and 2.2% excess from causes not explicitly identified as COVID.

The public report based on the SOA-sponsored COVID-19 Group Term Life Mortality Survey considered the experience period from April 1 through August 31 and used the 2017-2019 experience period to set the

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[1] Data as of February 3, 2021

baseline expectations. The following table compares the results from the U.S. population at approximately the same period using the same baseline expectations. The deaths are on an incurred basis and the expectations are adjusted for seasonality.

Table 2
Comparison of Group Life Survey Results to the U.S. Population

	Group Life Survey	U.S. Population	Ratio
Period (in 2020)	4/1 to 8/31	3/29 to 8/29	
Population (000)	145,429	330,384	44.0%
Total Deaths	197,691	1,420,361	13.9%
Annual Rates per 1,000	3.243	10.189	31.8%
COVID-19 Deaths	16,666	183,631	9.1%
Expected	175,114	1,193,714	14.7%
Excess Deaths as Percent of Expected			
Total	12.9%	19.0%	67.9%
COVID-19	9.5%	15.4%	61.9%
Exclude COVID-19	3.4%	3.6%	93.7%

These results have not been adjusted for the different distributions by age and sex between the two populations. This table shows that the proportional impact of the pandemic on Group Life claims is about 68% of the impact on the U.S. population.

Section 1: Study Results - Mortality Observations

The following tables and figures show the results of excess deaths studied. More details on how this analysis was performed are provided in the Study Methods section below.

The data used for this analysis was provided by the CDC as of February 3, 2021 and includes incurred deaths by week, beginning on December 29, 2019 through January 30, 2021. For 2020, the CDC defines Week 1 as ranging from December 29, 2019 through January 4, 2020, and Week 52 as ranging from December 19, 2020 through December 26, 2020, so when reporting on 2020 results, this convention is used. For purposes of this analysis, the start of the COVID-19 active period is considered to be March 22, 2020.

Due to the delay in reporting, the actual deaths have been completed based on factors that vary by age and sex. These are shown below along with the expectations that are based on the five-year trend after adjusting for seasonality.

Figure 1
Completed Actual and Expected Deaths by Week: All Ages and Sexes
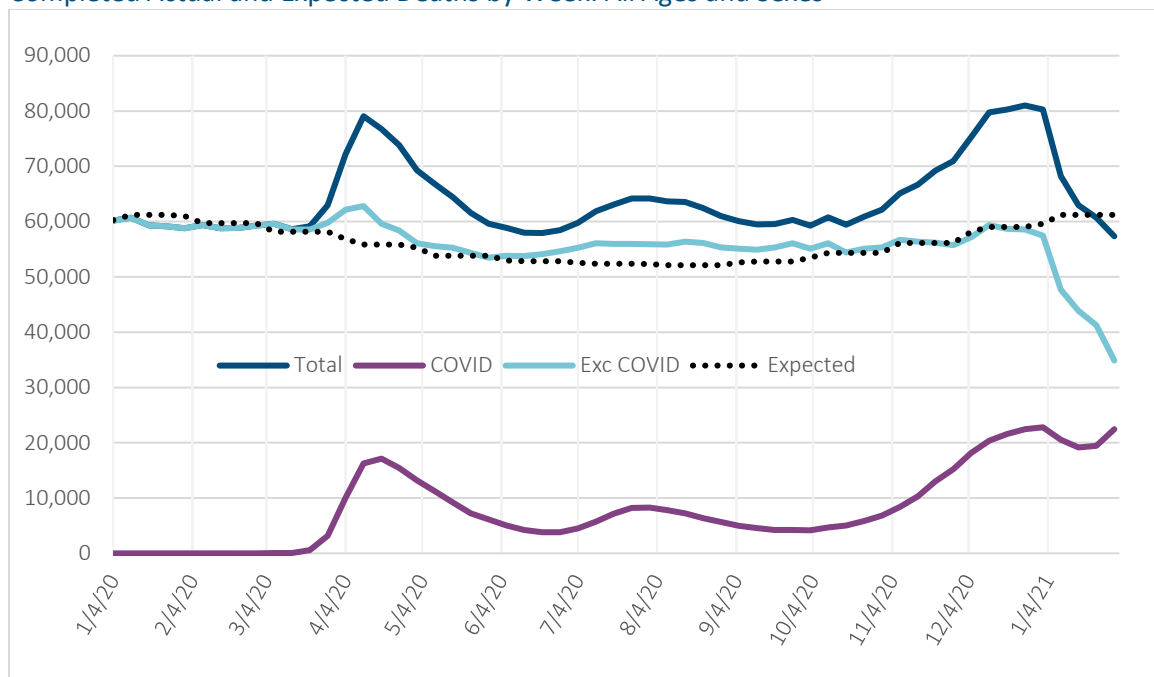
These data are as of February 10, 2021 and exclude deaths that occurred in the most recent week. This figure clearly shows some distortion in reported CDC deaths in the most recent few weeks, even after applying the completion factors. This means when considering overall actual-to-expected results, the most recent weeks should be excluded. This also shows that, for most months, the total A/E ratio is much greater than 100%, while the A/E ratio excluding COVID-19 deaths is also greater than 100% by a few percent. Table 3 below shows the total results for the COVID-19 active period up through December 26, 2020 (excluding the most recent five weeks).

Table 3

Actual to Expected Deaths: Mar 22, 2020 to Dec 26, 2020 as of Feb 03, 2021

Age	Female			Male		
	Total	COVID	Exc. COVID	Total	COVID	Exc. COVID
< 1	92.8%	0.2%	92.6%	90.6%	0.3%	90.3%
1-4	86.8%	0.7%	86.1%	94.2%	0.8%	93.3%
5-14	94.1%	1.5%	92.6%	104.6%	1.4%	103.2%
15-24	117.0%	3.5%	113.5%	123.1%	2.0%	121.1%
25-34	116.6%	6.1%	110.5%	120.4%	4.5%	115.9%
35-44	122.0%	9.2%	112.9%	126.9%	9.8%	117.1%
45-54	121.0%	12.3%	108.7%	126.9%	15.4%	111.5%
55-64	114.9%	13.4%	101.5%	119.7%	15.5%	104.1%
65-74	119.1%	16.2%	102.8%	121.4%	18.8%	102.6%
75-84	119.9%	17.3%	102.6%	122.2%	20.4%	101.7%
> 84	118.4%	16.7%	101.7%	118.4%	18.6%	99.7%
All Ages	118.4%	15.7%	102.7%	120.9%	17.2%	103.7%

It is interesting to note that the highest overall A/E ratio occurred for ages 35-54 for both sexes, and that the highest excess death percentage when COVID-19 is excluded was for ages 15-24.

Figures 2-5 show the history of actual-to-expected deaths by week, sex and age group. Generally, the deaths are low for ages under 15, and elevated for ages over 15, even excluding COVID-19. These figures exclude deaths incurred after December 26, 2020.

Figure 2

Females: Completed Actual-to-Expected Deaths by Week, Sex, and Broad Age Group
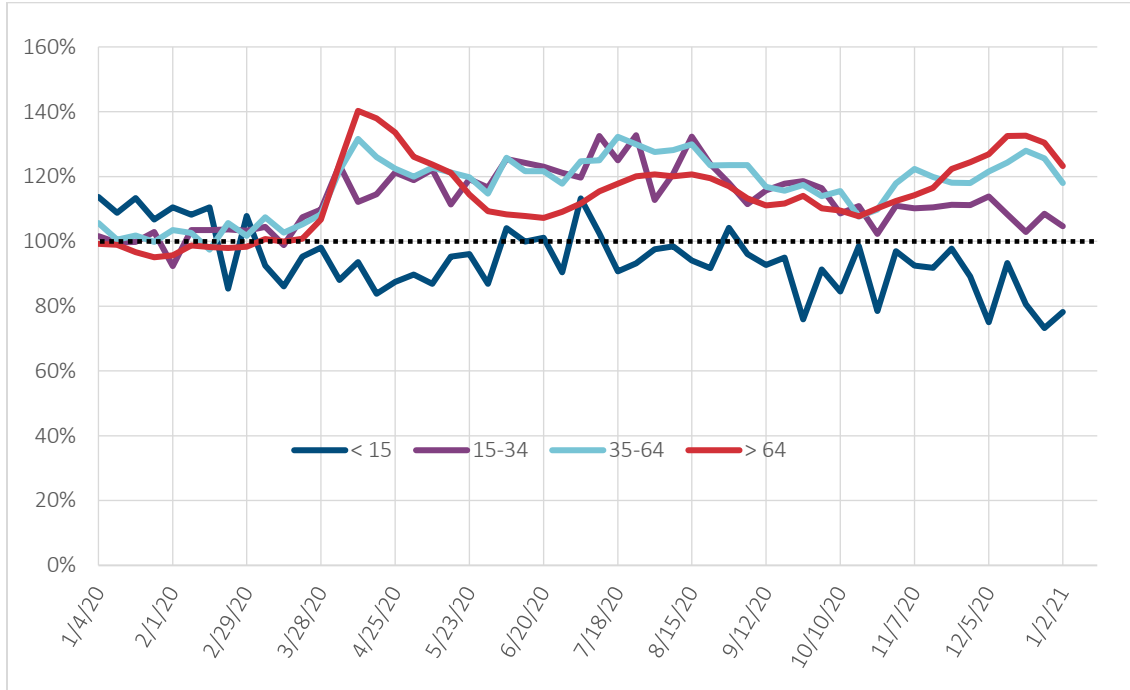
Figure 3

Males: Completed Actual-to-Expected Deaths by Week, Sex, and Broad Age Group
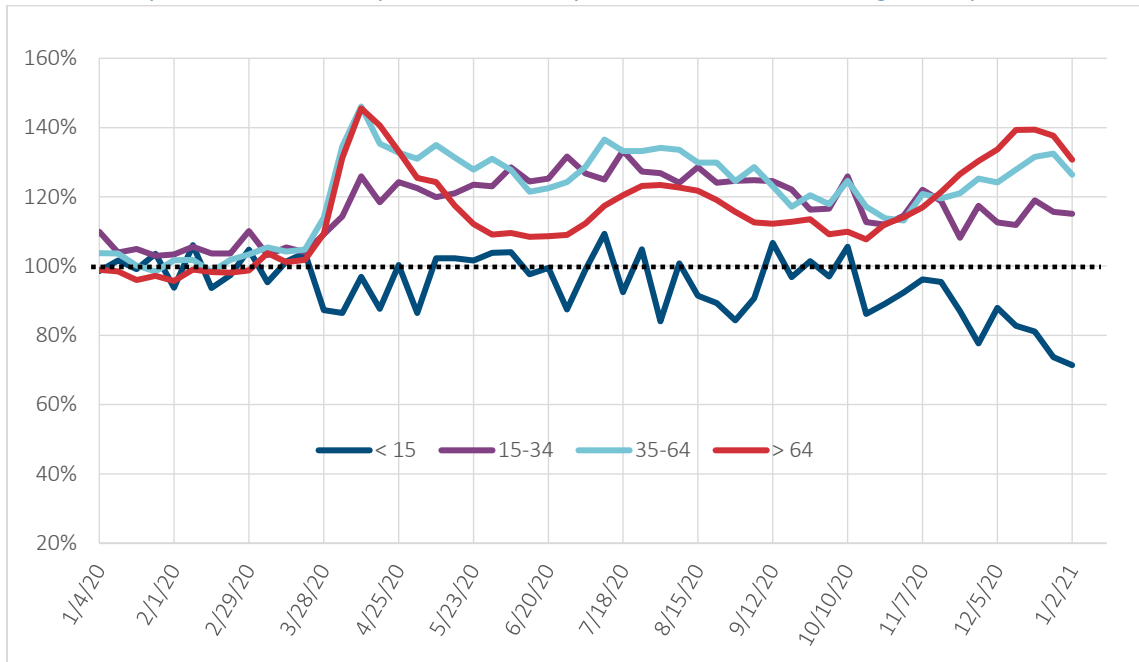
Figure 4

Females: Completed Actual-to-Expected Deaths, excluding COVID, by Week, Sex, and Broad Age Group
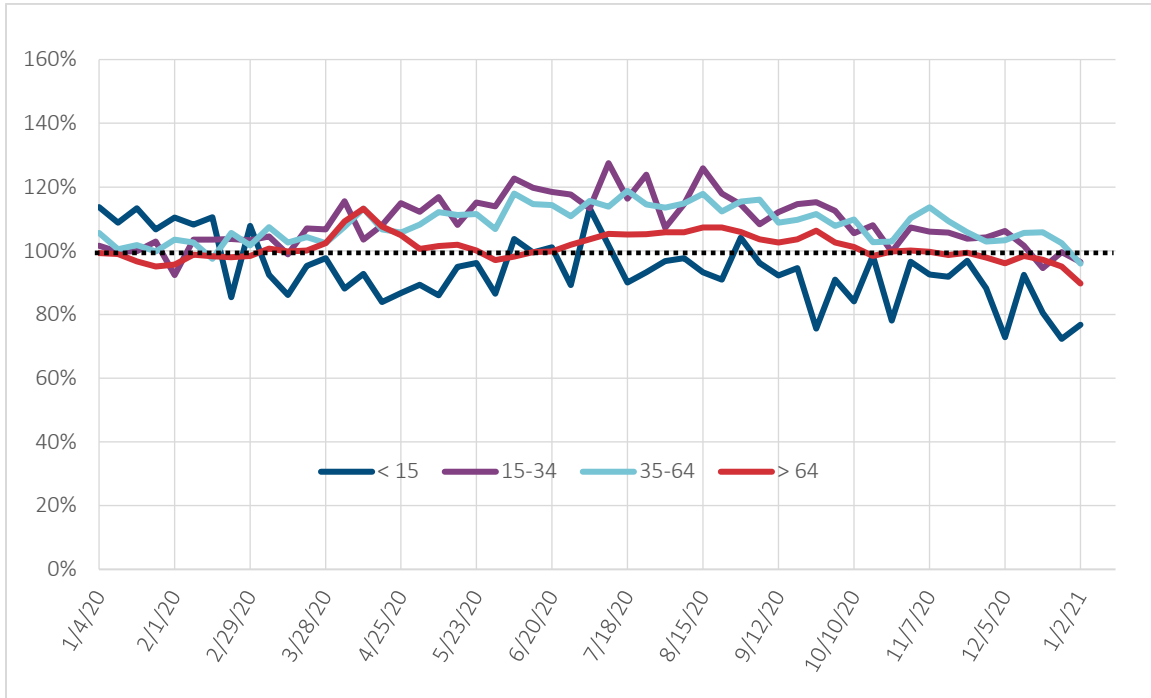
Figure 5

Males: Completed Actual-to-Expected Deaths, excluding COVID, by Week, Sex, and Broad Age Group
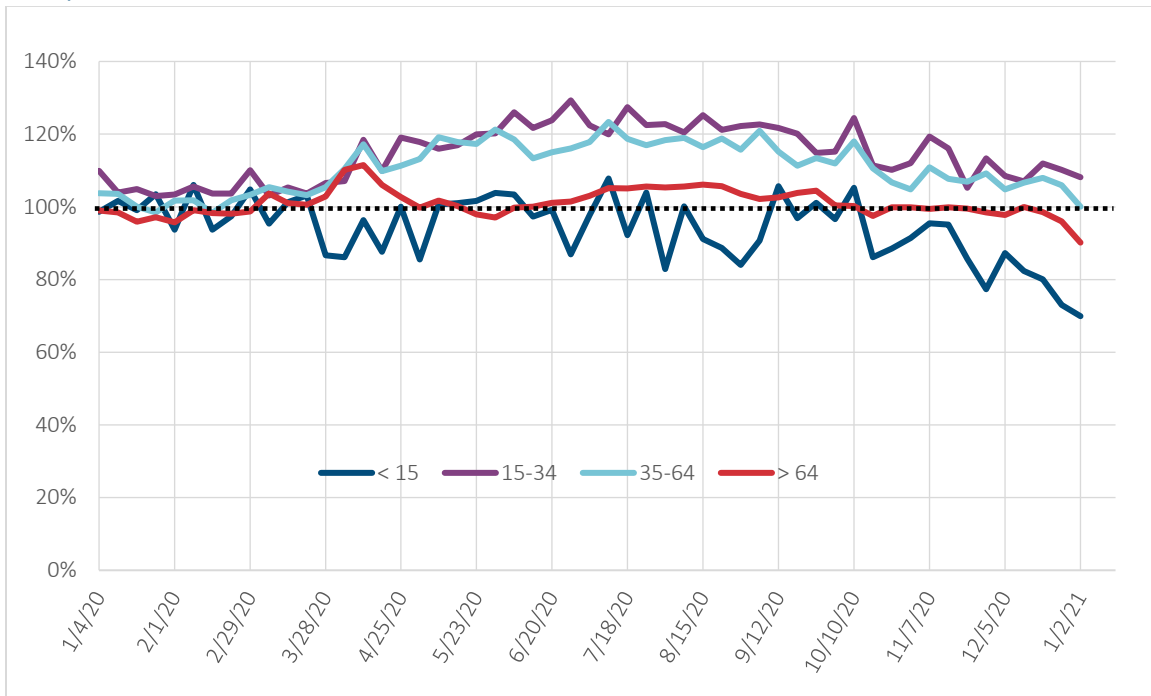
Section 2: Study Methods

There are several components to the calculation of expected deaths and this section will document the methods and assumptions made. Since some of the selections are subjective, several different approaches were included to get a feel for the potential impact of these assumptions. Broadly, the steps are as follows:

Step 1: Create Expected Deaths for 2020 by Age and Sex:

These expectations are based on U.S. CDC death information and U.S. Census Bureau population information from 2010 to 2019. These numbers are used to create prior year death rates. The projected death rates are multiplied by 2020 population estimates to determine expected 2020 deaths. The 2020 population estimates are based on applying a five-year linear trend to the populations from 2015 to 2019 by sex and age group.

Step 2: Collect Actual Deaths and Determine Completion Factors

In 2020, the CDC provided deaths by week on an incurred basis. There is some delay in reporting, so these figures need to be completed for the more recent weeks in order to estimate total incurred deaths. This is done by examining week-over-week completion in 2020 and then accumulating these factors to arrive at a total completion factor by the number of weeks of lag. This is done separately for total deaths and COVID-19 deaths, which tend to complete more slowly. The completion rates do vary by sex and age, and so the factors are developed by sex and age group. There is some volatility in the completion, so before determining the ratios, the weeks with the lowest and highest two factors are excluded.

Step 3: Adjust for Seasonality:

Death rates vary by time of the year, age and sex. Seasonality factors were developed by analyzing the CDC deaths by month for 2010 through 2019 and measuring the death rate in each month relative to the average for the year. When determining monthly adjustment factors, the lowest and highest ratios are excluded to dampen volatility. These adjustments are done by sex and age, both with detailed age buckets and more broad age buckets.

These are the three components of the excess death percentage calculations. Below, the calculations are described in more detail, and some observations are provided.

2.1 STEP 1: CREATE EXPECTED DEATHS FOR 2020 BY AGE AND SEX:

2.1.1 HISTORY OF U.S. DEATHS

The U.S. deaths were taken from the CDC data retrieval site (https://wonder.cdc.gov/) after selecting "Underlying Cause of Death" and then "1999-2019: Underlying Cause of Death by Bridged-Race Categories." The downloaded data were segmented by single-year of age, sex, year, and month.

2.1.2 U.S. POPULATION ESTIMATES

U.S. population estimates were taken from the U.S. Census Bureau website after selecting median age by sex and using individual ages:

https://www.census.gov/data/datasets/time-series/demo/popest/2010s-national-detail.html

2.1.3 HISTORY OF U.S. DEATH RATES

Death rates were determined by age and sex by computing the ratio of U.S. deaths to the U.S. population after grouping the U.S. deaths into the same age groups as used by the CDC for 2020 deaths.

2.1.4 PROJECTED 2020 DEATH RATES

The expected death rates for 2020 were found by projecting forward the 2010-2019 death rates by sex and ages, grouped into age groups. The trends by year and age are variable and not linear so the most appropriate projection method is not obvious. Six different projection methods were considered as follows:

1. Three-Year Average: 2017-2019 – This method was selected to match the baseline rates used in the SOA COVID-19 Group Life Mortality Survey.
2. Seven-Year Linear Trend: 2013-2019
3. Six-Year Linear Trend: 2014-2019
4. Five-Year Linear Trend: 2015-2019
5. Four-Year Linear Trend: 2016-2019
6. Three-Year Linear Trend: 2017-2019

All ages and sexes have some trends in death rates, but for many, the trends over time are not linear. Different diagnosis trends within these categories and other external factors are likely driving these results. Rather than try to estimate these influences with the 2020 selections, a range of trend options are shown to display the sensitivity and create ranges that likely encompass the true underlying expectation. The ranges are presented below Figures 6-8, which illustrate the patterns for a few selected ages and genders. In each chart, the actual numbers are represented by the black line and can then be compared to the different trends.

Figure 6

Death Rates by Year: Males, Ages 25-34
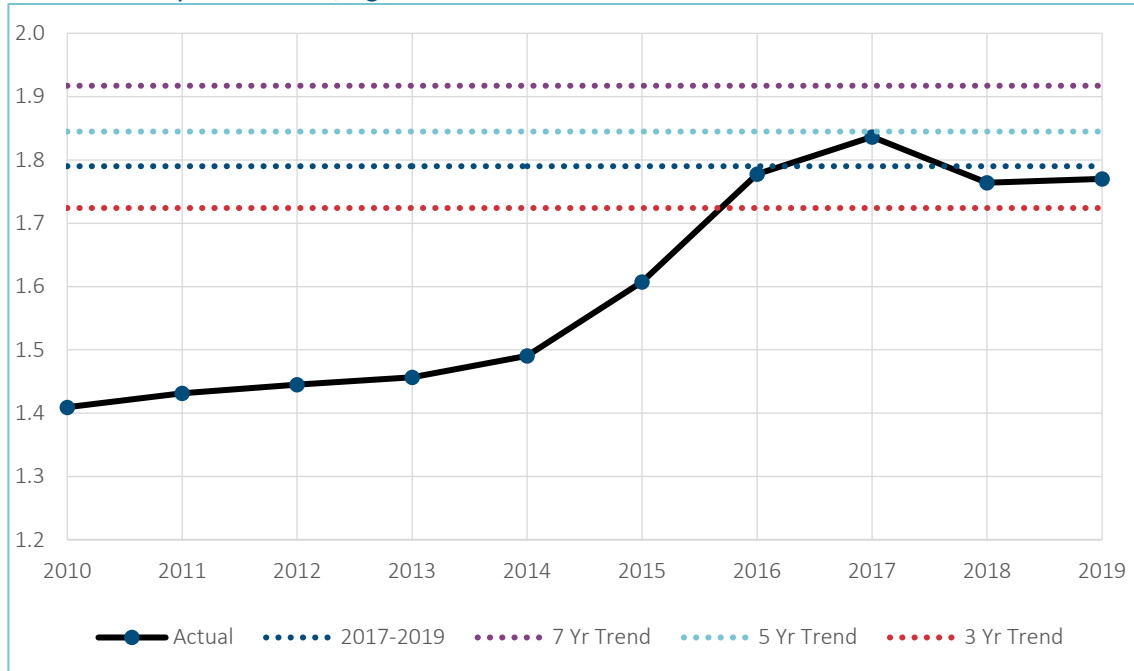
Figure 6 shows death rates that increased from 2013-2017 and then flattened out. The most recent four years are all within the trend estimates.

Figure 7
Death Rates by Year: Females, Ages 45-54
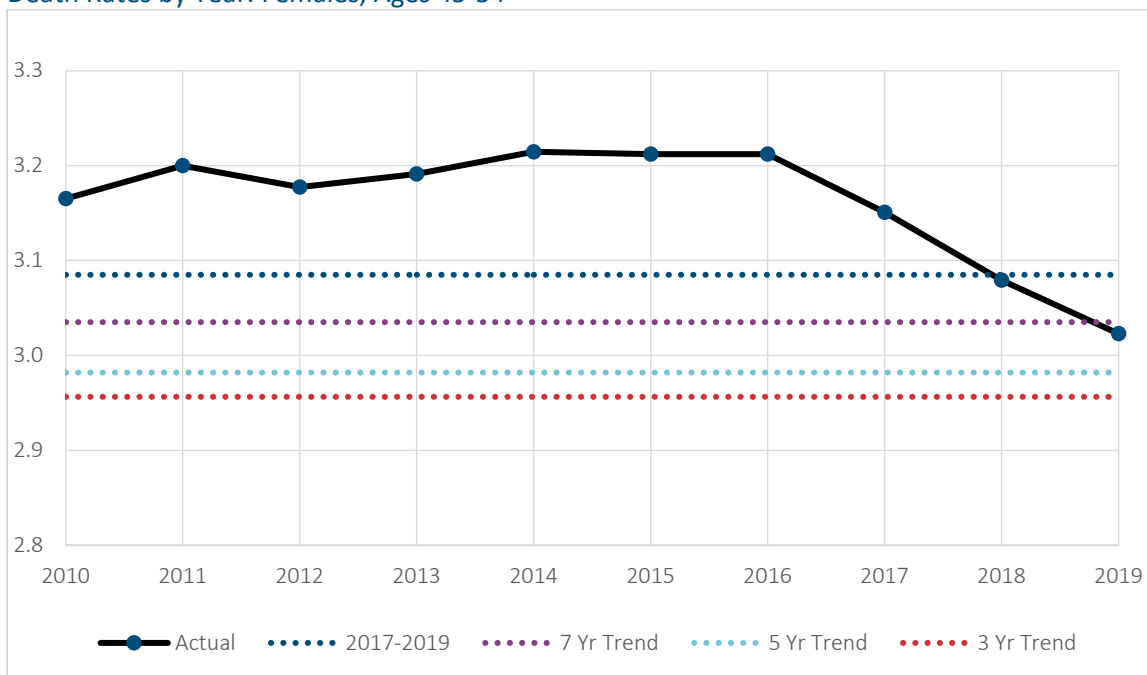
Figure 7 shows that the rates were flat from 2010 to 2015 and then declined. The range of trend estimates is wider, with the shorter trends being lower.

Figure 8
Death Rates by Year: Females, Ages 75-84
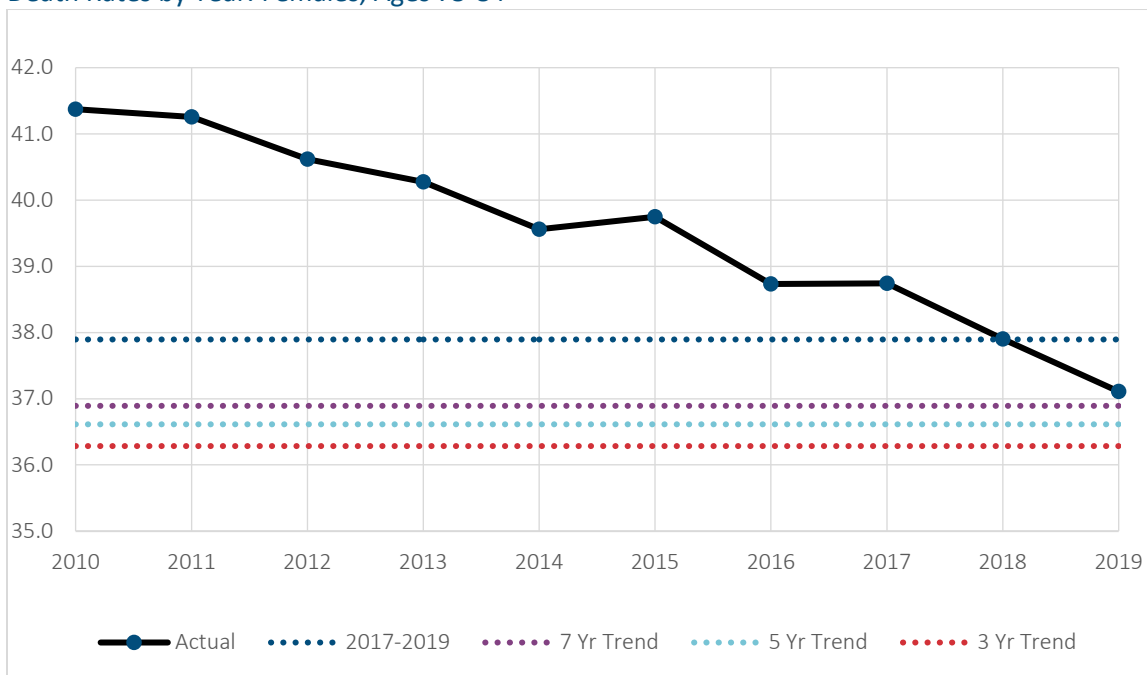
Figure 8 shows an example in which the trends all produce similar expectations that are below the three-year average. The female 75-84 age group shows evident long-term mortality improvement.

Table 4 shows the sensitivity to the different expected deaths assumptions and generally shows the five-year trend to be between the three- and seven-year trends. The biggest uncertainty is in the younger ages, given lower deaths and hence higher volatility. The complete set of expected deaths rates for the six methods are displayed in Appendix A.

Table 4
Actual to Expected Deaths: Mar 22 2020 to Dec 26 2020 by Method

Age	2017-2019	7 Yr Trend	6 Yr Trend	5 Yr Trend	4 Yr Trend	3 Yr Trend
> 15	90.6%	92.0%	92.1%	93.1%	93.8%	93.7%
15-34	121.9%	115.2%	116.3%	120.0%	125.2%	127.4%
35-64	125.0%	123.7%	124.1%	124.9%	126.2%	126.5%
> 64	117.5%	118.9%	118.9%	119.5%	119.3%	120.5%
All Ages	118.0%	118.9%	118.9%	119.7%	119.8%	120.9%

2.2 STEP 2: COLLECT ACTUAL DEATHS AND ESTIMATE COMPLETION FACTORS

The CDC publishes 2020 deaths by incurred week at the following link:

https://data.cdc.gov/NCHS/Provisional-COVID-19-Death-Counts-by-Sex-Age-and-W/vsak-wrfu

The CDC publishes deaths across all ages on a daily basis, but deaths by age, sex and week are published at the end of the day on Wednesday, covering incurred periods through the prior Sunday. The death counts are provided in total and for deaths identified as at least partially due to COVID-19. Since the numbers are on an incurred basis, they are incomplete due to reporting lags. The weekly death totals have been collected back to May of 2020 and the completion occurring for the prior weeks can be determined. The delays in reporting extend back many weeks and completion factors are used to infer deaths in more recent weeks.

The delays are material. For example, at the younger ages, death totals eight weeks later are still short by as much as 8%. This delay in reporting has likely been a source of confusion about how to interpret the CDC death totals. The method used is to determine average week-to-week completion factors by lag, and then accumulate these to determine the total completion for each starting lag.

There are two complications that have been addressed. The first is that there is a clear difference in completion of COVID-19 deaths versus the total deaths. This makes sense as sometimes it can take a while to establish the cause of death, even if the death has already been reported. Both the week-to-week completion factors and total completion factors are determined in total for all deaths, and then also separately for the COVID-19 deaths. The total completed deaths excluding COVID-19 are then found as the difference between these two estimates.

The second complication is that the completion varies by age, with older ages being reported more quickly than younger ages. To account for this, the week-to-week and total completion factors are determined by age group and sex. The chart below illustrates the magnitude of the sex-age differences. At the older ages, the sex difference all but disappears, but the age differences persist.

Figure 9
Lag Zero Total Completion Factors by Age and Sex
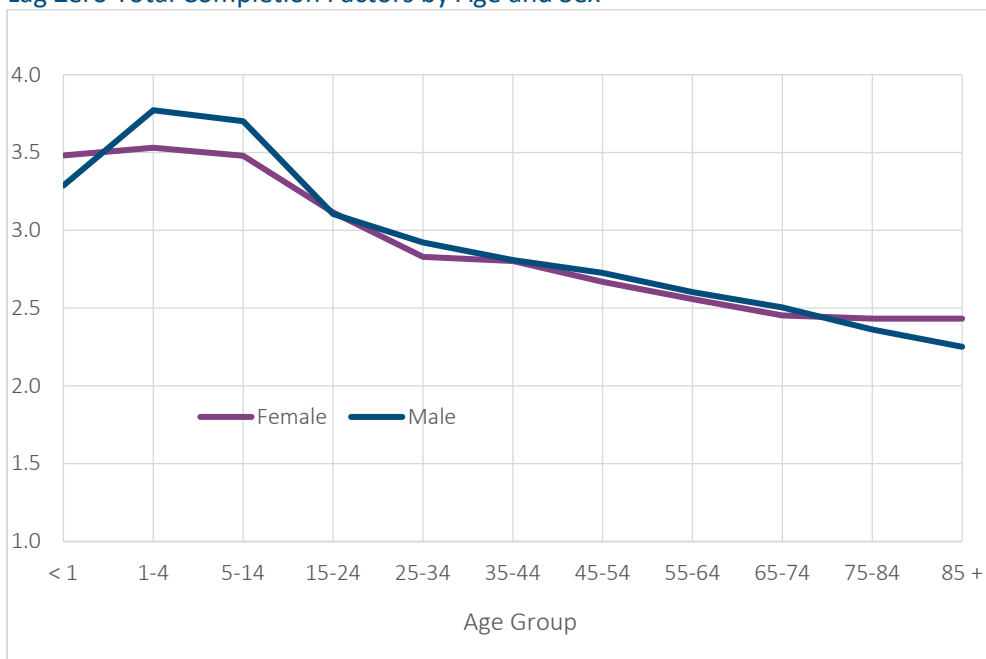
The method for developing the completion factors is described below. The week-to-week completion factors are determined first: As an example: For 45 to 54 year old females, there were 715 deaths in the week ending December 5, as of December 16, and 1,019 deaths for the week ending December 5, as of December 23. The initial reporting is defined as lag one, while the next week's reporting is defined as lag two. This means that, for this week, the lag one-to-two weekly completion factor is 1.425 (1,019 / 715). We find this ratio for all weeks after excluding the two weeks with the highest and lowest ratios, and then divide the lag-two totals by the lag-one totals to get the lag one-to-two weekly completion factor. For this lag and sex-age combination, the lag one-to-two weekly completion factor comes out to 1.370.

The product of these week-to-week completion factors then determines the total completion factor. For example, the lag-zero total completion factors are equal to the zero-to-one weekly completion factor times the one-to-two weekly completion factor times the two-to-three weekly completion factor, and so on. The lag-two total completion factor is equal to the two-to-three weekly completion factor times the three-to-four weekly completion factor, and so on. Thirty-six weeks of lag were considered, at which point there is very little change. As an example, the lag-two total completion factor for 45-54 females determined using this method is 1.342. Then, the lag-one total completion factor for 45-54 females is found by taking the lag-two total completion factor times the one-to-two weekly completion factor, producing 1.838 (1.342 * 1.370). The complete set of week-to-week and total completion factors by sex and the ten age group categories are displayed in Appendix B for both all deaths and for COVID-19 deaths. Note that, for COVID-19 deaths at the youngest ages, there were not sufficient deaths by week to create reasonable factors. For these ages (less than 15), we used the total death weekly completion factors times the ratio of all-ages-and-sexes COVID-19 weekly completion factors to the total death weekly completion factors by lag.

These factors are applied as follows: If the CDC reports a certain number of incurred deaths in a sex-age combination for a given week, as of a specified date, then we determine the weekly lag for this date and apply the total completion factor to estimate the eventual total deaths for that week. As an example, as of February 3, 2021, there were 715 reported deaths incurred in the week ending January 23, 2021. We

would classify this as a lag-one week and so apply the lag-one total completion factor (1.838) and estimate that, by the time the reporting is complete, there will be 1,315 total deaths for this sex-age combination.

As of the writing of this document, it appears that deaths in the last few weeks are being under-reported by the CDC. This is most easily seen in Figure 10, which shows a drop in reported deaths in the first week of January 2021 and the last couple of weeks in December 2020, with a bit of a rebound for the February 3 data. The variability in week-to-week reporting is also evident. This drop in reported deaths means that low-lag completed deaths as of the most recent weeks are likely understated.

Figure 10
Total CDC Weekly Reported Deaths by Number of Weeks of Lag
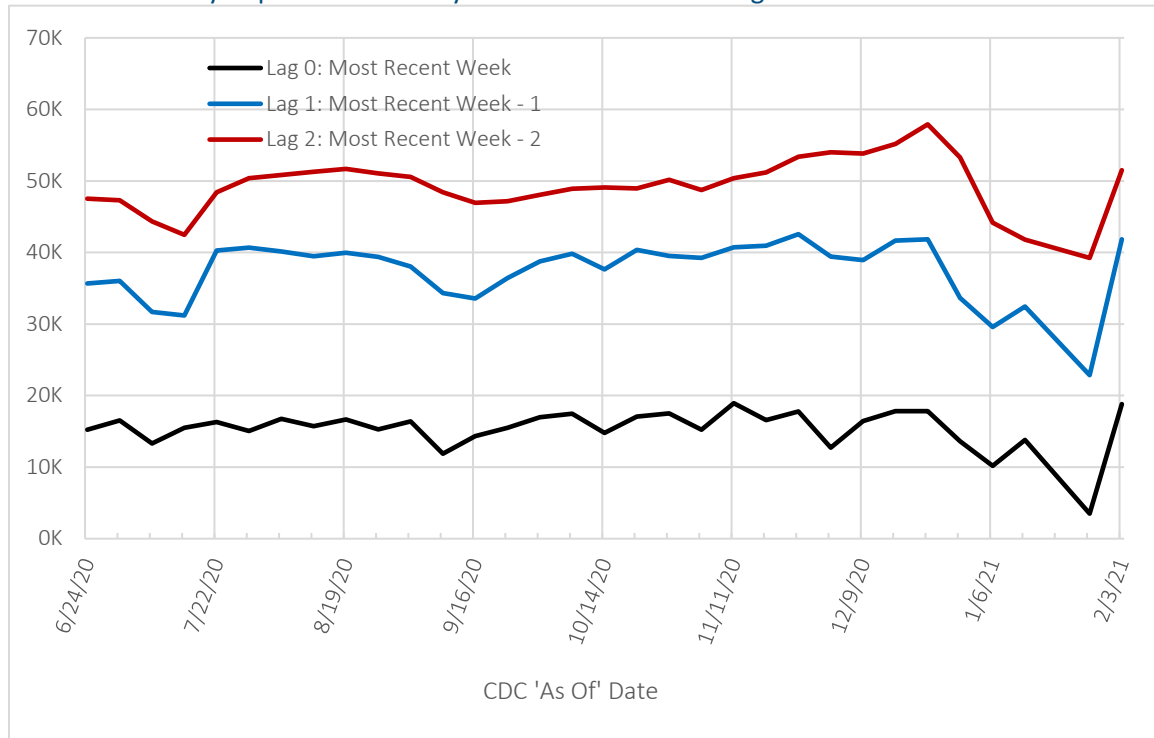
2.3 STEP 3: ADJUST FOR SEASONALITY:

U.S. deaths exhibit clear seasonal variations, so adjustments are made to the expectations to reflect these patterns with adjustments varying by sex and age. This is done by comparing deaths in a month to the average deaths per month for that year. This ratio is calculated by sex and age group for each month and each year, while excluding the years with the lowest and highest ratios before computing the overall ratio. This method is illustrated in the following table for males over age 85. The January with the highest ratio was in 2013 and the January with the lowest ratio was in 2012, so these years are excluded from the total.

Table 5

January CDC Deaths for 85+ Males by Year

Year	Deaths	Avg Deaths	Ratio	Rank
2010	25,213	22,989	109.7%	9
2011	27,549	23,785	115.8%	5
2012	26,728	24,509	109.1%	10
2013	32,795	25,372	129.3%	1
2014	28,303	25,732	110.0%	8
2015	33,577	26,809	125.2%	3
2016	30,179	26,946	112.0%	6
2017	32,628	27,906	116.9%	4
2018	35,923	28,110	127.8%	2
2019	31,145	28,180	110.5%	7
Total	244,517	210,457	116.2%	

- Total excludes 2012 and 2013

There is a final adjustment for the number of days in the month relative to the average number of days per month over the year. For example, January has 31 days, while the average days per month across all years and months is 30.44. Therefore, when setting a daily expectation for January, the ratio calculated above (116.2%) is multiplied by 30.44/31 to get a final adjustment of 114.1%.

The death rate seasonal factors are adjusted for the days in each month, so they can be compared across months. This is important since the 2020 CDC deaths are expressed weekly rather than monthly. The adjustments for weeks that cross over months are found by using the factors for the two months weighted by the number of days in each month. For example, the week from March 29 to April 4 will have an adjustment based on three days of March rates and four days of April rates.

The seasonal patterns by age and sex are interesting and displayed in the following figures. The patterns are split into two different sets of age ranges to improve legibility, and to illustrate that there are broad differences in the patterns by age (young versus old).

Figure 11

Female Seasonal Factors by Month and Age Group
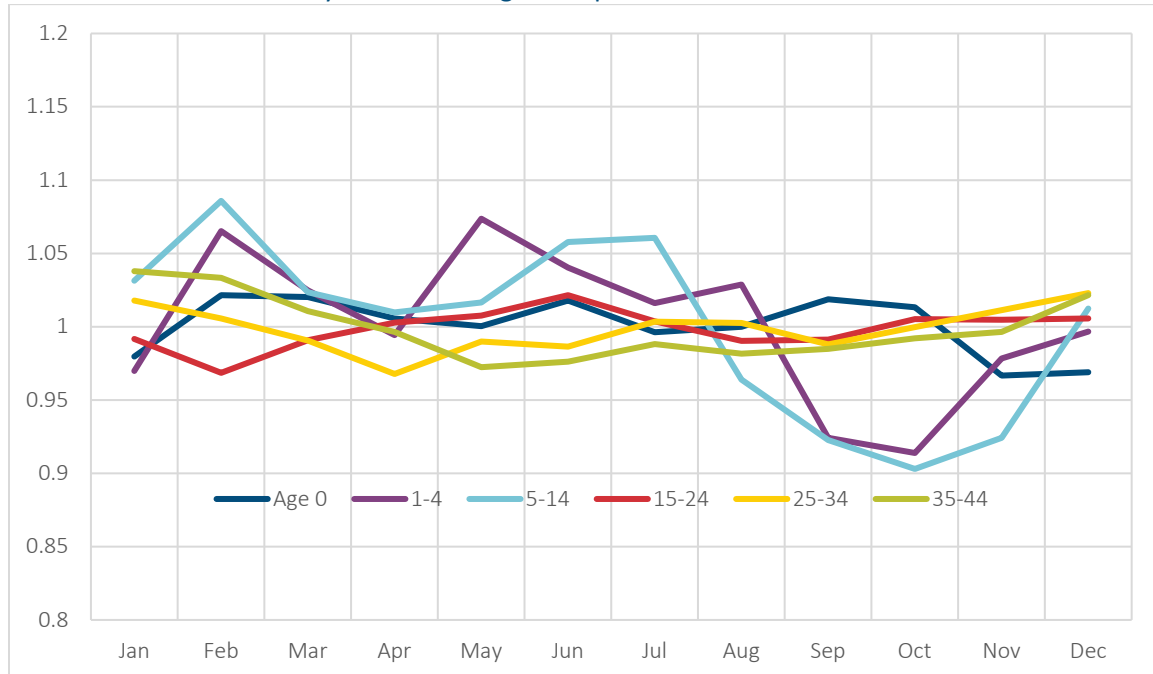
Figure 12

Female Seasonal Factors by Month and Age Group
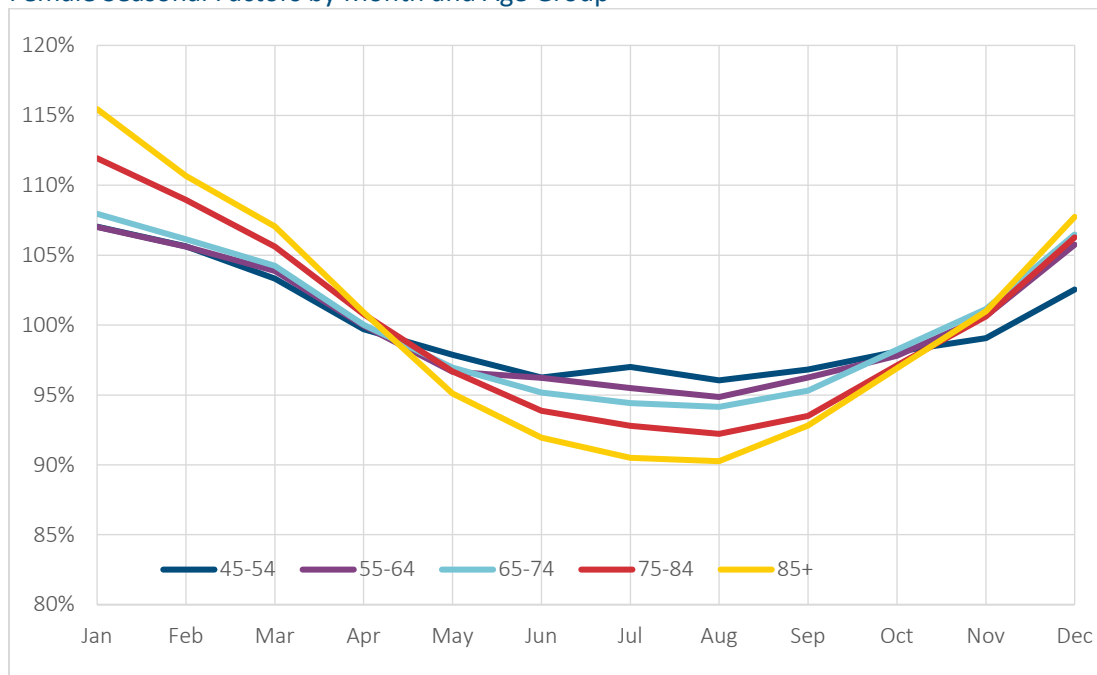
Figure 13
Male Seasonal Factors by Month and Age Group
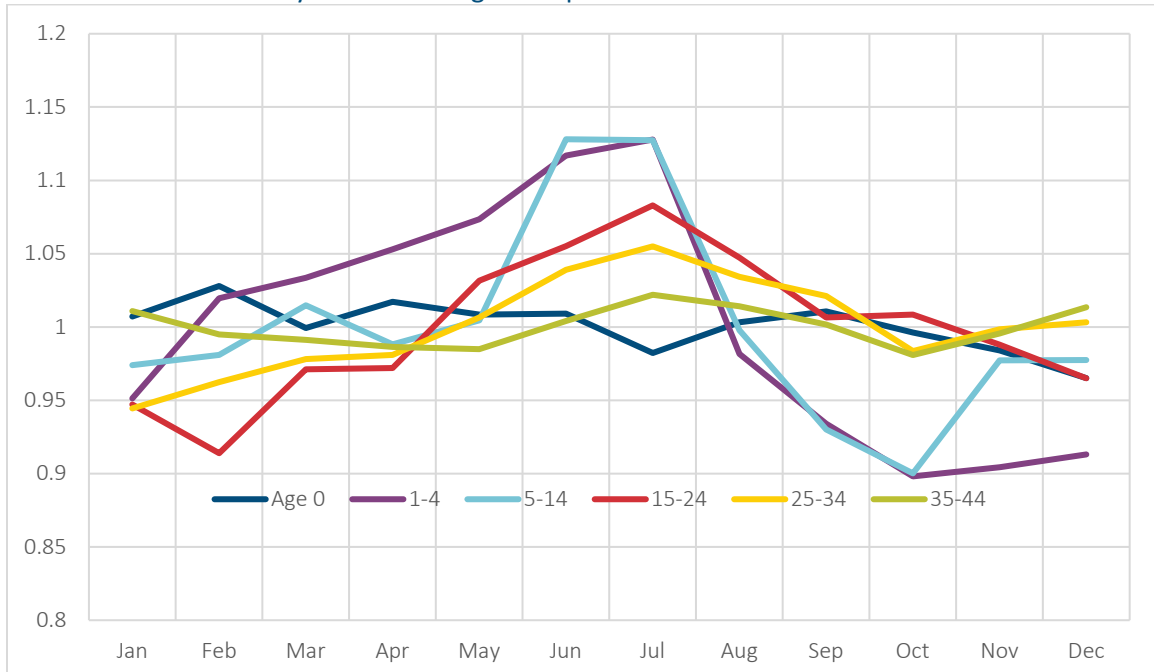
Figure 14
Male Seasonal Factors by Month and Age Group
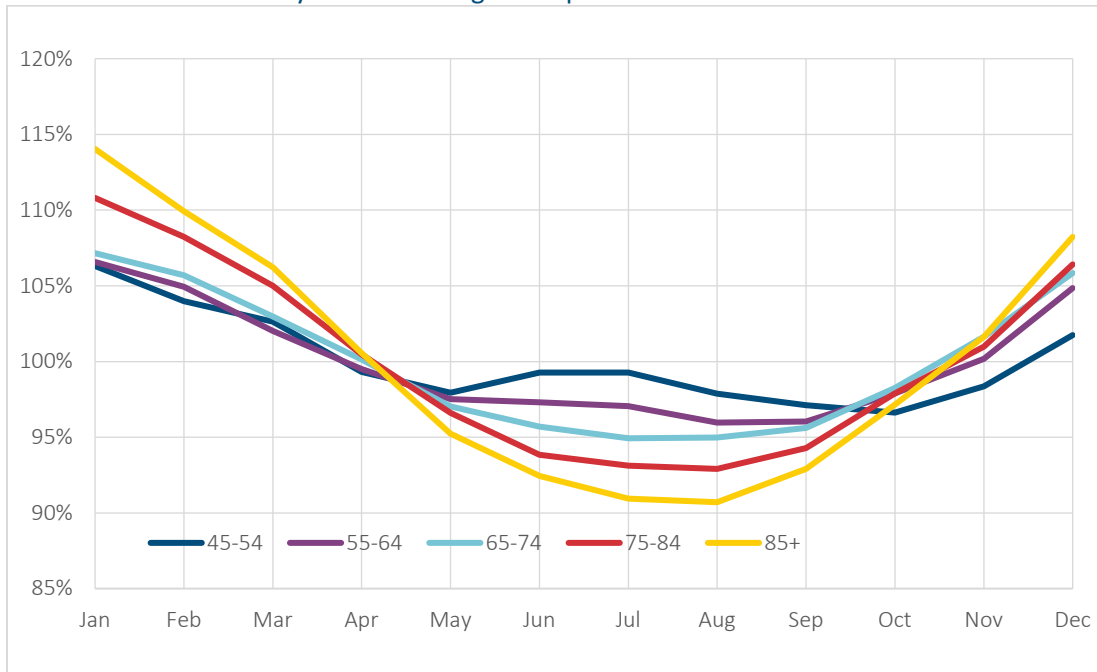
2.4 COMPARISONS TO SOA COVID-19 GROUP LIFE SURVEY

In December, the SOA released a public summary of the results of their Group Life COVID-19 Mortality Survey:

https://www.soa.org/resources/experience-studies/2020/group-life-covid-mort-survey/

One finding in this report was that total incurred deaths for the period from April 2020 through August 2020 were about 12.9% above the baseline (2017-2019) expectations, and that the mortality impact was 50% to 70% of the U.S. population impact. The following table shows the U.S. population results over a similar time period. Due to the weekly time periods, the period from April to August cannot be matched exactly, so the time period used is from March 29 through August 29.

Table 6

U.S. Population 2020 Mortality from Mar 29 to Aug 29

		Actual-to-Expected			
	Actual	**2017-2019**	**7-Yr Trend**	**5-Yr Trend**	**3-Yr Trend**
All Ages	1,420,361	119.0%	119.9%	120.7%	122.0%
Age >= 15	1,408,296	119.3%	120.2%	121.0%	122.3%
Ages: 15-64	179,479	127.9%	124.9%	127.2%	130.6%

Using the baseline period of 2017-2019 to set the expected death rates provides the closest comparison to the method used for the Group Life Survey. In determining the ratio of the proportional impact for the Group Life mortality to the U.S. population mortality, using the all ages A/E ratio of 119.0% yields a ratio of 68%.

A possible next step for this comparison would be to come up with estimated age-sex distributions of exposures for Group Life and create a true age/sex-adjusted comparison. A simple method of making this adjustment is accomplished by adjusting the U.S. population numbers by excluding deaths and exposures for ages less than 15, and then also modifying the deaths and exposures above age 64.

From the Group Life Survey, deaths in the baseline period for ages above 64 represent 63.2% of all deaths while, for the U.S. population, this ratio is 74.7%. If we multiply the U.S. population deaths by 55%, they would then also represent 63.2% of the total. Hence, for the adjusted U.S. population numbers, both the deaths and exposures are multiplied by 55%, along with excluding ages less than 15. This produces the following table:

Table 7

Comparison of Group Life Survey Results to Adjusted U.S. Population

	Group Life	Adjusted Population	Ratio
Period (in 2020)	4/1 to 8/31	3/29 to 8/29	
Population (000)	145,429	244,801	59.4%
Total Deaths	197,691	855,329	23.1%
Annual Rates per 1,000	3.243	8.281	39.2%
COVID-19 Deaths	16,666	107,906	15.4%
Expected	175,114	712,548	24.6%
Excess Deaths as Percent of Expected			
Total	12.9%	20.0%	64.3%
COVID-19	9.5%	15.1%	62.8%
Exclude COVID-19	3.4%	4.9%	69.0%

This view does not change the picture much from Table 2 provided at the start of this document. With this simple adjustment, the proportional impact on Group Life mortality relative to the U.S population drops from 68% to 64%.

This analysis will be updated as mortality experience emerges. In addition, this work can be used in subsequent reports on Group Life experience as a point of reference for the U.S. population mortality experience.

Section 3: Acknowledgments

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Appendix A: Expected 2020 Death Rates by Age and Gender

U.S. Population: 2020 Female Death Rates: Annual per 1000 Lives

Age	2017-2019	7 Yr Trend	6 Yr Trend	5 Yr Trend	4 Yr Trend	3 Yr Trend
Under 1 year	5.08	4.96	4.93	4.88	4.86	4.89
1-4 years	0.21	0.21	0.21	0.20	0.20	0.21
5-14 years	0.12	0.12	0.12	0.12	0.12	0.12
15-24 years	0.39	0.41	0.40	0.39	0.38	0.37
25-34 years	0.80	0.85	0.85	0.83	0.80	0.78
35-44 years	1.41	1.45	1.44	1.44	1.41	1.41
45-54 years	3.03	2.99	2.96	2.93	2.91	2.91
55-64 years	6.72	6.80	6.76	6.74	6.69	6.66
65-74 years	14.23	14.04	14.04	13.96	13.93	13.81
75-84 years	37.90	36.89	36.85	36.61	36.69	36.29
85 years +	128.52	127.21	127.52	126.41	127.12	125.25

U.S. Population: 2020 Male Death Rates: Annual per 1000 Lives

Age	2017-2019	7 Yr Trend	6 Yr Trend	5 Yr Trend	4 Yr Trend	3 Yr Trend
Under 1 year	6.16	6.02	6.03	5.98	5.94	5.93
1-4 years	0.27	0.26	0.26	0.25	0.25	0.25
5-14 years	0.15	0.15	0.15	0.15	0.15	0.15
15-24 years	1.02	1.06	1.04	1.01	0.96	0.95
25-34 years	1.79	1.92	1.90	1.84	1.76	1.72
35-44 years	2.52	2.68	2.68	2.65	2.60	2.59
45-54 years	4.94	4.90	4.90	4.89	4.87	4.85
55-64 years	11.16	11.25	11.21	11.18	11.15	11.12
65-74 years	21.91	21.91	21.91	21.85	21.84	21.74
75-84 years	51.66	50.36	50.37	50.14	50.26	49.77
85 years +	144.38	141.86	142.19	141.58	142.17	140.26

Appendix B: Death Completion Factors by Age and Gender

Female All Deaths: Week-to-Week Completion Factors by Age

Lag	< 1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	> 84
0	3.481	3.290	3.480	3.115	2.830	2.803	2.669	2.559	2.436	2.366	2.192
1	1.528	1.578	1.528	1.452	1.373	1.385	1.370	1.346	1.318	1.290	1.247
2	1.191	1.144	1.171	1.145	1.127	1.130	1.123	1.113	1.101	1.088	1.076
3	1.095	1.067	1.060	1.062	1.063	1.057	1.054	1.049	1.043	1.037	1.030
4	1.049	1.036	1.030	1.043	1.038	1.035	1.032	1.027	1.025	1.020	1.018
5	1.034	1.030	1.031	1.027	1.031	1.028	1.021	1.019	1.016	1.014	1.012
6	1.030	1.017	1.015	1.022	1.023	1.022	1.017	1.014	1.012	1.010	1.009
7	1.022	1.009	1.018	1.020	1.018	1.015	1.012	1.010	1.008	1.007	1.006
8	1.018	1.016	1.012	1.013	1.013	1.012	1.008	1.007	1.006	1.005	1.004
9	1.011	1.008	1.007	1.010	1.010	1.008	1.008	1.005	1.004	1.004	1.003
10	1.010	1.007	1.005	1.008	1.007	1.006	1.006	1.004	1.003	1.003	1.003
11	1.012	1.006	1.004	1.006	1.006	1.005	1.004	1.003	1.003	1.002	1.002
12	1.007	1.000	1.000	1.003	1.005	1.003	1.003	1.003	1.002	1.002	1.001
13	1.005	1.003	1.003	1.003	1.004	1.003	1.002	1.002	1.001	1.001	1.001
14	1.007	1.005	1.001	1.002	1.002	1.003	1.002	1.001	1.001	1.001	1.001
15	1.005	1.000	1.000	1.001	1.002	1.002	1.001	1.001	1.001	1.001	1.000
16	1.004	1.000	1.002	1.002	1.001	1.001	1.001	1.001	1.001	1.001	1.000
17	1.002	1.000	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.000
18	1.003	1.000	1.000	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001
19	1.003	1.000	1.000	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001
20	1.001	1.000	1.000	1.002	1.001	1.001	1.001	1.001	1.001	1.001	1.001
21	1.001	1.000	1.000	1.000	1.001	1.000	1.000	1.001	1.001	1.000	1.000
22	1.001	1.000	1.000	1.000	1.000	1.001	1.000	1.000	1.000	1.000	1.000
23	1.001	1.000	1.000	1.000	1.001	1.001	1.000	1.000	1.000	1.000	1.000
24	1.002	1.000	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
25	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
26	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
27	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
28	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
29	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
30	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
31	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
32	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
33	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
34	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
35	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
36	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Female All Deaths: Total Completion Factors by Age

Lag	< 1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	> 84
0	8.747	7.261	7.515	6.474	5.498	5.384	4.884	4.454	4.018	3.702	3.230
1	2.513	2.207	2.160	2.078	1.943	1.921	1.830	1.741	1.650	1.564	1.474
2	1.644	1.398	1.413	1.431	1.415	1.387	1.336	1.293	1.251	1.213	1.182
3	1.381	1.222	1.207	1.251	1.256	1.228	1.190	1.161	1.137	1.115	1.099
4	1.261	1.145	1.139	1.178	1.181	1.162	1.129	1.107	1.090	1.076	1.067
5	1.202	1.105	1.106	1.130	1.138	1.122	1.094	1.077	1.063	1.054	1.048
6	1.163	1.072	1.073	1.100	1.104	1.092	1.071	1.057	1.046	1.040	1.035
7	1.130	1.055	1.056	1.076	1.079	1.068	1.053	1.043	1.034	1.029	1.026
8	1.105	1.046	1.037	1.055	1.061	1.053	1.041	1.033	1.026	1.022	1.020
9	1.086	1.029	1.025	1.041	1.047	1.041	1.033	1.026	1.020	1.017	1.015
10	1.074	1.021	1.018	1.031	1.037	1.033	1.025	1.021	1.016	1.013	1.012
11	1.063	1.014	1.012	1.024	1.030	1.026	1.019	1.017	1.013	1.011	1.009
12	1.051	1.008	1.009	1.018	1.023	1.021	1.015	1.013	1.010	1.009	1.007
13	1.044	1.008	1.009	1.014	1.018	1.017	1.012	1.011	1.008	1.007	1.006
14	1.039	1.005	1.005	1.011	1.013	1.014	1.010	1.009	1.007	1.006	1.006
15	1.031	1.000	1.004	1.009	1.011	1.012	1.008	1.008	1.006	1.005	1.005
16	1.026	1.000	1.004	1.008	1.009	1.010	1.007	1.007	1.006	1.005	1.005
17	1.022	1.000	1.002	1.005	1.008	1.009	1.006	1.006	1.005	1.004	1.004
18	1.021	1.000	1.001	1.005	1.007	1.007	1.005	1.005	1.004	1.004	1.004
19	1.018	1.000	1.001	1.003	1.006	1.006	1.004	1.004	1.004	1.003	1.003
20	1.015	1.000	1.001	1.002	1.004	1.005	1.004	1.003	1.003	1.002	1.002
21	1.013	1.000	1.001	1.000	1.003	1.004	1.003	1.003	1.002	1.002	1.002
22	1.012	1.000	1.001	1.000	1.003	1.003	1.003	1.002	1.002	1.001	1.001
23	1.010	1.000	1.001	1.000	1.002	1.003	1.002	1.002	1.002	1.001	1.001
24	1.009	1.000	1.001	1.000	1.002	1.002	1.002	1.002	1.001	1.001	1.001
25	1.007	1.000	1.000	1.000	1.002	1.002	1.001	1.001	1.001	1.001	1.001
26	1.004	1.000	1.000	1.000	1.001	1.002	1.001	1.001	1.001	1.001	1.000
27	1.004	1.000	1.000	1.000	1.001	1.002	1.001	1.001	1.001	1.000	1.000
28	1.003	1.000	1.000	1.000	1.001	1.001	1.001	1.001	1.001	1.000	1.000
29	1.003	1.000	1.000	1.000	1.000	1.001	1.001	1.001	1.000	1.000	1.000
30	1.002	1.000	1.000	1.000	1.000	1.001	1.001	1.000	1.000	1.000	1.000
31	1.002	1.000	1.000	1.000	1.000	1.000	1.001	1.000	1.000	1.000	1.000
32	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
33	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
34	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
35	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
36	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Male All Deaths: Week-to-Week Completion Factors by Age

Lag	< 1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	> 84
0	3.287	3.772	3.702	3.105	2.922	2.809	2.726	2.604	2.504	2.362	2.235
1	1.530	1.541	1.506	1.413	1.374	1.370	1.378	1.359	1.335	1.293	1.257
2	1.187	1.195	1.175	1.133	1.121	1.130	1.125	1.120	1.106	1.091	1.079
3	1.088	1.073	1.071	1.062	1.062	1.060	1.058	1.054	1.045	1.037	1.032
4	1.054	1.037	1.040	1.039	1.043	1.037	1.035	1.031	1.026	1.022	1.018
5	1.040	1.022	1.021	1.033	1.028	1.026	1.026	1.022	1.018	1.015	1.012
6	1.031	1.019	1.022	1.022	1.023	1.022	1.017	1.015	1.012	1.010	1.008
7	1.023	1.009	1.019	1.017	1.016	1.015	1.013	1.011	1.008	1.007	1.006
8	1.019	1.011	1.017	1.012	1.012	1.012	1.010	1.008	1.006	1.005	1.004
9	1.020	1.009	1.010	1.008	1.009	1.008	1.007	1.005	1.004	1.004	1.003
10	1.012	1.010	1.004	1.007	1.007	1.007	1.006	1.005	1.004	1.003	1.003
11	1.010	1.005	1.004	1.005	1.005	1.005	1.004	1.004	1.003	1.002	1.002
12	1.009	1.006	1.007	1.004	1.004	1.004	1.003	1.003	1.002	1.001	1.001
13	1.006	1.002	1.001	1.002	1.003	1.003	1.003	1.002	1.002	1.001	1.001
14	1.006	1.003	1.002	1.002	1.003	1.003	1.002	1.002	1.001	1.001	1.001
15	1.005	1.004	1.003	1.002	1.002	1.002	1.001	1.001	1.001	1.001	1.000
16	1.005	1.005	1.000	1.002	1.001	1.001	1.001	1.001	1.001	1.000	1.000
17	1.003	1.003	1.002	1.001	1.002	1.001	1.001	1.001	1.001	1.001	1.000
18	1.004	1.003	1.000	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001
19	1.003	1.000	1.000	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001
20	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001
21	1.003	1.000	1.000	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.000
22	1.001	1.000	1.000	1.000	1.001	1.000	1.001	1.000	1.000	1.000	1.000
23	1.001	1.000	1.000	1.001	1.000	1.001	1.000	1.000	1.000	1.000	1.000
24	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
25	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
26	1.001	1.000	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
27	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
28	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
29	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
30	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
31	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
32	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
33	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
34	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
35	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
36	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Male All Deaths: Total Completion Factors by Age

Lag	< 1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	> 84
0	8.466	8.626	8.166	6.190	5.633	5.365	5.112	4.687	4.245	3.730	3.332
1	2.576	2.287	2.206	1.993	1.928	1.910	1.875	1.800	1.695	1.579	1.491
2	1.683	1.484	1.465	1.411	1.403	1.395	1.361	1.325	1.270	1.221	1.186
3	1.418	1.242	1.246	1.245	1.251	1.235	1.210	1.183	1.148	1.120	1.099
4	1.304	1.158	1.164	1.173	1.178	1.165	1.144	1.122	1.098	1.079	1.065
5	1.237	1.116	1.119	1.128	1.129	1.123	1.105	1.088	1.070	1.056	1.047
6	1.189	1.092	1.095	1.093	1.098	1.094	1.077	1.065	1.051	1.041	1.034
7	1.154	1.071	1.072	1.069	1.073	1.071	1.059	1.049	1.038	1.030	1.026
8	1.128	1.061	1.052	1.051	1.056	1.055	1.046	1.038	1.029	1.023	1.020
9	1.106	1.050	1.034	1.039	1.044	1.043	1.036	1.030	1.023	1.018	1.016
10	1.084	1.041	1.024	1.030	1.035	1.035	1.029	1.024	1.019	1.014	1.012
11	1.071	1.031	1.020	1.023	1.027	1.027	1.023	1.019	1.015	1.011	1.010
12	1.061	1.026	1.016	1.018	1.022	1.022	1.018	1.015	1.012	1.009	1.008
13	1.051	1.020	1.009	1.014	1.017	1.018	1.015	1.013	1.010	1.008	1.007
14	1.045	1.018	1.009	1.012	1.014	1.015	1.012	1.011	1.009	1.006	1.006
15	1.038	1.016	1.007	1.010	1.011	1.011	1.010	1.009	1.007	1.006	1.005
16	1.033	1.012	1.004	1.008	1.009	1.009	1.009	1.008	1.007	1.005	1.005
17	1.028	1.006	1.004	1.007	1.008	1.008	1.008	1.007	1.006	1.005	1.004
18	1.026	1.004	1.002	1.005	1.006	1.007	1.007	1.006	1.005	1.004	1.004
19	1.022	1.001	1.002	1.004	1.005	1.006	1.006	1.005	1.004	1.003	1.003
20	1.018	1.001	1.002	1.003	1.004	1.005	1.005	1.004	1.004	1.003	1.002
21	1.017	1.000	1.001	1.003	1.003	1.004	1.004	1.004	1.003	1.002	1.002
22	1.014	1.000	1.001	1.002	1.003	1.003	1.003	1.003	1.002	1.002	1.001
23	1.013	1.000	1.001	1.002	1.002	1.003	1.003	1.003	1.002	1.001	1.001
24	1.012	1.000	1.001	1.001	1.002	1.002	1.003	1.002	1.002	1.001	1.001
25	1.010	1.000	1.001	1.001	1.001	1.002	1.002	1.002	1.001	1.001	1.001
26	1.008	1.000	1.001	1.001	1.001	1.002	1.002	1.001	1.001	1.001	1.001
27	1.007	1.000	1.000	1.001	1.001	1.001	1.001	1.001	1.001	1.000	1.000
28	1.006	1.000	1.000	1.001	1.001	1.001	1.001	1.001	1.001	1.000	1.000
29	1.006	1.000	1.000	1.001	1.000	1.001	1.001	1.001	1.001	1.000	1.000
30	1.003	1.000	1.000	1.001	1.000	1.001	1.001	1.001	1.000	1.000	1.000
31	1.003	1.000	1.000	1.001	1.000	1.001	1.001	1.000	1.000	1.000	1.000
32	1.002	1.000	1.000	1.000	1.000	1.001	1.000	1.000	1.000	1.000	1.000
33	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
34	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
35	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
36	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Female COVID-19 Deaths: Week-to-Week Completion Factors by Age

Lag	< 1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	> 84
0	5.035	5.035	5.035	6.473	5.881	5.825	4.894	4.927	4.964	4.973	5.046
1	1.759	1.759	2.069	1.966	1.859	2.014	1.886	1.899	1.820	1.746	1.693
2	1.195	1.252	1.281	1.252	1.233	1.321	1.268	1.242	1.215	1.193	1.169
3	1.072	1.100	1.092	1.095	1.108	1.127	1.101	1.098	1.085	1.066	1.060
4	1.063	1.050	1.043	1.056	1.063	1.048	1.055	1.043	1.040	1.032	1.032
5	1.038	1.034	1.035	1.031	1.041	1.020	1.029	1.022	1.020	1.020	1.016
6	1.030	1.017	1.015	1.022	1.020	1.018	1.017	1.013	1.013	1.011	1.009
7	1.022	1.009	1.018	1.020	1.012	1.013	1.012	1.009	1.007	1.007	1.006
8	1.018	1.016	1.012	1.013	1.004	1.008	1.006	1.006	1.006	1.005	1.004
9	1.011	1.008	1.007	1.010	1.007	1.006	1.005	1.004	1.003	1.004	1.003
10	1.010	1.007	1.005	1.008	1.006	1.004	1.004	1.004	1.003	1.002	1.003
11	1.012	1.006	1.004	1.006	1.002	1.004	1.004	1.003	1.003	1.003	1.002
12	1.007	1.000	1.000	1.003	1.002	1.003	1.003	1.003	1.002	1.002	1.002
13	1.006	1.004	1.004	1.004	1.002	1.003	1.003	1.002	1.002	1.001	1.001
14	1.007	1.005	1.001	1.002	1.000	1.001	1.002	1.002	1.001	1.001	1.001
15	1.005	1.000	1.000	1.001	1.000	1.004	1.000	1.001	1.001	1.001	1.001
16	1.004	1.000	1.002	1.002	1.000	1.000	1.001	1.001	1.001	1.001	1.001
17	1.002	1.000	1.001	1.001	1.000	1.000	1.000	1.001	1.000	1.001	1.000
18	1.003	1.000	1.000	1.001	1.000	1.000	1.000	1.001	1.000	1.000	1.000
19	1.003	1.000	1.000	1.001	1.000	1.001	1.000	1.001	1.000	1.000	1.000
20	1.001	1.000	1.000	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000
21	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
22	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
23	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
24	1.002	1.000	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
25	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
26	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
27	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.001	1.000	1.000	1.000
28	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
29	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
30	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
31	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
32	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
33	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
34	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
35	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
36	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Female COVID-19 Deaths: Total Completion Factors by Age

Lag	< 1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	> 84
0	14.571	14.217	16.906	20.916	17.440	19.905	14.836	14.297	13.227	12.089	11.498
1	2.894	2.824	3.358	3.231	2.966	3.417	3.032	2.902	2.664	2.431	2.279
2	1.645	1.605	1.623	1.644	1.595	1.697	1.608	1.528	1.464	1.392	1.346
3	1.377	1.282	1.267	1.313	1.294	1.285	1.268	1.230	1.205	1.167	1.152
4	1.284	1.166	1.159	1.199	1.168	1.140	1.151	1.121	1.110	1.095	1.087
5	1.208	1.111	1.111	1.135	1.099	1.087	1.091	1.075	1.068	1.060	1.053
6	1.164	1.074	1.074	1.101	1.056	1.066	1.060	1.051	1.047	1.039	1.037
7	1.131	1.056	1.057	1.077	1.035	1.047	1.043	1.038	1.033	1.028	1.027
8	1.106	1.047	1.038	1.056	1.023	1.033	1.030	1.029	1.026	1.021	1.021
9	1.087	1.031	1.026	1.043	1.019	1.025	1.024	1.023	1.019	1.016	1.017
10	1.075	1.022	1.019	1.032	1.012	1.020	1.019	1.019	1.016	1.013	1.014
11	1.064	1.015	1.013	1.025	1.006	1.016	1.015	1.015	1.013	1.010	1.010
12	1.052	1.009	1.010	1.019	1.004	1.012	1.011	1.012	1.010	1.008	1.008
13	1.045	1.009	1.010	1.015	1.002	1.008	1.007	1.009	1.008	1.006	1.006
14	1.039	1.005	1.005	1.011	1.000	1.005	1.004	1.007	1.006	1.004	1.005
15	1.031	1.000	1.004	1.009	1.000	1.005	1.002	1.006	1.004	1.004	1.004
16	1.026	1.000	1.004	1.008	1.000	1.001	1.002	1.005	1.003	1.003	1.003
17	1.022	1.000	1.002	1.005	1.000	1.001	1.001	1.004	1.003	1.002	1.002
18	1.021	1.000	1.001	1.005	1.000	1.001	1.001	1.003	1.002	1.002	1.002
19	1.018	1.000	1.001	1.003	1.000	1.001	1.001	1.002	1.002	1.001	1.002
20	1.015	1.000	1.001	1.002	1.000	1.000	1.000	1.001	1.002	1.001	1.001
21	1.013	1.000	1.001	1.000	1.000	1.000	1.000	1.001	1.001	1.001	1.001
22	1.012	1.000	1.001	1.000	1.000	1.000	1.000	1.001	1.001	1.001	1.001
23	1.010	1.000	1.001	1.000	1.000	1.000	1.000	1.001	1.001	1.001	1.001
24	1.009	1.000	1.001	1.000	1.000	1.000	1.000	1.001	1.001	1.001	1.000
25	1.007	1.000	1.000	1.000	1.000	1.000	1.000	1.001	1.001	1.001	1.000
26	1.004	1.000	1.000	1.000	1.000	1.000	1.000	1.001	1.001	1.001	1.000
27	1.004	1.000	1.000	1.000	1.000	1.000	1.000	1.001	1.000	1.000	1.000
28	1.003	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
29	1.003	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
30	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
31	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
32	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
33	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
34	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
35	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
36	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Male COVID-19 Deaths: Week-to-Week Completion Factors by Age

Lag	< 1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	> 84
0	4.994	4.994	4.994	6.452	6.072	4.966	5.122	5.117	5.196	4.837	4.398
1	2.072	2.086	1.768	1.913	1.980	1.954	1.932	1.850	1.806	1.741	1.704
2	1.298	1.307	1.286	1.239	1.279	1.267	1.249	1.231	1.220	1.193	1.177
3	1.121	1.106	1.104	1.095	1.091	1.106	1.098	1.093	1.079	1.072	1.060
4	1.068	1.051	1.054	1.053	1.063	1.047	1.046	1.041	1.038	1.037	1.034
5	1.044	1.026	1.025	1.037	1.031	1.027	1.028	1.026	1.024	1.020	1.016
6	1.031	1.019	1.022	1.022	1.026	1.015	1.017	1.014	1.013	1.012	1.008
7	1.023	1.009	1.019	1.017	1.010	1.011	1.012	1.011	1.008	1.007	1.005
8	1.019	1.011	1.017	1.012	1.008	1.011	1.008	1.007	1.006	1.005	1.005
9	1.020	1.009	1.010	1.008	1.005	1.008	1.006	1.005	1.005	1.004	1.004
10	1.012	1.010	1.004	1.007	1.004	1.004	1.005	1.004	1.004	1.003	1.003
11	1.010	1.005	1.004	1.005	1.013	1.004	1.004	1.003	1.003	1.003	1.003
12	1.009	1.006	1.007	1.004	1.004	1.002	1.005	1.003	1.002	1.002	1.002
13	1.007	1.003	1.002	1.003	1.006	1.005	1.004	1.003	1.002	1.002	1.001
14	1.006	1.003	1.002	1.002	1.000	1.004	1.002	1.002	1.001	1.001	1.001
15	1.005	1.004	1.003	1.002	1.000	1.002	1.001	1.002	1.001	1.001	1.001
16	1.005	1.005	1.000	1.002	1.000	1.002	1.001	1.001	1.001	1.001	1.001
17	1.003	1.003	1.002	1.001	1.003	1.001	1.001	1.001	1.000	1.001	1.000
18	1.004	1.003	1.000	1.001	1.002	1.001	1.001	1.001	1.001	1.000	1.000
19	1.003	1.000	1.000	1.001	1.001	1.001	1.000	1.001	1.001	1.000	1.000
20	1.001	1.001	1.001	1.001	1.000	1.001	1.001	1.000	1.001	1.000	1.000
21	1.003	1.000	1.000	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000
22	1.001	1.000	1.000	1.000	1.000	1.001	1.000	1.000	1.000	1.000	1.000
23	1.001	1.000	1.000	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000
24	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
25	1.002	1.000	1.000	1.000	1.000	1.000	1.001	1.000	1.000	1.000	1.000
26	1.001	1.000	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
27	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
28	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
29	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
30	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
31	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
32	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
33	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
34	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
35	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
36	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Male COVID-19 Deaths: Total Completion Factors by Age

Lag	< 1	1-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	> 84
0	20.000	17.759	14.853	19.997	19.976	15.677	15.600	14.434	13.784	11.891	10.164
1	4.005	3.556	2.974	3.099	3.290	3.157	3.045	2.821	2.653	2.458	2.311
2	1.933	1.704	1.682	1.620	1.662	1.615	1.576	1.525	1.469	1.412	1.356
3	1.488	1.304	1.308	1.307	1.300	1.275	1.262	1.239	1.205	1.183	1.152
4	1.327	1.179	1.185	1.194	1.192	1.153	1.149	1.134	1.117	1.104	1.087
5	1.243	1.122	1.124	1.134	1.121	1.101	1.099	1.089	1.076	1.065	1.051
6	1.190	1.093	1.096	1.094	1.087	1.072	1.069	1.062	1.051	1.044	1.035
7	1.155	1.072	1.073	1.070	1.060	1.057	1.051	1.047	1.038	1.032	1.027
8	1.129	1.063	1.053	1.052	1.050	1.045	1.038	1.036	1.030	1.024	1.021
9	1.107	1.051	1.035	1.040	1.041	1.034	1.031	1.029	1.024	1.019	1.017
10	1.085	1.042	1.025	1.031	1.035	1.025	1.025	1.023	1.019	1.015	1.012
11	1.073	1.032	1.021	1.024	1.031	1.022	1.020	1.019	1.015	1.012	1.010
12	1.062	1.027	1.017	1.019	1.017	1.018	1.016	1.015	1.012	1.010	1.007
13	1.052	1.021	1.010	1.016	1.013	1.016	1.011	1.012	1.010	1.008	1.005
14	1.045	1.018	1.009	1.012	1.007	1.012	1.008	1.010	1.008	1.006	1.004
15	1.038	1.016	1.007	1.010	1.007	1.008	1.006	1.008	1.007	1.005	1.003
16	1.033	1.012	1.004	1.008	1.007	1.006	1.005	1.006	1.006	1.004	1.002
17	1.028	1.007	1.004	1.007	1.007	1.005	1.004	1.005	1.005	1.003	1.002
18	1.026	1.004	1.002	1.005	1.004	1.003	1.003	1.003	1.004	1.002	1.002
19	1.022	1.001	1.002	1.004	1.001	1.002	1.002	1.003	1.004	1.002	1.001
20	1.018	1.001	1.002	1.003	1.000	1.002	1.002	1.002	1.003	1.001	1.001
21	1.017	1.000	1.001	1.003	1.000	1.001	1.001	1.002	1.002	1.001	1.001
22	1.014	1.000	1.001	1.002	1.000	1.001	1.001	1.002	1.002	1.001	1.001
23	1.013	1.000	1.001	1.002	1.000	1.000	1.001	1.002	1.002	1.001	1.001
24	1.012	1.000	1.001	1.001	1.000	1.000	1.001	1.001	1.001	1.001	1.001
25	1.010	1.000	1.001	1.001	1.000	1.000	1.001	1.001	1.001	1.001	1.000
26	1.008	1.000	1.001	1.001	1.000	1.000	1.000	1.001	1.001	1.001	1.000
27	1.007	1.000	1.000	1.001	1.000	1.000	1.000	1.001	1.001	1.000	1.000
28	1.006	1.000	1.000	1.001	1.000	1.000	1.000	1.001	1.001	1.000	1.000
29	1.006	1.000	1.000	1.001	1.000	1.000	1.000	1.001	1.000	1.000	1.000
30	1.003	1.000	1.000	1.001	1.000	1.000	1.000	1.001	1.000	1.000	1.000
31	1.003	1.000	1.000	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000
32	1.002	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
33	1.001	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
34	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
35	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
36	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Appendix C: Additional Analysis on the Mortality Impacts of COVID-19

There has been a large amount of analysis performed by many different groups on the mortality impact of COVID-19. This document explicitly does not provide a summary review of this work, nor its relationship to the analysis described above. Instead, the intent was to provide an objective measurement of the observed deaths relative to a range of reasonable expectations. The following links are a subset of possible references that can be considered to pursue an enhanced understanding of the underling dynamics.

https://covid.cdc.gov/covid-data-tracker/#trends_dailytrendsdeaths

https://www.cdc.gov/nchs/nvss/vsrr/covid19/excess_deaths.htm

https://jamanetwork.com/journals/jama/fullarticle/2774445

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