Subject 1. Mortality After Age Retirement

The ratios of actual to expected deaths based on the 2021 Base Year RRB Annuitants Mortality Table (with and without mortality improvement scale), which is used for the 29th Valuation, are shown below for recent years.

Policy Year	Mortality Ratio	With Mortality Improvement
2015-2016	0.988	
2016-2017	1.007	*Basis for*
2017-2018	0.991	*29th valuation*
2018-2019	0.968	*assumption*
2019-2020	0.987	
2020-2021	1.117	
2021-2022	1.070	
2022-2023	0.981	0.988
2023-2024	0.952	0.965

A few observations can be made from the experience data above,

1. Mortality has shown continuous improvement since the COVID pandemic in 2020–2021 through 2023–2024.

2. Mortality experience was worse than expected during 2020–2022, most likely due to the effects of COVID pandemic.

3. Mortality experience in the most recent two years 2022-2024 is similar to or better than in the pre-COVID period.

Our practice is to update the Annuitants Mortality Table for each triennial valuation to reflect the latest mortality experience for this group. The Base Year RRB Annuitants Mortality Table for the 28th Actuarial Valuation was developed based on three years of experience (2015-2018). For the 29th Valuation, we expanded the experience period to six years (2015–2021) to lessen the impact of excess mortality associated with COVID in 2020–2021. The six-year data, with the final policy year (2020–2021) weighted at 50%, was used to develop the assumption rates for the 29th Actuarial Valuation.

Based on the latest experience above, we decided to return to the pre-COVID practice of using the latest three years of data (2021–2024) to develop the assumption rates for the 30th Actuarial Valuation. This approach allows the resulting rates to more closely reflect current experience. Because of the higher than expected mortality during the 2021-2022 policy year and consistent with the approach used in the 29th Valuation, we applied a 50% weighting factor to the 2021–2022 Covid period experience data.

In developing the new rates, we graduated the weighted crude data at ages 60 and above based on the three-year data period (2021–2024). Figure 1.1 presents the crude rates (2021-2024 with first policy year weighted), the graduated (proposed) rates for the 30th Actuarial Valuation, and the 29th Valuation rates improved to 2022.

Tables 1.1 through 1.3 present the 2021-2024 mortality experience (weighted) of railroad age annuitants.

Table 1.1 shows the crude experience by age group. In general, the proposed rates for the 30th valuation exhibit a slightly better fit than the 29th valuation rates. The aggregate ratio of actual to expected deaths based on the proposed 30th valuation rates is 100.0%.

The proposed rates in aggregate are about 0.5% lower than the 29th valuation rates for 2022 after applying the mortality improvement scale. On average, the proposed rates would project about 45 less deaths per year during 2021-2024 than the current rates. The average deaths per year during 2021-2024 are about 8,400.

Table 1.2 compares the experience by policy year.

Table 1.3 compares the experience by duration since retirement.

Table 1.4 shows the proposed rates for the 30th Valuation.

To evaluate how data weighting influences rate development, we calculated the following actual-to-expected mortality ratios.

2021-2024

Study Period	ACT/Exp [1]	ACT/Exp [2]	ACT/Exp [3]
With Weighting [4]	1.000	0.988	0.995
Without Weighting	1.014	1.002	1.009

[1] ACT/Exp based on the Proposed 30V base rates for 2021-2024.
[2] ACT/Exp based on 29V base rates for 2021.
[3] ACT/Exp based on 29V base rates with Mortality Improvement Scale to 2022.
[4] 2021-2022 experience is weighted 50%.

Based on the results above, had we used 100% crude data for all three years as the basis for graduation, the proposed rates would be 0.9% higher, instead of 0.5% lower, than the projected valuation rates for the 29th Valuation.

As was done with the 29th valuation, a separate mortality improvement scale, which will be discussed later in this report, is recommended for use in conjunction with the proposed base rates for the 30th valuation. Use of the mortality improvement scale is consistent with current actuarial practice and provides for more explicit mortality improvement. In theory, using the mortality

improvement scale could do a better job of projecting year-by-year mortality than using a fixed percentage margin.

For the 30th valuation, we are naming the new table the 2022 RRB Annuitants Mortality Table since that's the mid-year of experience data and the improvement scale will be applied from that year forward.

Figure 1.2 shows crude mortality rates in 5-year age groups on a logarithmic scale for each policy year starting from 1993 to 2023 and illustrates the difference in mortality improvement among the age groups.

(1) Before policy year 2020-2021, historically there is considerable improvement at ages below 90. The mortality improvement has slowed before 2020, especially for age 60-64 group which has worsened before 2020.
(2) There is little or no improvement in the highest age groups, 90-94, 95-99, and 100-104.
(3) In policy years 2020-2021 and 2021-2022, the mortality experience became much worse (+11.7% and +7.0%, respectively), most likely due to excess deaths during the COVID pandemic.
(4) The recent mortality levels have returned to pre-COVID levels.

The development of mortality improvement scale will be discussed separately in **Subject 4**.

Table 1. Mortality experience of railroad age annuitants[a] between anniversaries of retirement in 2021 and 2024[i], by sex and type of retirement

					Age[b]				
	All ages	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95 & over
A. Both sexes combined									
Exposed	455,461	32,148	102,192	124,285	90,324	50,400	31,101	17,493	7,520
Actual deaths	20,949	259	1,316	2,751	3,590	3,428	3,722	3,581	2,304
Age specific death rates (per thousand)	46.0	8.0	12.9	22.1	39.7	68.0	119.7	204.7	306.3
Ratio of actual to expected deaths									
PubG-2016 Male[c]	118.4%	106.3%	119.9%	127.3%	129.3%	120.6%	114.8%	112.5%	107.2%
29V Base Year RRB[d]	98.8%	102.0%	96.1%	95.3%	99.4%	98.0%	99.6%	102.5%	97.5%
29V Base Year RRB projected to 2022[e]	99.5%	102.8%	96.9%	96.1%	100.2%	98.8%	100.3%	103.1%	97.9%
Proposed 30V RRB[f]	100.0%	97.9%	99.6%	100.2%	100.5%	98.5%	100.2%	100.7%	100.2%
B. Male									
Exposed	404,454	28,827	92,164	110,464	80,055	44,748	27,313	15,172	5,713
Actual deaths	18,851	246	1,246	2,543	3,312	3,147	3,357	3,222	1,780
Age specific death rates (per thousand)	46.6	8.5	13.5	23.0	41.4	70.3	122.9	212.3	311.6
Ratio of actual to expected deaths									
PubG-2016 Male[c]	122.9%	112.5%	125.8%	132.5%	134.4%	124.8%	117.9%	116.9%	109.8%
29V Base Year RRB projected to 2022[e]	103.0%	108.9%	101.7%	100.0%	104.2%	102.2%	103.1%	107.1%	100.0%
Proposed 30V RRB[f]	103.6%	103.7%	104.5%	104.3%	104.5%	102.0%	103.0%	104.7%	102.2%
C. Female									
Exposed	51,007	3,322	10,028	13,821	10,269	5,652	3,788	2,322	1,807
Actual deaths	2,098	13	70	208	279	281	365	360	524
Age specific death rates (per thousand)	41.1	3.9	7.0	15.0	27.1	49.6	96.4	154.9	289.7
Ratio of actual to expected deaths									
2013 RRB Widows[g], 1-year rateback	96.7%	44.3%	52.2%	72.3%	84.8%	95.6%	111.2%	107.1%	120.9%
29V Base Year RRB projected to 2022[e]	75.8%	50.2%	52.7%	64.9%	68.7%	71.8%	80.5%	77.2%	91.4%
Proposed 30V RRB[f]	76.4%	47.8%	54.2%	67.7%	68.9%	71.7%	80.4%	75.4%	94.1%
D. Immediate[h]									
Exposed	307,237	25,080	74,456	84,540	58,360	31,801	18,592	9,846	4,565
Actual deaths	13,086	195	890	1,837	2,320	2,135	2,254	2,055	1,401
Age specific death rates (per thousand)	42.6	7.8	12.0	21.7	39.8	67.1	121.2	208.7	306.9
Ratio of actual to expected deaths									
29V Base Year RRB projected to 2022[e]	99.0%	99.3%	90.2%	94.6%	100.3%	97.6%	102.0%	105.0%	98.0%
Proposed 30V RRB[f]	99.6%	94.6%	92.7%	98.6%	100.6%	97.4%	101.9%	102.6%	100.4%
E. Deferred[h]									
Exposed	148,224	7,069	27,736	39,745	31,964	18,599	12,510	7,647	2,955
Actual deaths	7,863	64	426	914	1,270	1,293	1,469	1,526	903
Age specific death rates (per thousand)	53.0	9.1	15.3	23.0	39.7	69.5	117.4	199.6	305.4
Ratio of actual to expected deaths									
29V Base Year RRB projected to 2022[e]	100.3%	115.2%	114.5%	99.3%	100.0%	100.7%	97.9%	100.7%	97.8%
Proposed 30V RRB[f]	100.7%	109.8%	117.7%	103.6%	100.2%	100.5%	97.8%	98.4%	100.0%

[a] Nondisability retirement.

[b] Age nearest birthday at the beginning of the year of exposure.

[c] Pub-2016 Public Retirement Plans Mortality Tables, Society of Actuaries

[d] 2021 Base Year RRB Annuitants Mortality Table.

[e] 2021 Base Year RRB Annuitants Mortality Table projected to 2022 using 2021 RRB Mortality Improvement Scale.

[f] Proposed 2022 RRB Annuitants Mortality Table for the 30th Actuarial Valuation.

[g] 2021 RRB Mortality Table for Widows.

[h] Immediate retirements are those which occur in the same calendar year as, or the calendar year following, the year of last employment
    in the railroad industry; all others are deferred retirements.

[i] 2021-2022 experience is weighted 50%.

Table 2. Mortality experience of railroad age annuitants[a] between anniversaries of retirement in 2021 and 2024[g], by year

| | Age[b] | | | | | | | | |
	All ages	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95 & over
1. 2021-2024 experience									
Exposed[c]	455,461	32,148	102,192	124,285	90,324	50,400	31,101	17,493	7,520
Actual deaths	20,949	259	1,316	2,751	3,590	3,428	3,722	3,581	2,304
Crude rate per 1,000	46.0	8.0	12.9	22.1	39.7	68.0	119.7	204.7	306.3
Ratio Act./Exp. I[d]	98.8%	102.0%	96.1%	95.3%	99.4%	98.0%	99.6%	102.5%	97.5%
Ratio Act./Exp. II[e]	99.5%	102.8%	96.9%	96.1%	100.2%	98.8%	100.3%	103.1%	97.9%
Ratio Act./Exp. III[f]	100.0%	97.9%	99.6%	100.2%	100.5%	98.5%	100.2%	100.7%	100.2%
2. Crude rate per 1,000 for individual years									
2021-2022	49.6	9.1	14.5	23.7	45.4	75.4	127.9	215.7	324.1
2022-2023	45.5	7.7	13.1	22.3	39.5	67.5	119.1	200.5	299.0
2023-2024	44.6	7.7	11.7	21.1	37.5	65.2	115.9	202.7	304.6
3. Ratio Act./Exp. for individual years I[d]									
2021-2022	107.0%	115.8%	108.9%	102.2%	112.3%	107.1%	106.3%	107.6%	103.7%
2022-2023	98.1%	97.1%	97.8%	96.3%	98.9%	97.3%	99.2%	100.3%	95.5%
2023-2024	95.2%	97.9%	86.9%	90.8%	94.2%	94.5%	96.4%	101.8%	96.3%
4. Ratio Act./Exp. for individual years II[e]									
2021-2022	107.8%	116.7%	109.7%	103.0%	113.2%	107.9%	107.0%	108.2%	104.2%
2022-2023	98.8%	97.9%	98.6%	97.1%	99.7%	98.1%	99.9%	100.9%	95.9%
2023-2024	95.8%	98.7%	87.6%	91.6%	95.0%	95.3%	97.1%	102.3%	96.7%
5. Ratio Act./Exp. for individual years III[f]									
2021-2022	108.3%	111.2%	112.8%	107.4%	113.4%	107.7%	106.9%	105.7%	106.5%
2022-2023	99.3%	93.2%	101.4%	101.3%	100.0%	97.9%	99.8%	98.6%	98.1%
2023-2024	96.4%	94.0%	90.0%	95.5%	95.2%	95.0%	97.0%	100.0%	99.1%

[a] Nondisability retirement.

[b] Age nearest birthday at the beginning of the year of exposure.

[c] Exposure is between anniversaries of retirement in indicated years.

[d] Expected based on 2021 Base Year RRB Annuitants Mortality Table.

[e] Expected based on 2021 Base Year RRB Annuitants Mortality Table projected to 2022 using 2021 RRB Mortality Improvement Scale.

[f] Expected based on the Proposed 2022 RRB Annuitants Mortality Table for the 30th Actuarial Valuation.

[g] 2021-2022 experience is weighted 50%.

Table 1.3. Mortality ratios for railroad age annuitants on a select and ultimate
basis between anniversaries of retirement in 2021 and 2024 [d]

Duration	Exposure	Actual deaths	Crude rate per 1,000	Ratio Act./Exp.[a]	Ratio Act./Exp.[b]	Ratio Act./Exp.[c]
0	13,441	145	10.8	106.6%	107.5%	107.9%
1	14,837	155	10.4	93.8	94.6	95.1
2	16,353	173	10.6	87.5	88.2	88.8
3	17,737	205	11.6	88.0	88.7	90.0
4	19,061	243	12.7	89.8	90.5	92.1
5	20,950	312	14.9	96.8	97.6	101.0
6	22,026	335	15.2	93.7	94.5	97.3
7	23,013	396	17.2	94.5	95.3	98.2
8	23,095	420	18.2	91.6	92.3	95.2
9	22,646	482	21.3	97.4	98.2	100.9
10 & over	262,305	18,085	68.9	99.6	100.3	100.5
All durations	455,461	20,949	46.0	98.8%	99.5%	100.0%

[a] Expected based on 2021 Base Year RRB Annuitants Mortality Table.

[b] Expected based on 2021 Base Year RRB Annuitants Mortality Table projected to 2022 using 2021 RRB Mortality Improvement Scale.

[c] Expected based on the Proposed 2022 RRB Annuitants Mortality Table for the 30th Actuarial Valuation.

[d] 2021-2022 experience is weighted 50%.

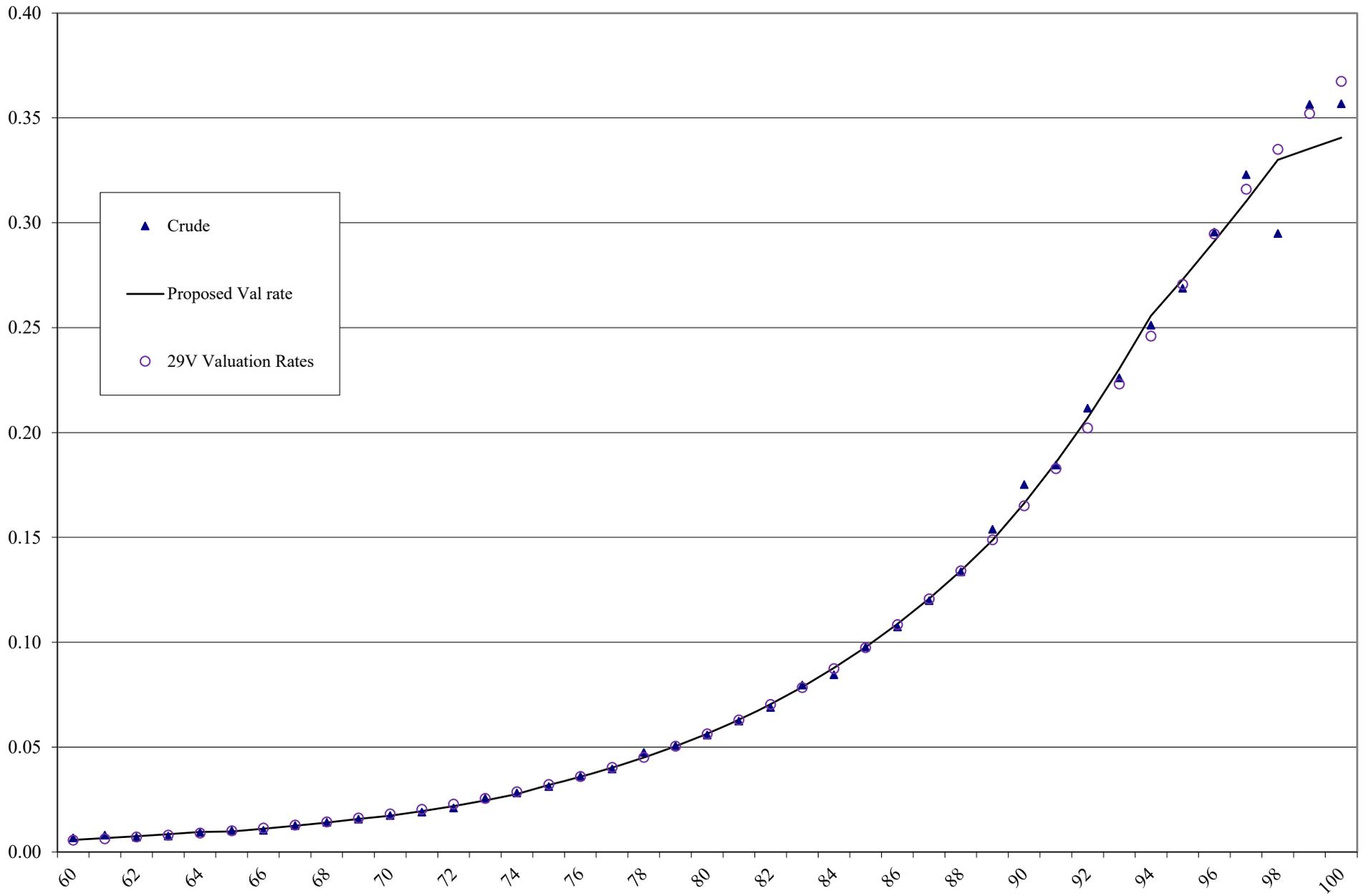**Figure 1.1 Mortality Experience of Age Annuitants**

Table 1.4. 2022 Base Year RRB Annuitants Mortality Table

Age[a]	$1,000q_x$	Age[a]	$1,000q_x$
60	5.81	95	272.98
61	6.58	96	291.18
62	7.44	97	310.19
63	8.41	98	330.01
64	9.50	99	335.35
65	9.76	100	340.62
66	11.01	101	345.82
67	12.42	102	350.94
68	14.01	103	352.56
69	15.78	104	354.17
70	17.26	105	355.79
71	19.43	106	357.40
72	21.86	107	359.00
73	24.57	108	360.60
74	27.61	109	362.20
75	31.93	110	1,000.00
76	35.83		
77	40.18		
78	45.03		
79	50.42		
80	56.42		
81	63.07		
82	70.46		
83	78.63		
84	87.67		
85	97.65		
86	108.66		
87	120.77		
88	134.07		
89	148.64		
90	166.27		
91	185.67		
92	206.97		
93	230.25		
94	255.61		

[a] Age nearest birthday.

Figure 1.2   Historical Crude Mortality Experience of Age Annuitants
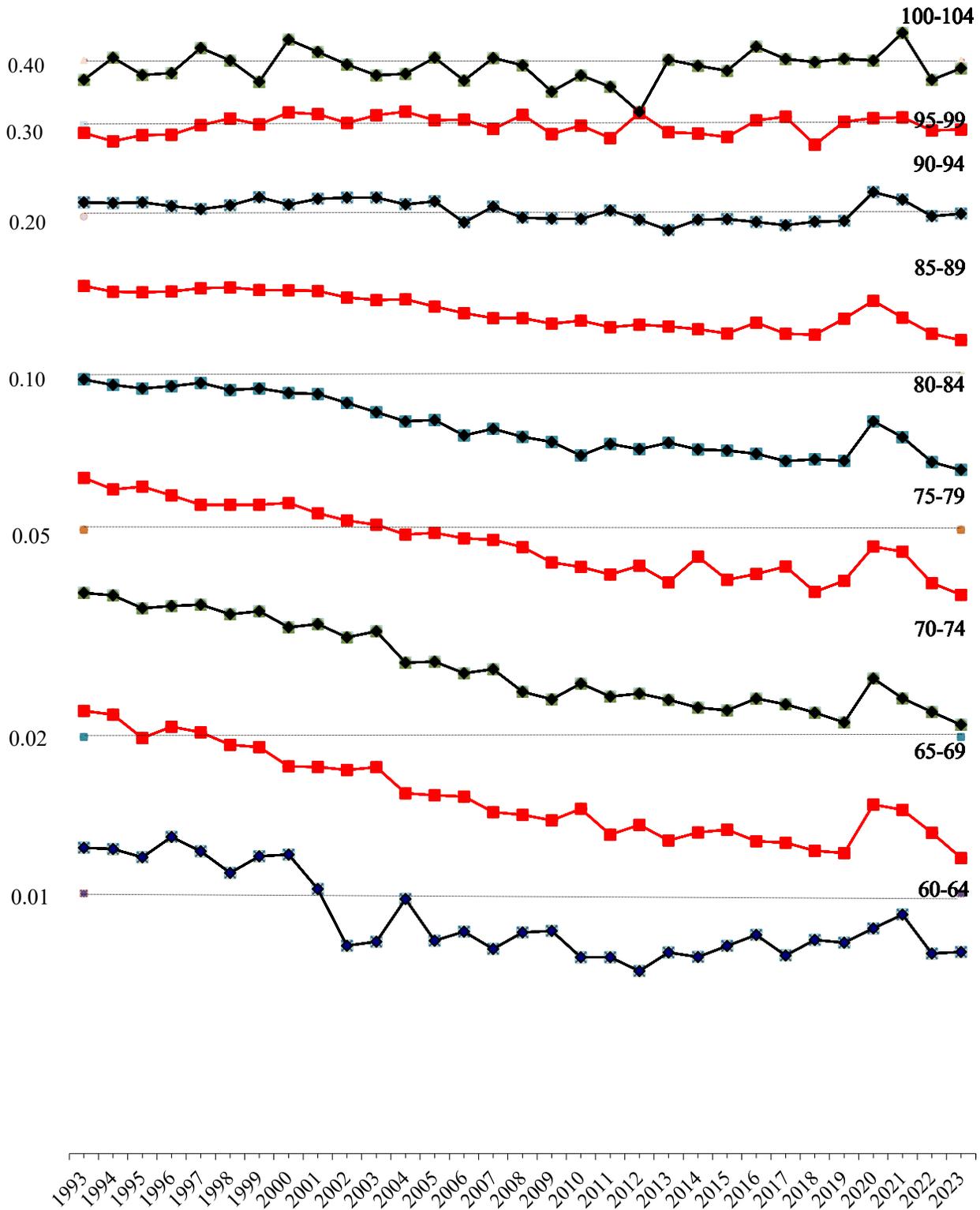
Subject 2. Mortality After Disability Retirement

The ratios of actual-to-expected deaths, based on the 2021 Base Year RRB Disabled Annuitants Mortality Tables (with and without the mortality improvement scale), which are used for the 29th Valuation, are shown below for recent years.

Policy Year	Disabled Annuitant with Freeze Mortality Ratio	Disabled Annuitant with Freeze With Mortality Improvement	Disabled Annuitant w/o Freeze Mortality Ratio	Disabled Annuitant w/o Freeze With Mortality Improvement
2015-2016	0.981		0.988	
2016-2017	0.995		1.016	
2017-2018	0.976		1.019	
2018-2019	0.951		0.944	
2019-2020	1.017		0.980	
2020-2021	1.139		1.126	
2021-2022	1.088		1.055	
2022-2023	0.995	1.003	0.996	1.003
2023-2024	0.938	0.953	0.925	0.939

The mortality has generally improved in recent years for both groups of disabled annuitants.

Based on the latest experience above and consistent with the approach used for age annuitants in Subject 1, we decided to develop mortality rates of disability annuitants for the 30th Actuarial Valuation using the same three years of data (2021–2024), with the 2021–2022 COVID-period experience weighted at 50%.

The proposed 2022 RRB Mortality Table for Disabled Annuitants with Disability Freeze and the proposed 2022 RRB Mortality Table for Disabled Annuitants without Disability Freeze are shown in tables 2.4 and 2.5, respectively.

In aggregate, the proposed 2022 RRB Mortality rates for Disabled Annuitants with a disability freeze are approximately 0.1% lower than the rates used in the 29th Valuation. For disabled annuitants without a disability freeze, the proposed rates are about 1.3% lower than the rates used in the 29th Valuation. These proposed rates would project roughly 3 fewer deaths per year for disabled annuitants with a disability freeze and about 12 fewer deaths per year for those without a disability freeze during 2021–2024. The average numbers of deaths per year during 2021–2024 were approximately 2,400 and 900, respectively.

Comparisons of the crude and graduated (proposed) rates are illustrated in figures 2.1 and 2.2.

Table 2.1 shows crude rates of death by 5-year age group and by duration. Exposure is highly concentrated at older ages (60+) and at longer durations, with durations 5 and above comprising roughly 88% of total exposure. As expected, mortality rates increase with age, reaching nearly 11% at ages 80–84 and about 20% at ages 85+ for duration 5+. The select period (durations 0–4) exhibits modest variation in crude rates. Their rates are relatively lower, largely because individuals in these durations are generally younger. On average, their mortality levels are comparable to those of younger annuitants at duration 5+. For this reason, we have historically not used select rates based on duration; the aggregate tables do a good job of projecting deaths.

Table 2.2 shows crude rates of death categorized by age and disability freeze eligibility (i.e., qualified under the social security definition of disability) and actual to expected mortality ratios. Consistent with prior experience, the crude rates are higher in each 5-year age group for the annuitants with a disability freeze.

To evaluate how data weighting influences rate development, we calculated the following actual-to-expected mortality ratios.

2021-2024	Disabled Annuitant with Freeze			Disabled Annuitant w/o Freeze		
Study Period	ACT/Exp [1]	ACT/Exp [2]	ACT/Exp [3]	ACT/Exp [1]	ACT/Exp [2]	ACT/Exp [3]
With Weighting [4]	1.000	0.991	0.999	1.000	0.980	0.987
Without Weighting	1.016	1.007	1.015	1.013	0.992	1.000

[1] ACT/Exp based on the Proposed 30V base rates for 2021-2024

[2] ACT/Exp based on 29V base rates for 2021

[3] ACT/Exp based on 29V base rates projected with Mortality Improvement Scale to 2022

[4] 2021-2022 experience is weighted 50%.

Based on the results above, had we used 100% crude data for all three years as the basis for graduation, the proposed rates would be 1.5% higher, rather than 0.1% lower, than the valuation rates for the 29th Valuation for disabled annuitants with freeze. For disabled annuitants without freeze, the proposed rates would be almost the same, rather than 1.3% lower, as the valuation rates for the 29th Valuation.

As with the Annuitants Mortality Table, I recommend that the Mortality Improvement Scale is used in conjunction with the rates for Disabled Annuitants with Disability Freeze and the rates for Disabled Annuitants without Disability Freeze to provide for mortality improvement.

Table 2.3 shows the percentage of disabled annuitants who would have qualified for a benefit under Social Security disability standards. This table is for informational purposes.

Table 2.1 Age specific death rates of railroad disability annuitants between anniversaries
of retirement in 2021 and 2024 [b], by age and duration

Select section

			Age at retirement [a]				
	All ages	Under 40	40-44	45-49	50-54	55-59	60 & over
Exposed							
Duration 0	3,694	71	244	451	894	1,155	881
1	4,209	98	276	560	962	1,325	988
2	4,201	127	283	638	898	1,311	945
3	3,991	141	276	616	842	1,251	866
4	3,830	144	274	522	828	1,271	793
Actual deaths							
Duration 0	93	3	7	14	24	23	23
1	106	5	6	16	17	33	30
2	93	2	4	10	15	45	18
3	93	1	6	11	16	35	25
4	87	-	3	10	17	33	26
Crude rate per 1,000							
Duration 0	25.0	35.2	28.7	31.1	26.3	19.5	26.1
1	25.2	51.2	19.9	28.6	17.7	24.9	29.9
2	22.1	11.8	14.2	15.7	16.1	34.3	19.0
3	23.3	7.1	21.7	17.9	19.0	27.6	28.3
4	22.7	-	11.0	18.2	19.9	25.6	32.2

Ultimate section, durations 5 and over

Age [c]	Exposed	Actual deaths	Crude rate per 1,000
Under 50	1,926	30	15.6
50-54	2,913	45	15.3
55-59	4,993	105	21.0
60-64	16,139	412	25.5
65-69	38,488	1,223	31.8
70-74	41,528	1,770	42.6
75-79	25,435	1,692	66.5
80-84	11,659	1,254	107.5
85 & over	7,087	1,402	197.8
All ages	150,167	7,930	52.8

[a] Age nearest birthday.

[b] 2021-2022 experience is weighted 50%.

[c] Age nearest birthday at the beginning of the year of exposure.

Table 2.2 Mortality experience of railroad disability annuitants between anniversaries of retirement in 2021 and 2024[h], by disability freeze status

Age[a]	All disability annuitants			Annuitants with disability freeze						Annuitants without disability freeze					
	Exposed	Actual deaths	Crude rate per 1,000	Exposed	Actual deaths	Crude rate per 1,000	Ratio Act./Exp[b]	Ratio Act./Exp[c]	Ratio Act./Exp[d]	Exposed	Actual deaths	Crude rate per 1,000	Ratio Act./Exp[e]	Ratio Act./Exp[f]	Ratio Act./Exp[g]
Under 40	349	7	18.6	277	7	23.5	1.330	1.341	1.174	73	0	0.0	0.000	0.000	0.000
40-44	1,136	16	13.7	887	15	16.3	0.835	0.842	0.807	249	1	4.0	0.788	0.795	1.203
45-49	2,887	59	20.3	2,042	54	26.2	1.257	1.267	1.271	845	5	5.9	0.940	0.948	1.182
50-54	6,138	119	19.4	4,476	114	25.4	1.167	1.177	1.188	1,662	6	3.3	0.377	0.380	0.528
55-59	9,382	196	20.8	7,179	182	25.4	1.098	1.106	1.110	2,204	14	6.1	0.545	0.550	0.809
60-64	18,890	457	24.2	14,030	407	29.0	1.110	1.119	1.114	4,861	51	10.4	0.662	0.668	0.802
65-69	36,898	1,130	30.6	27,459	922	33.6	1.045	1.053	1.043	9,439	208	22.0	0.974	0.982	1.057
70-74	42,464	1,703	40.1	30,614	1,301	42.5	0.962	0.970	0.961	11,850	402	33.9	0.983	0.991	1.007
75-79	29,320	1,742	59.4	20,301	1,280	63.1	0.943	0.951	0.951	9,019	462	51.2	0.957	0.965	0.956
80-84	13,934	1,364	97.9	9,329	921	98.7	0.946	0.953	0.965	4,606	443	96.2	1.112	1.121	1.101
85-89	5,830	887	152.1	3,480	556	159.6	0.989	0.996	1.019	2,351	331	140.8	0.992	1.000	0.978
90-94	2,284	533	233.1	1,169	293	250.7	1.044	1.050	1.072	1,116	240	214.7	0.958	0.964	0.969
95 & over	584	193	329.9	253	84	330.0	0.980	0.984	0.965	331	109	329.8	1.009	1.013	1.016
All ages	170,094	8,403	49.4	121,493	6,133	50.5	0.991	0.999	1.000	48,601	2,270	46.7	0.980	0.987	1.000

[a] Age nearest birthday at the beginning of the year of exposure.

[b] Expected based on 2021 Base Year RRB Disabled Mortality Table for Annuitants with Disability Freeze.

[c] Expected based on 2021 Base Year RRB Disabled Mortality Table for Annuitants with Disability Freeze projected to 2022 using 2021 RRB Mortality Improvement Scale.

[d] Expected based on the proposed 2022 base year RRB Disabled Mortality Table for Annuitants with Disability Freeze.

[e] Expected based on 2021 Base Year RRB Disabled Mortality Table for Annuitants without Disability Freeze.

[f] Expected based on 2021 Base Year RRB Disabled Mortality Table for Annuitants without Disability Freeze projected to 2022 using 2021 RRB Mortality Improvement Scale.

[g] Expected based on the proposed 2022 base Year RRB Disabled Mortality Table for Annuitants without Disability Freeze.

[h] 2021-2022 experience is weighted 50%.

Table 2.3 Percentages of railroad disability annuitants included in the 30th valuation mortality studies who would have qualified for a benefit under the social security disability standards

| Duration and type of freeze decision | Period between anniversaries of retirement | | | | | |
| | 2021-2022 | | 2022-2023 | | 2023-2024 | |
	Exposures	Actual deaths	Exposures	Actual deaths	Exposures	Actual deaths
Duration 0						
Freeze allowed	59.4%	93.3%	47.8%	96.9%	38.3%	92.1%
Freeze disallowed	10.2	4.4	6.7	0.0	6.4	5.3
No freeze decision	30.4	2.2	45.6	3.1	55.3	2.6
Duration 1						
Freeze allowed	70.8	90.7	58.6	86.4	46.8	91.4
Freeze disallowed	13.1	5.6	10.3	13.6	6.8	8.6
No freeze decision	16.1	3.7	31.1	0.0	46.4	0.0
Duration 2						
Freeze allowed	80.7	96.9	70.2	89.8	58.0	89.7
Freeze disallowed	14.8	3.1	13.2	8.2	10.2	6.9
No freeze decision	4.5	0.0	16.6	2.0	31.9	3.4
Duration 3						
Freeze allowed	86.6	92.0	80.4	97.2	69.7	93.8
Freeze disallowed	12.8	6.0	15.0	2.8	13.2	0.0
No freeze decision	0.6	2.0	4.6	0.0	17.0	6.3
Duration 4						
Freeze allowed	90.0	95.8	86.5	89.3	80.0	85.7
Freeze disallowed	10.0	4.2	12.9	10.7	15.2	14.3
No freeze decision	0.0	0.0	0.6	0.0	4.7	0.0
Duration 5 and over						
Freeze allowed	71.5	72.0	72.0	71.6	72.4	72.1
Freeze disallowed	28.5	28.0	28.0	28.4	27.6	27.9
No freeze decision	0.0	0.0	0.0	0.0	0.0	0.0

Figure 2.1   Mortality Experience of Disabled Annuitants with Freeze
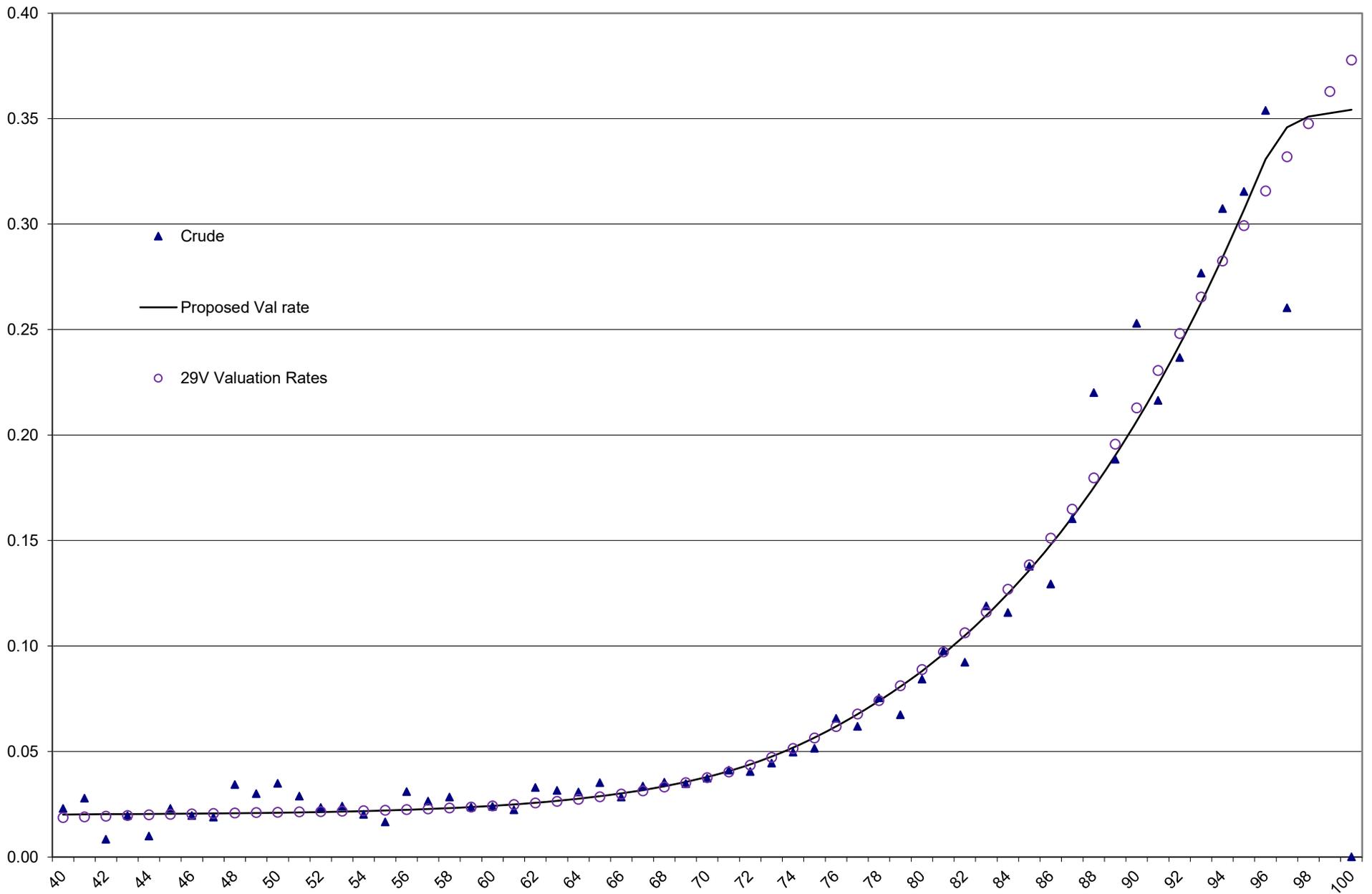
Table 2.4 2022 Base Year RRB Mortality Table for Disabled Annuitants with Disability Freeze [a]

Age [b]	$1{,}000q_x$	Age [b]	$1{,}000q_x$	Age [b]	$1{,}000q_x$
30	19.77	65	28.72	100	354.17
31	19.81	66	30.08	101	355.79
32	19.84	67	31.64	102	357.40
33	19.88	68	33.45	103	359.00
34	19.92	69	35.53	104	360.60
35	19.96	70	37.93	105	362.20
36	19.99	71	40.70	106	362.20
37	20.03	72	43.88	107	362.20
38	20.07	73	47.54	108	362.20
39	20.10	74	51.75	109	362.20
40	20.14	75	56.59	110	1,000.00
41	20.18	76	61.87		
42	20.22	77	67.62		
43	20.27	78	73.88		
44	20.33	79	80.70		
45	20.40	80	88.12		
46	20.47	81	96.19		
47	20.56	82	104.94		
48	20.67	83	114.45		
49	20.78	84	124.75		
50	20.92	85	135.91		
51	21.08	86	147.98		
52	21.26	87	161.02		
53	21.47	88	175.09		
54	21.72	89	190.24		
55	22.00	90	206.52		
56	22.32	91	224.00		
57	22.70	92	242.72		
58	23.13	93	262.73		
59	23.63	94	284.06		
60	24.20	95	306.73		
61	24.87	96	330.76		
62	25.63	97	345.82		
63	26.52	98	350.94		
64	27.54	99	352.56		

[a] Qualified under social security definition of disability.

[b] Age nearest birthday.

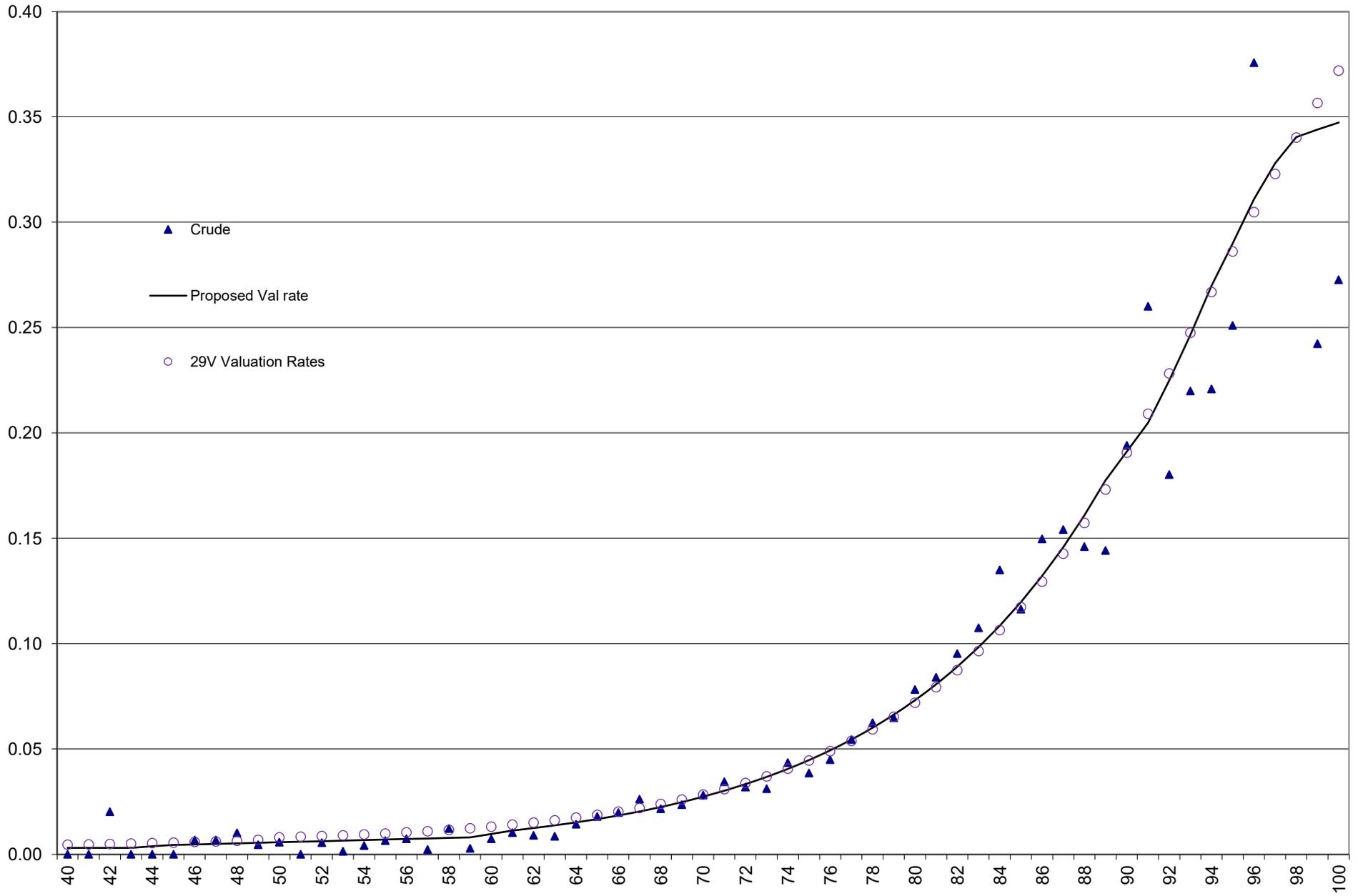**Figure 2.2 Mortality Experience of Disabled Annuitants without Freeze**

Table 2.5   2022 Base Year RRB Mortality Table for Disabled Annuitants without Disability Freeze [a]

Age[b]	$1,000q_x$	Age[b]	$1,000q_x$	Age[b]	$1,000q_x$
40	3.12	70	27.31	100	347.40
41	3.12	71	30.14	101	350.80
42	3.12	72	33.26	102	354.17
43	3.12	73	36.70	103	355.78
44	3.77	74	40.50	104	357.39
45	4.42	75	44.70	105	358.99
46	4.68	76	49.32	106	359.80
47	4.94	77	54.43	107	360.60
48	5.20	78	60.06	108	361.40
49	5.46	79	66.28	109	362.20
50	5.72	80	73.14	110	1,000.00
51	5.98	81	80.71		
52	6.24	82	89.07		
53	6.50	83	98.29		
54	6.76	84	108.46		
55	7.02	85	119.69		
56	7.28	86	132.08		
57	7.54	87	145.75		
58	7.80	88	160.84		
59	8.06	89	177.49		
60	9.66	90	191.16		
61	11.26	91	204.84		
62	12.42	92	224.85		
63	13.71	93	246.49		
64	15.13	94	269.83		
65	16.69	95	289.85		
66	18.42	96	310.97		
67	20.33	97	328.00		
68	22.43	98	340.47		
69	24.75	99	343.95		

[a] Not qualified under social security definition of disability.

[b] Age nearest birthday.

Subject 3. Mortality and Total Termination for Spouses

Table 3.1 presents the 2021-2024 total termination experience of spouse annuitants. Spouse benefits terminate mainly at either the death of the employee or the death of the spouse but can also stop upon rehire, recovery from disability, and remarriage. If the retiree dies first and has a current connection with a railroad retirement employer, then the spouse benefit converts to a survivor benefit. Otherwise, the spouse is transferred to Social Security to pay any benefit.

The age group experience for both the weighted data, which was used for the proposed rates, and the 100% crude data amounts are shown in Item 1. The ratio of actual to expected terminations for all ages, based on the unprojected 2021 RRB Spouse Total Termination Table used in the 29th valuation, is 99.7%. In aggregate, this table represents a decent fit of the 2021-2024 experience because some mortality improvement was expected. The fit across age groups and experience year, however, is somewhat volatile.

The crude rates for the individual years are shown in Item 2. The crude rates for 2021-2022 are higher for all ages than the following 2 years. This experience is presumed to be a result of the pandemic; therefore, the 2021-2022 experience year uses a 50% weight rather than fully reflecting the increased deaths in developing rates for the valuation projections.

Some improvement in mortality is expected, and we want to generate an updated Spouse Termination Table for a better fit across age groups and that is consistent with prior practice. The resulting aggregate actual to expected terminations is greater than 100% due to the lower weighting of the 2021-2022 experience. The weighting drops the experienced deaths and results in an aggregate reduction in graduated rates across age groups.

We recommend the adoption of the proposed 2022 RRB Spouse Total Termination Table (table 3.2) as the standard for the 30th valuation. A comparison of crude and graduated rates is illustrated in figure 3.1.

Using the RRB Mortality Improvement Scale in conjunction with the base rates in table 3.2 is also recommended.

Table 3.3 presents the recent mortality experience of spouse annuitants. Spouse mortality is not used directly in any part of the valuation. The table is included for informational purposes. This table shows that spouse mortality is significantly lower than widow mortality, as has also been the case for past study periods. The overall actual to expected ratio for spouses based on the 2021 RRB Mortality Table for Widows, is 76.9%, whereas the overall actual to expected ratio for widows based on the same table is 109.1% as shown in table 6.1.

Table 3.1 Total termination experience of spouse annuitants between anniversaries of retirement in 2021 and 2024[a]

	All ages	60-64	65-69	70-74	75-79	80-84	85-89	90 & over
					Age[b]			
1. 2021-2024 experience								
Exposed (50% weight 2021-2022, 100% other years)	365,483	45,029	101,102	103,495	66,380	31,974	13,007	4,498
Terminations (50% weight 2021-2022, 100% other years)	22,866	1,155	3,494	4,980	5,092	4,047	2,648	1,451
Crude rate per 1,000	62.6	25.7	34.6	48.1	76.7	126.6	203.6	322.5
Exposed (100% crude data)[c]	440,425	55,664	122,670	124,334	78,547	38,063	15,679	5,468
Terminations (100% crude data)	27,817	1,436	4,325	6,080	6,111	4,889	3,198	1,778
Crude rate per 1,000	63.2	25.8	35.3	48.9	77.8	128.4	204.0	325.2
Ratio Act./Exp. I[d]	99.7%	114.8%	105.1%	95.4%	97.0%	99.7%	100.0%	101.4%
Ratio Act./Exp. II[e]	101.3%	105.5%	103.0%	98.5%	101.5%	102.6%	100.8%	100.6%
2. Crude rate per 1,000 for individual years								
2021 - 2022	66.1	26.4	38.5	52.8	83.7	138.3	206.0	337.5
2022 - 2023	61.6	25.3	33.1	47.8	76.6	126.3	205.2	310.2
2023 - 2024	61.7	25.6	33.9	46.1	73.7	121.4	200.6	327.0
3. Ratio Act./Exp. for individual years I[d]								
2021 - 2022	106.3%	117.8%	115.1%	102.8%	103.7%	106.9%	100.9%	105.6%
2022 - 2023	97.5%	112.5%	98.7%	93.4%	95.9%	98.1%	100.6%	96.5%
2023 - 2024	95.4%	113.4%	100.8%	89.9%	92.3%	94.6%	98.4%	101.8%
5. Ratio Act./Exp. for individual years II[e]								
2021 - 2022	107.8%	108.3%	112.7%	106.2%	108.5%	109.9%	101.7%	104.7%
2022 - 2023	99.0%	103.4%	96.7%	96.4%	100.3%	100.9%	101.4%	95.7%
2023 - 2024	97.1%	104.2%	98.8%	92.8%	96.6%	97.3%	99.2%	101.0%

[a] Excludes spouses under age 60 with child in care.

[b] Age nearest birthday at the beginning of the year of exposure.

[c] Exposure is between anniversaries of retirement in indicated years.

[d] Expected based on 2021 RRB Spouse Total Termination Table.

[e] Expected based on 2022 RRB Spouse Total Termination Table.

Table 3.2 2022 RRB Spouse Total Termination[a] Table

Age[b]	$1,000\ q_x^t$	Age[b]	$1,000\ q_x^t$
60	20.21	95	389.27
61	21.75	96	409.63
62	23.41	97	429.10
63	25.19	98	447.68
64	27.10	99	465.35
65	29.16	100	482.10
66	31.38	101	497.95
67	33.76	102	512.88
68	36.31	103	526.91
69	39.06	104	540.04
70	42.14	105	552.27
71	45.60	106	563.62
72	49.50	107	574.10
73	53.89	108	583.70
74	58.83	109	592.44
75	64.41	110	1,000.00
76	70.72		
77	77.86		
78	85.95		
79	95.11		
80	105.20		
81	116.28		
82	128.44		
83	141.78		
84	156.36		
85	172.30		
86	189.66		
87	208.55		
88	229.04		
89	251.20		
90	275.10		
91	299.46		
92	323.10		
93	345.97		
94	368.04		

[a] Mainly death of employee or death of spouse.

[b] Age nearest birthday.
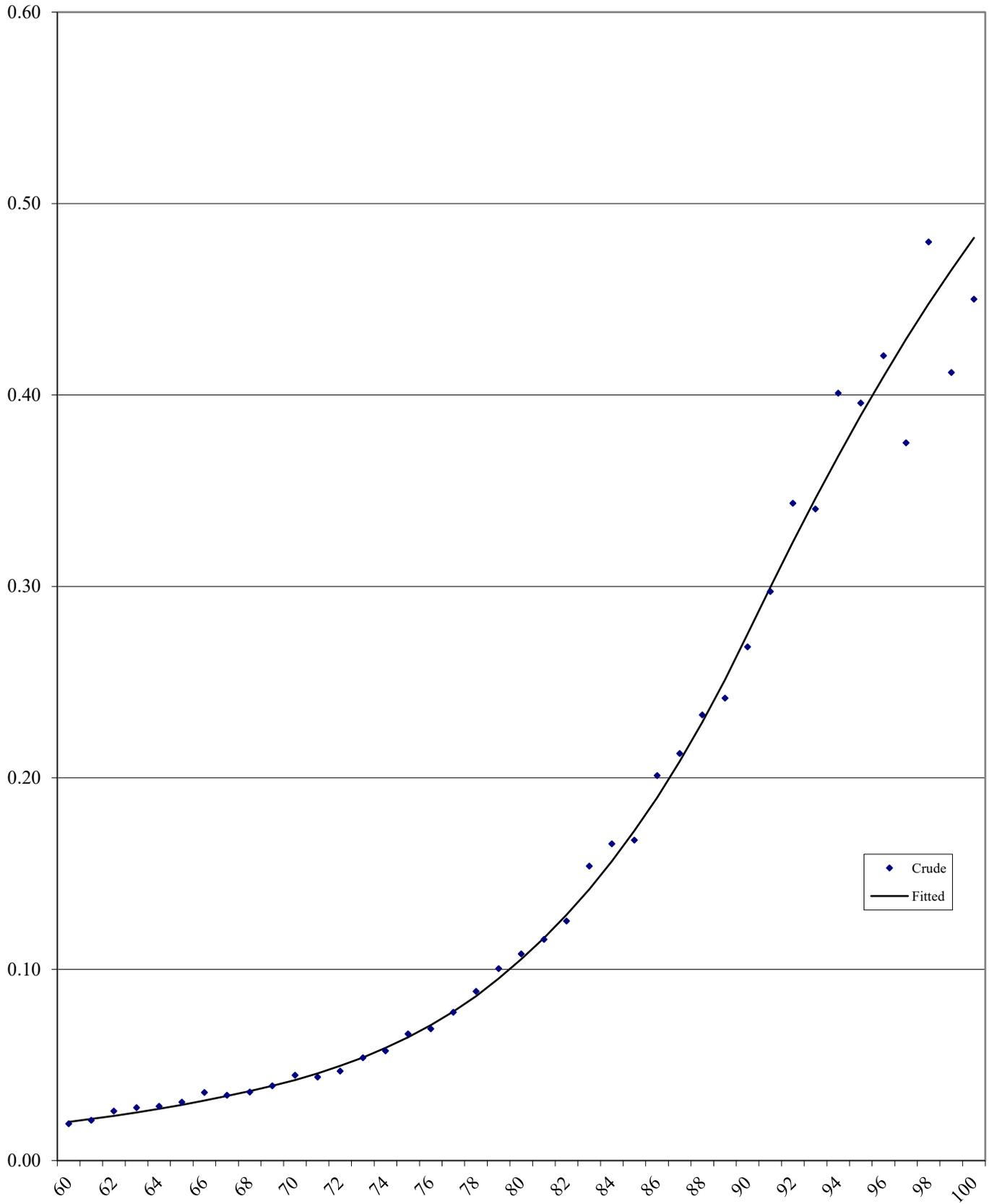
Figure 3.1 Spouse Total Termination Experience

Table 3.3 Mortality experience of spouse annuitants between anniversaries of retirement in 2021 and 2024[a]

	Age[b]							
	All ages	60-64	65-69	70-74	75-79	80-84	85-89	90 & over
1. 2021-2024 experience								
Exposed[c]	431,291	55,120	121,100	122,322	76,569	36,524	14,678	4,980
Actual deaths	9,548	347	1,184	2,055	2,155	1,811	1,195	801
Crude rate per 1,000	22.1	6.3	9.8	16.8	28.1	49.6	81.4	160.9
Ratio Act./Exp.[d]	76.9%	65.3%	66.4%	73.3%	78.1%	83.7%	81.3%	88.7%
2. Crude rate per 1,000 for individual years								
2021 - 2022	23.2	7.1	11.1	18.1	30.3	53.0	80.5	168.6
2022 - 2023	21.6	5.9	9.1	16.6	28.7	47.9	80.9	149.2
2023 - 2024	21.6	5.7	9.0	15.6	25.7	48.1	82.9	164.4
3. Ratio Act./Exp. for individual years[d]								
2021 - 2022	82.0%	73.6%	75.5%	78.9%	83.4%	88.7%	80.2%	93.1%
2022 - 2023	75.4%	61.4%	62.0%	72.6%	80.1%	80.9%	80.8%	82.2%
2023 - 2024	73.4%	58.9%	60.7%	68.3%	71.6%	81.7%	83.1%	90.5%

[a] Excludes spouses under age 60 with child in care.

[b] Age nearest birthday at the beginning of the year of exposure.

[c] Exposure is between anniversaries of retirement in indicated years.

[d] Expected based on 2021 RRB Mortality Table for Widows.

Subject 4. Mortality Improvement

Prior to the 26th valuation, improvement in annuitant mortality rates and spouse termination rates was provided for by the use of a 6% margin. Additional mortality improvement was provided through a 1-year rateback for future retirees. To be more consistent with current actuarial practice, for the 26th valuation we adopted the 2013 RRB Mortality Improvement Scale. For the 27th and 28th valuations, we continued to use the 2013 RRB Mortality Improvement Scale.

For the 29th Valuation, we revised our mortality improvement scale because our experience showed slower decreases in mortality rates. This was consistent with the SSA long-term mortality improvement assumption. The 2021 RRB Mortality Improvement Scale, which is 80% of the prior scale, was used for the 29th valuation.

For the 30th valuation, we have added the most recent experience to our past analysis of mortality improvement. Table 4.1 shows the improvement in annuitant mortality and spouse total termination. Because of limitations in the availability of information from the experience studies for the earliest valuations, the focus was on mortality improvement from the 8th valuation to the most recent available experience.

The experience of aged and disabled annuitants was combined because similar degrees of improvement in mortality have been observed for these types of annuitants and also because, by combining them, we can eliminate the effect of changes in disability allowance over time on mortality rates. The annuitants' mortality experience for the period 1957 to 2023 shows improvement ranging from 1.7% at ages 60-64 to 0.1% at ages 90 and over.   The experience for the period 1984 to 2023 shows mortality improvement ranging from 1.5% at ages 70-74 to -0.2% at ages 90 and over. Average annual mortality improvement rates have generally decreased or stayed the same since the experience was analyzed for the 29th valuation.

Spouse termination experience for the period 1957 to 2023 shows improvement ranging from 1.2% at ages 65-69 to 0.2% at ages 85 and over, while experience for the period 1984 to 2023 shows improvement ranging from 1.3% at ages 70-74 to 0.0% at ages 85 and over. As with the experience of annuitants, the mortality improvement rates for spouses have generally either stayed the same or decreased as compared to the rates shown in the study done for the 29th valuation.

As well as reviewing the experience of the Railroad Retirement program, we also looked at the mortality experience of the U. S. population and that of the Social Security Administration (SSA) and considered the mortality improvement assumptions in the OASDI Trustees' Report. Table 4.2 presents other sources of information on mortality improvement.

The Human Mortality Database, General Population USA, shows average mortality improvement from 1942 to 2022 ranging from 1.1% at ages 70-74 to 0.4% at ages 90 and over. From 1982 to 2022, average mortality improvement ranges from 1.0% at ages 70-74 to 0.2% at ages 90 and over. In the more recent period 2002 to 2022, average mortality improvement ranges from 0.8% at ages 70-74 and 80-84 to 0.2% at ages 60-64.

In the Long-Range Demographic Assumptions for the 2025 OASDI Trustees' Report, the historical average annual percent reductions in age-sex-adjusted death rates from 1900 to 2019 are 1.19% for ages 15-64 and 0.78% for ages 65 and over, while from 1982 to 2019, the historical average annual percent reductions are 0.90% and 0.79%, respectively. The SSA long-term intermediate alternative mortality improvement assumptions range from 0.95% for ages 50-64 to 0.55% for ages 85 and over. The Trustees assumed that the COVID-19 pandemic, which began affecting death rates in 2020, will continue to affect death rates through 2025. Because it is certainly possible that the pandemic could have longer-lasting effects on the death rates, the Trustees will continue to monitor emerging experience and expectations.

The 2019 Technical Panel on Assumptions and Methods to the Social Security Advisory Board suggested that near-term mortality improvement is likely to be depressed due to recent social issues that have affected mortality trends, such as drug overdose, obesity, and suicide. The Technical Panel also suggested that the most plausible assumption for long-term improvement would be based upon rates over a long period of history.

The Society of Actuaries (SOA) has published updates to mortality improvement scale MP-2014 from 2015 to 2021 incorporating the latest available historical data, to be used in conjunction with the annual update to the RP-2014 model. The Retirement Plans Experience Committee (RPEC) 2014 model has now been incorporated into the MIM-2021 model, which relies upon recent population mortality experience to project future mortality trends and reflected data through 2019. The most recent mortality data available was from 2020, which was severely affected by the COVID-19 pandemic. RPEC did not believe that it was appropriate to incorporate, without adjustment, the substantially higher rates of mortality from the 2020 experience into the graduation and projection models used to forecast future mortality and elected not to release a new mortality improvement scale.

RPEC continues to analyze and accumulate U.S. population experience data and believes this emerging information for the years after 2022, once collected in sufficient quantity, might reasonably be used in its traditional mortality improvement analysis. However, 2024 mortality data (the second full year since the pandemic) will not become available from CMS until 2026. The data set used in RPEC's algorithm needs to include at least five years of post-COVID experience so as not to be unduly impacted by nonrecurring pandemic-related experience. Because of these factors, RPEC would not expect to produce an updated scale in 2026 with its traditional methods using only two years of "post-pandemic" data.

Because we continue to see some decreases in mortality improvement in our own experience and consistent with information on mortality improvement from other sources, I propose continuing to use the 2021 RRB Mortality Improvement Scale, which is applied to mortality for Age Annuitants, Disabled Annuitants, and Eligible Spouses. We will monitor mortality experience to determine if the Mortality Improvement Scale should be modified in the future.

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Table 4.1 Improvement in RRB Annuitant Mortality and Spouse Total Termination

Age of employee	Average annual improvement in annuitant mortality[a]		
	1957 - 1984	1984 - 2023	1957 - 2023
60 - 64	2.7%	1.1%	1.7%
65 - 69	1.4%	1.4%	1.4%
70 - 74	0.9%	1.5%	1.2%
75 - 79	0.8%	1.1%	1.0%
80 - 84	0.8%	0.8%	0.8%
85 - 89	0.9%	0.4%	0.6%
90 +	0.5%	-0.2%	0.1%

.

Age of spouse	Average annual improvement in spouse total termination[b]		
	1957 - 1984	1984 - 2023	1957 - 2023
60 - 64	NA	1.0%	NA
65 - 69	1.2%	1.2%	1.2%
70 - 74	0.7%	1.3%	1.1%
75 - 79	0.7%	1.0%	0.9%
80 - 84	0.8%	0.6%	0.7%
85+	0.4%	0.0%	0.2%

[a] Includes both disabled and nondisabled annuitants.

[b] Mainly death of employee or death of spouse.

Table 4.2 Other sources of mortality improvement

Age	Average annual improvement in United States population mortality[a]		
	1942- 2022	1982 - 2022	2002 - 2022
60-64	1.0%	0.8%	0.2%
65-69	1.0%	0.9%	0.5%
70-74	1.1%	1.0%	0.8%
75-79	1.0%	0.8%	0.6%
80-84	0.9%	0.7%	0.8%
85-89	0.7%	0.4%	0.7%
90 +	0.4%	0.2%	0.6%

Age	SSA average annual reduction in age-sex-adjusted death rates[b]	
	1900 - 2019	1982 - 2019
0-14	2.97%	2.05%
15-64	1.19%	0.90%
65 & over	0.78%	0.79%

Age	SSA long-term mortality improvement assumption[c]
15-49	0.84%
50-64	0.95%
65-84	0.70%
85 & over	0.55%

[a] Human Mortality Database, Males and Females combined.

[b] The Long-Range Demographic Assumptions for the 2025 Trustee's Report, Table 2.1.

[c] Ibid, Table 2.2.

Table 4.3 2021 RRB Mortality Improvement Scale

Age[a]	Annual rate of mortality improvement
85 & under	0.80%
86	0.76%
87	0.72%
88	0.69%
89	0.65%
90	0.62%
91	0.59%
92	0.56%
93	0.53%
94	0.50%
95	0.48%
96	0.46%
97	0.43%
98	0.41%
99	0.39%
100	0.37%
101	0.35%
102	0.33%
103	0.32%
104	0.30%
105	0.29%
106	0.27%
107	0.26%
108	0.25%
109	0.23%
110	0.00%

[a] Age nearest birthday.

Subject 5. Retired Employees and Eligible Spouses

This assumption represents the number of retired employees at each age who have a spouse receiving benefits. This percentage is lower than percent married because a spouse may not currently be eligible for benefits because the spouse is younger and not eligible until a later age or the spouse benefit may be reduced to zero due to offsets. If the retired employee has 30 or more years of railroad retirement service, then the spouse benefit is also unreduced and payable as early as spouse's age 60.

Table 5.1 presents the number of retired employees, broken down by those with more or less than 30 years of railroad retirement service, and the number with a spouse eligible for railroad retirement benefits, by age nearest birthday of employee on December 31, 2024. This table also shows the ratio of the number of spouses to the number of employees.

The overall ratios of the actual number of spouses on December 31, 2024, to the expected number based on the 29th valuation standard are 97.8% and 99.3%, for employees with fewer than 30 years of service and 30 or more years of service, respectively. The rates for both groups have remained relatively stable, as in past studies, with the ratios of actual to expected showing small deviations from 100%, as shown below.

Valuation Assumption Comparison	Actual/expected ratios in following study period	
	<30 YOS	30+ YOS
27V Study compared to 26V Assumption	99.2%	100.7%
28V Study compared to 27V Assumption	98.9%	100.5%
29V Study compared to 28V Assumption	98.0%	99.6%
30V Study compared to 29V Assumption	97.8%	99.3%

We recommend that table 5.2 be the 30th valuation standard for the probability that a retired employee has an eligible spouse. The probabilities in table 5.2 were obtained by graduating the rates contained in table 5.1 to yield an actual to expected ratio of 100.0% for both groups. The crude and graduated rates are illustrated in figure 5.1.

Table 5.1 Number of retired employees and number with a spouse eligible for railroad retirement benefits, by age of employee on December 31, 2024

Age[a] of employee	30 or more years of service			Less than 30 years of service		
	Number of employees	Number of eligible spouses	Ratio of spouses to employees	Number of employees	Number of eligible spouses	Ratio of spouses to employees
60	444	133	0.300			
61	1,126	436	0.387			
62	1,237	561	0.454	1,211	95	0.078
63	1,566	798	0.510	1,966	382	0.194
64	2,027	1,208	0.596	2,167	475	0.219
65	2,696	1,734	0.643	2,697	849	0.315
66	3,482	2,326	0.668	3,303	1,172	0.355
67	4,323	3,064	0.709	4,313	1,667	0.387
68	4,953	3,609	0.729	5,026	2,146	0.427
69	5,932	4,422	0.745	5,307	2,458	0.463
70	6,312	4,809	0.762	5,719	2,881	0.504
71	6,716	5,072	0.755	6,031	3,083	0.511
72	6,768	5,284	0.781	5,972	3,182	0.533
73	6,897	5,332	0.773	5,981	3,335	0.558
74	7,072	5,497	0.777	6,011	3,325	0.553
75	6,638	5,116	0.771	5,565	3,241	0.582
76	6,614	5,141	0.777	5,499	3,205	0.583
77	6,318	4,765	0.754	5,184	2,909	0.561
78	6,306	4,704	0.746	5,313	3,057	0.575
79	4,257	3,131	0.735	3,439	1,976	0.575
80	4,148	3,073	0.741	3,208	1,878	0.585
81	3,648	2,593	0.711	2,953	1,637	0.554
82	3,642	2,544	0.699	2,735	1,509	0.552
83	2,810	1,927	0.686	2,265	1,248	0.551
84	2,424	1,619	0.668	1,918	1,020	0.532
85	1,893	1,206	0.637	1,626	857	0.527
86	1,762	1,141	0.648	1,472	727	0.494
87	1,597	950	0.595	1,334	651	0.488
88	1,460	811	0.555	1,132	510	0.451
89	1,164	642	0.552	994	438	0.441
90	1,052	541	0.514	918	360	0.392
91	879	428	0.487	702	264	0.376
92	762	327	0.429	608	220	0.362
93	586	251	0.428	452	135	0.299
94	548	186	0.339	435	123	0.283
95	449	137	0.305	341	102	0.299
96	345	101	0.293	249	50	0.201
97	306	79	0.258	206	33	0.160
98	217	48	0.221	163	19	0.117
99 & over	370	50	0.135	289	26	0.090

[a] Age nearest birthday.

Table 5.2 Probability of a retired employee having a spouse eligible for railroad retirement benefits

Age[a] of employee	Employees with 30 or more years of service	Employees with less than 30 years of service
59 and under	0.000	0.000
60	0.300	0.000
61	0.378	0.000
62	0.459	0.095
63	0.529	0.172
64	0.587	0.239
65	0.635	0.299
66	0.674	0.350
67	0.705	0.395
68	0.729	0.434
69	0.746	0.466
70	0.759	0.494
71	0.767	0.516
72	0.773	0.534
73	0.775	0.549
74	0.775	0.560
75	0.772	0.569
76	0.767	0.575
77	0.760	0.578
78	0.752	0.579
79	0.741	0.577
80	0.730	0.573
81	0.716	0.566
82	0.701	0.557
83	0.684	0.546
84	0.665	0.532
85	0.644	0.516
86	0.622	0.498
87	0.598	0.478
88	0.571	0.456
89	0.543	0.432
90	0.512	0.406
91	0.480	0.378
92	0.445	0.349
93	0.409	0.317
94	0.370	0.284
95	0.328	0.249
96	0.285	0.213
97	0.239	0.174
98	0.191	0.136
99 & over	0.140	0.098

[a] Age nearest birthday.

Figure 5.1 Probability of retired employee having a spouse eligible for railroad retirement benefits
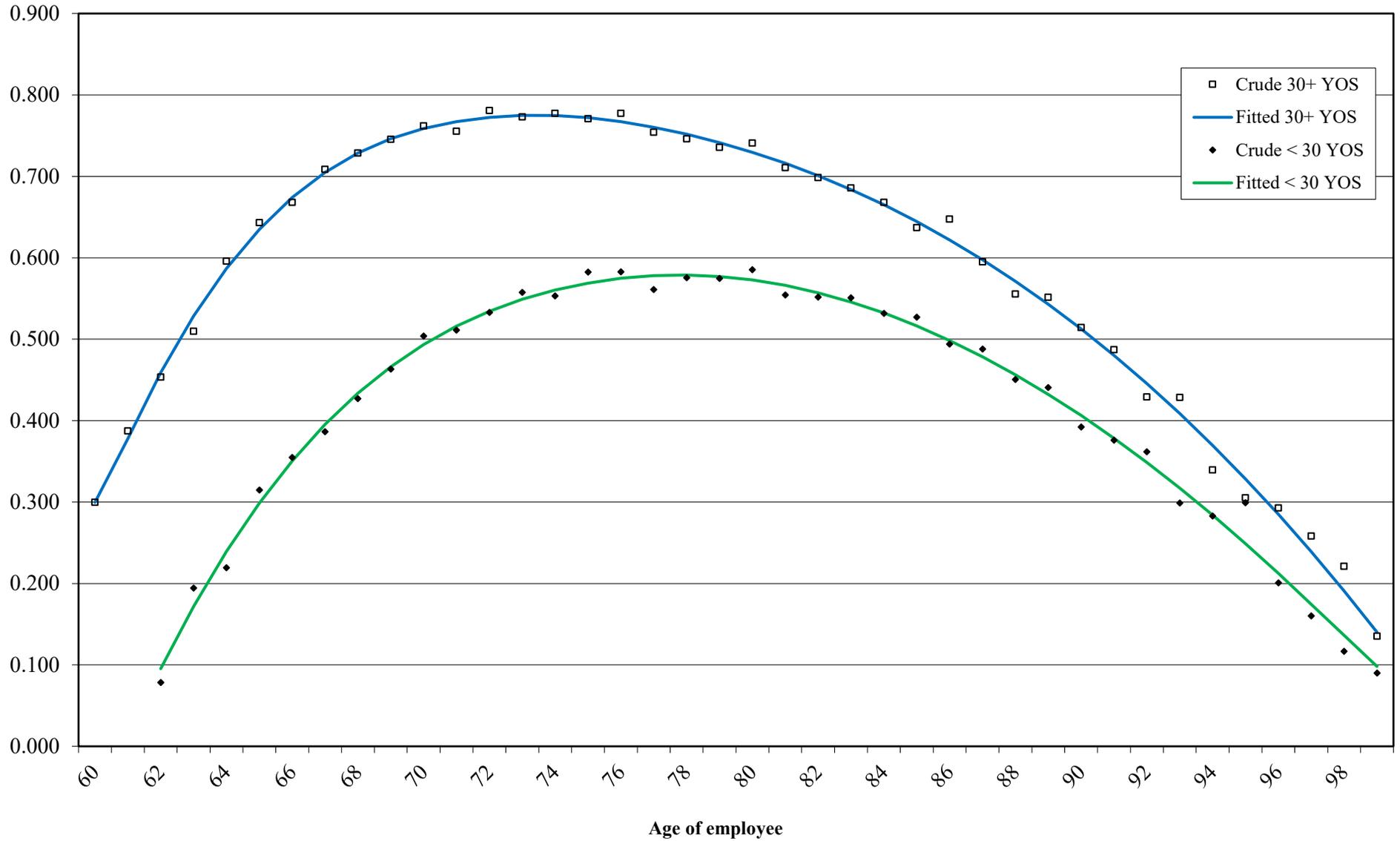
Subject 6. Mortality and Remarriage of Widows

Table 6.1 presents the 2021-2024 mortality experience of widow annuitants. The age group experience for both the weighted, which was used for the proposed rates, and the 100% crude data amounts are shown in Item 1. The crude rates under Item 2 and the actual to expected ratios under Item 3 are based on 100% crude data.

Based on this most recent experience, we updated the rates and the overall actual to expected ratio is 106.6% compared to 109.1% under the previous standard, the 2021 RRB Mortality Table for Widows.

The graduated widow mortality rates include an implied 6% mortality improvement, rather than using the RRB Mortality Improvement Scale. Mortality rates for widows have not shown large improvements over time. Figure 6.1 shows the historical crude widow mortality rates in 5-year age groups on a logarithmic scale for each policy year ending 1991 to 2024.

Based on the actual to expected ratio for the most recent three years of experience, we are recommending using the 2024 RRB Mortality Table for Widows as the standard for the 30th valuation. The updated rates are shown in table 6.2.

Table 6.3 shows the remarriage experience of widows between 2009 and 2024 anniversaries of widowhood. Remarriage experience does not reflect a reduced weight for pandemic years. Currently, the actual to expected ratio is 92.1% based on the 2021 RRB Remarriage Table. An updated table has been developed based on graduating rates for the most recent experience and produces the actual to expected ratio of 100.0%. On this basis, we recommend the 2024 RRB Remarriage Table for the 30th valuation outlined in Table 6.4.

Table 6.1 Mortality experience of widow annuitants between anniversaries of retirement in 2021 and 2024

					Age[a]							
	All ages	under 50	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95 & over
1. 2021-2024 experience												
Exposed (50% weight 2022, 100% other years)[b]	228,148	1,059	337	243	8,442	21,686	33,963	39,989	39,882	36,834	29,708	16,007
Deaths (50% weight 2022, 100% other years)	18,982	e	e	e	93	295	821	1,546	2,487	3,993	5,149	4,593
Crude rate per 1,000	83.2	e	e	e	11.0	13.6	24.2	38.7	62.3	108.4	173.3	286.9
Exposed (100% crude data)[b]	275,193	1,270	401	296	10,311	26,195	40,954	47,671	47,807	44,688	36,245	19,358
Deaths (100% crude data)	23,106	e	e	e	112	369	998	1,876	3,026	4,877	6,306	5,534
Crude rate per 1,000	84.0	e	e	e	10.9	14.1	24.4	39.4	63.3	109.1	174.0	285.9
Ratio of actual to expected deaths (100% crude data)												
2021 RRB Widow Table[c]	109.1%	e	e	e	114.2%	95.7%	105.9%	109.2%	107.7%	112.3%	108.9%	108.9%
2024 RRB Widow Table[d]	106.6%	e	e	e	120.9%	99.3%	107.7%	108.9%	105.5%	108.4%	104.7%	107.1%
2. Crude rate per 1,000 for individual years												
2021 - 2022	87.7	e	e	e	10.2	16.4	25.3	43.0	68.1	112.6	177.1	281.0
2022 - 2023	83.8	e	e	e	9.6	13.0	25.7	39.0	59.8	108.5	174.7	291.3
2023 - 2024	80.3	e	e	e	13.1	12.7	22.1	36.3	62.0	105.9	169.5	285.4
3. Ratio actual to expected[d] for individual years												
2021 - 2022	109.5%	e	e	e	113.3%	115.9%	111.6%	118.0%	113.0%	111.5%	106.8%	105.5%
2022 - 2023	106.4%	e	e	e	106.7%	92.1%	113.7%	108.1%	99.7%	107.8%	105.2%	109.2%
2023 - 2024	103.7%	e	e	e	145.7%	89.3%	97.5%	100.9%	103.8%	105.5%	101.6%	106.7%

[a] Age nearest birthday at the beginning of the year of exposure.

[b] Exposure is between anniversaries of retirement in indicated years.

[c] Expected based on 2021 RRB Mortality Table for Widows.

[d] Expected based on 2024 RRB Mortality Table for Widows.

[e] Fewer than 10 actual deaths.

Figure 6.1 Historical Crude Widow Mortality Experience, 1991-2024
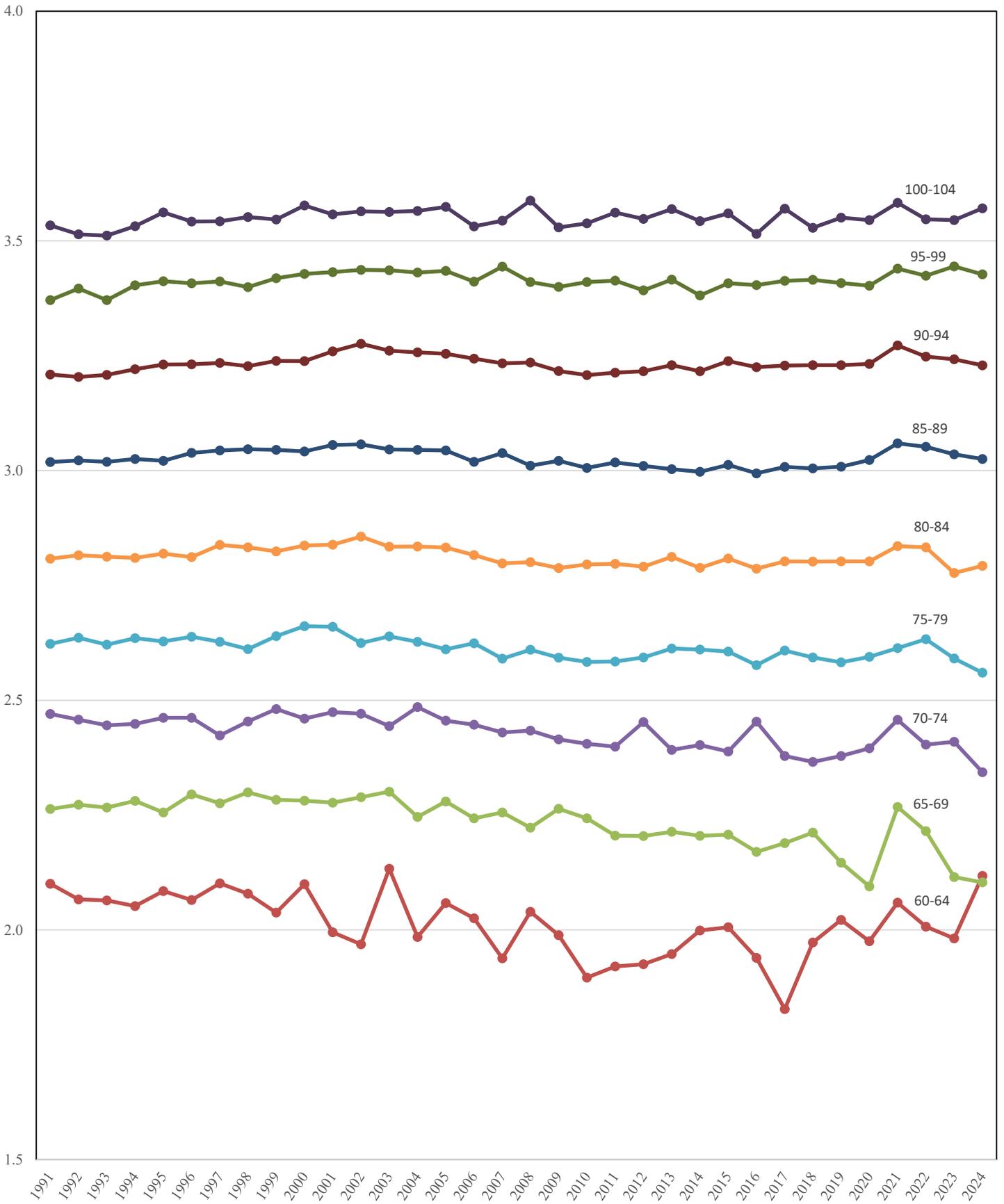
Table 6.2 2024 RRB Mortality Table for Widows

Age[a]	$1,000q_x$	Age[a]	$1,000q_x$	Age[a]	$1,000q_x$
30	0.45	65	11.33	100	310.57
31	0.47	66	12.47	101	325.49
32	0.50	67	13.73	102	339.07
33	0.53	68	15.11	103	351.15
34	0.58	69	16.62	104	361.57
35	0.63	70	18.29	105	370.20
36	0.69	71	20.12	106	376.89
37	0.76	72	22.14	107	382.53
38	0.84	73	24.35	108	388.11
39	0.93	74	26.79	109	393.63
40	1.02	75	29.46	110	1000.00
41	1.12	76	32.45		
42	1.24	77	35.79		
43	1.36	78	39.54		
44	1.50	79	43.72		
45	1.65	80	48.39		
46	1.82	81	53.60		
47	2.00	82	59.42		
48	2.21	83	65.91		
49	2.43	84	73.14		
50	2.68	85	81.18		
51	2.95	86	90.12		
52	3.24	87	100.05		
53	3.57	88	111.05		
54	3.93	89	123.24		
55	4.33	90	136.71		
56	4.77	91	151.68		
57	5.25	92	168.14		
58	5.78	93	185.68		
59	6.37	94	203.93		
60	7.01	95	222.54		
61	7.72	96	241.18		
62	8.49	97	259.55		
63	9.35	98	277.40		
64	10.29	99	294.47		

[a] Age nearest birthday.

Table 6.3 Remarriage experience of widows between 2009 and 2024 anniversaries of widowhood

					Age[a]					
	All ages	Under 35	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70 & over
1. Exposed										
Duration[b] 0	76,504	119	194	277	344	546	824	6,752	10,504	56,945
1	75,184	124	198	262	346	640	1,766	7,103	10,416	54,331
2	72,881	123	189	245	342	678	2,502	7,193	10,115	51,494
3	69,873	107	184	212	316	684	3,135	7,196	9,684	48,356
4	67,475	106	161	202	321	733	3,781	7,174	9,370	45,627
5 or more	1,165,813	63	283	723	1,094	2,305	5,457	41,011	78,582	1,036,295
Total	*1,527,731*	*642*	*1,210*	*1,920*	*2,764*	*5,584*	*17,465*	*76,427*	*128,670*	*1,293,049*
2. Actual remarriages										
Duration[b] 0	58	c	c	c	c	c	c	14	c	27
1	120	c	c	c	c	c	c	26	32	49
2	113	c	c	c	c	c	c	21	21	41
3	95	c	c	c	c	c	14	15	21	35
4	94	c	c	c	c	c	19	25	19	22
5 or more	716	c	c	c	c	c	17	139	164	368
Total	*1,196*	*16*	*11*	*25*	*11*	*21*	*63*	*240*	*267*	*542*
3. Crude remarriage rate per 1,000										
Duration[b] 0	0.76	c	c	c	c	c	c	2.07	c	0.47
1	1.60	c	c	c	c	c	c	3.66	3.07	0.90
2	1.55	c	c	c	c	c	c	2.92	2.08	0.80
3	1.36	c	c	c	c	c	4.47	2.08	2.17	0.72
4	1.39	c	c	c	c	c	5.03	3.48	2.03	0.48
5 or more	0.61	c	c	c	c	c	3.12	3.39	2.09	0.36
Total	*0.78*	*24.93*	*9.09*	*13.02*	*3.98*	*3.76*	*3.61*	*3.14*	*2.08*	*0.42*
4. Ratio Act/Exp[d]										
Duration[b] 0	121.1%	c	c	c	c	c	c	201.8%	c	138.7%
1	80.1%	c	c	c	c	c	c	93.1%	92.7%	70.9%
2	89.0%	c	c	c	c	c	c	81.2%	72.0%	92.0%
3	72.7%	c	c	c	c	c	106.1%	55.8%	74.8%	70.3%
4	86.7%	c	c	c	c	c	93.4%	88.2%	77.2%	86.4%
5 or more	97.4%	c	c	c	c	c	154.0%	105.1%	85.8%	99.9%
Total	*92.1%*	*119.3%*	*62.8%*	*125.3%*	*58.1%*	*95.7%*	*103.0%*	*96.7%*	*83.3%*	*93.9%*
5. Ratio Act/Exp[e]										
Duration[b] 0	153.3%	c	c	c	c	c	c	283.2%	c	183.5%
1	89.2%	c	c	c	c	c	c	97.2%	96.7%	82.9%
2	92.6%	c	c	c	c	c	c	89.1%	74.7%	96.7%
3	88.4%	c	c	c	c	c	145.2%	70.2%	82.6%	88.0%
4	87.6%	c	c	c	c	c	93.2%	88.8%	78.5%	92.2%
5 or more	104.2%	c	c	c	c	c	141.6%	112.5%	87.6%	110.9%
Total	*100.0%*	*125.5%*	*65.4%*	*128.3%*	*58.7%*	*94.6%*	*109.9%*	*105.1%*	*86.4%*	*105.9%*

[a] For durations 0-4, age nearest birthday on date of employee's death. For durations 5 and over, age nearest birthday at beginning of year of exposure which is on an anniversary of employee's death.

[b] Completed years since employee's death.

[c] Fewer than 10 actual remarriages.

[d] Expected based on 2021 RRB Remarriage Table.

[e] Expected based on 2024 RRB Remarriage Table.

Table 6.4 2024 RRB Remarriage Table
(Probabilities of remarriage)

Age[a] at widowhood [x]	$1{,}000q^m_{[x]+n}$ for n equal to					Age[a] x	$1{,}000q^m_x$
	0	1	2	3	4		
20	17.56	27.96	57.44	37.61	38.30	25	31.45
21	16.71	26.59	54.60	35.73	36.37	26	29.85
22	15.89	25.28	51.88	33.93	34.51	27	28.31
23	15.10	24.02	49.26	32.21	32.74	28	26.83
24	14.35	22.81	46.75	30.55	31.03	29	25.42
25	13.63	21.64	44.35	28.96	29.39	30	24.06
26	12.93	20.53	42.03	27.43	27.82	31	22.75
27	12.27	19.46	39.82	25.96	26.31	32	21.50
28	11.63	18.43	37.69	24.55	24.87	33	20.30
29	11.01	17.45	35.64	23.20	23.48	34	19.15
30	10.42	16.50	33.68	21.91	22.14	35	18.04
31	9.86	15.59	31.80	20.66	20.86	36	16.98
32	9.32	14.72	29.99	19.47	19.63	37	15.96
33	8.80	13.89	28.26	18.32	18.46	38	14.98
34	8.30	13.08	26.60	17.22	17.32	39	14.04
35	7.82	12.31	25.00	16.16	16.24	40	13.14
36	7.36	11.57	23.47	15.15	15.19	41	12.27
37	6.92	10.86	22.00	14.18	14.19	42	11.44
38	6.49	10.18	20.58	13.25	13.23	43	10.65
39	6.08	9.53	19.23	12.35	12.31	44	9.88
40	5.69	8.90	17.93	11.49	11.43	45	9.15
41	5.32	8.30	16.68	10.66	10.58	46	8.44
42	4.96	7.72	15.48	9.87	9.76	47	7.77
43	4.61	7.17	14.33	9.11	8.98	48	7.12
44	4.28	6.63	13.23	8.38	8.23	49	6.50
45	3.96	6.12	12.17	7.68	7.51	50	5.90
46	3.66	5.63	11.15	7.01	6.82	51	5.32
47	3.37	5.16	10.17	6.36	6.16	52	4.77
48	3.08	4.71	9.24	5.74	5.52	53	4.24
49	2.81	4.28	8.34	5.15	4.91	54	3.74
50	2.56	3.86	7.48	4.58	4.32	55	3.25
51	2.31	3.46	6.65	4.03	3.76	56	2.78
52	2.07	3.08	5.85	3.51	3.22	57	2.33
53	1.84	2.71	5.09	3.00	2.70	58	1.90
54	1.62	2.36	4.36	2.52	2.20	59	1.49
55	1.41	2.02	3.66	2.05	1.72	60	3.72
56	1.21	1.69	2.98	1.61	7.59	61	2.87
57	1.01	1.38	2.33	3.52	4.79	62	3.06
58	0.82	1.08	4.01	3.11	5.47	63	2.92
59	0.65	4.62	3.38	3.20	5.04	64	2.78
60	0.53	3.80	3.52	3.13	4.64	65	2.64
61	0.75	3.98	3.40	3.05	4.28	66	2.52
62	0.72	3.84	3.29	2.98	3.95	67	2.40
63	0.77	3.70	3.18	2.90	3.63	68	2.28
64	0.84	3.57	3.08	2.84	3.34	69	2.18
65	0.90	3.44	2.98	2.77	3.08	70	2.08
66	0.97	3.30	2.88	2.70	2.84	71	1.98
67	1.05	3.19	2.78	2.64	2.61	72	1.81
68	1.13	3.07	2.69	2.58	2.37	73	1.58
69	1.22	2.96	2.61	2.47	2.12	74	1.34
70	1.31	2.85	2.47	2.33	1.86	75	1.09
71	1.41	2.70	2.29	2.15	1.62	76	0.86
72	1.21	2.52	2.09	1.96	1.38	77	0.65
73	0.86	2.31	1.86	1.76	1.16	78	0.48
74	0.53	2.08	1.62	1.55	0.96	79	0.34
75	0.28	1.84	1.40	1.34	0.79	80	0.23
76	0.13	1.62	1.18	1.14	0.64	81	0.16
77	0.06	1.39	0.97	0.96	0.50	82	0.10
78	0.02	1.18	0.79	0.79	0.40	83	0.07
79	0.01	0.99	0.63	0.65	0.31	84	0.04
80	0.00	0.81	0.50	0.52	0.23	85	0.03
81	0.00	0.65	0.38	0.41	0.17	86	0.02
82	0.00	0.52	0.29	0.32	0.13	87	0.01
83	0.00	0.42	0.22	0.24	0.09	88	0.01
84	0.00	0.32	0.16	0.18	0.07	89	0.00

[a] Age nearest birthday.

Subject 7. Termination Rates for Disabled Children

The ratios of actual to expected deaths, based on the 2021 RRB Total Termination Table for Disabled Children, which was used for the 29th Valuation, are shown below.

Period	Actual Termination	Expected Termination [1]	Actual/Expected Termination [1]
2000-2003 (3 years)	1,137.0	1,253.9	0.907
2003-2006 (3 years)	1,165.0	1,214.9	0.959
2006-2009 (3 years)	1,144.0	1,176.2	0.973
2009-2012 (3 years)	1,045.0	1,130.1	0.925
2012-2015 (3 years)	1,054.0	1,098.2	0.960
2015-2016	367.0	352.7	1.040
2016-2017	317.0	344.1	0.921
2017-2018	343.0	341.0	1.006
2018-2019	377.0	332.6	1.133
2019-2020	357.0	321.9	1.109
2020-2021	409.0	311.1	1.315
2021-2022	342.0	298.1	1.147
2022-2023	300.0	287.5	1.044
2023-2024	272.0	282.1	0.964

[1] ACT/Exp based on 29V Valuation rates

In the 23rd valuation, the total termination rates for disabled children were increased because the actual to expected termination ratios were high for several study periods. These rates were maintained for the 24th through 28th valuations. In the 29th Valuation, we increased termination rates by 16.9% to reflect the higher observed termination experience during 2015–2021. The 29th Valuation rates appear to perform well in projecting actual terminations for 2022–2024.

For the 30th Valuation, we chose to develop a new set of rates based on the 2021–2024 experience. The 2021–2022 data is weighted at 50%, consistent with the approach used for age and disability annuitant mortality study.

Figure 7.1 shows the crude experience and the graduated rates. As we did in the past valuations, we add a 6.0% margin to the graduated rates in Figure 7.1 to generate the final proposed rates for the 30th valuation.

The proposed rates for the 30th valuation are presented in Table 7.2.

The proposed rates are approximately 2.5% lower in aggregate than the 29th valuation rates. The proposed rates will project roughly 7 fewer terminations per year than the 29th valuation rates. There are about 300 disabled-child terminations each year, and approximately 98.5% of these terminations are due to the child's death.

Figure 7.2 compares the proposed rates for the 30th valuation with the 29th valuation rates. The rates for ages below 39 are set lower than those in the 29th Valuation to better reflect the actual experience. The overall impact on the total is negligible.

Table 7.1 shows the crude experience by age group. The overall ratio of actual terminations to those expected based on the 29th valuation standard, the 2021 RRB Total Termination Table for Disabled Children, is 1.034. The aggregate ratio of actual to expected termination based on the proposed 30th valuation rates is 1.060, reflecting the 6.0% margin.

Table 7.1 Total termination experience of disabled children annuitants between anniversaries of retirement in 2021 and 2024

Age[a]	Exposed [d]	Actual terminations	Ratio Act./Exp.[b]	Ratio Act./Exp.[c]
Under 25	227	1	0.147	0.413
25-29	319	2	0.436	0.879
30-34	489	5	1.272	1.911
35-39	568	2	0.398	0.424
40-44	749	17	1.934	1.823
45-49	888	11	0.768	0.735
50-54	1,263	33	1.179	1.148
55-59	1,834	58	1.039	1.032
60-64	2,150	107	1.219	1.229
65-69	2,099	114	0.991	1.012
70-74	1,634	114	0.945	0.973
75-79	1,192	115	0.975	1.007
80-84	637	91	1.086	1.121
85-89	242	44	1.030	1.059
90 & over	117	32	1.068	1.090
All ages	14,405	743	1.034	1.060

[a] Age nearest birthday at beginning of the year of exposure.

[b] Expected based on 2021 RRB Total Termination Table for Disables Children.

[c] Expected based on proposed 2022 RRB Total Termination Table for Disables Children.

[d] 2021-2022 experience weighted 50%.

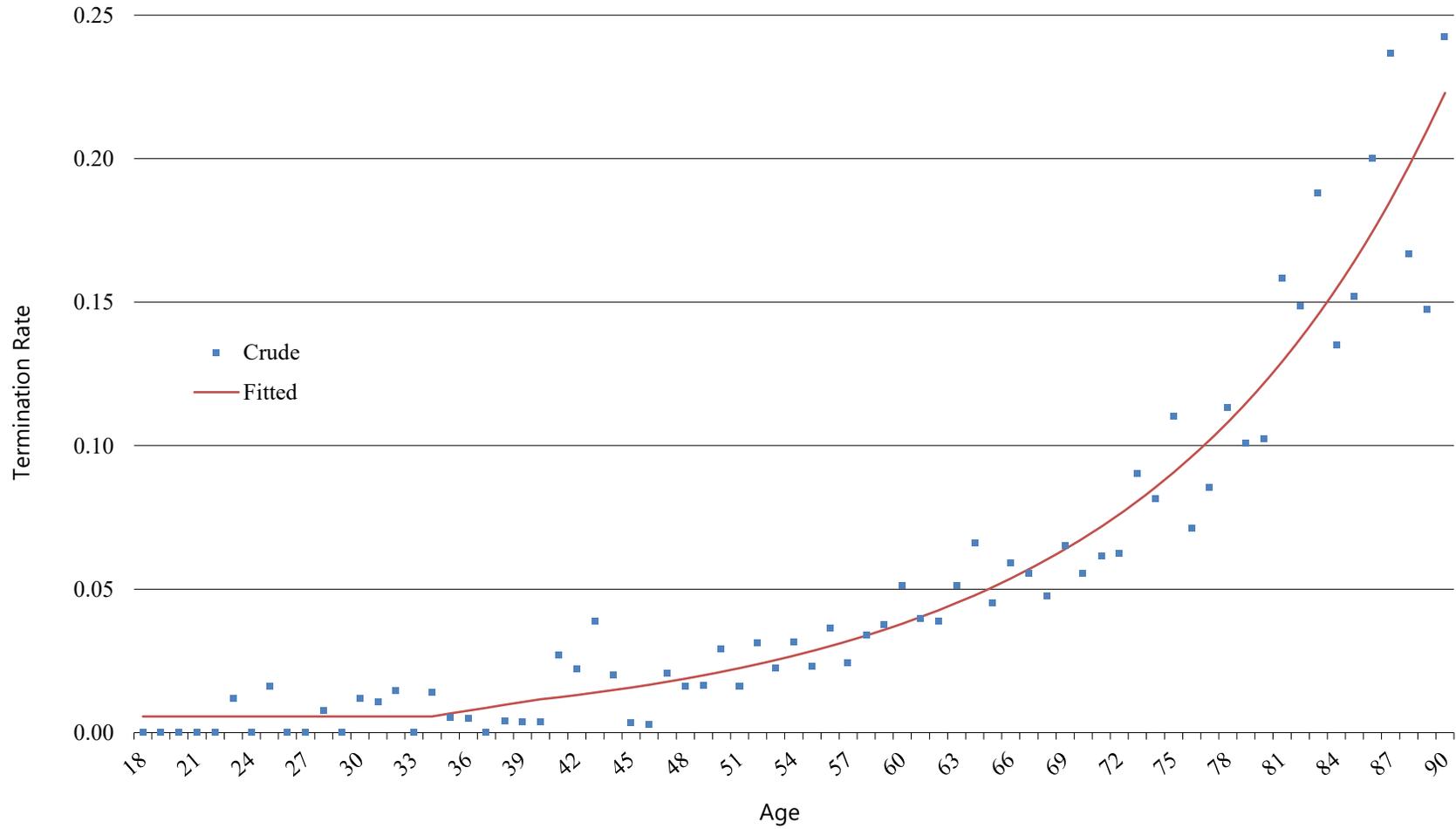**Figure 7.1 Total Termination Experience of Disabled Children Annuitants and the Fitted Rates**

Table 7.2 2022 RRB Total Termination Table for Disabled Children

Age[a]	$1,000q_x^t$	Age[a]	$1,000q_x^t$	Age[a]	$1,000q_x^t$
		50	19.99	85	155.02
		51	21.21	86	164.69
		52	22.50	87	175.01
18	5.35	53	23.85	88	186.00
19	5.35	54	25.29	89	197.74
20	5.35	55	26.81	90	210.26
21	5.35	56	28.42	91	215.95
22	5.35	57	30.11	92	233.05
23	5.35	58	31.91	93	249.57
24	5.35	59	33.82	94	265.58
25	5.35	60	35.83	95	281.10
26	5.35	61	37.97	96	296.17
27	5.35	62	40.21	97	310.82
28	5.35	63	42.61	98	325.08
29	5.35	64	45.14	99	338.98
30	5.35	65	47.82	100	352.55
31	5.35	66	50.66	101	365.88
32	5.35	67	53.68	102	377.85
33	5.35	68	56.88	103	388.67
34	5.35	69	60.28	104	398.55
35	6.29	70	63.87	105	407.68
36	7.22	71	67.69	106	416.21
37	8.16	72	71.75	107	424.62
38	9.09	73	76.06	108	432.78
39	10.03	74	80.63	109	440.67
40	10.96	75	85.49	110	1,000.00
41	11.65	76	90.66		
42	12.37	77	96.17		
43	13.15	78	102.02		
44	13.97	79	108.24		
45	14.84	80	114.86		
46	15.75	81	121.91		
47	16.73	82	129.42		
48	17.75	83	137.42		
49	18.83	84	145.93		

[a] Age nearest birthday.

Figure 7.2 Disabled Children Termination Rate Assumptions
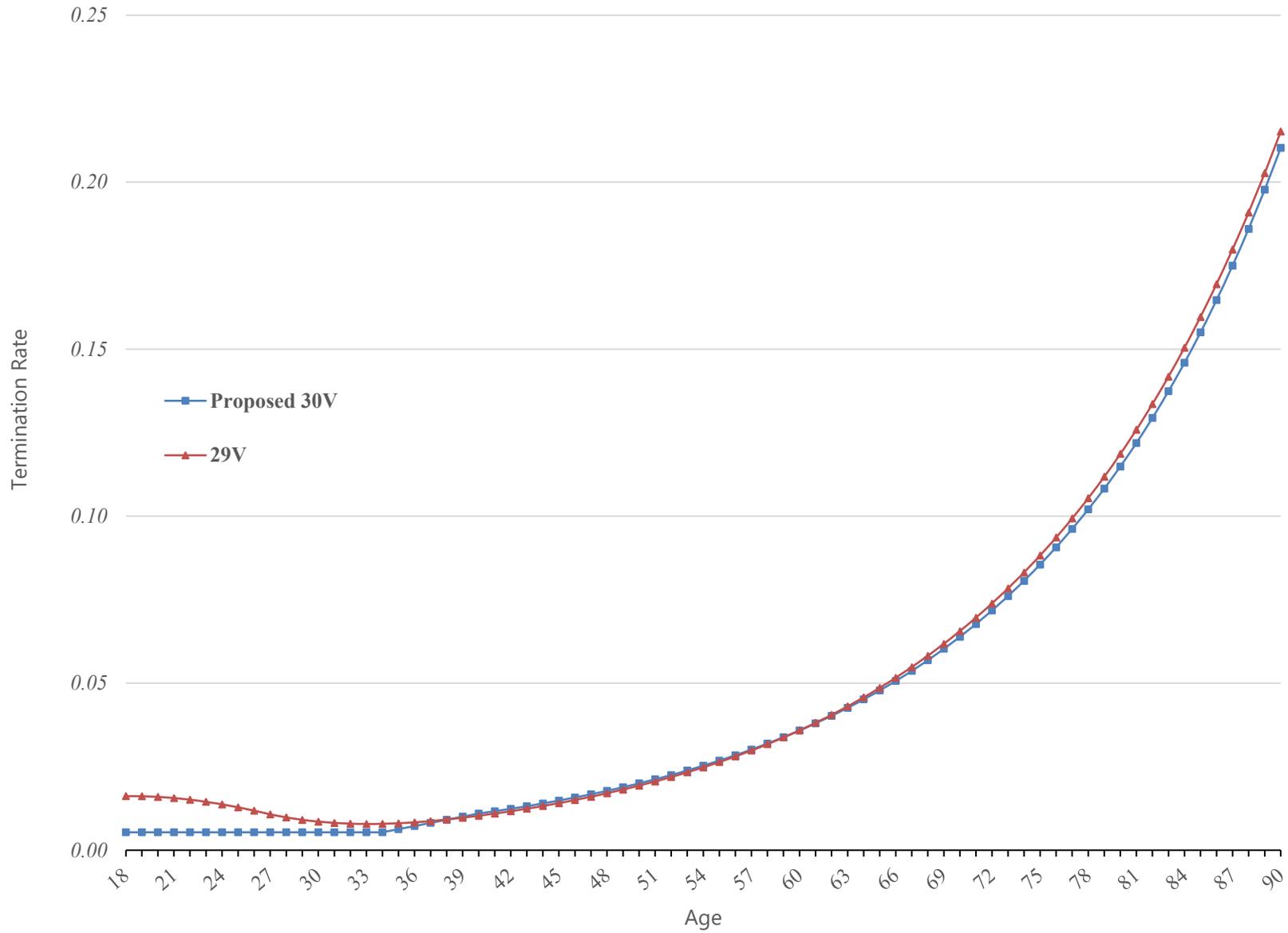
Subject 8. Family Composition

Tables 8.1 and 8.2 present family characteristics of railroad employees who died in calendar years 2021-2024 with a current connection and at least 10 years of service or 5 years of service after 1995. A current connection and either 10 years of railroad service or 5 years of service after 1995 are required for the payment of all survivor benefits except the residual lump sum benefit.

The crude rates related to deaths above age 70 shown in table 8.1 are generally consistent with prior results. The crude rates related to deaths under age 70 shown in table 8.1, however, show a notably lower percentage married and with the greatest differences tending to occur at ages with relatively small numbers of employee deaths.

In graduating the rates, full credibility was not given to current data. The graduated rates shown in table 8.2 reflect adjustments both to smooth the crude data and to give credibility to prior studies so as not to overreact to short-term fluctuations. We recommend table 8.2 as the 30th valuation standard.

Table 8.1 Family characteristics of railroad employees who died in 2021-2024 with a current connection

Age of employee[a]	Number of deaths[b]	Percent married							Percent with eligible child	
						Widow under 60 with eligible child				
		Total	Widow age 62 & over	Widow age 60-61	Widow under age 60	Youngest child under 16	Youngest child age 16-17	Youngest child disabled	Minor child	Disabled child
Under 35	50	48.0	-	-	48.0	40.0	-	-	52.0	-
35 - 39	89	52.8	-	-	52.8	50.6	1.1	-	70.8	-
40 - 44	158	51.3	-	-	51.3	43.0	5.1	-	67.7	0.6
45 - 49	304	56.9	0.4	-	56.5	32.2	7.5	1.0	53.0	1.3
50 - 54	465	51.0	2.8	2.0	46.2	12.8	7.5	0.6	32.5	1.7
55 - 59	605	51.7	6.6	3.8	41.3	7.1	2.9	1.0	13.6	1.7
60 - 64	1,110	55.3	24.6	9.7	21.0	1.0	0.8	0.1	3.5	1.2
65 - 69	3,000	60.0	48.7	5.4	5.9	0.5	0.2	0.1	1.6	1.0
70 - 74	5,390	64.7	60.1	1.9	2.7	0.3	-	-	0.7	0.9
75 - 79	6,712	65.2	63.2	0.9	1.1	0.1	-	-	0.3	0.5
80 - 84	6,229	61.2	60.3	0.4	0.5	-	-	-	0.1	0.6
85 - 89	5,777	52.2	51.9	0.1	0.2	-	-	-	0.1	0.4
90 & over	8,596	34.0	33.9	-	0.1	-	-	-	0.1	0.3

Age of employee[a]	Average ages of widows						Averages ages of children			Average number of minor children[d]
				Widow under 60 with eligible child						
	Widow age 62 & over	Widow age 60-61	Widow under age 60	Youngest child under 16	Youngest child age 16-17	Youngest child disabled	Youngest child under 16[c]	All minor children	All disabled children	
Under 35	e	e	32.5	31.6	44.2	e	4.5	6.8	e	2.0
35 - 39	e	e	36.1	35.8	40.0	e	6.3	7.4	e	2.1
40 - 44	e	e	42.0	41.5	41.5	e	8.7	9.9	16.8	2.1
45 - 49	66.9	e	46.2	44.5	45.9	49.0	11.4	12.0	23.3	1.6
50 - 54	66.3	61.1	49.8	46.2	49.6	50.9	11.7	12.7	22.4	1.3
55 - 59	66.5	60.9	53.7	49.1	51.7	54.1	11.1	13.3	25.3	1.4
60 - 64	65.6	61.0	56.3	47.1	54.8	e	11.6	12.3	27.3	1.2
65 - 69	66.9	61.0	56.3	46.9	54.8	56.8	11.6	12.0	35.2	1.3
70 - 74	70.3	61.0	55.8	48.4	47.4	48.6	11.2	12.4	38.1	1.4
75 - 79	74.1	61.0	55.6	45.6	52.7	59.8	13.0	12.0	45.1	1.3
80 - 84	78.1	61.0	56.0	52.7	49.2	59.3	8.6	13.7	49.6	2.0
85 - 89	82.4	60.8	52.2	40.6	e	e	10.8	13.5	53.2	1.4
90 & over	87.3	60.8	56.8	e	e	e	e	13.5	57.3	1.0

[a] Age nearest birthday at time of death.

[b] Includes employees with 120 or more service months and employees with 60 or more service months after 1995.

[c] Includes families with widows under 60 and children under 16 only.

[d] Includes families with minor children only.

[e] Insufficient data.

Table 8.2 Family characteristics of railroad employees assumed for the valuation of survivor benefits

Age of employee[a]	Percent married							Percent with eligible child	
					Widow under 60 with eligible child				
	Total	Widow age 62 & over	Widow age 60-61	Widow under age 60	Youngest child under 16	Youngest child age 16-17	Youngest child disabled	Minor child	Disabled child
Under 35	62.3	-	-	62.3	44.6	-	-	65.9	-
35 - 39	62.3	-	-	62.3	53.5	2.2	-	80.1	-
40 - 44	62.3	-	-	62.3	50.0	5.3	-	76.7	1.4
45 - 49	62.3	-	0.9	61.4	36.4	7.3	0.7	60.1	1.4
50 - 54	62.3	2.1	2.4	57.8	15.9	8.0	1.0	35.6	1.4
55 - 59	62.3	7.4	4.7	50.2	7.6	3.3	1.0	15.4	1.4
60 - 64	62.3	24.6	12.5	25.3	1.3	0.6	0.3	4.0	1.4
65 - 69	62.3	50.2	5.6	6.4	0.5	0.3	0.2	1.6	1.1
70 - 74	66.1	61.0	2.0	3.0	0.2	0.1	-	0.7	0.8
75 - 79	65.6	63.3	0.9	1.3	0.1	-	-	0.4	0.6
80 - 84	60.9	59.9	0.4	0.6	-	-	-	0.2	0.6
85 - 89	51.7	51.3	0.1	0.2	-	-	-	0.1	0.4
90 & over	33.9	33.8	-	0.2	-	-	-	-	0.1

Age of employee[a]	Average ages of widows						Averages ages of children			Average number of minor children[c]
				Widow under 60 with eligible child						
	Widow age 62 & over	Widow age 60-61	Widow under age 60	Youngest child under 16	Youngest child age 16-17	Youngest child disabled	Youngest child under 16[b]	All minor children	All disabled children	
Under 35	-	-	32	31	-	-	4	6	-	2.1
35 - 39	-	-	36	36	-	-	7	8	-	2.1
40 - 44	-	-	41	41	42	-	8	10	16	2.0
45 - 49	-	61	46	45	46	46	11	12	20	1.7
50 - 54	66	61	50	47	51	52	12	13	24	1.3
55 - 59	66	61	54	50	51	55	12	13	26	1.4
60 - 64	65	61	56	49	55	57	12	13	28	1.4
65 - 69	67	61	56	49	55	58	12	13	34	1.4
70 - 74	70	61	56	50	55	-	12	13	38	1.4
75 - 79	74	61	55	50	-	-	12	13	45	1.4
80 - 84	78	61	56	-	-	-	-	13	49	1.4
85 - 89	83	61	56	-	-	-	-	13	52	1.4
90 & over	87	61	56	-	-	-	-	-	-	-

[a] Age nearest birthday at time of death.

[b] Includes families with widows under 60 and children under 16 only.

[c] Includes families with minor children only.