State of Minnesota \ LEGISLATIVE COMMISSION ON PENSIONS AND RETIREMENT

TO: Members of the Legislative Commission on Pensions and Retirement

FROM: Lawrence A. Martin, Executive Director

RE: Comparison of the Mortality Tables Currently in Force – Statewide and Major
                Local Minnesota Retirement Plans

DATE: October 24, 2011

Introduction

At the October 20, 2011, meeting of the Legislative Commission on Pensions and Retirement, the Commission raised the issue of the mortality tables currently used by the Minnesota statewide and major local retirement plans. This memorandum compares the mortality tables currently in force for these plans and summarizes the development of the particular mortality tables currently in use.

Current Mortality Tables

Healthy pre-retirement mortality

MSRS-General: RP2000 non-annuitant generational table, white collar adjustment, set forward 3 years for males and set back 1 year for females.

PERA-General: RP2000 non-annuitant generational table, white collar adjustment, set forward 5 years for males and set back 3 years for females.

TRA: RP2000 non-annuitant generational table, white collar adjustment, set forward 5 years for males and set back 7 years for females.

PERA-MERF Division: RP2000 healthy annuitant table, white collar adjustment, projected to 2018, without set back or set forward for males or females.

Age	MSRS-General Male	MSRS-General Female	PERA-General Male	PERA-General Female	TRA Male	TRA Female	PERA-MERF Male	PERA-MERF Female
20	0.0255%	0.0176%	0.0270%	0.0172%	0.0177%	0.0156%	0.02%	0.02%
25	0.0297%	0.0186%	0.0336%	0.0176%	0.0226%	0.0176%	0.02%	0.02%
30	0.0457%	0.0236%	0.0562%	0.0212%	0.0270%	0.0180%	0.03%	0.02%
35	0.0722%	0.0393%	0.0821%	0.0335%	0.0336%	0.0224%	0.05%	0.04%
40	0.1066%	0.0515%	0.1178%	0.0463%	0.0562%	0.0366%	0.08%	0.05%
45	0.1456%	0.0793%	0.1649%	0.0656%	0.0821%	0.0488%	0.11%	0.08%
50	0.1960%	0.1220%	0.2268%	0.1025%	0.1178%	0.0719%	0.14%	0.12%
55	0.3017%	0.1977%	0.3628%	0.1618%	0.1649%	0.1120%	0.23%	0.22%
60	0.4896%	0.3248%	0.5841%	0.2694%	0.2268%	0.1786%	0.43%	0.44%
65	0.7404%	0.5179%	0.8445%	0.4318%	0.3628%	0.2955%	0.86%	0.80%
70	2.2964%	0.7785%	2.9211%	0.6674%	0.5841%	0.4735%	1.47%	1.40%
75	4.2084%	2.1643%	5.3731%	1.7687%	0.8445%	0.0722%		

Healthy post-retirement mortality

MSRS-General: RP2000 annuitant generational table, white collar adjustment, without set back or set forward for males or females.

PERA-General: RP2000 annuitant generational table, white collar adjustment, without set back or set forward for males, set back 2 years for females.

TRA: RP2000 annuitant generational table, white collar adjustment, set back 2 years for males and set back 3 years for females.

PERA-MERF Division: RP2000 healthy annuitant table, white collar adjustment, projected to 2018, without set back or set forward for males or females.

Age	MSRS-General Male	MSRS-General Female	PERA-General Male	PERA-General Female	TRA Male	TRA Female	PERA-MERF Male	PERA-MERF Female
20	0.0226%	0.0175%	0.0226%	0.0176%	0.0207%	0.0172%	0.02%	0.02%
25	0.0270%	0.0193%	0.0270%	0.0180%	0.0255%	0.0176%	0.02%	0.02%
30	0.0336%	0.0257%	0.0336%	0.0224%	0.0297%	0.0212%	0.03%	0.02%
35	0.0562%	0.0418%	0.0562%	0.0366%	0.0457%	0.0335%	0.05%	0.04%
40	0.0821%	0.5554%	0.0821%	0.0488%	0.0722%	0.0463%	0.08%	0.05%
45	0.1178%	0.0865%	0.1178%	0.0719%	0.1006%	0.0656%	0.11%	0.08%
50	0.4989%	0.2062%	0.4989%	0.1120%	0.1456%	0.1025%	0.14%	0.12%
55	0.4484%	0.3219%	0.4484%	0.2568%	0.4671%	0.2329%	0.23%	0.22%
60	0.5622%	0.5343%	0.5622%	0.4456%	0.4841%	0.4045%	0.43%	0.44%
65	1.0104%	0.8665%	1.0104%	0.7057%	0.8018%	0.6406%	0.86%	0.80%
70	1.6571%	1.4443%	1.6571%	1.1788%	1.3752%	1.0663%	1.47%	1.40%
75	2.9211%	2.3732%	2.9211%	1.9485%	2.2964%	1.7687%		

Disabled mortality

MSRS-General: RP2000 disabled table, no set back or set forward for males and set forward 5 years for females.

PERA-General: RP2000 disabled retiree table, set back 4 years for males and set forward 7 years for females.

TRA: RP2000 disabled retiree table without set back or set forward for males or females.

PERA-MERF Division: RP2000 healthy annuitant table, white collar adjustment, without projection, reduced by 20%, without set back or set forward for males or females.

Age	MSRS-General Male	MSRS-General Female	PERA-General Male	PERA-General Female	TRA Male	TRA Female	PERA-MERF Male	PERA-MERF Female
20	2.2571%	0.7450%	2.2571%	0.7450%	2.2571%	0.7450%	0.02%	0.02%
25	2.2571%	0.7450%	2.2571%	0.7450%	2.2571%	0.7450%	0.02%	0.02%
30	2.2571%	0.7450%	2.2571%	0.7450%	2.2571%	0.7450%	0.03%	0.02%
35	2.2571%	0.7450%	2.2571%	0.7450%	2.2571%	0.7450%	0.05%	0.04%
40	2.2571%	0.7450%	2.2571%	0.8959%	2.2571%	0.7450%	0.07%	0.05%
45	2.2571%	1.1535%	2.2571%	1.3456%	2.2571%	0.7450%	0.11%	0.08%
50	2.8975%	1.6544%	2.3847%	1.8654%	2.8975%	1.1535%	0.48%	0.20%
55	3.5442%	2.1839%	3.0268%	2.4080%	3.5442%	1.6544%	0.43%	0.28%
60	4.2042%	2.8026%	3.6732%	3.1325%	4.2042%	2.1839%	0.53%	0.45%
65	5.0174%	3.7635%	4.3474%	4.2851%	5.0174%	2.8026%	0.93%	0.73%
70	6.2583%	5.2230%	5.2213%	5.9545%	6.2583%	3.7635%	1.54%	1.21%
75	8.2067%	7.2312%	6.5841%	8.2298%	8.2067%	5.2330%		

MSRS-Correctional | State Patrol | PERA-P&F | PERA-Correctional

Healthy pre-retirement mortality

- MSRS-Correctional: 1983 Group Annuity Mortality for males set back five years. 1983 Group Annuity Mortality for females set back two years.
- State Patrol: 1983 Group Annuity Mortality for males set back five years. 1983 Group Annuity Mortality for females set back two years.
- PERA-P&F: 1983 Group Annuity Mortality for males set back six years. 1983 Group Annuity Mortality for females set back six years.
- PERA-Correctional: 1983 Group Annuity Mortality for males set back one year. 1983 Group Annuity Mortality for females.

Age	MSRS-Corr. Male	MSRS-Corr. Female	State Patrol Male	State Patrol Female	PERA-P&F Male	PERA-P&F Female	PERA-Corr. Male	PERA-Corr. Female
20	0.03%	0.02%	0.03%	0.02%	0.03%	0.01%	0.04%	0.02%
25	0.04	0.02	0.04	0.02	0.04	0.02	0.04	0.03
30	0.05	0.03	0.05	0.03	0.04	0.02	0.06	0.03
35	0.06	0.04	0.06	0.04	0.06	0.03	0.08	0.05
40	0.09	0.06	0.09	0.06	0.08	0.04	0.11	0.07
45	0.12	0.08	0.12	0.08	0.11	0.06	0.19	0.10
50	0.22	0.14	0.22	0.14	0.19	0.09	0.35	0.16
55	0.39	0.21	0.39	0.21	0.35	0.15	0.57	0.25
60	0.61	0.34	0.61	0.34	0.57	0.23	0.84	0.42
65	0.92	0.58	0.92	0.58	0.84	0.38	1.29	0.71
70	1.56	0.97	1.56	0.97	1.39	0.64	2.48	1.24

Healthy post-retirement mortality

- MSRS-Correctional: 1983 Group Annuity Mortality for males set back two years. 1983 Group Annuity Mortality for females set back one year.
- State Patrol: 1983 Group Annuity Mortality for males set back two years. 1983 Group Annuity Mortality for females set back one year.
- PERA-P&F: 1983 Group Annuity Mortality for males set back one year. 1983 Group Annuity Mortality for females set back one year.
- PERA-Correctional: 1983 Group Annuity Mortality for males set forward two years. 1983 Group Annuity Mortality for females set forward two years.

Age	MSRS-Corr. Male	MSRS-Corr. Female
20	0.04%	0.02%
25	0.04	0.02
30	0.05	0.03
35	0.07	0.04
40	0.10	0.06
45	0.17	0.09
50	0.31	0.15
55	0.52	0.23
60	0.77	0.38
65	1.24	0.64
70	2.22	1.09

Disabled mortality

- MSRS-Correctional: Combined Annuity Mortality up to age 40, grading to healthy mortality for ages 60 and over.
- State Patrol: Combined Annuity Mortality.
- PERA-P&F: 1965 RRB rates up to age 40. For ages 41 to 59, graded rates between 1965 RRB and the Healthy Post-Retirement Mortality Table. For ages 60 and later, the Healthy Post-Retirement Mortality Table.
- PERA-Correctional: Combined Annuity Mortality.

Age	MSRS-Corr. Male	MSRS-Corr. Female
20	0.21%	0.21%
25	0.22	0.22
30	0.24	0.24
35	0.31	0.31
40	0.46	0.46
45	0.58	0.48
50	0.69	0.49
55	0.80	0.51
60	0.92	0.52
65	1.56	0.87
70	2.75	1.62

Legislators | Constitutional Officers | Judges

Healthy pre-retirement mortality

- Legislators: 1983 Group Annuity Mortality for males set back four years. 1983 Group Annuity Mortality for females set back two years.
- Constitutional Officers: 1983 Group Annuity Mortality for males set back four years. 1983 Group Annuity Mortality for females set back two years.
- Judges: 1983 Group Annuity Mortality for males set back four years. 1983 Group Annuity Mortality for females set back two years.

Age	Legislators Male	Legislators Female	Const. Officers Male	Const. Officers Female	Judges Male	Judges Female
20	0.03%	0.02%	0.03%	0.02%	0.03%	0.02%
25	0.04	0.02	0.04	0.02	0.04	0.02
30	0.05	0.03	0.05	0.03	0.05	0.03
35	0.06	0.04	0.06	0.04	0.06	0.04
40	0.09	0.06	0.09	0.06	0.09	0.06
45	0.14	0.08	0.14	0.08	0.14	0.08
50	0.25	0.14	0.25	0.14	0.25	0.14
55	0.43	0.21	0.43	0.21	0.43	0.21
60	0.66	0.34	0.66	0.34	0.66	0.34
65	1.01	0.58	1.01	0.58	1.01	0.58
70	1.76	0.97	1.76	0.97	1.76	0.97

Healthy post-retirement mortality

- Legislators: 1983 Group Annuity Mortality for males. 1983 Group Annuity Mortality for females.
- Constitutional Officers: 1983 Group Annuity Mortality for males. 1983 Group Annuity Mortality for females.
- Judges: RP-2000 Combined Annuity Mortality, projected 8 years, with no collar adjustment.

Age	Judges Male	Judges Female
20	0.03%	0.02%
25	0.03	0.02
30	0.04	0.02
35	0.07	0.04
40	0.10	0.06
45	0.14	0.10
50	0.18	0.15
55	0.31	0.25
60	0.59	0.49
65	1.14	0.93
70	1.97	1.61

	Legislators	Constitutional Officers	Judges
Disabled mortality	N/A	N/A	Combined Annuity Mortality.

Current Mortality Tables - First Class City Teacher Retirement Fund Associations

	DTRFA	SPTRFA

Healthy pre-retirement mortality

DTRFA: 1994 Group Annuity Mortality for males set back two years.
1994 Group Annuity Mortality for females set back two years.

Age	Male	Female
20	0.05%	0.03%
25	0.06	0.03
30	0.08	0.03
35	0.08	0.04
40	0.09	0.06
45	0.14	0.09
50	0.21	0.12
55	0.36	0.19
60	0.63	0.34
65	1.15	0.67
67*	1.45	0.86

*Last retirement age

SPTRFA: 1983 Group Annuity Mortality Table for males set back 7 years.
1983 Group Annuity Mortality Table for females set back 5 years

Age	Male*	Female*	Age	Male*	Female*
20	3	2	45	10	7
21	3	2	46	11	7
22	3	2	47	12	8
23	3	2	48	14	8
24	3	2	49	15	9
25	4	2	50	17	10
26	4	3	51	19	11
27	4	3	52	22	12
28	4	3	53	25	14
29	4	3	54	28	15
30	4	3	55	31	16
31	4	3	56	35	18
32	5	4	57	39	19
33	5	4	58	43	21
34	5	4	59	48	23
35	5	4	60	52	25
36	6	5	61	57	28
37	6	5	62	61	31
38	6	5	63	66	34
39	7	6	64	71	38
40	7	6	65	77	42
41	8	7	66	84	47
42	9	7	67	92	52
43	9	8	68	101	58
44	10	8	69	111	64

*Expressed as the number of occurrences per 10,000

Healthy post-retirement mortality

DTRFA: 1994 Group Annuity Mortality for males set back two years.
1994 Group Annuity Mortality for females set back two years.

SPTRFA: 1983 Group Annuity Mortality Table for males set back 4 years.
1983 Group Annuity Mortality Table for females set back 1 year

Age	Male*	Female*	Age	Male*	Female*
20	3	2	45	14	9
21	3	2	46	15	10
22	4	2	47	17	11
23	4	2	48	19	12
24	4	2	49	22	14
25	4	2	50	25	15
26	4	3	51	28	16
27	4	3	52	31	18
28	4	3	53	35	19
29	5	3	54	39	21
30	5	3	55	43	23
31	5	3	56	48	25
32	5	4	57	52	28
33	6	4	58	57	31
34	6	4	59	61	34
35	6	4	60	66	38
36	7	5	61	71	42
37	7	5	62	77	47
38	8	5	63	84	52
39	9	6	64	92	58
40	9	6	65	101	64
41	10	7	66	111	71
42	10	7	67	124	78
43	11	8	68	139	87
44	12	8	69	156	97

*Expressed as the number of occurrences per 10,000

Current Mortality Tables - First Class City Teacher Retirement Fund Associations

	DTRFA		SPTRFA					

Disabled mortality	Male and Female tables apply:		1977 Railroad Retirement Board Mortality Table for Disabled Lives					
			Post-Disability Mortality*					
	Age	Table	Age	Male	Female	Age	Male	Female
	54 and younger	Disabled Eligible for Social Security Disability-ERISA Sec. 4044 for 2006	20	57	57	45	275	274
			21	60	60	46	275	275
	55-64	Graded from table for ages 54 and younger to table for ages 65 and older	22	63	63	47	276	276
			23	66	66	48	279	279
	65 and older	1994 Group Annuity Mortality Table set back 2 years	24	69	69	49	283	283
			25	72	72	50	289	289
			26	75	75	51	297	297
			27	79	79	52	310	310
			28	82	82	53	327	327
			29	87	87	54	348	348
			30	91	91	55	371	371
			31	95	95	56	395	395
			32	99	99	57	417	417
			33	103	103	58	439	439
			34	107	107	59	455	455
			35	273	273	60	473	473
			36	273	273	61	494	494
			37	273	273	62	516	516
			38	273	273	63	541	541
			39	273	273	64	569	569
			40	273	273	65	598	598
			41	273	273	66	628	628
			42	273	273	67	658	658
			43	274	274	68	687	687
			44	274	274	69	716	716

Expressed as the number of occurrences per 10,000

Comparison of GAM-83, GAM-94, and RP-2000 Mortality Tables in General [1]

Three different mortality tables are currently used in the various statewide and major local Minnesota public defined benefit retirement plans, the 1983 Group Annuity Mortality Table (GAM-83), the 1994 Group Annuity Mortality Table (GAM-94), and the RP-2000 Mortality Table (RP-2000).

1. The GAM-83 Mortality Table was the most commonly used mortality table by pension actuaries in 2003 (75% utilization according to a Watson-Wyatt survey of actuarial assumptions). The GAM-83 was based on group annuitant experience from 1964 to 1968. The youngest annuitants in the experience bracket were age 66 in 1964. The mortality table was constructed when a review of the 1971 Group Annuity Mortality table (GAM-71) and insurer experience showed that GAM-71 was inadequate. When GAM-83 was developed, credible data available to construct a new table was insufficient and the developers used the same annuitant mortality experience on which GAM-71 was based, mortality experience from 1964 to 1968, and projected additional mortality improvements to 1983 based in 1966 to 1975 trends.

2. The GAM-94 Mortality Table was developed to replace GAM-83 after a study of 1986 annuitant experience showed steady declines in ratio of actual to expected mortality, particularly for males. Researchers compared mortality rates at ages 66-95 for group annuitants, the Federal Civil Service Retirement System (CSRS), uninsured plans (24 private and one state) and the Railroad Retirement System. Rates for ages 25-65 were based on 1985 to 1989 (retired) and 1983 to 1986 (active) CSRS experience. Active and retired experiences were blended for ages 51-65. Rates for ages 66-95 were based on group annuitant experience data from 1985-1990. Rates at extreme ages (over 95 and under 25) were taken from 1990 life tables published in the Social Security Administration. Group annuitant experience was projected to 1994.

3. The RP-2000 Mortality Table is the only mortality table that uses underlying rates that are based solely on retirement plan mortality experience. The table was developed by the Society of Actuaries after the Retirement Protection Act of 1994 permitted the Secretary of the Treasury to promulgate a new mortality table for private sector retirement plan liability calculations after 2000. Data for the RP-2000 table was collected from private employers for plan years 1990 to 1994. Rates were adjusted for mortality improvement from 1992 to 2000 using the data underlying the Social Security Administration's Actuarial Study No. 110 and Federal Civil Service Retirement System data.

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[1] This comparison was adapted in part from a November/December 2005 article by Emily Kessler, "Pension Tables Should Reflect Improving Mortality," in *Contingencies Magazine*, published by the American Academy of Actuaries.

To illustrate how the tables compare, the following shows the change in annuity values under the three mortality tables:

| | Monthly annuity due factor, 5% interest* | | | Change in annuity value from GAM-83 value at the same age | |
Gender, Age	GAM-83	GAM-94	RP-2000	GAM-94	RP-2000
Male					
35	2.23	2.39	2.43	7.0%	8.6%
45	3.68	3.94	3.99	6.8%	8.4%
55	6.23	6.58	6.65	5.6%	6.7%
65	11.14	11.61	11.60	4.2%	4.1%
75	7.93	8.48	8.22	7.0%	3.7%
85	5.18	5.51	5.04	6.4%	-2.7%
Female					
35	2.82	2.81	2.69	-0.4%	-4.8%
45	4.63	4.61	4.41	-0.4%	-4.7%
55	7.66	7.62	7.31	-0.6%	-4.6%
65	13.02	12.98	12.54	-0.3%	-3.7%
75	9.67	9.80	9.34	1.4%	-3.4%
85	6.45	6.42	6.10	-0.4%	-5.4%

Deferred annuity (to age 65) for ages below 65; immediate annuity for ages 65 and above

In general, the RP-2000 values are between 2% and 11% higher for males and between 3% and 5% lower for females than the GAM-83 values.

Conclusion

The commission staff hopes that this memorandum provides greater clarity on the mortality tables currently in use in Minnesota public pension plans. If additional analysis of the issue is needed by the Commission, the consulting actuary retained by the Commission, Milliman, can be requested to provide a more in-depth analysis.