

**TRANSACTIONS OF SOCIETY OF ACTUARIES  
1979 REPORTS**

**REPORT OF THE COMMITTEE ON SELF-  
ADMINISTERED RETIREMENT PLANS**

**MORTALITY AMONG PENSIONERS  
AND SOME NONRETIRED EXPERIENCE**

**P**REVIOUS reports of this Committee are in the *1958 Reports* (p. 115), *1962 Reports* (p. 120), *1966 Reports* (p. 182), *1971 Reports* (p. 257), and *1976 Reports* (p. 151). Data from the *1971 Reports* were used in constructing the UP-1984 Mortality Table, the first such table based primarily on noninsured pensioner mortality experience for ages 65 and over.<sup>1</sup> For the *1976 Reports*, actual-to-expected mortality ratios were derived on the basis of the UP-1984 Table (set forward one year for males and set back four years for females, unless otherwise indicated) and also on the basis of the 1971 GAM Tables for males and females. For the purpose of analyzing the experience gathered for this report, actual-to-expected mortality ratios were derived on the basis of the UP-1984 Table adjusted as in 1976.

Reports prior to 1976 were limited to the mortality experience of non-disability retirements by number of lives. The 1976 report was expanded to include some disability pensioner mortality experience, and, for several of the nondisability mortality experiences, the results were shown on the basis of pension amounts and by number of lives. This report includes also some disability pensioner mortality experience and some results by amount as well as by number of lives. Each experience has been summarized and reported separately, as in prior reports, and, where available and of sufficient size to be meaningful, the experience for male and female pensioners has been shown separately. The data base includes the experiences for two large nonretired groups, as well as for the United States civil service retirement system and the social security program.

Data for a number of smaller groups, mainly governmental units, that were shown in the *1971 Reports* were not included in the 1976 report and have not been included in this report either. The tables and sections included herein are numbered as they were in the 1976 report for the sake of comparability. The experiences that have been included have not been regrouped on the basis of consistent quinquennial periods of time, nor are the experience periods coterminous, because of problems with data availability and time constraints.

<sup>1</sup> William W. Fellers and Paul H. Jackson, "Noninsured Pensioner Mortality: The UP-1984 Table," *PCAPP*, XXV, 456.

Experiences included in this report, and a brief description of the group, are shown in Table A. The years shown are the calendar years that include the first date of a given experience year.

The pensioner mortality experience (predominantly nondisability) has been summarized in Table B on the basis of actual-to-expected mortality ratios. All of the groups of Table A have been included except the sixth, which is an exclusively nonretired experience.

TABLE A  
GROUP EXPERIENCES INCLUDED IN REPORT

Most Recent Time Period Covered	Number of Deaths	Description of Group	Summarized in Table
1973-77	6,034,038	United States social security, ages 65-99 (includes disability pensioners), by number	1
1975-78	111,443	United States civil service retired government employees, by number	2
1975-79	24,625	Electrical union, merged nonretired and retired, unisex, by number	4
1976-77	12,403	Public utility companies, retired, by number and amount	5
1975-78	3,731	Manufacturing company, nonretired hourly males younger than age 55, by number	6
1973-77	2,229	Light manufacturing company, nonretired and retired, unisex, by number and amount	11

From Table B, it can be seen that the rate of mortality improvement has been greater for females than for males since 1968 for group 1 and since 1970 for all but group 2, which had identical rates of improvement for males and females. The suggestion of a trend reversal noted in the *1976 Reports* has not been borne out by these data, which indicate a higher rate of mortality improvement for females than for males in recent years. The rate of mortality improvement for both males and females has increased significantly since the 1970-74 period for all groups.

The experiences by amount of monthly pension, shown for groups 5 and 11, are still more favorable than the corresponding experiences by number. Group 5 has about a seven-point spread for males, thus suggesting that for this group the use of the UP-1984 Table without setback would make provision for the relatively better mortality experienced by those receiving higher benefits. There is a sixteen-point spread for unisex group 11. This represents roughly a two-year age setback on the unisex basis needed to reproduce the mortality by amount.

TABLE B  
PENSIONER MORTALITY

GROUP SUMMARIZED FROM TABLE	ACTUAL-TO-EXPECTED MORTALITY RATIOS ON UP-1984 BASIS							AVERAGE ANNUAL IMPROVEMENT	
	1945-49	1950-54	1955-59	1960-64	1965-69	1970-74	Most Recent Period Shown in Table A	Percent Improvement	Since Year
1. Males.....						122%	117%	2.0%	1968
Females.....						116	109	2.8	1968
2. Males.....	124%	120%	118%	114%	109%	101	93	1.0	1945
Females.....	125	112	102	99	92	90	82	1.5	1945
4. Ages 65 and over.....				131	127	124	120	0.7	1960
5. Males:									
By number	144	134	132	132	128	115	96	1.7	1945
By amount	141	129	142	127	118	105	89	1.8	1945
Females:									
By number	163	133	128	118	108	106	86	2.7	1945
By amount	162	135	130	118	106	102	83	2.7	1945
11. Unisex:									
By number						111*	101*	3.3	1970
By amount						105*	85*	6.7	1970

\* On basis of UP-1984 Table without adjustment, as compared with UP-1984 Table set forward one year for other predominantly male groups.

I. UNITED STATES SOCIAL SECURITY (MEDICARE EXPERIENCE, WHICH INCLUDES DISABILITY PENSIONERS)

Social security medicare mortality experience was made available by year for the years 1968-77. Age-reporting errors in the 1976 Reports have been corrected in this report for the years 1973-74.

Table 1 displays, by sex and quinquennial age group, the number of deaths and actual-to-expected mortality ratios for the United States social security system for each year from 1973 through 1977 and for the quinquennial periods 1968-72, 1970-74, and 1973-77. This experience includes all those covered under medicare at attained ages 65-99, that is, disability pensioners surviving to age 65 as well as regular and early retirements. The mortality results are thus independent of the liberality or strictness in awarding disability pensions. Also, when nondisability experience is considered alone, the exposure is select and the mortality rates are artificially depressed by the exclusion of disability deaths. It will be noted that, for males, the older the age group, in general, the

TABLE 1  
UNITED STATES SOCIAL SECURITY MEDICARE DATA  
(Disability and Nondisability)

AGE GROUP	1973*		1974*		1975		1976		1977†		1968-72		1970-74*		1973-77*	
	A/E UP-1984†	No. Deaths	A/E UP-1984†	No. Deaths	A/E UP-1984†	No. Deaths	A/E UP-1984†	No. Deaths	A/E UP-1984†	No. Deaths	A/E UP-1984†	No. Deaths	A/E UP-1984†	No. Deaths	A/E UP-1984†	No. Deaths
Males																
65-69	135%	129,320	131%	127,755	128%	127,082	126%	128,028	123%	126,727	139%	623,986	135%	635,005	128%	638,912
70-74	131	136,158	126	132,746	123	133,715	121	133,823	120	136,050	133	683,072	131	673,367	124	672,492
75-79	123	136,775	118	131,363	115	127,272	115	128,950	113	126,772	126	685,738	123	679,626	117	651,132
80-84	119	114,082	114	110,284	111	109,293	110	111,155	107	111,003	121	541,808	118	551,614	112	555,817
85-89	114	67,324	110	67,597	106	66,707	108	69,694	104	69,034	116	313,704	114	327,675	108	340,356
90-94	105	25,480	101	25,713	97	26,378	100	28,652	96	28,562	107	112,964	104	119,881	100	134,785
95-99	85	5,516	82	5,469	79	5,608	79	6,116	73	6,204	88	23,981	85	25,797	80	28,913
Total	124%	614,655	119%	600,927	116%	596,055	115%	606,418	113%	604,352	126%	2,985,253	124%	3,012,965	117%	3,022,407
Females																
65-69	102%	75,899	99%	75,503	96%	75,133	95%	75,965	94%	76,480	107%	372,814	103%	376,438	97%	378,980
70-74	104	99,285	100	96,724	97	96,222	95	96,092	93	96,649	110	509,415	106	497,527	98	484,972
75-79	116	130,897	110	126,273	105	120,412	103	120,098	100	117,033	121	643,507	116	644,976	107	614,713
80-84	124	136,980	120	136,036	114	133,862	112	136,320	107	135,281	130	637,989	125	661,041	115	678,479
85-89	132	102,514	127	103,935	119	102,208	121	109,322	115	108,711	137	458,714	132	489,007	122	526,690
90-94	131	47,787	126	49,249	119	50,305	122	54,976	116	55,862	134	204,025	130	222,761	122	258,179
95-99	113	12,689	110	13,015	103	13,260	107	15,198	101	15,456	118	52,754	113	58,839	106	69,618
Total	117%	606,051	112%	600,735	107%	591,402	107%	607,971	103%	605,472	122%	2,879,218	117%	2,950,589	109%	3,011,631
Grand Total (males and females)		1,220,706		1,201,662		1,187,457		1,214,389		1,209,824		5,864,471		5,963,554		6,034,038

\* 1973 and 1974 data revised since 1976 Reports. Data for 1976 Reports contained reporting errors in age information.

† UP-1984 Table of unisex rates set forward one year for males and set back four years for females.

‡ These are preliminary figures.

lower the ratio of actual-to-expected mortality. For females, however, the ratio of actual-to-expected mortality tends to increase by age until it reaches a maximum at ages 85-94, and drops thereafter.

Since the experience is so extensive, the actual-to-expected ratios for the older age groups have considerable credibility. For ages 95-99, the ratio of actual to expected mortality for males was less than 90 percent by this mortality standard for the full ten-year period. For females at ages 95-99, it was greater than 100 percent for all ten years.

From 1976 to 1977, the overall actual-to-expected ratios showed marked improvement for females and less improvement for males. For the four-year period prior to 1977, the mortality improvement was also more significant for females than it was for males. For the nine-year period prior to 1977, this relationship held, too, but at a lower level than the more recent experience indicated. There appears to have been a sharp improvement in mortality from 1973 to 1975, followed by a very slight improvement in 1976 and 1977.

## II. RETIRED GOVERNMENT EMPLOYEES (CIVIL SERVICE "NONDISABILITY ANNUITANTS")

The experience of the United States civil service retirement system for government employees for the four-year period from 1975 to 1978 included 111,443 deaths among pensioners classified as "nondisability annuitants."

Table 2 summarizes the mortality experience since 1945 for males and females. Mortality during the 1975-78 period was roughly 8 percent more favorable for males and 9 percent more favorable for females than during the 1970-74 period. The results indicate an annual rate of mortality improvement of about  $1\frac{3}{4}$  percent for males and 2 percent for females. Since 1945, on the average, the female mortality improvement has been about  $1\frac{3}{8}$  times that for males.

Another point to note is that at ages 80 and over the mortality ratios are generally less favorable for females than for males, whereas the reverse is more often true at ages under 80.

## III. RAILROAD RETIREMENT (current experience not available)

## IV. MERGED NONRETIRED AND RETIRED EXPERIENCES FOR ELECTRICAL GROUP

Another experience of a "heavy industry" type is that of a large electrical union group. This group is predominantly male, and no separation

TABLE 2  
RETIRED GOVERNMENT EMPLOYEES  
(Civil Service "Nondisability Annuitants")

AGE GROUP	7/45-6/50		7/50-6/55		7/55-6/60		7/60-6/65		7/65-6/70		7/70-6/75		7/75-9/79*	
	A/E UP- 1984†	No. Deaths	A/E UP- 1984†	No. Deaths	A/E UP- 1984†	No. Deaths	A/E UP 1984†	No. Deaths	A/E UP 1984†	No. Deaths	A/E UP- 1984†	No. Deaths	A/E UP- 1984†	No. Deaths
Males														
Under 55.....	‡	3	84%	21	127%	47	106%	77	97%	150	103%	698	94%	533
55-59.....	132%	340	134	424	118	565	123	786	105	1,171	104	3,143	83	3,079
60-64.....	154	1,940	144	3,031	130	4,169	126	4,408	118	5,341	106	8,514	85	7,658
65-69.....	130	3,962	134	6,333	128	10,206	121	14,015	111	12,954	103	14,747	90	13,875
70-74.....	119	5,489	114	7,649	116	11,354	113	17,530	109	22,269	103	19,819	93	15,534
75-79.....	118	4,588	112	6,556	113	9,247	111	13,149	107	19,492	102	25,392	96	16,888
80-84.....	123	2,926	112	4,229	112	6,383	111	8,782	107	12,244	99	18,456	96	17,777
85-89.....	117	1,269	114	1,908	114	3,130	110	4,558	107	6,125	95	8,836	97	9,888
90 and over.....	119	372	115	658	106	1,018	108	1,767	103	2,601	90	3,843	92	4,015
65 and over.....	121	18,606	117	27,333	117	41,338	114	59,801	108	75,685	101	91,093	94	77,977
All.....	124%	20,889	120%	30,809	118%	46,119	114%	65,072	109%	82,347	101%	103,448	93%	89,247

\* Four fiscal years, 1976-79, excluding the transition quarter of July 1, 1976, through September 30, 1976.

† UP-1984 Table set forward one year for males and set back four years for females.

‡ Less than ten deaths.

TABLE 2—Continued

AGE GROUP	7/45-6/50		7/50-6/55		7/55-6/60		7/60-6/65		7/65-6/70		7/70-6/75		7/75-9/79*	
	A/E UP-1984†	No. Deaths	A/E UP-1984†	No. Deaths	A/E UP-1984†	No. Deaths	A/E UP-1984†	No. Deaths	A/E UP-1984†	No. Deaths	A/E UP-1984†	No. Deaths	A/E UP-1984†	No. Deaths
Females														
415 Under 55.....	‡	0	‡	3	‡	4	‡	9	93%	19	97%	90	81%	75
55-59.....	79%	16	74%	36	102%	55	92%	66	83	115	94	357	72	336
60-64.....	110	125	101	263	107	436	90	643	84	847	79	1,328	69	1,133
65-69.....	132	364	108	639	100	1,021	88	1,777	81	2,363	77	2,912	72	2,765
70-74.....	110	480	100	770	94	1,362	86	2,308	78	3,397	78	4,479	70	3,738
75-79.....	124	448	113	710	98	1,220	106	2,085	93	3,333	89	5,246	81	4,808
80-84.....	147	342	128	526	108	901	118	1,469	111	2,519	102	4,489	90	4,783
85-89.....	141	136	148	296	119	476	124	792	123	1,377	116	2,597	101	3,061
90 and over.....	132	46	134	92	121	192	141	378	138	674	110	1,129	112	1,497
65 and over.....	126	1,816	114	3,033	101	5,181	100	8,809	93	13,663	90	20,852	83	20,652
All.....	125%	1,957	112%	3,335	102%	5,676	99%	9,527	92%	14,644	90%	22,627	82%	22,196
Grand total		22,846		34,144		51,795		74,599		96,991		126,075		111,443

\* Four fiscal years, 1976-79, excluding the transition quarter of July 1, 1976, through September 30, 1976.

† UP-1984 Table set forward one year for males and set back four years for females.

‡ Less than ten deaths.

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in data has been made by sex. The experience is given on a merged basis for nonretired and retired. Those at attained ages 65 and over are basically the retired group, although, in the absence of any mandatory retirement age, there are a considerable number of actives in the 65-69 and 70-75 age groups. Unfortunately, separate retired and nonretired experiences are not available for this group on a regular basis. Thus the degree to which pensioner mortality is worse than active mortality that is due to the retirement of those in poor health cannot be studied for this group. Annuity values based on the combined experience would tend to overstate the cost of pensions.

This experience is shown in Table 4 for the last four five-year periods beginning in 1960. For the five-year period 1975-79 there were 24,625 deaths, of which 16,993 were at attained ages 65 and older. First, it will be noted that this "heavy industry" experience is generally less favorable than others, including social security males at ages 75 and higher. Second, for the period since 1960, the compound annual rate of mortality

TABLE 4  
ELECTRICAL UNION PENSION AND DEATH  
BENEFIT FUNDS FOR MEMBERSHIP  
(Normal Retirement Age Is 65)

AGE GROUP	1960-64		1965-69		1970-74		1975-79	
	A/E UP-1984*	No. Deaths	A/E UP-1984*	No. Deaths	A/E UP-1984*	No. Deaths	A/E UP-1984*	No. Deaths
Under 25.....	102%	82	147%	131	115%	126	71%	75
25-29.....	108	136	146	213	112	208	99	188
30-34.....	145	283	148	259	143	290	125	292
35-39.....	126	454	119	368	119	323	108	321
40-44.....	118	637	117	658	107	501	92	385
45-49.....	123	989	113	980	111	963	97	704
50-54.....	129	1,626	116	1,445	111	1,428	96	1,254
55-59.....	133	2,420	128	2,344	119	2,096	103	1,882
60-64.....	134	2,686	128	3,301	118	2,944	104	2,531
65-69.....	127	2,535	124	3,411	120	4,049	109	3,572
70-74.....	132	2,147	130	3,164	126	4,023	115	4,456
75-79.....	134	1,370	127	2,321	122	3,163	122	4,110
80-84.....	128	597	127	1,227	124	2,011	126	2,788
85 and over.....	150	301	137	556	133	1,040	142	2,067
Ages 65 and over.....	131	6,950	127	10,679	124	14,286	120	16,993
Total.....	130%	16,263	126%	20,378	121%	23,165	113%	24,625

\* UP-1984 Table set forward one year.



improvement appears to have been only about 0.6 percent for those aged 65 and over. Since 1970, mortality improvement has been greatest for the group less than age 65, led by enormous improvements at ages 34 or under.

#### V. PUBLIC UTILITY COMPANIES

Table 5 shows the mortality experience of predominantly nondisability pensioners of a large complex of public utilities. There were 12,403 deaths from this group of pensioners during the three-year period 1975-77. Except for the short period 1975-77, experience has been made available for quinquennial periods beginning in 1945.

The first part of Table 5 shows the experience for each sex by number of deaths. The second part of Table 5 adds another dimension by showing the experience on the basis of amounts of monthly pension.

When measured by number of deaths, the overall mortality experience for males appears to be about 20 percent lighter than that of the electrical union group. The experience by amount of monthly benefit appears to be about 7 percent better than by number of deaths, which is close to a one-year adjustment in age by the UP-1984 Table. Perhaps, the higher the benefit, the more likely it is that the pensioner can have his medical requirements met on a timely basis and so defer the time of his death. Those receiving higher benefits may also have fewer worries of meeting the increasing cost of living.

A second observation on this latest experience is that the rate of mortality improved dramatically over the 1970-74 experience. The average annual rate of improvement in mortality was about  $4\frac{1}{2}$  percent for males and 5 percent for females from 1970-74 to 1975-77 as compared with 0.9 and 1.7 percent over the prior thirty-year period.

Finally, the extremely high rate of mortality for the younger age groups probably reflects both the fact that very early retirement is often triggered by poor health and the fact that the experience includes cases of disability where the employee was eligible for a service pension at retirement. This is therefore similar in certain respects to the Table 1 social security medicare experience for males.

#### VI. NONRETIRED HOURLY MALES OF A MANUFACTURING COMPANY

The mortality experience for a large nonretired group of hourly males is summarized in Table 6 for three periods, 1966-69, 1970-74, and 1975-78. The female experience was not of sufficient size to warrant inclusion in this report. For the period 1975-78, the male mortality experience pro-

TABLE 5

## SERVICE PENSIONERS OF A GROUP OF PUBLIC UTILITY COMPANIES COVERED UNDER A UNIFORM PLAN

(Retirement Is Compulsory at Age 65, and Service Pensioners Include Employees Retired for Disability if Eligible for a Service Pension)

## EXPERIENCE BY NUMBER

AGE GROUP	1945-49		1950-54		1955-59		1960-64		1965-69		1970-74		1975-77	
	A/E UP-1984*	No. Deaths	A/E UP-1984*	No. Deaths	A/E UP-1984*	No. Deaths	A/E UP-1984*	No. Deaths	A/E UP-1984*	No. Deaths	A/E UP-1984*	No. Deaths	A/E UP-1984*	No. Deaths
Males														
45-49.....	†	5	†	7	†	1	†	2	†	6	†	4	†	8
50-54.....	693%	35	594%	35	594%	54	513%	46	700%	25	569%	77	326%	93
55-59.....	377	153	366	142	384	185	344	269	369	276	305	192	180	201
60-64.....	198	427	196	471	173	476	173	800	181	1,469	180	1,357	109	387
65-69.....	126	768	129	1,131	127	1,367	126	1,630	116	2,122	114	2,853	90	1,256
70-74.....	132	573	117	868	129	1,365	126	1,622	122	1,912	105	2,348	92	1,648
75-79.....	128	339	124	576	117	946	123	1,393	124	1,694	109	1,864	94	1,312
80-84.....	135	156	115	268	117	486	117	864	114	1,138	106	1,290	97	874
85-89.....	86	37	150	108	135	205	130	344	102	491	100	686	88	438
90-94.....	126	14	109	27	127	29	127	74	103	119	75	186	94	177
95 and over.....	†	2			151	12	†	4	60	10	66	26	89	42
Total.....	144%	2,509	134%	3,633	132%	5,126	132%	7,048	128%	9,262	115%	10,883	96%	6,436

\* UP-1984 Table set forward one year for males and set back four years for females.

† Less than ten deaths.

TABLE 5—Continued  
EXPERIENCE BY NUMBER - Continued

AGE GROUP	1945-49		1950-54		1955-59		1960-64		1965-69		1970-74		1975-77	
	AE U/P- 1984*	No. Deaths	A/E UP- 1984*	No. Deaths	A/E UP- 1984*	No. Deaths	AE U/P- 1984*	No. Deaths	A/E UP- 1984*	No. Deaths	A/E UP- 1984*	No. Deaths	A/E UP- 1984*	No. Deaths
Females														
45-49	†	7	319%	14	414%	18	586%	16	†	3	1,134%	11	†	5
50-54	282%	60	259	83	260	129	240	145	349%	110	283	59	209%	62
55-59	205	141	163	189	159	268	131	400	135	555	155	382	137	187
60-64	170	186	124	238	127	418	112	608	108	1,017	120	1,382	77	426
65-69	118	169	106	319	104	575	95	898	89	1,246	92	1,971	75	1,155
70-74	156	141	133	262	117	486	115	881	97	1,282	100	1,961	77	1,291
75-79	171	72	127	133	133	311	126	631	120	1,124	104	1,711	89	1,202
80-84	144	31	150	63	152	167	143	348	123	652	108	1,114	95	960
85-89	239	10	207	32	167	53	155	132	138	268	116	514	106	511
90-94	†	2	†	2	239	15	220	26	119	54	131	135	114	155
95 and over							†	1	†	1	166	23	95	13
Total	163%	819	133%	1,335	128%	2,440	118%	4,086	108%	6,312	106%	9,263	86%	5,967

\* UP-1984 Table set forward one year for males and set back four years for females.

† Less than ten deaths.

TABLE 5—Continued  
EXPERIENCE BY AMOUNT

AGE GROUP	1945-49		1950-54		1955-59		1960-64		1965-69		1970-74		1975-77	
	A/E UP-1984*	Monthly Benefit	A/E UP-1984*	Monthly Benefit	A/E UP-1984*	Monthly Benefit	A/E UP-1984*	Monthly Benefit	A/E UP-1984*	Monthly Benefit	A/E UP-1984*	Monthly Benefit	A/E UP-1984*	Monthly Benefit
Males														
45-49	†	\$ 478	†	\$ 770	†	\$ 111	†	\$ 307	†	\$ 1,305	†	\$ 952	†	\$ 2,831
50-54	724%	3,289	614%	3,973	687%	8,667	502%	8,361	675%	5,625	511%	19,038	305%	37,386
55-59	371	14,968	355	16,073	366	27,168	333	56,707	349	70,038	280	59,135	147	83,778
60-64	175	41,093	188	57,947	166	77,127	153	174,842	155	380,004	162	505,395	96	192,203
65-69	128	75,445	119	121,435	117	176,319	113	296,854	102	520,448	102	1,075,132	84	667,528
70-74	127	49,777	116	90,441	126	163,196	121	251,079	111	402,602	96	833,315	84	783,539
75-79	119	30,427	116	59,299	110	98,657	117	188,689	116	259,725	99	597,682	89	594,380
80-84	139	13,442	109	32,348	115	55,205	122	115,639	113	179,687	95	353,730	92	358,927
85-89	87	2,635	145	12,977	136	28,391	127	43,773	91	63,564	91	171,038	91	170,996
90-94	116	1,052	105	2,815	127	3,196	123	10,878	99	16,629	72	45,812	100	61,099
95 and over	†	273	†	†	147	1,308	†	507	61	1,395	61	6,652	62	12,922
Total	141%	\$232,879	129%	\$398,078	142%	\$639,355	127%	\$1,147,636	118%	\$1,941,022	105%	\$3,667,881	89%	\$2,965,589

\* UP-1984 Table set forward one year for males and set back four years for females.

† Less than ten deaths.

TABLE 5—Continued  
EXPERIENCE BY AMOUNT—Continued

AGE GROUP	1945-49		1950-54		1955-59		1960-64		1965-69		1970-74		1975-77	
	A/E UP-1984*	Monthly Benefit	A/E UP-1984*	Monthly Benefit	A/E UP-1984*	Monthly Benefit	A/E UP-1984*	Monthly Benefit	A/E UP-1984*	Monthly Benefit	A/E UP-1984*	Monthly Benefit	A/E UP-1984*	Monthly Benefit
Females														
45-49	†	\$ 285	312%	\$ 1,050	461%	\$ 1,761	612%	\$ 1,843	†	\$ 369	1,406%	\$ 2,067	†	\$ 1,449
50-54	278%	3,033	260	6,396	266	11,484	241	16,438	355%	13,855	302	10,157	229%	17,190
55-59	209	7,540	165	14,880	163	24,509	132	46,802	133	73,139	161	63,956	134	48,099
60-64	168	9,449	125	18,576	128	35,575	112	61,719	108	126,802	119	244,851	77	108,318
65-69	116	7,598	109	25,042	104	45,417	94	87,386	84	151,651	90	364,245	71	277,594
70-74	154	6,337	136	22,024	117	40,436	115	85,577	95	152,116	96	344,521	74	290,776
75-79	162	3,445	129	12,018	133	27,335	125	62,286	118	128,312	100	295,306	87	267,438
80-84	140	1,564	142	5,827	154	15,897	144	35,926	122	73,258	105	188,195	93	204,504
85-89	219	414	214	3,231	172	5,556	156	14,224	136	29,858	112	81,083	103	100,378
90-94	†	100	†	200	235	1,447	225	3,000	119	6,251	129	21,076	112	28,216
95 and over	.....	.....	.....	.....	.....	.....	.....	115	.....	103	143	3,506	88	2,180
Total	162%	\$ 39,765	135%	\$109,244	130%	\$209,417	118%	\$ 415,316	106%	\$ 755,714	102%	\$1,618,963	83%	\$1,346,142

\* UP-1984 Table set forward one year for males and set back four years for females.

† Less than ten deaths.

TABLE 6

NONRETIRED HOURLY MALE EMPLOYEES OF A MANUFACTURING COMPANY  
(Pension Plan Permits Nondisability Retirement Beginning at Age 55  
or, if Earlier, after 30 Years of Service)

AGE GROUP	1966-69		1970-74		1975-78	
	A/E UP-1984*	No. Deaths	A/E UP-1984*	No. Deaths	A/E UP-1984*	No. Deaths
20-24	171%	534	164%	560	134%	237
25-29	138	354	147	556	128	338
30-34	122	305	136	482	120	395
35-39	115	429	114	521	108	426
40-44	112	669	106	771	86	486
45-49	101	882	103	1,217	90	826
50-54	107	1,326	96	1,583	76	1,023
Total	115%	4,499	112%	5,690	94%	3,731

\* UP-1984 Table set forward one year.

vided 85 percent of the total male-female exposure and slightly over 92 percent of the total male-female actual deaths for this group.

Except for the 1970-74 period, the periods include only four years, and this is the main reason why the number of deaths during the 1970-74 period was some 27 percent higher than during the 1966-69 period. There is less than a 2 percent drop in exposure from the earliest to the latest period, however, so the 17 percent drop in actual deaths is a significant development.

Generally, the actual-to-expected mortality ratios decline continuously from the younger age groups to the older age groups. Data for ages 55-64 were not available for this report, so data for the periods prior to 1975 were adjusted to exclude these ages also.

The average annual rate of mortality improvement from 1966-69 to 1970-74 was only about 0.6 percent, but from 1970-74 to 1975-78 the average has been 3.8 percent per year. The greatest improvement over the total period has been at ages 20-24.

The pattern of mortality improvement since the period 1970-74 strongly suggests a reduction in accidental death at the younger ages, whether because of improved safety measures at work or something like lower speed limits outside work. This pattern is similar to that found in Table 6 for the youngest electrical workers but is not found in Table 11, which has data from a company involved in light as opposed to heavy

manufacturing. The pattern also suggests that the minimum age at which early retirement becomes available may have been lowered since 1970-74, or at least that more of those subject to higher mortality are availing themselves of the opportunity to retire.

VII, VIII, IX, X (experience not currently available)

XI. NONDISABILITY UNISEX EXPERIENCE OF A  
LIGHT MANUFACTURING COMPANY

The nondisability mortality experience of a light manufacturing company is shown in Table 11 for the nonretired and retired categories separately. For the two quinquennial age groups 55-59 and 60-64, the nonretired and retired experiences are also shown on a merged basis. Since unisex procedures are being used for valuing this plan, the experience data have not been made available separately by sex. Therefore, the actual-to-expected mortality ratios have been developed only on the basis of the UP-1984 Table without any set-forward or setback in age. The group is approximately 16 percent female.

For the nonretired group, the overall actual-to-expected mortality ratio dropped from 67 percent in 1970-74 to 61 percent in 1973-77. This apparent improvement may be due to a relatively higher female content as well as a general improvement in mortality. Data distributions for 1971, which were available by sex, showed relatively higher female content at the younger ages. Even during the early retirement period, where there is an overlap with the retired group's experience from age 55 to age 65, the actual-to-expected mortality ratios are well below 100 percent. One reason for this is the handling of disability cases, which are excluded from both the nonretired and retired group experience.

As for the retired group experience beginning with age 65, the disability cases are included and so are treated as a part of the nondisability experience. This is the only sizable experience for which the nonretired and retired groups are shown separately and then merged. Hence it was felt that this experience should be included for consideration. The downward trend, by age group, of the actual-to-expected ratios noted for older ages of other groups is not evident in this experience. The average annual rate of pensioner mortality improvement by amount since the 1970-74 period was more than  $1\frac{1}{2}$  times greater than the rate of improvement for pensioners of public utility companies. A change in the method of reporting pensioner deaths that led to an underreporting of deaths in 1978 data, not shown here, possibly could have affected the reporting of 1977 deaths, but its effect, if any, is unknown at this time.

TABLE 11  
NONDISABILITY UNISEX EXPERIENCE OF A  
LIGHT MANUFACTURING COMPANY

AGE GROUP	NONRETIRED				RETIRED				NONRETIRED AND RETIRED			
	1970-74		1973-77		1970-74		1973-77		1970-74		1973-77	
	A/E*	No. Deaths	A/E*	No. Deaths	A/E*	No. Deaths	A/E*	No. Deaths	A/E*	No. Deaths	A/E*	No. Deaths
Under 25.....	55%	46	56%	28								
25-29.....	62	123	55	79								
30-34.....	60	120	62	131								
35-39.....	62	132	48	113								
40-44.....	58	147	59	174								
45-49.....	76	212	73	245								
50-54.....	73	215	59	222								
55-59.....	81	191	69	199	97%	12	78%	20	82%	203	70%	219
60-64.....	63	96	53	74	86	66	96	128	71	162	74	202
65-69.....					112	232	93	272				
70-74.....					125	197	113	231				
75-79.....					111	153	103	156				
80-84.....					111	77	110	115				
85-89.....					75	17	80	28				
90-94.....					125	11	135	12				
95 and over.....					155	2	154	2				
Total.....	67%	1,282	61%	1,265	111%†	767	101%†	964				

\* On basis of UP-1984 Table without adjustment, since unisex procedures were used and there is a significant female content.

† On basis of amounts, the comparable ratio is 105% for 1970-74 and 85% for 1973-77.