

TRANSACTIONS OF SOCIETY OF ACTUARIES

1982 REPORTS

II. 1975-80 BASIC TABLES

ABSTRACT

This report presents the 1975-80 Select and Ultimate Basic Tables. The Age Nearest Birthday tables are shown on the next three pages. The Age Last Birthday tables are shown in the Appendix. The select tables show mortality rates for issue age groups 0, 1, 2-4, 5-9, 10-14, through 70 and over, during the first fifteen policy years. The ultimate tables show mortality rates for individual attained ages from 15 through 100. Separate sets of tables have been constructed for male lives and for female lives.

The mortality rates are based on the combined intercompany mortality experience under Standard Ordinary insurance issues observed between 1975 and 1980 policy anniversaries. All rates are based on medical, paramedical and nonmedical issues combined.

The new tables are intended to replace the 1965-70 Basic Tables in the analysis of intercompany experience and to provide companies with an up-to-date basis for making mortality comparisons.

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1975-80 SELECT BASIC TABLES
MALE LIVES—AGE NEAREST BIRTHDAY
GRADUATED MORTALITY RATES PER 1,000

ISSUE AGE GROUP	POLICY YEAR														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	1.23	0.74	0.48	0.43	0.38	0.34	0.33	0.29	0.27	0.27	0.25	0.28	0.31	0.38	0.54
1	0.49	0.47	0.42	0.36	0.28	0.23	0.22	0.22	0.24	0.24	0.27	0.30	0.38	0.54	0.68
2-4	0.35	0.29	0.25	0.23	0.22	0.20	0.22	0.24	0.27	0.30	0.37	0.53	0.68	1.01	1.14
5-9	0.19	0.20	0.22	0.24	0.27	0.30	0.35	0.50	0.66	0.87	1.05	1.13	1.19	1.23	1.40
10-14	0.23	0.32	0.50	0.66	0.87	1.05	1.13	1.19	1.23	1.30	1.35	1.36	1.30	1.25	1.20
15-19	1.05	1.12	1.17	1.21	1.20	1.18	1.18	1.15	1.11	1.07	1.05	1.06	1.05	1.06	1.08
20-24	0.73	0.76	0.76	0.76	0.77	0.77	0.77	0.77	0.80	0.83	0.88	0.91	0.96	1.04	1.15
25-29	0.68	0.68	0.70	0.71	0.73	0.77	0.81	0.86	0.92	1.01	1.08	1.17	1.30	1.47	1.63
30-34	0.63	0.71	0.84	0.92	1.00	1.08	1.17	1.28	1.40	1.58	1.81	2.03	2.26	2.53	2.83
35-39	0.67	0.84	1.15	1.37	1.58	1.78	2.01	2.24	2.53	2.80	3.08	3.43	3.86	4.32	4.82
40-44	0.92	1.22	1.76	2.09	2.37	2.62	2.89	3.18	3.52	3.99	4.57	5.28	6.15	7.05	7.85
45-49	1.39	2.17	2.73	3.25	3.69	4.13	4.56	4.89	5.31	5.93	6.79	7.78	9.03	10.34	11.85
50-54	1.90	2.52	3.17	3.85	4.65	5.38	6.23	7.20	8.32	9.48	11.51	13.18	14.52	15.80	16.96
55-59	2.82	3.89	4.94	6.18	7.38	8.60	9.96	11.33	12.87	15.03	18.21	21.36	24.39	27.15	30.87
60-64	3.50	5.14	7.97	9.36	11.59	11.83	13.29	15.21	17.05	19.77	23.18	26.21	30.06	33.93	41.03
65-69	5.91	9.12	12.62	16.42	20.11	22.42	25.79	28.69	32.93	34.47	38.42	42.80	49.08	57.68	62.18
70 and over	9.12	12.90	16.85	22.45	25.17	26.41	29.63	34.65	40.30	46.63	52.71	61.41	73.53	88.71	110.30

(This table is continued on the next page.)

1975-80 SELECT BASIC TABLES (*continued*)
 FEMALE LIVES—AGE NEAREST BIRTHDAY
 GRADUATED MORTALITY RATES PER 1,000

ISSUE AGE: GROUP	POLICY YEAR														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0.93	0.34	0.30	0.27	0.24	0.22	0.20	0.18	0.18	0.18	0.19	0.21	0.24	0.27	0.32
1	0.34	0.30	0.27	0.24	0.22	0.20	0.18	0.18	0.18	0.19	0.21	0.24	0.27	0.32	0.36
2-4.....	0.24	0.24	0.22	0.20	0.18	0.18	0.18	0.19	0.21	0.24	0.27	0.32	0.36	0.40	0.44
5-9.....	0.17	0.18	0.18	0.19	0.21	0.24	0.27	0.32	0.36	0.40	0.44	0.47	0.49	0.51	0.52
10-14.....	0.18	0.27	0.32	0.36	0.40	0.44	0.47	0.49	0.51	0.52	0.53	0.53	0.53	0.53	0.53
15-19.....	0.36	0.37	0.39	0.40	0.41	0.42	0.43	0.44	0.53	0.53	0.53	0.53	0.54	0.55	0.58
20-24.....	0.32	0.34	0.36	0.38	0.40	0.41	0.43	0.45	0.46	0.50	0.61	0.65	0.70	0.77	0.84
25-29.....	0.30	0.35	0.41	0.45	0.50	0.55	0.59	0.63	0.66	0.76	0.93	1.03	1.15	1.29	1.45
30-34.....	0.38	0.44	0.54	0.65	0.76	0.86	0.97	1.08	1.19	1.31	1.62	1.79	1.96	2.14	2.33
35-39.....	0.48	0.58	0.71	0.92	1.13	1.35	1.56	1.77	1.98	2.19	2.39	2.60	2.82	3.15	3.42
40-44.....	0.70	0.98	1.20	1.54	1.80	2.10	2.33	2.58	2.83	3.10	3.38	3.69	4.01	4.57	4.94
45-49.....	0.96	1.33	1.68	1.95	2.34	2.65	3.06	3.49	3.94	4.41	4.90	5.41	5.94	6.84	7.46
50-54.....	1.20	1.68	2.10	2.47	3.01	3.61	4.28	5.03	5.40	6.01	6.64	7.27	7.91	9.00	9.70
55-59.....	1.51	2.11	2.76	3.49	4.24	5.02	5.82	6.62	7.42	8.21	9.00	10.04	11.20	13.13	14.65
60-64.....	2.15	3.12	4.07	5.01	5.93	6.88	7.90	8.97	10.07	11.19	13.90	15.50	17.30	20.28	22.64
65-69.....	2.82	3.94	5.10	6.27	7.48	8.85	10.43	12.32	14.61	17.37	21.40	23.87	26.64	31.21	34.98
70 and over	4.92	6.94	8.97	11.02	13.08	15.15	17.16	19.12	21.06	23.14	33.21	37.06	41.34	48.44	54.05

1975-80 ULTIMATE BASIC TABLES—AGE NEAREST BIRTHDAY
GRADUATED MORTALITY RATES PER 1,000

Attained Age	Male Lives	Female Lives	Attained Age	Male Lives	Female Lives
15	0.68	0.36	60	11.89	7.37
16	1.01	0.40	61	13.17	8.00
17	1.14	0.44	62	14.57	8.67
18	1.22	0.47	63	16.07	9.38
19	1.31	0.49	64	17.71	10.15
20	1.37	0.51	65	19.50	10.99
21	1.40	0.52	66	21.47	11.91
22	1.41	0.53	67	23.65	12.92
23	1.40	0.53	68	26.05	14.03
24	1.38	0.53	69	28.69	15.25
25	1.34	0.53	70	31.57	16.63
26	1.29	0.53	71	34.68	18.21
27	1.24	0.53	72	38.00	20.04
28	1.20	0.53	73	41.60	22.17
29	1.17	0.54	74	45.54	24.65
30	1.14	0.55	75	49.90	27.53
31	1.12	0.58	76	54.71	30.86
32	1.11	0.61	77	60.03	34.69
33	1.12	0.65	78	65.85	39.07
34	1.14	0.70	79	72.18	44.00
35	1.17	0.77	80	79.02	49.48
36	1.22	0.84	81	86.36	55.51
37	1.28	0.93	82	94.12	62.09
38	1.36	1.03	83	102.35	69.22
39	1.45	1.15	84	111.41	76.90
40	1.56	1.29	85	121.31	85.13
41	1.70	1.45	86	132.05	93.91
42	1.87	1.62	87	143.63	103.24
43	2.07	1.79	88	156.05	113.12
44	2.31	1.96	89	169.12	123.55
45	2.58	2.14	90	182.61	134.53
46	2.89	2.33	91	196.52	146.06
47	3.24	2.52	92	210.85	158.14
48	3.61	2.72	93	225.60	170.77
49	4.02	2.93	94	240.77	183.95
50	4.45	3.17	95	256.36	197.68
51	4.92	3.43	96	272.37	211.96
52	5.44	3.71	97	288.80	226.79
53	6.00	4.04	98	305.65	242.17
54	6.61	4.40	99	322.92	258.10
55	7.27	4.80	100	340.61	274.58
56	8.01	5.23			
57	8.82	5.70			
58	9.73	6.22			
59	10.75	6.78			

INTRODUCTION

The 1975-80 Basic Tables were prepared by the Committee on Ordinary Insurance and Annuities for the purpose of making mortality comparisons under Standard Ordinary insurance issues. Basic age nearest birthday tables previously were published for 1955-60 and 1965-70 in *TSA, 1962 Reports*, pages 44-58 and *TSA, 1973 Reports*, pages 199-223, respectively.

In recent years, intercompany mortality has been, in the aggregate, approximately 76 percent of that represented by the 1965-70 tables. Because of this improvement in mortality experience, the Committee decided to construct a new set of basic tables, to be called the 1975-80 Basic Tables.

Four tables of age nearest birthday rates have been constructed. The select tables show mortality rates for issue age groups 0, 1, 2-4, 5-9, 10-14, through 70 and over, for male and female lives separately, for each of the first fifteen policy years separately. The ultimate tables show mortality rates at each attained age from 15 through 100 for male and female lives separately.

The new tables are based on the combined intercompany experience on Standard Ordinary issues between 1975 and 1980 policy anniversaries as published in the *TSA Reports* 1977 through 1981. The number of companies contributing to this experience varied between nineteen and twenty-one.

No tables were constructed for combined male and female experience. There are significant differences between the male and female mortality rates, and it was felt that potential users of combined tables would prefer to choose their own mix of male and female lives.

In constructing the 1965-70 Select Basic Tables, experience from only medically examined business was used. Medical examinations at the younger ages are often obtained because of a questionable or borderline impairment. Therefore, in the current experience it was found that many of the cells at the younger ages showed poorer experience on medically examined issues than on nonmedical issues. Because of this and also because most new business on younger lives is written on other than a medical basis, intercompany experience for all issues, medical, paramedical and nonmedical, was used for both the select and the ultimate tables.

The new tables have been constructed to facilitate the analysis by the committee of intercompany mortality and to provide companies with a more up-to-date basis for making mortality comparisons. The tables should be recognized as a composite of the experience of a number of life insurance companies with varying underwriting standards and marketing characteristics. In addition, a given company's underwriting standards and marketing characteristics may have changed over the many years of issue included in the data.

BASIC DATA

The select crude mortality rates (Table 1) for issue age groups 0, 1, 2-4, 5-9, 10-14, through 70 and over, are based on the intercompany experience between 1975 and 1980 policy anniversaries for each of the first fifteen policy years for premium-paying insurance.

The ultimate crude mortality rates (Table 5) are based on experience by attained age for policy years 16 and over on premium paying policies and for all policy years on fully paid-up policies. Ultimate data for the period between 1975 and 1976 policy anniversaries were not available by individual attained ages and, therefore, were not used. Data for the other four years were available by individual attained ages.

A problem encountered was that while the data for most companies were submitted on an age nearest birthday basis, significant amounts were also submitted on an age last birthday basis. Actual deaths and expected deaths (obtained by using the 1965-70 Basic Tables age nearest or age last birthday mortality rates, as appropriate) were available for each cell.

To overcome this problem, the same procedure was used as was used in developing the 1965-70 Basic Tables. First, the ratio of actual to expected deaths on a combined age nearest and age last birthday basis was calculated for each cell. Crude age nearest birthday mortality rates were then calculated for each cell by multiplying this ratio by the corresponding age nearest birthday death rate from the 1965-70 Basic Table; the resulting crude mortality rates, shown in Tables 1 and 5, are what were used in the graduation process.

Also, pseudo nearest birthday exposures were then calculated by dividing the total actual deaths in each cell by these crude nearest birthday mortality rates. These pseudo exposures were used in determining the fit of the graduated tables.

Tables 4 and 7 provide summaries of the actual death claims used in developing the select and ultimate tables respectively.

GRADUATION—MALE LIVES

The male ultimate rates were graduated using a Whitaker-Henderson type A formula with the value of a equal to 2. Results were tested for fit and smoothness. The smoothness of the graduated rates at ages 85 and higher, as measured by second differences, was deemed not acceptable and empirical adjustments were therefore made which produced not only a very smooth curve (constant second differences to the end of the table) but improved the fit. Another adjustment, described below, was made to the rates at ages 15 and 16.

The graduated ultimate mortality rates are shown on page 58 of this report.

TABLE I
1975-80 SELECT EXPERIENCE
CRUDE MORTALITY RATES PER 1,000

ISSUE AGE GROUP	POLICY YEAR														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Male Lives Age Nearest Birthday															
0	1.38	0.55	0.44	0.38	0.38	0.36	0.35	0.27	0.28	0.27	0.24	0.29	0.26	0.42	0.43
1	0.38	0.50	0.57	0.38	0.24	0.18	0.27	0.20	0.28	0.10	0.41	0.25	0.30	0.26	0.38
2-4	0.37	0.28	0.24	0.21	0.31	0.15	0.17	0.22	0.24	0.30	0.38	0.55	0.97	0.99	1.15
5-9	0.20	0.18	0.22	0.26	0.26	0.29	0.55	0.50	0.58	0.87	1.18	1.06	1.28	0.99	1.61
10-14	0.27	0.28	0.48	0.59	1.04	1.29	1.06	1.22	1.16	1.31	1.39	1.39	1.30	1.22	1.16
15-19	1.06	1.08	1.18	1.26	1.17	1.20	1.16	1.15	1.15	0.96	1.14	1.01	1.07	1.02	1.10
20-24	0.72	0.77	0.80	0.78	0.77	0.75	0.75	0.80	0.82	0.88	0.90	0.89	0.94	0.97	1.22
25-29	0.69	0.65	0.74	0.69	0.70	0.75	0.82	0.85	0.91	1.01	1.03	1.19	1.21	1.54	1.64
30-34	0.57	0.71	0.89	0.90	0.94	1.07	1.17	1.31	1.33	1.55	1.82	2.06	2.27	2.68	2.79
35-39	0.69	0.83	1.20	1.35	1.54	1.83	1.84	2.25	2.65	2.89	2.91	3.34	3.99	4.13	4.96
40-44	0.92	1.14	1.86	2.35	2.01	2.86	2.69	3.34	3.45	3.89	4.52	5.24	6.05	7.35	7.78
45-49	1.39	2.24	2.92	3.14	3.46	3.95	5.08	4.95	4.98	5.55	7.01	7.63	9.06	10.10	12.18
50-54	1.94	2.63	2.96	3.62	5.10	5.48	6.09	6.78	8.50	9.21	12.14	13.61	14.01	16.37	16.58
55-59	2.88	3.88	4.52	6.86	6.97	8.32	10.95	11.45	12.66	12.90	19.94	21.77	25.25	24.97	31.91
60-64	3.58	6.13	5.52	8.26	11.07	12.62	14.25	13.96	13.37	22.12	24.82	26.62	37.95	29.14	40.74
65-69	5.72	6.27	10.46	10.47	50.41	21.09	22.74	32.05	30.19	45.89	28.15	49.18	41.12	51.20	56.55
70 and over	7.88	14.13	13.49	44.81	20.48	12.59	25.14	36.05	42.04	46.18	30.43	41.72	78.39	70.25	214.85

(Table I is continued on the next page.)

TABLE 1 -Continued
1975-80 SELECT EXPERIENCE
CRUDE MORTALITY RATES PER 1,000

ISSUE AGE GROUP	POLICY YEAR														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Female Lives Age Nearest Birthday															
0	0.93	0.39	0.40	0.27	0.13	0.17	0.21	0.29	0.13	0.15	0.20	0.11	0.23	0.14	0.28
1	0.37	0.37	0.21	0.21	0.18	0.22	0.22	0.14	0.14	0.23	0.05	0.08	0.14	0.45	0.46
2-4	0.24	0.16	0.32	0.16	0.15	0.15	0.05	0.10	0.05	0.11	0.17	0.26	0.37	0.39	0.59
5-9	0.17	0.19	0.18	0.16	0.11	0.11	0.22	0.34	0.29	0.42	0.60	0.80	0.57	0.57	0.47
10-14 . . .	0.18	0.29	0.41	0.53	0.38	0.44	0.41	0.47	0.72	0.38	0.54	0.74	0.77	0.44	0.60
15-19 . . .	0.34	0.42	0.37	0.37	0.47	0.42	0.41	0.43	0.50	0.44	0.61	0.50	0.49	0.56	0.48
20-24 . . .	0.30	0.33	0.35	0.40	0.46	0.42	0.37	0.47	0.40	0.52	0.66	0.63	0.85	0.66	0.76
25-29 . . .	0.29	0.29	0.46	0.41	0.51	0.65	0.59	0.69	0.59	0.66	1.01	1.09	0.92	0.91	1.14
30-34 . . .	0.35	0.41	0.45	0.94	0.68	0.68	1.07	1.02	1.12	1.42	2.74	1.67	1.88	2.13	2.99
35-39 . . .	0.40	0.42	0.67	0.89	1.34	1.00	1.71	1.69	2.43	2.03	2.41	2.32	2.79	3.07	3.38
40-44 . . .	0.76	1.39	1.67	1.91	1.56	1.93	2.33	2.85	2.90	2.61	3.89	2.86	3.90	4.64	4.99
45-49 . . .	0.87	1.04	2.07	1.59	2.48	2.26	3.02	3.51	3.70	4.98	4.76	5.64	5.09	5.38	8.65
50-54 . . .	1.09	1.43	2.79	3.08	2.51	2.94	4.37	5.34	4.81	6.98	4.82	9.41	10.11	16.11	10.27
55-59 . . .	1.87	2.04	2.82	2.88	3.91	4.61	6.42	5.84	8.79	7.49	9.10	11.04	9.46	11.27	12.08
60-64 . . .	1.21	3.72	4.88	7.50	4.46	5.25	5.64	12.06	7.03	12.15	13.18	12.46	18.93	13.14	15.60
65-69 . . .	26.86	5.37	4.11	10.01	6.53	11.13	9.96	10.42	10.93	12.59	18.93	16.26	34.13	45.90	30.37
70 and over	5.59	6.85	7.58	12.16	7.71	21.99	16.80	26.86	9.09	31.81	10.55	31.50	37.49	30.34	34.45

TABLE 2
1975-80 SELECT BASIC TABLES
TEST OF GRADUATION
(Units in \$1,000's)
MALE LIVES

POLICY YEAR GROUP	ISSUE AGE GROUP						
	0-19	20-29	30-39	40-49	50-59	Over 59	Total
Actual Claims							
1-2.....	\$ 24,374	\$ 79,344	\$ 66,736	\$ 73,412	\$ 65,939	\$ 24,424	\$ 334,229
3-5.....	30,416	82,561	102,375	141,028	104,079	43,311	503,770
6-10.....	36,767	103,019	167,665	240,009	169,705	53,058	770,223
11-15.....	30,543	85,716	206,047	293,427	186,863	48,315	850,911
All	\$ 122,100	\$ 350,640	\$ 542,823	\$ 747,876	\$ 526,586	\$ 169,108	\$ 2,459,133
Ratio of Actual to Tabular Claims							
1-2.....	.985	.993	.972	.953	1.031	.995	.987
3-5.....	1.012	1.019	1.021	1.015	.994	1.092	1.018
6-10.....	.994	1.004	1.005	1.003	.977	.958	.994
11-15.....	1.007	.993	.996	1.002	1.017	.986	1.002
All	1.000	1.002	1.000	1.000	1.001	1.003	1.001

POLICY YEAR	BY POLICY YEAR		BY ISSUE AGE GROUP		
	ALL ISSUE AGE GROUPS COMBINED	Ratio of Actual to Tabular Claims	ISSUE AGE GROUP	ALL POLICY YEARS COMBINED	Ratio of Actual to Tabular Claims
1.....	\$ 169,099	.991	0-9.....	\$ 21,489	1.002
2.....	165,130	.982	10-14.....	19,345	1.000
3.....	169,103	1.019	15-19.....	81,266	.999
4.....	168,360	1.018	20-24.....	158,259	1.003
5.....	166,307	1.019	25-29.....	192,381	1.002
6.....	160,294	1.010	30-34.....	230,064	1.000
7.....	156,769	1.008	35-39.....	312,759	1.001
8.....	153,416	1.004	40-44.....	366,593	.999
9.....	148,437	.974	45-49.....	381,283	1.000
10.....	151,307	.973	50-54.....	308,113	1.001
11.....	158,430	1.006	55-59.....	218,473	1.001
12.....	162,959	.996	60-64.....	105,800	1.007
13.....	172,795	1.003	65-69.....	49,769	.981
14.....	174,765	.990	70 and over..	13,539	1.057
15.....	181,962	1.016			
All	\$ 2,459,133	1.001	All	\$ 2,459,133	1.001

TABLE 3
 1975-80 SELECT BASIC TABLES
 TEST OF GRADUATION
 FEMALE LIVES
 (Units in \$1,000's)

POLICY YEAR GROUP	ISSUE AGE GROUP						
	0-19	20-29	30-39	40-49	50-59	Over 59	Total
Actual Claims							
1-2	\$ 7,383	\$ 11,674	\$ 8,092	\$ 7,884	\$ 5,983	\$ 7,343	\$ 48,359
3-5	6,593	12,433	12,823	15,324	11,270	5,932	64,375
6-10	5,745	10,859	17,773	25,785	19,241	7,746	87,149
11-15	4,158	7,265	18,946	26,812	19,263	7,815	84,259
All	\$ 23,879	\$ 42,231	\$ 57,634	\$ 75,805	\$ 55,757	\$ 28,836	\$ 284,142
Ratio of Actual to Tabular Claims							
1-2	1.019	0.928	1.014	0.967	1.123	2.172	1.083
3-5	1.025	1.038	1.049	1.069	1.053	1.095	1.054
6-10	0.922	1.007	0.979	0.981	0.970	0.944	0.974
11-15	1.027	0.948	1.061	0.993	0.993	1.016	1.007
All	0.997	0.982	1.025	1.001	1.009	1.168	1.019

POLICY YEAR	BY POLICY YEAR		BY ISSUE AGE GROUP		
	ALL ISSUE AGE GROUPS COMBINED		ALL POLICY YEARS COMBINED		Ratio of Actual to Tabular Claims
	Actual Claims	Ratio of Actual to Tabular Claims	ISSUE AGE GROUP	Actual Claims	
1	\$ 27,279	1.172	0-9	\$ 8,542	0.963
2	21,080	0.986	10-14	4,340	1.111
3	22,884	1.099	15-19	10,997	0.983
4	22,353	1.098	20-24	19,900	0.994
5	19,138	0.962	25-29	22,331	0.972
6	17,215	0.901	30-34	27,696	1.049
7	18,520	0.997	35-39	29,938	1.004
8	18,201	1.032	40-44	39,210	0.999
9	16,669	0.965	45-49	36,595	1.002
10	16,544	0.981	50-54	33,871	1.012
11	17,311	1.030	55-59	21,886	1.004
12	16,395	0.963	60-64	14,253	1.001
13	16,832	0.985	65-69	11,556	1.549
14	17,179	1.033	70 and over . . .	3,027	1.007
15	16,542	1.026			
All	\$ 284,142	1.019		All	\$ 284,142
					1.019

TABLE 4
1975-80 SELECT DATA
ACTUAL DEATH CLAIMS
(Units in \$1,000's)

ISSUE AGE GROUP	POLICY YEAR															Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	Male Lives															
0	\$ 3,118	\$ 969	\$ 699	\$ 517	\$ 459	\$ 369	\$ 317	\$ 214	\$ 199	\$ 176	\$ 146	\$ 170	\$ 151	\$ 227	\$ 217	\$ 7,948
1	335	368	357	217	118	79	106	68	84	27	100	60	71	61	86	2,137
2-4	567	355	263	209	264	115	107	116	106	130	153	212	360	340	365	3,662
5-9	436	327	351	370	337	346	552	436	430	599	766	660	765	541	826	7,742
10-14	705	643	1,044	1,183	1,906	2,127	1,538	1,524	1,275	1,359	1,417	1,373	1,231	1,074	946	19,345
15-19	8,857	7,694	7,771	7,733	6,618	6,249	5,368	4,797	4,422	3,532	4,235	3,625	3,680	3,309	3,376	81,266
20-24	19,847	16,363	14,461	12,891	11,985	10,893	10,017	9,613	8,851	8,446	7,748	6,986	6,743	6,216	7,199	158,259
25-29	25,060	18,074	16,956	13,730	12,538	11,889	11,613	10,866	10,365	10,466	9,529	10,149	9,416	10,936	10,794	192,381
30-34	17,702	17,212	17,774	15,434	14,207	14,037	13,585	13,668	12,514	13,316	14,227	15,140	15,908	17,706	17,634	230,064
35-39	16,283	15,539	18,465	17,967	18,528	19,413	17,667	19,760	21,565	22,140	20,626	22,754	26,462	25,993	29,597	312,759
40-44	15,671	15,811	21,711	24,327	19,063	24,435	21,019	24,036	22,873	24,268	25,350	27,969	30,891	34,987	34,182	366,593
45-49	17,802	24,128	26,657	25,018	24,252	24,525	28,503	24,867	22,478	23,005	25,914	25,641	28,331	28,809	31,353	381,283
50-54	18,074	19,839	18,259	18,794	22,284	19,922	19,244	18,656	20,706	20,096	23,666	23,863	22,226	22,636	19,848	308,113
55-59	13,522	14,504	13,513	16,916	14,313	14,295	16,123	14,514	13,972	12,177	15,581	14,885	15,439	13,460	15,259	218,473
60-64	6,904	9,318	6,365	7,809	8,374	7,815	7,329	5,987	5,012	7,131	6,738	6,228	8,258	5,662	6,870	105,800
65-69	3,254	2,743	3,514	2,792	10,220	3,325	2,957	3,451	2,780	3,659	1,815	2,783	2,103	2,292	2,081	49,769
70 and over	962	1,243	943	2,453	841	460	724	843	805	780	419	461	760	516	1,329	13,539
Total	\$ 169,099	\$ 165,130	\$ 169,103	\$ 168,360	\$ 166,307	\$ 160,294	\$ 156,769	\$ 153,416	\$ 148,437	\$ 151,307	\$ 158,430	\$ 162,959	\$ 172,795	\$ 174,765	\$ 181,962	\$ 2,459,133

(Table 4 is continued on the next page.)

TABLE 4--Continued
1975-80 SELECT DATA
ACTUAL DEATHS CLAIMS
(Units in \$1,000's)

ISSUE AGE GROUP	POLICY YEAR															Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	Female Lives															
0	\$ 1,665	\$ 525	\$ 473	\$ 271	\$ 107	\$ 122	\$ 125	\$ 146	\$ 59	\$ 59	\$ 73	\$ 36	\$ 74	\$ 40	\$ 75	\$ 3,850
1	248	197	94	81	58	60	52	27	25	35	7	10	18	55	56	1,023
2-4	287	153	258	109	87	72	19	33	12	25	34	48	65	66	87	1,355
5-9	286	255	205	161	89	73	121	149	103	134	171	212	141	124	90	2,314
10-14	317	424	517	613	375	367	273	241	284	132	170	211	198	99	119	4,340
15-19	1,548	1,478	1,104	953	1,038	797	648	558	558	436	552	398	345	340	244	10,997
20-24	3,312	2,511	2,071	1,889	1,784	1,330	969	1,026	740	804	855	713	826	541	529	19,900
25-29	3,460	2,391	2,881	1,924	1,884	1,843	1,292	1,218	847	790	1,002	933	678	573	615	22,331
30-34	2,752	2,316	1,923	3,132	1,816	1,452	1,821	1,428	1,323	1,432	2,396	1,327	1,375	1,410	1,793	27,696
35-39	1,708	1,316	1,671	1,864	2,417	1,545	2,291	1,995	2,557	1,929	2,069	1,899	2,179	2,232	2,266	29,938
40-44	1,950	2,843	2,941	2,988	2,213	2,402	2,627	2,924	2,705	2,212	2,981	2,071	2,634	2,886	2,833	39,210
45-49	1,547	1,544	2,689	1,867	2,626	2,139	2,579	2,647	2,503	3,047	2,624	2,853	2,416	2,270	3,244	36,595
50-54	1,496	1,625	2,624	2,520	1,809	1,829	2,320	2,498	2,016	2,537	1,548	2,782	2,641	3,618	2,008	33,871
55-59	1,533	1,329	1,515	1,303	1,499	1,514	1,826	1,325	1,888	1,388	1,432	1,546	1,190	1,257	1,241	21,863
60-64	498	1,250	1,296	1,642	799	768	689	1,272	643	959	884	812	1,165	761	815	14,253
65-69	4,411	652	398	750	397	550	656	353	330	344	439	354	707	782	433	11,556
70 and over	261	271	224	286	140	352	212	261	76	281	74	190	180	125	94	3,027
Total	\$27,279	\$21,080	\$22,884	\$22,353	\$19,138	\$17,215	\$18,520	\$18,201	\$16,669	\$16,544	\$17,311	\$16,395	\$16,832	\$17,179	\$16,542	\$284,142

Table 6 shows the results of a test of the fit of the graduation and shows that a very good fit has been achieved.

The select male rates were graduated by policy year for each issue age group using a Whitaker-Henderson type A formula. The relative emphasis on smoothness in the Whitaker-Henderson graduation process increases with the value of a . The value of a was, therefore, varied by issue age group according to the regularity of the underlying mortality curve and the volume of data available. A value of 0.5 was used for issue ages 14 and under where the mortality curve has some special characteristics; a value of 1.0 was used for the issue age groups 15-59 where a considerable volume of data was available; a value of 2.0 was used for issue ages 60-64; and a value of 3.0 was used for the two highest issue age groups where data were relatively scanty. The fit, when examined by issue age groups and policy year groups, was considered to be acceptable, but there remained some other problems.

In order for the select rates at issue age 0 to grade smoothly into the ultimate rates at the youngest ages, adjustments were made to the ultimate rates at attained ages 15 and 16.

It also seemed desirable that the following relationships should exist in the final graduation:

1. For consecutive issue age groups the select rate for any given attained age should not be lower for the younger issue age than for the older issue age. This can be expressed symbolically as:

$$q_{[x]:t+k} \geq q_{[x+k]:t}$$

2. The rate for any age in the ultimate table should be higher than or equal to any given rate in the Select Table for the same attained age. This can be expressed symbolically as:

$$q_{x+t} \geq q_{[x]:t}$$

where $q_{[x]:t}$ is the mortality rate in the select table and q_{x+t} is the corresponding mortality rate at the same attained age in the ultimate table.

Adjustments to satisfy these conditions were incorporated into the final graduated rates. Table 2 shows the results of the test of the fit of the graduation and shows that a very good fit has been achieved.

In preparing the 1965-70 Select Basic Tables, a Bayesian method of graduation was used. This procedure was not used for the present graduation because satisfactory results for fit and smoothness were developed using the Whitaker-Henderson formulae and because it was clear that empirical ad-

justments would be necessary, as they were in the construction of the 1965-70 tables also.

Table 8 compares the select rates to the ultimate rates for corresponding attained ages. As the table shows, there is a reasonably smooth gradation from select to ultimate up through issue ages 40-44, but the effects of selection seem to persist beyond policy year 15 for issue ages 45 and over.

GRADUATION—FEMALE LIVES

The graduation of the rates for female lives was done in a manner similar to that used in the graduation of male rates. There was a problem at issue ages 65-69, policy year 1, where there were two large claims for a total of \$3 million representing more than 1 percent of the total amount of claims in the entire select experience. To avoid the distortion which would otherwise have been produced, these two claims were removed from the data. Another problem was that at many of the younger attained ages, particularly in the twenties, ultimate mortality was lower than select mortality. This problem was handled by shortening the "select" period and by combining the select data beyond this shortened period with the ultimate data by attained age. The degree to which the "select" period was shortened can be observed in Table 8 for female lives.

The amount of data available for female lives was much less than for male lives and in order to achieve the desired smoothness, the value of a used in the Whitaker-Henderson graduation was taken as 3 for both the select and the ultimate graduation. For even greater smoothness in the ultimate table above age 70, a curve with constant second differences was fitted above that age. Certain empirical adjustments were also made to the select graduation to improve fit and smoothness. Adjustments were made to preserve reasonable relationships between the rates for different issue ages at the same attained age as was done for the male graduation. Table 3 shows the results of the test of fit of the female graduation and shows that except for the cells containing the two large claims (at issue ages 65-69, policy year 1), a reasonable fit was achieved for the select rates.

The graduated female ultimate mortality rates are shown on page 58 of this report. The results of the test of fit in Table 6 show that over the entire range of female ages a reasonably good fit has been obtained. The low actual to expected ratios at attained ages 20-24 and 25-29 reflect the fact that the graduated mortality rates in the ultimate table at those ages are the same as in the select table at the same attained ages, and the actual ultimate mortality experience was lower than the select experience for those attained ages.

TABLE 5
1975-80 ULTIMATE EXPERIENCE
CRUDE MORTALITY RATES PER 1,000

Attained Age	Male Lives	Female Lives	Attained Age	Male Lives	Female Lives
15.....	0.51	0.41	60.....	11.72	8.03
16.....	0.98	0.38	61.....	13.31	8.12
17.....	1.31	0.29	62.....	14.93	9.23
18.....	1.09	0.63	63.....	16.21	9.21
19.....	1.70	0.64	64.....	17.92	9.58
20.....	1.18	0.48	65.....	19.23	11.06
21.....	1.26	0.48	66.....	21.41	12.76
22.....	1.65	0.32	67.....	23.51	12.88
23.....	1.32	0.51	68.....	26.19	14.72
24.....	1.34	0.63	69.....	28.09	16.02
25.....	1.42	0.42	70.....	31.51	18.19
26.....	1.44	0.54	71.....	36.19	17.48
27.....	0.98	0.45	72.....	38.05	19.87
28.....	1.12	0.49	73.....	41.66	19.71
29.....	1.27	0.50	74.....	45.13	21.89
30.....	1.27	0.63	75.....	49.87	33.26
31.....	1.04	0.58	76.....	76.90	31.23
32.....	1.08	0.57	77.....	60.06	34.10
33.....	1.07	0.68	78.....	65.84	35.10
34.....	1.09	0.75	79.....	72.14	44.42
35.....	1.22	0.80	80.....	77.44	52.65
36.....	1.34	0.93	81.....	89.10	58.32
37.....	1.26	0.72	82.....	99.09	59.32
38.....	1.35	0.81	83.....	100.41	67.56
39.....	1.42	1.15	84.....	111.14	76.06
40.....	1.60	1.27	85.....	115.27	87.32
41.....	1.72	1.38	86.....	135.31	92.53
42.....	1.84	1.57	87.....	145.23	99.44
43.....	2.02	1.67	88.....	157.93	120.03
44.....	2.30	1.81	89.....	166.47	116.78
45.....	2.59	2.14	90.....	193.18	138.88
46.....	2.80	2.22	91.....	196.02	133.07
47.....	3.33	2.60	92.....	211.32	161.39
48.....	3.63	2.74	93.....	220.65	184.42
49.....	4.13	3.00	94.....	239.24	180.13
50.....	4.37	3.04	95.....	300.13	333.07
51.....	5.00	3.63	96.....	337.22	167.97
52.....	5.42	3.27	97.....	205.80	268.80
53.....	5.91	3.73	98.....	313.63	663.16
54.....	6.90	4.87	99.....	69.12	23.61
55.....	7.13	4.98	100.....	256.25	37.33
56.....	8.02	4.86			
57.....	9.06	5.61			
58.....	9.66	6.22			
59.....	10.36	6.50			

TABLE 6
 1975-80 ULTIMATE BASIC TABLES
 TEST OF GRADUATION
 (Units in \$1,000's)

ATTAINED AGE GROUP	MALE LIVES		FEMALE LIVES	
	Actual Claims	Ratio of Actual to Tabular Claims	Actual Claims	Ratio of Actual to Tabular Claims
15-19	\$ 3,225	106.6%	\$ 704	109.8%
20-24	5,332	97.4	894	92.0
25-29	5,089	100.0	737	89.7
30-34	8,866	97.5	1,157	104.0
35-39	24,125	101.3	2,202	93.4
40-44	52,856	99.4	3,908	94.9
45-49	116,910	100.9	8,087	100.6
50-54	228,690	100.7	14,977	99.0
55-59	344,395	99.3	23,500	98.1
60-64	442,646	100.9	30,039	101.7
65-69	442,853	99.2	32,316	103.5
70-74	477,171	100.7	34,252	96.2
75-79	421,025	99.7	39,001	102.1
80-84	327,118	100.9	36,518	100.8
85-89	167,167	99.4	21,403	99.9
90-95	60,858	101.4	7,698	100.1
All ages	\$3,128,326	100.2%	\$257,393	100.1%

TABLE 7
1975-80 ULTIMATE DATA
ACTUAL DEATH CLAIMS
(Units in \$1,000s)

Attained Age	Male Lives	Female Lives	Attained Age	Male Lives	Female Lives
15	\$ 190	\$ 81	60	\$78,935	\$5,947
16	505	104	61	86,003	5,834
17	749	90	62	90,755	6,293
18	670	205	63	92,295	6,008
19	1,111	224	64	94,658	5,957
20	828	176	65	86,192	5,895
21	1,013	185	66	86,877	6,432
22	1,354	123	67	87,659	6,218
23	1,071	188	68	91,204	6,781
24	1,066	222	69	90,921	6,990
25	1,121	139	70	94,129	7,400
26	1,124	169	71	99,713	6,687
27	778	137	72	95,384	7,069
28	929	143	73	94,812	6,508
29	1,137	149	74	93,133	6,588
30	1,375	194	75	91,263	8,935
31	1,288	183	76	87,075	7,654
32	1,604	190	77	84,758	7,564
33	2,040	262	78	80,831	6,917
34	2,559	328	79	77,098	7,931
35	3,479	394	80	73,066	8,189
36	4,402	480	81	73,011	7,904
37	4,556	365	82	69,436	7,070
38	5,426	400	83	58,607	6,892
39	6,262	563	84	52,998	6,463
40	7,778	627	85	43,008	5,761
41	9,104	688	86	40,299	4,767
42	10,274	784	87	33,557	4,147
43	11,752	855	88	27,862	3,930
44	13,948	954	89	22,441	2,798
45	16,309	1,184	90	20,069	2,578
46	18,552	1,313	91	14,489	1,686
47	23,323	1,647	92	11,165	1,411
48	26,808	1,829	93	8,632	1,159
49	31,918	2,114	94	6,503	864
50	34,926	2,258	95	5,432	1,260
51	41,151	2,801	96	2,509	156
52	45,272	2,640	97	783	134
53	49,473	3,108	98	633	202
54	57,868	4,170	99	940	84
55	59,556	4,297	100	123	5
56	65,696	4,180			
57	71,306	4,715			
58	73,390	5,140			
59	74,447	5,168			

Table 8 for females compares the select rates to the ultimate rates for corresponding attained ages. As in the case of the male rates, the effects of selection seem to persist beyond policy year 15 at the older issue ages, starting at about issue age 40 or 45 for females.

COMPARISON OF 1975-80 AND 1965-70 BASIC TABLES

Tables 9 and 10 provide a comparison of the 1975-80 and 1965-70 Basic Tables on a select and ultimate basis respectively. Based on the exposures used in the 1975-80 tables, the mortality in the 1975-80 tables is generally appreciably lower than in the 1965-70 tables. For males, the select rates in the 1975-80 tables range from over 105 percent of the 1965-70 tables at some of the younger ages to under 70 percent at some of the older ages, with an average of 75.9 percent. For females, there is less variation by age with an average of 75.4 percent. The corresponding ratios in the ultimate tables are 77.6 percent for males and 80.5 percent for females.

There are some cells where the mortality rates in the 1975-80 tables are higher than in the 1965-70 tables.

The Committee on Ordinary Insurance and Annuities would like to acknowledge the considerable amount of effort devoted by Philip F. Finnegan to the development of the 1975-80 Basic Tables.

TABLE 8
1975-80 BASIC TABLES
RATIOS OF SELECT TO ULTIMATE* MORTALITY RATES

ISSUE AGE GROUP	POLICY YEAR														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
MALE LIVES															
0 .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1 .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.00
2-4 .....	.....	.....	.....	.....	.....	.....	.....	.....	0.97	0.86	0.92	0.93	0.91	0.90	1.00
5-9 .....	.....	.....	.....	.....	.....	.....	.....	0.91	0.90	0.93	0.96	0.97	0.94	0.93	0.93
10-14 .....	.....	.....	0.97	0.86	0.92	0.93	0.91	0.90	0.93	0.96	0.97	0.94	0.93	0.93	0.93
15-19	0.92	0.92	0.89	0.88	0.86	0.84	0.84	0.83	0.83	0.83	0.85	0.88	0.90	0.93	0.96
20-24	0.52	0.54	0.55	0.57	0.60	0.62	0.64	0.66	0.70	0.74	0.79	0.81	0.84	0.89	0.94
25-29	0.55	0.57	0.60	0.62	0.65	0.69	0.72	0.75	0.79	0.83	0.84	0.86	0.90	0.94	0.96
30-34	0.57	0.63	0.74	0.79	0.82	0.84	0.86	0.88	0.90	0.93	0.97	0.98	0.98	0.98	0.98
35-39	0.52	0.62	0.79	0.88	0.93	0.95	0.97	0.97	0.98	0.97	0.95	0.95	0.96	0.97	0.98
40-44	0.49	0.59	0.76	0.81	0.82	0.81	0.80	0.79	0.79	0.81	0.84	0.88	0.93	0.97	0.98
45-49	0.43	0.60	0.68	0.73	0.75	0.76	0.76	0.74	0.73	0.74	0.77	0.80	0.84	0.87	0.90
50-54	0.35	0.42	0.48	0.53	0.58	0.61	0.64	0.67	0.70	0.72	0.79	0.82	0.82	0.81	0.79
55-59	0.32	0.40	0.46	0.52	0.56	0.59	0.62	0.64	0.66	0.70	0.77	0.82	0.85	0.86	0.89
60-64	0.24	0.32	0.45	0.48	0.54	0.50	0.51	0.53	0.54	0.57	0.61	0.63	0.66	0.68	0.75
65-69	0.25	0.35	0.44	0.52	0.58	0.59	0.62	0.63	0.66	0.63	0.64	0.65	0.68	0.73	0.72
70 and over	0.24	0.31	0.37	0.45	0.46	0.44	0.45	0.48	0.51	0.54	0.56	0.60	0.66	0.73	0.84

*NOTE — The ultimate basic table mortality rates were taken at the "central" attained ages for the respective age group, obtained by adding the policy year less 1 to the "central" issue age for the group. (For issue age group 70 and over, "central" issue age is taken as 72.)

(Table 8 is continued on the next page.)

TABLE 8—Continued
 1975-80 BASIC TABLES
 RATIOS OF SELECT TO ULTIMATE* MORTALITY RATES

ISSUE AGE GROUP	POLICY YEAR														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
FEMALE LIVES															
0 .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1 .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.00
2-4 .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.00	1.00	1.00
5-9 .....	.....	.....	.....	.....	.....	.....	.....	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
10-14 .....	.....	.....	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
15-19	0.82	0.79	0.80	0.78	0.79	0.79	0.81	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00
20-24	0.60	0.64	0.68	0.72	0.75	0.77	0.81	0.83	0.84	0.86	1.00	1.00	1.00	1.00	1.00
25-29	0.57	0.66	0.76	0.82	0.86	0.90	0.91	0.90	0.86	0.90	1.00	1.00	1.00	1.00	1.00
30-34	0.62	0.68	0.77	0.84	0.90	0.92	0.94	0.94	0.92	0.90	1.00	1.00	1.00	1.00	1.00
35-39	0.52	0.56	0.62	0.71	0.78	0.83	0.87	0.90	0.93	0.94	0.95	0.96	0.96	0.99	1.00
40-44	0.43	0.55	0.61	0.72	0.77	0.83	0.86	0.88	0.89	0.90	0.91	0.91	0.91	0.95	0.94
45-49	0.38	0.49	0.57	0.62	0.68	0.71	0.76	0.79	0.82	0.84	0.86	0.87	0.88	0.93	0.93
50-54	0.32	0.42	0.48	0.51	0.58	0.63	0.69	0.74	0.73	0.75	0.77	0.78	0.78	0.82	0.81
55-59	0.26	0.34	0.41	0.47	0.53	0.58	0.62	0.65	0.68	0.69	0.70	0.72	0.73	0.79	0.80
60-64	0.25	0.33	0.40	0.46	0.50	0.53	0.56	0.59	0.61	0.61	0.69	0.70	0.70	0.74	0.73
65-69	0.22	0.28	0.33	0.38	0.41	0.44	0.47	0.50	0.53	0.56	0.62	0.61	0.61	0.63	0.63
70 and over	0.25	0.31	0.36	0.40	0.42	0.44	0.44	0.43	0.43	0.42	0.53	0.54	0.54	0.57	0.58

*NOTE — The ultimate basic table mortality rates were taken at the "central" attained ages for the respective age group, obtained by adding the policy year less 1 to the "central" issue age for the group. (For issue age group 70 and over, "central" issue age is taken as 72.)

TABLE 9
COMPARISON OF 1975-80 AND 1965-70 SELECT BASIC TABLES
UNITS IN \$1,000's

POLICY YEAR	BY POLICY YEAR ALL ISSUE AGE GROUPS COMBINED		ISSUE AGE GROUP	BY ISSUE AGE GROUP ALL POLICY YEARS COMBINED	
	Expected Claims By Old Table	Ratio of New Table To Old Table		Expected Claims By Old Table	Ratio of New Table To Old Table
	MALE LIVES				
1.....	\$ 215,582	0.785	0-9	\$ 38,405	0.561
2.....	213,781	0.776	10-14	17,958	1.053
3.....	219,967	0.769	15-19	76,958	1.057
4.....	219,321	0.766	20-24	171,739	0.912
5.....	210,766	0.789	25-29	221,021	0.875
6.....	207,782	0.767	30-34	298,101	0.777
7.....	207,766	0.751	35-39	398,750	0.785
8.....	205,278	0.742	40-44	509,111	0.720
9.....	204,361	0.741	45-49	528,317	0.722
10.....	208,003	0.740	50-54	454,848	0.676
11.....	208,563	0.752	55-59	286,998	0.761
12.....	216,037	0.754	60-64	158,324	0.678
13.....	227,377	0.756	65-69	60,745	0.792
14.....	234,391	0.752	70 and over	18,276	0.729
15.....	240,576	0.748			
All	\$3,239,551	0.759	All	\$3,239,551	0.759
FEMALE LIVES					
1.....	\$ 44,468	0.552	0-9	\$ 21,494	0.412
2.....	33,593	0.646	10-14	4,289	0.910
3.....	30,831	0.674	15-19	13,772	0.812
4.....	28,556	0.709	20-24	28,360	0.706
5.....	26,344	0.755	25-29	33,755	0.681
6.....	24,678	0.774	30-34	37,781	0.709
7.....	23,627	0.787	35-39	41,136	0.753
8.....	21,647	0.815	40-44	43,693	0.862
9.....	20,617	0.828	45-49	42,800	0.881
10.....	19,745	0.840	50-54	42,198	0.742
11.....	19,106	0.869	55-59	25,442	0.886
12.....	19,262	0.870	60-64	19,952	0.765
13.....	19,852	0.846	65-69	10,261	0.723
14.....	19,562	0.869	70 and over	6,308	0.521
15.....	19,353	0.857			
All	\$ 371,241	0.754	All	\$ 371,241	0.754

TABLE 10
COMPARISON OF 1975-80 AND 1965-70 ULTIMATE BASIC TABLES

ATTAINED AGE	RATIO OF NEW TABLE TO OLD TABLE		ATTAINED AGE	RATIO OF NEW TABLE TO OLD TABLE	
	MALE LIVES	FEMALE LIVES		MALE LIVES	FEMALE LIVES
15	1.015	1.000	58	0.709	0.884
16	1.247	0.976	59	0.712	0.871
17	1.200	0.936	60	0.721	0.859
18	1.140	0.887	61	0.731	0.854
19	1.129	0.860	62	0.740	0.859
20	1.151	0.864	63	0.743	0.869
21	1.207	0.897	64	0.744	0.881
22	1.248	0.946	65	0.745	0.883
23	1.261	0.964	66	0.747	0.880
24	1.255	0.981	67	0.753	0.875
25	1.241	1.000	68	0.761	0.862
26	1.206	0.981	69	0.776	0.848
27	1.192	0.930	70	0.791	0.829
28	1.101	0.883	71	0.798	0.804
29	1.035	0.857	72	0.801	0.771
30	0.966	0.832	73	0.804	0.739
31	0.911	0.860	74	0.807	0.714
32	0.888	0.871	75	0.810	0.705
33	0.876	0.855	76	0.812	0.706
34	0.857	0.843	77	0.814	0.707
35	0.836	0.837	78	0.817	0.713
36	0.813	0.824	79	0.820	0.729
37	0.785	0.802	80	0.827	0.749
38	0.760	0.786	81	0.836	0.768
39	0.732	0.793	82	0.843	0.782
40	0.709	0.806	83	0.849	0.791
41	0.700	0.824	84	0.853	0.787
42	0.698	0.848	85	0.856	0.797
43	0.699	0.865	86	0.858	0.818
44	0.706	0.867	87	0.859	0.818
45	0.713	0.863	88	0.860	0.809
46	0.724	0.863	89	0.873	0.822
47	0.733	0.863	90	0.900	0.808
48	0.734	0.858	91	0.934	0.766
49	0.730	0.847	92	0.968	0.752
50	0.721	0.848	93	0.981	0.760
51	0.719	0.847	94	0.968	0.785
52	0.725	0.845	95	0.957	0.829
53	0.729	0.849	96	0.974	0.847
54	0.730	0.858	97	0.986	0.866
55	0.725	0.870	98	0.998	0.885
56	0.717	0.880	99	1.010	0.903
57	0.710	0.886	100	1.021	0.921
		Total		0.776	0.805

ATTAINED AGE GROUP	RATIO OF NEW TABLE TO OLD TABLE		ATTAINED AGE GROUP	RATIO OF NEW TABLE TO OLD TABLE	
	MALE LIVES	FEMALE LIVES		MALE LIVES	FEMALE LIVES
15-19	1.155	0.918	55-59	0.714	0.878
20-24	1.226	0.928	60-64	0.736	0.865
25-29	1.150	0.930	65-69	0.757	0.869
30-34	0.889	0.854	70-74	0.800	0.768
35-39	0.775	0.806	75-79	0.814	0.712
40-44	0.702	0.845	80-84	0.840	0.774
45-49	0.728	0.858	85-89	0.860	0.811
50-54	0.726	0.850	90-94	0.939	0.778

APPENDIX

1975-80 AGE LAST BIRTHDAY BASIC TABLES

The 1975-80 Age Last Birthday (ALB) Basic Tables were prepared by the Committee on Mortality under Ordinary Insurance and Annuities to facilitate the analysis by that Committee of future mortality trends and to provide companies, on an ALB basis, with an up-to-date basis for mortality comparisons. Basic ALB tables were previously published for 1965-70 in *TSA, 1974 Reports*, pages 57-62.

These new ALB Basic tables were derived from the 1975-80 Age Nearest Birthday (ANB) Basic Tables as follows:

NOTATION

A select mortality rate for issue age group x (there are seventeen issue age groups used in the Select Basic Tables) in policy year t is shown as $q_{[x], t-1}$ if the issue age is on the ANB basis and is shown as $q'_{[x], t-1}$ if the issue age is on the ALB basis.

An ultimate mortality rate for attained age x is shown as q_x if the attained age is on the ANB basis, and it is shown as q'_x if the attained age is on the ALB basis.

SELECT RATES

For each issue age group, with the exception of the group for issue ages 70 and over, the results were interpolated by using the following formula, where x represents an issue age group and $x + 1$ represents the next higher issue age group:

$$q'_{[x]+t-1} = (C)q_{[x], t-1} + (1 - C)q_{[x+1], t-1}$$

where the values of C used were:

<u>Issue Age Group</u>	<u>Value of C</u>
0	.850
1	.750
2-4	.875
5-9 thru 65-69	.900

For the issue age group 70 and over, the following formula was used:

$$q'_{[x]+t-1} = (1.1)q_{[x], t-1} + (-.1)q_{[x-1], t-1}$$

where x is issue age group 70 and over, and $x - 1$ is issue age group 65-69.

For some issue age-policy year combinations at a given attained age, the derived mortality rate was slightly higher than that for the same attained age at a greater policy year. These few anomalies were corrected by increasing the lower rate so as to be equal to the higher rate.

On the following two pages, two select tables, for male lives and for female lives, respectively, show mortality rates on an ALB basis for issue age groups 0, 1, 2-4, 5-9, 10-14, and so on, through 70 and over, for each of the first 15 policy years separately.

ULTIMATE RATES

The ALB ultimate rates were determined by the following formula:

$$q'_{x+} = \frac{1}{2}[q_x + q_{x+1}]$$

Since the mortality rates at the last several attained ages in the 1975-80 Ultimate ANB Basic Tables follow a third degree curve, the same curve was used to extend each of those tables to attained age 101.

The two ALB ultimate tables resulting (which are shown on page 81 of this report) are for male lives and for female lives, respectively, and show mortality rates for attained ages 15-100 separately, for policy years 16 and over, combined.

1975-80 SELECT BASIC TABLES
MALE LIVES—AGE LAST BIRTHDAY
GRADUATED MORTALITY RATES PER 1,000

ISSUE AGE GROUP	POLICY YEAR														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	1.12	0.70	0.47	0.42	0.37	0.32	0.31	0.28	0.27	0.27	0.28	0.33	0.38	0.46	0.66
1	0.46	0.43	0.38	0.33	0.27	0.23	0.23	0.23	0.25	0.28	0.33	0.38	0.46	0.66	0.80
2-4.....	0.33	0.28	0.25	0.23	0.23	0.21	0.25	0.28	0.33	0.38	0.46	0.61	0.74	1.04	1.17
5-9.....	0.19	0.21	0.25	0.28	0.33	0.38	0.43	0.57	0.72	0.91	1.08	1.15	1.20	1.23	1.38
10-14.....	0.31	0.40	0.57	0.72	0.90	1.06	1.14	1.19	1.22	1.28	1.32	1.33	1.28	1.23	1.19
15-19.....	1.02	1.08	1.13	1.17	1.16	1.14	1.14	1.11	1.08	1.05	1.03	1.05	1.04	1.06	1.09
20-24.....	0.73	0.75	0.75	0.76	0.77	0.77	0.77	0.78	0.81	0.85	0.90	0.94	0.99	1.08	1.20
25-29.....	0.68	0.68	0.71	0.73	0.76	0.80	0.85	0.90	0.97	1.07	1.15	1.26	1.40	1.58	1.75
30-34.....	0.63	0.72	0.87	0.97	1.06	1.15	1.25	1.38	1.51	1.70	1.94	2.17	2.42	2.71	3.03
35-39.....	0.70	0.88	1.21	1.44	1.66	1.86	2.10	2.33	2.63	2.92	3.23	3.62	4.09	4.59	5.12
40-44.....	0.97	1.32	1.86	2.21	2.50	2.77	3.06	3.35	3.70	4.18	4.79	5.53	6.44	7.38	8.25
45-49.....	1.44	2.21	2.77	3.31	3.79	4.26	4.73	5.12	5.61	6.29	7.26	8.32	9.58	10.89	12.36
50-54.....	1.99	2.66	3.35	4.08	4.92	5.70	6.60	7.61	8.78	10.04	12.18	14.00	15.51	16.94	18.35
55-59.....	2.89	4.02	5.24	6.50	7.80	8.92	10.29	11.72	13.29	15.50	18.71	21.85	24.96	27.83	31.89
60-64.....	3.74	5.54	8.44	10.07	12.44	12.89	14.54	16.56	18.64	21.24	24.70	27.87	31.96	36.31	43.15
65-69.....	6.23	9.50	13.04	17.02	20.62	22.82	26.17	29.29	33.67	35.69	39.85	44.66	51.53	60.78	66.99
70 and over....	9.44	13.28	17.27	23.05	25.68	26.81	30.01	35.25	41.04	47.85	54.14	63.27	75.98	91.81	115.11

(This table is continued on the next page.)

1975-80 SELECT BASIC TABLES
FEMALE LIVES—AGE LAST BIRTHDAY
GRADUATED MORTALITY RATES PER 1,000

ISSUE AGE GROUP	POLICY YEAR														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0.84	0.33	0.30	0.27	0.24	0.22	0.20	0.18	0.19	0.19	0.21	0.23	0.26	0.29	0.34
1	0.32	0.29	0.26	0.23	0.22	0.20	0.18	0.19	0.19	0.21	0.23	0.26	0.29	0.34	0.38
2-4.....	0.23	0.23	0.22	0.20	0.18	0.19	0.19	0.21	0.23	0.26	0.29	0.34	0.38	0.41	0.45
5-9.....	0.17	0.19	0.19	0.21	0.23	0.26	0.29	0.34	0.38	0.41	0.45	0.48	0.49	0.51	0.52
10-14.....	0.20	0.28	0.33	0.36	0.40	0.44	0.47	0.49	0.51	0.52	0.53	0.53	0.53	0.53	0.54
15-19.....	0.36	0.37	0.39	0.40	0.41	0.42	0.43	0.44	0.52	0.53	0.54	0.54	0.56	0.57	0.61
20-24.....	0.32	0.34	0.37	0.39	0.41	0.42	0.45	0.47	0.48	0.53	0.64	0.69	0.75	0.82	0.90
25-29.....	0.31	0.36	0.42	0.47	0.53	0.58	0.63	0.68	0.71	0.82	1.00	1.11	1.23	1.38	1.54
30-34.....	0.39	0.45	0.56	0.68	0.80	0.91	1.03	1.15	1.27	1.40	1.70	1.87	2.05	2.24	2.44
35-39.....	0.50	0.62	0.76	0.98	1.20	1.43	1.64	1.85	2.07	2.28	2.49	2.71	2.94	3.29	3.57
40-44.....	0.73	1.02	1.25	1.58	1.85	2.16	2.40	2.67	2.94	3.23	3.53	3.86	4.20	4.80	5.19
45-49.....	0.98	1.37	1.72	2.00	2.41	2.75	3.18	3.64	4.09	4.57	5.07	5.60	6.14	7.06	7.68
50-54.....	1.23	1.72	2.17	2.57	3.13	3.75	4.43	5.19	5.60	6.23	6.88	7.55	8.24	9.41	10.20
55-59.....	1.57	2.21	2.89	3.64	4.41	5.21	6.03	6.86	7.69	8.51	9.49	10.59	11.81	13.85	15.45
60-64.....	2.22	3.20	4.17	5.14	6.09	7.08	8.15	9.31	10.52	11.81	14.65	16.34	18.23	21.37	23.87
65-69.....	3.03	4.24	5.49	6.75	8.04	9.48	11.10	13.00	15.26	17.95	22.58	25.19	28.11	32.93	36.89
70 and over....	5.13	7.24	9.36	11.50	13.64	15.78	17.83	19.80	21.71	23.72	34.39	38.38	42.81	50.16	55.96

1975-80 ULTIMATE BASIC TABLES—AGE LAST BIRTHDAY
GRADUATED MORTALITY RATES PER 1,000

Attained Age	Male Lives	Female Lives	Attained Age	Male Lives	Female Lives
15	0.85	0.38	60	12.53	7.69
16	1.08	0.42	61	13.87	8.34
17	1.18	0.46	62	15.32	9.03
18	1.27	0.48	63	16.89	9.77
19	1.34	0.50	64	18.61	10.57
20	1.39	0.52	65	20.49	11.45
21	1.41	0.53	66	22.56	12.42
22	1.41	0.53	67	24.85	13.48
23	1.39	0.53	68	27.37	14.64
24	1.36	0.53	69	30.13	15.94
25	1.32	0.53	70	33.13	17.42
26	1.27	0.53	71	36.34	19.13
27	1.22	0.53	72	39.80	21.11
28	1.19	0.54	73	43.57	23.41
29	1.16	0.55	74	47.72	26.09
30	1.13	0.57	75	52.31	29.20
31	1.12	0.60	76	57.37	32.78
32	1.12	0.63	77	62.94	36.88
33	1.13	0.68	78	69.02	41.54
34	1.16	0.74	79	75.60	46.74
35	1.20	0.81	80	82.69	52.50
36	1.25	0.89	81	90.24	58.80
37	1.32	0.98	82	98.24	65.66
38	1.41	1.09	83	106.88	73.06
39	1.51	1.22	84	116.36	81.02
40	1.63	1.37	85	126.68	89.52
41	1.79	1.54	86	137.84	98.58
42	1.97	1.71	87	149.84	108.18
43	2.19	1.88	88	162.59	118.34
44	2.45	2.05	89	175.87	129.04
45	2.74	2.24	90	189.57	140.30
46	3.07	2.43	91	203.69	152.10
47	3.43	2.62	92	218.23	164.46
48	3.82	2.83	93	233.19	177.36
49	4.24	3.05	94	248.57	190.82
50	4.69	3.30	95	264.37	204.82
51	5.18	3.57	96	280.59	219.38
52	5.72	3.88	97	297.23	234.48
53	6.31	4.22	98	314.29	250.14
54	6.94	4.60	99	331.77	266.34
55	7.64	5.02	100	349.67	283.10
56	8.42	5.47			
57	9.28	5.96			
58	10.24	6.50			
59	11.32	7.08			

