

TRANSACTIONS OF SOCIETY OF ACTUARIES 1960 REPORTS

SECTION II. 1953-1959 GROUP CONVERSION MORTALITY AND WITHDRAWAL EXPERIENCE

THIS section presents the results of the investigation of the mortality and withdrawal experience under permanent forms of life insurance policies issued on the attained age basis without medical examination under the Group Life conversion privilege. It covers the experience of the ten contributing companies from policy anniversaries in 1953 to anniversaries in 1959 and is based on amounts of insurance. These ten companies have contributed 5,332 million dollars of exposure to this study, of which 5,046 million dollars was contributed for the select portion and 286 million dollars was contributed for the ultimate portion. The last study of this type was published in *TSA* 1954 Reports, 78-86, covering the period from anniversaries in 1947 to anniversaries in 1953 and was also based on amounts of insurance.

Excluded from this study are conversions from the Federal Employees Group Life Insurance plan, one year preliminary term conversions, conversions under Group Paid-up or Group Permanent insurance, conversions to monthly or weekly premium forms of insurance other than those classified as Ordinary insurance, and conversions which have been dated back or classified as "not taken." Substandard experience arising from ratings of a nonmedical nature, e.g., occupational ratings, was omitted. Conversions resulting from master policy terminations, comprising a small proportion of all conversions, are included in the study. Individual contributing companies were not always able to eliminate or include data of the types just mentioned, but the volume of such exceptions was small.

The tables used for most of the mortality comparisons are the Commissioners 1958 Standard Ordinary Table and the 1946-1949 Basic Tables (*TSA* II, 505-12). In the 1947-53 study, the Commissioners 1941 Standard Ordinary Table and the 1946-1949 Basic Table were used, which should be borne in mind when the two studies are compared. It should be noted that the table headings in the previous study refer to "CSO" without a 1941 label.

TOTAL MORTALITY EXPERIENCE

Table 1 provides a comparison of the mortality experience during the 1953-59 period with the corresponding experience of the 1947-53 study by five year age groups for all durations combined and by duration for all ages combined. The same ten companies contributed to both studies. The tabular deaths in Table 1 were derived through use of the actual death rates from the 1947-53 experience.

TABLE 1
1953-1959 GROUP CONVERSION STUDY
SELECT MORTALITY RATIOS COMPARED WITH THE 1947-1953 STUDY
BASED ON AMOUNTS OF INSURANCE (IN THOUSANDS OF DOLLARS)
RATIOS OF ACTUAL DEATHS TO TABULAR BASED ON 1947-1953 EXPERIENCE
Contributions of Ten Companies

	EXPOSED TO RISK 1953-1959	ACTUAL DEATHS 1953-1959	TABULAR BASED ON 1947-1953 EXPER.	RATIO ACTUAL TO TABULAR
Issue Age	5 Year Age Groups, Policy Years 1-20			
Under 20.....	\$ 26,400	\$ 74	\$ 99	75%
20-24.....	263,198	928	976	95
25-29.....	458,092	2,532	2,195	115
30-34.....	617,561	4,446	4,114	108
35-39.....	729,387	7,496	7,367	102
40-44.....	796,684	11,974	11,985	100
45-49.....	738,926	16,424	16,649	99
50-54.....	567,590	17,402	18,483	94
55-59.....	363,210	15,747	16,767	94
60-64.....	208,153	14,698	15,084	97
65-69.....	203,933	17,964	19,973	90
70-74.....	62,596	7,079	7,710	92
75 and over..	10,328	1,838	1,950	94
Total....	\$5,046,058	\$118,602	\$123,352	96%
Policy Year	By Policy Year, All Ages Combined			
1.....	\$ 567,204	\$ 21,884	\$ 23,180	94%
2.....	461,906	12,251	12,725	96
3.....	404,386	10,323	9,922	104
4.....	358,971	8,343	8,996	93
5.....	323,806	7,521	7,461	101
6.....	295,490	6,545	6,084	108
7.....	282,297	5,988	5,968	100
8.....	290,590	6,125	6,081	101
9.....	317,067	5,942	6,435	92
10.....	314,374	5,979	5,982	100
11.....	296,745	5,485	6,192	89
12.....	275,297	5,134	5,867	88
13.....	239,086	4,516	4,616	98
14.....	187,340	3,642	3,944	92
15.....	124,921	2,495	3,019	83
16.....	93,560	1,859	1,849	101
17.....	73,257	1,388	1,675	83
18.....	55,332	1,256	1,538	82
19.....	45,144	1,023	937	109
20.....	39,285	903	881	102
Total....	\$5,046,058	\$118,602	\$123,352	96%

The experience shows an improvement of about 4% in total, with the improvement principally at issue ages under 25 and issue ages 50 and over. By policy year the improvement is principally in the first two policy years and in policy years 11 through 18.

It should be noted in this and other tables that ratios which combine all issue ages or the twenty policy durations are considerably affected by differences in age and policy year distributions between the current and previous studies.

Table 2 displays experience of each of the first five durations by year

TABLE 2
1953-1959 GROUP CONVERSION STUDY
SELECT MORTALITY RATIOS BY CALENDAR YEAR OF ISSUE FOR POLICY YEARS 1-5
BASED ON AMOUNTS OF INSURANCE—CONTRIBUTIONS OF TEN COMPANIES

YEAR OF ISSUE	POLICY YEAR				
	1	2	3	4	5
Ratio of Actual Deaths to Tabular by the 1946-49 Basic Tables					
1949.....					319%
1950.....				365%	291
1951.....			438%	347	323
1952.....		544%	450	331	330
1953.....	1,036%	539	454	310	319
1954.....	1,047	616	404	395	298
1955.....	1,101	596	433	357	
1956.....	1,094	615	448		
1957.....	1,240	510			
1958.....	1,241				
All Years..	1,138	571	437	353	313
Ratio of Actual Deaths to Tabular by the 1958 CSO Table					
1949.....					183%
1950.....				189%	166
1951.....			208%	180	184
1952.....		208%	212	170	186
1953.....	294%	206	214	159	179
1954.....	295	232	188	200	166
1955.....	310	224	201	180	
1956.....	310	233	208		
1957.....	353	194			
1958.....	352				
All Years..	322%	216%	204%	180%	177%

of issue, thus providing a picture of the trend of mortality during the period of the study. The previous study indicated a rather marked increase in mortality ratios beginning with the year of issue 1949 and extending through year of issue 1952. The first four issue years of the current study, namely 1953 through 1956, develop ratios similar to the level of the experience of years of issue 1947 and 1948, whereas the first policy year experience for years of issue 1957 and 1958 is again at the higher level of the period 1949-1952. A review of the underwriting and commission practices of the various companies in the period covered by the previous and current study does not reveal any underlying reasons for these fluctuations in the experience.

The select mortality of all ten companies in ten year age groups is presented in Table 3, using a 20 year select period. This table is similar in form to that in the preceding report. It should be noted that some distortion is caused by the necessity for using 1946-49 ultimate rates for tabular deaths at durations 16 through 20. For the age group 65 and over the mortality ratios may be considerably affected by differences in age distributions between group conversion issues and the policy issues underlying the 1946-49 Basic Tables.

Caution should be used in utilizing these data in that they represent the average of the experience of the contributing companies and so reflect a blend of the different underwriting and commission practices followed. However, an analysis showed that the select experiences of all companies during the period of this study lie within a range of 15% on either side of the average.

Table 4 presents results of the ultimate mortality study. Mortality ratios are shown according to the 1946-1949 Basic Tables, the 1958 CSO table, and according to tabular deaths derived from the 1947-1953 Group Conversion Experience. The ultimate experiences of 7 companies were within a 15% range on either side of the average; one company with 68 deaths was 17% over the average and another with 9 deaths was 55% over.

TOTAL WITHDRAWAL RATES

The withdrawal part of this study is limited to withdrawal in the first 19 policy years. All types of terminations were counted as withdrawals, *i.e.*, lapses, surrenders, term extensions, reduced paid-ups and maturities. The withdrawals of policy year t were taken to be the total withdrawals at mean duration t , except that for the first year those at mean duration 0 were added. Exposure to death for policy year t is the denominator, except that for the first policy year withdrawals at mean duration 0 were added. The effect of this method of determining withdrawal rates is that withdrawals occurring during any calendar year before or after a policy

TABLE 3
1953-1959 GROUP CONVERSION STUDY
SELECT MORTALITY RATIOS IN 10 YEAR AGE GROUPS
BASED ON AMOUNTS OF INSURANCE—CONTRIBUTIONS OF TEN COMPANIES

POLICY YEAR	ISSUE AGES						All Ages
	Under 25	25-34	35-44	45-54	55-64	65 and over	
Ratios of Actual Deaths to Tabular by the 1946-1949 Basic Tables							
1.....	1,244%	1,469%	1,313%	1,080%	1,183%	1,069%	1,138%
2.....	658	794	687	564	582	516	571
3.....	452	668	553	459	391	399	437
4.....	244	418	352	356	338	360	353
5.....	230	417	341	322	277	319	313
6.....	214	436	329	276	262	279	285
7.....	312	351	310	251	256	254	267
8.....	348	333	228	243	240	250	245
9.....	252	248	232	206	196	201	210
10.....	261	277	204	198	195	192	202
11.....	240	227	182	177	173	212	184
12.....	177	228	174	173	165	168	175
13.....	271	212	178	158	154	146	166
14.....	247	187	157	150	151	159	157
15.....	114	177	144	153	126	148	147
16.....	225	165	135	129	100	78	125
17.....	99	118	111	120	115	65	112
18.....	94	127	158	109	114	98	125
19.....	219	148	132	99	104	92	116
20.....	146	140	104	113	113	70	111
Ratios of Actual Deaths to Tabular by the 1958 CSO Table							
1.....	443%	455%	428%	333%	358%	268%	322%
2.....	273	315	307	242	233	169	216
3.....	214	315	306	249	197	153	204
4.....	120	211	213	214	186	145	180
5.....	117	227	226	212	166	141	177
6.....	107	246	226	188	160	130	169
7.....	153	202	210	169	155	125	161
8.....	174	203	163	173	154	135	159
9.....	127	154	169	149	128	114	140
10.....	133	177	152	147	130	113	140
11.....	128	155	143	139	120	129	135
12.....	99	161	140	140	117	103	132
13.....	159	156	146	132	113	92	129
14.....	158	145	134	130	115	107	127
15.....	80	147	133	140	102	107	128
16.....	156	138	132	130	95	76	121
17.....	69	101	110	120	109	63	108
18.....	67	110	159	108	109	95	121
19.....	159	131	134	97	99	91	113
20.....	108	126	106	110	108	69	108

TABLE 3—*Continued*
1953-1959 GROUP CONVERSION STUDY
NUMBER OF ACTUAL DEATHS

POLICY YEAR	ISSUE AGES						All Ages
	Under 25	25-34	35-44	45-54	55-64	65 and over	
1.....	65	219	577	1,291	2,483	3,992	8,627
2.....	39	158	377	853	1,463	2,392	5,282
3.....	25	131	356	811	1,187	1,935	4,445
4.....	18	100	290	751	1,098	1,633	3,890
5.....	23	109	316	719	986	1,378	3,531
6.....	23	122	336	693	893	1,039	3,106
7.....	27	120	307	681	839	846	2,820
8.....	37	138	359	745	897	791	2,967
9.....	34	139	463	827	888	617	2,968
10.....	42	193	449	891	865	507	2,947
11.....	38	176	471	887	747	463	2,782
12.....	26	216	443	864	699	302	2,550
13.....	46	219	462	729	592	247	2,295
14.....	36	175	412	681	480	192	1,976
15.....	20	144	297	447	259	131	1,298
16.....	30	110	257	325	193	84	999
17.....	14	101	182	254	170	63	784
18.....	7	86	195	186	112	54	640
19.....	17	87	152	154	100	45	555
20.....	10	81	125	165	85	23	489

TABLE 4
1953-1959 GROUP CONVERSION STUDY
ULTIMATE MORTALITY RATIOS TRUNCATED AT 20 YEARS
BY 10 YEAR AGE GROUPS
BASED ON AMOUNTS OF INSURANCE
Contributions of Nine Companies

ATTAINED AGE	RATIO OF ACTUAL TO TABULAR DEATHS			NUMBER OF ACTUAL DEATHS	AMOUNTS EXPOSED (THOUSANDS)
	By 1946-49 Basic Tables	By 1958 CSO	By 1947-53 Group Conv. Exper.		
Under 45.....	95%	75%	56%	18	\$ 7,621
45-54.....	98	91	85	398	78,092
55-64.....	109	111	99	1,202	112,160
65-74.....	109	105	97	1,537	67,905
75-84.....	99	95	87	1,015	19,450
85 and over.....	106	104	132*	143*	933
All Ages.....	106%	103%	95%	4,313	\$286,161

* Only 35 deaths at 85 and over in 1947-53 Experience.

anniversary are averaged together. The resulting rates can be readily used to give proper effect to all withdrawals, including policies with fractional modes of payment. The 20th year withdrawal rates are not included in Table 5 because they are affected considerably by maturing endowments.

The 1953-59 withdrawal rates are in most cases slightly higher than the 1947-53 withdrawal rates. One company had rates about 90% of the average; two companies were about 12% above the average; and the remaining companies were within 6% of the average.

TABLE 5
1953-1959 GROUP CONVERSION STUDY
SELECT WITHDRAWAL RATES
BASED ON AMOUNTS OF INSURANCE
Contributions of Ten Companies

POLICY YEAR	ISSUE AGES		
	Under 45	45-59	60 and over
1.....	18.2%	14.4%	8.5%
2.....	4.4	3.3	2.6
3.....	3.4	2.6	2.0
4.....	2.6	2.0	1.8
5.....	2.4	2.0	1.6
6.....	1.9	1.6	2.1
7.....	1.7	1.5	2.2
8.....	1.6	1.3	2.0
9.....	1.4	1.4	1.8
10.....	1.4	1.6	2.3
11-15.....	1.2	1.7	2.5
16-19.....	1.0	1.9	2.7

MORTALITY AND WITHDRAWAL RATES BY SEX

Companies were asked to submit data by sex where such coding was available. Of the total select exposure of 5,046 million dollars, about 2,223 million dollars was on males, 412 million dollars on females, and 2,411 million dollars without sex coding. Of the total ultimate exposure of about 286 million dollars, about 52 million dollars was on males, about 11 million dollars on females and 223 million dollars without sex coding. Since several companies have only recently introduced sex coding, the experience by sex is more heavily weighted with recent issues than the experience in total.

Select mortality experience varies considerably by sex as shown in Table 6. For the first policy year male mortality, all ages combined, is

TABLE 6
1953-1959 GROUP CONVERSION STUDY
SELECT MORTALITY RATIOS—BY SEX
BASED ON AMOUNTS OF INSURANCE

Policy Year	Sex*	Under 25	25-34	35-44	45-54	55-64	65 and over	All Ages
Ratio of Actual to Tabular by the 1958 CSO Table								
1	M	510%	469%	431%	333%	377%	282%	333%
	F	276	427	459	286	208	150	238
	Total	422	461	434	327	357	271	322
2-5	M	260%	291%	278%	239%	209%	162%	205%
	F	124	143	204	122	98	83	113
	Total	193	261	268	224	196	155	194
6-10	M	254%	263%	207%	184%	159%	131%	169%
	F	71	112	116	101	75	78	92
	Total	156	229	195	175	150	126	161
11-15	M	224%	196%	153%	155%	128%	119%	146%
	F	75	84	81	62	60	69	70
	Total	149	170	144	145	122	116	138
16-20	M	145%	133%	126%	134%	104%	87%	121%
	F	47	66	59	68	63	30	61
	Total	98	113	119	129	101	83	114
Number of Actual Deaths								
1	M	40	119	339	820	1,724	2,892	5,934
	F	20	41	119	187	223	222	812
	Total	60	160	458	1,007	1,947	3,114	6,746
2-5	M	51	272	808	1,959	3,049	5,046	11,185
	F	28	73	190	323	353	382	1,349
	Total	79	345	998	2,282	3,402	5,428	12,534
6-10	M	49	280	788	1,615	1,925	2,007	6,664
	F	23	74	134	243	231	148	853
	Total	72	354	922	1,858	2,156	2,155	7,517
11-15	M	40	240	514	972	787	476	3,029
	F	16	54	81	99	67	33	350
	Total	56	294	595	1,071	854	509	3,379
16-20	M	11	93	186	255	143	103	791
	F	5	31	24	29	16	4	109
	Total	16	124	210	284	159	107	900

* Separate male and female data combined for total.

about 140% of female mortality. The percentage ratio is about 175% to 200% for later policy years in the select period. Individual companies may wish to study how these comparative ratios tie in with their rate differentials by sex for policies issued as conversions.

Although the volume of data for females is small, the ultimate experience in Table 7 indicates a considerable variation in ultimate mortality by sex.

TABLE 7
1953-1959 GROUP CONVERSION STUDY
ULTIMATE MORTALITY RATIOS TRUNCATED AT 20 YEARS—BY SEX
BASED ON AMOUNTS OF INSURANCE—1958 CSO AS TABULAR

Attained Age	Ratio of Actual to Tabular	Number of Actual Deaths	Amount Exposed (Thousands)
Male			
Under 45.....	171%	2	\$ 784
45-54.....	145	71	11,189
55-64.....	117	208	22,106
65-74.....	95	249	13,384
75-84.....	102	170	3,764
85 and over.....	115	37	284
All Ages.....	107%	737	\$51,511
Female			
Under 45.....	74%	2	\$ 594
45-54.....	51	23	5,482
55-64.....	63	40	3,550
65-74.....	71	37	1,167
75-84.....	70	17	287
85 and over.....	31	1	13
All Ages.....	63%	120	\$11,092
Total of Above			
Under 45.....	129%	4	\$ 1,378
45-54.....	116	94	16,671
55-64.....	110	248	25,656
65-74.....	93	286	14,551
75-84.....	100	187	4,051
85 and over.....	111	38	297
All Ages.....	102%	857	\$62,603

Withdrawal rates in the select period show very minor variation by sex as displayed in Table 8.

TABLE 8
1953-1959 GROUP CONVERSION STUDY
SELECT WITHDRAWAL RATES—BY SEX
BASED ON AMOUNTS OF INSURANCE

Policy Year	Sex	Under 45	45-59	60 and over
1.....	M	18.3%	14.2%	8.2%
	F	18.5	14.0	10.3
2- 5.....	M	3.2	2.5	2.0
	F	3.8	2.5	2.1
6-10.....	M	1.7	1.6	2.0
	F	2.1	1.7	1.8
11-15.....	M	1.2	1.6	2.6
	F	1.5	2.1	2.2
16-19.....	M	1.2	1.7	2.0
	F	1.0	1.3	3.3

The following companies contributed to the experience for this investigation:

Aetna Life Insurance Company
Connecticut General Life Insurance Company
Continental Assurance Company
Equitable Life Assurance Society
John Hancock Mutual Life Insurance Company
Metropolitan Life Insurance Company
Occidental Life Insurance Company of California
Prudential Insurance Company of America
Sun Life Assurance Company of Canada
The Travelers Insurance Company