

# TRANSACTIONS OF SOCIETY OF ACTUARIES 1979 REPORTS

## III. MORTALITY UNDER SUBSTANDARD ORDINARY INSURANCE ISSUES BETWEEN 1972 AND 1977 ANNIVERSARIES

**T**HIS report describes the results of an investigation of Substandard Ordinary mortality experience in relation to the corresponding Standard Ordinary mortality experience on life insurance policies during the first fifteen policy years.

### SUMMARY

The experience on Substandard Ordinary policies included in this study demonstrates that there is in fact a strong correlation between the degree of rating assigned by the issuing company and the actual level of mortality experienced on such business.

### SCOPE OF STUDY

The study covers the experience of twelve companies between 1972 and 1977 policy anniversaries. These twelve companies contributed nearly \$47 billion of exposure on substandard business for which "Table" ratings were applied, excluding business for which a flat extra premium (permanent or temporary) was also charged. Only six of the twelve companies submitted data on their business for which a flat extra premium was charged (with or without a "Table" rating). Approximately \$2.6 billion of exposure was contributed on this type of business.

The study excludes experience under term conversions, group conversions, guaranteed issue option elections, joint life policies, and policies issued under simplified underwriting standards such as pension and tax-qualified contracts. Reinsurance assumed business is also excluded. Reinsurance ceded business is included.

The basis of expected deaths for each contributing company is the contemporaneous Standard Ordinary mortality experience of that particular company. The expected deaths figure for the total study is the sum of the expected deaths for each company separately.

### MORTALITY EXPERIENCE

#### *Table-rated Substandard Business*

Each contributing company subdivided its Table-rated Substandard data into three broad groups based upon the degree of substandard: slight substandard (classes with anticipated mortality of less than 175 percent of Standard mortality), moderate substandard (classes with anticipated mortality from 175 percent through 250 percent of Standard mortality),

and high substandard (classes with anticipated mortality greater than 250 percent of Standard mortality).

Ratios of actual to expected deaths based on each individual company's own Standard Ordinary mortality experience for these three broad substandard categories for males and females combined are shown for policy-year groups 1-5, 6-15, and 1-15 in Table 1 (all issue ages combined), and by issue-age groups for policy years 1-15 combined in Table 2.

The ratios of actual to expected deaths in these three substandard categories are shown in the table below. The ratios demonstrate a strong

Degree of Substandard	Anticipated Mortality as a Percentage of Standard	Actual Mortality as a Percentage of Standard
Slight.....	Less than 175%	154.1%
Moderate.....	175%-250%	192.4
High.....	Greater than 250%	300.9

correlation between the degree of substandard rating assigned by the issuing company and the level of mortality subsequently experienced on such business. Table 1 shows that the overall correlations noted above also hold true for policy years 1-5 and 6-15 separately. Table 2 generally confirms the correlation by age group between anticipated and actual substandard mortality levels.

#### *All Business with Flat Extra Premiums (Permanent and Temporary)*

Because of the paucity of data contributed on policies with flat extra premiums, all these data were combined into one category called "All Business with Flat Extra Premiums (Permanent and Temporary)." The contributions from the individual companies do not identify the amount of the extra premium, and there is no information to distinguish between permanent and temporary flat extra premiums. For this reason it is not possible to establish the degree of substandard rating assigned by the issuing company. The mortality ratios appear in Table 3 by policy-year groups and in Table 4 by issue-age groups. Expected deaths are based on each company's Standard mortality experience.

It is interesting to note that the excess mortality associated with these cases in policy years 6-15 is nominal. This drop in mortality ratios may result from the wearing off of the excess mortality attributable to certain physical impairments for which a temporary (five years or less) extra premium was charged. The data do not permit an identification of the

volume of business at durations 6–15 for which no extra premium had been charged subsequent to the fifth policy year.

*Tables and Appendixes*

The numerical results of the investigation are presented in four tables as follows:

Table	Description
1	Policies with a “Table” Rating (Policies with a Flat Extra Premium Excluded)—by Policy-Year Groups—All Ages Combined—Subdivided by Degree of Substandard (Slight, Moderate, and High)
2	Policies with a “Table” Rating (Policies with a Flat Extra Premium Excluded)—by Issue Age Groups—Fifteen Policy Years Combined—Subdivided by Degree of Substandard (Slight, Moderate, and High)
3	Policies with a Flat Extra Premium—by Policy-Year Groups—All Ages Combined
4	Policies with a Flat Extra Premium—by Issue-Age Groups—Fifteen Policy Years Combined

There are two appendixes with background information as follows:

Appendix	Description
A	Contributing Companies, Proportion of Total Exposures Contributed by Each Company
B	Instructions to the Participating Companies in the Investigation of Substandard Ordinary Mortality Experience

**TABLE 1**  
**INTERCOMPANY SUBSTANDARD ORDINARY MORTALITY EXPERIENCE**  
**SELECT EXPERIENCE BETWEEN 1972 AND 1977 POLICY ANNIVERSARIES**  
**MALES AND FEMALES COMBINED—ALL PLANS COMBINED**  
**TABLE-RATED SUBSTANDARD BUSINESS\***

Expected Deaths Based on Individual Company's Own Standard Ordinary  
Mortality Experience  
(Amounts Shown in \$1,000 Units)

POLICY YEARS	EXPOSED TO RISK	ACTUAL DEATHS		EXPECTED STANDARD DEATHS		MORTALITY RATIO
		Amount	Claims per \$1,000 Insurance	Amount	Claims per \$1,000 Insurance	
Slight Substandard						
1-5.....	\$19,633,938	\$ 62,588	\$ 3.19	\$ 43,718	\$2.23	143.2%
6-15.....	11,702,009	105,077	8.98	64,582	5.52	162.7
1-15†..	\$32,574,573	\$173,940	\$ 5.34	\$112,893	\$3.47	154.1%
Moderate Substandard						
1-5.....	\$ 6,718,595	\$ 27,775	\$ 4.13	\$ 15,613	\$2.32	177.9%
6-15.....	3,095,915	38,754	12.52	18,424	5.95	210.3
1-15†..	\$11,493,415	\$ 78,607	\$ 6.84	\$ 40,860	\$3.56	192.4%
High Substandard						
1-5.....	\$ 1,671,176	\$ 12,862	\$ 7.70	\$ 4,155	\$2.49	309.6%
6-15.....	815,584	14,100	17.29	4,726	5.79	298.3
1-15†..	\$ 2,864,459	\$ 30,900	\$10.79	\$ 10,270	\$3.59	300.9%
All Substandard						
1-5.....	\$28,023,709	\$103,225	\$ 3.68	\$ 63,486	\$2.27	162.6%
6-15.....	15,613,508	157,931	10.12	87,732	5.62	180.0
1-15†..	\$46,932,447	\$283,447	\$ 6.04	\$164,023	\$3.49	172.8%

\* Based on data from twelve companies.

† Two companies submitted data only for durations 1-15 combined.

TABLE 2

INTERCOMPANY SUBSTANDARD ORDINARY MORTALITY EXPERIENCE  
 SELECT EXPERIENCE BETWEEN 1972 AND 1977 POLICY ANNIVERSARIES  
 MALES AND FEMALES COMBINED—ALL PLANS COMBINED  
 TABLE-RATED SUBSTANDARD BUSINESS\*

Expected Deaths Based on Individual Company's Own Standard Ordinary  
 Mortality Experience  
 (Amounts Shown in \$1,000 Units)

ISSUE- AGE GROUP	EXPOSED TO RISK	ACTUAL DEATHS		EXPECTED STANDARD DEATHS		MOR- TALITY RATIO
		Amount	Claims per \$1,000 Insurance	Amount	Claims per \$1,000 Insurance	
Slight Substandard						
10-19 .....	\$ 1,340,674	\$ 1,900	\$ 1.42	\$ 1,248	\$0.93	152.2%
20-29 .....	6,871,156	10,419	1.52	5,624	0.82	185.3
30-39 .....	9,006,602	25,649	2.85	15,639	1.74	164.0
40-49 .....	9,577,057	61,122	6.38	38,066	3.97	160.6
50 and over	5,779,084	74,850	12.95	52,316	9.05	143.1
Total..	\$32,574,573	\$173,940	\$ 5.34	\$112,893	\$3.47	154.1%
Moderate Substandard						
10-19 .....	\$ 297,403	\$ 487	\$ 1.64	\$ 289	\$0.97	168.5%
20-29 .....	1,876,921	3,166	1.69	1,530	0.82	206.9
30-39 .....	3,027,270	10,807	3.57	4,681	1.55	230.9
40-49 .....	3,729,279	28,452	7.63	13,070	3.50	217.7
50 and over	2,562,542	35,695	13.93	21,290	8.31	167.7
Total..	\$11,493,415	\$ 78,607	\$ 6.84	\$ 40,860	\$3.56	192.4%
High Substandard						
10-19 .....	\$ 121,054	\$ 227	\$ 1.88	\$ 112	\$0.93	202.7%
20-29 .....	583,779	1,788	3.06	485	0.83	368.7
30-39 .....	642,111	3,610	5.62	1,068	1.66	338.0
40-49 .....	869,518	11,157	12.83	3,334	3.83	334.6
50 and over	647,997	14,118	21.79	5,271	8.13	267.8
Total..	\$ 2,864,459	\$ 30,900	\$10.79	\$ 10,270	\$3.59	300.9%
All Substandard						
10-19 .....	\$ 1,759,131	\$ 2,614	\$ 1.49	\$ 1,649	\$0.94	158.5%
20-29 .....	9,331,856	15,373	1.65	7,639	0.82	201.2
30-39 .....	12,675,983	40,066	3.16	21,388	1.69	187.3
40-49 .....	14,175,854	100,731	7.11	54,470	3.84	184.9
50 and over	8,989,623	124,663	13.87	78,877	8.77	158.0
Total..	\$46,932,447	\$283,447	\$ 6.04	\$164,023	\$3.49	172.8%

\* Based on data from twelve companies.

TABLE 3

INTERCOMPANY SUBSTANDARD ORDINARY MORTALITY EXPERIENCE\*  
 SELECT EXPERIENCE BETWEEN 1972 AND 1977 POLICY ANNIVERSARIES  
 MALES AND FEMALES COMBINED—ALL PLANS COMBINED  
 ALL BUSINESS† WITH FLAT EXTRA PREMIUMS (PERMANENT AND TEMPORARY)  
 Expected Deaths Based on Individual Company's Own Standard Ordinary  
 Mortality Experience  
 (Amounts Shown in \$1,000 Units)

POLICY YEARS	EXPOSED TO RISK	ACTUAL DEATHS		EXPECTED STANDARD DEATHS		MORTALITY RATIO
		Amount	Claims per \$1,000 Insurance	Amount	Claims per \$1,000 Insurance	
1-5	\$1,448,364	\$4,871	\$3.36	\$2,397	\$1.65	203.2%
6-15	704,603	2,791	3.96	2,614	3.71	106.8
1-15†	\$2,630,819	\$9,863	\$3.75	\$6,228	\$2.37	158.4%

\* Based on data from six companies.

† Standard and Table-rated Substandard combined.

‡ One company submitted data only for policy years 1-15 combined.

TABLE 4

INTERCOMPANY SUBSTANDARD ORDINARY MORTALITY EXPERIENCE\*  
 SELECT EXPERIENCE BETWEEN 1972 AND 1977 POLICY ANNIVERSARIES  
 MALES AND FEMALES COMBINED—ALL PLANS COMBINED  
 ALL BUSINESS† WITH FLAT EXTRA PREMIUMS (PERMANENT AND TEMPORARY)  
 Expected Deaths Based on Individual Company's Own Standard Ordinary  
 Mortality Experience  
 (Amounts Shown in \$1,000 Units)

ISSUE AGE GROUP	EXPOSED TO RISK	ACTUAL DEATHS		EXPECTED STANDARD DEATHS		MORTALITY RATIO
		Amount	Claims per \$1,000 Insurance	Amount	Claims per \$1,000 Insurance	
10-19	\$ 55,757	\$ 98	\$1.76	\$ 58	\$1.04	169.0%
20-29	846,645	1,969	2.33	795	0.94	247.7
30-39	867,024	2,055	2.37	1,403	1.62	146.5
40-49	571,841	3,006	5.26	1,964	3.43	153.1
50 and over	289,552	2,735	9.45	2,008	6.93	136.2
Total	\$2,630,819	\$9,863	\$3.75	\$6,228	\$2.37	158.4%

\* Based on data from six companies.

† Standard and Table-rated Substandard combined.

APPENDIX A  
 CONTRIBUTING COMPANIES  
 PROPORTION OF TOTAL EXPOSURES  
 CONTRIBUTED BY EACH

Company	Table-rated Substandard Business	All Business with Flat Extra Premiums
Prudential.....	28.1%	
Metropolitan.....	27.1	
Northwestern Mutual.....	9.5	
New York Life.....	6.7	
John Hancock.....	6.0	32.8%
Mutual Life, New York.....	5.3	19.3
Equitable.....	5.0	18.2
Connecticut General.....	3.4	5.7
Lincoln National.....	2.4	
Sun Life.....	2.3	19.4
Mutual Benefit.....	2.1	4.6
Penn Mutual.....	2.1	
Total.....	100.0%	100.0%

APPENDIX B

*To Participating Companies in the New Special  
 Substandard Mortality Study:*

Enclosed are the instructions for the new special intercompany Substandard Ordinary Mortality Study covering select experience between 1972 and 1977 policy anniversaries.

It is possible that the attached instructions provide for a greater degree of refinement than your company normally uses in reviewing its substandard mortality experience. Therefore, please comply with these instructions to the extent feasible and convenient for your company. Hopefully, each contributing company will at least be able to show its data separately for each of the slight substandard, moderate substandard, and high substandard categories. *However, even if your company is unable to provide any subdivision of the data, please contribute your substandard data in bulk.*

Please address your contribution to Mr. David C. Wetter, Actuarial Associate, Metropolitan Life Insurance Company, 1 Madison Avenue, New York, N.Y. 10010. The Committee would like to have your contribution by April 30, 1979.

Thank you for your cooperation in this study.

Thomas R. Huber  
*Chairman*

INSTRUCTIONS FOR THE NEW SUBSTANDARD ORDINARY MORTALITY STUDY  
OF THE EXPERIENCE BETWEEN 1972 AND 1977 ANNIVERSARIES

The new special intercompany Substandard Mortality Ratio Report is designed to measure Substandard Ordinary Mortality experience in relation to Standard Ordinary Mortality experience on life insurance policies for a 15-year select period. Data subdivided by degree of rating, while somewhat inconsistent between individual company contributions, will be used to check the correlation between degree of rating assigned by an issuing company and the level of mortality experienced on a particular block of business. The report will summarize substandard experience in three basic rating levels: slight substandard, moderate substandard, and high substandard. The slight substandard category will be separated between medical, paramedical, and non-medical issues. Further refinement for issue age, duration, and sex will be examined if sufficient data are provided by the contributing companies.

The report will cover experience between policy anniversaries in 1972 and 1977. If your company cannot provide data on this basis, then the calendar year mortality experience for 1973-77 may be submitted instead. If your company is unable to provide data for the full five-year period, we will appreciate receiving data for as much of the period as you are able to provide. Please indicate in your letter of transmittal the years studied and whether the study is between policy anniversaries or by calendar year. Please also indicate whether your study is on an age nearest birthday or an age last birthday basis.

The basis of expected deaths should be the contemporaneous standard ordinary mortality experience of your company. If the basis usually used by your company is industry mortality (e.g., 1965-70 Basic Tables), then the submission should be modified to reflect your own company's Standard Ordinary experience mortality level. Modification of your expected claims on the industry table may be accomplished by multiplying your initial (tabular) expected claims by the corresponding appropriate standard ordinary mortality ratio for each summary age-sex-duration cell. One global adjustment factor may be used if it is the only practicable way for your company to modify your expected claims from an industry table to your own Standard Ordinary mortality experience.

The study will exclude experience under term conversions, group conversions, GIO elections, joint life policies, and policies issued under different underwriting standards such as pension and tax-qualified contracts. Reinsurance assumed business will also be excluded (reinsurance ceded business should be included).

Select period data should be summarized for policy years 1-5 combined and for policy years 6-15 combined.

The data should be reported in the following issue-age groups:

10-19, 20-29, 30-39, 40-49, 50 and over,

and summarized for all of these age groups combined. (Note: show quinquennial groups if it is more convenient for your company.)



Companies which are in a position to submit their experience separately for male and female lives are requested to do so. If your company is unable to subdivide the data by sex, the combined data should be reported.

Tabular substandard experience should be reported in three broad groups based upon current rating: slight, moderate, high. Borderline substandard rating classes should be reported as *slight* substandard (e.g., classes with anticipated mortality ratio less than about 175 percent). Business which is highly rated (e.g., anticipated mortality ratio over approximately 250 percent) should be reported as *high* substandard. The remaining tabular rating classifications should be reported as *moderate* substandard. The percentage mortality "break-points" which your company finds convenient should be included in your letter of transmittal.

If possible, the data for slight substandard should be reported separately for medical, paramedical, and nonmedical issues. If your company is unable to subdivide the data into these three categories, then it is requested that the data be subdivided into two categories: medical (including paramedical) and nonmedical issues; otherwise data should be submitted on a combined basis.

The experience reported for moderate and high substandard business should be submitted on a medical, paramedical, and nonmedical combined basis.

Business currently rated as standard plus an extra premium (permanent or temporary) should be excluded from your slight, moderate, and high contributions, and should instead be submitted as a separate category. Similarly, business written as a combination of tabular substandard and an extra premium should be reported separately and, if possible, subdivided according to tabular rating: (a) slight, (b) moderate, and (c) high.

Separate experience for Permanent (including term riders, if any, as part of the policy's total face amount) and Term plans should be submitted by those companies which are in a position to do so. Such companies should also include the ratio or ratios of their own standard ordinary term to their own standard ordinary permanent experience in their letter of transmittal.

Companies that can conveniently do so should furnish exposures, mortality ratios, actual deaths, and expected deaths both by number of policies and by amount of insurance. If it is not convenient to show both, preference is for information by amount of insurance.

The data may be submitted in the form most convenient to you: punched cards, output listings, or tables with covering letter. The format for punch cards is attached.

The data should be submitted to Mr. David C. Wetter, Actuarial Associate, Metropolitan Life Insurance Company, 1 Madison Avenue, New York, N.Y. 10010.

Please submit your data no later than April 30, 1979.

CODING INSTRUCTIONS FOR THE NEW SUBSTANDARD ORDINARY MORTALITY  
STUDY EXPERIENCE BETWEEN 1972 AND 1977 ANNIVERSARIES

Columns	Item	Instructions
1-3	Company code	Your company code number is ——— .
4-7	Years covered	Punch last two digits of the initial and terminal years of observation.
8-9	Policy year	Punch 05 for policy years 1-5 combined. Punch 06 for policy years 6-15 combined. Punch 15 for policy years 1-15 combined.
10-13	Issue age	Punch the lowest issue age of the group in columns 10-11 and the highest issue age in columns 12-13.
14	Sex	Punch 1 for males, 2 for females. If data are not subdivided by sex, punch 0.
15-23	Exposed (amounts)*	Punch amount in thousands to nearest \$1,000.
24-30	Actual deaths (amounts)	Punch amount in thousands to nearest \$1,000.
31-37	Expected deaths (amounts)	Punch amount in thousands to nearest \$1,000.
38-44	Exposed (policies)*	Punch the number of policies exposed, if such figures are available; if not, leave the field blank.
45-49	Actual deaths (policies)	Punch the number of policies terminated by death if such figures are available; if not, leave the field blank.
50-54	Expected deaths (policies)	Punch the number of deaths expected (rounded to nearest integer) if such figures are available; if not, leave the field blank.
55-59	Mortality ratio (amount)†	If not applicable, leave the field blank.
60-64	Mortality ratio (policies)†	If not applicable, leave the field blank.
65	Exposure basis	Punch 1 for policy anniversary basis, 2 for calendar-year basis.
66	Age basis	Punch 0 for age nearest birthday basis, 1 for age last birthday basis.
67	Plan group	Punch 1 for Permanent Plans (including term riders, if any), 2 for Term Plans. If data are not subdivided by plan group, punch 3.
68-78		Leave blank
79-80	Control number	Enter the appropriate two-digit number: <i>Permanent Table Extra Premium:</i> 11—slight substandard medical 12—slight substandard paramedical 13—slight substandard (medical including paramedical) 14—slight substandard nonmedical 15—slight substandard combined‡ 25—moderate substandard combined‡ 35—high substandard combined‡

\* If the observation period covered on a card exceeds one year, the above references to (policies) or (amounts) mean the sum of the components for the individual years.

† Round ratio to the nearest tenth of a percent and right-justify.

‡ "Combined" refers to medical, paramedical, and nonmedical issues combined.

Columns

Item

Instructions

*Combination:*

- 70—standard and with extra premium  
(permanent or temporary)
- 71—slight substandard and with extra  
premium
- 73—moderate or high substandard and  
with extra premium
- 74—other combination ratings
- 85—data which cannot be subdivided by  
rating

