

**TRANSACTIONS OF SOCIETY OF ACTUARIES
1956 VOL. 8 NO. 20**

**EFFECT OF FAMILY HISTORY ON
LONGEVITY AFTER AGE 45**

HARRY L. SUTTON, JR.

BECAUSE of current interest in the correlation between family history and mortality, I have extended the experience published by Mr. Valentine Howell in a paper entitled "The Effect of Family History on Longevity After Age 45," *TASA XXXIII*, 149. Family history, as used in Mr. Howell's paper and in this note, refers to deaths in the family due to all causes (except accidents), rather than to deaths due to a particular cause.

The paper dealt with a group of lives age 45 and over at issue insured in the Prudential in 1908. The original experience covered the period between 1911 and 1931 policy anniversaries. This note will show the experience between 1931 and 1955 anniversaries and the combined experience for the entire period.

Mr. Howell classified the entrants into the study according to family history by considering the relation of actual to expected deaths (based on the American Men Ultimate Table) in the insured's family, including his parents, brothers, and sisters. The entrants were divided into a number of classes which corresponded in their median value to the following ratios of actual to expected deaths:

Class	Ratio
X.....	Over 2,000%
0.....	900
1.....	550
2.....	280
3.....	195
4.....	130
5.....	90
6.....	60
7.....	40
8.....	28
9.....	19

Some of these classes were too small to produce significant results. Details of the classification procedure are given in Mr. Howell's paper.

There were 2,895 male entrants, of whom 766 were existing at the close of the observation period in 1931 and 3 in 1955. There were only 200 female entrants, too few to warrant analysis. Table 1 presents the ex-

TABLE 1

Class	Actual Deaths	Ratio of Actual to Expected Deaths
Experience between 1911 and 1931 Policy Anniversaries		
X, 0, 1, 2.....	59	104%
3.....	102	98
4.....	349	100
5.....	575	91
6.....	120	74
7.....	13	118
All Classes.....	1,218	92%
Experience between 1931 and 1955 Policy Anniversaries		
X, 0, 1, 2.....	20	190%
3.....	46	112
4.....	153	99
5.....	246	96
6.....	53	90
7.....	4	161
All Classes.....	522	99%
Experience between 1911 and 1955 Policy Anniversaries		
X, 0, 1, 2.....	79	117%
3.....	148	102
4.....	502	100
5.....	821	92
6.....	173	78
7.....	17	126
All Classes.....	1,740	95%

perience for males; expected deaths are based on the American Men Select Table.

The table shows a definite downward trend in the ratios as the family history improves. Class 7 is an exception; as Mr. Howell pointed out, this may be an accidental fluctuation due to the small amount of data, or overstatement of parents' ages may have caused the applicant to be placed in too favorable a family history class. The experience between 1931 and 1955 anniversaries, probably because of its smaller volume, produced wider variations at the extreme ends than the original experience. The mortality ratios in the later experience were somewhat higher; this feature may be partly due to the fact that it was at high attained ages,

TABLE 2

Pulse Rate	Actual Deaths	Ratio of Actual to Expected Deaths
Under 60	3	81%
60-69	227	84
70-79	1,254	92
80-84	281	102
85-89	47	99
90 and over	18	181
All	1,830	93%

where there has been less mortality improvement in relation to the American Men Table than at the younger ages.

Mr. Howell also investigated the correlation between family history and pulse rate and found that there was none. As to the significance of the pulse rate itself, he found that the mortality experience was satisfactory for pulse rates under 80; in particular, there was no difference in mortality experience between pulse rates in the 60's and in the 70's, both of which produced a ratio of 88%. On this last point the later experience was markedly different in that mortality ratios for entrants having pulse rates in the 70's were higher than for the group having pulse rates in the 60's. In general, there was a tendency for the ratios to increase with the pulse rate. Table 2 shows the mortality ratios for the entire period from anniversaries in 1911 to anniversaries in 1955, for males and females combined; expected deaths are based on the American Men Select Table.

No doubt certain family histories are significant, while others may be disregarded. For example, there were indications in the 1951 Impairment Study that a group of applicants with a family history of cardiovascular-

renal disease may experience substandard mortality. This subject was further investigated by Mr. A. P. Morton in his paper "Family History of Cardiovascular-Renal Diseases," *TSA* VII, 391, where he showed that such a history is particularly significant when accompanied by related, though minor, impairments. Among the parents of male entrants to Mr. Howell's study, however, cardiovascular-renal diseases accounted for only a small percentage of the deaths. This percentage may have been understated because many applicants did not know the true causes of death in their family, and because classification of causes of death was less accurate then.

Since the effect of family history in total may be too heterogeneous to be of practical underwriting value, it is hoped that the general subject of family history will be broken down and studied in its various parts to determine which history factors are of importance.