

# MORTALITY EXPERIENCED AMONG ANNUITANTS

## In the United States and Canada—Ratios of Actual to Expected Deaths Are Lower.

Mr. Arthur Hunter recently reported on the mortality experienced among annuitants resident in the United States and Canada before the Actuarial Society of America. Mr. Hunter said that through the courtesy of the members of the Society and the companies they represent, he was enabled in 1905 to investigate the mortality experienced among annuitants resident in the United States and Canada. It was measured by the McClintock rates of mortality, the ratio of actual to expected by lives being 76 per cent. for men and 83 per cent. for women. It was also tested by the French Companies' annuity experience (R. F.), the ratio of actual to expected deaths being 81 per cent. for men and 64 per cent. for women—by lives. In making these calculations it was known that the McClintock and the R. F. Tables, being aggregate tables, were not appropriate for testing the mortality, especially when the average duration was short. The experience was accordingly measured by a select table—the British Offices' Experience (1863 to 1893)—the ratio by lives being 76 per cent. for men and 80 per cent. for women. This low rate of mortality was noticeable in each of the first five annuity years as well as after the fifth annuity year. The corresponding ratio for amounts of annuity was 86 per cent. for men and 83 per cent. for women. As the mortality was heavier by amounts than by lives there was evidently no selection against the companies. Graduated rates of mortality were not prepared, because the data were not considered sufficient.

## Present Standard of Reserve Insufficient.

In October of 1909 Mr. McClintock presented a note "On Annuity Reserves," in which he made the following statement:—"Companies cannot expect their mortality among American annuitants now entering to be as high on the average as that of the table compiled in 1893 from previous records of the British offices and they must accordingly expect to make good their losses from their interest gains."

He also intimated that while the present standard of reserve used by the Insurance Department of the State of New York was the most stringent extant, it was probably "insufficient as a guide for the proper reserves that should be held on the lives of annuitants in the United States and Canada."

## Council Approve of Suggestion.

In view of Mr. McClintock's opinions, it was advisable to prepare premiums and reserves based on the experience of annuitants resident in the United States and Canada. The council of the Actuarial Society approved this suggestion, the investigation to be undertaken when the statistics available were about double those of the former investigation. At the end of 1910 it was estimated that the foregoing condition had been fulfilled, and requests for data were accordingly sent to the companies.

All the companies represented in the Actuarial Society granting annuities consented to furnish their data. The issues include annuities granted by the companies up to the year 1909 inclusive, the exposures being carried to the anniversaries in 1910. Only immediate annuities were included, issued on single lives for the whole of life and which had been paid for in cash. Temporary, deferred, joint and survivorship annuities were therefore excluded, as were also annuities issued in exchange for dividend, or where there was no cash consideration.

## Age Taken at the Nearest Integral Age at Purchase.

As in the former investigation, the age is taken at the nearest integral age at purchase, which is approximately accurate, as the general custom of the companies is to base the price on the age according to the last completed quarter of a year. The tests made in the British experience showed that, by assuming all annuities purchased at their nearest age at date of purchase, the error involved amounted to 15 days for men and 18 days for women. As this is an immaterial error and as there is no reason to expect any greater divergence in the present experience, the labor of determining the extent of the error was not undertaken.

In the case of the existing, the durations were obtained by deducting the year of purchase from the year of termination of the observations (1910). The deaths were treated as exposed to risk to the end of the annuity year in which death occurred. There were very few annuities surrendered for cash, and as the exclusion of these would not affect the experience, they were ignored.

The cards were first sorted by date of birth, then alphabetically by name. This brought together the most of the duplicates, but not where an error had been made in the date of birth. The cards were accordingly re-sorted by name of annuitant, irrespective of age, and the resulting discrepancies were, if material, brought to the attention of the various companies. Where a different date of birth had been given in two or more companies, and there were no means of determining the correct date, the earliest year of birth was taken.

The process of eliminating the duplicates also brought together cases on the same life which were marked "Dead" on the books of one company and were in force on those of another. In most cases the differences arose with regard to the year 1910, and it was found that the information of the two companies was not as a rule inconsistent, the annuitant having been alive at the anniversary in 1910 of the annuity in one company, but being dead before the anniversary of the annuity in the other company. In sorting the cards, it was noticed that in very few cases had a woman married after the annuity was taken out, due to the advanced age at which the annuities were usually issued, and, accordingly, no systematic attempt was made to bring together such cases, as the labor would have been considerable.

## Total Number of Cards Received.

The total number of cards received from the 30 companies was 12,174, of which 6,620 were on women and 5,554 on men, 76 per cent. of the cards having been contributed by six companies. After elimination of the duplicates issued at the same age, the following is a summary of the extent of the data:

	No. of Entrants.	Deaths.	Annual Amount of Annuities.	Annuity Released by Death.
Women	5,510	1,585	\$2,188,090	\$665,390
Men	4,042	1,295	2,143,290	845,010

It may be worth mentioning that the proportion of the number of annuities on men to the total was 42 per cent., that the average age at purchase was, of men, 61½, and, of women, 63. The average amount of annuity purchased was \$453, while the average on each life was \$610.

## Data Tested by British Offices' Annuity Experience.

The statistics were tested by the British Offices' Annuity Tables which shows effect of selection for five years. The aggregate rate of mortality for the 6th and succeeding years is not strictly applicable for several annuity years after the 5th, as it is recognized that the effect of selection lasts for more than five years. This fact should be kept in mind in studying the following tables—the expected deaths from the 6th to the 10th years being too high, and those from the 11th and later years being too low. In the following table appear the deaths among men and women, both by lives and by amounts of annuity, compared with the expected deaths on the graded mortality rates in the British Offices' Annuity Tables:

Men.	Lives.	Amounts of Annuity.					
Duration Years.	Ex- pected Deaths.	Actual Deaths.	Ratio of Actual to Ex- pected.	Annuity		Ratio of Actual to Expected.	
				Pay- ments ex- pected to cease by Death.	Annuity Payments actually ceasing by Death.		
1	110	107	97%	\$63,310	\$91,300	144%	
2	128	104	81	73,460	53,250	72	
3	144	147	102	83,650	89,710	107	
4	149	115	77	86,480	76,810	89	
5	149	110	74	85,150	59,180	70	
6-10	542	441	81	315,540	309,559	98	
11 & after	297	271	91	185,960	165,210	89	
Total	1519	1295	85%	\$893,550	\$845,010	95%	

Women.	Lives.	Amounts of Annuity.					
Duration Years.	Ex- pected Deaths.	Actual Deaths.	Ratio of Actual to Ex- pected.	Annuity		Ratio of Actual to Expected.	
				Pay- ments ex- pected to cease by Death.	Annuity Payments actually ceasing by Death.		
1	107	90	84%	\$43,170	\$39,950	93%	
2	138	107	78	55,450	38,720	70	
3	163	120	74	65,990	44,510	67	
4	177	143	81	72,410	53,660	74	
5	176	135	77	71,080	58,170	82	
6-10	662	562	85	267,000	251,440	94	
11 & after	467	428	92	190,680	178,940	94	
Total	1890	1585	84%	\$765,780	\$665,390	87%	