

## REVIEW

*THE ANALYSIS OF MORTALITY AND  
OTHER ACTUARIAL STATISTICS*

by

B. Benjamin, Ph.D., F.I.A. and the late H. W. Haycocks

Pp. viii + 392. Cambridge University Press. £3.00

Dr. Benjamin pays tribute in the Preface to his co-author who died at an early stage in the preparation of the book, and his generous words will be echoed by those of us who may have experienced the influence and helpful advice of Mr. Haycocks in tuition work on the subjects covered by the book.

The book replaces in the Course of Reading for Part IIIA, Actuarial Statistics, Volume I by Tetley, and Volume II by Anderson and Dow, which have served their purpose so well for more than twenty years. The student will find it helpful to have under one cover, in addition to much of the material encompassed by these two volumes, useful summaries of other writings to which copious references are made. These references, which are evidence of the vast amount of research done by the authors, must imbue the student with the desire to read the original papers.

Chapter 1 discusses various measures of mortality and gives a general introduction to subject matter dealt with in considerable detail in subsequent chapters. The interesting treatment of the subject will encourage the non-actuarial reader to read on. The reminder of the relationship between rates and frequency distributions is appropriate for the actuarial reader who may be inclined to lose sight of this fact because he tends to regard the basic measure as a rate or a ratio and leave it there. The paragraphs devoted to terminology are important in establishing the need to appreciate what might seem to be the ambiguity of such terms as rates.

The concept of using years of life lost as a measure of mortality may be unusual to the actuary in his normal work but is a sign of his development as a social statistician.

The next four chapters are devoted to the extremely important subject of Exposed to Risk, which often causes difficulty to the student coming to it for the first time. The use of the very powerful

method of arriving at the difference between  $E_x$  and  $E_{x-1}$  by considering the contribution to each by the various increments and decrements should enable students and others to tackle successfully the more complicated problems. In the reviewer's experience students often have difficulty because of the tendency at first always to think in terms of a life year rate interval no matter how the data are classified. The terminology, Calendar Year Method, Policy Year Method, etc., probably has not helped. The authors' use of the terms Calendar Year Rate Interval, etc., should do much to avoid the confusion which perhaps led to the difficulty.

The connection between the continuous method and the census method is very clearly demonstrated in Chapter 2.

The authors have appreciated the need of the student to have as much practical application as possible of the principles involved. The worked examples are extremely helpful and there cannot be too many of them in a subject like Exposed to Risk.

In paragraph 5.42 the reader is invited to check the amendments to formulae (5.1) and (5.5). At least one reader is convinced that this was no lighthearted invitation since the first term on the right hand side of the amended (5.5) should read  $b_{(y)}$  and not  $\frac{1}{2}b_{(y-1)} + \frac{1}{2}b_{(y)}$  as shown.

The theory of multiple decrements is very adequately dealt with in Chapter 6, but in this essentially practical subject it is perhaps disappointing to find only two worked examples, albeit these are very fully dealt with.

Chapter 7 deals with sickness rates. In practice in the past the actuary has met this subject mainly in connection with friendly societies and the authors have dealt with the practice in this context. With the emphasis nowadays on permanent health insurance, the actuary in the ordinary life office is going to be much more concerned with the theory and practice of sickness business in the future.

Marriage and fertility rates are discussed in Chapter 8, and trends and forecasting in the next chapter. The reader is referred to a number of authoritative papers on the latter subject and is reminded that, as so often applies in this kind of work, an appreciation of the underlying trend is more important than mathematical precision.

Dr. Benjamin acknowledges his debt to the writings of Anderson and Dow, particularly on Selection which is the subject matter of Chapter 10.

It is readily understandable that with a subject such as the Principles of Graduation which has occupied the thoughts of the profession down the years, there would not be great scope for originality. Chapters 11 to 16 on principles and methods of gradua-

tion follow fairly closely the lines of Tetley's excellent treatment of the subject.

The omission of Examples to be worked by the student himself takes away from the emphasis of the practical nature of graduation. Although he may find them elsewhere, perhaps in examination papers, to have them readily available, appended to the appropriate chapter, is of considerable value.

The updating of the text to take account of recent developments is very useful. The methods of construction of abridged life tables and in particular the current General Register Office method, are worthy of note.

Chapter 17 contains excellent summaries of the main features of the construction of mortality tables in current use, and here again there is given a full list of references to the source literature for the interested student.

The next chapter on social and economic factors affecting mortality is of general interest dealing with a variety of influences such as nutrition, occupation, housing, climate and education.

The final chapter is certainly not the one of least interest to the student. This all too short section must stimulate his thoughts about the scope for his talents and techniques in tackling problems outside the traditional actuarial sphere. The reference to non-life insurance and risk theory is very brief, but one cannot help feeling that actuaries will increasingly be concerned with these matters, that their training will require to take care of this and that this one short chapter may be the forerunner of much more copious instruction material in the not-too-distant future.

Although written primarily to cover the examination requirements of the Institute and the Faculty, this very readable book must have an appeal to the non-actuarial reader who is interested in the vital statistics of the community in which he lives. It will have its special appeal to demographers and social scientists and will do much to foster the image of the actuary as a social mathematician.

To the actuary himself, the book, with its clarity of expression, is an object lesson in one of his main tasks, viz., to explain complicated problems in a simple way. Too often he is regarded as someone who excels in doing just the opposite.

W.McC.