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BOOK REVIEW

National Center for Health Statistics, *Synthetic State Estimates of Disability Derived from the National Health Survey,* PHS Publication No. 1759, Washington, D.C., 1968.

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This paper arises in response to the increasing demand for health statistics on the state level. Currently, the National Center for Health Statistics conducts a continuous poll of the non-institutional, civilian population of the U. S. to produce such statistics for large metropolitan and regional areas and for the entire nation.

The Center has expended a great deal of effort in search of methods for deriving credible state estimates from already accumulated national and regional results. The model suggested by the Center in the paper represents a tentative solution — tentative in that it is subject to ". . . further refinement and validation."

Random Variables

Although it would appear to be the authors' intent to apply their model to other health related subjects, they have for various reasons selected long and short term disability for an initial test of the applicability of their model. The random variables "restricted-activity days per person per year", "bed-disability days per person per year", and "work-loss days per currently.employed person per year", were selected as measures for short-term disability and "percent with one or more chronic conditions" and "percent with an activity limitation due to chronic conditions" as measures for long term disability.

For each of these random variables the proposed model purports to obtain an estimate of the expected value for individual states, using an estimating equation which is a natural consequence of the authors' fundamental premise: "It is reasonable to assume that the likelihood of a person being disabled varies with a number of factors: age, sex, race, marital status, occupation, industry, urban-rural residence, income, family size, geographic location, and n.e.c. (not elsewhere classified), the latter being a convenient label for 'all other factors, including chance' ".

Let us assume that it is desired to

estimate the expected value $\overline{X}s$ of the random variable X for a specified state s. Furthermore, we will assume that the following data are available:

(1) A subdivision of the national population into the subsets dictated by the authors' premise, that is, groups of people of like race, sex, income, age, and so forth. Restricted by the availability of required data, the number of subsets used in practice will be significantly less than the number produced by considering all possible combinations.

(2) P_n the proportion of the population in state s in the nth subset, the subsets determined in (1) having been numbered arbitrarily.

(3) X_n is the expected value of the random variable X for the people from the entire nation who fall into the nth subset.

(4) N, the number of subsets.

On the basis of these known quantities, we can calculate an estimate of $\overline{X}s$ using the equation

$$\overline{X}_s = \sum_{t=1}^{N} P_t \overline{X}_t$$

Based on data collected by the Center in fiscal years 1963 and 1964, the authors divided the national population into 78 subsets. The values of P_n for these years were derived by projecting figures taken from the 1960 census. Finally, it should be noted that while this is not the precise estimating equation employed, it satisfactorily conveys the authors' rationale.

Two Questions

Two questions, it would seem, must be considered in evaluating the proposed model. First, how "good" are the estimates produced by this method? Second, are the results or the model of any specific value to the insurance industry?

As would be expected, the authors, too, were deeply concerned with the first question. Unlike the probability model used by the Center in preparing estimates on a regional and national basis, the model does not produce formally unbiased statistical estimates and the error introduced is not a measurable quantity. However, the estimates have proven remarkably satisfactory in light of the results of tests designed by the Center to determine their consistency and their plausibility.

On this basis, the authors believe the estimates to be useful for very general purposes. They add that caution must be exercised in applying the model or the results in very specific instances. This fact significantly affects the answer to the second question.

The nature of the random variables selected by the authors renders the results *per se* of little value to insurance actuaries in analyzing variations in disability experience by state. One possible exception may be the results shown in Table C for the random variable "number of work loss days per currently employed person per year". It is interesting to note, however, that the value of this variable appears to vary inversely with the tentative level of disability experience reflected in the studies of one company.

While the actual results seem to have little application in the work of insurance actuaries, the proposed model would appear to have a wide degree of applicability in the fields of disability and health insurance. The exacting nature of the variables most frequently measured in these fields and the authors' words of caution seem to require that we await the results of ". . . further refinement and validation".   □

'Introducton to Demography' Revised Edition Published

A revised edition of *Introduction to Demography* by Mortimer Spiegelman, F.S.A., has been published by the Harvard University Press, Cambridge, Mass.; price, $15. New features are the plans for the 1970 census of population, the program of the National Health Survey, theories of mortality, and chapters on income and socio-economic status and on education.

Also included are new techniques for detecting and measuring errors in census data and for the projection of fertility. Trends and variations in the demography of the United States and Canada are described. The book has 544 pages, with 124 tables and 20 charts.

Although the first edition (1955) was designed primarily for students of the Society, it found a wide market among demographers, sociologists, and business statisticians.   □