

BOOK REVIEWS

EPIDEMIOLOGY

REPORTS ON RESEARCH AND TEACHING, 1962

JOHN PEMBERTON, CO-ORDINATING EDITOR

London, Oxford University Press, 1963, 341 pp. \$12.50

At Korčula, Yugoslavia, in 1961, the International Epidemiological Association held its Third Scientific Conference. A selection of the papers given on that occasion, together with a preface by the co-ordinating editor, Professor John Pemberton, has been published under the title, "Epidemiology: Reports on Research and Teaching 1962." The opportunity to review this volume when the Association is about to hold another major scientific meeting at Princeton, in August 1964, is naturally welcome for the occasion it affords to review the current position of epidemiological inquiry.

The title of this volume implies that one may expect to find within a statement of major current preoccupations and perhaps a hint of likely future trends. Unfortunately the content of the book does little justice to its title. It is possible that an exclusive and representative coverage was not the aim of those who organized the meeting in Korčula, and was not uppermost in the minds of those who contributed papers. The sections are headed: Cancer; Diarrhoeal Diseases; Arterial Pressure; Occupational Diseases and Accidents; Neurological Disease, Anaemia, and Nephropathy; Standardization of Diagnostic Techniques; Health Services; and Some Recent Develop-

ments in the Teaching of Social Medicine. It is not clear whether the Conference was similarly divided or whether the grouping was done subsequently. In either case, it is difficult to agree with the editor that the headings represent the "growing points of the subject."

Epidemiology may be defined as the study of the behavior of disease in human communities and of the means that communities may adopt to secure its limitation or control. This definition, which is the reviewer's own, is partly etymologically and historically based, but also takes account of the current preoccupations of epidemiologists and of the need to give the term a coherent meaning from the viewpoint of its characteristic methods and areas of concern. Defined in these terms, this discipline embraces studies in the sociology of medicine and of its institutions, as well as in the demography of disease and the determinants of variations in its prevalence. Largely for these reasons the term "social medicine" is used in some countries to describe the domain here defined under the term epidemiology.

Whichever term we choose, this discipline seems to the reviewer to involve characteristically the notion of the study of health and disease in the community and thus to be distinct from clinical medicine, which is concerned with the processes of disease in the individual. It is, of course, easy to press this distinction too far. Social medicine inevitably recognizes that societies are composed of individuals, just as clinical medicine inevitably employs the idea of population disease frequency in the diagnosis and prognosis of disease. But the distinction is nonetheless important. Studies in clinical medicine do not become epidemiological inquiries simply because of the replication of observations.

The book affords very little account of the scope of epidemiological inquiry and hardly any indication of the range of its characteristic methods. Still less does it provide any general appraisal of the problems, conceptual or methodological, which now or in the next few years may confront us. It represents for the most part a series of quite brief and sometimes superficial accounts of some of the current preoccupations of the authors, by no means all of whom could be regarded as primarily concerned with epidemiological inquiry. Very

few of the papers aim at the discussion of general problems; but it is interesting that those that do seem most at home between hard covers and under the title borne by this volume.

For the book begins well with a paper by Richard Doll on "The Contribution of Epidemiology to Knowledge of Cancer." This is a persuasive argument for the proposition that observations on man are more relevant, and at least as practicable, as those made on laboratory animals, and Dr. Doll's final sentences are worth quoting:

"It cannot, for example, be assumed that there is only one mechanism of carcinogenesis and it does not follow that the mechanism involved when, say, 100 per cent incidence of tumours is produced in a highly inbred strain of animal by injection of a virus, is necessarily the same as when 1 per cent of tumours is produced in the old age of such a wild population as man. And even if it is, it will still be the epidemiologist's responsibility to demonstrate it."

But even Dr. Doll's paper has surprising omissions. For example, it is not enough to have demonstrated the etiological role of cigarette smoking in lung cancer when this demonstration has no evident effect on population smoking habits nor on mortality from lung cancer. Dr. Doll makes no reference to inquiries directed toward describing and quantifying the phenomenon of resistance to health education which is now a crucial factor in determining the continued development of lung cancer in populations.

Two sections of the book call for special comment: that on standardization of diagnostic techniques and that on health services. Under the former heading appear several papers dealing with the difficulties of diagnostic consistency. The approach generally is one in which the content of a disease category is defined in advance and devices are employed for including within or excluding from the category on the basis of symptomatic history or physical examination. The alternative approach, based on the classification of encountered morbidity, is discussed by Professor G. M. Carstairs in the context of mental illness. No mention is made in either instance of recent advances in the application of rigorous taxonomic methods to diagnostic classification.

Research into the functioning of health services receives some discussion, even though the space devoted to this area of concern seems disproportionately small. Thomas McKeown's opening paper in this section outlines his views on likely trends in the future pattern of curative and preventive services. The paper implies the need for study of the functional effect of alternative arrangements, and, indeed, such studies have been extensively carried out, notably in the United States. Three very brief accounts of such studies are given by Lester Breslow, Milton I. Roemer, and George A. Silver.

One might perhaps complain less of the unrepresentative nature of this sample of current epidemiological concerns if the volume had managed to communicate something of the contemporary climate of epidemiological thinking and of the prevailing sense of excitement at the challenge now being confronted. For while the past half century has brought changes in the patterns of morbidity and in our approach to its control which pose epidemiological problems of immense complexity, these are being matched by the potential power of the methods and concepts now being brought to bear on epidemiological inquiry.

The critic who expresses disappointment at what has been omitted is under some obligation to indicate the nature and relevance of the omissions. Indeed, since the reviewer's brief calls for an appraisal of the present volume as a report on the current state of epidemiological inquiry and its likely future trends, it may be useful to examine the present position. It is convenient to do so under three heads: Methodology, Conceptual Basis, and Areas of Concern.

Methodology

Since epidemiological inquiry is concerned with population measurement and with the relationships of disease occurrence and of medical practice to social organization, it is natural that it should have drawn heavily on research methods developed in other population and social sciences, and that it should have recruited to the ranks of its practitioners workers with individual backgrounds in demography, human genetics, sociology, and economics. But it is

important at the present time to develop research methods directly appropriate to epidemiological problems.

The methodological problems engaging most attention concern the development of new methods of data collection and of data analysis. The problems of data collection are broadly of two kinds: those of retrieval of information from contemporarily made records of social, vital, or medical events, and those of current collection, usually by field inquiry. Data retrieval problems center around the development of systematic methods for making records and of high speed, large-scale techniques for the assembly and analysis of recorded data. An enormous quantity of data is put on record during the day-to-day practice of medicine, which it is reasonable to suppose could be made to yield information of great value, were it possible to recover and process the required elements on an adequate scale. The advent of mechanical and electronic devices for performing this kind of task has enormously widened the prospective scope of epidemiological inquiry, and has added several new skills to the required armory of the investigator.

It is surprising that the work under review makes no mention of the contribution, actual or potential, that electronic digital computing may make to epidemiology. The papers date from 1961, but even then it was apparent that computers were likely to effect a revolution in epidemiology comparable with that brought about in the biological sciences by the introduction of the microscope. Indeed, the problems of automatic data recording and retrieval were at that time already being explored at several centers, and several publications had appeared.

The methods requiring development in current data collection include those under development in other social and population sciences as well as those relevant to specifically medical inquiry. The former include methods appropriate to the quantitative investigation of social characteristics and personal attitudes and their relationship to identifiable medical problems. Techniques of interviewing and the problems of obtaining relatively unbiased data on the personal history of individuals are receiving considerable attention in the context of medical inquiry.

Conceptual Basis

In what might be termed the classical period of epidemiology, the late nineteenth century, the study of the patterns of disease prevalence concerned itself mainly with communicable disease. Variations in the prevalence of such diseases are most easily demonstrated as being localized within the dimensions of time and space, and the determinants of such localization are conveniently characterizable as causal factors in the inception of disease. Variation in disease prevalence remains a major theme of epidemiological inquiry, but our interest in localization of undue prevalence is no longer largely limited to the temporal and spatial dimensions. We are now interested in prevalence variation between categories, defined in terms of personal attributes and other social and demographic variables. We are also now concerned with diseases whose local prevalence is determined as much or more by their characteristic course and by medical and social intervention as by their originating causes, and whose originating causes lie more in modes of behavior and personal attitudes than in the nature of external agents.

The older notion of disease occurrence as the consequence of a disturbance in the ecological equilibrium between a host, an agent, and their common environment is no longer meaningful. But the notion has acquired a venerable sanctity and still pervades much epidemiological thinking. The present volume contains several instances of the contortions necessary to accommodate modern epidemiological thought within this conceptual framework, as when the editor talks of the "agent" in genetic disease as "man himself."

The current need is for the development of a more relevant conceptual background, but it is by no means easy to suggest how this might be created. Epidemiological inquiry must now depend on contributions from a wider range of past experience and from a wider range of modes of thought than formerly; but it will not suffice to recruit a range of personnel and house it under a common roof. The need is for an integrated approach in which those whose backgrounds are medical, numerical, or behavioral have sufficient common ground to permit a common assault on problems requiring formulation in terms of at least these three groups of discipline simultaneously. Such

an approach will not be achieved unless epidemiology remains a distinct academic discipline capable of integrating its recruits into a team. At the present time, epidemiology is far too frequently the part-time activity of those who believe that larger numbers will add conviction or respectability to commonplace clinical observations.

Areas of Concern

Etiological inquiry will continue to represent a dominant element in epidemiology, and its record of conspicuous successes will be thought an adequate justification of this central role. But in the past it has been possible to criticize much of this research for having stopped short just at the point of maximum interest. For example, much attention has been attracted by the discovery of the teratogenic effects of thalidomide, but relatively little interest has been shown in the problem of why newly developed sedatives are so widely prescribed. The demonstration of the etiological importance of diet and of physical activity in cardiovascular disease has yet to be followed by any general studies of the determinants of personal behavior in relation to health. Etiological inquiry now faces the need to provide a very much more complete account of the genesis of disease than was needed formerly, and the task has hardly begun.

The related task of improving the precision and utility of available accounts of the natural history of diseases is another natural area of concern for epidemiological inquiry. A more efficient discrimination between varieties of morbid conditions will undoubtedly permit a more informative analysis of the variability encountered in therapeutic evaluation, but an area which may become particularly important is the investigation of the modes of disease presentation. The observation may already crudely be made that diseases present in different ways and at different stages, according to social characteristics of the populations in which they occur. For example, the mode and stage of presentation of tuberculous infection vary at different ages and in different social, national, or ethnic groups. Epidemiological inquiry has a considerable task in the further exploration of such observations and will eventually need to tackle such problems as what determines the patient's decision that he is

unwell or that he requires medical advice, and what determines the patterns of referral of patients within the medical services.

A neglected area in the volume is that often described as operational research. As applied to medicine, this branch of science is concerned with investigating the functioning of medical care and preventive services in the light of the determinable medical and health needs of the community they serve and falls naturally within the domain of epidemiological inquiry. Few societies undertake no collective responsibility for health and many accept explicitly a total responsibility. Since no society exists (or probably ever will) which commands resources adequate to meet all envisageable demands, it is obviously better to attempt an allocation of available resources in terms of an efficient determination of needs and expected effects. Similarly, it is important to subject services to a continuing appraisal of their contemporary relevance to the distribution of morbidity and its predictable trends.

The functions of medical institutions are at present the subject of many investigations. The traditional respective roles of hospital consultants, of general practitioners, and of other medical workers evolved relatively freely in a world which is left behind as organized medical care becomes accepted as a community responsibility. Yet many of the institutions of medicine exhibit features no longer appropriate to a changed world. Although it is easy (and attractive) to propose solutions to such problems, the real need is for objective investigation. In this case there is probably much more to be learned by an experimental rather than an observational approach, and alternative solutions may need to be locally adopted and their effectiveness evaluated.

The identification of those features of our social organization which influence the efficiency of medical services is another important field for epidemiological inquiry. The interfaces between morbid experience and medical effort are as complex as those between the body and the external world, and at least as crucial to the development of medicine, but they are still very poorly understood. The precise determinants of effective access by patients to good medical care require identification if we are to solve such problems as those

of the large variations in mortality from birth injury between different social classes, and the possibly related variations between classes in the proportion of mothers confined in hospitals. It is worthy of note that if all classes experienced the stillbirth and infant death rates prevailing in the upper class (social class I), there would be 1,600 lives saved each year in Scotland, compared with present experience. This represents in that country a greater number than would be saved by the total elimination of deaths from prematurity and congenital malformations combined, and a greater gain in years of human life than would be achieved by the total abolition of death from lung cancer.

The book does not seem to touch at all upon a number of these areas where the prospects for epidemiological inquiry seem likely to be rewarding. The divisions employed here are in practice far from clear. For example, methodological research is probably most usefully developed side by side with the investigation of the problems requiring new methods for their solution; and it is also probable that operational research depends on a better understanding of the distribution of morbidity and of variations in its course.

The field as here outlined may seem a wide one, but it has a reasonable degree of methodological coherence and a definable area of concern. There seems to be little doubt that epidemiology faces a situation incomparably more challenging, and that it is also immensely more ready to meet that challenge than is even hinted at in the volume under review.

ALWYN SMITH