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**Cardiovascular Mortality:
Seven Countries**

Seven Countries: A Multivariate Analysis of Death and Coronary Heart Disease, by Ancel Keys, with Christ Aravanis et al (Commonwealth Fund Book), 381 pp. with illus. \$25. Cambridge, Mass, Harvard University Press, 1980.

During the last 30 years, epidemiologists have made remarkable progress in identifying important factors that are associated with the incidence of chronic diseases. Nowhere has this been more successful than in the area of coronary heart disease.

Beginning with Professor Keys' study of Minnesota businessmen and the Framingham (Mass) Heart Study, innumerable reports have appeared that have documented a wide variety of personal characteristics strongly associated with heart attacks. These characteristics include high blood pressure, elevated blood cholesterol levels, cigarette smoking, and glucose intolerance. The available data for other characteristics are more controversial; these include overweight and obesity, physical activity, and specific components of diet. Most studies have been concerned with single population groups, and most of the reports have covered only one or two endpoints, usually coronary heart disease or myocardial infarction. However, a few studies have wisely examined several diverse population groups and have included the observation of other endpoints, including noncardiovascular events.

Perhaps the most ambitious and famous of these studies is the Seven Countries Study launched by Ancel Keys and his colleagues in the early 1950s, covering 16 communities in seven different countries. The present book is an overview of the major findings in this study, spanning a period of ten years, which not only includes the traditional risk factors and endpoints but assesses the impact of these risk factors on total mortality in contrasting geographic situations. The book, therefore, is much more than just a compendium of previously published results.

Professor Keys confirms some of

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the previously established relationships of risk factors with coronary heart disease, in particular, that blood pressure and age are two of the most important determinants of the risk of, and mortality from, heart attacks. For several other suspected risk factors, the data contradict some widely held opinions: for example, mortality was found to be inversely associated with body mass index, a surrogate measure of obesity; the mortality among men who were less physically active tended to be lower than mortality among the more physically active men. For a few risk factors, Professor Keys demonstrates that the relationships are far more complex than usually supposed. For example, blood cholesterol levels appeared to be related to the risk of heart attacks only in areas that have high rates of coronary heart disease.

Cigarette smoking seems to follow a similar pattern, with no discernible effect in the communities where heart disease is infrequent.

But one of the most significant features of this book is its first-time effort to look at the impact of each risk factor on total mortality and mortality from noncardiovascular diseases. Some great surprises are uncovered. For example, statistically significant inverse relationships are found between blood cholesterol levels and mortality from noncardiovascular causes in Finland, Greece, and Italy; and inverse but not statistically significant trends are also found in Yugoslavia, in the Netherlands, and among US railroad workers.

One of the major objectives of the Seven Countries Study was to correlate the frequency of disease with differences in the dietary characteristics of the populations. Dietary information was not available for all of the individual participants in the study, but subsampling within each of the regions provided estimates of the mean nutrient intake in the different cohorts. Although important differences were found in the habitual diets among the cohorts, the substudies showed that within each group the diet was relatively homogeneous, so no analyses could be made relating

disease outcome to diets of individuals. Data are presented on two important nutrients: percent of dietary calories from total fats and percent of dietary calories from saturated fats. Each of these are related to the ten-year incidence and mortality from coronary heart disease, the correlations being much stronger for saturated fats than for total fats. However, these are "ecological correlations," comparing disease rates with mean nutrient levels for the cohorts. In such correlations, it is difficult to rule out the effects of numerous other factors which differ among the respective groups.

For most risk factors discussed in this book, analyses are presented in regard to total mortality. This was omitted in the chapter on diet, and one cannot help but suspect that there is a hidden agenda here. By estimating the values not presented from data given elsewhere in the text, one can infer that there is a negative association, although perhaps not significant, between total mortality and percent of dietary calories from fats, and that the correlation between noncoronary mortality and total fat intake is fully as strong as, although opposite in direction to, the relationship for coronary heart disease mortality. These findings are consistent with those explicitly presented for the relationships to blood cholesterol levels and give rise to speculation about the overall impact of these risk factors on the total disease experience in a community.

This is an extremely important book, worthy of full consideration by epidemiologists and clinicians interested in preventive cardiology and disease prevention in general. There are several shortcomings that might be quite disturbing to those who want to test some of their own pet theories. The tabular material does not allow for extensive verification of the great amount of information presented in the figures, nor do the appendices provide detailed information on the risk factors and disease outcomes for all of the cohorts. Furthermore, the grouping of communities is not uniform from chapter to chapter, so that

one cannot construct a consistent picture of the experience in any particular community with regard to all of the risk factor data. However, there is much in this volume to stimulate careful thought about the association of disease to life-style.

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The Framingham Study: The Epidemiology of Atherosclerotic Disease, by Thomas Royle Dawber, 257 pp, with illus, \$20, Cambridge, Mass, Harvard University Press, 1980.

Most physicians are familiar with the major "risk factors" for coronary heart disease established by the Framingham study and other epidemiologic studies over the past 30 years. Few physicians know of the early history of the Framingham study and its venture into the long-term investigation of the origins of coronary heart disease in the residents of Framingham, Mass.

Dr Dawber, medical director of this Public Health Service-sponsored project from 1949 to 1965, has continued his association with the Framingham study up to the present, more than 30 years. He has produced an informative book whose purpose, he states, is to tell the "entire story of the Framingham Study—a narrative that without being too detailed would give the reader a reasonably complete knowledge of the overall project."

Findings from the study on 5,127 men and women, free of coronary heart disease at the time of their first examination, are presented for the main risk-factors studied over 24 years of follow-up. Relationships of the risk factors to coronary heart disease, stroke, and peripheral vascular disease are presented from the medical standpoint with minimal statistical analysis. Data are displayed in a series of figures relating each risk factor by level to these disease endpoints. The incidence of such events per 1,000 men and women by five-year age groups is shown.

The National Heart, Lung, and Blood Institute, which has provided and still provides most of the funding for the Framingham study, considers this research program highly productive. It has helped to establish sound knowledge of the natural history of coronary heart disease and the relative power of various risk factors in determining the likelihood of developing its fatal or nonfatal clinical consequences.

Physicians will find Dr Dawber's "entire story of the Framingham Study" both interesting and a convenient summary of Framingham findings that should have practical usefulness in the education of their patients.

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Anesthesiology

Health Care Delivery in Anesthesia, edited by Robert A. Hirsh et al, 253 pp, with illus, \$14.50, Philadelphia, 19106 (210 W Washington Square), George F. Stickley Co, 1980.

This book is a written collection of papers and questions and answers presented at a symposium-workshop on the Epidemiology and Demography of Anesthesia, held in Washington, DC, on Nov 2 and 3, 1977. The title of the book, however, differs from the title of the symposium and suggests to the reader that a plan for rational delivery of anesthesia services will be outlined. Since the meeting and participants were sponsored by the Association of University Anesthetists, the emphasis of the text is understandably academically oriented, and terms like critical incident, probability, population studies, control variables, and epidemiology occur repeatedly and attest to the book's strong statistical base. Some of the participants and authors are professionals of great responsibility and expertise in anesthesia delivery. Others are part of the team, quantitating the effectiveness and safety of this delivery.

The team approach and surgical necessity of such are presented in a holistic and succinct manner by the only surgeon among the contributors. Perhaps greater understanding of the problems presented would have occurred with more participation from other surgical colleagues.

The contents are organized into a developmental approach. Historical perspective and results of early studies perhaps are the essence of the text. Well written and factual, this emphasis suggests that the broader subject of the text—anesthetic morbidity and mortality—is not a new concern. The concern for proper statistical methods recurs throughout.

The incidence of surgery, case-fatality rates, and probability of death from surgery among various populations adds to the anesthesiologists' perspective. Anesthesia is generally not therapeutic but allows surgical treatment to be performed. The need for surgery is addressed by the

availability of surgeons. It is acknowledged that future deliberations on mortality associated with anesthesia must recognize the fundamental importance of the surgeon as a decision maker on the need for surgery.

The section "Hospital Death and Morbidity Studies—A National Sample" suggests that institutional differences occur that relate to its organizational characteristics of physicians and nurses. In addition, we are reminded that geography, nursing intensity, expenditures per patient, medical school affiliation, and case load affect outcome.

Section 9, "The Post-Anesthetic Recovery Score: A Method of Evaluation of Anesthesia Performance," seems to be ancillary to the book's concept and perhaps should have been left out. Section 11 introduces the concept that not only death but examination of expected mortality should be added to our data base. Mortality can be predicted fairly accurately for high-risk surgery based on physical status and age.

The section "Hospital Organization and Outcomes of Care" outlines interesting concepts for hospital-medical staff relations. "Anesthesia Manpower" addresses differences in perception of anesthesia delivery by various providers, especially governmental. Chapters 15 and 16 suggest that the characteristics of the anesthesia provider may influence outcome, but the statistics provided fail to substantiate this. The cost of research in anesthesiology outcome is addressed in chapter 18. Existing hospital data systems, as suggested in chapter 19, can be used to reduce the cost of epidemiologic and statistical research.

Dr Bendixen presents a simplified view of the problems by suggesting the "Tractor Principle"—that is, if you give a farmer a better tractor, he will drive on a steeper incline. This seems to summarize the nature of the solutions provided for the important questions addressed in this book.

The editors should be commended for their efforts in presenting a well-organized approach to the many aspects of anesthesia delivery and in suggesting solutions by expert discussion. This book is especially recommended for hospital administrators, deans, and anesthesia and surgical departmental chiefs, who are responsible for anesthesia delivery. Others will benefit from awareness of the problem and the solutions suggested in this text.

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