

10. Ader, R., Kreutner, A., and Jacobs, H. L. Social Environment, Emotionality and Alloxan Diabetes in the Rat. *Psychosom. Med.* 25: 60-68, 1963.
11. King, J. T., Lee, Y. C. P., and Visscher, M. B. Single Versus Multiple Cage Occupancy and Convulsion Frequency in CH Mice. *Proc. Soc. Exp. Biol. Med.* 88: 661-663, 1955.
12. Andervont, H. B. Influence of Environment on Mammary Cancer in Mice. *J. Natl. Cancer Inst.* 4: 579-581, 1944.
13. Christian, J. J., and Williamson, H. O. Effect of Crowding on Experimental Granuloma Formation in Mice. *Proc. Soc. Exp. Biol. Med.* 99: 385-387, 1958.
14. Henry, J. P., Meehan, J. P., and Stephens, P. M. The Use of Psychosocial Stimuli to Induce Prolonged Hypertension in Mice. *Psychosom. Med.* 29: 408-432, 1967.
15. Mason, J. W. Psychological Influences on the Pituitary-Adrenal-Cortical System. *Recent Prog. Horm. Res.* 15: 345-389, 1959.
16. Mason, J. W., and Brady, J. V. The Sensitivity of the Psychoendocrine Systems to Social and Physical Environment. In *Psychobiological Approaches to Social Behavior*, edited by Shapiro, D. Stanford University Press, Palo Alto.
17. Cassel, J. Health Consequences of Population Density and Crowding. In *Rapid Population Growth*, prepared by National Academy of Sciences, Ch. 12, pp. 462-478. Johns Hopkins Press, Baltimore, 1971.
18. Holmes, T. Multidiscipline Studies of Tuberculosis. In *Personality Stress and Tuberculosis*, edited by Sparer, P. J. International Universities Press, New York, 1956.
19. Leighton, D. C., Harding, J. S., Macklin, D. B., MacMillan, A. M., and Leighton, A. H. *The Character of Danger*. Basic Books, New York, 1963.
20. Nesor, W. B., Tyroler, H. A., and Cassel, J. Stroke Mortality in the Black Population of North Carolina in Relation to Social Factors. Presented at the American Heart Association Meeting on Cardiovascular Epidemiology, New Orleans, March, 1970.
21. Harburg, E., et al. Stress and Heredity in Negro-White Blood Pressure Differences. Progress Report to National Heart Institute, 1969.
22. Syme, S. L., Hyman, M. M., and Enterline, P. E. Some Social and Cultural Factors Associated with the Occurrence of Coronary Heart Disease. *J. Chronic Dis.* 17: 277-289, 1964.
23. Syme, S. L., Hyman, M. M., and Enterline, P. E. Cultural Mobility and the Occurrence of Coronary Heart Disease. *Health Hum. Behav.* 6: 178-189, 1965.
24. Syme, S. L., Borhani, N. O., and Buechley, R. W. Cultural Mobility and Coronary Heart Disease in an Urban Area. *Am. J. Epidemiol.* 82: 334-346, 1965.
25. Christian, J. J. The Potential Role of the Adrenal Cortex as Affected by Social Rank and Population Density on Experimental Epidemics. *Am. J. Epidemiol.* 87: 255-264, 1968.
26. Mason, J. W., Brady, J. V., Polish, E., et al. Concurrent Measurement of 17-Hydroxycorticosteroids and Pepsinogen Levels During Prolonged Emotional Stress in the Monkey. *Psychosom. Med.* 21: 432, 1959.
27. Kessler, A. Interplay Between Social Ecology and Physiology, Genetics, and Population Dynamics. Doctoral Dissertation, Rockefeller University.
28. Haenzel, W., Loveland, D. B., and Sirken, M. G. Lung-Cancer Mortality as Related to Residence and Smoking Histories. *J. Natl. Cancer Inst.* 28: 947-1001, 1962.
29. Conger, J. J., Sawrey, W., and Turrell, E. S. The Role of Social Experience in the Production of Gastric Ulcers in Hooded Rats Placed in a Conflict Situation. *J. Abnorm. Soc. Psychol.* 57: 214-220, 1958.
30. Bogdanoff, M. D., Back, K., Klein, R., Estes, E. H., and Nichols, C. The Physiologic Response to Conformity Pressure in Man. *Ann. Intern. Med.* 57: 389-397, 1962.
31. Brett, G. Z., and Benjamin, B. Housing and Tuberculosis in a Mass Radiography Survey. *Br. J. Prev. Soc. Med.* 11: 7, 1957.
32. Christenson, W. N., and Hinkle, L. E., Jr. Differences in Illness and Prognostic Signs in Two Groups of Young Men. *J. A. M. A.* 177: 247-253, 1961.

Behavioral Factors Associated with the Etiology of Physical Disease: A Social Epidemiological Approach

S. LEONARD SYME, PhD

Introduction

Epidemiology may be defined as the study of the distribution of disease in the population and of the factors which affect this distribution. Social epidemiology may be defined as the study of social factors as they affect

distributions of disease. More precisely, the concern of social epidemiology is to investigate the ways in which a person's position in the social structure influences the likelihood that he will develop disease.

This is a very general definition and encompasses a wide range of research activity. Thus, social epidemiologists have focused attention on a variety of diseases such as heart disease, arthritis, cancer, ulcers, hypertension, and so on. Further, the social epidemiologist has studied these diseases from various theoretical viewpoints ranging from descrip-

Dr. Syme is Professor of Epidemiology, School of Public Health, University of California, Berkeley, California 94720.

tive (relying on variables such as age, race, sex, and education) to analytical approaches (utilizing such concepts as marginality, incongruity, and relative deprivation). To speak of social epidemiology, then, is to refer only very generally to a very broad area of research. In consequence, the development of a discussion relating the social epidemiological approach to the etiology of physical illness requires that an appropriately broad and general view be formulated—a view broad enough to transcend the particular problems involved in the social epidemiological study of specific diseases using specific theoretical frameworks.

This is an interesting and challenging proposition. It can be argued, for example, that there does not exist a social epidemiological approach as such, but there are, instead, social epidemiological approaches which are either primarily sociological or primarily epidemiological. This is an admittedly crude formulation, but it may serve our purpose to contrast these two different perspectives.

In the approach emphasizing a sociological perspective, the social epidemiologist begins with an interest in a social concept. For example, he may study the relation between mobility and coronary heart disease. If an interesting association is found, he may wish to extend his understanding of the concept of mobility by broadening his research to include the investigation of other diseases. In studies of this kind, interest is focused on the development of sociological understanding, and the particular diseases being studied are merely useful and convenient means of enhancing such understanding. Clearly, this is a worthwhile and important endeavor; clearly also, the results are more useful in the development and enrichment of social theory than they are in clarifying understanding of the etiology of specific diseases.

In the approach which we may refer to as primarily epidemiological, the social epidemiologist is fundamentally concerned with the study of a particular disease. In such a study, the investigator will utilize whatever social variables are available to assist him in disentangling etiological associations. The primary emphasis here is on the etiology of disease; social variables are utilized in the hope that they will contribute to understanding of such etiological relationships.

Put broadly, where the epidemiologist seeks to learn about the nature of human diseases from the study of social characteristics, the sociologist seeks to learn about the social characteristics of human populations from the study of the occurrence of disease. Traditionally, the epidemiologists think in terms of a specific disease or disabling condition in whose etiology he is interested and seeks to determine all the relevant "causes" of it. The sociologist would be more likely to reverse this view and seek all of the relevant disease consequences of a social condition.

These considerations suggest that the social epidemiological approach is not a distinctive approach at all but, rather, a vague term used in reference to two general types of research approach: (1) sociological studies in which various diseases are studied and (2) epidemiological studies of disease in which a variety of social variables are studied. While each of these approaches is of undoubted value, it is

of interest to inquire whether a social epidemiological research approach, as such, is possible and worth consideration. Certainly there are a variety of provocative findings in the literature which suggest that an elaboration of this third approach would indeed be useful.

Cigarette Smoking

The problems posed by the cigarette smoking issue, for example, are well known but continue to evade adequate explanation. Thus, we know that cigarette smokers have higher mortality rates for lung cancer and for cancer of the lip and throat as well as for coronary heart disease. We also know that cigarette smokers have higher mortality rates than nonsmokers for a wide variety of diseases, including all forms of cardiovascular disease, malignancies of all sites in the body, cirrhosis, ulcers, accidents, murder, and suicide.¹ The generality of this effect of cigarette smoking has prompted some to suggest that we should study the type of person who smokes cigarettes.²⁻⁴ What started as the observation of an association between a specific risk factor—cigarette smoking—and a specific disease—lung cancer—moved to the study of a more general set of diseases. Consideration of this more general disease impact led to the suggestion that understanding of the risk factor be broadened from smoking per se to the type of person who smokes. Nor is this the end of the matter. It has more recently been argued that it makes little sense to focus too much attention on this selection hypothesis. Those who argue against the selection hypothesis do so on two grounds. First, they point out that disease risk increases as the number of cigarettes smoked per day increases. If smoking per se is irrelevant, why would one observe this dose-response effect with smoking? Second, if the selection hypothesis is valid—if the risk associated with smoking inheres more in the type of person who smokes rather than in the smoking per se—why, they ask, does risk of disease markedly decline among those who quit smoking?⁵ The response to this question has been that those who quit were not really smokers in the first place, which, incidentally, is the reason they were able to quit at all. And the debate continues. For our purposes, however, note the expansion of the argument from smoking and lung cancer to a far more general view of personality, life-styles, and the disease process.

Marital Status

Lest it be thought that an overly specific case is being developed with reference to cigarette smoking, it may be useful to consider briefly another factor such as marital status. It is well known, for example, that people who are married have lower death rates than those who are single, widowed, or divorced for a variety of causes of death. They have lower death rates for suicide, ulcers, motor vehicle accidents, other accidents, and coronary heart disease.⁶ At

least two interpretations have been offered to account for this observation. One is that the marital state somehow provides a beneficial and healthy environment conducive to health; another possible explanation is that marriage selects people who are healthier in the first place. In consideration of these questions, however, it may be instructive to recall the very wide range of conditions for which married people have lower mortality rates. The list of such conditions includes lower death rates for respiratory tuberculosis, stroke, influenza, pneumonia, and cancer of almost all sites including cancer of the buccal cavity and pharynx, the digestive organs, the respiratory system, the breast, and the urinary system. While the possibility cannot be ruled out, it is difficult to see how people who die of a stroke when they are 70 or 80 years old were less likely to have gotten married 50 years earlier. Further, if the marital state provides an environment which reduces the risk of death from this long list of conditions, it must be that a very profound and important influence is at work which is certainly worthy of prompt and careful study. By such detailed study of marital status and its varied disease consequences, we may be able to develop a whole set of insights about social processes and health status which would not be possible by restricted attention to the relationship of marital status and one or another specific disease.

Urban Living

We all know that suicide rates tend to be higher in urban places than in rural places.⁷ Death rates from influenza and pneumonia are also higher in urban areas. It is probable, in fact, that most of us have already developed some notions about why this makes sense but I want to resist the temptation to systematically articulate a hypothesis on this until I am able to examine death rates for a wide variety of conditions in varying urban settings. It is all too easy to develop a hypothesis to account for the finding that middle-aged male residents of the major metropolitan areas in this country have the world's highest death rates for coronary heart disease compared to residents of rural areas.⁸ I doubt that any of us are surprised to learn that New York City has an extremely high coronary death rate. It is interesting to note, however, that middle-aged male residents of Tokyo have one of the world's lowest mortality rates from coronary heart disease.⁹ Surely, this more general view of urban areas permits a keener insight into the role of urban living as an etiological factor in specific disease conditions. But I would go further. After expanding my view of the urban process, I would insist that a wide range of disease consequences be examined in addition to

conditions such as coronary disease, suicide, influenza, and the like. Hopefully, this expanded view would lead to study of a series of fundamental questions: Are cities unhealthy places? What is included in the concept of "healthy"? What is a city? Does our definition of a city account for disease differences observed between New York City and Tokyo?

The argument, then, is fairly straightforward. Social epidemiological research generally emphasizes either specific sociological concepts or specific disease conditions. While much is to be learned from these research approaches, neither really takes advantage of the unique perspective afforded by a truly social epidemiological approach. Thus, the sociological approach tends to emphasize studies of specific social variables in which outcome variables are viewed as sets of disease clusters rather than in terms of a single disease; the epidemiological approach tends to emphasize the study of specific disease conditions where social variables are viewed only quite generally. Much may be gained from a social epidemiological approach in which a broad range of relevant social conditions and disease processes may be studied together and our understanding of both thereby increased.

References

1. Surgeon General's Advisory Committee. Smoking and Health. U.S. Department of Health, Education, and Welfare, 1964.
2. Berkson, J. Smoking and Lung Cancer: Some Observations on Two Recent Reports. *J. Am. Stat. Assoc.* 53:28-38, 1958.
3. Seltzer, C. C. Morphologic Constitution and Smoking. *J. A. M. A.* 183:639-645, 1963.
4. Lilienfeld, A. M. A Study of Emotional and Other Selected Characteristics of Cigarette Smokers and Nonsmokers as Related to Epidemiological Studies of Lung Cancer and Other Diseases. *J. Natl. Cancer Inst.* 22:259-282, 1959.
5. Yerushalmy, J. Statistical Considerations and Evaluation of Epidemiological Evidence. In *Tobacco and Health*, edited by James, G., and Rosenthal, T. Charles C Thomas, Springfield, Illinois, 1962.
6. National Center for Health Statistics. Mortality from Selected Causes by Marital Status. *Vital and Health Statistics, Series 20, No. 8A and B*, U.S. Department of Health, Education, and Welfare, 1970.
7. Enterline, P. E., and Stewart, W. H. Geographic Patterns in Deaths from Coronary Heart Disease. *Public Health Rep.* 71:849-855, 1956.
8. Enterline, P. E., Rikli, A. E., Sauer, R. I., and Hyman, M. Death Rates for Coronary Heart Disease in Metropolitan and Other Areas. *Public Health Rep.* 75:759-766, 1960.
9. Gordon, T. Mortality Experience among the Japanese in the United States, Hawaii, and Japan. *Public Health Rep.* 72:543-553, 1957.