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# Translating Social Science Concepts into Medical Education: A Model and a Curriculum

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## ABSTRACT

*Most serious efforts aimed at linking social and behavioral sciences knowledge to medical practice have included "models" which integrate social and behavioral science concepts. We argue that such an integration is intellectually problematic due to an important analytic distinction between "social" sciences and "psychological" sciences. If the social explanation of illness is to become useful in medical education, a distinctly social model is necessary for conceptual clarity and for guidance of which is useful for explicating the link between social science knowledge and medical practice and for organizing the knowledge for teaching in medical schools.*

## Introduction

Most attempts to integrate the diverse knowledge generated by the social and behavioral sciences into medical education in the United States have been only marginally successful. Despite the fact that nearly all 120 U.S. medical

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schools have acknowledged the value of including these topics in the medical school curriculum and have hired faculty from these disciplines, there is still considerable dissatisfaction with the variety of ways that the social and behavioral sciences are organized and taught [1]. As Hartings and Counte describe the teaching of social/behavioral science in medicine:

Though experimentation has spawned multiple forms of faculty organization for behavioral science, and a seemingly endless procession of courses and formats, basic problems of organization and content remain unsolved [2].

In response to this situation a significant body of literature has been generated in which authors suggest ways to revise the teaching of social and behavioral science in medical schools [e.g. 3–6]. Representative of these proposals is the work of Van Egeren and Fabrega, who state that the difficulty in translating “medical behavioral science” into effective teaching programs derives, in large part, from the fact that such efforts are not guided by a “precisely articulated model which links the *behavioral sciences* to clinical medicine” [7, emphasis added]. As they correctly describe it, “medical behavioral science” is rejected by medical students who already believe that the material is not relevant to medical practice, a belief reinforced by the lack of conceptual clarity, fragmented courses, the student’s chronic information overload, the perceived lack of “hard” facts, and the struggle to integrate this material with the biomedical sciences.

While we share the emphasis that these authors (and others) place on the lack of a model, the idea of a unifying model that *integrates* the interdisciplinary behavioral science concepts is not only premature but inappropriate as well. The idea is premature mainly because at this point there is little agreement about the exact nature of the teaching problem; it is appropriate because unifying models have tended to obscure, rather than illuminate, both the overlap and the important differences among the various disciplines encompassed by the term “social and/or behavioral sciences.”

Confronted with a lack of consensus about the most effective way to teach the social and behavioral sciences, medical school educators are faced with a multitude of alternatives and no means to evaluate uniformly the relative merits of the options. This confusing situation can be traced to several interrelated problems that are both intellectual and organizational in character. In this paper we identify an important dimension of intellectual diversity in the social and behavioral sciences and discuss the implications of the difference for the organization and teaching of these subjects in medical schools. We argue further that a resolution of the problems in the organization and teaching of the social and

behavioral sciences must begin with an appreciation of fundamental intellectual differences within the social and behavioral sciences. Finally, we propose a unifying "social model" of illness and present a curriculum derived from it in the hope that such a model will furnish a more coherent way of organizing and teaching *social science* knowledge in medical schools.

### **Intellectual Diversity in the Social and Behavioral Sciences**

An important source of intellectual diversity in the social and behavioral sciences is the distinction between social and psychological interpretations of human behavior. These two interpretations constitute alternative models for understanding individual behavior in general, and the personal and institutional context of health and illness in particular. The social explanation is concerned with the impact of social structure on individual behavior. In this view, most abstractly, social structure consists of the organization of a set of social positions, with "social position" referring to the role expectations faced by all individuals by virtue of their placement in this social structure. In contrast, the psychological explanation represents individual behavior as the outcome of psychic processes occurring within the individual. (Clearly, this is a matter of emphasis—the psychological explanation does not completely deny the importance of external social factors.)

Lack of recognition of this difference leads to conceptual confusion which is manifested in several ways. First, conceptual confusion is reflected by the practice of assuming that frequently-used terms, such as "social and behavioral science" or "behavioral science" have common definitions and shared meanings. *Misunderstandings and miscommunication occur when authors unknowingly assign different meanings to these and other frequently-used terms, or use different terms, such as "human behavior" or "social behavior," to refer (perhaps) to the same phenomena. A thorough linguistic analysis of terms used in the medical behavioral science literature would be valuable.*

This conceptual confusion typically leads to debate in the literature over the best definition of these terms. Authors seem unaware that it is impossible to define these terms in any absolute way because such definitions are dependent on each author's explanatory framework. Some of the terminological disputes result from the failure to distinguish, at a minimum, the definitions which derive their meaning from social explanatory models and those which derive their meaning from psychological models. Once such distinctions are recognized the definitional debates will become more fruitful.

A second manifestation of the conceptual confusion is the indiscriminate grouping of concepts from diverse disciplines, such as psychology, sociology, anthropology, economics, and the humanities into an "integrated" curriculum.

Faculty from these generally independent intellectual disciplines often are organized into a single department, as well. It is mainly in medical and other professional schools where such mergers, which blur the distinctions between autonomous disciplines, even are attempted. One simply cannot group faculty from diverse disciplines in a single course and assume that an "integrated" curriculum content results. One may achieve a "coordinated" course, but not a course derived from a coherent model that gives concepts appropriate interpretations. When well-intentioned interdisciplinary teams attempt to force conceptually distinct knowledge into an integrated framework, the result is more confusion. Such a task is logically impossible. Furthermore, developments in the history and philosophy of science [cf. 8,9] suggest that conceptual clarity is a necessary condition for the growth of knowledge in both the applied and basic sciences.

### Distinguishing among the Behavioral Sciences

The conceptual confusion we refer to above implies the need when referring to "behavioral science" to make a distinction between "social science" and "psychological science." The dominant mode of thinking about how to combine the relevant knowledge from the behavioral sciences is again represented by Van Egeren and Fabrega, who define "medical behavioral science" as a "highly specialized interdisciplinary field embracing subspecialties within psychology, sociology and anthropology" [7]. The conceptual model they offer to unravel the confusion defines the "interplay of *sociopsychological* factors and disease factors in an integrated *biobehavioral* process occurring in time in distinct, delimited states" [7, emphasis added]. This model, and the implicit assumption imbedded in the underlined terms, simply confound the issue [see also 3, 4, 10].

The central problem with such a conceptual model is that it does not make a distinction between the biological and psychological levels of explanation, on the one hand, and the social level of explanation, on the other. To repeat, the social explanation of behavior analyzes an individual process, illness, as a result of external structural influences.\* The biological and psychological levels of explanation analyze an individual process, illness or disease, as a result of biological and psychological influences within the individual.

Biological and psychological explanations are compatible with the medical model of disease, which explains disease as an abnormality in the individual's biological or psychological processes. Both levels focus on individual health and

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\*We prefer the term "illness" when describing the social explanation of behavior because "disease" connotes an organic etiology.

pathology, for the most part independent of the social structure. In teaching this perspective, the material is presented in a straightforward way such that direct causal linkages of biological and psychological factors to disease are demonstrated to exist *within* the individual patient.

The relationship of the social structure to illness is less explicit than is the relationship of biological and psychological factors. The link between biological and psychological factors and disease is clear and generally is acknowledged. The link between *social* factors and illness is less clear and requires more explanation and justification; this is indicated by the familiar criticism that social science knowledge is not relevant to medical practice [11]. As Harper states:

The contribution of social science to medical education needs to be defined and presented in the very frame of reference in which it is to be used by the future practitioner[3].

The conglomerate courses subsumed under the title "social and behavioral science" traditionally have focused on the psychological content and level of explanation, covering the development of personality and life stages, or "human behavior" [cf 12]. The courses often are taught by psychiatrists or other medical doctors, whose training leads them to interpret social science concepts as part of a psychological or biological framework. The dominance of the psychological perspective is reflected further in the National Board examination questions on the behavioral sciences.

To clarify the differences between the social and psychological explanations and the implications for teaching these subjects in medical schools, consider the application of the explanations to two major topics in social and behavioral science courses. One major topic focuses on the acknowledged link between stress and coronary disease. An example of the mainly *psychological interpretation* of this link is the Jenkins description of the "coronary-prone personality" which utilizes the research on Type A-B behavior patterns [13]. An example of the social interpretation is to link stress to coronary disease through social positions, such as occupation or status incongruity [14].

Another major topic is the doctor-patient relationship, which most practitioners and researchers acknowledge has an impact on the efficacy of medical intervention. A psychological interpretation of this relationship focuses on the personality characteristics of the doctor and patient. One article on the psychology of illness explains the patient's reactions to the doctor as instances of negative or positive "transference," the patient's reaction to illness as "regression," and the doctor's reaction to the patient as "countertransference" [15]. A social interpretation of this same phenomenon might center on the relative social positions occupied by the doctor-patient relationship as an example of authority

relations produces a discussion of the interaction on the basis of the distribution of power [cf. 16,17].

These illustrations emphasize that the two explanatory frameworks which we have designated as social and psychological can provide rather different interpretations for the same observed phenomena, and that these differences have real implications for medical practice. In order for the social explanation of behavior to develop a coherent model which can be used effectively for clinical training, we must separate, at least conceptually, the social from the psychological sciences. The term "behavioral science" merely blurs, for purposes of this argument, a necessary distinction.\*\* In the remainder of this paper, we delineate a conceptual model linking social structure with illness. We then describe its utility for organizing and teaching social science in one medical school program.

### A Model for Organizing Social Science Knowledge

The model presented in Fig. 1 organizes knowledge generated by the social sciences that is relevant to the practice of medicine. The model provides a way of understanding how elements of the social context influence the illness process. In previous models, social positions are not included explicitly or are not linked to the patient (see, e.g. Hughes and Kane's "health-sickness" continuum model [18]; Fabrega's decision-theoretic model of illness behavior [19]; McKinlay's "patient career" model [4]; Donabedian's model of the medical care process and its environment [20]). Relevance is achieved by organizing the model presented here around the *illness process*, which is the center of the physician's activity. The *social context* of illness includes consideration of all non-organic factors which influence illness.

The social explanation of behavior places illness in a wider social context. Knowledge of the patient's social context aids the physician in developing empathy, making the appropriate diagnosis, prescribing a realistic treatment regimen and predicting the outcome of the illness episode.

In the social model, the illness process is defined by 4 overlapping stages. Each stage of the illness process is influenced by structural factors, such as social institutions, cultural values, and technology, and more directly by social positions of both the patient and clinician. The following are examples of social positions of patients and clinicians: age, sex, race/ethnicity, occupation, education, income/social class, religion, marital/family situation, and geographic location.

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\*\*This distinction does not deny the obvious fact that a combination of social, psychological and biological factors determines the onset of and response to illness.

The first phase in the illness process is conceptualized as the “Onset” stage. In the social model with the onset of illness it is not always possible to identify a single, organic cause or a disease syndrome as it is in the medical model. After the onset of the illness, individuals react differently due to various social factors, making “Response” the second stage in the illness process. The organic onset of disease may not be perceived as illness, symptoms may be denied or

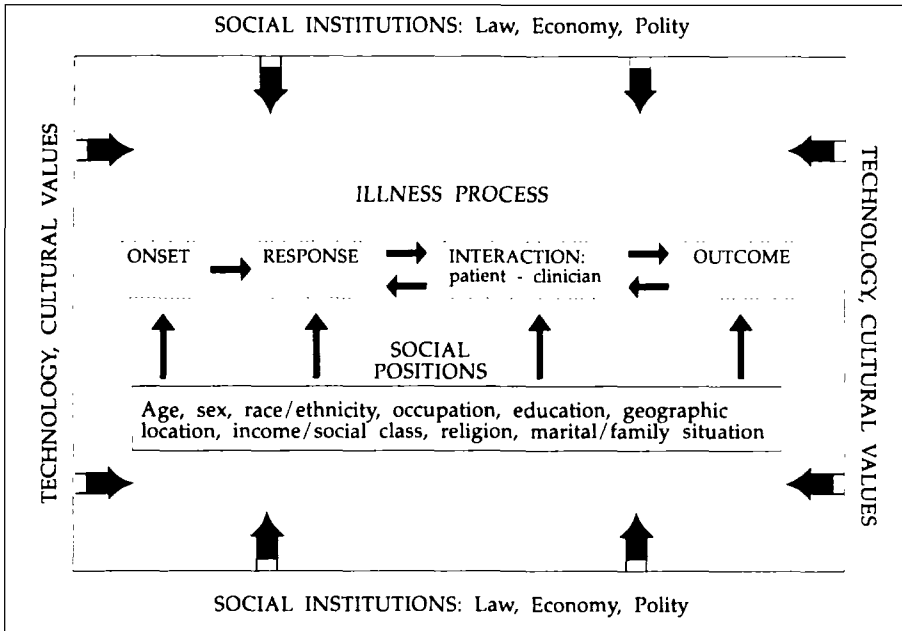


Fig. 1 A social model of the illness process

ignored, or a sick role may or may not be adopted, depending on the social context. An individual’s socially conditioned response may or may not lead to interaction with some type of clinician. Because we particularly are concerned with those circumstances when this does occur, the third stage in the illness process is the “Interaction” between patients and clinicians. At this stage, social positions shape the attitudes, behavior and role performance of the clinician and affect the interaction with the patient. The interaction eventually leads to some kind of “Outcome,” which defines the final stage in an illness sequence or leads to onset of another sequence.



As indicated above, illness proceeds within and is influenced by legal, political and economic institutions, technology, and cultural values. These general, abstract forces influence the development and distribution of societal resources for coping with illness and disease. For example, cultural values incorporated into sex role socialization can be used to help explain the differential morbidity and mortality rates of males and females [21, 22]. National and state laws, such as those governing Medicare and Medicaid, affect utilization behavior of patients and treatment patterns of providers.

The above process description oversimplifies a complex process, of course, but the social model of illness gives an analytic framework for understanding the influence of and interrelations among various social factors and the process of illness.

### **Implications of the Social Model for Social and Behavioral Science Education**

Adoption of the social model has definite implications for the organization and teaching of behavioral and social science in medical schools. It follows from our argument that material treating illness as an individual biological or psychological process should be presented in courses separate from those covering the social context of illness, and psychologists, psychiatrists and other physicians in most cases would not be appropriate for teaching the social sciences. Traditionally, this has not been the case. The most common home for courses in behavioral science currently is Departments of Psychiatry [2], and as a result behavioral science often is presented as a subfield of psychiatry. A perusal of behavioral science teaching content reported in the literature shows the predominance of knowledge from psychology [e.g. 23–26].

At the University of North Carolina at Chapel Hill (UNC-CH) first year medical students are being presented much of the wide range of knowledge illustrated in the social model. The 160 students are taught a year long course by 8 teams of clinicians and social scientists in small groups of 20. Social scientists present research results and clinicians provide case illustrations from their practices of the same principles. The social scientist/clinician teams teach from a uniform curriculum and together attempt to achieve the integration and relevance necessary for the effective teaching of the social model. In this way medical students still have physician role models to identify with and social scientists to provide complementary perspectives on illness. Medical students strongly approve of the team teaching, with 97% of them recommending it over solo teaching by a physician or social scientist in an evaluation of the fall semester, 1979.

**Table 1**  
**Organization of Social Science Knowledge for Medical School Course**

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Introduction: A Social Model of the Illness Process

A. The Illness Process

1. Onset
2. Response
3. Patient-clinician interaction
4. Outcome

B. Social Positions and the Illness Process: age, sex, race/ethnicity, occupation, education, income/social class, religion, marital/family situation, geographic location

C. Structural Influences and the Illness Process: law, economy, polity, technology, cultural values

Section I: The Onset of Illness and Responses to Illness

A. Gender, Sex Role and Illness

1. Patterns of illness
2. Preventive measures and the role of the clinician

B. Occupation and the Risk of Illness

1. Coronary heart disease
2. Cancer, brown lung, black lung
3. Preventive measures and the role of the clinician

C. Social Class/Income and Illness

1. Patterns of illness by social class/income levels
2. Preventive measures and the role of the clinician

D. Ethnicity and Perceptions of Pain

E. Religion and Attitudes Toward Health and Illness

F. *Aging and Attitudes Toward Health and Illness*

G. Cultural Conceptions of the Sick Role

H. Legal and Political Influences on the Labelling of Illness

I. *Legal, Political and Economic Influences on the Demand for Health Services*

Section II: The Training of Clinicians

A. Types of Clinicians: Roles and Relationships

1. Physicians, osteopaths, dentists, optometrists, podiatrists, chiropractors, nurses, pharmacists
2. Allied health workers
3. Alternative healers

B. Age, Sex, Race and Social Class of Clinicians

1. Description
2. *Implications for patient care*

- C. Education and Socialization of Clinicians
  - 1. Attitudes toward patients
  - 2. Uncertainty in medical judgment

### Section III: The Patient-Clinician Interaction and Its Outcomes

- A. Models of the Patient-Clinician Interaction
  - B. Ethical Dilemmas in the Patient-Clinician Interaction
    - 1. Confidentiality and truth-telling
    - 2. Informed consent and medical intervention
  - C. Racism and Sexism in Diagnosis and Treatment
  - D. Social Factors and Compliance
  - E. Outcomes of the Patient-Clinician Interaction
    - 1. Coping with chronic illness
    - 2. Death and dying
      - a. Cultural values
      - b. Organization of death
  - F. Cost of Health Services
  - G. Distribution of Scarce Resources for Health Services
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Teaching of the medical social science course ideally would begin with a discussion of the organizing model, as shown in Table 1. Table 1 also gives a suggested outline for material to be taught to first year medical students. This outline was used to plan the UNC-CH first year course, "Social and Cultural Issues in Medical Practice". As shown in Table 1, the course proceeds from a discussion of the social model to material on the influence of social factors such as occupation, social class and religion on the onset and response to illness. Then the training of healers in our culture and other cultures is explored (Section II). In the last major section of the course, the influence of social factors on the patient-clinician interaction is discussed. Ethical problems are subsumed under this topic, along with problems in death and dying and the cost and distribution of health care resources.

The social model of the illness process has proven to be a useful means of organizing the case material presented to students by clinical faculty. For example, research has suggested a relationship between cultural values emphasizing occupational achievement and individual competition in the United States and a high coronary heart disease rate. This general social influence affects the illness process at the individual level through social positions such as occupation, and through psychological concepts, such as personality [13,14]. The clinician provides examples of patients whose social positions have influenced the onset of, response to, and outcome of coronary heart illness and describes in detail

the natural history of the interaction with the coronary illness patient.\*\*\* Also, throughout the course physicians relate case examples from clinical practice illustrating such topics as religion and illness behavior, uncertainty in medical judgment, patient "compliance," and the cost of health services. In this way the medical student comes to understand both the general concept and its specific application.

Results of a student evaluation of the UNC-CH course are reported elsewhere [11]; that evaluation and subsequent ones have shown a high degree of student receptivity to the course. One drawback to teaching the course to first-year students is the lack of clinical involvement that students could use for immediate application or validation of knowledge.

### Summary

We have argued that an important analytic distinction must be made between the social sciences and the psychological and biological sciences in order for social science knowledge to be presented and perceived as relevant to medical practice. If the social explanation of illness is to become useful in medical education, an alternative social model is necessary for conceptual clarity and for guidance of course material selection and teaching format. We have outlined a preliminary model which organizes social science material relevant to the clinical practice of medicine and has proven useful in organizing and teaching social science knowledge in one medical school. We contend that it is misleading to try to integrate distinctive explanations of illness process into a single model. It is hoped that this discussion will stimulate further interchange regarding the most effective means of utilizing social science knowledge in applied settings such as medical schools.

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\*\*\*A very interesting case study of the interaction between social and psychological influences and coronary heart disease can be found in the book *A Coronary Event* written by Michael Halberstam (a physician) and Stephen Leshner (the patient) [27]. This case-example, which is used in the course, demonstrates in a concrete way how social positions such as age, sex role, marital situation and occupation shape the attitudes and behavior of patient and physician during the illness process.

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# Teaching Social Epidemiology: An Applied Assignment for Undergraduate Instruction

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## Introduction

The area of health sociology has expanded to include the topic of social epidemiology. Social epidemiology is the study of the distribution of disease, impairment, and general health status across various social groups within the same population (Ibrahim, 1983). Its focus is on documenting and explaining the origins and distribution of health problems in a society or subgroup of a society within a larger socio-ecological context.

Although sociologists and demographers have contributed to social epidemiology through both research and teaching, the recent upsurge of interest was stimulated by Fuch's (1974) *Who Shall Live?* and Clark's (1977) *Mortality American Style: A Tale of Two States*. Both presented compelling data and arguments linking life style to health status and utilization of health care. In addition 1975 marked the onset of a new age of epidemics—swine flu (which never materialized), Legionnaires' Disease, and AIDS—all of which focused on socio-ecological factors and life style.

In response, textbooks in medical sociology and sociology of health began to emphasize social epidemiology. Cockerham (1978) was one of the first to

devote an entire early chapter in his text to social epidemiology, focusing on Legionnaires' Disease. He was followed by Wolinsky (1980) who presented Clark's study, and Kurtz and Chalfant (1984) who brought in demography and ecology in the development of a critical review of social models of epidemiology. These books formed the backbone of sociological and health care courses during the past decade. Social epidemiology is now an important component of such courses.

About the same time, Lilienfeld (1979) argued that the study of epidemiology should be expanded beyond the province of graduate study in public health, and Bunker et al. (1986) outlined the implications for expanding social epidemiology and health promotion into undergraduate and professional programs in health administration and education for nursing and allied health students. Arand and Harding (1987) saw the study of epidemiology by health care students as fostering the ability to attack unknown information as problems to be solved and Fraser (1987) went so far as to argue that epidemiology ought to be included in liberal arts curricula because it helps free students from the limitations of prior beliefs and experiences and teaches important modes of thinking to prepare them to ask and answer new questions.

Teaching social epidemiology at the undergraduate level and as part of a health care or sociology course poses special challenges. Undergraduate students often view studies of disease as pathological descriptions, clinical case reports, or treatments for sick individuals. This view differs from the traditional epidemiologic orientation of disease which includes comparisons of sick and well persons, emphasizes prevention and early detection in the community through screening, and stresses that disease seen by the practitioner is only the "tip of the iceberg."

To help "free students from the limitations of prior beliefs and experiences," we have designed an assignment to facilitate students' understanding of the impact of disease on communities and the importance of risk factors (diet, exercise, work environment, habits) and social/demographic characteristics (age, sex, race, location) to explain disease distribution. The purpose of this paper is to describe the assignment, give examples of its use as a teaching tool, and discuss students' reactions to the assignment.

The assignment is designed to have students use epidemiologic concepts and understand the social epidemiologic perspective as an investigative tool. We attempt to promote learning by making social epidemiology more relevant and meaningful with an applied assignment (Arand and Harding, 1987). It is hoped that those who teach social epidemiology to undergraduates may be able to adopt some aspects of this assignment to help promote both interest in and an understanding of social epidemiology.

This assignment is used in two dissimilar programs. It was first introduced in 1980 at the University of Michigan-Flint's Health Care program in "Introduction to Epidemiology." This program has a non-traditional student population; most of the students are employed as nurses or allied health professionals such as respiratory therapists, x-ray technologists, dental hygienists, medical record technicians, and physical therapy, veterinary and medical assistants. It was introduced into the Health, Management and Policy (HMP) program at the University of New Hampshire in 1987. This program enrolls primarily residential undergraduate students. The assignment has been used more than one dozen times between these two universities. Both programs continue to use this assignment.

### **Description of the Assignment**

Students are required to select a disease and write a research paper containing the following five sections: (1) natural history of the disease; (2) review of epidemiologic literature; (3) identification of unanswered questions about risk factors for the disease; (4) outline of a research proposal; and (5) summary of an interview with a "disease expert."

Class time is set aside for discussion of the research assignment to help students avoid common errors such as studying risk factors or syndromes rather than diseases. Students hand in sections 1 and 2 by midterm. This requires them to select a disease early and to read selected literature during the same weeks social epidemiologic concepts are covered in class lectures. Students can submit a revised draft of these sections at the end of the term.

The assignment deadlines reflect the topical sequence of lectures throughout the semester and give students their own disease context for lecture material. Throughout the first half of the semester, while students are gathering and organizing reference material on specific diseases, the lectures focus on definitions of epidemiology, the use of rates to measure morbidity (illness) and mortality (death), and the application of these to an understanding of how diseases are distributed in communities. These lectures provide the foundation for students to understand the concepts discussed in selected journal articles. Examples of some disease topics are listed in Table 1.

Computerized literature searches are suggested to identify several journal articles which report specific research studies. Students are asked to extract key elements from each study reviewed such as population studied, data sources, methods, and conclusions (see Appendix) and to compare and contrast studies on these items. Students are told that they are not expected to fully comprehend all aspects of these studies, but are expected to understand and report on these key elements.



**Table 1**  
Examples of Student's Topics for Assignment.

Infectious Diseases	Mental Disorders	Chronic Diseases
AIDS	Alzheimers	Amnesia
Botulism	Depression	Asthma
Cholera	Schizophrenia	Cancer
Dengue fever	Anorexia nervosa	colon
Emphysema		colo-rectal
Hepatitis B		lung
Histoplasmosis		cervical
Gingivitis		mouth
Kawasaki		prostate
Legionnaires'		Cystic fibrosis
Leprosy		Hodgkin's
Meningitis		Juvenile rheumatoid
Mononucleosis		arthritis
Reyes syndrome		Diabetes
Rheumatic fever		Lupus
Rubella		Chronic bronchitis
Smallpox		Multiple sclerosis
Trichomonas vaginalis		Scoliosis
Typhoid		Osteoarthritis
Toxic-shock		Ulcerative colitis
		Sickle cell anemia
		SIDS
		Hyaline membrane
		disease
		Periodontal disease

During class discussion of types and uses of rates, students are asked about the rates reported in their selected journal articles. During a class lecture focusing on "person" characteristics of disease, a student studying Dengue Fever asked whether "age distribution" was relevant as this disease primarily affects children. The student had assumed a disease must affect many different age groups for there to be a "distribution." This question prompted a discussion of the concept of distribution as a variable with no inherent range. During a lecture on AIDS, one student realized that her selection of articles on various AIDS educational programs was outside the scope of a social epidemiologic study.

The importance of disease classification was made clearer during a discussion on a student's work with COPD (Chronic Obstructive Pulmonary Disease). Because this student focused on a syndrome rather than a specific disease, she was finding inconsistent information on disease distribution. After narrowing the focus to a specific disease category of asthma, it became clearer that syndromes consist of symptoms which do not necessarily behave like a disease. Other students pointed out that they found different constants with different disease incidences. Incidence is the number of new cases of a specific health disorder arising within a given population during a stated time period. They noticed that infant mortality was reported as "per 1,000" while breast cancer was reported as "per 100,000." The students' concrete examples helped to convey the reason for selecting different constants; i.e., to achieve a rate that is a whole number.

Students learned that mortality or death rates do not apply to all diseases such as periodontal disease; one class was introduced to the concept of "tooth mortality." Another student studying lung cancer was interested in studies of occupational exposure, rather than cigarette smoking, but found that studies of lung cancer almost always include cigarette smoking as a risk factor. Apart from smoking's important causal role, this demonstrated that lung cancer, like most chronic diseases, is caused by multiple factors.

As mentioned, the first two sections of the paper (natural history and literature review) are due midterm. This deadline is intended to involve the student as early as possible in researching and writing the paper. However, because the specific concepts, the literature sources, and the organization of this paper are new to almost all students, the sections handed in at midterm are often incomplete, or not well organized, with some of the reviewed literature inappropriate for the assignment.

We provide extensive comments on these papers at midterm and offer detailed suggestions as to how the student can improve these sections. Many students follow these suggestions and re-write these sections as the concepts become more familiar as they are repeated through lectures, class discussions and reading assignments. The revised sections usually are much improved and reflect a better understanding of the subject material covered.

By the second half of the semester students complete the literature review and turn in three questions about the nature of the relationship of their disease to a given risk factor. With instructor assistance students restate these questions into researchable form, learning the importance of clearly posed questions. One student posed the following question: "What will be the incidence of AIDS in the year 2000?" This example was used to demonstrate the necessity of asking questions in the context of time, place, and person. The new question was more precise and specific: "Based on the number of reported cases of AIDS

in New York City in 1986 among *male IV drug users*, what is the expected number of cases in 2000 in *New York City* among this high risk group?" This process helps to teach students the importance of social demographic variables in understanding disease distribution.

Students learn which research designs fit different types of research questions through class discussions. Instructors ask "What type of research design would allow us to answer this question?" Specific research questions are selected to demonstrate the appropriateness of different research designs.

Epidemiological research designs and methods focus on the manner in which the data are collected and how they are to be analyzed. Retrospective studies collect data from subjects or records about characteristics and events that happened in the past. Subjects who already have the condition of interest are compared with a control group which does not have the condition. Prospective studies are longitudinal. A population is sampled and observations made over a number of years to measure their exposure and resulting morbidity or mortality.

Retrospective studies depend heavily on subject memory, and the researchers may know which subjects do or do not have the condition. Retrospective studies, however, are relatively inexpensive to conduct, can be done in a short period of time, and are useful in finding out about new or rare diseases. Prospective studies permit direct measurement of subjects and decrease reporting bias. But they are costly and require a long term commitment by both researchers and subject.

As Kurtz and Chalfant point out (1984:37), the sociological approach assumes that risk factors and socio-demographic characteristics are independent variables which explain, contribute to, or cause the health condition of interest, the dependent variable. Directionality is clear from socio-ecological factors to disease and illness. But students may become confused because some epidemiologists have a tendency, in retrospective studies, to determine if characteristics were present in the past and therefore extrapolate percentage or perform regressions against the line of cause (Zeisl, 1957).

In their classic study linking smoking to lung cancer, Doll and Hill (1952) collected data retrospectively by matching male lung cancer patients with control patients having other diseases. They then projected percentages in the wrong direction (percent of lung cancer patients who smoked "n" cigarettes daily and percent of non lung cancer patients who similarly smoked). On examining the data (Table 8-7 in Lilienfeld, 1976:177), students were unable to find the expected dose-response effect: the more cigarettes smoked, the greater the proportion in hospital for lung cancer. In fact, the tobacco industry was able to criticize the findings by arguing that the data did not link smoking to lung cancer. But a simple recalculation of the data in the line of cause (percent of "n" cigarettes a

day smokers who were hospitalized for lung cancer or for other diseases) clearly reveals a dose-response effect.

Students need to identify an appropriate reference population including cases and controls, and then develop some dummy tables to indicate how they would perform the analysis. When this is done, the students are required to interview a "disease expert." This expert may be a researcher or clinician at the University, an epidemiologist at a city or county health department, a medical records administrator at a local hospital or a staff member from a voluntary health organization like heart, lung, cancer, cerebral palsy, March of Dimes or multiple sclerosis. Students should ascertain the expert's views on the literature, assessment of the risk factors and socio-demographic characteristics linked to the disease, feasibility of conducting the proposed research in terms of accessibility to subjects, ability to obtain measurements, and expected costs and outcomes.

Students' papers are graded on the following criteria: (1) appropriateness of literature reviewed; (2) demonstration of understanding of basic concepts discussed; (3) clarity of research question; (4) demonstration of an understanding of the steps in a research proposal; (5) the appropriateness of the specific research design for the stated question; and (6) the extent to which the interview reflects the content of sections I-IV of the paper.

### **Student Evaluations of Assignment**

Students completed a self-assessment evaluation of how the assignment affected their knowledge in several different areas. Over three-fifths of the students reported that the assignment greatly increased their knowledge of the differences between types of analytical studies (retrospective, prospective and experimental); differences between epidemiologic studies and descriptions of the pathology of disease; concepts of incidence and prevalence; and the importance of time, place and person for the distribution of disease. In addition, students with little health science background reported learning more about the natural history of disease, disease transmission, risk factors for disease and the disease classification system.

In addition to the students' own assessment, a review of items addressed in the assignment and included on the mid-term and final exams indicated that students did consistently better on the exam items covered in the assignment. Students' comments on evaluations, such as "many of the concepts I learned about while researching my paper were included on the test . . . it helped me to do well on the test," also suggest the paper did contribute to exam success. We believe that correct responses to these exam items reflect learning that is qualitatively different, and not just a function of repetition of material.

Students provided comments which indicate some frustrations and difficulties

in completing the assignment. These include "difficulty in narrowing topic," "organizing literature review," "lack of available library resources," and "difficulty finding local person to interview." Some students stated they felt ill-prepared to develop and organize a research design and indicated they would like examples of a "good" research design available in the library.

Most of these concerns can be addressed through individual consultation with students and early planning to use an interlibrary loan system if local resources are inadequate. In addition, model assignments from previous students can be made available, along with additional reference material on research design.

Students' comments have led to continuous refinements in this assignment. Examples of these changes which reflect students' comments include: more detailed instructions for the literature search; suggesting specific journals; deadlines early in the semester to submit copies of articles which students are considering reviewing; establishing section deadlines, providing extensive written comments, and allowing students to re-do sections; using student-generated researchable questions as the basis of classroom instruction and translating those into appropriate research designs; and requiring students to hand in interview questions to provide for a more structured and focused interview with their "expert." Most of these refinements have been introduced to give students more guidance and feedback so they complete the assignment in a piecemeal fashion, which seems to reduce their anxiety and enhance learning.

### **Discussion and Applications**

We feel that this exercise is appropriate for undergraduate students to enhance the teaching of social epidemiology. An understanding of abstract concepts is promoted when these concepts are applied to a "concrete" disease of the student's choice. The assignment helps students to broaden their understanding of the impact of disease beyond the disease process. They learn that clinical case presentations represent only one perspective on the study of disease. They are exposed to new literature sources and gain experience with literature searches.

The classroom discussions of appropriate research designs demonstrate the problem-solving processes of inter-disciplinary teams such as those in public health settings. This can be used to promote group problem-solving within a class with diverse professional or educational backgrounds. This is particularly important for students interested in public health where the solution of problems requires input from many varied professions.

Some students who have completed this assignment have conducted in-service training sessions and presentations to community groups on their disease topic. Other students have indicated their ability to apply social epidemiologic

concepts to issues in the media such as AIDS and environmental hazards, and have indicated that the assignment helped them to improve their writing ability.

Recent trends in educational requirements for allied health personnel reveal a greater emphasis on general studies/liberal arts which may include a social epidemiology or sociology of health/medicine course. In such courses, the skills learned and reinforced through this assignment can contribute to broader educational goals.

Students with allied health backgrounds often enter four-year academic programs from community college or, if they are older returning students, from hospital-based programs. Both tend to emphasize scientific concepts and technical training over formal writing and research skills. In addition, many of these students are without the benefit of adequate preparation in formal writing in their previous educational settings. These students are not always well-prepared to write a formal research paper requiring extensive library work and organization of detailed material.

For sociology, social work, health education and health administration students, this assignment familiarizes them with the public health literature, medical terminology and epidemiological thinking. It also helps them to apply more abstract behavioral and social science concepts to health/medicine and sharpens their analytical and methodological skills.

In addition to the wide range of students who might be attempting this assignment, not all instructors are equally knowledgeable or comfortable with the social epidemiological approach and methods. We recommend Lilienfeld (1976) and Mausner and Kramer (1985) for a basic overview of epidemiology, and Cockerham (1989) and Wolinsky (1988) for their discussions of social epidemiology and social demography of health. Instructors at institutions without an extensive medical library may wish to make arrangements with their state or local public health department for access to journals and experts who may be willing to be interviewed by the students.

The assignment, then, does take some preparation on the part of the instructor and requires a considerable investment on the part of the student. But we have enjoyed teaching it and recurring comments on student evaluations are: "This assignment is very challenging, but worthwhile," and "I didn't think I could do this well."

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## APPENDIX

### Suggested Outline

#### I. Natural History of Disease

- A. When was the disease first diagnosed and included in the International Classification of Diseases (ICD)?
- B. How has the classification changed over time, if at all?
- C. Natural history of the disease
  1. What are the agent, host and environment factors?
  2. What is the natural course of the disease?
  3. What is the incubation period?
  4. How long is its duration?
  5. What is known about the primary, secondary and tertiary prevention of this disease?

#### IIa. Review of Literature (for each article reviewed)

- A. What is the stated purpose of the study?
- B. What study population is used?
  1. How is study population described: age, sex, race, ethnic background, clinical characteristics, etc?
  2. Over what time period is population observed?
  3. Where does study take place?
- C. What risk factors are examined in this study?
- D. What ratios and rates are presented?
  1. Sex ratio
  2. Morbidity rates
    - a. attack rate
    - b. incidence
    - c. prevalence
  3. Mortality rates
    - a. case fatality
    - b. age-sex specific
- E. What research design was used?
- F. What are the specific results/conclusions such as rates of illness, etc?



- G. Are there any recommendations made based on results for future studies or interventions?
- H. Are limitations of the study addressed?
- I. Do authors discuss any special problems due to quality and availability of data?

**IIb. Summary of Articles Reviewed**

- A. Discuss similarities of articles according to A through I
- B. Discuss differences of articles according to A through I

**III. Research Questions**

- A. Main research question and brief explanation of why you want to investigate this relationship
- B. Additional research questions with explanation

**IV. Research Design**

Answer the following questions about your research question:

- (1) What research design is most appropriate to answer your question?
- (2) What is the reference population for your research study?
- (3) What study population would you use and why?
- (4) How do you define "cases" and "controls" for your study?
- (5) What do you expect the outcome of your study to be?
- (6) What difficulties do you see if your proposed study were actually carried out?
- (7) Develop dummy tables necessary to analyze your results.

**V. Interview**

- A. Who you interviewed, training, experience, position
- B. Expert's Opinion on:
  1. Literature
  2. Risk factors and socio-demographic characteristics linked to the disease or condition
  3. Feasibility of conducting the study you proposed in terms of:
    - a. Access to subjects or records
    - b. Ability to obtain measures or observations
    - c. Costs
  4. What outcomes would they expect you to find and why?