ebrothers.com, for detailed information on nursing books, visit our website www.jaypeebrothers.com, for detailed information on nursing b



Social Epidemiology

for Community Health Nursing

Nirmallya Chatterjee

JAYPEE

Contents

1. Background and History **1**

- *Definition of Social Epidemiology* 1
- *History of Social Epidemiology* 2
- *Significant Concepts of Social Epidemiology* 3
- *Guiding Concepts in Social Epidemiology* 5
- *Counterfactual Challenges to Social Epidemiology* 18

2. Issues Related to Effect of Social Determinants on Disease **25**

- *Theories of Disease Causation* 25
- *Social and Psychological Factors and Health* 28
- *People, Places and Health* 32
- *The Social Causes of Disease: Biological Pathways* 33

3. Identification and Analysis of Health Disparities **41**

4. Theories and Constructs **50**

- *Psychosocial Theory* 51

5. Fundamental Measurement Issues in Social Epidemiology **66**

Part 1: Measures of Disease Frequency 66

- *Mathematical Quantity* 68
- *Epidemiological Quantity Measurement* 72
- *Prevalence* 74
- *Comparing Disease Occurrence* 76

Part 2: Measures of Socioeconomic Status 79

- *Socioeconomic and Health* 80
- *Socioeconomic Status Measurement* 80

Part 3: Measuring Poverty 86

Part 4: Measuring Health Inequities 96

- *Reasons for Health Inequities* 97
- *Barriers in Concepts and Paradigms* 98

Part 5: Measuring Racial Inequities 100

- *Race and the Evolution of Ideas of Racial Difference* 101

6. Fundamental Design and Analysis Tools in Social Epidemiology **111**

- *Community-based Participatory Research 112*
- *Definition and Principles of CBPR 113*
- *Utility, Possibilities and Potential Outcomes of CBPR 119*
- *Process of Community-based Participatory Research 124*
- *Key Challanges of Community-based Participatory Research 127*
- *Reflections on CBPR Challenges in Practice 131*
- *Whether CBPR Useful? 134*
- *Network Methods in Social Epidemiology 135*
- *Basic Network Concepts 137*
- *Identifying Social Interactions 144*
- *Multilevel Studies 153*
- *Multilevel Models 156*
- *Experimental Social Epidemiology-controlled Community Trials 160*
- *Natural Experiments and Instrumental Variable Analyses in Social Epidemiology 166*

7. Use of Social Epidemiology **177**

- *Identifying the Relevant Contexts 202*
- *The Family Level 204*
- *Investigating General and Specific Contextual Effects from a Longitudinal, Life-Course Perspective, and Across Generations 208*
- *Developing Quasi-Experimental Family-based Designs for the Analysis of Causal Effects in Observational Multilevel Analyses 209*

Self-Evaluation Questions *213*

Index *223*

1
CHAPTER

Background and History

JAYPEE BROTHERS

INTRODUCTION

Social epidemiology is the systematic and comprehensive study of health, well-being, social conditions or problems, diseases and their determinants, using epidemiology and social science methods to develop interventions, programs, policies, and institutions that may reduce the extent, adverse impact, or incidence of a health or social problem and promote health. This definition provides evidence-based methods for public health activism.

Social problems are specifically included in this definition because many of today's challenges in public health, including obesity, infectious diseases, violence, child abuse, and drug use, are associated with both personal behavior and macro trends in the social structure such as the distribution of wealth, social resources, and exposure to media and market forces.

Furthermore, those who specifically study social problems can enrich their research and practice through the methods of social epidemiology, revealing how social problems are intrinsically linked to the health status of populations. Social epidemiology is the combination of epidemiology (the study of the distribution and determinants of disease and injury in human populations) with the social and behavioral sciences.

DEFINITION OF SOCIAL EPIDEMIOLOGY

This definition of social epidemiology emphasizes that determining the distribution of disease and social problems and understanding

the relevant risk factors and their inter-relationship are only one part of social epidemiology. *Risk factors* are the behaviors, attributes, inherited characteristics, and exposures that increase the probability of a specific outcome such as a health or social condition, problem, or disease (last 1995).

In addition to determining distribution and identifying risk factors, a central focus of social epidemiology is implementing what we know about a particular condition in order to maintain and improve health and well-being. Inherent in this definition is the equal emphasis given to the psychosocial and the biological or medical determinants of disease and well-being. This definition emphasizes the use of multidisciplinary approaches to analyze complex social problems.

Some theorists have proposed an **alternative definition** of social epidemiology as:

"The branch of epidemiology that studies the social distribution and social determinants of state of health" Berkman and Kawachi 2000:6.

This approach to social epidemiology contrasts with classic epidemiology in its explicit emphasis on investigating social factors such as poverty and gender through the judicious use of theories, concepts, and methods instead of merely assuming their effects as background variables in biomedical research (Krieger 2001).

HISTORY OF SOCIAL EPIDEMIOLOGY

In the beginning of the 19th century, several investigations were conducted based on the idea that social conditions affect health. In France, Villerme examined differences in mortality between the poor and the affluent. He emphasized that improved schooling and working conditions would reduce disparities in mortality between the poor and the affluent. In Germany, Virchow reported the relationship between poor social conditions and the typhus epidemic in Upper Silesia. He speculated that unequal access to society's products was the fundamental cause of unequal distribution of diseases in the society.

He highlighted the central role of social conditions in population health. In the middle of the 19th century, Chadwick reported that

JAYPEE BROTHERS

unsanitary soil, air, and water were major causes of diseases and promoted sanitation measures to improve the health of the poor. Clearly, studies in the beginning and middle of the 19th century were conducted with the assumption that societal conditions affect physical health.

At the end of the 19th century, germ theory came into fashion; germs were considered the major cause of diseases. Epidemiological studies during this period concentrated on identifying new germs that cause diseases. Consequently, the idea that social conditions affect health was overshadowed.

In the early 20th century, the idea flourished that it was exposure to a single individual risk factor, including germs, that led to disease; however, with the rise of infectious diseases, the idea that disease is caused by exposure to multiple individual risk factors, the so-called "web of causation," entered the mainstream of epidemiological theories. Modern epidemiology has developed based upon this multifactorial model. The original concept of social epidemiology was concealed within the prosperity of modern epidemiology.

By the 1980s, however, several epidemiologists developed social epidemiology, underscoring the importance of sociostructural factors on health as well as in a population perspective. In a backlash against the strong individualism of modern epidemiology, social epidemiologists argued for the need to return to the traditional epidemiological theme: how do social conditions produce patterns of health and disease? The central question of social epidemiology—what are the effects of social factors such as social structure, culture, and environment on both individual and population health—has existed since the beginning of epidemiological history. However, the new focus on this theme using current epidemiological methods is a relatively recent phenomenon.

SIGNIFICANT CONCEPTS OF SOCIAL EPIDEMIOLOGY

This section deals with several significant concept of social epidemiology. These concepts are not limited to social epidemiology alone, but they are fully applicable to modern epidemiology as well.

JAYPEE BROTHERS

First, the biopsychosocial paradigm is an important concept in social epidemiology. Social epidemiology uses the biopsychosocial paradigm in contrast, modern epidemiology often uses the biological paradigm.

The biological paradigm assumes that all diseases are biological phenomena and can be described fully in biological terms. It guides the views that a population is merely the sum of its individuals, and that the population pattern of diseases is simply a reflection of individual risk factors. Consequently, social level factors cannot be considered "real" causes of diseases, if the biological paradigm is used. In contrast, the biopsychosocial paradigm of social epidemiology assumes that the biology of organisms is determined in multilevel, interactive environments. In other words, diseases are assumed to be products of mutual interaction among social factors, individual factors, and biological factors. The biopsychosocial paradigm assumes that population is not merely the sum of its individuals; rather, every population has its own history and culture, which determine how and why people are exposed to specific individual risk factors.

In social epidemiology, social factors can be risk factors of health by adding to or interacting with individual and biological factors.

Population perspective is second significant concept in the field of social epidemiology. Geoffrey Rose pointed out that an individual's risk of disease cannot be isolated from the disease risks of the population to which she/he belongs. This is Rose's population perspective, which has a crucial meaning in social epidemiology.

Social epidemiology is particularly interested in the first question, that of distribution. Researchers in social epidemiology look for socio-structural factors that affect distributions of diseases and risk factors, and they propose measures to shift these distributions in the desired direction, as a "population strategy." Population perspective and population strategy are essential to social epidemiology.

A third important concept in the field of social epidemiology is the use of new statistical approaches, such as multilevel analysis, to determine the effects of sociostructural factors on health. Multilevel analysis allows several levels of analysis to be accounted for simultaneously and more effectively than in conventional multivariate analysis. The importance of a multilevel statistical approach for social epidemiology is discussed below.

JAYPEE BROTHERS

Social epidemiology is concerned with the effect of social features. New statistical approaches such as multilevel modeling allow us to examine the relative importance of individual and social factors or the interaction between individual and social factors, permitting several levels of analysis to be controlled simultaneously.

Lastly, the use of theory is another significant concept in social epidemiology. Social epidemiology requires the use of theory to build hypotheses and interpret results. Social epidemiologists select variables in statistical models based upon a conceptual framework that indicates hierarchical relationships among factors.

This conceptual framework is built upon theory. For example, in a model of social class and congenital heart disease (CHD), controlling for smoking implicitly assumes that social class has a direct effect on CHD independent of smoking. Also, if a statistical association between social class and CHD disappears when smoking behavior is accounted for, the hypothesized theory will tell us whether the effect of social class on CHD is spurious, or mediated by smoking behavior. It is necessary to have conceptual clarity about the relationships between independent sociostructural factors, possible intervening variables, and health outcomes.

Theory is a significant tool for social epidemiological studies. Berkman said: "Without hypotheses that can be clearly supported or refuted, without having a clear understanding of temporal sequencing or biological plausibility, and without articulated theories and specific concepts to guide empirical investigation, we will not be able to make progress."

GUIDING CONCEPTS IN SOCIAL EPIDEMIOLOGY

Epidemiologist usually focus on specific social phenomena such as socioeconomic stratification, social networks and support, discrimination, work demands, and control rather than specific disease outcomes. While future studies may reveal that some diseases are more heavily influenced by social experiences than others, we suspect that the vast majority of diseases and other health outcomes such as functional status, disability, and well-being are affected by the social world surrounding us all.

JAYPEE BROTHERS

Like environmental and nutritional epidemiology, social epidemiology must integrate phenomena at the margins of what is defined as its domain. For instance, psychological states, behaviors, and aspects of the physical or built environment are influenced by social environments and vice versa. Borders at the periphery of any field, and social epidemiology is no exception, are bound to be fuzzy.

Individuals are embedded in societies and populations. The crucial insight provided by Rose's (1992) population perspective is that an individual's risk of illness cannot be considered in isolation from the disease risk of the population to which she belongs. Thus, a person living in Finland is more likely to die prematurely of a heart attack compared to someone living in Japan, not just because any particular Finnish individual happens to have a high level of cholesterol, but because the population distribution of cholesterol levels in Finnish society *as a whole* is shifted to the right of the Japanese distribution. The level of cholesterol that might be considered "normal" in Finnish society would be grossly abnormal and a cause for alarm in Japan. Moreover, we know from detailed studies of migrants that the basis for these population differences are not genetic (Marmot and Syme, 1976). For instance, Japanese immigrants to America take on the coronary risk profiles of their adopted country.

Over the last several decades, a huge number of clinical trials have been launched to modify individual behavioral risk factors such as alcohol and tobacco consumption, diet, and physical activity. By and large, the most successful have been those which incorporated elements of social organizational changes into interventions. We now understand that most behaviors are not randomly distributed in the population. Rather, they are socially patterned and often cluster with one another. Thus, many people who drink also smoke cigarettes, and those who follow health-promoting dietary practices also tend to be physically active. People who are poor, have low levels of education, or are socially isolated are more likely to engage in a wide range of risk related behaviors and less likely to engage in health-promoting ones (Matthews et al. 1989; Adler et al. 1994). This patterned behavioral response has led Link and Phelan (1995) to speak of situations that place individuals "at risk of risks."

JAYPEE BROTHERS

Understanding why "poor people behave poorly" (Lynch et al., 1997) requires a shift in understanding-specific behaviors once thought of as falling exclusively within the realm of individual choice occur in a social context. The social environment influences behavior by shaping norms, enforcing patterns of social control (which may be health-promoting or health-damaging), providing or not providing environmental opportunities to engage in certain behaviors, and reducing or producing stress for which certain behaviors may be an effective coping strategy, at least in the short-term. Environments place constraints on individual choice.

Research Examples

In this section, some examples of social epidemiological research, i.e. social class, income distribution, life course, social biology, ecological perspectives, general susceptibility to disease will be discussed.

Social Class

A great number of studies have identified disparities in health among social classes. One of the noteworthy points we need to recognize in terms of the relationship between social class and health is that disparities in health are gradual and exist across all social classes. Many previous studies have found that the relationship between health and social class cannot be fully explained by poverty.

Several theories explain how health disparities are generated among social classes. Social selection is one major classical theory. It asserts that a person's health status determines his or her social class, rather than vice versa. This theory maintains that a person with poor health is likely to be in a low social class because his chance to hold a job may be limited due to his poor health status. However, this theory has not been supported by evidence and contains some contradictions. For example, did the people with respiratory problems become coal miners? Or, coal miners get respiratory dysfunction from their work? It is more reasonable to think coal miners developed respiratory problems from their work, and several longitudinal studies have provided evidence of this.

JAYPEE BROTHERS

There is also sociobiological translation theory, in which social class influences biological functions through several paths that, in turn, affect health status. For example, the physical environments in which one lives and works are major pathways between social class and health. Physical environment affects health by exposing people to carcinogens and other environmental hazards. It is hypothesized that the poor tend to live and work in more hazardous environments, such as polluted neighborhoods and unsafe working conditions; thus, differences in physical environment among social classes are hypothesized to lead to disparities in health among social classes.

Social environment is another major pathway. Social environment affects health differently by providing vulnerability to interpersonal aggression or violence to some, and access to social resources and support to others. People in low social classes are more likely to live and work in unsafe neighborhoods, which provide higher chances of becoming victims of crimes, compared to people in high social classes. Also, because people in low social classes have limited access to social resources and social support considered to have a protective health effect, their health, in the face of equivalent exposure to risk factors, would be damaged even more than the health of those in high social classes.

Another relationship between social class and health is explained through socialization and experiences. The effect of social class on health may be mediated by social experiences; daily experiences may vary by different social class. These social experiences are hypothesized to influence psychological development, ongoing mood, and cognition, which, in turn, impact health status. For example, people in low social classes may have more anxiety, anger, or depression than those in high social classes as a result of financial difficulty.

Accordingly, they may have a more deteriorated health status due to a higher risk of CHD, accident, violence, or suicide compared to those in high social classes.

Finally, social class may affect health through health behaviors. Health behaviors are not randomly distributed in a society, but often are socially patterned. Many risky health behaviors for chronic diseases, such as smoking, physical activity, and dietary fat intake, are

JAYPEE BROTHERS

more prevalent in lower social class groups. Social context has a strong impact on health behaviors. Even when an individual is interested in improving her health behavior, it may be difficult to accomplish in unfavorable social conditions. People in low social classes tend to have more barriers to behavior change in their social conditions compared with those in high social classes, which might lead to differences in health status between classes.

Research in social class and health has several challenges. First, theoretically grounded research is needed in order to make it clear how social class affects health. It is important to be clear about the underlying models. Social class gradients can be seen as expressions of differences in wealth and income, exposure to health-damaging physical environments, access to support and resources, and attainment of education and coping skills. However, often it is not explicit which underlying model is being assumed.

Second, having valid and reliable measurements for social class is another challenge. In order to improve the measurement of social class, we must offer explicit hypotheses about which aspects of social class convey health risks.

Social class is a traditional but still significant theme for social epidemiology. A great number of studies have shown a gradient effect of social class on health; the relationship between health and social class cannot be fully explained by poverty. Despite much effort, the effect of social class on health is not yet fully understood. We need more theoretically grounded research with improved measurement of social class to understand the effect of social class on health.

Income Distribution

Although, the relationship between income and health has been well-established, income distribution and health is a relatively new field in social epidemiology. There have been several significant studies conducted within one country, and others among multiple countries. For example, Kennedy et al. studied the relationship between the degree of household income inequality across the 50 US states and state-level variation in age-adjusted total mortality rates. They found a strong correlation between the so-called Robin Hood Index and age adjusted total and cause-specific mortality rates. The Robin Hood

JAYPEE BROTHERS

Index indicates "the proportion of aggregate income that must be redistributed from rich to poor households in order to attain perfect equality of incomes."

A lower point of this measurement indicates more equal distribution of income; a higher point represents unequal income distribution. The positive correlation between the Robin Hood Index and age-adjusted total and cause-specific mortality rates persisted even after accounting for poverty rates, median household income, urban/rural mix, and health behavior, such as cigarette smoking rates. States with unequal income distribution have a higher mortality rate, on average, than states with equal income distribution.

There are at least three proposed pathways through which income distribution may affect health.

First, income inequality may lead to underinvestment in human capital. Kaplan et al. reported a significant correlation between the degree of income inequality and indicators of human capital. States with higher income inequality spent smaller proportions of their state budgets on education, which leads to lower educational outcomes. One reason that income distribution translates into human capital is the divergence in interests of the rich from those of the poor. For example, the rich may lose their interest in public education because they can educate their children privately. According to Krugman, "A family at the 95th percentile [in income] pays a lot more in taxes than a family at the 50th, but it does not receive a correspondingly higher benefit from public services, such as education. The greater the income gap is, the greater the disparity in interests is. This translates, because of the clout of the elite, into a constant pressure for lower taxes and reduced public services." Reduced social spending translates into poorer population health.

The second pathway is disinvestment in social capital. Social capital is defined as "those features of social structures— such as levels of interpersonal trust and norms of reciprocity and mutual aid—which act as resources for individuals and facilitate collective action." Social capital is an ecological dimension of society, in contrast to concepts of social network or social support, which are individual characteristics. Kawachi et al. reported the relationship between state-level social capital and individually self-rated health; the self-rated health of

JAYPEE BROTHERS

individuals living in states with high social capital tends to be higher than in states with low social capital. Unequal income distribution breeds conflicts among groups and erodes social solidarity. As a result, unequal income distribution impairs individual health through violence, psychological anxiety, and concerns among members of the society, which come of disinvestment in social capital.

The third pathway is psychological process; income inequality might produce ill health through a psychologically mediated effect of relative deprivation. A widening income gap in a society may produce psychological frustration and envy among residents through social comparison. Psychological emotion is a pathway through which income distribution affects health.

Life Course

The idea that a person's experiences over a lifetime can have a cumulative effect on their health is a central idea within social epidemiology. The study of long-term effects of physical and social exposures during gestation, childhood, adolescence, young adulthood and later adult life on the risk of chronic disease has been defined as a life course approach to chronic disease epidemiology (Ben-Shlomo and Kuh, 2002).

There are three different ways in which factors from early life might influence subsequent disease risk (Power and Hertzman, 1997). The first is a latency model of early life experiences which hypothesizes that experiences in utero and early life affect cardiovascular disease in adulthood (Barker 1991, Barker 1997). Barker found evidence that birthweight and other indicators of fetal growth in the newborn are related to fibrinogen and insulin resistance fifty years later. He also found that birthweight is related to functioning of the hypothalamic-pituitary-adrenal axis. Low-birthweight is associated with poorer childhood health which some researchers have linked to lower social position in adulthood (Illsley, 1986). This evidence suggests that a short-term exposure in utero can have a long latency period with adverse health and social consequences in adulthood.

The second theory of the life course suggests that the accumulation of social advantage and disadvantage throughout the life course affects adult health (Ross and Wu, 1995). Studies that have examined social

JAYPEE BROTHERS

circumstances in childhood and beyond do show an effect of social advantage throughout the lifetime (in childhood, early adulthood and later adulthood) on blood pressure, obesity (Wadsworth, 1997) and measures of health status.

The third life-course pathway is one in which childhood circumstances may not affect adult risk of ill health and disease directly. It is possible that parental social class and educational qualifications are important because they help to determine the social circumstances in which the offspring lives and works in adult life, and it is these circumstances that give rise to social inequalities in disease.

Social Biology

Human beings are both social and biological and understanding the interaction between the two is crucial to understanding the social determinants of health. The biological processes that underlie the social determinants of health makes explicit the pathways from psychosocial factors to biological responses. Psychosocial factors may affect health in two distinct ways—they may directly cause biological changes which predispose to disease, or they may, indirectly, influence behaviors such as smoking and diet, which in turn affects health (Brunner, 2000).

The direct effect of psychosocial factors on biology may be through the experience of chronic stresses which in turn modify neuroendocrine and physiological functioning (Selye, 1956). Humans are adapted to meet the challenge of short-term threats. However, frequent and prolonged activation of the fight-or-flight, or defence, reaction appears to be maladapted (Sapolsky, 1993).

The main axes of the neuroendocrine response appears to be the sympathoadrenal and hypothalamic-pituitary-adrenal (HPA) systems (Brunner, 2000). The former, the sympathoadrenal system is characterized by the rapid release of adrenaline from the adrenal medulla and noradrenaline from the sympathetic nerve endings, which produces among other things, cognitive arousal, raised blood pressure and glucose mobilization.

There is evidence of wide variations between individuals in the size and duration of these endocrine responses attributed to individual differences in psychological coping resources (Grossman, 1991). The

JAYPEE BROTHERS

for detailed information on nursing books, visit our website **www.jaypeebrothers.com,** for detailed information on nursing books, visit our webs

Social Epidemiology
for Community Health Nursing

Salient Features

- A brief and compact text on the subject
- Deals with various social determinants and uses of epidemiology
- Provides fundamental measurement issues and fundamental design and analysis tool in social epidemiology
- Identifies and analyzes health disparities in social structure
- Elaborates what are the background of different epidemiological theories in the community health, how they have been formed as well as how to do the analytical measurements to determine the outcome of different health-related states
- Focuses on the effects of social structure factors on health condition of the society
- Helpful for the students of nursing and community medicine in well grasping the concepts and for the health nurses in proper diagnosing the diseases during their clinical practices
- Provides a very good opportunity to do the self-evaluation by attempting Self-Evaluation Questions.



Nirmallya Chatterjee MSc (N) MSc (Psycho and Counseling) is Lecturer at Ma Sarada College of Nursing, under Ramakrishna Mission Seva Pratishthan, Kolkata, West Bengal, India. She is a scholar of PhD (Nursing) in Community Cardiology, West Bengal University, Kolkata. She has rich experience in community health nursing. During her tenure, she has worked as staff nurse, clinical instructor, and former lecturer at BM Birla College of Nursing. She has enhanced her knowledge by pursuing short courses on community health from various national and international universities. She has extended her skills at publishing articles pertaining to nursing. She holds a life membership of various national and international organizations.

Available at all medical bookstores
or buy online at www.jaypeebrothers.com

JAYPEE BROTHERS
Medical Publishers (P) Ltd.
www.jaypeebrothers.com

Join us on facebook.com/JaypeeMedicalPublishers

ISBN 978-93-5270-184-1