

ERIC Notebook

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Issue 1

Issues in Epidemiology and Health Services Research



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Introduction

ERIC Notebook is published for use by clinicians, health services researchers, and administrators in the Veterans Administration. It will address key issues, concepts, and healthcare methods of epidemiology, which may serve as refresher notes for these professionals.

Each ERIC Notebook will address a different concept of epidemiology and health services research. The Notebooks will cover the fundamental measures of disease occurrence in populations (incidence, prevalence, relative risk, absolute risk, incidence rates, mortality rates) and how to compute them by using research problems applicable to the health of veterans. Readers will be able to apply concepts of disease variation in time, person and place to the understanding of disease in populations. ERIC Notebooks will explain the relative strengths and limitations of different strategies to study the association between risk factors (or exposures) and disease in populations. Readers will be able to evaluate major sources of random and nonrandom error in community health studies, and implement methods to control for these sources of error. ERIC Notebooks will also address the strategies available to evaluate the effectiveness of medical and public health intervention programs.

Some of the individual topics of upcoming ERIC Notebooks are:

- Incidence versus prevalence
- Measures of incidence: cumulative incidence versus incidence rate
- Computing person-time in incidence measures
- Differences in sensitivity and specificity and how to compute each measure
- Randomization
- Confidence intervals

- Computing risk ratio, rate ratio, attributable risk, attributable risk percent, and mortality rates
- Advantages and limitations of case control studies
- Computing odds ratios
- Advantages and disadvantages of cohort studies
- Prospective versus retrospective studies.
- Issues in the design, conduct, and ethics of randomized trials
- Advantages and disadvantages of cross-sectional studies
- Measures of association in cross-sectional studies: computing prevalence, prevalence ratios and prevalence odds ratios
- Bias in prevalence studies: survival bias and antecedent-consequence bias.
- Small area analysis
- Ecologic studies: How are they different from cross-sectional studies? What are their strengths and weaknesses?
- Types of Biases: Selection, information, and confounding
- The guidelines for causality

Each ERIC Notebook will include information on when and how to use the measure or type of study covered in that issue, obstacles that need to be dealt with when performing the research, and a relevant health-oriented problem or example using that issue's topic. In addition, colorful illustrations, a glossary, and self-evaluation questions will help readers understand each topic.

If you are interested in receiving the ERIC Notebook on a regular basis, please contact **Angie.Tuck@sph.unc.edu** in order to be added to the mailing list. Each issue of ERIC Notebook will also be available on the Internet at <http://hrsd.durham.med.va.gov/eric/>

Internet: If you want to learn more about different topics in epidemiology, you can take the ERIC Epidemiologic Perspectives Course on the Internet. Please visit our homepage at: http://cdlhc.sph.unc.edu/dl_courses/epid160ERIC/index.html for more details.

What to Expect

Healthcare Epidemiology and the Population Perspectives

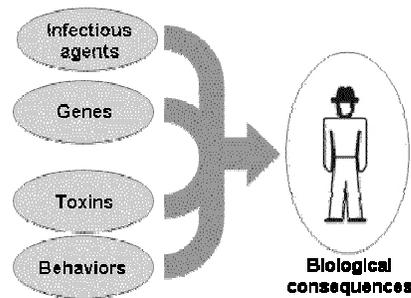
Definition of epidemiology.

Epidemiology is the study of the distribution and determinants of disease, risk factors and exposures, and health status in populations. Epidemiologists evaluate trends in health and disease in order to provide a factual basis for evaluating health programs and services.

Determinants of disease. There are many determinants of disease. These are not only immediate biomedical causes of disease (pathogens, diet, home environment), but also underlying population causes of disease (cultural, economic, and social).

The biomedical perspective on disease. In a biomedical approach to disease, the biological consequences of exposure to infectious agents, toxins, genes, or behavioral risk factors are the objects of study. When disease is considered from a biomedical perspective, the focus is on its proximate or immediate causes. Emphasis is placed on causal mechanisms of disease, i.e., the sequence of events taking place in the body when effective contact is made with a disease agent. The biomedical perspective on disease

in populations is thus characterized by research to identify its immediate causes and to understand biological mechanisms for its development and transmission.



Ultimately biomedical research targets individuals for disease control, either by reducing their exposure to agents of disease, or by directly treating individuals who have been adversely affected by their exposures. However, the amount of disease in different populations is not just a matter of exposure to the known immediate causal agents of disease.

Example of the biomedical perspective versus the population perspective on lung cancer. The epidemic of lung cancer in this country began approximately in the 1940s and increased in magnitude from then until the 1990s. For the past two or more decades, we have known that tobacco smoking, particularly cigarette smoking, is the immediate cause of the epidemic. We know a great deal about biological mechanisms of the action of cigarette smoke. But this knowledge does not explain why lung cancer became an epidemic in developed countries in the past 50 years, although tobacco smoking was practiced in one form or another over the past 300 years. Nor did the knowledge of the immediate cause of most lung cancers stem the rising tide of this

epidemic in our country in the 1970s and 1980s, and this knowledge is not preventing developing countries from experiencing a large increase in the prevalence of smokers and a consequent increase in the lung cancer epidemic.

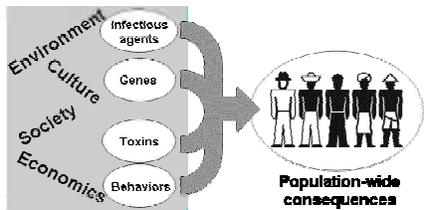
To understand the causes of the lung cancer epidemic of the 20th Century, we have to move beyond the biomedical perspective and consider disease in a societal context. It is said that we are creatures of our environment. The environment, broadly understood as including the physical, social, economic and cultural environment, is a major determinant of disease in populations.

The biomedical perspective, with its focus on immediate causes and mechanisms of disease, helps us understand how and why individuals become diseased, but it does not address disease in its societal context, from the population perspective.

The underlying causes of the lung cancer epidemic were the societal factors--economic, social and cultural-- that resulted in a major increase in the prevalence of smoking, particularly between the ages of 10 and 25 years. The addictive nature of nicotine added to the epidemic by prolonging the habit of smoking even after the culturally-determined symbolic benefits of smoking may no longer have motivated the adult smoker. Nearly all important diseases of society have similar underlying causes, embedded in the cultural and economic structure of each population. These underlying causes explain variations in the

prevalence of disease in different communities.

The population perspective on disease. The population perspective focuses on these underlying causes, that is, on the environmental, social, cultural and economic determinants of differences in disease frequency between populations. The population perspective on disease is characterized by research to: 1) identify variations in disease frequency in different populations, specified by place, person and time; 2) investigate the underlying causes of disease in populations, that is, the environmental, economic, social and cultural determinants of disease; and 3) identify societal mechanisms that affect the distribution of disease, or of risk factors for disease, in populations.



The ultimate purpose is to develop a societal environment in which the health and well being of the population as a whole can be enhanced.

Combining the biological and population perspectives:

Epidemiology embraces both the biological and population perspectives on disease in populations, and is thus a biological, social and ecological science. Epidemiology differs from other biomedical sciences by its population perspective on disease, and it differs from other social and

ecological sciences by its incorporation of biomedical science into its process of inquiry.

Self Evaluation

Q 1: State three characteristics of the biomedical perspective on disease in populations.

Q 2: State three characteristics of the population perspective on disease in populations.

Q 3: The prevalence of asthma is apparently increasing in the population. The specific reasons for this increased prevalence are unknown. What patterns of the distribution of asthma prevalence in the population would provide us with some leads for eventual public health action against asthma?

Answers

Q 1: The biomedical perspective is characterized by:

1. Research into the immediate causal agents of disease,
2. Research into biological mechanisms of disease development and transmission,
3. Targeting disease control efforts towards individuals who are potentially exposed to the agent or already are infected with the agent.

Q 2: The population perspective is characterized by:

1. Identifying variations in disease frequency in different populations.
2. A focus on underlying societal causes of disease in populations.

3. Investigating societal mechanisms to prevent disease in populations.

Q 3:

1. Among what age group is the increased prevalence occurring? e.g. children only?
2. Is the rise in prevalence occurring more among disadvantaged persons? Among inner city populations only? In areas with humid vs. arid climates?
3. Is there a similar rise in prevalence of one of the suspected risk factors for asthma, such as cigarette smoking, exposure to house dust mites or cockroaches, air pollution, molds and pollens?

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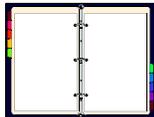
Upcoming Topics

Incidence vs. prevalence.

In this issue we will focus on two basic measures of disease frequency incidence and prevalence.

Cumulative incidence vs. Incidence rate

Please let Angie Tuck know which topics are of special interest to you so that we can include them in a future issue.



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