

EPIDEMIOLOGY major module 223: SCHWARTZ

CLASS SESSION

Daily 9-5

Duration : 1 week

COURSE DESCRIPTION

As a basic science of public health, epidemiology is responsible for the identification of causes of disease that can guide the development of rational public health policies. The accuracy of the information provided by epidemiologic studies is therefore of central concern. Epidemiologic methods are the tools we use to make valid causal arguments. The primary objective is to provide students with the basic tools necessary to design, carry out, and interpret the results from observational epidemiologic studies.

PREREQUISITES

Students entering this course are assumed to be able to:

Calculate basic measures of association between exposures and disease

Interpret data in 2 by 2 tables

Identify major epidemiologic study designs

Define confounding, selection bias and misclassification

Explain the concept of causality in epidemiology

COURSE LEARNING OBJECTIVES

Students who successfully complete this course will be able to:

- Develop testable research hypotheses
- Write a principled argument supporting research hypotheses
- Operationalize hypotheses into statistically testable statements
- Articulate the principles of basic observational study designs
- Choose study designs that can test research hypotheses
- Recognize and explain the effects of confounding and bias
- Conduct basic sample size and power calculations

ASSESSMENT AND GRADING POLICY

Each session will be accompanied by a lab exercise called an IRA (Individual Readiness Assurance) which indicates that the student is ready to proceed to the next section of the course.

The grade for the course is based on a final multiple choice exam which covers the material of the IRAs.

COURSE REQUIREMENTS

The textbook for the course is: Susser, Schwartz, Morabia and Bromet: Psychiatric Epidemiology: Searching for the Causes of Mental Disorders. Oxford: New York 2006.

COURSE SCHEDULE

Session 1 – CAUSAL INFERENCE IN EPIDEMIOLOGY AND MEASURES OF EFFECT	
Monday AM	Basic concepts in causal inference will be introduced as a framework for understanding the design and execution of epidemiologic studies. Confounding and bias will be discussed from this perspective. Since the scientific method requires the quantification of phenomena, we will review basic

epidemiologic measures of disease frequency (risk, rates, and odds) and disease associations (risk ratios, rate ratios and odds ratios, risk differences) their interrelationships and relationships to causal inference.

All design, analysis and measurement issues that form the bulk of this course will be discussed in the context of this conceptual framework.

Learning Objectives:

By the end of this section students should be able to:

- Define a cause from a counterfactual perspective
- Explain the sources of non-comparability in epidemiologic studies
- Articulate the basic principles of the scientific method
- Define and calculate a risk, odds and rate
- Describe the relationship among these three measures of effect

Reading: Text chapters: 4, 8 (to p. 84), Supplement 1

Assignment: IRA 1

Session 2 – DEVELOPING PRINCIPLED ARGUMENTS

Monday PM With the framework of causal inference in mind, we will review the components of a research proposal and how each component is related to the process of causal inference. Each session of the course will relate to sequential components of the grant proposal. After examining the framework, this session will focus on the Specific Aims, and Background and Significance Sections. We will discuss how to review the literature, develop hypotheses and operationalize them. The roles of confounding, bias and interaction in hypothesis development will be discussed.

Learning Objectives:

By the end of this section students should be able to:

- Recognize the components of a grant proposal
- Describe how each component is related to the process of causal inference
- Develop research hypotheses
- Write a principled argument

Reading: Text Chapters 5,6,7

Assignment: IRA 2

**Session 3 – DESIGNS: EXPERIMENTAL, COHORT, CASE-CONTROL, CROSS-SECTIONAL, ECOLOGIC :
INTRODUCTION TO DESIGN**

Monday PM The next four sessions introduce the issues involved in the choice of study design. The benefits and limitations of each design will be discussed in the context of causal inference. We will compare and contrast the problems of confounding and bias posed by each design and the methods for dealing with them.
Learning Objectives: for sessions 3 - 6

By the end of this section students should be able to:

- Define the basic study designs used in epidemiologic research
- Describe the relationships among the study designs
- Select study designs appropriate to specific study hypotheses
- Compare the roles of confounding and bias in each type of design
- Critically assess the choice of study designs in research articles
- Operationalize hypotheses to be tested in the context of these designs

Reading: Text Chapters 9 – 12

Assignment: IRA 3

Session 4 – DESIGNS: EXPERIMENTAL and COHORT

Tuesday AM Learning Objectives: See Session 3

Reading: Text Chapter 13

Assignment: IRA 4

Session 5 – DESIGNS: CASE-CONTROL: Connection with Cohort

Tuesday PM Learning Objectives: See Session 3

Reading: Text Chapters 15 – 17, 18 (p. 217-222)

Assignment: IRA 5

Session 6 – DESIGNS: CASE-CONTROL

Wed Am Learning Objectives: See Session 3

Reading: Text Chapters 15 – 17, 18 (p. 217-222)

Assignment: IRA 6

Session 7 – DESIGNS: X-SECTIONAL & ECOLOGIC

Wed Am Learning Objectives: See Session 3

Reading: Text Chapters 31-33

Assignment: IRA 7

Session 8 – TESTING OUR CAUSAL HYPOTHESES: CAUSAL IDENTIFICATION THROUGH STRATIFICATION

Thurs. AM These four sessions provide an introduction to the basic analytic approaches to examining data from cohort, case control and cross-sectional studies. The goal is to translate causal ideas into statements that can be tested with data. We will examine simple bivariate methods for analyzing unmatched and matched data and multivariate extensions of these methods. We will cover stratified analyses, linear regression, logistic regression and survival analytic techniques. The goal will be to understand the basic concepts and the situations in which each technique is appropriate, to be able to read and interpret computer printouts and to understand how to evaluate confounding, mediation and effect modification.

Learning Objectives for sessions 7 - 10:

By the end of this section students should be able to:

- Draw DAGs to represent causal ideas
- Describe the relationship between stratified analysis and mathematical modeling
- Select analytic approaches appropriate for the study design
- Interpret results of output from stratified analyses, linear regression, logistic regression and survival analyses

Reading: Text Chapters 12, 18 (p. 212-217), 25 (to p. 297)

Assignment: IRA 7

Session 9 – TESTING OUR CAUSAL HYPOTHESES: CAUSAL EXPLANATION THROUGH STRATIFICATION

Thurs. PM Learning Objectives: See Session 7

Reading: Text Chapters 27 (to p. 326), 25 (to p. 297)

Assignment: IRA 8

Session 10 – CONSEQUENCES OF MEASUREMENT ERROR

Friday AM This session provides an introduction to the problem of measurement error and its implications for causal inference. We will examine the effects of measurement error in independent and dependent variables of interest as well as confounders and covariates. Sensitivity and specificity will be covered. We will also describe the sources of measurement error and various techniques to avoid it and tame its consequences

Learning Objectives:

By the end of this section students should be able to:

- Calculate and interpret sensitivity, specificity, predictive power and Kappa
- Describe the consequences of different types of measurement error
- Identify sources of potential bias in the way information is obtained
Implement strategies to avoid bias in obtaining information

Reading: Text Chapter 14, Supplement 11

Assignment: IRA 11

Session 11 – SAMPLING AND POWER

Friday PM This session provides an overview of issues in sampling including an introduction to considerations and biases in different sampling procedures - random sampling, systematic, stratified, cluster, etc. This session also includes a conceptual and applied discussion of power analysis.

Learning Objectives:

By the end of this section students should be able to:

- Describe the basic rights of study participants
- Delineate the ethical responsibilities of researchers regarding study results
- Identify strategies to avoid unethical conduct in epidemiologic studies
- Explain the role of IRB's

Reading: Text Chapter 24 Supplements 12a, 12b

Master of Public Health – Semester 3**Week 50: from Monday 12th to Friday 16th of December 2011****Module 223 Major A: “Design, Concept and Methods in Epidemiology”****Coordinators: Sharon Schwartz****Location: Reid Hall 4 rue de Chevreuse – 75006 PARIS**

Monday December 12th	Tuesday December 13th	Wednesday December 14th	Thursday December 15th	Friday December 16th
9h Introduction to casual inference	9h Study designs: Randomized control trials. Natural experiments. Cohort study designs	9h Case control studies I	9h Identifying causes (main effects and confounding)	9h Sampling and power
12h : Lunch	12h : Lunch	12h : Lunch	12h : Lunch	12h : Lunch
14h Implications of causality for basic epidemiologic concepts	14h Cohort studies	14h Case control studies II	14h Explaining causes (mediation and effect modification)	14h Measurement issues 16h30: Module evaluation
17h	17h	17h	17h	17h