

**PUB HLTH 304**  
**INTRODUCTION TO EPIDEMIOLOGY – 1.0 credit**  
**Winter 2008 (January 9 – March 19, 2008)**

<b>Instructors:</b>	Rowland Chang, MD, MPH Phone: 312-503-2952 FAX: 312-908-9588 e-mail: <a href="mailto:rwchang@northwestern.edu">rwchang@northwestern.edu</a>	Steven Whitman, PhD Phone: 773-257-5661 FAX: 773-257-5680 e-mail: <a href="mailto:whist@sinai.org">whist@sinai.org</a>
---------------------	--	---

**Office Hours:** BY APPOINTMENT  
680 N. Lake Shore Drive, Suite 1102

**Teaching Assistant:** Jocelyn Hirschman e-mail: [j-hirschman@md.northwestern.edu](mailto:j-hirschman@md.northwestern.edu)

**Class Time and Room:**           **Wednesdays, 6:00pm-9:00pm**  
  **McGaw Building, Williams Auditorium (Lectures)**  
  **Lurie - Searle Seminar and McGaw 1-401 Rooms (Discussion groups)**

**Course description:** Introduction to epidemiology and its uses. Topics include measures of disease occurrence, common sources and types of data, important study designs and sources of error in epidemiologic studies, and epidemiologic methods.

**Course objectives:**

- Describe how the tools of epidemiology allow for the study of how the ecology of Chicago impacts on morbidity and mortality.
- Define nominal/ordinal/interval data; validity, reliability.
- Explain meaning and use of “p-values” and confidence intervals.
- Define, calculate, & use cumulative & person/time incidence rates, prevalence rates; crude and specific rates
- Describe different types of descriptive studies & how they are used to describe person/place/time characteristics of disease/illness events
- Explain uses & limitations of: correlational (ecological) studies, case reports/ series, cross-sectional studies.
- Define Public Health Surveillance and explain the major uses of immediate, annual, and archival surveillance information; explain the major elements in establishing a surveillance system. Give examples of active and passive surveillance systems.
- Recognize & be able to describe important sources of error in epidemiology studies, including different types of bias.
- Define confounding and give examples.
- Explain when adjustment is necessary and/or appropriate
- Perform simple direct & indirect standardization
- Explain what screening is and when screening is appropriate
- Describe the basic elements of a good screening program.
- Define sensitivity, specificity, and positive & negative predictive value, explain their relation to each other and to disease prevalence; be able to calculate these quantities given appropriate data
- Describe a cohort study & explain advantages & limitations of cohort study design, including important types of bias, & how to address these in study design.
- Define relative risk, attributable risk, and number needed to treat (harm); be able to calculate & interpret these quantities.
- Define & recognize a case-control study; understand advantages & limitations of case-control design, including important types of bias & how to address these in study design.
- Define odds ratio & how this differs from relative risk; calculate & interpret odds ratios.
- Compare & contrast case-control & cohort methodology; apply these methods appropriately.
- Explain how intervention studies differ from observational studies
- Define “intention to treat” and recognize when this concept should be applied.
- Apply “number needed to treat” concept in interpreting results of intervention studies.
- Recognize and identify different types of intervention studies; e.g., drug trials, prevention studies.
- Describe basic elements of randomized clinical trials; recognize & define “stages” of trials used in drug development, including post-marketing surveillance.
- Discuss and apply ethical concepts related to intervention studies
- Describe basic steps of an outbreak investigation & types of bias likely to affect outcome investigation; be able to suggest appropriate control mechanisms & discuss their benefits & limitations.
- Define & recognize: common source vs. propagated epidemic; vector, reservoir.

- Define the three levels of prevention and costs associated with each level.
- Be able to discuss the ethical issues surrounding prevention research in developing countries.

**Text:** Required: Rothman KJ. Epidemiology, an introduction. Oxford University Press, 2002

Optional: Fletcher RH, Fletcher SW, Wagner: Clinical Epidemiology: The Essentials. 3<sup>rd</sup> edition. Williams & Wilkins, Baltimore MD, 1996.

Coughlin SS, Soskoline CL, Goodman KW: Case Studies in Public Health Ethics. American Public Health Association, Washington, DC 1997. (abbreviated below as **CSPHE**)

Kachigan SK. Statistical Analysis: An Introduction to Univariate and Multivariate Methods. Radius Press.

Rosner B. Fundamentals of Biostatistics, 5th Edition. Duxbury, Pacific Grove, CA, 2000

**Format:** Informal lectures, discussion of materials & homework from previous week. Homework will include problem assignments, case studies, and critical reading of papers. Homework will be due at the beginning of the class following assignment.

**Evaluation:** Homework assignments and participation in discussions.....15%

Midterm: .....25%

Paper: .....25%

Final: .....35%

Exams will be multiple choice/short answer, including some calculations. The final will be cumulative. Students are expected to take exams in class on the specified date.

**Course Evaluation:**

The Programs in Public Health administer web-based course evaluations to students for each course near the end of the quarter. **Your completion of both the unit (course) and faculty evaluation components is required; failure to complete either of the evaluations will result in an incomplete grade until the evaluations are submitted.** You will be sent the web link and instructions via email later in the quarter. You will have about two weeks time to complete the evaluations before grades are submitted.

**Academic Integrity**

Academic integrity at Northwestern University is based on a respect for individual achievement that lies at the heart of academic culture. Every faculty member and student, both graduate and undergraduate, belongs to a community of scholars where academic integrity is a fundamental commitment. The Programs in Public Health abides by the standards of academic conduct, procedures, and sanctions as set forth by The Graduate School at Northwestern University. Students are responsible for knowledge of the information provided by The Graduate School on their Web page at <http://www.tgs.northwestern.edu/studentsvcs/ethics/>.

**January 9****Week 1**

---

**Topics:**

- Introductions (Chang/Whitman)
- Goals for Course (Chang/Whitman)
- What is epidemiology? (Whitman)
- Introduction to measurement & hypothesis testing (Chang)

**Goals:**

- List what work is expected in the course and how student will be evaluated
- Describe how the tools of epidemiology allow for the study of how the ecology of Chicago impacts on morbidity and mortality.
- Define: nominal/ordinal/interval data; validity, reliability.
- Be able to explain meaning and use of “p-values” and confidence intervals.

**Lecture Readings**

- Rothman chaps: 1, 2, 6
- Fletcher chaps: 2
- *Fletcher chaps: 1,9,11 (optional)*

**January 16****Week 2**

---

**Topics:**

- Ratios, proportions, and rates (Whitman)
- Descriptive studies (Whitman)

**Goals:**

- Define, calculate, & use cumulative & person/time incidence rates, prevalence rates; crude, specific, & adjusted rates
- Describe different types of descriptive studies & how they are used to describe person/place/time characteristics of disease/illness events; be able to explain uses & limitations of: correlational (ecological) studies, case reports/ series, cross-sectional studies.

**Discussion Readings/Problem Set**

- Liu et al. A study of the reliability and comparative validity of the CARDIA dietary history. *Ethnicity & Disease* 1994;4:15-25

\*\*Problem set due\*\*

**Lecture Readings**

- Rothman chaps. 3 (pp.24-44)
- *Fletcher chaps: 4 (optional)*

**January 23****Week 3**

---

**Topics:**

- Surveillance (Whitman)
- Sources of error (Chang)
- Age-adjustment of rates (Whitman)

**Goals:**

- Define Public Health Surveillance and explain the major uses of immediate, annual, and archival surveillance information; explain the major elements in establishing a surveillance system. Give examples of active and passive surveillance systems.
- Recognize & be able to describe important sources of error in epidemiology studies, including different types of bias. Define confounding and give examples.
- Explain when adjustment is necessary and/or appropriate; be able to perform simple direct & indirect standardization.

**Discussion Readings/Problem Set**

- Connolly et al. Valvular heart disease associated with fenfluramine-phentermine. NEJM 1997;337:581-88
- Related correspondence and MMWR report.

\*\*Problem set (rates) due\*\*\*

**Lecture Readings**

- Public Health Surveillance, chapter 4 in Applied Epidemiology
- Rothman chaps. 5, 8.

**January 30****Week 4****Topics:**

- Screening (Whitman)

**Goals:**

- Be able to explain what screening is and when screening is appropriate; and to describe the basic elements of a good screening program.
- Define sensitivity, specificity, and positive & negative predictive value; be able to explain their relation to each other and to disease prevalence; be able to calculate these quantities given appropriate data.

**Discussion Readings/Problem Set**

- El-Serag et al. Rising incidence of hepatocellular carcinoma in the United States. NEJM 1999;340:745-50.

\*\*Problem set (rate adjustment) due\*\*

**Lecture Readings**

- CSPHE chaps. 2-3 "Privacy & Confidentiality; Informed consent"
- Rothman chap 11 (pp. 198-203)
- *Fletcher chaps: 3 (optional)*

**February 6****Week 5****Topics:**

- Estimation of risk; Cohort studies (Chang)

**Goals:**

- Describe a cohort study & explain advantages & limitations of cohort study design, including important types of bias, & how to address these in study design.
- Define relative risk, attributable risk, and number needed to treat (harm); be able to calculate & interpret these quantities.

**Discussion Readings/Problem Set**

- Discussion questions in CSPHE readings

\*\*HIV Screening Case Study due\*\*

**Lecture Readings**

- Rothman chaps. 3 (to end), 4 (pp. 57-73), review chap. 8
- *Fletcher chaps. 5,6 (pp. 116-123) (optional)*

**February 13****Week 6****Topics:**

- Case-control studies (Chang)

**Goals:**

- Be able to define & recognize a case-control study; understand advantages & limitations of case-control design, including important types of bias & how to address these in study design.
- Define odds ratio & how this differs from relative risk. Be able to calculate & interpret odds ratios.
- Compare & contrast case-control & cohort methodology; be able to apply these methods appropriately.

**Discussion Readings/Problem Set**

- Stampfer MJ et al. Postmenopausal estrogen therapy and cardiovascular disease. NEJM 1991 325:756-62.

\*\*Problems set: Questions 1-3, Rothman. p. 92 due\*\*

\*\*Problem set (risk) due\*\*

**Lecture Readings**

- Rothman chap. 4 (pp. 73-93)
- *Fletcher chap.10 (optional)*

**February 20****Week 7**

Midterm Exam (through Screening)

**February 27****Week 8****Topics:**

- Intervention studies (Chang)

**Goals:**

- Explain how intervention studies differ from observational studies; define “intention to treat” and recognize when this concept should be applied. Apply “number needed to treat” concept in interpreting results of intervention studies.
- Recognize and identify different types of intervention studies; e.g., drug trials, prevention studies.
- Describe basic elements of randomized clinical trials; recognize & define “stages” of trials used in drug development, including post-marketing surveillance.
- Be able to discuss and apply ethical concepts related to intervention studies.

**Discussion Readings/Problem Set**

- Marchbanks et al. Oral Contraceptives and the Risk of Breast Cancer. NEJM. 2002;346:2025-32.
- Paper assignment to be discussed

\*\* Problem 3, Rothman, p.112 due\*\*

**Lecture Readings**

- Rothman chap. 11 (pp. 206-215)
- CSPHE chapt. 4: Rand. Cont. Trials
- *Fletcher chap.7 (optional)*

**March 5****Week 9**

---

**Topics:**

- Outbreak Investigation (Jones)

**Goals:**

- Describe basic steps of an outbreak investigation & types of bias likely to affect outcome investigation; be able to suggest appropriate control mechanisms & discuss their benefits & limitations.
- Define & recognize: common source vs. propagated epidemic; vector, reservoir.

**Discussion Readings/Problem Set**

- WHI Writing Group. Risks and Benefits of Estrogen plus Progestin in Healthy Postmenopausal Women. JAMA 2002;288:321-33.
- Safety of Newly Approved Medicines
- Discussion questions in CSPHE reading

\*\*Problems 4, 6, Rothman. p. 216 due\*\*

**Lecture Readings**

- Tengs, et al. Risk Analysis 1995;15:369-90. "Five-Hundred Life-Saving Interventions and Their Cost-Effectiveness" *Fletcher chap. 8 (optional)*

**March 12****Week 10**

---

**\*\*Paper assignment due\*\*\*****Topics:**

- Prevention Studies (Whitman)

**Goals:**

- Define the three levels of prevention and costs associated with each level.
- Be able to discuss the ethical issues surrounding prevention research in developing countries.
- Review for final exam

**Discussion Readings/Problem Set**

\*\*Neurologic syndrome outbreak case study\*\*

**Lecture Readings**

- Kelsey et al chap. 11

**March 19****Week 11**

---

- Final Exam

**Paper Assignment: Due at beginning of class period, 03/12/08.**

**Suggested length: 5-6 pages (No more than 7 pages; font must be no smaller than 12 point)**

**Cite all references, numbered in the order in which they appear in the paper. Use JAMA format (example):**

Harris RB, Laws A, Reddy VM, King A, Haskell WL: Are women using postmenopausal estrogens? A community survey. Am J Public Health 1990; 80:1266-1268.

### **Soy Intake and Breast Cancer**

Quite a few papers have been written on the subject of soy foods and risk of breast cancer. In the early 2000s, the two attached papers (Yamamoto et al. "Soy, isoflavones, and breast cancer risk in Japan"; Horn-Ross et al. "Phytoestrogen consumption and breast cancer risk in a multiethnic population") were published, each in a highly regarded medical journal.

Using these 2 papers as a starting point, address the following points:

- 1) Why might these two studies have arrived at differing results and conclusions? (compare and critique design and methodology).
- 2) Do you think that soy intake decreases the risk of breast cancer? Why or why not? (Consider methodological issues, including Bradford-Hill's criteria for causation. You may wish to use additional references on this topic to support your argument.)
- 3) Given your conclusions, *and* considering the potential public health benefits and risks of soy intake, what recommendations would you make about soy use? (You may include *specific* requests for additional studies but you must also come up with some advice for women (and physicians) who need to make this decision *now*).

**Criteria for grading papers will include:**

**a) Evaluation of assigned papers (correct identification of design and possible/probable sources of bias);**

**b) Development and presentation of a reasonable argument that specifically addresses the questions given in the assignment;**

**c) Use of appropriate causal criteria for supporting your position;**

**d) Use of additional literature to support your position;**

**e) Overall quality of writing** (*The best scientific writing conveys a maximum amount of information in relatively few words, but with a high degree of clarity and precision. A good resource can be found at*

<http://www.writing.northwestern.edu>.