INTRODUCTION TO NUTRITIONAL EPIDEMIOLOGY
Nutritional Sciences/Population Health 621
Spring 2016

Instructor: Julie Mares, Professor
Department of Ophthalmology and Visual Sciences
1063 WARF Building
262-8044; jmarespe@wisc.edu

Dates and Location: Wednesday and Friday 11 AM- 12:10, Feb 3, 2016-
April 1, 2016
WARF Building, Room 758

Course objectives:
NS 621, 1 credit: This course is designed for graduate students in Nutritional Sciences and Population Health. The purpose is to introduce students to conceptual frameworks and skills needed in order to understand how to evaluate relationships of nutritional states to health and chronic disease in large samples of people. There is a focus on interpreting findings of epidemiological studies and clinical trials in the scientific literature, and integrating them with other knowledge in nutritional research and epidemiological research. The purpose of this course is to 1) to provide students with the ability to understand and critically evaluate the nutritional epidemiology literature; 2) to provide students with basic knowledge to incorporate methods of assessing dietary and nutritional status of individuals into future studies. There is a focus on chronic disease epidemiology rather than acute nutritional deficiencies.

Prerequisites: A course in nutrition and a course in statistics; graduate student status or consent of instructor.

To enable students to:
1. Discuss the complexity of assessing the diets of free-living individuals:

   Apply knowledge about the contributions that nutritional epidemiology can make to understanding relationships between food and health, in relation to other approaches used in nutritional sciences. Describe limitations of this method of acquiring knowledge and new future directions that show promise for greater understanding.

2. Describe the study designs and statistical tools commonly used in the nutritional epidemiology literature to report the magnitude and statistical significance of relationships between diet and health or disease outcomes.

3. Outline the strengths and weaknesses of assessing nutrition through biological markers, individual nutrients, supplement use and adherence to dietary patterns.

4. Choose a dietary intake instrument appropriate to particular research designs and questions.

5. Critically interpret the results of studies in the nutritional epidemiologic literature based on potential for bias, confounding and effect modification.
6. Describe national and state surveys which monitor the nutritional status of the U.S. population.

**Grading:**
Completion of Diet Assessment Project 10%
Midterm Exam – Take Home 30%
Final Paper* 40%
Final Quiz -10%
Class Participation 10%

*Read and critique an assigned paper on nutritional exposures relating to a common chronic disease. Plan and discuss papers in groups. Present as part of a group in class. Prepare a five page paper which describes and critiques the paper using skills learned in class. This will include a critiques of 1) Study hypotheses and background which supports them, 2) Measurement of nutritional exposures, 3) Study design 4) Statistical approach 5) Results and interpretation 6) Conclusions and how these relate to the overall body of evidence using Bradford Hill criteria.

**Diet Assessment Project:** Complete, as a study participant, assessments of your diet two National Cancer Institute web-based tools: Diet History Questionnaire and automated Self-administered 24-hour Recall (ASA24) system. Complete: 1) a questionnaire about this experience, 2) a worksheet about these diet assessment resources after discussing class results in class.

**Textbooks**

**REQUIRED:**
* Nutritional Epidemiology* by Walter Willett (3rd edition, Oxford University Press, 2013). Available at University Bookstore.

**Additional resources (on Reserve at Ebling library) are:**
Intuitive Biostatistics by Harvey Motulsky (Oxford University Press, 1995)


Epidemiology:” Beyond the Basics* by Moyses Szklo and Javier Nieto (2nd edition, Jones and Bartlett Publications, 2007)

Critical Appraisal or Epidemiologic Studies and Clinical Trials* by Mark Elwood (2nd edition, Oxford University Press, 1998)

### Nutritional Sciences 621/Population Health 904
### Introduction to Nutritional Epidemiology and Applications
### Syllabus

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<tr>
<th>SESSION</th>
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<tr>
<td>Class 1: February 3</td>
<td>INTRODUCTION TO THE STUDY OF NUTRITIONAL EPIDEMIOLOGY-ROLE OF THIS SCIENCE IN EVALUATING DIET AND DISEASE RELATIONSHIPS; OVERVIEW OF ROLE OF DIET IN DISEASE CAUSATION.</td>
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**Required Reading**
Willett, Chapter One, pages 1-4. (Up to “Correlation Studies”) and 10-11 (Interpretation of Epidemiological Data” to “Interpretation of Null Associations”)

**OPTIONAL RECOMMENDED READING AND RESOURCES:**


An Introduction to Epidemiology Rothman, KJ, Oxford University Press, 2002; Chapter 2. What is Causation?

Examples of using Bradford Hill-based criteria for causal inference in evaluating a body of evidence supporting relationships of nutrition to chronic disease:
- **Vitamin E and Heart Disease**
- **Lutein and Cataract**

This series not only addresses causal criteria but also issues of strength of association (class 3) and confounding and effect modification (class 4):


<table>
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<tr>
<th>Class 2: February 5</th>
<th>RESEARCH DESIGNS: OBSERVATIONAL EPIDEMIOLOGY AND CLINICAL TRIALS</th>
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<td>Examples of Major Observational Studies:</td>
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<td>Women’s Health Initiative</td>
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<td>Harvard Nurse’s Health Study and Male Health Professional Studies</td>
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<td>Atherosclerosis Risk in Communities Study</td>
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<td>Swedish Mammography Cohort</td>
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**Examples of Major Clinical Trials:**
Women’s Health Initiative
Women’s Health Study
Physician Health Study

REQUIRED READING:
Willett Chapter One, page 4 “Correlation Studies” to and page 10 Chapter 16, p 357-362, up to “Types of Nutritional Policies.”

For discussion in next 3 classes: Rautiainen S, Lindblad BE, Morgenstern R, Wolk A. Total antioxidant capacity of the diet and risk of age-related cataract: a population-based prospective cohort of women. JAMA Ophthalmol. 2014;132(3):247-252. For this class, read the Introduction and Methods sections: Sample description (first section) and Identification of “Cases and Follow-up of the Cohort”

ADDITIONAL OPTIONAL RESOURCES:


Freudenheim JL. Study design and hypothesis testing: issues in the evaluation of evidence from research in nutritional epidemiology. Am J Clin Nutr 1999;69(suppl): 1315S-1321S.

Good discussion of study designs: Epidemiology: Beyond the Basics by Moyses Szklo and Javier Nieto (2nd edition, Jones and Bartlett Publications, 2007) pp3-42

Class 3: February 10

HOW STRONG IS DIET’S INFLUENCE ON DISEASE?: STATISTICAL TOOLS USED TO DESCRIBE AND INTERPRET EPIDEMIOLOGIC DATA

REQUIRED READING:
Willett chapter 1, page 10-13; chapter 13, page 327-328.

Odds ratios: p 212-216
Relative risk: p 223-224


ADDITIONAL OPTIONAL RESOURCES:
Chapter 8: Confidence Interval of the Difference or ratio of Two Proportions: Prospective Studies
Chapter 9: Confidence Interval of the Difference or ratio of Two Proportions: Case-Control Studies
Chapter 10: What is a P-value?
Chapter 18: Introduction to Regression
Chapter 19: Linear Regression
Chapter 31 Multiple Regression
Chapter 32: Logistic Regression
Chapter 33: Comparing Survival Curves
Chapter 38: The Big Picture, p303-306.


Good discussion of measures of associations in epidemiology including odds ratios and relative risks: Epidemiology: Beyond the Basics by Moyses Szklo and Javier Nieto (2nd edition, Jones and Bartlett Publications, 2007) pp 47-103

Class 4: February 12

LIFESTYLE AND OTHER CONFOUNDING FACTORS THAT MAY EXPLAIN OR ALTER RELATIONSHIPS OF DIET TO DISEASE AND HOW TO CONTROL FOR THEM; PHYSICAL ACTIVITY AND ENERGY ADJUSTMENT
REQUIRED READING:

Willett Chapter 1, page 10-13.
Willett et al Adjustment for total energy intake in epidemiologic studies. AJCN 1997 65 (S)1220-8
Chapter 11 p260-265; Summary on p 283.
Willett: Chapter 13- p317-319 (Multivariate analysis)


ADDITIONAL OPTIONAL RESOURCES
Willett
Chapter 10 Assessment of Physical Activity
Chapter 11 Implications of Total Energy Intake for Epidemiological Analyses
Chapter 12 Correction for the Effects of Measurement Error


Assignments:
- Diet Assessment Project Passed Out
- Diet Assessment Project Due

Class 5: February 17
MEASUREMENT OF NUTRITIONAL EXPOSURES I: OVERVIEW OF TECHNIQUES; OVERVIEW OF DIETARY EXPOSURES, ASSESSING DIET EXPOSURE WITH BIOLOGICAL MARKERS, ASSESSING DIET: INTRODUCTION AND VARIATION IN DIET

REQUIRED READING:
Willett W. Nutritional Epidemiology. Chapter 3, “Nature of Variation in Diet” (Overview- not details)


Willett W. Nutritional Epidemiology. Chapter 2, “Nutrients and Food”

ADDITIONAL OPTIONAL RESOURCES:
Willett W. Nutrition Epidemiology, Chapter 8, Biochemical Indicators of Dietary Intake


Assignments: Diet Assessment Project Due

Class 6, 7: February 19 and 24
MEASUREMENT OF NUTRITIONAL EXPOSURES II: ANALYSIS OF DIETARY DATA-DAILY AND FOOD FREQUENCY METHODS; NUTRIENT COMPOSITION AND SUPPLEMENT DATABASES

REQUIRED READING (CLASS 6):
Willett W. Nutritional Epidemiology. Chapter 5: Food Frequency Methods


REQUIRED READING (CLASS 7):
Subar AF, et al., “Comparative validation of the Block, Willett, and National Cancer Institute food frequency questionnaires: the Eating at America’s Table Study.” AJE. 2001;154(12):1089-99.

Willett W. Nutritional Epidemiology. Chapter 6 Reproducibility and Validation of Food Frequency Questionnaires

ADDITIONAL OPTIONAL RESOURCES:
Willett W. Nutritional Epidemiology. Chapters 4 and 5: 24-hour Recall and Food Record Methods and Food Frequency Methods


References:


MEASUREMENT OF NUTRITIONAL EXPOSURES III: DISCUSSION OF DIET ASSESSMENT
PROJECT: THE ESTIMATION OF AND EFFECTS OF MEASUREMENT ERROR; CALIBRATION AND VALIDATION STUDIES

REQUIRED READING:

Please look at briefly:

Kipnis V and Freedman LS. “Impact of Exposure Measurement Error in Nutritional Epidemiology.” JNCI. 2008;100:1658-9 and parent article:


ADDITIONAL OPTIONAL RESOURCES:

Willett W. Nutritional Epidemiology Chapter 6, “Reproducibility and Validity of Food Frequency Questionnaires and Chapter 12, “Correction for Measurement Error”


DIET ASSESSMENT RESULTS DISCUSSION (Dr. Rakesh Ghosh) 20 minutes

A BROADER LOOK AT NUTRITION- DIETARY PATTERNS. TOOLS TO STUDY THEM AND TO EVALUATE THEIR RELATION TO HEALTH AND DISEASE:

EXAMINE MAJOR DIETARY PATTERNS WHICH REFLECT: ADHERENCE TO US DIETARY GUIDELINES, MEDITERRANEAN DIET PATTERNS, DASH DIET PATTERNS

REQUIRED READING:

WILLETT CHAPTER 13, PAGE 319-322.

ADDITIONAL OPTIONAL RESOURCES:


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<tr>
<th>Class 11: March 9</th>
<th>ANALYTIC STRATEGIES TO EVALUATE GENETIC AND OTHER FACTORS MODIFYING DIET AND DISEASE RELATIONSHIPS: Resources for genetic data in epidemiological studies</th>
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| Class 12: March 11 | HISTORY LESSONS: In search of the Magic Bullet Beta-Carotene, Folate, Fish oils, Vitamin D Discussion of Midterm and Final Projects Groups Meet to Discuss Final Project |


| Class 14: March 18 | INTERPRETING THE EPIDEMIOLOGIC LITERATURE: FINAL PAPER GROUP 1: To be announced |

| Class 15: March 30 | INTERPRETING THE EPIDEMIOLOGIC LITERATURE: FINAL PAPER GROUP 2: To be announced |

| Class 16: April 1 | INTERPRETING THE EPIDEMIOLOGIC LITERATURE: FINAL PAPER GROUP 3: To be announced Take Home Final Quiz Passed Out Final Quiz Due with Final papers on April 8 (In Learn @ UW Drop Box) |

EVALUATIONS