COURSE OBJECTIVES: The course introduces students to key concepts and methods in Nutrition Epidemiology in order to equip them with the tools needed to design, analyze, and critically evaluate population-based nutrition research. Through team-based discussions, lectures, computer exercises, and homework, this course aims to provide students with hands-on experience in selecting nutritional measures, and in analyzing and interpreting data. The course is intended for second year Master’s students and first or second year PhD students depending on experience; knowledge in nutrition is desirable but not required. Prerequisites include basic biostatistics and introductory epidemiology. Two major themes are addressed.

I. Measures. The course will discuss and debate the utility of alternative methods for nutritional measures in three major areas: (i) dietary intakes (foods, nutrients, non-nutrients, diet patterns, food contaminants); (ii) nutritional status including obesity; and (iii) various dimensions of physical activity and inactivity. An in-depth understanding of these measures is fundamental for correctly interpreting and evaluating nutritional epidemiology literature, which is essential for successful practice and research in clinical as well as public health nutrition.

II. Analysis, interpretation and critical evaluation. Appropriate data analysis, taking into account issues such as measurement error and bias, is also essential for effective research that reaches valid conclusions. To provide practical experience on this issue, the course includes a hands-on introduction to the analysis of nutritional data, as well as active participation in interpreting and evaluating the analytic methods applied in published research.

Competencies: Students are expected to gain competency in the following areas:

1. Describe strengths and weaknesses of common dietary assessment methods in the context of particular populations and specific research topics.

2. Evaluate and propose appropriate dietary assessment methods for different research scenarios, study designs, and practical constraints (e.g. subject burden, budget), including proposing modifications to existing instruments.

3. Describe the primary strengths and weaknesses of common methods used in epidemiological research to assess (a) nutritional status, with an emphasis on obesity; and (b) physical activity. Students should be able to evaluate these strengths and weaknesses in the context of their application to specific population groups and particular research topics.

4. Evaluate and suggest appropriate measures of obesity and physical activity for particular research scenarios and study designs, keeping in mind practical constraints.

5. Critically interpret and evaluate scientific literature in nutritional epidemiology taking into account issues such as: the appropriateness of the study design and measures used for the research question; potential sources of error or bias; and adequacy of the data analysis approaches used.

6. Be equipped to conduct or help to guide the basic (Master’s) or intermediate/advanced (PhD) analysis of nutritional epidemiology data involving measures of dietary intake, including addressing potential confounding by energy intake.

Tuesdays and Thursdays, 9:30-10:45
235 Rosenau Hall
* Indicates separate breakout groups for doctoral vs. MPH students in Rosenau 241
**Recommended Textbooks (HSL library and NUTR student room)**

- Willett W. Nutritional Epidemiology.
- Hu FB. Obesity Epidemiology.

**Instructors**

- Michelle Mendez, McGavran-Greenberg 2205A and 137 E Franklin St, Carolina Population Center (office hours Tuesdays, 10:50-11:50 and by appointment)
- Co-instructor: Sandra Albrecht, 137 E Franklin St, Carolina Population Center (office hours TBA and by appointment)

**Teaching assistants**

- Xiaofan Xu, [xiaofanx@live.unc.edu](mailto:xiaofanx@live.unc.edu) (office hours TBA)
- Nancy Lopez, [nancylo@live.unc.edu](mailto:nancylo@live.unc.edu) (office hours TBA)

**Grades** will be based on:

- **Active** participation in class exercises/case studies: 10 points
- Epi quiz: 5 points
- Homework assignments (diet data tools; food composition; group in-class physical activity exercise): 15 points
- Mid-term exam: 20 points
- Group analysis project: Introduction to data analysis in nutritional epidemiology: 20 points
- Final paper (3-5 pages): 30 points

**Turning in assignments**

- Please save all files as Word Docs with the following convention: `assignment_lastname_first name.doc` or `assignment_group#.doc` for group work.
  
  Examples: `hw1_smith_ann.doc` / `projectpart1_group1.doc`

- Post all individual assignments by the due date to your personal Dropbox on Sakai. For all group assignments, please post your assignments by the due date to your Group's Drop Box. These will be located under Resources--->Assignments and Project --> Group DropBox --> [individual groups that only members and instructors can see].

- We will also use your respective Dropboxes to return all assignments to you.
DETAILED SYLLABUS WITH READINGS

EPIDEMIOLOGY CONCEPTS & METHODS REVIEW: RECOMMENDED – Date TBA

**Learning objectives**: Review basic study designs, interpretation of different measures of association, potential sources of bias (e.g. selection, information bias such as recall bias, confounding), and criteria for causal relationships. The main objective is to provide a solid review for students who have had only a brief introduction to basic epidemiology methods and concepts. **There will be a quiz based on material covered.**

A. INTRODUCTION TO THE COURSE – Tuesday Jan 12

[A1] **Introduction to nutritional epidemiology**: Overview of the scope of nutrition epidemiology; syllabus review exercise [MM].

[A2] **Case study**: Adapting a dietary assessment tool to meet study aims -- group exercise. [MM]

**Learning objectives**: Introduce objectives and challenges in nutritional epidemiology research. Review the broad scope of the field and how it relates to class members diverse interests. Discuss challenges involved in appropriately measuring variables of interest: diet, activity, and nutritional status; illustrate with case study.

**Required readings**: None for this class; *please begin readings AND preparation for Thursday.*


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PART 1: MEASURES OF DIET, NUTRITIONAL STATUS AND PHYSICAL ACTIVITY

B. ASSESSMENT OF DIETARY INTAKES: Participant perspectives – Thursday Jan 14

[B1] **Small group brainstorming** [35 min]: The participant perspective on dietary assessment—how might factors such as time required, cognitive burden, and social desirability affect intake reporting? Students will meet in small groups to develop and present a list of pros and cons of using alternative methods to assess usual intake of major food groups, keeping in mind the perspective of the respondent as well as the researcher. Draw on personal experiences from the assignment, which involves completing various dietary assessments. **Integrating readings**: Be prepared to integrate/discuss Thompson et al (especially Table 1) and Scagliusi et al (especially paragraph 3 of results and Table 3) in developing your pros and cons.

[B2] **Dietary assessment overview lecture**: Building on the group activity, the lecture/discussion will review the main methods for dietary assessment, focusing on strengths and limitations of each approach. We will briefly review potential goals of dietary assessment (e.g. estimate intakes of various dietary factors to assess compliance with guidelines, assess nutrient status, evaluate a policy or intervention program, or evaluate relationships with health outcome). [30 min MM]

**Learning objectives**: Heighten awareness of how alternative dietary assessment methods and participant characteristics may influence the quality/validation of self-reported dietary data.

**Required readings**:


Suggested readings:
- Hu textbook, pp 84-88.
- Willett textbook, pp. 4 to 148.

Required class preparatory activities:
Complete a 24-h recall, a diet record, an FFQ, and a fruit/vegetable screener found at:
1. Automated web-based 24h recall: http://asa24demo.westat.com/ [input at least 2 meals]
2. Diet record/diary: use format shown here: http://www.nhlbi.nih.gov/health/educational/lose_wt/eat/diary.htm [input at least 1 large meal, noting ingredients in as much detail as possible (oils, condiments, etc.)]
3. Food frequency questionnaire [the NCI Diet History Questionnaire]: http://appliedresearch.cancer.gov/archive/dhq2/dhq2_pastmonth.pdf [complete at least 50%];

C: ASSESSMENT OF DIETARY INTAKES: Intake assessment for research needs – Tuesday Jan 19

[C1] Small group case studies - dietary assessment consulting [15 min small group discussion/20 min class feedback to groups]. The researcher perspective on dietary assessment. Each group has been asked to advise a research group on appropriate dietary assessment methods for one of the following studies: (a) a randomized weight loss intervention in overweight and obese adults involving reduced sedentarism and dietary behavior changes (e.g. increased fruit and vegetable intakes); (b) a case-control study on dietary risk factors (e.g. fruit/vegetable or cereal fiber; probiotics) for irritable bowel syndrome, believed to develop over many years, and (c) a prospective study which will explore diet quality (e.g. fruit and veg intake) and incident obesity in a small multi-ethnic cohort of 9-10y old children, and (d) a prospective cohort study on maternal diet during pregnancy and infant neurodevelopment at one year of age, with a particular interest in fish consumption. As limited resources are available for collecting these data, the researchers have asked about the possibility of using low-cost approaches such as web-based methods, or brief tools. What approach will you suggest they use to collect dietary data? Justify your recommendation. Integrating readings: Keep in mind to mention in your justification any relevant findings from Bingham et al (esp Table 4 and Figure 1), Mendez et al (esp Figure 2, Table 3 and Methods), and Martínez-González et al (e.g. Table 3).

[C2] Strengths, weaknesses and validity of dietary assessment methods: Building on small group activity, review typical sources of error and bias in estimates of dietary intake including variation; approaches for validating intakes [35 min MM]. Learning objectives: Provide insights on how the choice of dietary assessment method depends on study goals and designs.

Required readings:
Suggested readings/for future reference:

HW1. Begin homework assignment 1 (due Jan 22)—dietary assessment comparisons: Students will review and compare reported intakes of energy and selected nutrients (dietary fat, fiber) obtained using 24-h recalls, diet records and an FFQ.

D: DIETARY PATTERNS - Thursday Jan 21*

[D1] Dietary patterns lecture: Rationale for studying dietary patterns. Methods for developing and analyzing patterns that account for health effects of multiple dietary factors in dietary patterns [30 minutes]

[D2] Debate on dietary pattern methods*: The class will break into groups to debate the pros and cons of assessing dietary patterns using either (i) an a priori method (eg Mediterranean diet scores, Healthy Eating Index) or (ii) data-driven methods (e.g. factor or cluster analysis). [10 min brainstorming, 20 min debate].

Integrating readings: In your debates, build on information from Reedy et al Table 1 (overview of interpreting different types of patterns); Fung et al methods section (especially methods section on construction of alternative a priori indices), and Varraso et al (results table illustrating distribution of food intakes across factor scores).

Learning objectives: To discuss how synergies in health effects of multiple foods/nutrients can be potentially relevant for health outcomes. To raise awareness of the difference questions being addressed by research applying a priori vs. data-driven methods for developing dietary patterns. To discuss the relevance of exploring diet-disease relationships at multiple levels, including individual nutrients and foods as well as overall patterns.

Required readings:

Breakout readings, doctoral students: Recent exploratory and a priori methods for dietary patterns.

Suggested readings/future reference:

E. ASSESSMENT OF NUTRITIONAL STATUS I – Tuesday Jan 26

[E1] Assessment of nutritional status, part 1 [60 min lecture with integrated discussion] Use and interpretation of anthropometric and more direct measures of body composition/adiposity; sources of error and bias; relationships between anthropometry and measures of adiposity; use of multiple measures of obesity. Readings: Be prepared to discuss table 4 and Figure 2 of Janssen et al.
Learning objectives: Highlight sources of error and bias in anthropometric as well as direct measures of obesity (e.g. inter-observer variability, bioelectric impedance prediction equations), differences in interpretation, and strengths as well as limitations of various measures.

Required readings:
-Janssen I, Mark AE. Separate and combined influence of body mass index and waist circumference on coronary artery disease risk factors among children and adolescents. Pediatrics. 2005 June;115(6):1623-30. Be prepared to discuss Table 4 and Figure 2.

Suggested readings/future reference:

Upload HW1 to your Drop Box by Jan 26: Comparison of dietary assessment methods

F. ASSESSMENT OF NUTRITIONAL STATUS II – Thurs Jan 28

[F1] Assessment of nutritional status, part 2 [60 min SA or MM with integrated discussion] Use and interpretation of anthropometric and more direct measures of body composition/adiposity; sources of error and bias; relationships between anthropometry and measures of adiposity; use of multiple measures of obesity.

Required readings:
-Begin readings to help prepare debate in next session, below.

G. ASSESSMENT OF NUTRITIONAL STATUS III – Tues Feb 2
[G1] **Small group debates** on two topics: 1) Should different BMI cutpoints be used for different ethnic groups when comparing adult overweight and obesity across the globe? And 2) Should a single waist circumference criterion be used for all US children and adolescents or should ethnic group specific criterion be utilized? **Readings:** Be prepared to cite the assigned readings to support the side of the debate to which you are assigned.

[G2] **Assessment of nutritional status, part 3:** Building on the debate, review approaches to the assessment of obesity in global and diverse populations [30 min SA or MM]

**Learning objectives:** Highlight variable associations between direct measures of adiposity and anthropometry across populations.

**Required readings:**

**Breakout readings:** Challenges in interpreting measures of obesity and adiposity.

**Suggested readings/resources for future reference:**

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**H. ASSESSMENT OF NUTRIENTS AND NON-NUTRIENTS I: BIOMARKERS – Thurs Feb 4**

[H1] **Biomarkers** in nutritional epidemiology: Challenges and considerations in the use of biomarkers as proxies or gold standards of dietary intakes, including variability related to within-person/daily changes, seasonal effects, genetic and other influences on metabolism, and factors that may impact bioavailability and turnover. [30 minutes]

[H2] *Group discussion on (a) impact of factors such as supplement use, tobacco, alcohol and genetics on the interpretation of biomarker vs. dietary intake measures of vitamin C, (b) use of biomarkers in the validation and calibration of dietary instruments. Integrating readings:** Be prepared to discuss Table 4 of Prentice et al, which shows associations between energy intake and different types of cancer before and after biomarker calibration.

**Learning objectives:** Review biomarker media reflecting dietary intakes (blood, urine, adipose tissue, nails, hair), the interpretation of different types of biomarkers (concentration, recovery, replacement), and factors that influence biomarker variability. Describe the use of biomarkers to validate, calibrate and substitute for intake estimates, and limitations such as the absence of reliable markers for many diet components.

**Required readings:**
- Hu, Obesity Epidemiology, pp 88-100

**Breakout readings:** Challenges in interpreting nutrient biomarkers.


**Suggested readings for future reference:**


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**I. ASSESSMENT OF NUTRIENTS II: DEVELOPMENT AND USE OF FOOD COMPOSITION TABLES – Tues Feb 9**

[1] Part 1: Overview of major food composition resources, challenges in linking intake data with FCTs, and the range of dietary factors of interest to estimate using FCTs (n-3s, PAHs, glycemic index, antioxidant capacity) [20 min].

[2] Part 2: Methods being used to improve the precision of FCT data by the UNC Food Research Program (FRP) [50 min]. In-class exercise by FRP.

**Learning objectives:** Introduce the challenge of compiling sufficiently valid food composition data. Review major sources of food composition data and potential discuss sources of error, including variability in nutrient content and missing values.

**Required readings:**


**Suggested readings/resources for future reference:**


-Gibson R. Principles of Nutritional Assessment, Chapter 4, pp 65 through 69.


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**Begin HW2 (due Feb 12):** Short exercise on adapting food composition data for use in a global context.
J. PHYSICAL ACTIVITY ASSESSMENT AND ANALYSIS – Thurs Feb 11

[J1] Physical activity assessment and analysis: Critical review of subjective and objective methods for measuring different types of physical activity, sedentarism and energy expenditure [40 min SA or MM].

[J2] Start group homework exercise in class (due Feb 19) on the challenges of physical activity assessment using self-reports. Short group exercise will critically evaluate the ability of alternative physical activity questionnaires to rank subjects with respect to activity-related energy expenditure, compared with more detailed data from an activity diary.

Learning objectives: Review of main methods for assessing self-reported and objective measures of physical activity and inactivity (recalls, records and other questionnaires; pedometers, accelerometers, heart rate monitoring, doubly-labeled water). Critical assessment of the strengths and limitations of alternative approaches.

Required readings:

Suggested readings:

Preparatory activity: Become familiar with accessing the statistical analysis software STATA via the UNC virtual computing lab (VCL), which we will begin to use in the next class. [https://vcl.unc.edu/index.php?mode=selectauth]

PART 2 -- ANALYZING/INTERPRETING DATA

K. INTRODUCTION TO DATA ANALYSIS INCLUDING HYPOTHESIS GENERATION– Tues Feb 16

[K1] Introduction to data analysis issues lecture: Integrating hypothesis generation, design and analysis [30 min].

[K2] *Prepare to begin data analysis lab project, part 1 (DUE FEB 25): Overview of STATA commands for descriptive analyses. Descriptive analysis: begin estimating food group intakes from FFQ data, and estimating the prevalence of child overweight [30 minutes, TAs].

Learning objectives: Developing study hypotheses and specific aims in nutritional epidemiology; introduction to conducting appropriate basic data analyses in nutritional epidemiology.

Required readings: None

Suggested readings:
Upload HW 2 to your Drop Box: adapting food composition data for use in a global context.

L. DATA ANALYSIS: CONFOUNDING AND EFFECT MODIFICATION Thurs Feb 18

[L1] Data analysis and study design continued: Confounding and interactions [30-40 mins].

[L2] *Group discussion (30 mins): How might socioeconomic, lifestyle and community factors influence reported intakes and diet-disease associations?  What are other key potential confounders or diet-disease associations?  –Readings: Kesse et al (especially Figure 1).  Be prepared to brainstorm about the types of community and policy as well as individual factors they think may influence patterns and trends in diet and physical activity, and whether/how these factors should be taken into account in study designs and analyses.

Learning objectives: Reinforce understanding of the concepts of confounding and effect modification, how these concepts differ, and how multivariate analyses can try to address these issues. Discuss lifestyle, socioeconomic and sociodemographic (disparities) factors, as well as other dietary variables, as potential confounders in diet-disease research.

Required readings

Suggested readings:

Upload group HW3 to group dropbox: physical activity measures.

M. DATA ANALYSIS: ENERGY ADJUSTMENT – Tues Feb 23


[M2] Continue work on data analysis project, part 1; begin part 2.

Learning objectives: Overview of alternative methods for adjusting for total energy intake and of how to interpret adjusted intake measures. Introduce the use of alternative dietary measures to calibrate intake data.

Required readings:

Suggested readings:
-Hu text pp 101-108
-Willett text pp 288-298, also 273-288

N. STUDY DESIGN ISSUES – Thurs Feb 25

[N1] Study designs: Ecological, cohort, case-control and cross-sectional studies; Randomized Trials vs. Observational studies: Lecture with integrated discussion on strengths and weaknesses of different designs
to keep in mind when evaluating the nutrition epi literature. Introduce and reinforce key considerations in developing and evaluating randomized trials and intervention studies, highlighting strengths and limitations of interventions and RCTs relative to observational designs. The lecture will also introduce students to the methods and aims of important nutrition intervention studies such as DASH and DPP. Class discussion will assess the strengths and limitations of different designs for varied research questions.

**Learning objectives:**
Reinforce the potential impact of issue including basic designs, sample selectivity (poor response rates, loss to follow-up, missing data) and information bias (recall bias, measurement error, systematic misreporting) on estimates of diet-disease relationships. Review strengths and limitations of interventions and RCTs relative to observational designs. Highlight the critical importance of the randomization process in RCTs.

**Required readings:**

**Suggested readings:**

O. ANALYZING AND INTERPRETING NUTRITION EPI DATA – Tues Feb 29

**[O1] *Evaluating a nutrition epidemiology study:* Students will form groups to conduct a case study based on the Halton et al paper below on approaches to critically evaluating, in depth, an individual nutrition epidemiological study, including use of the STROBE guidelines. This exercise will build on issues addressed in class to date (e.g. study design, measures used, error and bias, confounding).

**[O2] *Data analysis project, part 2 continues (DUE MARCH 17).*

**Required readings:**

Begin take-home mid-term: Due on March 10.

Turn in data analysis lab project, part 1 (Post it to your group’s dropbox).

P. CRITICAL REVIEW OF NUTRITION EPI LITERATURE, CASE STUDY – Tues March 1

**[P1] Case study: conducting a critical review of nutritional epidemiology literature [30 min lecture].

**[P2] *Small group case study exercise [20 min small groups/20 min class discussion]: Each student group will propose the design for a new study to increase knowledge on the topic presented, taking into account**
limitations of existing literature presented in class. Proposed projects will be presented to the class, highlighting how the design they propose addresses weaknesses of earlier studies to contribute new knowledge. Class discussion will focus on common design ideas across groups, as well as strengths and weaknesses of any differences in proposed designs.

Q. EVALUATING NUTRITION EPI LITERATURE – Thurs March 3

| Q1 | Evaluating the Nutrition Epidemiology Literature: Evaluating the literature to guide practice, policy, interventions or programs, and new research. Guided discussion. *Students will form groups to discuss the development and use of the nutrition evidence library. Larger groups will then convene to discuss and debate key considerations in evaluating nutritional epidemiology literature, including intervention studies/trials as well as observational studies. |

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<th>Required readings/preparation:</th>
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<tr>
<td>Review selected topics of interest in the Nutrition Evidence Library (to be selected by popular vote) <a href="http://www.nel.gov/">http://www.nel.gov/</a>.</td>
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R. CONTINUE DATA ANALYSIS LAB PROJECT– Tues March 8

| R1 | *Data analysis lab project part 2, begin part 3 (DUE MARCH 24): Continue data analysis project work (i) begin to estimate the bivariate association between intakes of these food groups and child overweight. (ii) multivariate analysis of the association between selected food groups and child obesity. |

<table>
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<th>Learning objectives:</th>
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<td>Introduction to evaluating the literature: the potential impact of factors including (among others) definitions of intake variables, ranges of intake or exposure, and data analysis approaches on individual study results, and implications for evaluating a body of literature. Define different types of reviews: non-systematic eg state-of-the-art, systematic review and meta-analyses.</td>
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S. CONTINUE DATA ANALYSIS LAB PROJECT– Thurs March 10

| S1 | *Data analysis lab project part 2, begin part 3 (DUE MARCH 24): Continue data analysis project work (i) begin to estimate the bivariate association between intakes of these food groups and child overweight. (ii) multivariate analysis of the association between selected food groups and child obesity. |

<table>
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Upload take-home midterm by 5pm. Spring break, March 11 - 20

T. CONTINUE DATA ANALYSIS LAB PROJECT—Tues March 22

[T1] *Continue data analysis lab project part 2, begin part 3 (DUE APRIL 1): Continue data analysis project work (i) begin to estimate the bivariate association between intakes of these food groups and child overweight. (ii) multivariate analysis of the association between selected food groups and child obesity.

U. MID-TERM REVIEW—Thurs March 24

[U1] Review of mid-term exam in class.

[U2] *Continue final analyses for lab project: Students will complete analyses to identify subjects with implausible energy intakes, and evaluate the effect of excluding or adjusting for implausible energy reporters in their multivariate analysis.

V. MID-TERM REVIEW—Tues March 29

[V1] Presenting findings in nutritional epidemiology: Continue final element of data analysis project. Students will begin to develop an abstract and tables/figures to summarize and present their key findings.

PART 3 – SPECIAL TOPICS AND CASE STUDIES

W. CRITICAL THINKING ON VARIABILITY IN NUTRITION MEASURES—Thurs March 31

[W1] *Critical thinking on variability in nutrition measures. Discussion and review on the importance and impact of within- vs. between-person variability in diet and physical activity.

Suggested readings:


X. INTEGRATIVE APPROACHES TO EPIDEMIOLOGIC RESEARCH: CASE STUDY 1—Tues April 5

[X1] Case study 1: Junk food** diets and health – linking biochemistry and mechanisms with research designs and intervention/policy implications. Brief lecture. *Group case study discussion.

Learning objectives: Promote critical thinking in linking biochemistry, epidemiology and intervention/policy.

Required readings:
Y. INTEGRATIVE APPROACHES TO EPIDEMIOLOGIC RESEARCH: CASE STUDY 2 – Thurs April 7

Case study 2: Sugar sweetened beverages diets and obesity – linking biochemistry and mechanisms with research designs and intervention/policy implications. Students will be assigned roles with different areas of expertise in this translational case study. As panels of experts in the areas of nutritional biochemistry, epidemiology and intervention/policy, each group will be asked to provide perspectives to a school committee regarding the possible mechanisms linking SSB to energy intake and obesity based on their area of expertise and knowledge available at the height of early debates on this topic. Students will also be asked to evaluate the epidemiologic evidence supporting this link, and focusing on evidence that SSB-related policies will lead to a reduction of caloric intake and/or weight loss in school children.

Learning objectives: Promote critical thinking in linking biochemistry, epidemiology and intervention/policy.

Required readings for each panel:

a) Nutritional biochemistry experts:

b) Epidemiology experts:

c) Intervention and policy experts:
**Z. INTEGRATIVE APPROACHES TO EPIDEMIOLOGIC RESEARCH: CASE STUDY 3—Thurs April 12**

**[Z1] Large group case study.** — using nutritional epidemiology in public health practice. A case study involving quantitative considerations for local-level policies related to menu labeling. This case study is motivated by a kind of problem you can encounter as a chronic disease epidemiologist working in a health agency. In evaluating health-related bills, the legislature may request an assessment of policy impact for the local population. We will consider the specific question of menu labeling. The article by Kuo et al provides a general illustration of the exercise. *In particular, please study table 1* to understand the logic of their approach. In class, we will evaluate Kuo’s model inputs and assumptions, and consider the effects of input modifications on estimated impact.

**Learning objectives:** Promote an understanding of the role of nutritional epidemiology in applied public health / public health practice. Issues to consider include how to identify appropriate data sources, how to summarize and evaluate the evidence base, how to apply evidence to the relevant population, including how to quantify potential impact of proposed policies on populations.

**Required readings:**

**AA. NUTRITION MONITORING AND SURVEILLANCE – Thurs April 14**

**[AA1] Nutrition monitoring and surveillance (B Popkin):** Sources and applications of global and local nutritional surveillance data and their strengths and limitations.

**Learning objectives:** Provide a framework for discussing how to promote scientific progress in nutritional epidemiology.

**BB. GLOBAL RESEARCH CASE STUDY – Tues April 19**

**[BB1] *Critical thinking global case study:** Nutritional epidemiology studies in a global context. How do we adapt to international nutritional cultures and conditions? How do we develop and test appropriate hypotheses for these contexts building on prior evidence from both epidemiology and biochemistry? These issues will be addressed via a case study: The Ministry of Health in Ecuador is interested in looking at respiratory health (asthma) and diet as a protective factor. They have proposed initiating a prospective longitudinal cohort study of elderly (65+ y) men and women in Ecuador. You have been asked to consult on the development of an FFQ for assessing dietary intakes at baseline in the elderly. No FFQ currently exists in Ecuador. While you may or may not agree with this choice of dietary assessment instrument, it is all that the Ministry of Health can afford at this time (it is costly to training dieticians to collect multiple standardized 24-h recalls as well as to subsequently develop methods to convert data on many hundreds of food and beverages reported in recalls to estimate energy and nutrient intakes). Objective: Based on the research question, the objective is to measure intakes of key antioxidant nutrients, zinc, vitamin D, and other
nutrients thought to be potentially most relevant for respiratory health outcomes (infections, wheeze, asthma), a public health concern for this age group in Ecuador. It is also important to note that there may be regional and seasonal differences in dietary intakes. Your task during the class period will be to develop a proposal for how you will develop the FFQ and design a study to validate it.

Learning objectives: Promote critical thinking on adapting to the global context in conducting nutritional epidemiology research. Promote integrative thinking on multi-disciplinary testing of hypotheses.

Required readings:
-Examples of Ecuadorian diet: http://www.thelatininkitchen.com/recipe-origin/ecuadorian-food-recipes
-Pennington JAT. Applications of food composition data: Data sources and considerations for use Journal of Food Composition and Analysis 21 (2008) S3–S12 [See especially sections 2.3 2.4 and 2.5]

CC. GENETICS IN NUTRITION EPIDEMIOLOGY– Tues April 19
Genetics in nutritional epidemiology (guest lecturer Kari North): Integrating genetic variation and epigenetics in nutritional epidemiology studies: essential concepts and methods.

Learning objectives: Provide background on how genetic factors may be an important influence on associations between nutritional exposures and health outcomes, and describe different approaches to gene-environment analysis. Briefly introduce the potential relevance of nutritional influences on epigenetics for some research topics.

DD. ANALYSIS PROJECT REVIEW – Thurs April 21
Review of data analysis project. We will review and discuss lessons learned from the laboratory project designed to introduce students to data analysis considerations in nutritional epidemiology. Students will discuss how they would design and analyze data from a new project on the study topic.

BEGIN TAKE HOME FINAL EXAM: CRITICAL COMPARATIVE ANALYSIS OF NUTRITIONAL EPIDEMIOLOGY LITERATURE

EE. ANALYSIS PROJECT REVIEW PART 2 – Tues April 26

FF. WRAP UP SESSION – Thurs April 28
Review of lessons learned and implications for future directions in nutritional epidemiology.

Upload your FINAL EXAM to your Drop Box. Due on MAY 2