Graduate Group in Epidemiology and Biostatistics
EPID 7040: Methods for Social Epidemiologic Research
Spring 2025

Overview

Social epidemiology is "the branch of epidemiology that considers how social and environmental interactions and intersections and collective human activities affect health" (Oakes and Kaufman). More specifically, social epidemiology focuses on understanding how sociobehavioral, environmental, economic, and political factors influence the distribution and determinants of health and disease in populations. It emphasizes the role of social structures, relationships, and contexts in shaping health outcomes and health disparities. This branch of epidemiology focuses on complex, multifactorial systems in populations, thus setting it apart from "traditional" or other domains of epidemiology, while not restricting its reach to disease, but addressing health outcomes in the broadest sense. Accordingly, social epidemiology requires an expansion of the methods used in those other domains and includes those borrowed from the social sciences such as path analysis, structural equation modeling, generative methods including agent-based models, ethnographic and mixed methods research, and social network analysis. This course focuses on these methods, but in the context of social phenomena such as sex and gender, race and ethnicity, socioeconomic status and poverty, neighborhood characteristics, and built and socially constructed environments in which people interact.

This is a seminar course. As such, we adhere to the traditional principles and format of the seminar model, which means:

- Lots of reading and thinking and discussing!
- We will focus on guided readings and discussion.
- There is a premium on participation in our sessions together.
- We are focusing our efforts on mutual *discovery* and planting the seeds (that's why it's called a *seminar)* for future work in social epidemiology and related fields. All of us will be learning from each other, with respect for and consideration of our varied backgrounds and lived experiences.

Class structure

Each class will generally follow the same schedule

- Discussion of assigned reading (30-60 minutes)
    - We will discuss any questions you have about the reading, and I will ask a few questions of you to stimulate discussion.
- Journal Club (60-90 minutes)
    - We will discuss the paper(s) that is/are up for review for the week's journal club. I will call upon one of you to review the/a, offering a brief summary as well as a critical appraisal of its strengths and weaknesses.
- Introduction of next week's material (30 minutes)

A note about journal club

Journal clubs are an excellent way to explore a topic, exchange ideas, and react to what others (authors as well as your classmates) think about what has been written on that topic. Typically, one person will present an article and questions about it to the class. From there, the focus shifts from the presenter to everyone, who will join in the discussion. It is assumed that the presenter will have critically appraised the article, but everyone is expected to contribute to the appraisal during the discussion. There are helpful documents in *Files*|*Journal Club Tips* on Canvas.

I will indicate the articles for journal club at the end of each class, and they will be available in the *Files|Readings for journal club* folder on Canvas.

Participating faculty
Course director and facilitator: John H. Holmes, PhD

Course units
This is a 1.0cu course.

Class meetings: Mondays, 10:15-1:15pm, Room 940 Blockley Hall

Pre-requisites
EPID 7010, or equivalent; One semester of graduate-level biostatistics; Instructor permission.

Course structure
The course is designed around six modules, each focusing on a major area of epidemiologic research principles. Each module (except for the last) consists of a series of sessions which are dedicated to a specific topic or method:

- Introduction to social epidemiology
- Measures and measurement in social epidemiology
- Design and analysis 1
- Design and analysis 2
- Design and analysis 3
- Design and analysis 4

Course materials and resources

- Texts
    - Oakes and Kaufman: *Methods in Social Epidemiology*. Second Edition. Available online at the Penn Library, but it is a good reference to have on the bookshelf!
- Selected readings from the epidemiologic literature for journal club are provided in the *Files|Readings for journal club* folder on Canvas, in the subfolder for each week.
- Documentation for the labs is in Files|Labs|{specific lab materials}
- This syllabus Is located in Files|Syllabus.

Learning outcomes
After completing this course, you should be able to:

- Describe the concept of a syndemic and offer two examples- one historical and one recent.
- Demonstrate ability to develop a variety of observational and analytic study designs as they apply to social epidemiologic inquiry.
- Demonstrate an understanding of the social, behavioral, and environmental science foundations of social epidemiology.
- Demonstrate ability to critically assess literature in social epidemiology, positioning the assessment in the larger landscape of social sciences.
- Develop the data collection procedures for a social network analysis.
- Demonstrate and comment on an analysis of a social network.
- Create a simple agent-based model to illustrate the effects of social structure and personal behavior on a population health problem.
- Design and implement a mixed-methods study for investigation of a complex health problem that occurs within a social, behavioral, environmental, and policy context.

Performance evaluation

The grade for the course will be based on the following:

- *Lab exercises (10% each)*. There are three laboratory exercises: social network analysis, agent-based models, and mixed methods. The assignment for each is to set up the appropriate software to investigate a research question of your choice, and then to write a 2-3 page paper describing the investigation and conclusions you draw from it, as well as a paragraph on limitations and another on how you might extend or apply this work in the future.
    - *Each lab is due on Canvas by 11:59pm the day before the next class*
- *Final project (60%)*
    - Students will submit an eight to 10-page written report on their project, using this outline as structure:
        - Description of the problem domain
        - Background/prior work
        - Formulation of a research question
        - Specific aims for a project to address the research question
        - Outline of methods to address the research question
            - Study design
            - Target population
            - Data source(s)
            - Sampling methods
            - Analysis plan
    - Group projects are allowed and encouraged, but the work must reflect the effort of all students in the group. Extra time will be allotted for the presentation, proportional to the number of students in a group.
    - *The final project due on Canvas by 11:59pm on May 13.*
- *Engagement (10%).* You are expected to participate actively in the seminar discussions and labs. This means that you are expected to attend each session, and if the spirit moves, join in on the discussion. FYI, this is an easy 10% to get! You will have to miss a number of classes, not speak up during our discussions, or not post to the chat or on the discussion board in order to lose these points.

About the use of large language models

No large language model (LLM)-driven chatbots, including ChatGPT, will be accepted as a credited author in your work. All cited author attributions included in your answers must demonstrate accountability for the work, and LLM tools cannot take such responsibility. As a result, students are not allowed to copy (in part or in whole) or cite (in part or in whole) any result from a query posed to a LLM application. In some cases, you may be approved for the use of LLMs for specific tasks; however, use without prior approval is not allowed.

Class Schedule

Note: Chapter numbers refer to Oakes and Kaufman

Week	Module	Topic and readings
1 **1/15**	**Introduction**	• Introduction to the seminar • Fundamentals of complex systems and social epidemiology • Syndemics: Key concepts and case studies • Theoretical frameworks
2 **1/27**	**Key concepts and Measurement**	• Ch. 2: SES • Ch. 4: Poverty
3 **2/3**		• Ch. 3: Race and Ethnicity • Gender, sexual orientation, and health
4 **2/10**		• Ch. 6: Segregation • Ch. 7: Neighborhood contexts • Social capital and cohesion
5 **2/17**		• Ch. 5: Disparities • Intersectionality
6 **2/24**	**Design and Analysis 1**	• Observational designs for social epidemiology • Ch. 9 Social network analysis
7 **3/3**		**Lab: Social network analysis**
8 **3/10**	**Spring Break**	
9 **3/17**	**Design and Analysis 2**	• Ch. 8: Community-based Participatory Research • Ch. 11: Community trials • Ch. 19: Natural experiments
10 **3/24**	**Design and Analysis 3**	• Simulation studies • Agent-based models
11 **3/31**		**Lab: Exposomics and agent-based models**
12 **4/7**		• Ch.15: Multilevel analysis • Ch.16: Mediation analysis
13 **4/14**	**Design and Analysis 4**	• Ch. 17: Instrumental variables • Ch..18: DAGs in social epidemiology
14 **4/21**		• Mixed methods studies
15 **4/28**		**Lab: Mixed methods studies for syndemics- Focus to be determined**
5/12	**Final project due 11:59pm**	