

**Tufts University, Friedman School of Nutrition Science and Policy**

**NUTR 204 – Principles of Epidemiology**

*Spring 2024*

**Class Meetings:** Wednesdays, 9:00 AM-12:00 PM ET  
**Zoom link:** Available in Canvas under the Zoom tab (unique link for each class)

**Instructors:** Silvina F. Choumenkovitch, M.S., Ph.D.  
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**Office hours:** By appointment

**Graduate Credits:** 3

**Course Description:**

This course covers basic epidemiologic methods and concepts, including study design, calculation and interpretation of basic measures of disease frequency and measures of association, sources of inaccuracy in experimental and observational studies, causal inference, and an introduction to the evaluation and interpretation of epidemiological data. Students will discuss past and recent publications and apply their understanding of abstract concepts and specific quantitative methods to interpret and critique published work.

**Course Objectives:**

The overall purpose of this course is to introduce students to basic epidemiologic methods and concepts. The specific objectives are to:

1. Describe the principles of epidemiology and its major objectives and explain the scope of epidemiology as a discipline.
2. Discuss basic concepts in infectious disease epidemiology and the importance and challenges of conducting epidemiologic investigation of chronic diseases.
3. Calculate, interpret, and compare measures of disease frequency and measures of association.
4. Differentiate among various epidemiologic study designs, identify steps to conduct each study design, explain their strengths and limitations, and identify research questions that would be appropriately addressed by each study design.
5. Discuss the concepts of measurement error, bias, and confounding, explain their consequences, and outline strategies to reduce sources of error, prevent or reduce the occurrence of bias, and prevent or control for confounding.

6. Discuss the principles of screening and evaluate screening in terms of sensitivity and specificity.
7. Explain causal inference in epidemiologic studies and use a specific set of criteria to assess whether an association is causal.
8. Critically evaluate published research papers.

**Competencies for MPH Students (relevant to MPH students only):**

*This is a required core course in the Tufts MPH program.* This course delivers foundational public health knowledge required for the MPH degree, as detailed towards the end of this document. To pass this course, you must successfully complete each competency-based assessment. If you do not get a passing grade on the competency-based assessment, please arrange to meet with the course director to discuss next steps so we can ensure you attain the competency.

Competency	Sessions Where Competency is Taught	Competency-based Assessment
Apply epidemiological methods to the breadth of settings and situations in public health practice	All sessions	Paper Critique

**Textbooks:**

*Required Textbook:*

Calentano DD and Szklo M. *Gordis Epidemiology*. 6<sup>th</sup> Edition. 2019. Publisher: Elsevier ISBN: 9780323552295. Link to the eBook from the Hirsh Health Sciences Library:

<https://login.ezproxy.library.tufts.edu/login?auth=tufts&url=https://www.clinicalkey.com/dura/browse/bookChapter/3-s2.0-C20160022520>

*Optional Textbook:*

Aschengrau A and Seage GR III. *Essentials of Epidemiology in Public Health*. 4th Edition. 2020.

Publisher: Jones & Bartlett Learning. ISBN: 9781284128352. Also available online at the Hirsh Health Sciences Library: <https://search-ebscobost.com.ezproxy.library.tufts.edu/login.aspx?direct=true&db=nlebk&AN=1862287&site=ehost-live&ebv=EK&ppid=Page--1>

<https://search-ebscobost.com.ezproxy.library.tufts.edu/login.aspx?direct=true&db=nlebk&AN=1862287&site=ehost-live&ebv=EK&ppid=Page--1>

**Course Canvas site:**

All class materials (recorded lectures, slides, readings, etc.) are available on the class website at <https://canvas.tufts.edu>.

**Academic Conduct:**

Each student is responsible for upholding the highest standards of academic integrity, as specified in the Friedman School's Policies and Procedures Handbook

([https://nutrition.tufts.edu/sites/default/files/documents-forms/2023-](https://nutrition.tufts.edu/sites/default/files/documents-forms/2023-2024PoliciesandProceduresHandbook.pdf)

[2024PoliciesandProceduresHandbook.pdf](https://nutrition.tufts.edu/sites/default/files/documents-forms/2023-2024PoliciesandProceduresHandbook.pdf)). It is the responsibility of each student to understand and comply with these standards, as violations will be sanctioned by penalties ranging from failure on an assignment and the course to dismissal from the school.

**Course Format:**

The course combines pre-recorded lectures plus in-person class discussions, with the possibility of holding some of those discussions over zoom (only after Instructor's approval). Students in this class are part of a learning group, and we trust that this group experience will provide you with a great support system, a rich learning environment, and a long-lasting network of colleagues and friends to learn with and from. The primary format of this course consists of:

**Lectures:** All weekly lectures are recorded for asynchronous access. Watching the recorded lecture(s) before each in-person class is mandatory.

**Class Readings:** Assigned readings for each week are mandatory and an important part of the learning experience. For the best learning experience, we encourage you to complete your readings before listening to the recorded weekly lectures.

**Class group discussions** (in person): These discussions are designed to connect as a class, to practice the concepts and methods introduced in lectures and readings, and to discuss topics and publications in epidemiology. Students will be assigned to a working group. Each group will discuss an assigned reading and answer in Canvas questions posted by the instructors. As a member of this learning group in an intensive experiential learning community, your participation is an essential and necessary component to the group's success and the quality of everybody's learning experience. Students are encouraged to bring questions that they would like to discuss. Please, try not to feel intimidated by the size of the class, the nature of the material, or the format of the discussions. We are interested in what you have to say and contribute to this class. If something puzzles you, there is an excellent chance that the same thing puzzles several of your classmates, so questions are welcome and highly encouraged. We understand that in certain situations, students may not be able to participate in these class discussions. In those cases, additional meetings and check-ins with those students will be arranged on a one-to-one basis.

**Assessments and Grading:**

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

- |                         |                      |
|-------------------------|----------------------|
| 1. Group Discussions    | (15% of final grade) |
| 2. Homeworks            | (10% of final grade) |
| 3. Midterm Exam         | (15% of final grade) |
| 4. Final Exam           | (15% of final grade) |
| 5. Group Presentation   | (15% of final grade) |
| 5. Final Paper Critique | (30% of final grade) |

A passing grade in the course is B- or better. Course grades will be based on the following: (subject to revision during the course):

- A+  $\geq 97\%$
- A 94 - < 97%
- A- 90 - < 94%
- B+ 87 - < 90%
- B 84 - < 87%
- B- 80 - < 84%

**Group Discussions** (15% of the final grade)

During class time, students will be assigned to a working group. Each group will discuss an assigned reading and will post a summary of their discussion on Canvas. Each group will choose a designated reporter each week to contribute to the class discussion on the assigned reading. We encourage groups to give the opportunity to all members to participate at least once as reporters. If your working group is not a good fit for you, please reach out to us early in the semester so that we can re-assign you to a different group. Participation in group discussions is required, if you need to miss a class please contact the instructor in advance via email.

**Homeworks** (10% of the final grade)

There will be three homework assignments to be completed during the course. These homework assignments will include computational exercises (e.g., calculations of measures of disease frequency and association), multiple-choice questions, or short answer questions. These assignments are designed to provide practical applications of the concepts presented in readings, lectures, and discussed in class. Collaboration with classmates on homework assignments is strongly encouraged.

**Midterm and Final Exams** (each worth 15% of the final grade)

There will be an in-class midterm and a final examination to be completed on Canvas. They will include multiple choice and short answer questions.

**Group Presentation** (15% of the final grade)

The first day of class, students will be randomized to small working groups. Each group will be given a research question and a study design and will be asked to create a proposal to answer the given question. At the end of the semester, each group will briefly present their study design proposal in class, and each group member is expected to participate in the presentation. If your presentation group is not a good fit for you, please reach out to us by mid semester so that we can re-assign you to a different group.

**Final Paper Critique** (30% of the final grade)

At the end of the semester, students will be asked to hand in a final paper. The paper will involve a critique of an assigned journal article. This will be an independent project (no collaboration allowed). The article will be posted on Canvas along with guidelines for the critique.

### ***Extension Requests***

Students who are unable to complete an assignment on time for any reason should notify the instructors by email prior to the deadline, with a brief explanation for why the extension is needed.

### **All are welcome:**

We believe that the diversity of student experiences and perspectives is essential to the deepening of knowledge in this course. We consider it part of our responsibility as instructors to address the learning needs of all the students in this course. We will present materials that are respectful of diversity in race, color, ethnicity, gender, age, disability, religious beliefs, political preference, sexual orientation, gender identity, socioeconomic status, citizenship, language, or national origin among other personal characteristics. We would like to create a welcoming classroom environment in which all feel comfortable to participate and learn.

### **Accommodation of Disabilities:**

Tufts University is committed to providing equal access and support to all students through the provision of reasonable accommodations so that each student may access their curricula and achieve their personal and academic potential. If you have a disability that requires reasonable accommodations, please contact the Friedman School Assistant Dean of Student Affairs at 617-636-6719 to make arrangements for determination of appropriate accommodations. Please be aware that accommodations cannot be enacted retroactively, making timeliness a critical aspect for their provision.

**Course Schedule** (This schedule is subject to modification at the instructors' discretion.)

**“PLEASE READ AND BE AWARE”** that the **NUTR 0204 Final Exam** will in fact take place in-person on **May 3<sup>rd</sup>** which is a **Reading Day**. However, a dedicated **NUTR 0204 Final Exam Review Session** will be conducted (date TBD).

Week #	Class discussion	Topic	Instructor	Assignments Due (*)
Wk1 1/17/24	Jaharis 156	Introduction to Epidemiology and Concepts in Infectious Disease Epidemiology	Choumenkovitch	<i>Discussion Forum Intro due: Opens 1/13 12:00 am, closes 1/16 11:59 pm</i> <i>Discussion Forum wk 1 due 1/17</i>
Wk2 1/24/24	Jaharis 156	Epidemiology of Chronic Diseases	Singh	<i>Discussion Forum wk 2 due: 1/24</i>
Wk3 1/31/24	Jaharis 156	Measures of Disease Frequency	Singh	<i>Discussion Forum wk 3 due: 1/31</i> <b>Paper and Group Project assigned</b>
Wk4 2/7/24	Jaharis 156	Measures of Association	Singh	<i>Discussion Forum wk 4 due: 2/7</i> <i>Homework 1 assigned</i>
Wk5 2/14/24	Jaharis 156	Cohort Studies	Choumenkovitch	<i>Discussion Forum wk 5 due: 2/14</i> <b>Homework 1 due 2/14 9:00 am</b>
Wk6 2/21/24	Jaharis 156	Case-Control Studies	Choumenkovitch	<i>Discussion Forum wk 6 due: 2/21</i>
Wk7 2/28/24	Jaharis 156	Experimental Studies	Singh	<i>Discussion Forum wk 7 due: 2/28</i> <i>Homework 2 assigned</i>
Wk8 3/6/24	Jaharis 156	Cross-Sectional and Ecological Studies	Choumenkovitch	<i>Discussion Forum wk 8 due: 3/6</i> <b>Homework 2 due 3/6 9:00 am</b>
Wk9 3/13/24	Jaharis 156	<b>Midterm Exam</b>		
3/20/24	<b>No class</b>	<b>Spring Recess</b>		<b>No class</b>
Wk10 3/27/24	Jaharis 156	Bias	Choumenkovitch	<i>Discussion Forum wk 10 due: 3/27</i>
Wk11 4/3/24	Jaharis 156	Confounding	Choumenkovitch	<i>Discussion Forum wk 11 due: 4/3</i> <i>Homework 3 assigned</i>
Wk12 4/10/24	Jaharis 156	Screening	Choumenkovitch	<b>Homework 3 due 4/10 9:00 am</b> <i>Discussion Forum wk 12 due: 4/10</i>
Wk13 4/17/24	Jaharis 156	Causal Inference	Singh	<i>Discussion Forum wk 13 due: 4/17</i>
Wk14 4/24/24	Jaharis 156	<b>Group Presentations</b>		<b>Group Presentations on Study Designs</b>
Wk15 5/1/24	Jaharis 156	<b>NUTR 0204's Final Exam as indicated in note above will take place during reading period</b>		<b>Final Exam</b>
Wk16 5/8/24	No class			<b>Final Paper Critique: due 5/8 at 11:59 PM</b>

**\*Please note: All times refer to Eastern Time (ET)**

### **Course Topics, Learning Objectives, and Assignments**

*(This schedule is subject to modification at the instructors' discretion. Additional readings may be assigned and posted on Canvas.)*

## **Week 1: Introduction to Epidemiology and Concepts in Infectious Disease Epidemiology**

### **Learning Objectives**

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Upon completion of this week, you will be able to:

- Identify the principles and main objectives of epidemiology.
- Explain basic terms related to the occurrence of disease in a population.
- Discriminate between descriptive epidemiology and analytic epidemiology.
- Explain the meanings of disease frequency, disease distribution, and disease determinants in epidemiology.
- Describe the main concepts in infectious disease epidemiology (mode of transmission, iceberg phenomenon, carrier status, incubation period, epidemic curve, herd immunity).
- Demonstrate how to conduct outbreak investigations (steps in an outbreak investigation).

### **Readings**

- Gordis, Ch. 1 and Ch. 2.
- Dworkin MS. How an outbreak is investigated (Ch. 1). In: *Outbreak Investigations around the World*. Dworkin MS (Editor). Sudbury, MA: Jones and Bartlett Publishers. 2010.
- Poole MK, Fleischhacker SE, Bleich SN. Addressing child hunger when school is closed: considerations during the pandemic and beyond. *NEJM* 384; (March 11): e35(1-3).

**Class group discussion:** Introduction to epidemiology and concepts in infectious disease epidemiology.

### **Homework assignment:**

- None

## Week 2: Epidemiology of Chronic Diseases

### Learning Objectives

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Upon completion of this week, you will be able to:

- Identify possible contributors to the changing pattern of disease occurrence over the last century, from primarily infectious to chronic diseases.
- Define and compare the different stages of prevention of disease.
- Discuss the challenges of epidemiologic research of chronic diseases.
- Describe the concept of multifactorial causal models for chronic diseases and the complexities of measuring common modifiable risk factors such as diet, physical activity, and obesity.

### Readings:

- Chapter 11: Non-communicable diseases, the slow-motion disaster. Ten years in public health, 2007-2017. Report by Dr. Margaret Chan, past Director-General, World Health Organization, Geneva. WHO: 2017. License CC BY-NC-SA 2.0 IGO.
- Khraishah H, Alahmad B, Ostergard L, et al. Climate change and cardiovascular disease: implications for global health. Nature Reviews Cardiology, 2022. <https://www.nature.com/articles/s41569-022-00720-x> (Note: Focus on understanding overall trends and implications rather than particular study designs and methods)

**Class group discussion:** Epidemiological investigation of chronic diseases.

### Homework assignment:

- None



## **Week 3: Measures of Disease Frequency**

### **Learning Objectives**

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Upon completion of this week, you will be able to:

- Describe the importance of epidemiology in disease surveillance.
- Calculate and compare different measures of disease frequency, including incidence rate, incidence proportion, prevalence, attack rate, and mortality measures.
- Use measures of disease frequency appropriate to describe disease frequencies in the population.
- Illustrate why incidence data are necessary for measuring risk.
- Discuss the interrelationship between incidence and prevalence.

### **Readings:**

- Gordis, Ch. 3 and Ch. 4
- Davies AR, Smeeth L, Grundy EM. Contribution of changes in incidence and mortality to trends in the prevalence of coronary heart disease in the UK: 1996-2005. *European Heart Journal* 2007; 28:2142-7.

**Class group discussion:** Measures of disease frequency

### **Homework assignment:**

- None

**Final paper critique and group project will be assigned.**

## Week 4: Measures of Association

### Learning Objectives

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Upon completion of this week, you will be able to:

- Explain how to investigate the relationship between a potential exposure and a disease.
- Describe the concepts of risk ratio (also called rate ratio or relative risk) and odds ratio and be able to calculate and interpret them.
- Describe the concept of risk/rate difference and attributable risk/rate difference and be able to calculate and interpret them.
- Compare the different measures of association and explain the difference between absolute and relative measures.

### Readings:

- Gordis, Ch. 12 and Ch. 13
- Golestaneh L, Neugarten J, Fisher M, Billett HH, Gil MR, Johns T, et al. The association of race and COVID-19 mortality. (2020) *Lancet*, 25, 100455

**Class group discussion:** Measures of association

### Homework assignment:

- Homework 1 (due next week): measures of disease frequency and association.

## Week 5: Cohort Studies

### Learning Objectives

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Upon completion of this week, you will be able to:

- Describe the design and timing of a cohort study and the different types of cohort studies.
- Explain the steps in conducting a cohort study.
- Calculate and interpret risk (or rate) differences/ risk (or rate) ratios in cohort studies.
- Identify strengths and weaknesses of cohort studies and discuss potential issues in their design.

### Readings

- Gordis, Ch. 8 (excluding section on Case-Control Studies Based Within a Defined Cohort, Nested Case-Control Studies, Case-Cohort Studies, and Advantages of Embedding a Case-Control Study in a Defined Cohort).
- Doll R & Hill AB. Lung cancer and other causes of death in relation to smoking. A second report on the mortality of British doctors. *British Medical Journal*. 1956; Nov.10, 1071-1081.
- Raquel de Deus Mendonça, Adriano Marçal Pimenta, Alfredo Gea, Carmen de la Fuente-Arrillaga, Miguel Angel Martinez-Gonzalez, Aline Cristine Souza Lopes, Maira Bes-Rastrollo. Ultraprocessed food consumption and risk of overweight and obesity: the University of Navarra Follow-Up (SUN) cohort study. *Am J Clin Nutr* 2016; 104 (5): 1433–1440.

**Class group discussion:** Design and interpretation of cohort studies.

### Homework assignment:

- Homework 1 due today

## Week 6: Case-Control Studies

### Learning Objectives

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Upon completion of this week, you will be able to:

- Describe the design features of case-control and nested case-control studies.
- Explain the appropriate way to select cases and controls in a case-control study.
- Calculate and interpret an odds ratio in a case-control study, and explain when the odds ratio is a good estimate of the relative risk.
- Identify strengths and weaknesses of case-control studies.
- Discuss potential selection biases, information biases, and the use of matching in case-control studies.

### Readings:

- Gordis, Ch. 7 (section on case-control studies), Ch. 8 (sections on Case-Control Studies Based Within a Defined Cohort, Nested Case-Control Studies, Case-Cohort Studies, and Advantages of Embedding a Case-Control Study in a Defined Cohort), and Ch. 9.
- Grimes DA, Schulz KF. Compared to what? Finding controls for case-control studies. *Lancet* 2005; 365: 1429-33.
- Lu MS, Fang YJ, Chen YM, Luo WP, Pan ZZ, Zhong X, Zhang CX. Higher intake of carotenoid is associated with a lower risk of colorectal cancer in Chinese adults: a case-control study. *European Journal of Nutrition* 2015; 54(4):619-28.

**Class group discussion:** Design and interpretation of case-control studies.

### Homework assignment:

- None

## Week 7: Experimental Studies

### Learning Objectives

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Upon completion of this week, you will be able to:

- Explain the fundamental difference between randomized trials and observational studies.
- Describe the concepts of randomization, placebo effect, and blinding.
- Calculate measures of association from randomized trials.
- Describe the concept of intention-to-treat analysis in randomized trials.
- Explain important issues in conducting experimental studies such as ethics and non-compliance.

### Readings:

- Gordis, Ch. 10 and 11
- Estruch R, Ros E, Salas-Salvado J, et al. Primary Prevention of Cardiovascular Disease with a Mediterranean Diet Supplemented with Extra-Virgin Olive Oil or Nuts. *NEJM* 2018. 378(35): e34
- Optional reading (the original retracted PREDIMED study): Estruch R, Ros E, Salas-Salvado J, et al. Primary Prevention of Cardiovascular Disease with A mediterranean Diet. *NEJM* 2013; 368: 1279-1290

**Class group discussion:** Design and interpretation of randomized controlled trials.

### Homework assignment:

- Homework 2 (due next week): study designs.

## **Week 8: Cross-Sectional and Ecological Studies**

### **Learning Objectives:**

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Upon completion of this week, you will be able to:

- Describe the design features of cross-sectional and ecological studies.
- Describe the measures of association used in cross-sectional and ecological studies.
- Explain the concept of ecological fallacy.
- Describe the advantages and disadvantages of cross-sectional and ecological study designs.
- Calculate direct and indirect age adjustment.

### **Readings:**

- Gordis, Ch. 7 (section on cross-sectional and ecological studies), Ch.4 (read again section on direct and indirect age adjustment).
- Zhang Z, Jackson SL, Martinez E, Gillespie C, Yang Q. Association between ultraprocessed food intake and cardiovascular health in US adults: a cross-sectional analysis of the NHANES 2011–2016. *Am J Clin Nutr.* 2016; 00:1-9.
- Gross LS, Li L, Ford ES, Liu S. Increased consumption of refined carbohydrates and the epidemic of type 2 diabetes in the United States: an ecologic assessment. *Am J Clin Nutr.* 2004; 79(5):774-9.

**Class group discussion:** Design and interpretation of cross-sectional and ecological studies.

### **Homework assignment:**

- Homework 2 due today

## Week 9: Midterm : 3/13/24

## Week 10: Bias

### Learning Objectives

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Upon completion of this week, you will be able to:

- Explain and give examples of possible biases in epidemiological studies, including selection bias and the various types of observation (i.e., information) bias.
- Describe ways to minimize bias in epidemiological studies.
- Explain the concept of random error and be able to differentiate it from systematic error.

### Readings:

- Gordis, Ch. 15 (section on bias), Ch. 7 (re-read section on potential biases in case-controls studies), Ch. 8 (re-read section on potential biases in cohort studies).
- Lu MS, Fang YJ, Chen YM, Luo WP, Pan ZZ, Zhong X, Zhang CX. Higher intake of carotenoid is associated with a lower risk of colorectal cancer in Chinese adults: a case-control study. *European Journal of Nutrition* 2015; 54(4):619-28.
- Chew M, Das P, Aujla M, Horton R. Advancing racial and ethnic equity in science, medicine, and health: a call for papers. *Lancet* 2021; 398: 1287-89.
- Striving for diversity in research studies. *NEJM* 385; 15: 1429-31.

**Class group discussion:** Bias in epidemiological studies.

### Homework assignment:

- None

## **Week 11: Confounding Learning Objectives**

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Upon completion of this week, you will be able to:

- Define confounding and be able to explain the conditions a variable must fulfill to be considered a confounder in an epidemiological study.
- Discuss possible ways to control for confounding in the design and/or analysis of a study.
- Explain how these methods for controlling for confounding may be used through examples.

### **Readings:**

- Gordis, Ch. 15 (section on confounding).
- Fogelholm, M; Kanerva, N; Männistö, S. Association between red and processed meat consumption and chronic diseases: the confounding role of other dietary factors. *European Journal of Clinical Nutrition* (2015) 69, 1060–1065.

**Class group discussion:** Evaluation of confounding in epidemiological studies.

### **Homework assignment:**

- Homework 3 (due next week): bias and confounding.



## **Week 12: Screening**

### **Learning Objectives:**

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Upon completion of this week, you will be able to:

- Describe the purpose and benefits of screening in populations and identify conditions that are appropriate for screening.
- Describe different types of screening (sequential/simultaneous).
- Assess the validity and reliability of screening (sensitivity, specificity, positive predictive value), and diagnostic tests.
- Explain the concepts of lead time bias, volunteer bias and length-based sampling and discuss how they affect the evaluation of screening.

### **Readings:**

- Gordis, Ch. 5 and Ch. 18
- Ava Tsapatsaris, Kemi Babagbemi, Melissa B. Reichman. Barriers to breast cancer screening are worsened amidst COVID-19 pandemic: A review. *Clinical Imaging* 2022, Volume 82, Pages 224-227,

**Class group discussion:** screening in epidemiology and public health

### **Homework assignment:**

- Homework 3 due today

## Week 13: Causal Inference

### Learning Objectives:

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Upon completion of this week, you will be able to:

- Define the concept of a cause of disease in epidemiological studies and describe characteristics of a cause.
- Explain necessary, sufficient, and component causes in the context of a causal relationship.
- Explain how causal inference is central to the role of epidemiology and discuss guidelines for judging whether an association is causal.
- Describe and critique Bradford Hill's causal criteria.

### Readings:

- Gordis, Ch. 14
- Rothman KJ, Greenland S. Causation and Causal Inference in Epidemiology. *AJPH* 2005; 95: S144-S150.
- Ellul M, Varatharaj A, Nicholson TR, Pollak TA, Thomas N, et. al. Defining causality in COVID-19 and neurological disorders. (2020) *Journal of Neurology and Neurosurgical Psychiatry*, 19, 100630

**Class group discussion:** Causal Inference

### Homework assignment:

- None

## **Week 14: Student Presentations on Study Design**

**Group Project Presentations:** Students will present (within groups) a proposal to answer a given research question using an assigned study design (e.g., cohort, experimental, case-control study).

**Final Exam: 5/1/24**

**Final Paper Critique Due: 5/8/24**