***Module overview***

One way to describe the practice of modern epidemiology is combing expert knowledge, data, and analytic techniques for one of three purposes: ***describe*** a phenomenon or characteristic in a population, ***predict*** a phenomenon or characteristic in a population, and/or draw conclusions about the ***cause***(s) of a phenomenon or characteristic of a population. The third purpose — drawing causal conclusions — has a special place in epidemiology (and in science generally). In this module, we will begin to discuss why that is the case and learn about some tools we can use in practice when causal inference is our goal.

***Module topics / Key Concepts***

* Be able to discuss what causal inference means in epidemiology and compare it to a statistical association.
* Be able to identify, interpret, and create diagrams based on Rothman’s Sufficient-Component Cause model.
* Be able to describe what the term counterfactual means in the context of epidemiology.
* Be able to identify, interpret, and create Directed Acyclic Graphs (DAGs).
* Be able to describe why Bradford-Hill’s guidelines are an important historical document but are not sufficient to draw to be used as criteria for determining whether a relationship between to variables is causal or not.

***Required videos***

Please view the following presentations **before** our next in-class lab session:

* [Causal Diagrams: Draw Your Assumptions Before Your Conclusions](https://courses.edx.org/courses/course-v1:HarvardX+PH559x+3T2017/course/) (Hernán, 2017)
  + Lesson 1: Causal DAGs
  + Only videos are required. You are welcome to complete questions if you would like.
  + This is a free video series you can access online at a website called [edX](https://www.edx.org/). The videos feature [Miguel Hernán](https://www.hsph.harvard.edu/miguel-hernan/), who is at Harvard and one of the leading causal inference researchers in the field.
  + You will have to create a login and password with the edX website in order to view the materials. There is no cost.

***Required Readings***

Please read the following textbook chapters and articles **before** our next in-class lab session:

* Szklo, M., & Nieto, F. J. (2019). *Epidemiology: Beyond the Basics*. Burlington: Jones & Bartlett Learning.
  + Chapter 10.1, 10.2, 10.2.2, 10.2.3, 10.2.4 (pages 437-456)
* Pearl J., & Mackenzie D. (2018). *The Book of Why: The New Science of Cause and Effect*. Basic Books.
  + Chapter 3. From Evidence to Causes: Reverend Bayes Meets Mr. Holmes

***Optional supplemental material***

* [Hernán MA, Robins JM. *Causal Inference: What If*. CRC Press; 2020.](https://www.hsph.harvard.edu/miguel-hernan/causal-inference-book/)
* [Rothman, K. J., & Greenland, S. (2005). Causation and causal inference in epidemiology. *American Journal of Public Health*, *95 Suppl 1*, S144–S150. https://doi.org/10.2105/AJPH.2004.059204](https://doi.org/10.2105/AJPH.2004.059204)

***Assignments***

1. Check on learning quiz
2. Lab
3. Module quiz