Population Burden Measures in Cardiovascular Disease Epidemiology
EPID 889, Section 01
Fall, 2012

Lead instructor:
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Office hours: By appointment. (I am not always in my office and the BOA is a hike from the SPH.)

Pre-requisites: EPID 715 or permission of the instructor and demonstrated SAS competency.

Time and place: Thursdays 3:00 – 4:40 PM. Location: 307 Health Sciences Library

Credits: 1 credit

Course objectives: This course will provide students with a practical knowledge of disease burden metrics that can serve as a substitute or companion to traditionally reported ratio measures. Although this course will use examples from the cardiovascular disease literature, the concepts presented are applicable to a broad range of topical areas.

Course structure: This course is a combination of lecture and laboratory analysis and is organized around five themes: ratio and difference measures, cumulative incidence, population attributable fractions, generalized impact fractions, and the global burden of disease project. Each class, with the exception of the introduction, will begin with an overview, which is provided by the instructor. After the overview, the class will change to a lab format and use a common dataset provided by the instructor to estimate the effect measures discussed during the lecture using SAS and limited STATA.

Attendance policy: As the class meets only six times, attendance is mandatory. If a student knows before enrollment that s/he will miss any classes, s/he should discuss the absence with the instructor to decide whether to postpone enrollment until the subsequent year. If an unforeseeable emergency or illness prevents a student from attending class, please notify the instructor as soon as possible. One excused absence per student is permitted.

Course project: Students will choose an exposure and/or outcome relevant to public health research and of interest to them (e.g. cigarette smoking, diabetes, stroke, air pollution, adiposity etc.). If you are unsure if your topic is appropriate, please discuss it

with the instructor. This paper should not be structured as a critique of an article that reports a metric that we evaluated in class. Instead, you should think of it as a mini-review and commentary, i.e. briefly review the state of the science today and comment how population burden measures could contribute. No population burden measures published for your topic of interest? Recall that several approximations of population burden measures were presented in class; approximation is acceptable if you believe the assumptions behind such approximations are appropriate for your topic of interest. In the paper, please:

1. Describe your exposure/outcome and its relevance to epidemiology and public health.
2. Interpret published research examining the selected exposure/outcome and at least two separate population burden metrics discussed in class. (The attributable fraction and population attributable fraction or DALYs and YLLs or YLDs are not considered separate metrics.)
3. Compare and contrast associations between traditionally reported relative effect measures and the population burden metrics interpreted in (2).
4. Evaluate the use of the population burden metrics described in (2). Do they provide information not captured by traditionally selected disease metrics? Do you perceive any barriers to the use, interpretation, or widespread adoption of population burden measures? Would you draw different inferences based on the metrics you select, either comparing one to the other or your metrics to commonly reported measures? Which metric(s) do you believe are (is) most relevant to public health practice?

The paper will be no longer than four double-spaced pages with 1inch margins, 12 point font, and exclusive of references and the honor code. Text exceeding the four-page limit will not be reviewed. If figures or tables are needed to help convey information, they may be submitted as an appendix, but should be used judiciously and formatted for publication. The course project is due via email on November 26, 2012. Please include your PID and the page number on each page (including the appendix, if applicable) in a footnote. Do not forget to cite all references using whatever format you prefer.

Grading: The course project accounts for 80% of the class grade. The remaining 20% of the grade is class participation, which is assessed by the instructor. The grade scale is:

<60.0	F
60.0 – 74.9	L
75.0 – 89.9	P
≥ 90.0	H

Late policy: The course project is due via email on November 26, 2012. Assignments that are submitted after November 26 will receive a 10% deduction for each day they are overdue. Course projects submitted after November 30, 2012 will not be accepted.

Honor code: Please submit the course project with a signed honor code stating that:

"On my honor, I have neither given nor received unauthorized aid on this assignment". The project is not considered complete until it is accompanied by the honor code. Additional information on the honor code is available at: http://honor.unc.edu/

Data set: The Atherosclerosis Risk in Communities Study (ARIC) is a prospective epidemiologic study conducted in four U.S. communities. ARIC is designed to investigate the etiology and natural history of atherosclerosis, the etiology of clinical atherosclerotic diseases, and variation in cardiovascular risk factors, medical care and disease by race, gender, location, and date. ARIC includes two study designs: the Cohort Component and the Community Surveillance Component. The Cohort Component, from which the data for this course were obtained, began in 1987, and each ARIC field center randomly selected and recruited a cohort sample of approximately 4,000 individuals aged 45-64 from a defined population in their community. A total of 15,792 participants received an extensive examination, including medical, social, and demographic data. These participants were reexamined every three years with the first screen (baseline) occurring in 1987-89, the second in 1990-92, the third in 1993-95, and the fourth and last exam was in 1996-98. Follow-up occurs yearly by telephone to maintain contact with participants and to assess health status of the cohort. Cardiovascular disease hospitalizations continue to be adjudicated by a combination of active and passive surveillance.

Exposure of interest: Systolic blood pressure

Outcome of interest: Incident CHD.

Course Schedule:

Date	Topic	Readings
October 4, 2012	• Review of syllabus • Introductory lecture	**Required:** Avery, 2012 Baylin, 2006 (abstract) C Poole, 2007 **Optional:** Steenland, 2006
October 11, 2012	• Shifting the population burden of disease/exposure • Introduction to ARIC/ class dataset	**Oct 11 required:** Erlinger, 2003 Rose, 2001 **Optional:** Cook, 1995 **Resources:** ARIC investigators, 1989
October 25, 2012	• Reliance on ratio measures / distortion of relative effects • Calculating IRRs/IRDs in SAS	**Oct 25 required:** Boshuizen, 2010 Kauffman, 2005 Kaufman, 2010 Langholtz, 2010 Poole, 2010 **Optional:** Fann, 2012 Hernan, 2010 Ridker, 2005
November 1, 2012	• Cumulative incidence	**Required:** Besier, 2000 Lloyd-Jones, 2003
November 8, 2012	• Population attributable fraction • Generalized impact fraction (continuous and categorical)	**Required:** Loehr, 2010 Rockhill, 1998 Flegal, 2005 (Abstract)
November 15, 2012	Global Burden of Disease (GBD) project	**Required:** McKenna, 2005 Grosse, 2009 **Optional:** Ezzati, 2002
November 26, 2012	Course project due via email	
"Resources" are for interested parties; no need to skim unless you have an interest outside class (i.e. dissertation or manuscript proposal).		

Readings (available on SAKAI):

ARIC Investigators. The Atherosclerosis Risk in Communities (ARIC) study: Design and objectives. The ARIC investigators. *American Journal of Epidemiology*. 1989;129:687-702

Avery CL, Loehr LR, Baggett C, Chang PP, Kucharska-Newton AM, Matsushita K, Rosamond WD, Heiss G. The population burden of heart failure attributable to modifiable risk factors: the Atherosclerosis Risk in Communities Study. *Journal of the American College of Cardiology* 2012; in press.

Barendregt JJ, Veerman JL. Categorical versus continuous risk factors and the calculation of potential impact fractions. *Journal of Epidemiology and Community Health* 2010;64:209-212.

Baylin A, S Hernandez-Diaz, EK Kabagame, X Siles, H Campos. Transient exposure to coffee as a trigger of a first nonfatal myocardial infarction. *Epidemiology* 2006;17: 506-511.

Beiser A, D'Agostino RB, Seshadri S, Sullivan LM, Wolf PA. Computing estimates of incidence, including lifetime risk: Alzheimer's disease in the Framingham Study. The Practical Incidence Estimators (PIE) macro. *Stat Med* 2000;19:1495-1522.

Boshuizen HC, Feskens EJM. Fitting additive Poisson models. *Epidemiology Perspectives & Innovations* 2010;7(4)

Cook NR, Cohen J, Hebert PR, Taylor JO, Hennekens CH. Implications of small reductions in diastolic blood pressure for primary prevention. *Arch Intern Med* 1995; 155: 701-709.

Erlinger TP, Vollmer WM, Svetkey LP, Appel LJ. The potential impact of nonpharmacologic population-wide blood pressure reduction on coronary heart disease events: pronounced benefits in African-Americans and hypertensives. *Preventive Medicine* 2003;37:327-333.

Ezzati M, Lopez AD, Rodgers A, Vender Hoorn S, Murray CJL. Selected major risk factors and global and regional burden of disease. *Lancet* 2002;360(9343):1347-60

Fann N, Lamson AD, Anenberg SC, Wesson K, Risley D. Hubbell BJ. Estimating the national public health burden associated with exposure to ambient $PM_{2.5}$ and ozone. *Risk Analysis* 2012;32: 81-95.

Flegal KM, Graubard BI, Williamson DF, Gail MH. Excess deaths associated with underweight, overweight, and obesity. *Journal of the American Medical Association* 2005;293:1861-1867.

Grosse SD, Lollar DJ, Campbell VA, Chamie M. Disability and disability-adjusted life years: not the same. *Public Health Reports* 2009;124:197-202.

Hernan MA. The hazard of hazard ratios. *Epidemiology* 2010;21:13-15.

Kaufman JS. Toward a more disproportionate Epidemiology. *Epidemiology* 2010;21:1-2.

Kauffman, JM. Long-term aspirin for women: what did the Women's Health Study really show? *Journal of American Physicians and Surgeons* 2005;10:90

Langholtz B. Case-control studies = odds ratios. Blame the retrospective model. *Epidemiology* 2010;21:10-12.

Lloyd-Jones DM, Wilson PWG, Larson MG, Leip E, Beiser A, D'Agostino RB, Cleeman JI, Levy D. Lifetime risk of coronary heart disease by cholesterol levels at selected ages. *Annals of Internal Medicine* 2003;163:1966-1972.

Loehr LR, Rosamond WD, Poole C, McNeill AM, Chang PP, Deswal A, Folsom AR, Heiss G. The potentially modifiable burden of incident heart failure due to obesity: The Atherosclerosis Risk in Communities Study. *American Journal of Epidemiology* 2010;172:781-789.

McKenna MT, Michaud CM, Murray CJL, Marks JS. Assessing the burden of disease in the United States using disability-adjusted life years. *Am J Prev Med* 2005;28:415-423.

Poole C. Coffee and myocardial infarction. *Epidemiology* 2007;18(4):518-519.

Poole C. On the origin of risk relativism. *Epidemiology* 2010;21:3-9.

Rose G. Sick individuals and sick populations. *International Journal of Epidemiology* 2001;30:427-432.

Ridker PM, Cook NR, Lee-IM, Gordon D, Gaziano JM, Manson JE, Hennekens CH, Buring JE. A randomized trial of low-dose aspirin in the primary prevention of cardiovascular disease in women. *New England Journal of Medicine* 2005;352:1293-1304.

Rockhill B, Newman B, Weinberg C. Use and misuse of population attributable fractions. *American Journal of Public Health* 1998;88:15-19.

Steenland K and B Armstrong. An overview of methods for calculation the burden of disease due to specific risk factors. *Epidemiology* 2006;17: 512-519.

Whelton PK. Epidemiology of hypertension. *Lancet* 1994;334:101-106.

Xu Y, Cheung YB, Lam KF, Tan SH, Milligan P. A simple approach to the estimation of incidence rate difference. *American Journal of Epidemiology* 2010;172:334-43.