

Environmental Epidemiology, EPID 785

Spring 2014

Course Instructor

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Office hours by appointment

Time and place

Tuesdays and Thursday 9:30AM - 10:45AM, Room 2305 McGavran-Greenberg

Objectives

This course provides an introduction to topics and methods in environmental epidemiology. Topical areas include selected air and water pollutants, radiation, pesticides, metals, environmental microbial exposures, asbestos, persistent organic pollutants, endocrine-disrupting chemicals, disease clusters, disaster epidemiology, and climate change. Exposure assessment and statistical methods for evaluation of environmental and occupational factors will be considered in the context of specific applications. The course will prepare students to critically interpret environmental epidemiologic research, understand the types of questions that can and cannot be answered in environmental epidemiology, and help provide a foundation for designing and conducting such studies.

Organization

Lectures by the instructor and guests will be mixed with student-led discussions. Students will facilitate discussions that address issues of study design and conduct, sources of bias in measures of frequency and association, analytic methods, and choice of study questions.

Readings

Assigned articles will be available through sakai. Readings should be completed in preparation for the lecture.

Requirements (% of grade)

Class Participation (10%): Class participation is important. Prior to each class, students should prepare at least two questions or comments based on each assigned reading, and bring these to class for discussion.

Student Facilitation of Journal Article Critique (15%): Each student will be responsible for facilitating one class discussion of a paper on a non-lecture day. Prior to the journal article critique class, everyone should complete the Journal Article Critique Outline. At the end of the discussion, the facilitators are required to turn in the Journal Article Critique Outline assignment to the instructor.

Student Debate (15%): Students will debate a topical issue in environmental epidemiology/health. Students will be divided into groups and each group will be assigned a position, which they will research, prepare for, and then defend in a classroom debate. Each group will turn in a summary of their main points at the end of the debate.

Final Project (60%): Each student is responsible for designing a study proposal to investigate a research question in the area of environmental epidemiology. The proposed study can address an exposure-outcome relation or a methodologic issue (e.g., exposure assessment, method of statistical analysis). The paper

should be about 10-15 double-spaced pages (excluding references, tables, and figures) and should include 1) an abstract (≤ 1 page), 2) a review of the literature (2-4 pages), 3) a statement of research hypothesis(es) and specific aims of the study (1-2 pages), 4) a research proposal (5-10 pages), and 5) references, tables, figures, appendices. A title and abstract for the final project must be submitted by February 27. The final project is due April 24.

Grading

P will be given for adequate completion of course requirements. H will be given for outstanding work in one or more areas.

Class schedule

#	Date	Topic	Speaker	Readings
1	Jan 9	Introductions, overview	Engel, L	
2	Jan 14	Choosing research questions	Engel, L	Clapp R, et al. Environment and Health: Vital Intersection or Contested Territory? <i>American Journal of Law & Medicine</i> . 2004;30:189-215. Kriebel D, et al. The Precautionary Principle in Environmental Science. <i>Environmental Health Perspectives</i> . 2001;109(9):871-876.
3	Jan 16	Cluster studies	Engel, L	Rothman KJ. Sobering Start for the Cluster Busters' Conference. <i>Am J Epidemiol</i> . 1990;132(1): S6-S13. Brown P. Popular Epidemiology and Toxic Waste Contamination: Lay and Professional Ways of Knowing. <i>Journal of Health and Social Behavior</i> . 1992;33(3): 267-281 Costas K, et al. A case-control study of childhood leukemia in Woburn, Massachusetts: the relationship between leukemia incidence and exposure to public drinking water. <i>The Science of the Total Environment</i> . 2002;300: 23-35.
4	Jan 21	Radiation: exposure assessment	Sit, R	Hall EJ. Radiation and Life. http://www.world-nuclear.org/education/ral.htm Updated in July 2002 International Atomic Energy Agency. Radiation, People, and the Environment. IAEA Division of Public Information, 2/2004.
5	Jan 23	Ionizing radiation: A-bomb, occupational, power plants	Richardson, D	Douple EB, et al., Long-term Radiation-Related Health Effects in a Unique Human Population: Lessons Learned from the Atomic Bomb Survivors of Hiroshima and Nagasaki. <i>Disaster Med Public Health Prep</i> . 2011 Mar;5 Suppl 1:S122-33. Jacob P, et al., Is cancer risk of radiation workers larger than expected?. <i>Occup Environ Med</i> . 2009;66(12):789-96.
6	Jan 28	Non-ionizing radiation: power lines, cell phones	Engel, L	INTERPHONE Study Group, Brain tumour risk in relation to mobile telephone use: results of the INTERPHONE international case-control study. <i>Int J Epidemiol</i> . 2010;39(3):675-94. Frei P, et al., Use of mobile phones and risk of brain tumours: update of Danish cohort study. <i>BMJ</i> .

				2011;343.
7	Jan 30	Student-led discussion		<p>Kaatsch P, et al., Leukaemia in young children living in the vicinity of German nuclear power plants. <i>Int J Cancer</i>. 2008;122(4):721-6.</p> <p>Bithell JF, et al. Leukaemia in young children in the vicinity of British nuclear power plants: a case-control study. <i>Br J Cancer</i>. 2013;109(11):2880-5.</p>
8	Feb 4	Pesticides and cancer	Engel, L	<p>Teitelbaum SL, et al., Reported residential pesticide use and breast cancer risk on Long Island, New York. <i>Am J Epidemiol</i>. 2007;165(6):643-51.</p> <p>Engel LS, et al., Pesticide use and breast cancer risk among farmers' wives in the agricultural health study. <i>Am J Epidemiol</i>. 2005;161(2):121-35.</p>
9	Feb 6	Pesticides and neurological outcomes	Engel, L	<p>Wang A, et al., Parkinson's disease risk from ambient exposure to pesticides. <i>Eur J Epidemiol</i>. 2011 Jul;26(7):547-55.</p> <p>Engel SM, et al., Prenatal exposure to organophosphates, paraoxonase 1, and cognitive development in childhood. <i>Environ Health Perspect</i>. 2011;119(8):1182-8.</p> <p>Tanner CM, et al., Rotenone, paraquat, and Parkinson's disease. <i>Environ Health Perspect</i>. 2011;119(6):866-72. (OPTIONAL)</p>
10	Feb 11	Pesticide exposure assessment	Engel, L	Bradman A, et al. Characterizing exposures to nonpersistent pesticides during pregnancy and early childhood in the National Children's Study: a review of monitoring and measurement methodologies. <i>Environ Health Perspect</i> . 2005;113(8):1092-9.
11	Feb 13	Student-led discussion		<p>Curl CL, et al., Organophosphorus pesticide exposure of urban and suburban preschool children with organic and conventional diets. <i>Environ Health Perspect</i>. 2003 Mar;111(3):377-82.</p> <p>Metayer C, et al. Exposure to herbicides in house dust and risk of childhood acute lymphoblastic leukemia. <i>J Expo Sci Environ Epidemiol</i>. 2013;23(4):363-70.</p>
12	Feb 18	Air pollutants: sources, constituents, measurement	West, J	<p>EPA, Our Nation's Air: Status and Trends Through 2010. 2012</p> <p>Anenberg SC, et al. An estimate of the global burden of anthropogenic ozone and fine particulate matter on premature human mortality using atmospheric modeling. <i>Environ Health Perspect</i>. 2010;118(9):1189-95.</p>
13	Feb 20	Introduction to air pollution epidemiology	Neas, L	<p>Schneider A, et al. Association of cardiac and vascular changes with ambient PM2.5 in diabetic individuals. <i>Part Fibre Toxicol</i>. 2010;7:14</p> <p>Svendson ER, et al. GIS-modeled indicators of traffic-related air pollutants and adverse pulmonary health among children in El Paso, Texas. <i>Am J Epidemiol</i>. 2012;176 Suppl 7:S131-41.</p>

				Neas LM, Methodological issues in the use of generalized additive models for the analysis of particulate matter health effects. In Effects of air contaminants on the respiratory tract – interpretations from molecules to meta analysis, Heinrich U, ed. 2004. (OPTIONAL)
14	Feb 25	Student-led discussion		Dales RE, et al., Air pollution and hospitalization for headache in Chile. Am J Epidemiol. 2009;170(8):1057-66. Pope CA III, et al, Fine-Particulate Air Pollution and Life Expectancy in the United States. N Engl J Med 2009;360(4): 376-386.
15	Feb 27	Metals and health effects	Fry, R	Hughes MF, et al. Arsenic exposure and toxicology: a historical perspective. Toxicol Sci. 2011;123(2):305-32.
16	Mar 4	Arsenic	Wade, T	Steinmaus C, et al. Low-level Population Exposure to Inorganic Arsenic in the United States and Diabetes Mellitus: A Reanalysis. Epidemiology 2009;20(6): 656-664 Navas-Acien A, et al. Arsenic Exposure and Prevalence of Type 2 Diabetes in US Adults. JAMA. 2008;300(7): 814-822 Wu MM, et al. Dose-response relation between arsenic concentration in well water and mortality from cancers and vascular diseases. Am J Epidemiol. 1989;130(6):1123-32. Smith AH, et al. Marked increase in bladder and lung cancer mortality in a region of Northern Chile due to arsenic in drinking water. Am J Epidemiol. 1998;147(7):660-9. (OPTIONAL) Lamm SH, et al. Arsenic cancer risk confounder in southwest Taiwan data set. Environ Health Perspect. 2006;114(7):1077-82. (OPTIONAL)
17	Mar 6	Asbestos	Dement, J	Magnani C, et al. Increased Risk of Malignant Mesothelioma of the Pleura after Residential or Domestic Exposure to Asbestos: A Case–Control Study in Casale Monferrato, Italy. Environmental Health Perspectives 2001;109(9): 915–919 Hein MJ, et al. Follow-up study of chrysotile textile workers: cohort mortality and exposure-response. Occup Environ Med 2007;64: 616–625.
	Mar 11	Spring break		
	Mar 13	Spring break		
18	Mar 18	Student-led discussion		Marshall G, et al. Fifty-Year Study of Lung and Bladder Cancer Mortality in Chile Related to Arsenic in Drinking Water. J Natl Cancer Inst. 2007;99: 920-8 Alexander BH, et al. Radiographic evidence of nonoccupational asbestos exposure from processing Libby vermiculite in Minneapolis, Minnesota. Environ

				Health Perspect. 2012;120(1):44-9.
19	Mar 20	Environmental microbial exposures	Stewart, J	Rowny JG, et al. Characterization of nonpoint source microbial contamination in an urbanizing watershed serving as a municipal water supply. Water Res. 2012;46(18):6143-53 Stewart JR, et al. Recommendations following a multi-laboratory comparison of microbial source tracking methods. Water Res. 2013;47(18):6829-38.
20	Mar 25	Student-led debate: Health effects of climate change		
21	Mar 27	Persistent organic pollutants and metabolic and immune effects	Engel, L	Warner M, et al. Diabetes, metabolic syndrome, and obesity in relation to serum dioxin concentrations: the Seveso women's health study. Environ Health Perspect. 2013;121(8):906-11 Heilmann C, et al., Serum concentrations of antibodies against vaccine toxoids in children exposed perinatally to immunotoxicants. Environ Health Perspect. 2010;118(10):1434-8.
22	Apr 1	Persistent organic pollutants and cancer	Engel, L	Ward MH, et al. Residential exposure to polychlorinated biphenyls and organochlorine pesticides and risk of childhood leukemia. Environ Health Perspect. 2009;117(6):1007-13 Engel LS, et al., Polychlorinated biphenyl levels in peripheral blood and non-Hodgkin's lymphoma: a report from three cohorts. Cancer Res. 2007;67(11):5545-52.
23	Apr 3	Endocrine disruptors, PBDEs	Stapleton, H	Meeker JD, et al. Exploratory analysis of urinary metabolites of phosphorus-containing flame retardants in relation to markers of male reproductive health. Endocr Disruptors (Austin). 2013;1(1):e26306. Stapleton HM, et al. Serum PBDEs in a North Carolina toddler cohort: associations with handwipes, house dust, and socioeconomic variables. Environ Health Perspect. 2012;120(7):1049-54.
24	Apr 8	Endocrine disrupting chemicals and neurological disorders in children	Engel, S	Engel SM, et al., Prenatal phthalate exposure is associated with childhood behavior and executive functioning. Environ Health Perspect. 2010;118(4):565-71. Braun JM, et al., Impact of early-life bisphenol A exposure on behavior and executive function in children. Pediatrics. 2011;128(5):873-82.
25	Apr 10	Hydraulic fracturing ("fracking")	Engel L, Werder E	Osborn SG, et al. Methane contamination of drinking water accompanying gas-well drilling and hydraulic fracturing. Proc Natl Acad Sci U S A. 2011;108(20):8172-6.
26	Apr 15	Student-led discussion		Barry V, et al. Perfluorooctanoic acid (PFOA) exposures and incident cancers among adults living near a chemical plant. Environ Health Perspect. 2013;121(11-12):1313-8 Baris D, et al. Blood levels of organochlorines before and after chemotherapy among non-Hodgkin's

				lymphoma patients. <i>Cancer Epidemiol Biomarkers Prev.</i> 2000;9(2):193-7.
27	Apr 17	Disaster epidemiology	Engel, L	<p>Consonni D, et al. Mortality in a population exposed to dioxin after the Seveso, Italy, accident in 1976: 25 years of follow-up. <i>Am J Epidemiol.</i> 2008;167(7):847-58.</p> <p>Wisnivesky JP, et al. Persistence of multiple illnesses in World Trade Center rescue and recovery workers: a cohort study. <i>Lancet.</i> 2011;378(9794):888-97.</p>
28	Apr 22	Case study: GuLF STUDY 1	Engel, L	<p>Aguilera F, et al., Review on the effects of exposure to spilled oils on human health. <i>J Appl Toxicol.</i> 2010;30(4):291-301.</p> <p>Rodríguez-Trigo G, et al., Health changes in fishermen 2 years after clean-up of the Prestige oil spill. <i>Ann Intern Med.</i> 2010;153(8):489-98.</p>
29	Apr 24	Case study: GuLF STUDY 2	Engel, L	Goldstein BD, et al. The Gulf oil spill. <i>N Engl J Med.</i> 2011;364(14):1334-48.