Syllabus Module 217

N°217	Health impact Assessment
Coordinator	Tarik Benmarhnia and Youssef Oulhote
Dates	5-9 December
Credits/ECTS	3 ECTS
Duration	5 days of online courses, and personal or group work (estimation 30h)
Location	EHESP
Description	This course deals with Health impact assessment (HIA) approaches and methods in the domain of environmental health focusing on chemical exposures and climate and health applications. This course focuses on the application of quantitative techniques for impact evaluation. It is recommended for students who have an interest in better understanding certain biostatistics and epidemiological notions in an environmental health issue. The main goal of the module is to give an overview of the different approaches and methods aiming to assess the health impact of exposure to environmental stressors. These include epidemiological, economical and deliberative territorial methods that provide different metrics to give an appreciation of the health impact of a given environmental situation for use by decision makers and different stakeholders to inform their choices for action.
Prerequisites	
Course learning objectives	At the end of the module, the students should be able: - Know how to implement HIA and conduct a quantitative risk assessment - Understand some key concepts in environmental epidemiology, including how concentration-response functions are estimated and sources of bias - Be familiar with common biomarkers for exposure assessment - Understand how to assess the health effects of chemical mixtures - Understand the main mechanisms through which climate change impacts population health - Be familiar with the main Burden of Disease metrics - Understand the health co-benefits of mitigation strategies - Know how to apply a HIA in the context of mitigation strategies to quantify the health co-benefits
Structure (details of sessions title/speaker/date /duration)	- See details in the Schedule document
Resources	Collins, J., & Koplan, J. P. (2009). Health impact assessment: a step toward health in all policies. JAMA, 302(3), 315-317. Gundacker, C., Forsthuber, M., Szigeti, T., Kakucs, R., Mustieles, V., Fernandez, M. F., ... & Saber, A. T. (2021). Lead (Pb) and neurodevelopment: A review on exposure and biomarkers of effect (BDNF, HDL) and susceptibility. International Journal of Hygiene and Environmental Health, 238, 113855. Hernández, A. F., & Tsatsakis, A. M. (2017). Human exposure to chemical mixtures: challenges for the integration of toxicology with epidemiology data in risk assessment. Food and Chemical Toxicology, 103, 188-193. Khomenko, S., Cirach, M., Pereira-Barboza, E., Mueller, N., Barrera-Gómez, J., Rojas-Rueda, D., ... & Nieuwenhuijsen, M. (2021). Premature mortality due to air pollution in European cities: a health impact assessment. The Lancet Planetary Health, 5(3), e121-e134.

	Watts, N., Amann, M., Arnell, N., Ayeb-Karlsson, S., Beagley, J., Belesova, K., ... & Costello, A. (2021). The 2020 report of the Lancet Countdown on health and climate change: responding to converging crises. The Lancet, 397(10269), 129-170. Maizlish, N., Woodcock, J., Co, S., Ostro, B., Fanai, A., & Fairley, D. (2013). Health cobenefits and transportation-related reductions in greenhouse gas emissions in the San Francisco Bay area. American journal of public health, 103(4), 703-709. Chen, K., Wang, M., Huang, C., Kinney, P. L., & Anastas, P. T. (2020). Air pollution reduction and mortality benefit during the COVID-19 outbreak in China. The Lancet Planetary Health, 4(6), e210-e212.
Course requirement	Students will practice exercises in **R or Stata software** during afternoon lab sessions and will do additional homework practice besides the assigned readings .
Grading and assessment	Written in class exam is scheduled on 2022 Dec 9, 1:00 -4:00 pm Note also that students will complete a questionnaire that assesses their own and their teammates' contributions to group work. All team members will receive the same grade except if it is clear that a student has not participated effectively (attended and contributed to meetings; made timely, helpful contributions; been constructive, etc.). In that case, the student's grade will be lowered accordingly.
Course policy	**Attendance & punctuality** **Regular and punctual class attendance is a prerequisite for receiving credit in a course.** Students are expected to attend each class. Attendance will be taken at each class. The obligations of attendance and punctuality cover every aspect of the course: - lectures, conferences, group projects, assessments, examinations, as described in EHESP Academic Regulations http://mph.ehesp.fr EHESP Academic Regulation Article. 3). If students are not able to make it to class, they are required to send an email to the instructor and to the MPH program coordinating team explaining their absence prior to the scheduled class date. All supporting documents are provided to the end-of-year panel. . Students who miss class are responsible for content. Any student who misses a class has the responsibility for obtaining copies of notes, handouts and assignments. If additional assistance is still necessary, an appointment should be scheduled with the instructor. Class time is not to be used to go over material with students who have missed class. **Lateness**: Students who are more than 10 minutes late may be denied access to a class. Repeated late arrivals may be counted as absences (See http://mph.ehesp.fr EHESP Academic Regulation Article. 3 Attendance & Punctuality) **Maximum absences authorized & penalty otherwise** Above 20% of absences will be designated a fail for a given class. The students will be entitled to be reassessed in any failed component(s). If they undertake a reassessment or they retake a module this means that they cannot normally obtain more than the minimum pass mark (i.e. 10 out of 20) **Exceptional circumstances** Absence from any examination or test, or late submission of assignments due to illness, psychological problems, or exceptional personal reasons must be justified; otherwise, students will be penalized, as above mentioned. Students must directly notify their professor or the MPH academic secretariat before the exam or before the assignment deadline. Before accepting the student's justification, the professor or the MPH academic secretariat has the right to request either a certificate from the attending physician or from a psychologist, or from any other relevant person (See http://mph.ehesp.fr EHESP Academic Regulation Article 4 Examinations). **Courtesy**: All cell phones/pages MUST be turned off during class time. Students are required to conduct themselves according to professional standards, eating during class time is not permitted during class time, such as course or group work.
Valuing diversity	Diversity enriches learning. It requires an atmosphere of inclusion and tolerance, which oftentimes challenges our own closely-held ideas, as well as our personal comfort zones. The results, however, create a sense of community and promote excellence in the learning environment. This class will

	follow principles of inclusion, respect, tolerance, and acceptance that support the values of diversity. Diversity includes consideration of: (1) life experiences, including type, variety, uniqueness, duration, personal values, political viewpoints, and intensity; and (2) factors related to "diversity of presence," including, among others, age, economic circumstances, ethnic identification, family educational attainment, disability, gender, geographic origin, maturity, race, religion, sexual orientation and social position.
Course evaluation	EHESP requests that you complete a course evaluation at the end of the school year. Your responses will be anonymous, with feedback provided in the aggregate. Open-ended comments will be shared with instructors, but not identified with individual students. Your participation in course evaluation is an expectation, since providing constructive feedback is a professional obligation. Feedback is critical, moreover, to improving the quality of our courses, as well as for instructor assessment.

Session 1	**Intro to Health impact assessment and its general framework**
Speakers	Youssef Oulhote
Session Outline	- Introduction to Health impact assessment, History and Scope - Discussion of the syllabus and course objectives -
Learning Objectives	- Understanding the objectives of Health Impact Assessment as a valuable tool for understanding of human health consequences to public policy and decision-making - Introducing students to the tools needed for HIA, and that will be learnt later in the course -
Duration	4h
Training methods	Lecture and group discussion
Reading	TBD

Session 2	Health impact assessment (HIA): French Context and case study
Speakers	Guilhem Dardier
Session Outline	This course will focus on the history and applications of HIA in the French context. We focus on the elaboration of a conceptual causal pathway model between the plan/project/policy and health & wellbeing. A range of environmental nuisances will be considered.
Learning Objectives	At the end of the sessions, students will be able to: - Discuss the core steps of HIA development over the last two decades - Identify how HIA fits Health in All Policies approach. - Appreciate the development of HIA from Environmental Impact Assessments (EIA) - Analyze the use of HIA in national policy/program - Identify the methodological approaches used to conduct HIA
Duration	2 h
Training methods	Lecture and group discussions
Reading	TBD

Session 3	Tools and Methods for HIA
Speakers	Youssef Oulhote
Session Outline	This session comprises three main topics. - Introduction to key concepts in environmental epidemiology: We will discuss history of environmental epidemiology, its evolution, and novel developments in the field that is key to evaluating health impacts of environmental exposures - Biomarkers of exposure in environmental health: Progress and novel systematic methods - Dose-response relationships: Introduction to methods for evaluation of dose-responses, including supra-linear responses and non-monotonic relationships
Learning Objectives	1- Critically interpret environmental epidemiologic research, 2- Adequately understand the types of questions that can and cannot be answered in environmental epidemiology, 3- Understand new approaches to evaluate effects of environmental exposures, including non-parametric models and 4- Understand the science of biomarkers and its evolution for HIA purposes
Duration	6h
Training methods	Lecture and Hands-on using R
Reading	TBD

Session 4	Advanced topics in Environmental HIA
Speakers	Youssef Oulhote
Session Outline	This course will focus on new evaluations of health effects of environmental chemical mixtures and potential ways to establish regulatory guidelines. The course will also introduce students to the basics of establishing causality for individual and multiple chemicals
Learning Objectives	1- Understand the challenges in evaluating the health effects of chemical mixtures 2- Assess the hypotheses required to establish these effects 3- Understand the steps required for establishing guidelines for joint exposures to chemicals 4- Get a sense of the new science of causal inference and its implications for HIA 5- Apply the methods discussed
Duration	3h
Training methods	Lectures and Hands-on in R
Reading	

Session 5	An Introduction to Climate change and Urban Health
Speakers	Tarik Benmarhnia

Session Outline	- What is climate change and the links with population health - Focus on some case studies including extreme heat and wildfire smoke - Introduction to Urban Health - Focus on green space and outdoor air pollution - Climate change and environmental justice
Learning Objectives	Understand the links between climate change and human health
Duration	3h
Training methods	Lecture
Reading	See above

Session 6	Climate Change epidemiology & Review of Burden of Disease metrics
Speakers	Tarik Benmarhnia
Session Outline	Introducing some designs used in climate change epidemiology (time series modelling, case crossover etc..) Biases in environmental epidemiology An overview of GBD metrics (PAF, YLL, DALYs,QALYs) Calculation of attributable number of cases and uncertainty analyses
Learning Objectives	Know how to interpret climate change epidemiology studies and identify main sources of bias Know how to compute Population Attributable Fractions for different exposures such as green space and air pollutants
Duration	3h
Training methods	Lecture with case studies
Reading	See above

Session 7	Urban Health HIA in Practice
Speakers	Tarik Benmarhnia
Session Outline	Hands-on lab on conducting a HIA Focus on 2 cases studies: - Low Emission Zone in Paris and health benefits - Covid-19 lockdowns impacts on traffic related air pollution and health benefits
Learning Objectives	Know how to implement a HIA for hypothetical policy scenarios regarding air pollution changes
Duration	3h
Training methods	Lab session using R and Excel
Reading	N/A

Session 8	Exposure modelling for Health Impact Assessment, Advanced topics for HIA
Speakers	Tarik Benmarhnia
Session Outline	Modern tools to model environmental exposures Introduction to remote sensing images and products Modeling exposure to air pollution, green space and other urban exposure
Learning Objectives	Being familiar with methods to estimate exposure to various environmental exposures
Duration	3h
Training methods	Lecture with case studies and group discussion
Reading	See above