

Medida de la Exposición / Exposure Assessment Medida del Riesgo / Risk Assessment

Teaching staff

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Aims and objectives

- 1) To understand the utility, principles and methods of environmental risk assessment (RA) and health impact assessment (HIA)
- 2) To understand RA in the context of other forms of assessment
- 3) To learn how to conduct a risk and exposure assessment
- 4) To learn how to conduct a health impact assessment

Summary

The course will provide an introduction to environmental risk and health impact assessment. It will consist of lectures, practical exercises, discussion sessions and course/case study work. The students will learn about the basic methodologies that are applied for risk and exposure assessment and get hand on experience conducting a health impact assessment.

Lecture summaries

28/09/2021 15.00-17.00 Virtual lecture: Introduction (Natalie Mueller, Sasha Khomenko)

Introduction to the course.

Definitions and introduction to environmental risk assessment and health impact assessment.

Introduction to the case study.

5/10/2021 15.00-19.30 In person lecture: Identification of risk and exposure response functions (Sasha Khomenko)

Risk assessment framework and methods.

Risk assessment of environmental and lifestyle exposures in urban settings.

Exposure Response Functions (ERFs) for health impact assessment.

Practical exercise: the students will conduct a practical exercise to learn how to find and select ERFs for environmental exposures that are prevalent in cities. The practical exercise will be followed by a discussion of the student's findings.

14/10/2021 15.00-19.30 Virtual lecture: Exposure assessment (Mark Nieuwenhuijsen)

Definitions and introduction to exposure assessment.

Exposure assessment framework and methods.

Assessment of environmental and lifestyle exposures in urban settings.

Assessment of environmental and lifestyle exposures for health impact assessment.

Practical exercise: the students will read several health impact assessment studies and identify how the environmental and lifestyle exposures were assessed and assigned. This practical exercise will be followed by a discussion of the strengths and limitations of the distinct methods/approaches for exposure assessment in health impact assessment studies.

19/10/2021 15.00-19.30 In person lecture: Health Impact Assessment methods (Natalie Mueller)

Health Impact Assessment (HIA) framework and methods.

Distinction between qualitative and quantitative HIA.

Review of quantitative HIA forecasting models.

Comparative risk assessment.

Quantitative HIA tools: AirQ+ and HEAT tool.

Practical exercise: the students will calculate the health impacts of an air quality improvement policy for the city of Barcelona. The exercise will be replicated in AirQ+ and in Excel using provided formulas for risk ratio scaling, calculation of population attributable fractions (PAF) and attributable health burden. The practical exercise will be followed by a discussion of the findings to provide a better understanding of what parameters the results are sensitive to.

26/10/2021 15.00-19.30 Virtual lecture: HIA case studies (Sasha Khomenko)

Introduction to the 1000 cities project.

Presentation of the case studies: air pollution, green spaces, road traffic noise.

Assessment of uncertainties in the data.

Description of the main strengths, limitations and challenges of the project.

Translation of the project findings to policy makers/society.

Case study: the students will have time to work on the case study and address any questions/doubts regarding the methodology and the interpretation of the findings.

2/11/2021 15.00-19.30 In person lecture: Research translation and presentation of the case study results (Carolyn Daher, Sasha Khomenko and Natalie Mueller)

Translation of research findings and risk communication.

Involvement of and work with distinct stakeholders.

Translation of research findings across distinct sectors.

Impact of research findings on policy-making and society.

Case study: the students will present their case study results. The presentations will be followed by a discussion of the findings.

Time table

Date	28th September	5th October	14th October	19th October	26th October	2nd November
Lecture	1	2	3	4	5	6
15.00-16.00	Introduction	Risk assessment and exposure response	Exposure assessment	Health Impact Assessment methods	HIA case studies	Research translation
16.00-17.00	Introduction	Risk assessment and exposure response	Exposure assessment	Health Impact Assessment methods	HIA case studies	Research translation
17.00-17.30		<i>Break</i>	<i>Break</i>	<i>Break</i>	<i>Break</i>	<i>Break</i>
17.30-18.30		Practical exercise	Practical exercise	Practical exercise	Work on case study	Presentation of case study results
18.30-19.30		Discussion of findings	Discussion of findings	Discussion of findings	Work on case study	Presentation of case study results

Evaluation

- Participation (30%) – attendance to all lectures
 - Final presentation (30%) – last lecture
 - Final report (40%) – November 9th 2021

Case study

QUANTITATIVE HEALTH IMPACT ASSESSMENT EXERCISE

Contact person: Sasha Khomenko (sasha.khomenko@isglobal.org)

Aim: to conduct a health impact assessment in the city of Barcelona for policies to reduce air pollution and road traffic noise, and increase cycling and green space exposure.

There are a number of quantitative health impact assessment tools available for air pollution and physical activity. Most of them are quite advanced research tools (e.g. ITHIM, TAPAS, UTOPIA) but the World Health Organisation (WHO) has also developed a number of easier to use tools to estimate the impact of urban and transport planning policies related air pollution and physical activity levels in cities and the impact on mortality.

WHO AirQ+ tool for air pollution

<https://www.euro.who.int/en/health-topics/environment-and-health/air-quality/activities/airq-software-tool-for-health-risk-assessment-of-air-pollution>

WHO HEAT tool for walking and cycling

<https://www.heatwalkingcycling.org/#homepage>

Barcelona is a dense Mediterranean city with around 1.6M people, a high traffic density and high levels of air pollution and noise. Around 20-30% of trips in Barcelona are by car, and levels of PM_{2.5} are around 17 µg/m³ per year.

Research question: How many deaths could be avoided each year in Barcelona if 20% of the car trips would be replaced by cycling; air pollution and road traffic noise levels would meet the WHO recommendations and surrounding greenness would be increased by 10%? Use the Excel sheets provided for the calculations and the WHO AirQ+ and HEAT tools.

The report (max 10 pages) should be structured as:

What is the relation between air pollution, road traffic noise, green spaces, physical activity and mortality?

What are the benefits/advantages of health impact assessment studies?

What are the purposes of the tools? How do these compare to implementing HIA methods in an independent software (R, Excel)?

What are the input data needed?

What are the main assumptions the models make?

Model the different scenarios and provide mortality estimates

What are the strengths and limitations of the analyses?

What policies should be put in place?

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