ISEE Young Rennes
June 5-7, 2024

# Pre-conference Workshops

## ISEE Young Rennes 2024 – June 5, 2024

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# Workshop Schedule

All workshops take place on Wednesday, June 5. There are morning and afternoon sessions.

| Morning Workshops (10h00 – 13h00) | | |
|---|---|---|
| **WS1** | Title | **Statistical methods for studying mixtures and the exposome** |
| | Presenters | - Maximilien Génard-Walton<br>- Charline Warembourg<br>- Alan Dominguez |
| | Number of attendees | 30 |
| **WS2** | Title | **Exploring spatial data with R** |
| | Presenter | Noémie Letellier |
| | Number of attendees | 20 |
| **WS3** | Title | **Methods for risk extrapolation from multi-location studies in environmental epidemiology** |
| | Presenter | Pierre Masselot |
| | Number of attendees | 20 |
| **WS4** | Title | **Environmental Justice in Europe: closing the gap in air pollution health effects between East and West** |
| | Presenters | - Artur Badyda,<br>- Zorana Jovanovic Andersen<br>- Natasa Dragic<br>- Lilian Tzivian<br>- Konstantinos Makris<br>- Stevan Savic<br>- Katarina Pauvonic |
| | Number of attendees | 20 |

| Afternoon Workshops (14h30 – 17h30) | | |
|---|---|---|
| **WS5** | Title | **From science to policy: an interactive game to understand development of environmental health policy** |
| | Presenters | - Ebba Malmqvist<br>- Zorana Jovanovic Andersen |
| | Number of attendees | 40 |
| **WS6** | Title | **All you ever want to know about writing, publishing and reviewing environmental epidemiology papers** |
| | Presenter | - Bert Brunekreef<br>- Hanna Boogaard<br>- Ingrid Dahmen<br>- Payam Dadvand<br>- Apolline Saucy |
| | Number of attendees | 30 |
| **WS7** | Title | **An introduction to climate data for health analysis** |
| | Presenter | - Regan Mudhar<br>- Emily Ball<br>- Chloe Brimicombe<br>- Katharina Wieser |
| | Number of attendees | 20 |
| **WS8** | Title | **Elevate your research with reproducibility science practices: a R workshop for young researcher in epidemiology** |
| | Presenters | Stephane Tuffier |
| | Number of attendees | 30 |

# Workshop Details

## WS1: Statistical methods for studying mixtures and the exposome

### Knowledge or equipment required

Basic R knowledge. A computer with the R software installed is recommended (but not compulsory).

### Objective /expected outcome

At the end of the workshop, participants will be able to:

- Determine which statistical model is appropriate in what circumstances and for which research objective
- Run mixture and exposome models in R

### Who is the workshop for?

Anyone interested in performing an exposome/mixture-health outcome association studies (OMICs specific research questions will not be covered).

### Context

The study of mixtures and the exposome in the context of environmental epidemiological research is a rapidly-growing field. Investigating mixtures or the exposome allows researchers to assess the independent and combined effects of various exposures, as well as their potential synergistic or antagonistic effects, on health outcomes. However, the complexity of exploring these questions requires the use of specific statistical models to account for aspects that single-exposure models cannot typically handle (e.g. multicollinearity).
This workshop therefore aims at summarizing and presenting the main models used in this specific context, and discussing the pros and cons of each method in relation to specific study objectives.

### Format

The workshop will be split into a theoretical part and a practice part.

- Theory (1h30): During this workshop, we will present:
    - Aims and statistical challenges/specificities of mixture and exposome analyses
    - A range of (non-exhaustive) statistical models specific to mixtures and/or the exposome with an example application for each method, that will cover: exposome-wide association study model (ExWAS), mixture models (e.g. BKMR, WQS, and their extensions, etc), variable selection methods (e.g. DSA, ENET, (s)PLS, etc), and dimension reduction/clustering tools (e.g. PCA, HCPC)
    - Pros and cons of using each method
    - Comparative performances of these methods
    - The data pre-processing steps required to perform these analyses
    - The R packages available to implement these methods
- Practice (1h): We will give a dataset to participants along with codes for running methods presented in the theoretical parts. Each participant will then be able to apply one (or more) of the methods to answer one of the possible research questions in relation to the dataset. Workshop organizers will roam around the room to assist participants if needed.

# WS2: Exploring spatial data with R

## Knowledge or equipment required

Participants need to bring their computers with R Studio software installed, and having some experience with R is a prerequisite.

## Description

Curious about the field of Geographic Information Science (GIS)? Interested in managing, visualizing, and analyzing spatial information?
This workshop will provide an overview of tools available in R for exploring spatial data - an invaluable tool in environmental epidemiology.

The objectives of the workshop are to:

1) understand spatial data handling and mapping in R;
2) generate basic maps;
3) integrate data from another source (e.g., remote sensing); and
4) understand the basics of spatial data analysis.

The workshop will be divided into four parts, each comprising both a lecture and practical exercises. The four parts of the workshop will be as follows:

1) Spatial data manipulation in R
2) Data visualization (integrating neighborhood information, basic mapping)
3) Remote sensing data processing using MODIS data as an example
4) Basics of methods used to analyze spatial data, including an introduction to spatial autocorrelation, Moran's I, and cluster analysis

# WS3: Methods for risk extrapolation from multi-location studies in environmental epidemiology

## Knowledge or equipment required

Computer with R software installed

## Description

The two-stage methodology is now a standard tool in environmental epidemiology to pool single-location estimate of environmental stressors related risks. This methodology has recently been the subject of intensive research and methodological innovation, making it flexible in representing risks of various complexities at different geographical levels. Given its flexibility and computational convenience, the two-stage methodology can also be used to extrapolate the risk to locations or situations in which health data are sparse or non-existent. This allows expanding the scope of environmental epidemiology studies, in particular health impact assessment across large populations. Extrapolating the risk however, necessitate several steps to accurately map the risk and its uncertainty across large geographical domains.

In this workshop, we will introduce advanced techniques to extrapolate the risks estimated from several locations with available data to new locations. It will consist in a blend of lectures and computer practicals with the R software, providing example code that attendees can then reuse in their own work.
From a toy dataset of location specific exposure-response functions, we will explore how to:

i) pool these location-specific risks into a meta-regression model accounting for local characteristics,
ii) use the meta-regression model to extrapolate exposures-response function to new locations, including the random part of the models and
iii) characterise the uncertainty associated with the estimated impact measures.

The introduction of extrapolation techniques and sample code to be adapted by the user, will provide tools to the attendees to assess risks and impacts of environmental stressors on underrepresented populations.

# WS4: Environmental Justice in Europe: closing the gap in air pollution health effects between East and West

## Knowledge or equipment required

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## Context

Most of the population across Central and Southeast Europe live in areas where air quality is poor, and in many countries, the annual EU Air Quality Limit Values as well as the World Health Organization guidelines for PM2.5 are exceeded. However, the discourse related to air pollution has remained focused on issues most pertinent for countries in Western Europe, and there has been insufficient attention to the research and policy needs in this region. As air quality data has become more accessible, public attention on the issue has increased across the region. At the same time, significant gaps remain concerning the body of evidence in epidemiological literature. There are very few studies on the effects of long-term exposure to air pollution and the field of environmental epidemiology remains nascent.
This symposium proposes to examine the status of current epidemiological evidence on the health effects of air pollution in the region and identify opportunities for research and collaboration. Workshop will use regional and national case studies to discuss the types of epidemiological evidence available and necessary for informing policies in this region.

## Description

The workshop will have different speaker and experts from Eastern and South Eastern Europe. Below is a summary of the content of the talks and the proposed program.

- Air Pollution and Health in Serbia: Where are we now and where we can be
  Nataša Dragić, University of Novi Sad, Faculty of Medicine, Serbia
  Several recent investigations in Serbia estimate that each year between 6600 and 13200 premature deaths are a contribution of ambient particulate air pollution. One of the latest very detailed reports gives an explanation regarding the air pollution as a health risk in Serbia (air pollution exposures, key sources and the related health impacts). Among others, it is recognized that the current situation with dataset of air quality and health, data streams, as well, could represent one of the important gaps as part of a solution for better understanding air pollution as a health risk and for health impact assessment.
- Air pollution in Poland: why is it an issue and what can be done?
  Artur Badyda, Warsaw University of Technology, Poland
  Due to the still significant use of coal and wood for heating purposes in the municipal and domestic sector, air quality in Poland, despite some improvement in recent years, remains at one of the worst levels in Europe. Moreover, the growing traffic intensity, especially in large cities, causes intensified emissions of traffic pollutants, which have additional negative effects on the health of residents. Poland has the highest levels of PM2.5 and benzo(a)pyrene in the European Union. Over 47,000 premature deaths annually are attributed to the exposure to high concentrations of PM2.5 in Poland (and over 53,000 when including also NO2 and O3). Negative health effects are widely observed particularly in children, but also in elderlies and people suffering from chronic cardiovascular and respiratory diseases. In many locations mean concentrations of PM2.5 still exceed the EU air quality standards. There is also no single location in Poland where the WHO recommendations for fine PM are met. BaP concentrations are also a serious threat, exceeding the air quality standards in almost the whole country. This presentation will provide an overview of the state of air pollution and health in Poland. It will critically review the current policies on air pollution, showing also the

activities that started to give positive results. It will also discuss solutions on how to tackle air pollution problems and improve health status among residents of Polish cities.

- Air pollution in Latvia: limited availability of data for scientific work
  Dr. Lillian Tzivian, University of Latvia, Riga, Latvia
  Measures of air pollution in Latvia are performed by the Latvian Center for Environment, Geology, and Meteorology. Although the norms of air pollution are strictly defined by the Ministry Cabinet of Latvia, these norms are not fully in line with the newest standards by WHO. The main accent in monitoring is made on agriculture emissions, particle matter measures are scarce. First, the number of monitoring stations in Latvia is very low: only four stations are placed in the capital city of Latvia, Riga. From these stations only two measure PM10 and PM2.5 (one is placed in a park zone). Additionally, six stations are located in different regions of Latvia, and four of them measure particle matter. In 2021 all the monitoring stations displayed increased levels of annual PM2.5 and PM10 which were higher than WHO guidelines: mean yearly concentrations of 34.96 µg/m3 for PM10 in Riga with 51 days when the PM10 concentration is higher than 50 µg/m3. The maximal 24-h concentration of PM10 in the park zone was 31.2 - 79.95 µg/m3. In rural areas, the mean yearly concentrations for particle matter in 2021 were 10.9 µg/m3 for PM2.5 and 18.9 – 22.7 µg/m3 for PM10. Although the last official Latvia's Informative Inventory Report (2021) reveals the possibility of a reduction of PM2.5 in 2030 by 22.3% in comparison with 2018, this data should be taken with some pessimism.
- Panel Discussion with experts
  Dr. Katarina Paunovic (Serbia); Dr. Stevan Savic (Serbia); Dr. Konstantinos Markis (Cypress)

# WS5: From science to policy: an interactive game to understand development of environmental health policy

## Knowledge or equipment required

Pen and paper

## Description

Environmental health negotiations and policy decisions take place at the science-policy interface. While this is well-known it is often difficult to convey how the process of science and policy interact. Negotiation simulations, is as an experiential learning tool, to teach how science and policy interact in decision-making. This has been done successfully both with students and high level UN officials.

This workshop is an opportunity to learn about negotiations and policy, including the role economics and politics play in the policy process. Scientists often communicate in a way that is confusing to the public, this game aim to show the important role communication and translation play when science is used in policymaking and negotiation. Our workshop build upon previous simulation games on climate, chemicals, and air pollution but is adapted to a group of environmental epidemiologists. Each participant will be given role to play and receive documentation and a mandate that resembles the real life situation. The purpose is to learn about the differences in perspectives from various disciplines, industry, countries and ministries, the nature of international negotiations and to come up with creative solutions that can bridge the contrasting stakes of the participants.

# WS6: All you ever want to know about writing, publishing and reviewing environmental epidemiology papers

## Knowledge or equipment required

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## Scope

It is becoming increasingly difficult to publish scientific papers in many areas of research. This is also true for studies in environmental epidemiology.
The proposed workshop is intended for PhD students and postdocs - but mid- to late career participants are welcome too to discuss their experiences.

## Aim

The aim is to provide guidance, and to pay specific attention to questions from the audience related to the practicalities of getting your work published effectively in journals with a good reputation and a high visibility.
Another aim is to encourage young investigators to become active as reviewers for scientific journals. Reviewing manuscripts is a great learning experience that, although unpaid and time consuming, is good for your career.
Further aims are to discuss modern-day (and not so modern day) challenges to scientific publishing such as plagiarism, predatory publishing, paper mills, how to do (and get your own papers cited in) narrative and systematic reviews, how to review collections of systematic reviews (so-called umbrella reviews), and how to rate the certainty of the evidence generated by such reviews.

## Expected outcomes

Increased knowledge of tools to publish and review manuscripts effectively. Increased awareness of challenges to scientific publishing.

## Format

There will be a few short introductions by the workshop conveners, followed by an inventory and discussion of questions raised by the audience. Participants in the workshop are encouraged to submit questions in advance so they can be grouped, and answers/talking points prepared by the organizers. The emphasis will be on interaction with the participants.

The organizers will bring their experiences as editor-in-chief of the official ISEE journal Environmental Epidemiology (Bert Brunekreef) and associate editor of the high-volume general journal Environment International (Hanna Boogaard) to guide the discussions. In addition, they will bring their experience in reviewing for other journals, and for major organisations such as the World Health Organisation and the Health Effects Institute.

# WS7: An introduction to climate data for health analysis

## Knowledge or equipment required

A laptop that can connect to the internet. Attendees should have some prior coding experience; we will predominantly work with Python, but through using a notebooks approach, detailed knowledge of Python is not a necessity.

## Description

In this workshop we will introduce you to the world of weather and climate science, showing you how you can leverage such data in your own work. You may have wondered what climate models are and what they can be used for in epidemiology! We will show you some of the possibilities by sharing examples of studies into the health impacts of extreme weather and climate events. You may also have wondered what climate data products are out there and which may be appropriate for your own work. Though we will talk you through some of the details, this workshop will predominantly provide you the opportunity to get some hands-on experience of opening and analysing “reanalysis” and climate model data – including feeding variables into a basic health model.

# WS8: Elevate your research with reproducibility science practices: a R workshop for young researcher in epidemiology

## Knowledge or equipment required

Computer with the following software installed:

- R (version ≥ 4.3.0 or later)
- R-studio (version ≥ 2023.03), other IDE like Visual code can also be used
- Quarto (version ≥ 1.3 )
- git and git-gui (version ≥ 2.40.0)

Installation details and scripts will be provided.

## Description

This workshop aims to give young epidemiology researchers the knowledge and skills needed to enhance the reproducibility of their research.

The first part of the workshop will begin by defining reproducibility and its importance in epidemiology, exploring associated challenges and opportunities. Besides study design and research good practices, focus will be put on practical solutions that young researchers can implement in their analysis and writing.

In the second part of the workshop, participants will learn how to start reproducible projects and incorporate best data management and coding practices, inspired by data science and open-source worlds. We will introduce participants to collaboration tools like Git, Git-Hub, and several R packages that improve analysis and code reproducibility, including quarto, purrr, targets, gt.

The workshop will conclude with hands-on exercises, enabling participants to apply these learnings by themselves.

Pre-workshop materials including package installation scripts, data sets, R scripts, will be shared and freely accessible on Git-Hub.