



# European Human Exposome **NETWORK**

The world's largest project network studying the impact of environmental exposure on health

ISSUE #5

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## NEWSLETTER

**“This is a severe public health crisis...What we see quite clearly is that nearly everyone in Europe is breathing unhealthy air.”**



## Welcome

We are now approaching the end of the fourth year since the European Human Exposome Network (EHEN) was established. Since the last newsletter, we have held the EHEN Scientific Meeting and Policy-Research event and you can find more information on this in the events section.

We would like to thank the project leads of EXIMIOUS and LongITools, Peter Hoet and Sylvain Sebert and their teams, who coordinated the network activities for 15 months until the end of September 2023. They have now handed the baton to EPHOR, HEDIMED and REMEDIA and we will coordinate the Network until the end of December 2024.

In this issue of the newsletter, we explore some of the new tools that are being developed by the EHEN projects that will help researchers undertake exposome research. You can also read progress updates from each project, as well as hear about the latest news, events, and publications from across the network.

We welcome any feedback on this newsletter so please do not hesitate to [contact us](#).

Anjoeka Pronk, Heikki Hyöty and Sophie Lanone  
EHEN Coordination Team

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Million euros from  
the European  
Commission

# New Tools are Key to Furthering our Understanding of the Exposome

How environmental factors collectively contribute to the risk and development of diseases is still not well understood. It is difficult to characterise the exposome and one of the main reasons is due to the technical, statistical and analytical challenges faced by researchers. Currently there are not many tools that enable researchers to move away from focusing on one exposure and one disease to look at the holistic effect of multiple exposures on health. Of course, even if a researcher is equipped with good tools, they need to know how to use them, so clear guidance documents and training are also essential.

Across the nine EHEN projects, a vast array of new tools, models, methodologies, guidelines and protocols are being developed to help researchers, policymakers and citizen scientists understand how the exposome affects our health.

Some of the latest EHEN projects' tools to be developed include:

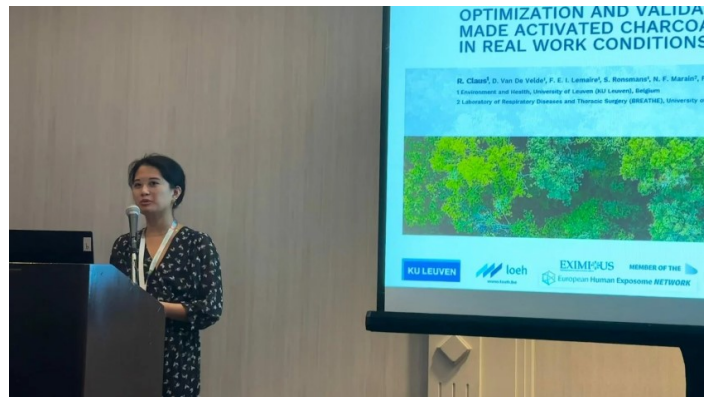
## New road traffic flow prediction modelling for air quality and environmental noise indicators

Researchers in Equal-Life have constructed a road traffic flow prediction model to be used as input to air quality and environmental noise modelling in the project. In out-of-sample tests, the model explained more than 50% of the variability in annual average daily traffic across different road types (e.g., motorways, primary roads, local and residential roads) in Denmark, Spain, and the UK. The model can be supplied with open data relating to population density, land cover, terrain, road geography and does not require modelled or measured traffic data as an input. It is therefore potentially generalisable to different locations. This approach will provide noise modelling for the first time in at least two project cohorts. The code will be made available publicly once published and agreed with the Equal-Life partners.

## New charcoal cloth patch measures skin exposure to chemicals

The research conducted in EXIMIOUS by the team at KU Leuven involves the design of a new custom-made activated charcoal cloth patch, intended to measure skin exposure to volatile organic compounds (VOC; organic chemical compounds that evaporate easily at room temperature). While it is becoming increasingly important to measure this type of exposure in industrial settings, there are currently no standardised methods to do so. The charcoal cloth patch offers a potential solution to this.

The latest work from EXIMIOUS was presented at the International Society of Exposure Science (ISES) 2023 Annual Meeting in Chicago. Read more about the [test study](#) on the EXIMIOUS website.



*Rani Claus of KU Leuven presenting at ISES 2023*

## Online toolbox to collate and add value to data analysis tools and visualisation methodologies

The LongITools team at the University of Barcelona are developing a new, user friendly Exposome Data Analysis Toolbox. This novel toolbox will enable researchers to access and use multiple exposome data analysis tools and methodologies via a single platform. Each tool or methodology will be supported by comprehensive user documentation (e.g., guidelines, example data).

Users will be able to interact with the tools based on their needs and level of expertise. For example, users could view and download the specific code for a particular tool (if open source) or use the tools directly on the platform to run their analysis.

The toolbox will enhance research and support open science by increasing usability and interoperability, defining data analysis standards and reference methods, and facilitating the execution of complex computational pipelines.

The toolbox will be open access but some functions will require registration. [Find out more.](#)

To keep up to date with the latest developments, visit the [EHEN Toolbox website page](#), a signposting hub for each of the project's tools

# Events

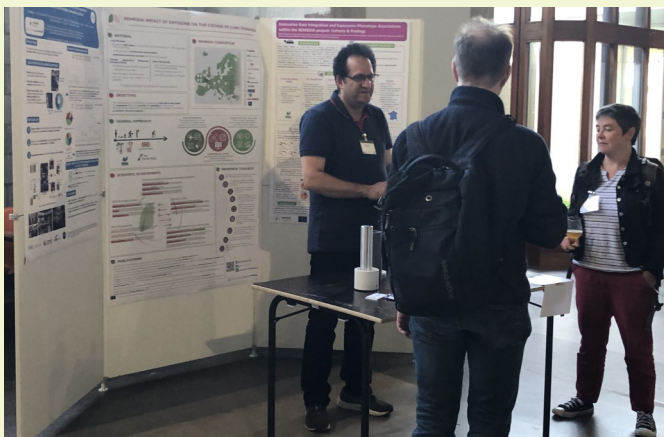
## Highlights from the EHEN Scientific Meeting

Around 140 attendees from the nine EHEN projects gathered to talk and exchange on everything exposome in Leuven, Belgium and online from 30th May to 1st June 2023.



*Attendees from the project teams at the EHEN Scientific Meeting in Leuven, Belgium*

The focus of the first two days was to share the progress and results of the projects' research with members of the network. Day two wrapped up with an exhibition featuring posters, tools and product demonstrations.



*The REMEDIA team's exhibition stall*

On day three, EHEN's Communication, Dissemination and Policy Working Group invited environmental and health policy specialists to an open event with EHEN researchers. The event was a step forward in engaging with policymakers, at a point where results and publications from EHEN projects are gathering momentum.

Read the [full summary and access the recording](#) of the open event on the EHEN website.

*The meeting was organised by the EXIMIOUS and LongITools teams and hosted by KU Leuven.*



## Other Event News

The Endocrine Society have invited EHEN projects to present at a workshop on 15th November 2023. The workshop is part of the [EndoCompass project](#). The project is writing a roadmap for the future of endocrine research, and needs to incorporate the exposome approach into their vision. Sylvain Sebert, LongITools and George Downward, EXPANSE will participate in the workshop to talk about the network and the data catalogues.

The [Exposome-NL Conference](#) will take place on 17th November in Utrecht. This year's conference topic is Exposome and Preventive Health: Analysing and simulating the exposome in space and time, and is held in collaboration with the Netherlands Metabolomics Centre and the EXPANSE project. Several projects will present.

## Policy Activity

The EHEN Communication, Dissemination and Policy Working Group have followed up on the Leuven event by having individual meetings with policy representatives at the European Commission, DG Research and DG Environment, to further explore how the work of the EHEN projects may support and contribute to key European policies. Work on a draft of the first EHEN policy briefing is ongoing.

### The benefits of exposome research for policy action

Countries across Europe committed to take urgent action to stop millions of preventable deaths every year linked to climate change and pollution during the 7th Ministerial Conference on Environment and Health, organised by the World Health Organization (WHO) Regional Office for Europe in July in Budapest, Hungary. ATHLETE, EXPANSE and EQUAL-LIFE, participated in the event to highlight the various ways research into the exposome can benefit future policy action to end pollution and protect health.

[Find out more.](#)

# EHEN in the News

The work of researchers in the EXPANSE project was highlighted in the Guardian article [Revealed: almost everyone in Europe is breathing toxic air](#) in September 2023. The Guardian worked with pollution experts to produce an interactive map revealing the worst-hit areas for air pollution in Europe. The data was compiled by academics in the EXPANSE project, using a combination of sources, from high-resolution satellite data to pollution monitoring stations and information about land use.

A new article about LongITools was published in the Autumn 2023 issue of EU Research Magazine. The article titled [Discovering Health Risks from Environmental Exposures for Stronger Policies](#) was produced following an interview with Sylvain Sebert, LongITools Project Coordinator. The article focuses on how the project, along with the other EHEN projects are addressing the challenges of exposome research.



In October, two of the EHEN projects ATHLETE and EXPANSE featured in Horizon, The EU Research & Innovation Magazine. Project Coordinators, Professors Martine Vrijheid and Roel Vermeulen were interviewed for [From womb to tomb: tackling diseases by knowing the surrounding influences](#), which focuses on understanding how environmental factors affecting health could reduce chronic illnesses.

## EHEN Blog Series

### Building Healthier, More Equitable Urban Areas Through Exposome Research

In a world where over 55% of the population currently resides in urban areas - a figure expected to rise to 68% by 2050 - understanding the complex relationship between health and increasingly urbanised environments is crucial. While city life offers many advantages, it also presents unique health challenges.



In the blog, LongITools explores the urban exposome and some of the initiatives which focus on creating healthier urban environments, as well as how many of the EHEN projects are contributing to improving and supporting urban health. [Read more.](#)

## Project Blogs

A number of project blogs relevant to exposome research can be found on the project websites:

- [The power of the human exposome](#) by Sammie Jansen, Equal-Life.
- [Harmonising data in collaborative projects](#) by Justiina Ronkainen, LongITools.
- [New study links prenatal exposure to environmental chemicals to childhood growth changes](#), ATHLETE.

## Project Updates

**EXIMIOUS**  
Mapping Exposure-Induced Immune Effects

[EXIMIOUS](#)' latest activities include:

- The project is preparing to launch its Toolbox page with the first tool, the EXIMIOUS DMP-CHECK. This is associated with a recent [publication in Environmental Research](#).
- The fifth EXIMIOUS symposium Risk assessment of mixed exposures: particles, carcinogens, and EU policies took place online on 28th September 2023. You can now [read our key takeaways and watch the recording](#) on the EXIMIOUS website.
- Over the summer, EXIMIOUS ran a social media campaign focused on the most frequently asked questions about the exposome and the project. You can still browse through the campaign on [LinkedIn](#), [Twitter](#) and [Facebook](#) under the hashtag #EXIMIOUSFAQ.

**ATHLETE**'s latest updates include:

- Time to put a spotlight on our ATHLETE research fellows! We sat down with Sophie Blaauwendraad (Erasmus Medical Centre, The Netherlands) [to talk about](#) her recent fellowship run at NYU Langone Health, where she studied how endocrine disrupting chemicals impact children's health during pregnancy.
- Not sure which statistical strategy is more suitable for your exposome research? A recent [ATHLETE article](#) tests and compares several statistical approaches to study exposome-health associations in the context of repeated exposure data.



**EPHOR**'s latest updates include:

- Analyses in the EPHOR mega cohort are ongoing and are focusing on a broad range of occupational exposures and various NCD's.
- Within EPHOR, we are developing tools for external exposure assessment focused on the occupation setting working closely together with stakeholders using co-creation methods.
- EPHOR and EXIMIOUS were present at the [ISBM12 conference](#) in a session on Multi-disciplinary approaches in exposome research.
- Keep up to date with the EPHOR project by following us on [LinkedIn](#) and on [Twitter/X](#).

**HEAP** partner Statens Serum Institut is spearheading international collaboration between public health researchers working with Consumer Purchase Data (CPD), and welcomed speakers from the University of Leeds, the University of Helsinki and the US Environment Protection Agency to the [First International Consumer Purchase Data \(CPD\) Symposium](#), in Copenhagen in September 2023.

HEAP researchers presented an encrypted app that enables shoppers to share their purchase data with researchers, which is paving the way for personalised nutritional or chemical exposure profiles. SSI researchers have also used purchase data to successfully trace the source of disease outbreaks. If you missed the Symposium, watch on [HEAP's YouTube channel](#).

Key updates from **Equal-Life** include:

- Analysis on the cohort and school study data in relation to the exposome is in full progress.
- Several co-design workshops with stakeholders were organised in Como and Helsinki.
- Several peer-reviewed [publications](#) saw light, one being [Plasma proteomics discovery of mental health risk biomarkers in adolescents](#), in Nature Mental Health.
- Members of the Equal-Life team presented abstracts at a number of conferences focused on future cities, computational urban planning, geographical information science and noise in public health.



The latest **EXPANSE** project highlights are:

- [Urban Lab Study](#) is on full speed in 5 countries collecting detailed individual exposure data.
- Consortium members will meet on 16th November in Utrecht, The Netherlands to work on key publications together.
- Last month EXPANSE researchers Caspar Safarlou and Charisma Hehakaya organised several focus groups to discuss the importance of [exposome](#) research with citizens.
- Check out recent publications on topics such as metabolomics, food environment and exposure assessment in relation to stroke [here](#).



*EXPANSE researchers with citizens during the focus group*

The latest updates from [LongITools](#) are:

- The project held an [Autumn School](#) in Frascati, Rome in early October. The main aim was to share knowledge on exposome data analysis to enable a pilot study to be replicated across all LongITools data sets. This ticked off an important project milestone. The School also included sessions on causal inference in economic modelling and communication to a non-scientific audience.
- User testing of the [LongITools Health Risk Assessment System](#) prototype has begun in Italy.
- The project's 5th policy forum "Navigating the Urban Exposome for Policy Solutions" was held on 28th September 2023. [Key takeaways and the full recording](#) are available on the website.



Some of the LongITools team at the Autumn School in Frascati, Italy.



[REMEDIA](#) is organising a huge experimental campaign during Autumn 2023. It is a multidisciplinary work between biologists and atmosphere physico-chemists. For this particular campaign, REMEDIA set up an innovative experiment allowing them to address the impact of several components of the exposome (air pollution, seasonality, age, sex) on the course of cystic fibrosis (CF) as well as the early origins of chronic obstructive pulmonary disease (COPD).

The team also presented their work at several conferences including the European Respiratory Society 2023, European Conference on Rare Diseases, International Society for Environmental Epidemiology (ISEE), the Exposome Symposium and the American Association for Aerosol Research (AAAR).

## Featured Publication



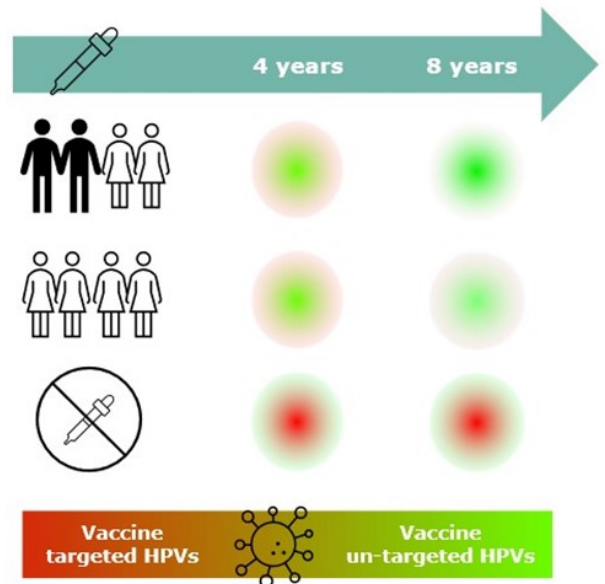
Photo by  
Vilma Pimenoff

Ville N. Pimenoff et al. [Ecological diversity profiles of non-vaccine-targeted HPVs after gender-based community vaccination efforts](#). Cell Host & Microbe 31 (2023) p1921-1929.

Ville says: "Our study demonstrates that gender-neutral HPV vaccination is the best way to achieve community-level immune protection and to eradicate vaccine-targeted oncogenic HPVs.

It also gives us new insights into the dynamic interactions between humans and human-infecting papillomaviruses. Using data from the world's largest community-randomized Finnish vaccination trial, we now have evidence that cancer-causing HPVs are replaced in the long term after vaccination by the vaccine-untargeted HPV types with low or no risk for cancer."

### Population-level host-virus interactions after HPV vaccination among 12,000 adolescents



"Most importantly, our findings suggest that HPV screening programmes for cervical cancer prevention, which include testing for HPVs with low cancer risks, should be redesigned or stopped among vaccinated communities, as the current approach could lead to overdiagnosis of individuals who are not at risk of cancer. Unnecessary testing and treatment would be a burden for the patient and the healthcare system."

# Publications



Gudi-Mindermann H., et al. [Integrating the social environment with an equity perspective into the exposome paradigm: A new conceptual framework of the Social Exposome](#). Environmental Research, Vol 233, 2023, 116485.

Person Waye K., et al. [Adopting a child perspective for exposome research on mental health and cognitive development - Conceptualisation and opportunities](#). Environmental Research, online, 2023, 117279.



Jenickova E. et al. [Effects of Lactiplantibacillus plantarum and Lacticaseibacillus paracasei supplementation on the faecal metabolome in children with coeliac disease autoimmunity: a randomised, double-blinded placebo-controlled clinical trial](#). Frontiers in Nutrition. Vol 10, 2023.

Voor T. et al. [Atopic sensitization in childhood depends on the type of green area around the home in infancy](#). Clinical & Experimental Allergy, Vol 53(8), 2023.



Atehortúa A. et al. [Cardiometabolic risk estimation using exposome data and machine learning](#). International Journal of Medical Informatics, Vol 179, 2023, 105209.

He Y. et al. [A bidirectional Mendelian randomisation study to evaluate the relationship between body constitution and hearing loss](#). Scientific Reports, 13: 18434, 2023.



Münzel, T. et al. [The contribution of the exposome to the burden of cardiovascular disease](#). Nature Reviews Cardiology, Vol 20, p651–669, 2023.



EPHOR. Verscheure E. et al. [Characterization of the internal working-life exposome using minimally and non-invasive sampling methods - a narrative review](#). Environmental Research Vol 238, Part 1, 1 2023.

EPHOR. Wan W. et al. [Automated Coding of Job Descriptions From a General Population Study: Overview of Existing Tools, Their Application and Comparison](#). Annals of Work Exposures and Health wxad002. 2023.



Ghosh M. et al. [Data management and protection in occupational and environmental exposome research - A case study from the EU-funded EXIMIOUS](#). Environmental Research, Vol 237, Part 1, 2023, 116886.



Montazeri P. et al. [Prenatal exposure to multiple endocrine disrupting chemicals and childhood BMI trajectories in the INMA cohort study](#). Environmental Health Perspectives, 107006-11 131(10), October 2023.



de Bont J. et al. [Mixtures of long-term exposure to ambient air pollution, built environment and temperature and stroke incidence across Europe](#). Environment International, Vol 179:108136, 2023.

For more information visit the website:

<https://www.humanexposome.eu/>

And for details of upcoming exposome-related events visit:

<https://www.humanexposome.eu/events/>

This newsletter only reflects the author's view and the European Commission is not responsible for any use that may be made of the information it contains.



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