# LIFEINDEXAIR

## NEWSLETTER 03


THIS PROJECT IS FUNDED BY THE LIFE PROGRAMME FROM THE EUROPEAN UNION

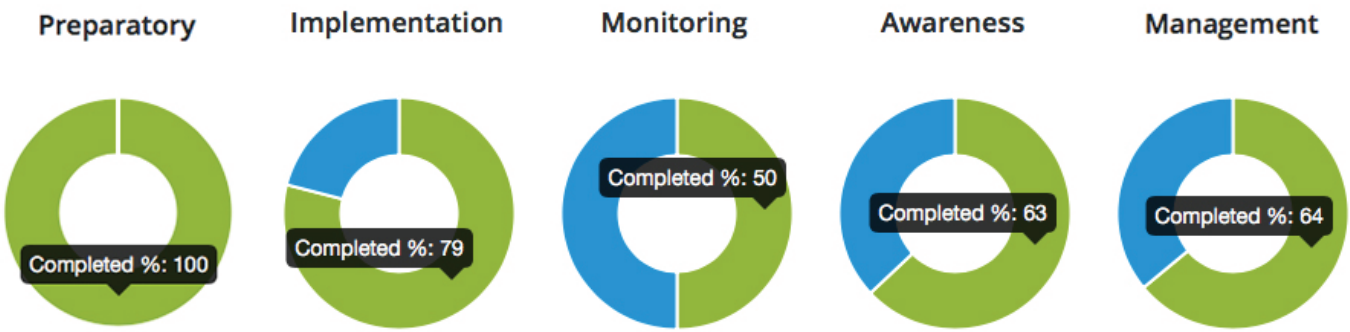
TÉCNICO LISBOA · universidade de aveiro · Technical University of crete · DEMOKRITOS NATIONAL CENTRE FOR SCIENTIFIC RESEARCH · NATIONAL INSTITUTE FOR HEALTH AND WELFARE

# LIFE INDEX-AIR – REACHING OUR GOALS

## Welcome to the third newsletter of our project – LIFE Index-Air!

At this moment, we are halfway through the project! In this newsletter, you will find information about children exposure to particulate matter and to black carbon in urban settings, about RICTA 2019, more members of our team and some news regarding the last months!

## ACTIONS PROGRESS





## TO KNOW MORE ABOUT OUR PROJECT

**We invite you to follow us through our website and facebook!**

www.lifeindexair.net
www.facebook.com/LIFEIndexAir

If you have any questions or comments about our work or our future plans, don't hesitate to get in touch.

# WHAT IS THE CHILDREN EXPOSURE TO PARTICULATE MATTER AND BLACK CARBON IN URBAN ENVIRONMENTS?

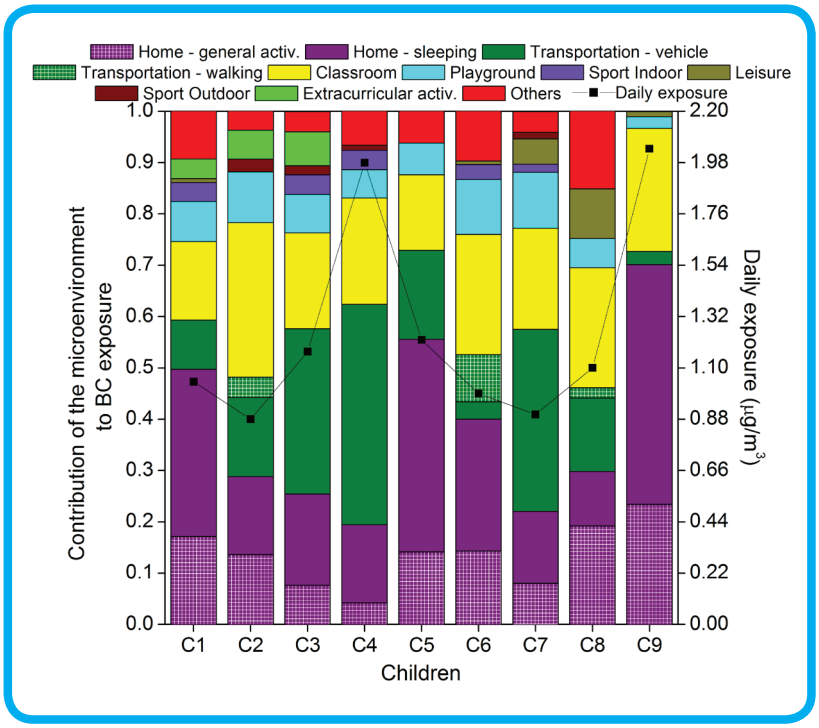
Children exposure to fine particulate matter (PM2.5) and black carbon (BC) was assessed in the Lisbon metropolitan area (Portugal) in the first semester of 2018. Nine children, aged between 5 and 9 years old, carried monitoring and sampling equipment during their daily activities along three days in order to quantify PM2.5 and BC concentrations in different micro-environments.

Results showed that children spent more than 80% of their time indoors, especially at home and in the classroom. Children exposure depends on the microenvironment frequented and on the activities performed.

Overall, mean daily PM2.5 concentrations varied between 12 and 28 $\mu g.m^{-3}$. Time series analysis of the BC concentrations showed high peaks in underground parking lots, when candles are burning and during charcoal grills. The mean daily exposure to BC was 1.3 $\mu g.m^{-3}$ and BC inhaled dose was 15 $\mu g$.

Home was the microenvironment that most contributed to daily BC exposure (39%) and to inhaled dose (28%) due to the large amount of time spent there (55%).

Transportation accounted only for 5 % of the daily time but, regarding BC, it had an huge impact on children exposure and inhaled dose. This fact resulted from the very high BC concentration (5.1 $\mu g.m^{-3}$) that children were exposed in transports.




## Black Carbon (BC) what is it?

- BC is a constituent of fine particles (PM2.5)
- Sources: traffic and biomass combustion
- % in PM2.5: between 20 and 38 %
- Effects: climate change, health

# 7TH IBERIAN MEETING ON AEROSOL SCIENCE AND TECHNOLOGY


LIFE Index-Air joined with the research center C$^2$TN – Centro de Ciências e Tecnologias Nucleares of Instituto Superior Técnico – Universidade de Lisboa (Portugal) to organize the 7th Iberian Meeting on Aerosol Science and Technology - RICTA 2019.

This annual event aims to bring together Spanish and Portuguese groups active in aerosol research, as well as researchers from other countries, to disseminate the latest research in the field, promote networking for new and longstanding collaborations, exchange ideas and to be inspired by top-level keynote lectures.

RICTA 2019 will be held at Lisbon (Portugal), from 9 to 11 July 2019 and in the last day LIFE Index-Air will promote a special session dedicated on Urban Air Quality Management.

All information can be found in the conference website:

**WWW.LIFEINDEXAIR.NET/RICTA19**

Join us at Lisbon in 2019 for RICTA 2019!

## IMPORTANT DATES

| Opening for abstract submission | Abstract submission deadline | Notification of abstract acceptance | Deadline for early registration | PhD Prize, deadline for application | Poster Prize, deadline for application |
|---|---|---|---|---|---|
| 15th November 2018 | 1st March 2019 | 26th April 2019 | 17th May 2019 | 17th June 2019 | 26th June 2019 |

# MEET THE TEAM

## Each newsletter features profiles of collaborators from our five partner organizations.

### LILA DIAPOULI

**Researcher at the NCSR-D, Athens**
**Greece**

Lila Diapouli is a Researcher at the Institute of Nuclear & Radiological Sciences and Technology, Energy & Safety of NCSR "Demokritos" and member of the Aerosol Group of the Environmental Radioactivity Laboratory. She has been working on air quality and population exposure for more than 15 years. Her research interests include air quality monitoring at ambient and indoor microenvironments, with focus on aerosol physico-chemical properties, assessment of exposure to atmospheric contaminants of the general population as well as occupational risk assessment, source identification and apportionment of air pollution.

*"The protection of the environment has always been my motivation in my professional endeavours, from my studies to my current employment at NCSR "Demokritos". Working in the field of air quality gave me the opportunity to link the high-level research we strive to perform in Greece and abroad with concrete and urgent needs of our society. Air pollution remains one of the major environmental problems, especially in urban environments where the majority of the population is concentrated. Our work provides the evidence for the severity of the problem, but also assists in elucidating the causes of the problem and identifying effective solutions. Through LIFE Index-Air I have learnt that, by educating the public on the causes and effects of air pollution, we may significantly assist towards achieving cleaner air and a safer environment. The final objective is to create a new generation of informed and environmentally aware citizens, who demand from their governments for effective air quality management but also adopt themselves sustainable practices in their everyday life."*

### MIHALIS LAZARIDIS

**Professor at the Technical University of Crete,**
**Greece**

Coordinator of B4 LIFE Index-Air Action, Professor at the Technical University of Crete, Greece. Lazaridis is working in the area of air pollution and atmospheric aerosols including indoor air pollution and human exposure and dose. He worked previously at Rutgers University, University of Helsinki, Technical Research Centre of Finland, EU Joint Research Centre at Ispra, Italy and Norwegian Institute for Air Research. He worked also as a visiting researcher at the Harvard University, the Aristotle University of Thessaloniki and the Institute of Chemical Kinetics and Combustion, Novosibirsk.

*"The work in LIFE Index-Air project aims the estimation of personal/population exposure to particulate matter and specific particle-bound metals in various indoor/outdoor microenvironments and calculation of human dose using biological dosimetry modeling. A dosimetry model was used which calculates human exposure, dose and retention of particles in the respiratory tract during and after exposure, under variable environmental exposure conditions. In the current approach the exposure – dose relationship for specific particle components and their chemical composition will be calculated. The metabolized doses will be calculated by suitably adapting Physiologically Based Toxicokinetic modules, in particular for estimating doses of particles. The application of this methodology to children is of paramount importance for health impacts. This exposure may associated with elevated health risk in later life."*

# 5TH PROJECT MEETING OF LIFE INDEX-AIR WITH ALL PARTNERS - AVEIRO, PORTUGAL

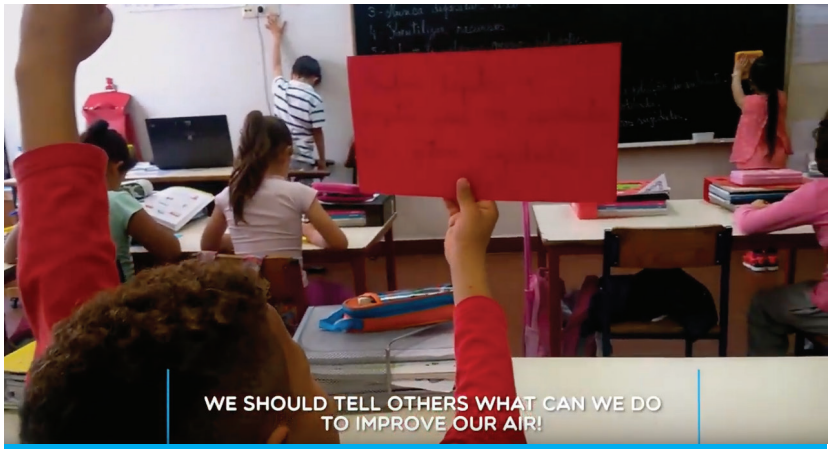
## LIFE Index-Air meeting

On 27th and 28th of August 2018, team members of LIFE Index-Air project from Portugal, Greece and Finland gathered at University of Aveiro (Aveiro, Portugal) for the 5th project meeting to discuss the progress of the project and plan the future work.
This meeting was hosted by CESAM team at University of Aveiro.

## The air belongs to everyone - how can we improve the air that we breathe?

The new LIFE Index-Air video was just released at our youtube page: "The air belongs to everyone – how can we improve the air that we breathe?"

This video was developed within the framework of the challenge "The air belongs to everyone" that was promoted by LIFE Index-Air and involved 26 schools and around 3800 children from Lisbon. Two classes of the primary school "Leão de Arroios" (Lisbon, Portugal) produced this great video (that is a mannequin challenge!) to show us how we can improve the air that we breath at school!




https://youtu.be/G7AfhUpe6MI

You can find this movie and others at **our youtube channel**!

# NEW SCIENTIFIC ARTICLES WITHIN THE FRAMEWORK OF LIFE INDEX-AIR

## Estimation of the Personal Deposited Dose of Particulate Matter and Particle-Bound Metals Using Data from Selected European Cities

**Authors:** E. Chalvatzaki, S.E. Chatoutsidou, E. Mammi-Galani, S.M. Almeida, M.I. Gini, K. Eleftheriadis, E. Diapouli, M. Lazaridis

**Abstract:**The present study focused on the estimation of the personal dose of airborne particles using an exposure dose model (ExDoM2). Input data from three European cities (Athens, Kuopio, Lisbon) were selected to implement the model that calculates the deposited dose and retention of particles in the respiratory tract, the mass transferred to the oesophagus and the absorption to blood as well as the dose for five particle-bound metals. Model results showed that after one day exposure higher deposited dose in the respiratory tract was obtained for Lisbon as a direct consequence of the higher PM concentration measured in this city. Moreover, the activity profile and the physical characteristics of the exposed subject had strong impact on the estimated deposited dose. Thus, light activity corresponded to higher deposited dose compared to no activity as well as an adult male exhibited higher dose, both findings associated with increased inhalation rate. Regarding the internal dose for particle-bound metals higher dose for four out of the five metals was obtained in lungs followed by the muscles for As, the gastrointestinal tract for Cr, the other tissues for Mn, the intestines for Cd and finally for Pb higher dose was found in bones and blood.

**Type of publication:** Scientific article published at Atmosphere (Open Access)

**How to cite:** E. Chalvatzaki, S.E. Chatoutsidou, E. Mammi-Galani, S.M. Almeida, M.I. Gini, K. Eleftheriadis, E. Diapouli, M. Lazaridis (2018) Estimation of the Personal Deposited Dose of Particulate Matter and Particle-Bound Metals Using Data from Selected European Cities. Atmosphere 2018, 9(7), 248. doi: 10.3390/atmos9070248

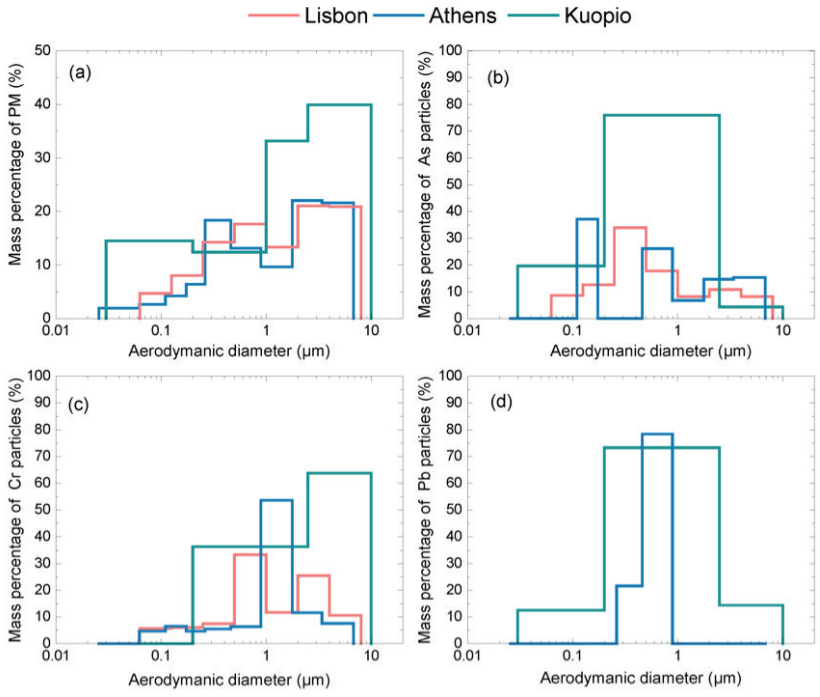



Figure. Size distribution of mass percentage for (a) particulate matter, (b) arsenic, (c) chromium and (d) lead for the 3 European cities.

08

# Health Impacts of Ambient Air Pollution in Finland

**Authors:** H. Lehtomäki, A. Korhonen, A. Asikainen, N. Karvosenoja, K. Kupiainen, V.V. Paunu, M. Savolahti, M. Sofiev, Y. Palamarchuk, A. Karppinen, J. Kukkonen, O. Hänninen

**Abstract:** Air pollution has been estimated to be one of the leading environmental health risks in Finland. National health impact estimates existing to date have focused on particles (PM) and ozone ($O^3$). In this work, we quantify the impacts of particles, ozone, and nitrogen dioxide ($NO^2$) in 2015, and analyze the related uncertainties. The exposures were estimated with a high spatial resolution chemical transport model, and adjusted to observed concentrations. We calculated the health impacts according to Word Health Organization (WHO) working group recommendations. According to our results, ambient air pollution caused a burden of 34,800 disability-adjusted life years (DALY). Fine particles were the main contributor (74%) to the disease burden, which is in line with the earlier studies. The attributable burden was dominated by mortality (32,900 years of life lost (YLL); 95%). Impacts differed between population age groups. The burden was clearly higher in the adult population over 30 years (98%), due to the dominant role of mortality impacts. Uncertainties due to the concentration–response functions were larger than those related to exposures.

**Type of publication:** Scientific article published at International Journal of Environmental Research and Public Health (Open Access)

How to cite: H. Lehtomäki, A. Korhonen, A. Asikainen, N. Karvosenoja, K. Kupiainen, V.V. Paunu, M. Savolahti, M. Sofiev, Y. Palamarchuk, A. Karppinen, J. Kukkonen, O. Hänninen (2018) Health Impacts of Ambient Air Pollution in Finland. International Journal of Environmental Research and Public Health 15(4), 736. doi: 10.3390/ijerph15040736

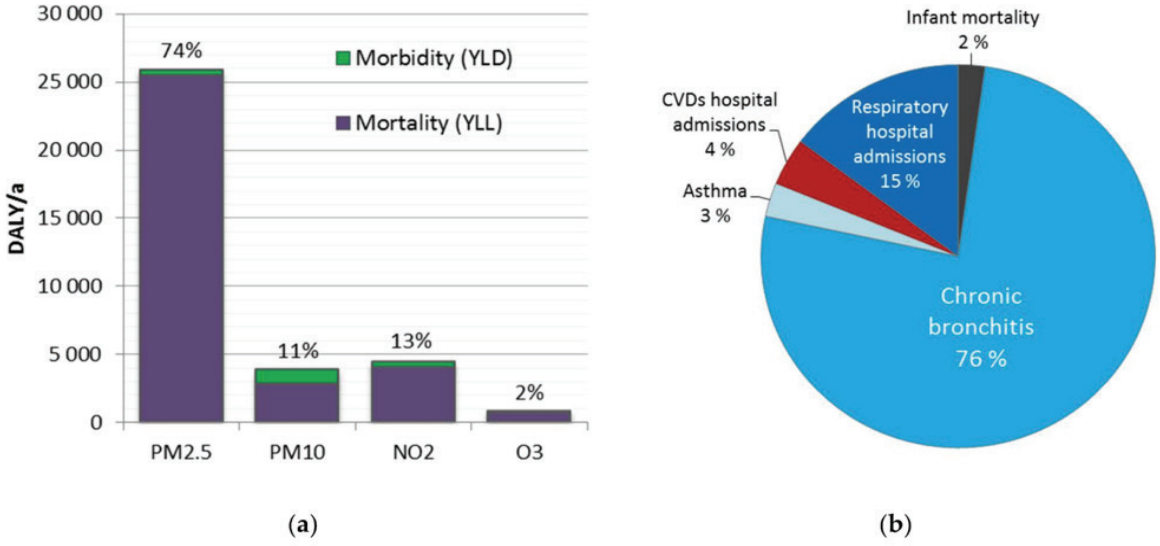



Figure. (a) Attributable disease burden for the four assessed air pollutants in Finland (35,000 DALY in 2015). (b) Disease burden by health outcomes excluding natural mortality (4600 DALY).

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