HEALS Newsletter

Health and Environment-wide Associations based on Large population Surveys

Project No 603946 of the European Union's Seventh Framework Programme

Contents

Editorial Note

Welcome to the fourth issue of the HEALS Newsletter!

In this issue we are starting with an article that reports the methodologies for the assessment of the indoor air quality in dwellings which constitute a substantial part of the **EXHES Pilot Study**. In this article, Prof. Eduardo de Oliveira Fernandes from the Institute of Science and Innovation in Mechanical and Industrial Engineering (INEGI, Portugal) describes the protocols and techniques for auditing homes in the context of the HEALS project. Moreover, the article includes a note on the training activity held in the last HEALS Annual Meeting (Crete, Greece, September 2015) and the views of some participants.

Two achieved Deliverables are also described in the newsletter: D1.3 "Socioeconomic health differences with a particular focus on the exposome" that is summarized by Rosemary Hiscock, from the University of Bristol (UNIBRIS, UK), and D8.2 "Design and implementation of the Environmental data management system (EDMS)", that is summed up by Panagiotis Karagiannis, Evangelos I. Tolis and John G. Bartzis, from the University of Western Macedonia (UOWM, Greece).

The *Who is Who* section describes the professional profiles of two research colleagues who are actively involved in the project and participate in different work packages: Mike Dickinson from Fera Science Ltd (UK) and Rob Stierum from TNO (The Netherlands). As usual the issue ends with a list of the main scientific publications, public presentations, workshops, conferences and other knowledge-dissemination activities generated by the HEALS researchers since January 2015.

We take advantage of this editorial note to inform that HEALS is co-organizing the **8th International Network on Children's Health, Environment and Safety (INCHES) Conference**, which will be held in Barcelona, Catalonia, Spain, on the 14–16th September 2016.

HEALS contribution towards the enhancement of the EC methodologies on the assessment of the indoor air quality in dwellings (EXHES Pilot Study – WP-17)

by Eduardo de Oliveira Fernandes

Institute of Science and Innovation in Mechanical and Industrial Engineering (INEGI)
Porto, Portugal

The improvement of the indoor air quality (IAQ) in Europe requires the enhancement of the methodologies and techniques to assess the IAQ status and thus, the impact of policies in reducing the burden of disease associated with exposure to indoor air pollution. This could lead to a better understanding of the role of environmental risk factors in respiratory diseases and other chronic pathologies, ultimately resulting in better primary prevention strategies.

The Indoor Monit is an EC project comprehending a harmonised framework of criteria, protocols and techniques to monitor the IAQ status generating five audit typologies/objectives for specific circumstances*(Figure 1), where the sixth one, at project design phase, is a promise towards the future. The protocol and techniques for auditing homes in the HEALS project refers to the 'survey' type audit which objective is to characterize the indoor air conditions in general.

For the HEALS survey an electronic tool was elaborated including information regarding outdoor environment, building construction, age and size, number of floors, number of occupants, finishing materials, heating and ventilation systems, past occurrences and current visible problems and potential indoor sources. This a totally innovative tool accompanied of an explanatory video, having both products a high potential for replication.

**PILOT INDOOR AIR MONIT project, coordinated by the Joint Research Centre on behalf of DG SANCO.*

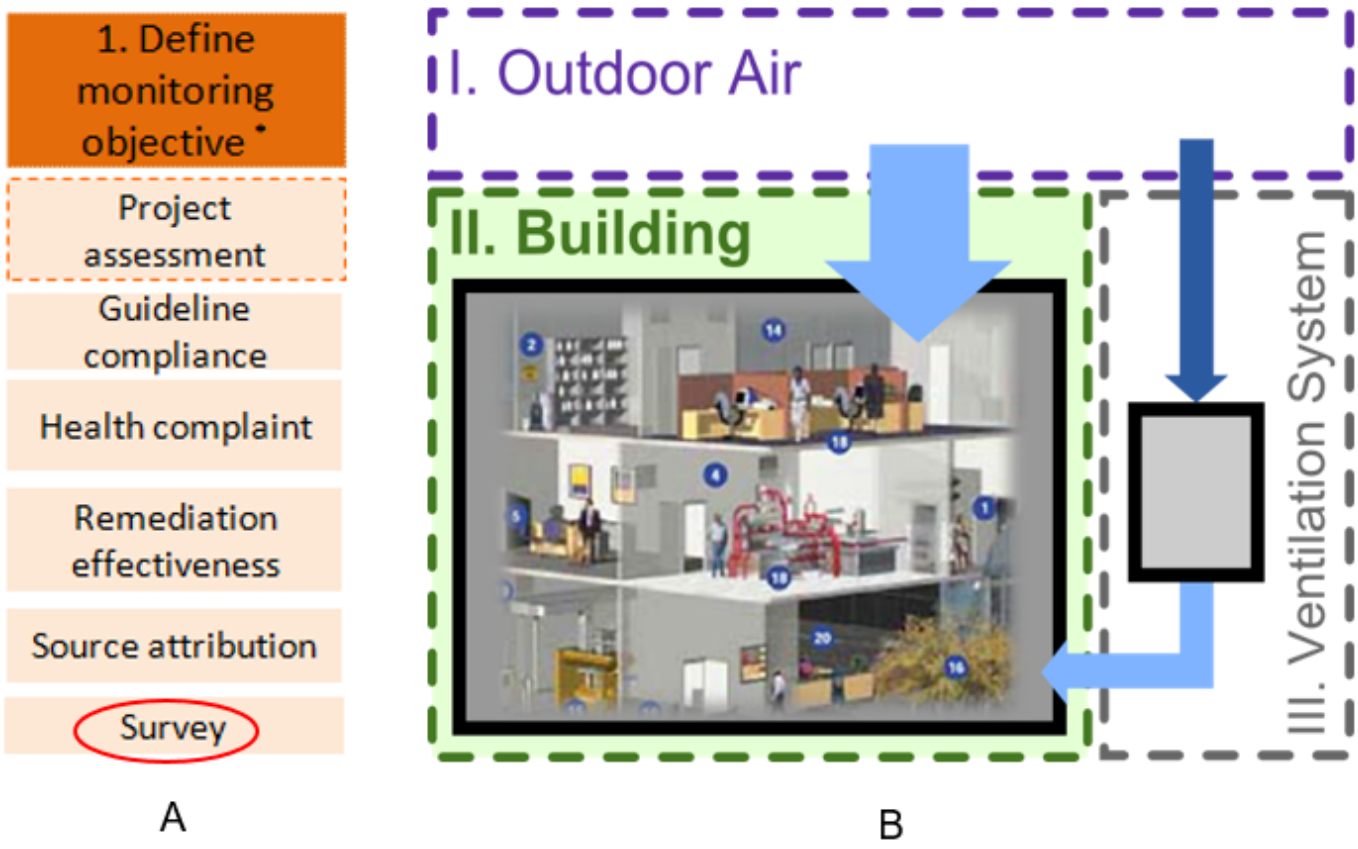

Figure 1. A. IAQ audit typologies. B. The building as an air system imaged in the outdoor air.
*Differ in the amount and specificity of the requirements.

Training on field activities focussed on indoor air quality in the EXHES IAQ audit (protocol B)

A training exercise on IAQ auditing was held on September 24, 2015 in Crete, Greece, aimed at providing expertise to the 10 project partners on how to conduct the EXHES IAQ field studies, including methodologies to fill in checklists and perform measurements and use specific equipment (Figure 2).

The training was directed by a INEGI/UP' team coordinated by Eduardo de Oliveira Fernandes and comprising Joana Madureira, Inês Paciência, João Rufo and Raquel Sousa.

Selected answers to the questionnaire administered to the participants in the training

Some partners involved in the training shared their impressions; among them, Nour Baïz (UPMC, France), Kinga Polanska (NIOM, Poland), Asimina Stamatelopoulou (NCSRD, Greece), Darja Mazej (JSI, Slovenia), Zdravko Špirić (OIKON, Croatia), Edward Johnstone (UM, UK) and Joaquim Rovira (URV, Spain)

Question 1 *How efficient was the IAQ audit training session?*

Joaquim Rovira IAQ audit training gave me the overall view of what is and how to perform these surveys. For me this was the goal of training session.The materials (presentation and supporting material) were very useful.

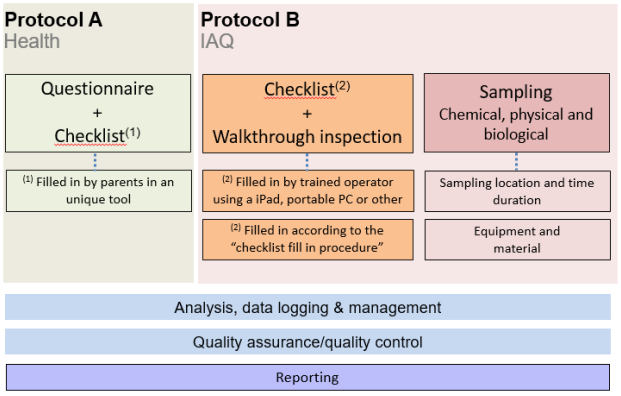

Figure 2. EXHES data collection (A. Health Questionnaire; B. Environmental Survey).

Question 2 *What were your impressions regarding the IAQ audit training session?*

Darja Mazej It was a step forward to do IAQ assessment in more harmonized way in HEALS. Maybe it would be helpful to do some practical measurements and do some intercomparisons.

Question 3 *Do you think it was a good idea to have videos and other support material during the training session?*

Asimina Stamatelopoulou Videos and other support material during the training session contributed to make the presentation more descriptive and schematic. It was easier for us to understand how measurements should be done in practice.

Environmental data management system (EDMS)

by Panagiotis Karagiannis, Evangelos I. Tolis and John G. Bartzis

University of Western Macedonia (UOWM)
Konzani, Greece

Introduction

The design and implementation of the Environmental Data Management System or EDMS is one of the three specific tasks in WP 8 under the title "Environmental Data Mining" and is in straight relation to the other two tasks, namely Data Collection and Data Quality and Assessment. The EDMS has been created in order to gather environmental data from other information sources, as well as those produced throughout the project. In short, the EDMS has to be a solid and robust application in order to host the data processed or pre-processed by the aforementioned tasks.

Pre-processing involves Environmental Data Source Identification that is suitable for Environment-wide application studies in specific areas. This task is carried out through detailed review of past and ongoing research and survey projects. Moreover, this data have to be gathered and possibly stored in its existing format before they are stored in the EDMS. This means that primary data, when available, will come in a wide variety of forms as long as its structure and file format is concerned.

Ultimately, since the collected data will serve other WPs, any given dataset, after having been evaluated in terms of quality and applicability, will have to be transformed in a standard format, compliant with the INSPIRE Directive.

The first approach on creating the EDMS had three alternatives:

- Link to existing databases
- Incorporate these application to the environmental management system
- Extract datasets and import them to the environmental management system

System requirements and implementation

On top of the already referred cross – task issues, the EDMS has been designed and implemented following certain procedures

and standards. The main issue here was that the HEALS database should be able to retrieve data from existing databases.

Additionally, the database design sees that,

a) All data are geo-referenced, by specifying the geographic coordinates of each single observation, both for point-form and for polygonal spatial information and

b) All data are univocally coupled to a time reference (instant, hour, day, month, etc.) and as such they are ready to be investigated, by using time series based statistics.

Furthermore, the EDMS is in compliance with the INSPIRE Directive. The Directive 2007/2/EC of the European Parliament aims to create a European Union (EU) spatial data infrastructure. It is addresses 34 spatial data themes which are based on the following common principles:

1. Data should be collected only once
2. Combine seamless spatial information
3. Should be possible for information collected to be shared
4. Geographic information readily available
5. Geographic information easy to find
6. Implementing Rules (IR) on
   - Metadata
   - Data Specifications
   - Network Services
   - Data and Service Sharing
7. The Implementing Rules are adopted as Commission Decisions or Regulations and are binding in their entirety.

Building the EDMS is perceived as a 4 step process. First, the web framework and application architecture is defined. In general, the application consists of a web component, various application programming interfaces for interacting with databases and the database itself. Then, the appropriate Database Management System is chosen as well as the relational model or models. Secondly, EDMS is populated via a commonly accepted template for entering data sets. The third step was to establish links to existing data bases or more appropriately to their web interfaces in order to provide a head start for the steps to come. At the same time there was work toward connecting to other databases for automatic updating, importing or exporting data, as well as making specific selections or grouping records. The last step involves data which come in formats that require further processing.

Data Collection Entry

The EDMS of HEALS project contains data on the following environmental categories of interest (***Data class***):

- Land use/Land cover
- Meteorological Data
- Comfort data indoors (temperature-relative humidity)
- Air emission data
- Air emission data – materials/products
- Pollutant concentration data in indoor air, outdoor air, in vehicle air, soil, dust, water and drinking water
- Food concentration data
- Population data (age/gender/etc.)
- Noise data
- Building characteristic data
- Heat Stress Data
- Pharmaceutical Data
- EMF Data

Under the ***environmental stressor*** the EDMS includes the priority pollutants of the HEALS project or other environmental parameter relative to humans which are:

- PM10, PM2.5
- VOCs
- Phthalates
- Toxic metals
- Organic compounds
- Organohalogens
- Dust mites
- Pesticides
- Endocrine disruptors
- POPs
- NO2
- O3
- Mold
- Pollen
- Noise

Figure 1. Data search options.

The EDMS currently stores more than 100 detailed data sets, a considerable number of which (more than 60) also contain data files that have been uploaded in various formats (*eg*. csv, mmz, zip, pdf), apart from a great number of URLs leading to external data sources. These numbers will change because uploading data is an ongoing process. The URL in order to visit the EDMS is:

https://heals.uowm.gr

Data search and presentation

After entering the EDMS, data retrieval involves selection queries bases on three categories (Figure 1):

1. Data Class
2. Country
3. Pollutant / Stressor

The search produces the available data sets (Figure 2). Each set, upon selection is presented providing the categories used to collect the data in tabbed format (Figure 3).

The Present Status and the way forward

EDMS can be perceived as a solid and detailed environmental data repository accessible via the web.

The EDMS currently stores more than 100 detailed data sets, while these numbers will change because uploading data is an on-going process. The efforts will continue with new environmental data giving emphasis on the areas of EXHES study (WP17) and WP9 pilot studies and the requirements of external exposure modeling (WP11).

In addition there is an ongoing effort to link EDMS as a module to HEALS Geodatabase system in collaboration with WP12 partners.

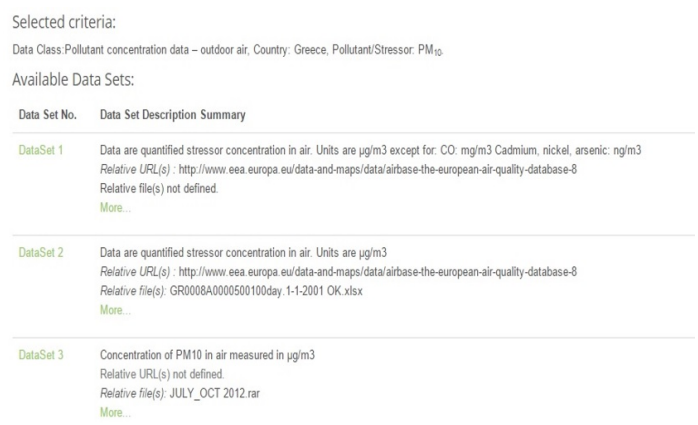

Figure 2. Available data sets after search.

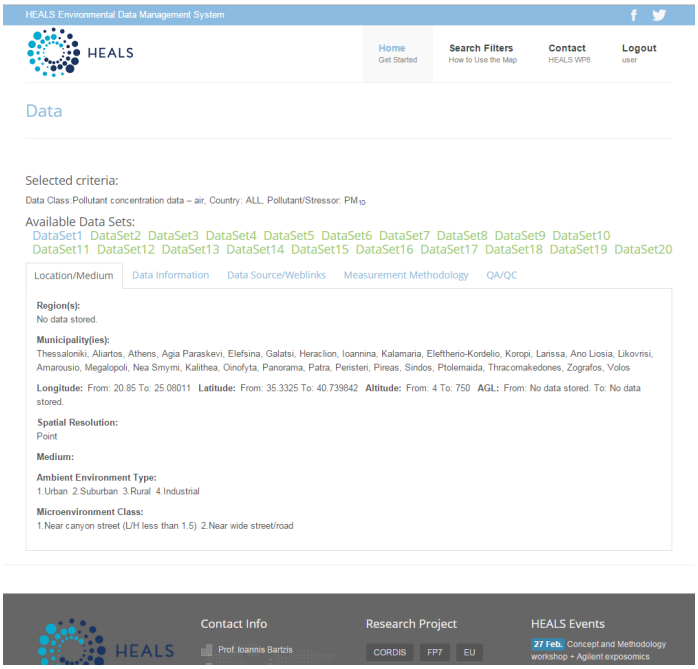

Figure 3. Data presentation.

Socioeconomic health differences: a particular focus on exposome differences

by Rosemary Hiscock

University of Bristol (UNIBRIS)
Bristol, UK

There is no single definition of socioeconomic status (SES) [1] but it can be said to embody an array of social and economic resources: material capital such as money and goods, human capital such as skills, knowledge, prestige or power, and social capital – beneficial social connections [2–5]. These resources can be deployed in order to protect and promote health. Disease, disability and premature death are higher for lower socioeconomic groups, two or three times higher in the EU [6].

The exposome is likely to play a dominant role in the SES and health relationship because in general the genome appears to play a small part in disease development: possessing a genetic variant associated with a particular disease only increases the risk of disease

occurring by 10 to 30% [7]. However no studies were found which contrasted genetic and environmental causes of the association between SES and health. Many studies have considered one pathway between SES and health but few have contrasted multiple pathways empirically. Even those that have compared multiple pathways have only considered a small number of options within a single study. These studies have not found stable pathways – rather pathways vary with different health outcomes. Thus it is not possible with the current state of the literature to estimate what proportion of SES differences in health is due to the exposome. However it is possible to describe some of the possible pathways between the exposome, SES and health.

SES differences in health may be the results of firstly demographic differences – some population groups such as ethnic minorities, women and children and older people have less access to health promoting and maintaining resources, secondly differences in world view through cognitive and personality differences and health knowledge and thirdly, at least partly as a result of the above, low SES groups may be less likely to engage in healthy behaviours such as following a good diet, not smoking and vaccinating children. However the extent to which low SES becomes health endangering will depend on the social environment: on parenting, on supportive relationships, on government provision of health care, welfare, education and housing, on the physical environment: infrastructure, noise levels and air pollution. An adverse social environment can lead to stress causing internal changes and an adverse physical environment can lead to build up of some pollutants in the body.

We examined relationships between SES and pollution, occupation and physical activity in particular detail. We found that in general low SES groups are more exposed to air pollution but there are exceptions (*i.e.* there are high status neighbourhoods in central areas of some cities). They may be more exposed to contaminants through diet in particularly in developing countries and to infections. There are many features of low SES occupations which may compromise health such as low control over work and high physical demands. Other possibilities include exposure to chemicals, job security and low occupational prestige. However physical strength required for, or developed from, jobs often filled by low SES people and lack of mental strain may be health. Low SES people in poor health are less likely to be able to continue to work – the physical demands of low SES jobs require good physical health. Our findings on exposure to physical activity suggested that low SES people may undertake less leisure time physical activity but they may be at least as physically active in other domains (*e.g.* occupation, active travel).

Our review also leads to some methodological recommendations. Firstly a composite SES measure may be preferable to a multitude of SES measures due to multicollinearity. The exception would be a study that aims to explore the meaning of measures in which case it would be important to recruit large numbers of unusual subjects (*e.g.* highly educated but low income or low education but high income). Secondly it is not possible to tell from previous studies whether ethnic differences are due to SES, culture or genetics. Ethnic group differences thus need to be understood in context. Finally if an aim of a research project is to examine exposure to pollution as a mediator between SES and health it is necessary to design the study and analysis carefully in order to do so. The methodologies used in several studies were not fit for purpose.

The literature would suggest that a study seeking to account for SES differences in health should include the external exposome differences detailed in table 4.1 and the genome differences detailed in table 4.2. An important factor that does not really fit in either of these tables is age. Lifecourse models suggest that SES differences in health can start in utero and occur throughout our lives.

Table 4.1 Exposome pathways between SES and health

Pathway	Subcategories/description
Health behaviour	
Health service use	Vaccinations, dental, screening
Obesity/diet	BMI related/nutrition, diet related contaminants
Physical activities	Leisure, occupational, for transport
Smoking	
Other	Sunbed use, alcohol, sleep
Supportive environment	
Parenting	Skill acquisition, children at risk
Relationships	Social network/support
Government provision	Access to health services, education for disadvantage groups
Stigma	Due to age, gender, ethnicity, disability, etc.
Physical environment	
Exposure to socially stress producing situations	Violence, residential mobility, family turmoil and conflict, lack of routine
Housing conditions	Damp, temperature, building materials, ventilation, infestations, hygiene, food preparation facilities
Neighbourhood conditions	Abandoned lots, graffiti, noise, advertisements, design, traffic
Access	Municipal services, places for physical exercise, purchasing points for healthy food and unhealthy substances (*e.g.* tobacco, alcohol)
Exposure to chemicals	Toxins and hazardous wastes, ambient pollutants, lead, tobacco smoke
Exposure to nature	Recreation and food growing opportunities

Table 4.2 Differences created by the genome that may explain associations between SES and health

Pathway	Subcategories/description
Tangible	
Demographic#	sex
Physical differences*	height, potential for poor health
Worldview	
Psychological*	personality
Cognitive*	IQ

Race is not included here because current research suggests that genetic susceptibility is a minor predictor of poor health and is not strongly patterned by race [8]. * In addition to their genetic component these are also impacted by the exposome.

To conclude, there are many explanations with support from previous literature for the relationship between SES and health. However very few studies were encountered that empirically contrasted different pathways. Thus on the basis of the collated literature, we have much to learn in this area.

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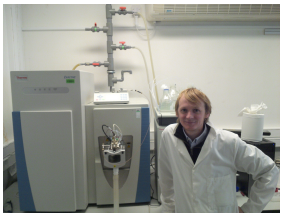
This is an edited version of **R. Hiscock**, **C. Schieberle**, **N. Li**, **M. Garí** & **J.O. Grimalt** (2015). HEALS Deliverable 1.3: *A critical review of how much of the difference in disease between socioeconomic and other social groups can be explained by the differences in the "group" exposome*. Retrieved from:

http://www.heals-eu.eu/wp-content/uploads/2013/08/HEALS_D1.3.pdf

WHO is WHO

HEALS 'WP5 Omics and epigenetics analyses' coordinator, **Rob Stierum**, is a Senior Researcher and European Registered Toxicologist at The Netherlands Organization for Applied Scientific Research TNO. After obtaining his PhD at Maastricht University (Maastricht, The Netherlands) on poly(ADP-ribosylation), Rob was further trained in mitochondrial DNA repair during a fellowship at the National Institutes on Aging (Baltimore, USA) for which he was awarded the NIH Fellows Award for Research Excellence. Currently, Rob heads the risk assessment and toxicology group, including systems toxicology and toxicoinformatics activities, at TNO. His drive is to aim for improvement of toxicology and exposure assessment, via the integration with omics and bioinformatics technologies. He has obtained/coordinated various research grants in this area. As such, he coordinated the bioinformatics for the European Nutrigenomics Organisation (NuGO), The Netherlands Toxicogenomics Centre (NTC) and EU FP6 Carcinogenomics. Further, he is the coordinator of several CEFIC long range initiative projects AIMT-2, AIMT-3 and AIMT-4 to explore the value of data mining, chemical grouping and toxicogenomics for toxicological risk assessment in the chemical industry. He also heads large national projects funded by ZonMw aiming at the integration of human disease mechanistic data for exploration of (in vitro) systems toxicology data. This task is currently expanded towards the inclusion of PBPK data to allow for in vivo potency estimation based upon in vitro toxicogenomics. Within the recent H2020 caLIBRAte project (Performance testing, calibration and implementation of a next generation system-of-systems Risk Governance Framework for nanomaterials), Rob has started to coordinate the workpackage on human risk assessment, in which the inclusion of omics and other innovative testing data for nanoparticle safety is evaluated. Rob has >60 publications/bookchapters in the areas of genomics and bioinformatics applied to toxicology and nutrition, exposure assessment and DNA repair. He presented at, and organized, several scientific meetings, and serves as a frequent reviewer on scientific journals. Finally, he serves as a guest researcher in bioinformatics for the exposome at IRAS, Utrecht University.



Mike Dickinson works as a Research LCMS specialist at Fera Science Ltd (previously the Food and Environment Research Agency). Graduating from the University of York in 2003 he has over 10 years of experience in analytical chemistry and over 4 years experience in high resolution mass spectrometry applications. Mike's current work involves non targeted analysis of food, plant and clinical samples for various international industrial and research partners. He has published several articles in the field of high resolution mass spectrometry. In addition to HEALS he is currently participating in the EU project Abstress, in which he studies metabolomics of legumes in order to understand the mechanisms of resistance to combined abiotic and biotic stress. Within HEALS, Mike Dickinson is working on the metabolomic profiling of biological samples (blood, urine, umbilical tissue, etc.) by both high resolution MS and NMR (using other colleagues expertise at Fera). This involves setting up and validating the non-targeted analytical methodologies in preparation for the analysis of existing cohort samples. He is involved in WPs 5, 15, 19 and 20.

Publications

The scientific contributions of the HEALS Project are hosted on ZENODO, an open digital repository that enables researchers, scientists, EU projects and institutions to share and showcase multidisciplinary research results (data and publications) that are not part of the existing institutional or subject-based repositories of the research communities.

The collection of HEALS scientific papers on ZENODO can be found in the following website:

https://zenodo.org/collection/user-heals

Papers published from July 2015 include:

- Polanska K, Jurewicz J and Hanke W (2015) Smoking and alcohol drinking during pregnancy as the risk factors for poor child neurodevelopment – A review of epidemiological studies. International Journal of Occupational Medicine and Environmental Health 28(3): 419–443.
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Presentations at International Meetings and Workshops

Dissemination and networking activities since July 2015 included the participation of several HEALS members at international workshops, conferences and scientific events hereinafter summarised:

- **I. Annesi-Maesano (UPMC)** *The burden of meteorological factors to allergic and respiratory health and risk factors* (lecture). Symposium on "Current and Future Research trends on Climate Change and Health", a side event of the conference "Our Common Future Under Climate Change". Paris, France. 6th July 2015.
- **R. Barouki (UPD)** *Climate change and health in the context of the exposome* (lecture). Symposium on "Current and Future Research trends on Climate Change and Health", a side event of the conference "Our Common Future Under Climate Change". Paris, France. 6th July 2015.
- **M. Mari *et al.* (URV & CSIC)** *Human Exposure and risk assessment of PAHs bound to three PM fractions (10, 2.5 and 1) in an area influenced by a cement plant* (lecture). 35th International Symposium on Halogenated Persistent Organic Pollutants (Dioxin2015). São Paulo, Brazil. 23–28th August 2015.
- **M. Marquès *et al.* (URV)** *Long term study on the levels of PCDD/Fs and other organic substances in workers of a hazardous waste incinerator* (poster presentation). 35th International Symposium on Halogenated Persistent Organic Pollutants (Dioxin2015). São Paulo, Brazil. 23–28th August 2015.
- **F. Sánchez-Soberón *et al.* (URV & CSIC)** *Cancer risk assessment of PM1-bound PAHs nerby a cement plant using a respiratory tract model* (poster presentation). International Symposium on Polycyclic Aromatic Compounds conference (ISPAC 2015). Bordeaux, France. 13–17th September 2015.
- **R. Barouki (UPD)** *The Ah Receptor system regulation: Implications for environment and health risk assessment* (lecture). 18th International Symposium MESAEP. Crete, Greece. 26th September 2015.
- **S. Augusto *et al.* (URV)** *Using lichens to monitor PAHs in a multisource industrial and urban area* (poster presentation). 18th International Symposium on Environmental Pollution and its Impact on Life in the Mediterranean Region (MESAEP). Crete, Greece. 26–30th September 2015.
- **F. Sánchez-Soberón *et al.* (URV & CSIC)** *Human exposure and risk assessment of three pm fractions (10, 2.5 and 1) in an urban-industrial area of Barcelona* (poster presentation). 18th International Symposium on Environmental Pollution and its Impact on Life in the Mediterranean Region (MESAEP). Crete, Greece. 26–30th September 2015.
- **M. Schuhmacher *et al.* (URV)** *Climate change impact on photodegradation and ecotoxicity of PAHs in Mediterranean soils* (poster presentation). 18th International Symposium on Environmental Pollution and its Impact on Life in the Mediterranean Region (MESAEP). Crete, Greece. 26–30th September 2015.
- **D.A. Sarigiannis, I. Annesi-Maesano, J. Cherrie *et al.* (HEALS partners)** *The HEALS approach to health and environment-wide associations* (poster presentation). 18th International Symposium on Environmental Pollution and its Impact on Life in the Mediterranean Region (MESAEP). Crete, Greece. 26–30th September 2015.
- **V. Karri *et al.* (URV)** *Improving interaction mechanism of metal mixtures (Pb, Cd, Hg, As, Cr) in Generalized Physiological Toxicokinetic Model (PBTK)* (poster presentation). 18th International Symposium on Environmental Pollution and its Impact on Life in the Mediterranean Region (MESAEP). Crete, Greece. 26–30th September 2015.
- **N.I. Pitaraki *et al.* (HEALS partners)** *Estimating individual exposure by human monitoring* (poster presentation). 18th International Symposium on Environmental Pollution and its Impact on Life in the Mediterranean Region (MESAEP). Crete, Greece. 26–30th September 2015.
- **R. Barouki (UPD)** *The Aryl hydrocarbon Receptor system* (lecture). CS-DC 15 e-conference: From Molecules to Organisms and Ecosystems. Integrative Ecotoxicology. Paris, France. 1st October 2015.
- **R. Barouki (UPD)** *The "exposome" – a new concept unifying social and environmental non-genetic determinants of health across the life course* (lecture). Workshop on "Innovation in research and teaching in planetary health". World Health Summit. Berlin, Germany. 13th October 2015.
- **R. Barouki (UPD)** *Changement climatique et impact sur la santé humaine vus sous l'angle de l'exposome* (Séminaire scientifique annuel). Maison de la Chimie. Paris, France. 15th October 2015.
- **R. Barouki (UPD)** *Changement climatique et Santé*. Bordeaux, France. 22nd October 2015.
- **R. Barouki (UPD)** *Changement climatique et Santé a l'ère de l'exposome*. Journée des médecins de santé publique. Paris, France. 22nd October 2015.
- **R. Barouki (UPD)** *OMICS!* OPAL-Francopa 2015. 4th November 2015.
- **R. Barouki (UPD)** *Changement Climatique et Santé* (Table ronde Generali). Le Bourget, France. 1st December 2015.
- **R. Barouki (UPD)** *Climate change impact on humans as a part of affected ecosystem* (lecture). Workshop COP21 Responding to Health and Data Challenges. Case for Climate Change and Atmospheric Pollution. Paris, France. 4th December 2015.
- **A. Leblanc *et al.* (UPD)** *Carbohydrate metabolism is disrupted by a combination of persistent organic pollutants in the human hepatic cell line HepaRG* (poster presentation). 2nd Paris Workshop on Endocrine Disruptors Effects on Wildlife and Human Health". Paris, France. 21–22 January 2016.

Other dissemination activities

- **Kinga Polanska (NIOM) and Gemma Calamandrei (ISS)** gave a joint presentation of the HEALS project during the LIFE PERSUADED (an EU funded project on Phthalates and bisphenol A biomonitoring in Italian mother child pairs) workshop, held at the Istituto Superiore Sanità in Rome (Italy) on December 17th 2015. The workshop was finalized at dissemination among stakeholders, researchers and personnel of the National Health System of research initiative on the theme of children's environmental health. It represented an occasion of networking with other LIFE projects.

- **Gemma Calamandrei (ISS)** was invited to present the HEALS project in the WHO International Meeting "Eastern Mediterranean Country Resources for children and adolescents with Autism Spectrum Disorder", November 16–18th 2015, organized by Instituto Superiore di Sanità, Rome (Italy). The presentation was focused on the role that environmental factors may play in the aetiopathogenesis of Autism Spectrum Disorders. The audience was composed by a selected group of Pediatricians, Psychologists and Neuropsychiatrists from Eastern and Southern Mediterranean Countries working in the field of Autism and other Neurodevelopmental Disorders.

Forthcoming Events

- **2nd Conference on Occupational Medicine and Endemiology (COME 2016)**
  2–4 March 2016, Beijing (China)
  http://www.engii.org/ws2016/Home.aspx?ID=696

- **Society of Toxicology 55th Annual Meeting and ToxExpo**
  13–17 March 2016, New Orleans (Louisiana, USA)
  http://www.toxicology.org/events/am/AM2016/

- **10th Network Conference on Persistent Organic Pollutants**
  13–14 April 2016, Birmingham (UK)
  http://www.birmingham.ac.uk/schools/gees/research/projects/nercpops/conferences/10th-conference.aspx

- **The International Conference on Environmental Pollution and Public Health (EPPH 2016)**
  13–15 April 2016, Suzhou (China)
  http://www.engii.org/epph2016/

- **2nd International Conference on Human Biomonitoring**
  17–19 April 2016, Berlin (Germany)
  http://www.umweltbundesamt.de/en/2nd-international-conference-on-human-biomonitoring

- **SETAC Europe 26th Annual Meeting**
  22–26 May 2016, Nantes (France)
  http://nantes.setac.eu

- **11th European Pesticide Residue Workshop**
  24–27 May 2016, Limassol (Cyprus)
  http://eprw2016.com/

- **2nd International Conference on Atmospheric Dust (DUST 2016)**
  12–17 June 2016, Taranto (Italy)
  http://www.scientevents.com/dust2016/

- **8th International Congress on Environmental Modelling and Software (iEMSs 2016): *Supporting a sustainable future***
  10–14 July 2016, Toulouse (France)
  http://www.iemss.org/sites/iemss2016/

- **36th International Symposium on Halogenated Persistent Organic Pollutants (DIOXIN 2016)**
  28 August – 2 September 2016, Firenze (Italy)
  http://dioxin2016firenze.org/

- **8th International Network on Children Health, Environment and Safety Conference (INCHES 2016)**
  14–16 September 2016, Barcelona (Catalonia, Spain)
  http://inchesnetwork.net/upcoming-conferences/

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