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Salud ambiental

Environmental health

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Moderador/Chairperson:
Ferrán Ballester y Sylvia Medina

APHEIS: ASSESSMENT OF THE PUBLIC HEALTH IMPACT OF AIR POLLUTION IN 26 EUROPEAN CITIES

Sylvia Medina*, Antoni Plasència**, Ferran Ballester***. En nombre del Grupo: the APHEIS Group

*Santé-Environnement, Institut de Veille Sanitaire, Saint Maurice Cedex, France. **Institut Municipal de Salut Pública, Barcelona, Spain. ***Epidemiology and Statistics, Escola Valenciana d'Estudis per a la Salut, Valencia, Spain.

Introduction: The APHEIS programme aims to provide European, national, regional and local decision makers, environmental-health professionals and the general public with an up-to-date and easy-to-use information on air pollution (AP) and public health (PH). For this purpose, APHEIS has performed and delivered the first of a series of standardised periodic reports on health impact assessments (HIA) in 26 cities in 12 Western and Eastern European countries.

Methods: APHEIS centres have been created in all participating cities. APHEIS adopted WHO guidelines and developed own guidelines for gathering and analysing data on AP and its impact on PH. APHEIS has assessed the acute and chronic effects of fine particles on premature mortality and hospital admissions for cardiovascular and respiratory diseases using the estimates developed by Aphea2 study and two North-American cohort studies. The present HIA was performed for different scenarios on the health benefits of reducing PM10 and BS levels. For BS only acute effects were considered since no exposure-response functions were available.

Results: The total population covered in this HIA includes nearly 39 million inhabitants. PM10 concentrations were measured in 19 cities (annual average range: 20- 50 µg/m³). Black smoke (BS) concentrations were provided by 15 cities (annual average range: 20-65 µg/m³). The annual age-standardised mortality rates (per 100 000 people) ranged from 456 in Toulouse to 1 127 in Bucharest. Reducing long term exposure to PM10 levels by 5 µg/m³ would have prevented 5 547 premature deaths annually, 800 of which attributable to short-term exposure. A reduction of 5 µg/m³ in BS levels would have decreased short-term deaths by over 500 per year.

Conclusions: APHEIS has created an active public-health and environmental-information network on air-pollution-related diseases in Europe using a standardised methodology. With its monitoring system, APHEIS will continue to keep the information we provide as up-to-date and accurate as possible and make it available for decision makers, environmental-health professionals and the general public.

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EUROPEAN CLIMATE CHANGE HEALTH IMPACT AND ADAPTATION ASSESSMENT

Bettina Menne¹, Roberto Bertolini², Sari Kovats³, Elisabeth Lindgren⁴, Bohumir Kris⁵, Gerd Jendritzky⁶, Richard Klein⁷, Anna Alberini⁸, Pim Martens⁹, et al. En nombre del Grupo: "climate change and adaptation strategies for humans"

¹GCH, WHO, Rome, Italy. ²DTS, WHO, Copenhagen, Denmark. ³Centre, LSHTM, London, United Kingdom. ⁴Centre for ecological studies, Stockholm University, Stockholm, Sweden. ⁵NIPH, Prague, Czech Republic. ⁶dWd, Freiburg, Germany. ⁷PiK, Potsdam, Germany. ⁸Feem, Venice, Italy. ⁹CIS, Maastricht, the Netherlands.

Human-induced changes in the global climate system pose a range of health risks. Irrespective of any actions, which may soon be taken to reduce or halt these environmental changes, human populations will be exposed to some degree of climate change over the coming decades.

Objectives: In June 2001 the EC funded project "climate change and adaptation strategies for human health (cCASH)(EVK-2000-00070) started to a) to identify the vulnerability to adverse impacts of climate change on human health; b) to review current easures, technologies, policies and barriers to improve the adaptive capacity of human populations to climate change; c) to identify for European populations the most appropriate measures, technologies and policies, as well as the most effective approaches to implementation, in order to successfully adapt to climate change; d) to provide estimates of the health benefits of specific strategies or combinations of strategies for adaptation for vulnerable populations under different climate change scenarios; e) to estimate the costs (due to climate-related damage and the implementation of adaptive measures) and benefits (both of climate change and of adaptation strategies) including co-benefits independent of climate change

Methods: In order to reach the objectives, epidemiological methods from time series analysis to event-based assessments have been used to identify populations at risk and to estimate the health impacts of weather, climate variability and potential changes. Methods of policy analysis, cost-benefit assessment as well as integrated assessment are also used.

Results: The presentation will give an overview of the results of the first year results: literature review on the health impacts of floods, time series analysis of 14 countries on salmonella and ambient temperature, highlights of the review of vector borne diseases and hopefully allow some discussions on future research recommendations. The study involves 25 countries and around 150 scientists from across Europe.

The assistance of many other scientists will be acknowledged during the presentation.

EMECAS: SPANISH MULTICENTER STUDY OF THE SHORT-TERM EFFECTS OF AIR POLLUTION ON HEALTH: FIRST RESULTS FOR CARDIOVASCULAR ADMISSIONS

Ferran Ballester¹, Paz Rodriguez¹, Carmen Iñiguez¹, Santiago Perez-Hoyos¹, Marc Saez², Antonio Daponte³, Jose Maria Ordoñez⁴, Eva Alonso⁵, Federico Arribas⁶. En nombre del Grupo: the EMECAS -group

¹Epidemiology and Statistics, Escola Valenciana d'Estudis per la Salut-EVES, Valencia, Spain. ²GRECS/Economy Dpt., University of Girona, Girona, Spain. ³Escuela Andaluza de Salud Pública, Granada, Spain. ⁴D:G. Salud Pública, Madrid, Spain. ⁵Dept. Sanidad. Gobierno Basco, Bilbao, Spain. ⁶Dept. Salud de Aragón, Zaragoza, Spain.

Introduction: EMECAS is a collaborative project that seeks to evaluate the short-term effect of air pollution on hospital admissions for cardiovascular and respiratory diseases and for mortality in 16 Spanish cities, accounting for nearly 10 million inhabitants. In this paper we present the combined results for cardiovascular admissions.

Methods: The period of the study goes from 1995 to 1999. From hospital database records we obtained the number of daily hospital admissions of residents in each city with a primary discharge diagnosis of all cardiovascular diseases (CVS) (ICD-9: 390-459), heart diseases (HD) (ICD-9: 410-414, 427-428), ischemic heart diseases (IHD) (ICD-9: 410-414), and cerebrovascular diseases (CBS) (ICD-9: 430-438). From Air Pollution Networks we collected data for 24 hours daily levels of black smoke, total suspended particles (TSP), particles less than 10 (PM₁₀), SO₂ and NO₂; 8 hours maximum moving average of CO and ozone; and, lastly, 1 hour maximum of SO₂, NO₂ and ozone. Magnitude of association in each city was estimated using generalized additive models (GAM) under a Poisson distribution controlling for confusion and overdispersion, as well as allowing for non-linear relationships. Co-variables included were trend, temperature, humidity, barometric pressure, influenza, day of the week, and unusual events. Combined estimates for each cause, lagged effects up to three, and pollutant were obtained under 'fixed effect' models, and, if heterogeneity, under 'random effects' ones. For ozone the analyses were restricted to the warm period (May to October). Following these analyses we selected the estimates of the relationship between hospital admissions for cardiovascular causes and the average of the concurrent and one day lag for all the pollutants, except for ozone (average of the 2 and 3 day lags).

Results: Average levels of pollutants were, in general, low to moderate (i.e. SO₂: 15-73 (g/m³), CO: 0.9-2.5 mg/m³, PM10: 33-43 (g/m³, g/m³, exceeding in some cases the European limit values (NO₂: 23-79 (g/m³). The combined estimates showed an association with cardiovascular admissions except for cerebrovascular diseases. An increase of 10 (g/m³ in the PM10 levels was associated with a 0.9% (95% CI: 0.4-1.5%) increase in the number of hospital admissions for CVS, 1.6% (95% CI: 0.8-2.3%) for HD, and 1.6% (95% CI: 0.8-2.3%) for IHD. The same increase in concentrations of NO₂ was significantly associated with a 0.3% increase in CVS, 0.8% in HD, and 1.2% in IHD admissions. An increase in 1mg/m³ levels of CO was associated with an increase of 1.7% in CVS, 3.3% in HD, and 3.2% in IHD admissions. The estimates for TSP, black smoke and SO₂ were lower and in some cases non-significant. Ozone was also significantly related with CVS and HD admissions.

Conclusions: This is the first multicenter study assessing the impact of air pollution on cardiovascular hospital admissions in Spain. There is a short-term association between increases in daily levels of air pollutants and the number of daily admissions for cardiovascular diseases. The effect is greater for heart diseases than for all cardiovascular ones, due to a non-association of pollution with admissions for cerebrovascular diseases.

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ANNOYANCE DUE TO AIR POLLUTION IN FIVE SPANISH CITIES

Benedicte Jacquemin*, Jordi Sunyer*, Angeles Jaen*, Jan-Paul Zock*, Xavier Basagaña*, Josep Maria Anto*, Nino Kunzli**

*Unitat de Recerca Respiratòria i Ambiental, Institut Municipal d'Investigació Mèdica, Barcelona, Spain. **University of South California, Los Angeles, EE UU.

Introduction: The impact of chronic exposure to air pollution on health is difficult to study. Annoyance might be one of the outcomes of air pollution. On the other hand, exposure assessment of air pollution is complicated and self-reported annoyance can be an option.

Although annoyance due to air pollution has been poorly studied, it is known that some host factors like age, or presence of a respiratory illness can influence annoyance. The objectives of this study were to describe the variability and the determinants of annoyance in five cities in Spain, and to correlate the prevalence of reported annoyance with historical data of ambient NO₂ and PM₁₀.

Methods: The European Community Respiratory Health Survey II (ECRHSII) is a repeated cross sectional study, conducted in 2000-01. In Spain it was performed in five cities (Albacete, Barcelona, Galdakao, Huelva and Oviedo), including 1387 randomly selected adult participants aged 28-58 years (53 percent females). The study consisted, among others, of a detailed interview. The questionnaire included the assessment of annoyance due to air pollution on an 11 points scale (0: no disturbance at all, 10: intolerable disturbance). Demographic and socioeconomic factors, smoking status and presence of respiratory symptoms or disease were tested as possible predictors of annoyance. Air pollution data were obtained from city-networks.

Results: Forty-eight per cent of participants reported annoyance between 0 and 3, 30% between 4 and 6 and 22% between 6 and 10. Being a female (p=0.043), suffering from dyspnea (p=0.003), asthma (p=0.05) or rhinitis (p=0.003), history of respiratory symptoms at work (p<0.001), low educational level (p=0.07), living next to a street with heavy traffic (p<0.001) and living in Huelva were predictors to report higher annoyance. A linear relation between prevalence of annoyance >=6 and PM₁₀ level was found, but not between NO₂ and annoyance.

Conclusions: In this study several predictors of annoyance due to air pollution were identified. It is necessary to do more studies of annoyance and air pollution to define if those predictors could be useful as health markers and as social markers to predict and understand the perception of the population against air pollution. As annoyance is related with ambient PM₁₀, it could be used as measurement of exposure. However, more studies of validity are needed.

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HUMAN EXPOSURE TO DIOXINS AND FURANS (PCDDs/PCDFs) IN NORTHERN PORTUGAL

Jose Calheiros¹, Rui Santos², Miguel Coutinho³, Olaf Papke⁴

¹Community Health, ICBAS-Univ. Porto, Porto, Portugal. ²C. Maia Health Center, ARS-Norte, C. Maia, Portugal. ³IDAD, Aveiro, Portugal. ⁴ERGO, Hamburg, Germany.

Background: As part of an ongoing Environmental Health Surveillance Program (The LIPOR Project) associated with a state-of-the-art new urban waste mass-burning incinerator, which started operating in February 1999 near Porto, we report the results of the biological monitoring component - human milk and blood. Together with a similar program developed in Lisbon, this is the first time ever that such an evaluation has been performed in Portugal.

Objectives: To develop baseline information to be integrated with other components of the surveillance program.

Methods: Voluntary participants, with no known exposure to possible occupational or other sources of PCDDs/PCDFs, were selected by local general practitioners among healthy members of their lists. Two similar populations were studied: A - located within 5 km from the new unit and B - located 30 km North of the unit.

Results:

1. Human milk

Population-A n=19; mean age=28;
PCDDs/PCDFs (WHO-TEQ pg/g lipid based):
Median=10.0; 95-Percentile=31.0

Population-B n=10; mean age=31;
PCDDs/PCDFs (WHO-TEQ pg/g lipid based):
Median=16.0; 95-Percentile=37.0
p=0.015

2. Blood

Population-A n=46; mean age=44;
PCDDs/PCDFs (WHO-TEQ pg/g lipid based):
Median=21; 95-Percentile=35

Population-B n=29; mean age=46;
PCDDs/PCDFs (WHO-TEQ pg/g lipid based):
Median=19; 95-Percentile=34
p=0.21

Conclusions: For human milk the differences are statistically significant, being higher in the reference population. The results may be partially explained by the fact that population-B has higher mean ages. For human blood similar results were observed in the two populations. The above results confirm that exposure to these compounds is widespread in Portugal and point for the need to develop integrated, long-term strategies that should target food as the major source of exposure. The exposure levels to PCDDs/PCDFs documented for these Portuguese populations are similar to values reported in the literature for western countries and the analysis of future trends is essential. It is expected that the LIPOR program will continue to contribute to the development of sound knowledge on current exposure patterns and control strategies, and promote the much needed responsible public awareness and participation.

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SHORT-TERM EFFECTS OF AIR POLLUTION AND POLLEN ON ASTHMA EMERGENCY ROOM VISITS IN MADRID: A CASE-CROSSOVER ANALYSIS

Aurelio Tobías*, Iñaki Galán**

*Department of Statistics and Econometrics, Universidad Carlos III de Madrid, Getafe, Spain. **Department of Epidemiology, Instituto de Salud Pública, Madrid, Spain.

Background and objective: There are evidences that the prevalence of asthma is increasing in numerous countries. This fact has produced great interest in the study of possible environmental factors. We have analysed the short-term effects of air pollution and pollen with allergenic capacity on asthma emergency room visits in Madrid starting using a case crossover design.

Methods: The Hospital General Universitario Gregorio Marañón provided information on daily asthma emergency room visits between 1995 and 1998. We considered the following air pollutants: PM₁₀, SO₂, NO₂, and O₃, also the following types of pollen with allergenic capacity: olea, plantago, poaceae, and urticaceae. Information on daily mean temperature, and relative humidity, influenza epidemics and respiratory infections was also collected. The case was defined as the level of both air pollution and pollen on the day of the patient's visit. Bidirectional controls were defined as the levels of one week before and one after the day of visit at the emergency room. Thus, the confusion due to temporality was controlled by the own design. As effect modifiers we considered the following variables: sex, age (children < 15 years old vs. adults > 15), and the repeated admissions, as a marker of the asthma severity. Data was analysed using conditional logistical regression models.

Results: The odds ratio (OR) for an increase of 10 µg/m³ of air pollutant in a multiple pollutant models was 1.013 (95% CI:0.966-1.064) for PM₁₀, 1.022 (0.967-1.081) for SO₂, 1.024 (0.998-1.051) for NO₂, and 1.032 (1.004-1.059) for O₃. The OR for the comparison between the minimum value-percentile 90 vs. p90-maximum value of pollen distribution, in a multiple pollen types model was 0.986 (0.835-1.165) for olea, 1.167 (0.976-1.396) for plantago, 1.305 (1.059-1.606) for poaceae, and 1.153 (1.000-1.329) for urticaceae. Results did not change after adjusting by multiple air pollutants and multiple pollen types in a same conditional logistic regression model. There was no effect modification for any of the variables considered.

Conclusions: The results suggest that both, air pollution and pollen levels, are associated with an increase asthma emergency room visits. These results agreed with those from previous studies in Madrid based on time-series regression analysis.

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PREVENTION OF HEALTH EFFECTS OF HEAT WAVES IN VARIOUS ITALIAN CITIES: THE HEAT/HEALTH WATCH/WARNING SYSTEM

Valeria Galani¹, Paola Michelozzi¹, Ennio Cadum², Luigi Bisanti⁴, Claudia Fanos⁵, Laurence S. Kalkstein⁶, Francesca De Donato¹, Agostino Miozzo⁸, Carlo A. Peruzzi¹.

¹Epidemiology, Local Health Authority, Rome, Italy. ²Environmental epidemiology, Regional Agency for Environmental Protection, Turin, Italy. ³Epidemiology, Local Health Authority, Milan, Italy. ⁴Regional Agency for Health, Bologna Italy. ⁵Center for Climatic Research, University of Delaware, Newark, USA. ⁶Protezione Civile, Presidenza del Consiglio dei Ministri, Rome, Italy.

Introduction: Current knowledge of the effects of high temperature on mortality is largely based on studies on the effect of extreme temperatures, so called "heat waves", which have been linked to excess deaths from cardiovascular, cerebrovascular, and respiratory conditions. Local systems that forecast oppressive weather conditions (Health/Health Watch/Warning system, HHWW) have been successfully implemented in various US cities. An Italian network for prevention of the health effects of heat waves has been initiated in 2003 by the National Department for Civil Protection. During the first year, the HHWW system is active in five pilot cities, namely Rome, Milan, Turin, Bologna, Palermo.

Methods: Local weather characteristics are summarized through a synoptic approach to identify climatic conditions ("oppressive" air masses) associated with a heat-related mortality. The HHWW system is based on weather forecasts and is able to predict potentially dangerous climatic conditions for human health three days in advance. Meteorological data is provided by the Italian Air Force Meteorological Service and is collected from the nearest weather station for each city. A web site dedicated to the service is active for each city during summer season. A series of mitigation strategies are planned in collaboration with the National Department for Civil Protection whose task is to locally direct public health intervention. A daily bulletin, with the major outcomes of the system, is provided to update local services in charge of public health intervention. Information and preventive measures include: alert of health, social and public transportation authorities, mass media, and public and private associations; traffic regulatory policies, and other interventions such as air conditioned public facilities, a telephone heat-line, personal contacts for elder people, and increased emergency medical services.

Results: Results from one summer of activity in the city of Rome are reported as an example. Two air masses ("moist tropical plus" and "dry tropical") resulted as being the main meteorological determinants of excess mortality with 5 and 7 extra daily deaths respectively. The maximum apparent temperature showed a trend similar to mortality, with high levels corresponding to the peaks in mortality. Over 170 days of observation, 27 days of alert/alarm were called; a minimum of 2 and a maximum of 26 excess daily deaths were predicted; a minimum of 1 and a maximum of 33 daily deaths were observed. Mortality peaks were detected in advance by the system, although underestimated.

Conclusions: The routine activation of the Heat/Health Watch/Warning System supports public health programs to prevent mortality excess during hot periods. The priorities for future activities include further integration of other cities into a nation-wide alarm-system and a closer collaboration between the partners on a local level to optimise the system's preventive ability.

PHEWE: A PROJECT TO EVALUATE THE ACUTE HEALTH EFFECTS OF WEATHER CONDITIONS IN EUROPE

Paola Michelozzi¹, Ursula Kirchmayer¹, Glenn R McGregor², Annibale Biggeri³, Bettina Menne⁴, Klea Katsouyanni⁵, Petros Kassomenos⁶, H. Ross Anderspn⁷, et al. the PHEWE collaborative group

¹Epidemiology, Health Local Authority, Rome, Italy. ²School of Geography and Environment, The University of Birmingham, Birmingham, UK. ³Dipartimento di Statistica "G. Parenti", Università di Firenze, Firenze, Italy. ⁴WHO - European Centre for Environment and Health, Rome, Italy. ⁵Department of Hygiene & Epidemiology, University of Athens Medical School, Athens, Greece. ⁶Laboratory of meteorology, Department of Astrogeophysics, University of Ioannina, Ioannina, Greece. ⁷Department of Public Health Sciences, St. George's Hospital, London, UK.

Introduction: Epidemiological studies indicate that increases in mortality from cardiovascular and respiratory diseases are associated with exposure to extreme warm and cold temperatures. A large-scale study applying a standardised scientific approach across a wide range of locations will provide better knowledge both on the susceptible populations and the weather conditions with the greatest adverse effects.

Methods: This is a three year project. The general aim of the study is to evaluate the acute health effects (mortality, and hospital admissions for cardiovascular, cerebrovascular, and respiratory causes) of weather, using a time series approach, both during the warm and the cold season, in 16 European cities, characterised by widely differing climatic conditions (Athens, Barcelona, Bucharest, Budapest, Cracow, Dublin, Helsinki, Ljubljana, London, Milan, Paris, Prague, Rome, Stockholm, Turin, and Zurich) for the period 1990-2000. The following issues will be evaluated: threshold levels for weather variables, form of the dose-response relationship, latency time between exposure and effect, air masses associated with health effects, and the interaction between weather and air pollutants. Time series analysis will be carried out for each city. Pooled analysis will provide results for large geographic areas. Experimental heat/health watch warning systems will be implemented in 5 pilot cities using a synoptic approach. A framework of preventive strategies to minimise adverse health effects together with guidelines for public health interventions will be developed. Objectives of the first year are: data collection for each city; descriptive analysis of mortality hospital admission, and meteorological variables; evaluation of the relationship between single weather variable and health outcomes; analysis of meteorological data to develop a synoptic index in each city.

Results: The study includes an overall population of more than 30 million inhabitants, ranging from 270.000 in Ljubljana to 7.2 million in London. To date a descriptive analysis of the dataset for the period 1990-1996 has been conducted. Mean daily mortality was in the range of 6.5 deaths in Ljubljana and 168 deaths in London. Winter mean temperatures ranged between -1.66 °C in Helsinki and 11.4 °C in Barcelona, while mean relative humidity registered the lowest value in Rome (66.6%) and the highest in Dublin (85.3%). In the summer season, the lowest mean temperature was observed in Dublin (13.5 °C) and the warmest in Athens (25.0°C), while mean relative humidity ranged between 51.3% in Athens and 80.2% in Dublin. Bucharest registered the largest range in mean temperatures between the winter and summer season (1.1-20.2 °C), while the largest range in relative humidity was found in Athens (51.3-72.7%). An overview of the preliminary results on the relationship between weather conditions and health outcomes will be presented.

Conclusions: This large scale project establishes the scientific basis for the evaluation of the health effects of climatic variability in Europe, the development of preventive policies and the implementation of adaptive actions.