PHASE final meeting

Rome, Kolbe Hotel

5-6th June 2014,

Meeting minutes

Marina Davoli, Director of the Department of Epidemiology gave the welcoming address and opened the meeting.

Bettina Menne, WHO Office Bonn also gave an opening address stressing the key role of WHO and public health in reducing the impact of climate change and extreme weather events.

Paola Michelozzi, Coordinator of the PHASE project gave an overview of the PHASE project describing the work packages, the common approach adopted throughout the WPs and the aims of the project. A specific focus was also given on what the objectives of the meeting were and the importance of developing public health messages for adaptation to extreme weather events. Having experts from Health Ministries and public health institutions at the final meeting was an important added value in order to share and disseminate results and have feedback on how to present final project results to the PH community in an effective way. (**see presentation 1_Michelozzi introduction**)

WP4 Heat and cold

Heat and cold were presented and discussed among PHASE partners and invited experts. Firstly, Michela Leone presented results of the temporal variation in the effect of heat on health in 9 EU cities on mortality by cause and age groups in a period analyses before and after 2003. Results showed J-shaped relationship between mean temperature and mortality in all cities. The highest effect was observed in cities with the highest exposure levels (Mediterranean cities). A reduction in the effect was observed in Athens, Rome and Paris both for total and by cause mortality with greater reduction in the elderly (adaptation: introduction of heat plans). An increase in effect in recent years Helsinki, Budapest and Stockholm where previously high temperatures had not been not observed (**see presentation 2_PHASE_WP4_Leone**).

Secondly, the temporal variation in terms of annual effects of heat were presented through a novel approach which allowed to detect if there has been a variation in the effect of heat in EU countries

include din PHASE considering each summer separately, trends as well as specific years and extreme events that had a significant impact like 2003 or more recently 2006 could be studied. Results confirm what showed in the first analyses, a reduction in the effect of heat in Rome, Athens and Barcelona in more recent years. In London and Paris 2003 was depicted as year with "extreme" impact. NO change in trend was observed for Valencia and Budapest (**see presentation 3_PHASE_WP4_Scortichini**).

Thirdly the effect of cold and possible variations in the effect of low temperatures were presented. Results show a linear relationship between temperature and mortality, with smaller estimates compared to heat and a smaller effect in colder cities that are more acclimatized and prepared to cope than Mediterranean cities which are not prepared. The temporal variation was smaller compared to that shown for heat and mainly among the elderly (75-84, 85+). Analyses by cause showed a reduction in cardiovascular disease in Barcelona and an increase in Paris: while for respiratory disease a reduction was observed in Budapest, Barcelona, Athens especially among the elderly (**see presentation 4_PHASE_WP4_dedonato**).

Within the PHASE project, a key focus has been posed on susceptible subgroups and for WP4 very interesting results were presented regarding cohorts of vulnerable subgroups considering pre-existing chronic disease (diabetes, COPD and CHF, MI and psychiatric disease). The effect of heat waves in cohorts in Stockholm and Rome were presented and results show an indication of greater effect (although non-significant difference) of heat on mortality for all vulnerable subgroups compared to the general population in Stockholm, while no relevant differences were observed in Rome, except for COPD where there is an indication of a higher effect (**see 5_WP8_Susceptible Cohorts heat_OudinAstrom**).

The effect of heat on hospital admission among children was also addressed in PHASE as the evidence on children as risk group is limited. Results were presented for Valencia and an effect on respiratory and gastrointestinal admissions among children aged 0-14 years was observed **(see 6_WP4 children heat_Iniguez).**

The effect of temperatures on preterm births were also studied in the PHASE project and results were presented. Firstly, results from an Italian study on 5 cities (Rome, Turin, Trieste, Venezia and Palermo) were illustrated which builds on another study conducted in Rome by same authors in PHASE. An effect of maximum apparent temperatures on preterm births, although not significant was seen in all cities(Rome and Venice statistically significant). For Rome, women with previous chronic disease, in particular cardiovascular disease, and the very young seem more susceptible to the effects of heat on preterm birth. Women with obstetric related diseases and those with a high education level are more susceptible to the effects of PM10 and preterm birth **(see 7_WP8 heat and preterm birth Italy_Schifano)**.

Similar study was conducted in Stockholm and Valenica, although inclusion criteria of preterm birth and data sources were slightly different. Results suggest that exposure to elevated temperatures is associated with a increase of preterm birth during the last weeks of gestation. The effect was more delayed in Stockholm and more immediate after extreme heat for Valencia **(see 8_WP8 heat and preterm birth Stockholm and Valencia_Vicedo)**.

Regarding heat\cold plans and prevention measure it was decided to develop a web-based questionnaire in collaboration with WP8 and WP4 that would help give an overview of heat warning

systems, prevention measure sin place, susceptible populations included in the heat plans and rapid surveillance schemes implemented to monitor the impact of heat waves and cold spells rapidly after events occur. The web-based platform was briefly illustrated to invited experts and will be sent to all stakeholders identified by PHE in the dissemination stakeholder overview (**see 9_WP4/8 web questionnaire_Astrom**).

In the afternoon session case study examples, best practice, of prevention measures related to heat and cold in different EU countries were presented. The Lazio regional GP active surveillance plan was described briefly and variations over time were studied. In brief, the plan comprises the active surveillance of **susceptible elderly patients** through telephone contacts, **home visits during heat waves**, modulation in pharmacological treatment, and favoring the access to nursing/residential homes when necessary. Results show no reduction in mortality during HW in the subgroup under GP surveillance but a reduction in mortality risk during HW in the very old age groups, while an increase in the 65-74 yrs was observed, probably as less attention has been posed to this age group. Time variations of susceptibility characteristic (several clinical conditions) following the implementation of the plan suggest that psychiatric/neurological disease are still associated with an increased mortality risk during HW among the very old. Improvements are needed to better identify clinical susceptibility (i.e. pharmaceutical and exemptions database) and to evaluate interventions to reduce heat effect also in the "younger" elderly (**see 10_GP surveillance Lazio_DeSario**).

The French heat warning system and heat prevention plan, operational after the 2003 heat wave which had a dramatic impact in France, was described. (**see 13_French HW Plan_Guichard)**

A simple methodology to identify excess mortality attributable to heat waves was also created in PHASE by NIEH and illustrated here. Different temperature indicators were investigated and results were comparable, hence the simple indicator of mean temperature is recommended. At 90th percentile, the mean excess mortality of the whole period computed by using the four indicators did not differ considerably, although the identified heat wave days varied to some extent. The 90th percentile of temperature seems to be an optimal threshold for heat alert, while the highest excess deaths can be prevented in this case, on the other hand the number of heat waves is still between 0-5 events. However, we acknowledge that most countries have developed more complex and diverse methods to predict heat warning alerts relate to health and these are consolidated. The effort here was to develop a simple tool that can be shared across countries for a comparison of results and to be implemented in countries that still do not have warning systems or heat-related monitoring. The tool developed within CEHAPIS by the same authors was also illustrated (**see 11_heat warning tool_ Paldy**).

Another example presented was the England cold weather plan, details of the plan of the warning system and prevention measures for both vulnerable populations and indoor measures to adopt during severe cold spells are reported in **(12_Cold weather plan PHE_Bone)**.

The PHASE project gives specific focus to the identification of subgroups of the population most vulnerable to EWEs. An overview of the work carried out in PHASE for the identification of susceptible subgroups in particular to heat and floods was presented. The risks of EWEs for population health depend not only on the event, but also on who is exposed and their underlying vulnerability. Hence in terms of public health, to reduce the health burden of these events prevention measures need to be

specifically targeted to vulnerable groups. It is important to recall that vulnerability is dynamic, varying across temporal and spatial scales and this is also accounted for in PHASE.

All WPs had as milestone in the first year a literature review of the effects of each EWEs on health with a specific focus on susceptible subgroups. Furthermore, epidemiological studies and more detailed reviews were carried out on certain key aspects. The effect of heat was investigated within WP8 in cohorts of susceptible subgroups with pre-existing disease associated to an increase risk of mortality during extreme high temperatures or heat waves in Rome and Stockholm. The risk of pre-term birth was also investigated as recent studies have suggested an impact on pregnancy outcomes. Studies were conducted in Italian cities, Stockholm and Valencia. The health effects of flooding, considering the review conducted within PHASE and the effects of heavy rainfall on health on this aspect were also summarized (**See 14_WP8 Susceptible subgroups_Forsberg**).

Paola Michelozzi gave an overview of WP4 and identified key messages for public health actions related to exposure to heat and cold. Specifically the temporal change in the effect of heat in more recent years especially in Mediterranean countries after the introduction of warning systems and heat prevention plans. While for cold the temporal variations seem limited, more needs to be done regarding cold not only in terms of public health but also in terms of housing and promotion of adequate indoor heating measures. Subgroups at risk that have to date received limited attention are children and pregnant women. Maybe research is not definitive here yet and more multi-national studies need to be carried out on preterm births and pregnancy outcomes. Another important aspect is the changes in the pool of susceptible subgroups over time (several clinical conditions and age groups) as a result of prevention measures and population characteristics.

Friday 6th June

WP7 synergies between EWES, air pollution and forest fires

The analyses conducted in WP7 on the potential synergy between air pollution and extreme temperatures and the impact on health outcomes (mortality) in 8 European cities (same dataset as WP4) years are restricted to 2004-2010 in this analyses and the exposure considered was maximum apparent temperature, heat wave or cold spell and air pollutants. Results show that in the warm season there is significant interaction between temperature and PM10 in total (15-64 age group) and CVD mortality (>75 and all ages). During heat waves, no evidence for interaction with air pollution were shown, results are in contrast with previous results (EuroHEAT). For the cold season no consistent - significant evidence. No significant interaction between weather and NO2 - SO2 was observed. City-specific results show synergistic effects is several cities, which appear to be consistent with previous studies (**see 16_WP7synergies air pollution temps_Analitis**).

The second presentation was on the effect of forest fires on natural and cause-specific mortality and the synergy between pollutants and heat waves. The case study of Athens was presented and results show an increase in mortality during large fires while for medium fires there is a suggestion of increase in cardiovascular and respiratory mortality, although not statistically significant. Cardiovascular mortality is affected more in the younger age groups whilst respiratory mortality is more strongly affected among the elderly (75+ years old). The effects is stronger and more persistent in time for respiratory mortality. Other case studies are underway in Valencia where large fires seem to have an

impact on respiratory mortality and Italy. There is some evidence for effect modification on total and CVD mortality between forest fires and PM10 in the younger (<75) age group. There appears to be interaction (or effect modification) between the effect of FF and the occurrence of HW. Thus the effects of FF during HW days are significantly larger compared to non-HW days. Additional adjustment for temperature leads to a decrease of the FF effects, which however remain large and statistically significant (and show dose-response) (**see 17_WP7 synergies temps forest fires_Analitis**).

WP6 Forest fires

For WP6 unfortunately the exposure of was not presented due to a last minute change in the program, results will be made available by Isabella Annesi Maesano and Cathy Liousse.

The methodology adopted for the Marseilles case study was presented (**see 18_WP6 Short-term effects of air pollution forest fires_Banjaree**). An extreme fire event occurred in Marseilles in July 2009 that destroyed 1300 hectares and threatened 300 people. ER visits were studied in relation to estimated wild fire emissions (all sources, anthropogenic and from fire) using a time series approach. Results show significant association between PM2.5 from all emissions and PM2.5 from anthropogenic and health outcomes and no associations between wildfire emissions and health outcomes. The greatest effect on cardiovascular ER vistis and total consultations, effects were generally immediate. (**see 20_WP6 forest fires Marseilles_Hassani**).

The finish case study of a warning system to detect the occurrence of long-range transport to air pollution from forest fires was illustrated. The system was introduced in response to the transboundary forest fires events in Russia 2010 which had serious health implications in Finland. The model and the health scenarios developed were described, in particular hospital admissions for asthma in children, asthma and COPD and CVD and respiratory disease in adults (**see 19_Wildfire smoke_GIS & Early warning_Salonen**). This tool is very important and is a best practice case study of how to develop warning systems on which prevention strategies should be based.

Klea Katsouyanni gave an brief summery on the key public health messages on synergies between air pollution, wild fires and EWEs to introduce the group discussion. The main points were:

1. Evidence of the synergistic effect \interaction between temperatures and air pollutants in inconclusive and needs to be further investigated. High temperatures seem to interact with PM10 and O3, however the synergistic effect with heat waves doesn't seem to be consistent with previous studies. Possible temporal variation in the synergistic effect or aspects still not clearly identified that may induce this variation. Policy should take adequate measures during heat waves and extreme pollution days adopting abatement strategies.
2. Communication and management of these EWEs need to be carried out in collaboration and adopting combined strategies. Collaboration between different agencies and departments is key. Warning systems should also be integrated.
3. It is important to recall that forest fire events affect health because of increases in particulate concentrations and particulate matter toxicity but also stress mechanisms associated to occurrence of fire event in proximity to inhabited areas and which cause increase in CVD **(21_public health messages_synergies pollution temp_Katsouyanni**).

WP5 Flooding

An overview of the work carried out in WP5 was presented by PHE. A literature review on the health impacts of flooding was carried out in collaboration with WHO to improve the evidence base on this topic. While regarding the overview of the existing tools for flood response and health resilience the UK plan was described in detail as best practise case study. The plan comprises a warning system developed in collaboration with the floods forecast centre (Environment Agency and MetOffice), public health advice for different users (public, front line responders) before, during and after a flooding event, surveillance of health impacts. Case studies of community resilience, wetland management and Co poisoning were presented as tools for flood minimisation and resilience (**see 22_WP5 Adaptation tools to prevent health effects of flooding_Bone**).

Diane Lowe gave a presentation on the work carried out within WP8 on factors increasing vulnerability to health effects of flooding which have recently been published **(see 23_susceptibility to flooding_Lowe).** The risk factors associated to pre, during and after flooding were assessed and findings described, these seem to vary with the timing of a flooding event and related outcome.

A workshop was carried out in London on the 29th January within WP5 to raise awareness of the health risks of flooding and to contribute to the reduction of future impacts by improving flood preparedness and response. The event was aimed at PHASE partners, national and European colleagues, key experts and stakeholder organisations with the aim of sharing experiences of flooding across Europe and promoting best practice. The workshop had three themes: flooding and communities , guidance and communication and tools for prevention and intervention. Resilience community groups such as National Flood forum were presented and activities described, guidance documentation and communication of risk associated to flooding campaign were illustrated such as children books Susie the child minder to educate children , families and communities to be better prepared for EWES **(see 24_Summary of WP5 European Flood Workshop_Landeg)**.

Between December 2013 and February 2014 recurrent and prolonged flooding occurred in the UK , over 6000 properties were flooded for an estimated damage of £1.1 billion. In response to this event, it was decided to carry out an evaluation of the PHASE leaflets on flooding prevention that were used by front line responders and local communities to assess perception of risk, content of PH messages and diverse setting uptake (rural vs urban) **(see 25_Evalaution of the PHASE health-related flooding advice)**. This work has been very useful as it has been an opportunity to evaluate a PHASE product and have feedback which will ensure the improvement for future years and other communities.

Another case study example of how to deal with flooding in the context of the health care system is the NHS Blood and Transplant (NHSBT) centre in Filton which flooded in September 2012. This is a best practice case study of how to deal with an emergency situation **(see 26_Flooding NHS Blood and Transplant Facility_Landeg)**.

Bettina Menne from WHO Bonn Office gave an overview of how results from PHASE can contribute to reduce the risk of EWE in terms of improving public health response and in terms of a WHO perspective **(see 27_WHO_Bettina Menne**). Health measures need to be integrated in plans for adaptation to climate change. To promote effective engagement of the health sector and its collaboration with all related sectors in order to strengthen capacity of health systems. Heat plans and

emergency response frameworks should be implemented together with specific Guidelines and where necessary new innovative research to bridge the gaps in knowledge where necessary.

The development of guidance is one of the core duties of the WHO, and it is also one of the most immediate ways to translate scientific evidence into policy action. WHO guidelines are recommendations intended to assist providers and recipients of health care and other stakeholders to make informed decisions. Recommendations may relate to clinical interventions, public health activities, or government policies. If PHASE results could become WHO guidelines this would be excellent, however it is worth noting that the process is very long and requires much work.

Paola Michelozzi thanked everyone for their contribution and closed the meeting.