

# Le Projet ACHIA Évaluation de l'impact sanitaire de la pollution de l'air et du changement climatique

## Air Pollution and Climate Change Health Impact Assessment The ACHIA Project

Patrick L. KINNEY<sup>(1)</sup>

Climate change may affect human health *via* interactions with air pollutants such as ozone and PM<sub>2.5</sub>. These air pollutants are linked to climate because they can be both affected by and have effects on climate. In coming decades, substantial, cost-effective improvements in public health may be achieved with well-planned strategies to mitigate climate impacts while also reducing health effects of ozone and PM<sub>2.5</sub>. Climate mitigation actions affect greenhouse pollutant emissions, including methane and black carbon, but also may affect other key air pollution precursors such as NO<sub>x</sub>, CO, and SO<sub>x</sub>. To better understand the potential of such strategies, studies are needed that assess possible future health impacts under alternative assumptions about future emissions and climate across multiple spatial scales.

The overall objective of this project is to apply state of the art climate, air quality, and health modelling tools to assess future health impacts of ozone and PM<sub>2.5</sub> under different IPCCs scenario of climate change, focusing specifically on pollution-related health co-benefits which could be achieved under alternative climate mitigation pathways in the period 2030-2050. This question will be explored at three spatial scales: global, regional (Europe), and urban (Paris). ACHIA is comprised of an integrated set of four work packages:

### WP1. Global Climate and Air Pollution Impacts of Alternative Emissions Pathways

Projections of climate and air quality (PM<sub>2.5</sub> and ozone) at the global scale are being developed with the LMDz-INCA global model, run using the four IPCC

representative concentration pathways (RCPs) for the 2030 to 2050 time horizon. Model outputs will be available at a spatial resolution of 3.75° in longitude and 1.9° in latitude. Comparison across the RCPs will answer the question, "what are the global health implications of various greenhouse gas and aerosol control policies?"

### WP2. Climate and Air Quality at Regional and Urban Scales: Results for Europe and Paris

Here we develop projections of temperatures and air pollution concentrations at a 50x50 km scale over Europe, and at a 5x5 km scale over the Paris region using new multi-scale air quality projections that will be driven by the same RCPs as above based on the international coordinated programs CMIP5 and CORDEX. Deterministic, statistical and semi-empirical methods will be developed to downscale the large scale air-quality model (WP1) to regional (countries and regions) and urban scale grids. Emission projections will be adjusted to be consistent with the global RCPs and/or European and Parisian emissions targets. These results will be of direct value to national and local decision makers in quantifying health benefits of global and regional emissions pathways.

### WP3. Health Impact Assessment

This work package is responsible for adapting, developing and applying state of the art health impact modelling tools within the overall objectives of the project. WP3 will use the air quality model outputs from

---

(1) Columbia University – Climate and Health Programme, Earth Institute – Mailman School of Public Health, New York.

WP1 and WP2 in combination with other relevant inputs (concentration-response functions, populations, and cause-specific mortality rates) to compute estimates of ozone and PM<sub>2.5</sub>-attributed mortality under alternative emissions scenarios at the global, regional and urban scales. WP3 will adapt HIA guidelines developed in the APHEKOM project for use with modeled data. It will take into account demographic projections to estimate future population and health data.

#### **WP4. Dissemination, Evaluation, Management**

This WP is responsible for overall project coordination and management. In addition, it is responsible for communicating goals, progress, and results of the project with outside parties, including policy makers.

In addition, it will be responsible for evaluating the success of the project.

ACHIA is designed to create an interdisciplinary approach to the impacts of climate change on health through air quality changes, and to start longer-term collaborations between communities. We expect the project to advance state of art across all WPs, with important implications for research groups around the world. A particular innovation of the project is the multi-scale aspect, i.e., the analysis of climate, air quality and health at the global, regional and urban scales using consistent methodologies. Comparison of health findings across scales will provide unique insights into the importance of geographic scale in assessing health impacts of alternative climate and air quality scenarios.

