Dossier 2017/1/137 HECEHO

Organisme du coordinateur scientifique : Espagne, ISGlobal, Barcelona Institute for Global Health

Effets sur la santé et les coûts associés de l'exposition à la chaleur extrême et à l'ozone dans le contexte du changement climatique

Sommaire

1. Accueil

Titre de l'appel: Appel à projets de recherche sur la santé environnement et la santé au travail

Description: -

Date de limite de réponse: **Lettre d'intention : 29/11/2016 12:00:00**
Dossier complet : 07/03/2017 12:00:00

Documents

Titre	Fichier	Taille	
Aide au dépôt	Aide au dépôt.pdf	893 Ko	>
La lettre d'intention	La lettre d'intention.docx	19 Ko	>
Modèle de convention 2 versements	modele_convention 2V.pdf	834 Ko	>
Modèle de convention 3 versements	modele_convention 3V.pdf	867 Ko	>
Plan projet complet	Plan Projet Complet.pdf	186 Ko	>

2. Présentation

Auteur de la saisie du dossier

- (•) Je suis le coordinateur scientifique et je n'ai pas de délégataire pour le renseignement du dossier
- ( ) Je suis le coordinateur scientifique et je désigne un délégataire
- ( ) Je suis le délégataire et je désigne le coordinateur scientifique

Présentation

Titre du projet (FR): Effets sur la santé et les coûts associés de l'exposition à la chaleur extrême et à l'ozone dans le contexte du changement climatique

Titre du projet (EN): Health effects and costs of exposure to extreme heat and ozone in a changing climate

Acronyme du projet: HECEHO

Type de projet

Etude de faisabilité: [ ]

Projet complet: [X]

Durée du projet (en mois): 36

3. Résumé détaillé

Objectif détaillé

The main objective is to assess the public health impact of ozone and heat exposure on mortality in France and Spain, using data from the entire country and thus including urban and rural areas.
The specific objectives are:
1. To assess the effect of both short-term and long-term exposure to ozone and heat, and their interaction, on all-cause and cause-specific mortality, in France and Spain, providing national and regional-level estimates.
2. To investigate the simultaneous impacts of future climate and anthropogenic emission projections on air quality in France and Spain in 2050.
3. To estimate the monetary cost of mortality due to ozone and heat in three scenarios: i) at present; ii) assuming compliance with WHO guidelines; and iii) in 2050, using future projections.

Argumentaire de l'originalité et/ou caractère novateur du projet

Most of the evidence of the relationship between ozone and mortality comes from studies on short-term effects. Even the largest, multi-centre studies are based on a collection of big cities, while usually the highest concentrations of ozone are found in rural areas that are downwind of main urban areas. In addition, those studies may reflect mortality displacement, i.e. deaths that are advanced by just a few days. Recently, some cohort studies have reported long-term effects of ozone on mortality, but they are mostly based in North America.
With regards to heat, the totality of studies has focused on short-term effects. As in the case of ozone, they may be influenced by short-term mortality displacement. Only recently, a study in Hong Kong attempted to estimate long-term effects of heat using a novel methodology.
Our study will overcome limitations of previous studies by:
i) Performing time-series analyses to estimate short-term effects of heat and ozone in two entire countries (France and Spain).
ii) Performing studies on the long-term effects of heat and ozone using data from mortality registries, which are often only used to produce short-term effect estimates.
iii) Providing better insights on the independent and joint effects of ozone and heat on mortality.
iv) Estimating realistic costs at a regional scale.

Argumentation du choix des questions (3 questions maximum)

Pertinence des résultats/de la méthode pour faire avancer la connaissance sur ces questions

Our project fits perfectly in the research questions of the call. On one hand, mortality from heat waves is the most important direct effect of climate change on human health in Europe. Similarly, mortality due to air pollution is the principal indirect effect of climate change on health, and ozone concentrations are the ones that are expected to increase the most with global warming. We will also estimate more realistic estimates of costs under a variety of scenarios. This information will be of great interest for policymakers.

Description des méthodes mises en oeuvre - éléments de calendrier

The overall period of study will be the years 2000-2015. Temperature data will be retrieved from the European Climate Assessment Dataset (ECA&D), which contains daily data from 88 meteorological stations in France and 101 stations in Spain. Gridded data (25x25 km) is also available at the ECA&D website. Hourly observed concentrations on tropospheric ozone and its precursors (e.g. NO2) will be retrieved from the European air quality database 'Airbase'. In addition, we will model air quality and meteorological climatic projections using state-of-the art chemical transport models incorporated in the CALIOPE air quality modelling system, which will predict ozone concentrations at 25-km horizontal resolution.
We will define small and homogeneous areas based on the spatial distribution ozone and temperature and the availability of data. All the following analyses will use those geographical divisions. Analyses of short-term effects will be performed by an extension of current time series analyses developed for the project that will allow estimating effects in small areas and combining area estimates to obtain overall figures. The analyses of long-term effects will be based on yearly age-standardized mortality rates according to the methodology described by Goggins et al. Am J Epidemiol 2014. We will adjust by area-level socio-economical indicators available at census tract. The number of deaths attributable to heat and ozone will be obtained using the usual techniques for attributable fraction calculation. Monetary costs will be estimated using the value of a statistical life methodology adopting a society point of view. Simulation models, notably Markovian, will be used to describe and analyse ozone and heat impact under various hypotheses.
The project will be organized as follows.1st year: data collection and cleaning, modelling ozone and temperature projections in Spain and France; 2nd year: analyses of ozone and heat impact on mortality; 3rd year: costs analyses and dissemination.

Partenaires (en précisant les conditions : au moins une équipe de recherche et une équipe française) Compétence et moyen humain

ISGlobal : X Basagaña, PhD (coordination; biostatistics, epidemiology, climate change), MC Turner, PhD (air pollution, epidemiology)
Inserm : B Jacquemin, MD PhD (air pollution, epidemiology), Ph Aegerter, MD PhD (environment, health economics)
BSC: MT Pay, PhD (air quality modeller) M Guevara, PhD (air pollutant emission modeler)

Montant approximatif de la demande de subvention prévue

199 680€ to pay for data gathering, personnel (modelers, PhD student), travel (conferences and project meetings) and general functioning budget (informatics, dissemination). Equipe ISGLOBAL 65 520 €; Equipe INSERM : 65 520 €; Equipe BSC : 68 640 €

Publications du consortium sur les 5 dernières années en lien avec le projet (5 publications maximum)

1. Basagaña X, Jacquemin B, ... Short-term effects of particulate matter constituents on daily hospitalizations and mortality in five South-European cities: Results from the MED-PARTICLES project. Environ Int. 2015; 75:151-8
2. Valverde V, Pay MT, Baldasano JM. Ozone attributed to Madrid and Barcelona on-road transport emissions: characterization of plume dynamics over the Iberian Peninsula. Sci Total Environ 2016; 543: 670-682.
3. Turner MC,... Long-term O3 exposure and mortality in a large prospective study. Am J Respir Crit Care Med 2016. 193(10):1134-42.
4. Tran TC, ..., Aegerter P. Are Meteorological Conditions within the First Trimester of Pregnancy Associated with the Risk of Severe Pre-Eclampsia? Paediatr Perinat Epidemiol. 2015;29:261-70.
5. Basagaña X, ... Heat waves and cause-specific mortality at all ages. Epidemiology. 2011;22(6):765-72.

Indicateur du nombre de caractères : 6136 / 6500 caractères.

4. Questions

Questions à la recherche

CCLIM - Changements climatiques et santé

☑ CCLIM 1 - **Impacts du changement climatique sur la santé : directs (conséquences sanitaires immédiates et à long terme de la chaleur et des événements climatiques exceptionnels, en particulier sur les populations vulnérables : épisodes caniculaires, inondations...) et indirects via la qualité de l'environnement (air : ozone, pollens... - eau - sols...) et de l'alimentation (conséquences de la sécheresse sur l'activité agricole...) et le développement de maladies émergentes (à transmission hydrique ou vectorielle).**

☑ CCLIM 2 - **Estimation des coûts directs et indirects.**

Commentaire

Mots clés

Choix de la liste	Choix libres
• Epidémiologie • Exposition environnementale • Qualité de l'air	• changement climatique • canicule • • •

Disciplines

Choix de la liste	Choix libres
• Santé environnement	•

- Santé publique

Fin du dossier 2017/1/137