

## Post-doctoral position

### Extreme Values in Epidemiology Research: Extensions to Space and Time

<p><b>Period</b> 12 months</p> <p><b>Gross Monthly Salary</b> 2 589.68 €, if less than 2 years' experience, with bonus if more than 2 years' experience</p>	<p><b>Location</b> Sorbonne Université Campus Jussieu</p> <p><b>Contact</b> Maud Thomas maud.thomas@sorbonne-universite.fr</p>
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This post-doctoral position is part of a collaboration between the Laboratoire de Probabilités Statistique et Modélisation (LPSM, UMR CNRS 8001) and the Institut Pierre Louis d'Épidémiologie et de Santé Publique (iPLESP, UMR S 1136), Sorbonne Université. The recruited person will be assigned to the "Statistique, Données, Algorithmes" team of the LPSM, in regular liaison with the "Maladies transmissibles : Surveillance et modélisation" team of IPLESP.

#### Context

A major concern for public health resource planning is anticipating extreme events that may cause mortality peaks and place significant strain on the health care system. The recent COVID-19 pandemic illustrated both of these phenomena, highlighting the vulnerability of the hospital system in coping with a significant increase in patient numbers during an outbreak. Extreme Value Statistics (EVS) aims at describing such extreme events. In epidemiology, excess mortality can be considered as an extreme event measured by the exceedance over the expected mortality threshold adjusted for seasonal variations and population characteristics. However, public health and epidemiological applications, for example to mortality rates or hospital capacity planning, have remained scarce. In order to understand and analyze the spatial and temporal dependence in excess mortality, some theoretical and methodological gaps in EVS need to be filled in. The developed theory will be applied to mortality data for Europe of the last 20 years. The characterization of the spatio-temporal dynamics of mortality will yield new knowledge on the drivers of excess mortality, and the impact on mortality of epidemic events such as influenza and COVID-19.

The recruited person will have the task of understanding and extending some recent models in spatial EVS in order to study the temporal and spatial structure of dependence of the mortality in Europe. The developed models will be applied to the data of European mortality. For that purpose, they will be implemented in the R software. The aim is to provide new insights on the source of variability in mortality outcome (regarding both timing and extent) and on the relation between mortality and the epidemic process.

#### Objectives

- propose new mathematical models in spatial Extreme Value Statistics;
- extend the models to add temporal dimension and covariates;
- implement the developed models in the R software;
- apply the models to the data of European mortality with a high concern for the interpretation of the results.

#### Applications

##### Candidate profile

- PhD in Applied mathematics (statistics)
- Strong knowledge of statistical methods in data analysis
- Good programming skills in R
- Knowledge of epidemiology/biostatistics is not mandatory but will be appreciated.

##### Application procedure

Please send your CV with a list of publications and a short cover letter to the contact person.