# Climate change and health in Brazil: Investigating the impacts of extreme rainfall and drought

## Supervisory team


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## Project in Summary


Climate change is influencing human health through both direct and indirect causal pathways, with the highest risks and most severe consequences often carried by populations experiencing the greatest social disadvantages. Using ecological precipitation data from the CIDACS Climate and Environmental Platform (CIDACS-Clima) and individual-level socioeconomic and health data from the CIDACS 100 Million Brazilian Cohort, this project aims to generate new knowledge on the links between extreme climatic events and health. This project will focus specifically on the health-related impacts of extreme precipitation events (i.e., extreme rainfall, flooding, and drought) within the low-income population of Brazil.

The specific objectives will be to:

1. Conduct a systematic review collating and appraising the methods and results of published literature evaluating the health-related impacts of precipitation extremes in low- and middle-income countries.
2. Evaluate the association between extreme precipitation events and all-cause and cause-specific mortality patterns over the life course, after accounting for socioeconomic factors.
3. Conduct mediation analyses to investigate socioeconomic factors that may link extreme precipitation events to mortality.
4. Evaluate the impact of the Cisternas (Wells) social protection policy on all-cause mortality during and after extreme precipitation events.


### Project Key Words
Climate change, rainfall, flood, drought, mortality, social protection policy

### MRC LID Themes
Global Health = Yes
Health Data Science = Yes
Infectious Disease = Yes
Translational and Implementation Research = Yes

## Skills

### MRC Core Skills

Quantitative skills = Yes
Interdisciplinary skills = Yes
Whole organism physiology = No

### Skills we expect a student to develop/acquire whilst pursuing this project

In pursuing this project, the student will develop quantitative skills related to the epidemiologic analysis of large electronic health record datasets and interdisciplinary skills related to investigating health inequalities and climate change. The student will have opportunities to participate in specialized training via standard accredited modules at LSHTM and distance learning courses on data linkage from CIDACS/Fiocruz.

Over the course of their studies, the student will gain experience in critical thinking, coordination of international collaborations, acquisition of ethical approval, conduct of systematic reviews/meta analyses, public engagement, and dissemination of research findings via participation in international conferences and publication in peer-reviewed journals.

## Routes

Which route/s is this project available for?
1+4 = Yes
+4 = Yes

Possible Master's programme options identified by supervisory team for 1+4 applicants:

- LSHTM – MSc Climate Change & Planetary Health
- LSHTM – MSc Epidemiology
- LSHTM – MSc Health Data Science
- LSHTM – MSc Medical Statistics

## Full-time/Part-time Study

Is this project available for full-time study? Yes
Is this project available for part-time study? Yes

## Eligibility/Requirements

*Particular prior educational requirements for a student undertaking this project*
LSHTM's standard institutional eligibility criteria for doctoral study.
MSc (or equivalent) in epidemiology, medical statistics, or a related field

## Other useful information

Potential CASE conversion? = No

# Project in more detail

## Scientific description of this research project

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Techniques to be used:
Under the close supervision of Prof. Elizabeth Brickley and Dr. Enny Cruz in the Faculty of Epidemiology and Population Health at LSHTM and with the statistical support of Drs. Julia Pescarini and Cherie Part and external supervision of Prof. Mauricio Barreto, the Director of the Oswaldo Cruz Foundation's Center of Data and Knowledge Integration for Health (CIDACS/Fiocruz, Salvador, Brazil), the doctoral candidate will apply advanced epidemiological methods to ecological and individual-level data using STATA and R statistical software.

Confirmed availability of any required databases or specialist materials:
Objective 1 will be based on the published literature and there are no data availability concerns. Objectives 2 to 4 of this project will be completed using available rainfall data from CIDACS-Clima linked with the CIDACS 100 Million Brazilian Cohort. Precipitation data from the ERA5-Land database and the Brazilian Daily Weather Gridded Data are currently available at CIDACS, and additional precipitation/flooding data sources may be pursued. The CIDACS 100 Million Brazilian Cohort (N=131,697,800 low-income individuals, 2001-2018) database is currently available and includes information on socioeconomic information from the Unified Registry of Social Programs (CadUnico) linked with birth, death, and notifiable disease registries (SINASC, SIM, and SINAN respectively). The data for the proposed analyses are held securely at CIDACS-Fiocruz in Salvador, Brazil, and the student will work with the data via VPN access.

Potential risks to the project and plans for their mitigation:
There are many systematic reviews related to climate and health that are currently being conducted. If the proposed topic is already published or registered in Prospero at the time of the PhD's start, a complementary topic (e.g., social protection policies and climate-sensitive diseases) will be selected.

If there is any difficulty in using the VPN to conduct the analyses, we will consider having the student spend time on-site in Brazil using funding from our larger Wellcome Trust grant.

## Further reading

(Relevant preprints and/or open access articles)
10.1093/ije/dyab213

### Additional information from the supervisory team

The supervisory team has provided a recording for prospective applicants who are interested in their project. This recording should be watched before any discussions begin with the supervisory team.
Brickley-Cruz Recording

## MRC LID Links

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