# Climate change and population studies

**Strand organisers: Tobias Ruttenauer (UCL), Jasmin Abdel Ghany (Nuffield College) and Dermot Grenham**

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## 16:45 - 18:15 Monday 9 September: Climate change 1

**Standards for Official Statistics on Climate-Health Interactions**
**Matt Pearce & Anthony Brown - ONS**

Climate change poses one of the greatest threats to global health. Climate impacts are felt disproportionately by the most vulnerable and disadvantaged groups, who suffer the highest mortalities and other health effects from climate-related health risk. However, there is currently a lack of harmonised approaches and statistical methodology to allow countries to produce climate-health statistics consistently and easily, especially for low/middle income countries where there may be less resource or data available.

Our project aims to address this gap by developing:

•        a transparent and globally generalisable framework and methods for producing official statistics on climate change and health, and

•        an online knowledge-sharing platform and open-source toolset to facilitate data-sharing, build capacity, and reduce resource burden.

This project is a collaboration with academic institutions in Rwanda and Ghana, linking climate and health data to deliver improved reporting on climate-related health risk and support national monitoring and evidence-based policy.

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**Prenatal heat exposure and infant mortality**
**Jasmin Abdel Ghany - University of Oxford (Leverhulme Centre for Demographic Science, Nuffield College, Nuffield Department of Population Health), Liliana Andriano - University of Southampton (Department of Social Statistics and Demography)**

Previous studies have highlighted the severe consequences of exposure to extreme weather events on infant health and mortality. However, evidence remains inconclusive on the impact of prenatal heat exposure on infant mortality. One reason for this is that exposures to extreme heat, malaria, and malnutrition overlap in the samples under study. We address this issue by focusing on Mali, where the hot dry season and wet lean season usually do not coincide, making it easier to distinguish the effects of heat exposure during the hot season from disease and malnutrition in the wet season. We merge data from Mali's 2018 Demographic and Health Survey which provides information on gestational length with fine-grained hourly temperature data to examine the effect of prenatal heat exposure in each pregnancy trimester on infant mortality with fixed effect regressions. The results show that prenatal heat exposure in the second trimester decreases infant mortality, but not child mortality. This finding suggests in utero selection of "stronger" offspring through heat induced abortions of frailer offspring, resulting in a cohort with advantaged mortality outcomes shortly after birth. Third trimester heat exposure also decreases infant mortality, and this effect seems to be explained entirely by decreases in preterm births. We further analyse heat impacts on abortions and heterogeneity across sociodemographic groups. This study underscores the importance of climatic variability in shaping both pregnancy and infant health outcomes in low- and middle-income countries.

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**Understanding the effects of seasonality on acute child undernutrition and household coping mechanisms in selected areas of Bangladesh**
**Alice Wolfle - University of Southampton; Fatema Tuz Zohora - International Centre for Diarrhoeal Disease**

**Research, Bangladesh (icddr,b); Dr Shouro Dasgupta - Fondazione Centro Euro-Mediterraneo sui Cambiamenti Climatici (CMCC) & Grantham Research Institute, LSE; Tasmima Rahin - Bangladesh University of Professionals, et al**

Background: Bangladesh has made huge progress in reducing the prevalence of acute child undernutrition. However, there is still large intra-year variability in the level of undernutrition throughout the changing seasons. In an era where people's lives are impacted by climate change, and as seasonal weather patterns are becoming increasingly unpredictable, understanding how households cope and adapt to seasonal changes has never been more relevant.

Aims: This research seeks to explore people's lived experiences of seasonal variation in acute undernutrition in children under 5 years and understand how households cope and adapt to perceived seasonal risk factors in both urban and rural areas of Bangladesh.

Methods: A total of seventeen focus group discussions and four key informant interviews were conducted during February-March 2024, overlapping with the transition from winter to spring in two areas of Bangladesh. Participants were parents of children under 5 years. Participatory methods including seasonal calendars and risk ranking exercises facilitated discussions about the characterisation of each season, seasonal risk factors and coping strategies. Thematic analysis of the qualitative data was conducted, comparing experiences between urban and rural areas.

Results: Preliminary findings indicate that the summer is when children experience increased diarrhoeal diseases, loss of appetite and excessive sweating, all perceived to contribute to increased acute undernutrition. The transition period between seasons was considered a high-risk period for infections. Surprisingly, the monsoon season is rarely discussed by participants. These findings lead to interesting discussions about how seasonality is conceptualised and accounted for in quantitative data and analysis.

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**Cohort-Based Analysis of Climate-Related Mortality Differentials in Spain**
**Dariya Ordanovich, Diego Ramiro, Aurelio Tobías, Michel Oris - Institute of Economy, Geography and Demography, Spanish National Research Council**

This study aims to explore the disparities in health effects across birth cohorts as function of climate change-related exposures in Spain since 1975. First, we leverage individual-level data with information on timing and location of birth and death, as well as on sex and socio-economic position. This dataset, provided by the National Institute of Statistics, spans a period of 45 years and allows to analyse differential vulnerability (mortality) not only by cohort (date of birth), but also by province or municipality of birth, place of residence from 1975, and socioeconomic status (e.g. marital status, education, occupation) for men and women. Second, we create indicators of cumulative environmental exposure by using the ECMWF ERA5 reanalysis dataset, which is available for public use from 1940 onward and provides hourly values of a large number of variables globally. As a proxy for human distribution, we take advantage of the cadastral data with rich thematic property attribution, such as building usage and construction year. These gridded surfaces describe the evolution of human settlements in Spain from 1900 to 2020. In the present study, we include the surfaces representing the measures of building density in order to refine the indicators of exposure based on the urbanisation levels in the administrative units of interest. The preliminary results reveal sharp geographic disparities in mortality outcomes across birth cohorts, underscoring the influence of environmental exposures during early life on later-stage health. We also aim to integrate the socioeconomic variables and establish if they mediate or moderate this influence.

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## 09:00 - 10:30 Wednesday 11 September: Climate change 2

**Heatwave adaptation conditioned by everyday life: a simultaneous modelling approach during Pacific**

**Northwest summers**
Shiv Yucel & Tim Schwanen - Transport Studies Unit, School of Geography and the Environment, University of Oxford

As heatwaves increase in intensity, frequency, and duration, there is an urgent need for adaptation to limit their adverse effects on health, well-being, and livelihoods. Heat exposure and adaptive responses during heatwaves are tightly linked to mobility behaviours – the subject of a rapidly growing body of literature. There remains a limited understanding of the processes which shape and constrain opportunities to seek cooling, as this literature has yet to examine how people alter the various activities of everyday life in response to heatwaves. Addressing this gap, the current paper simultaneously models these interdependent activity changes, shedding light on behavioural adaptations during heatwaves and the underlying structures which condition them. Combining Google Community Mobility Reports, ERA5 climate re-analysis, and socio-economic data across the Pacific Northwest region of North America, the analysis uses a multivariate multi-level model to examine how anchor (home, work, transit), essential (grocery/pharmacy), and discretionary (retail/recreation, parks) activity change together during summer heatwaves. Focusing on a climatically diverse region and modelling heatwaves as distinct multi-day events, the paper explores how these responses vary across climatic, temporal, and contextual features of heatwaves. Four main conclusions about behavioural adaptation to heatwaves are drawn: (1) Workplace rigidity and non-work adaptations vary by region; (2) Absolute and relative intensities shape adaptive responses; (3) Adaptation evolves over time, both within and between heatwaves; (4) Urban form and socio-economic disparities influence heatwave activity trade-offs. By contextualizing heatwaves within people's everyday life, this study highlights the diverse, dynamic, and yet constrained processes by which adaptation occurs.

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**The Nexus of Climate Change, Migration and Conflict in Sudan**
Sarah Wahby - University of Minnesota

Using Sudan as a case study of a country in the Sahel bearing the brunt of climate change, I study the three-way relationship between climate change, migration, and conflict. Sudan is one of the most vulnerable countries to climate change and climate variability. The 2003 war in Darfur was considered as a case of climate conflict resulting from competition of farmers and pastoralists over scarce resources (Cabot, 2017, p. 12). The repercussions of this war are still at play in the current civil conflict. Sudan is also one of the fastest urbanizing populations in the world (NUPI & SIPRI, 2022). I specifically ask 1) How did climate change affect migration patterns of the agriculturalist population in Sudan in the form of urbanization of farmers and sendentarization of pastoralists? 2) Is conflict more likely to erupt in areas receiving mass migration? 3) How much of the effect of climate change on migration is mediated by conflict?

I use a difference-in-differences design to compare migration and conflict outcomes across space and time for a host of climate events: climate variability, climate change and natural disasters. Having quantified the relationship of climate change on migration and conflict separately, I use mediation analysis to estimate the effect of climate change on migration that is transmitted by conflict. I use individual and household level data on the history of migration of respondents from the Sudan Labor Market Panel Survey 2022. The data also provides the history of employment (formal and informal) used to identify sedentary farmers and pastoralists even if they have shifted livelihoods over time. I link this data with global gridded weather and precipitation data from CHIRTS and CHIRPS as well as natural disasters data from EM-DAT The International Disaster Database. I also link geocoded conflict data from the Armed Conflict Location & Event Data Project with household level data and climate data at the locality level.  Understanding how climate change contributes to migration and conflict is crucial to devise preemptive policies and more coordinated action to address the needs of vulnerable groups affected by climate change.

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**Greening the Nursery: Exploring the (Un)fertile Grounds of Environmentalism in Fertility Intentions**
Katya Ivanova - Tilburg University, Tobias Ruttenauer - University College London

The question of whether individuals incorporate climate change considerations into their reproductive decisions has emerged as a significant area of inquiry. Research in this field predominantly follows two

trajectories: exploring the influence of extreme weather events on fertility planning, and investigating the relationship between self-reported climate change concerns and (often concurrently stated) fertility intentions. This study advances the existing body of research by leveraging individual-level panel data from the UK Household Longitudinal Study (UKHLS) conducted between 2009 and 2020. The UKHLS provides information on a nationally representative cohort of approximately 50,000 individuals in the UK. We focus on two primary predictors: belief in climate change and self-reported pro-environmental behaviours (reported in waves 1, 4, and 10). The outcomes are fertility intentions and preferences regarding the number of children (reported in waves 1, 5, and 10). We execute the analyses in consecutive steps, with the main aim of uncovering whether any potential cross-sectional associations are present when more robust approaches to modelling the theorized causal links are applied. All analyses are run separately for men and women and for parents and non-parents at first observation. Our preliminary findings suggest that while there are some cross-sectional associations, particularly with pro-environmental behaviors as predictors, these do not hold when adjusting for essential covariates or employing person-fixed effects models. We reflect on these findings by discussing the narratives that people might employ to make sense of their fertility preferences in a society where the transition to parenthood is still seen as a key milestone.

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