Weather and climate change impacts on human mortality in Bangladesh

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Data and methods

• The relationship between daily mortality counts and temperature from 2003 to 2007 was analyzed using Generalized Additive models with segmented relationships adjusting for long-term and seasonal trend, day of the month and age

• Daily future temperature values were obtained from the NASA Earth Exchange Global Daily Downscaled Projections (NEX-GDDP) dataset. This dataset is comprised of downscaled climate scenarios for the globe that are derived from the General Circulation Model (GCM) runs conducted under the Coupled Model Intercomparison Project Phase 5 (CMIP5)

• The derived dose-response functions were used to estimate the number of heat-related deaths occurring during the 1990s (1980-2005), the 2020s (2011-2040) and the 2050s (2041-2070):

\[ ED_i = RR_i \times T_{threshold} \times \text{Pop}_i \times \text{CDR}_i \]

with \( ED_i \) being the estimated heat-related excess deaths in group \( i \), \( RR_i \) the relative risk above threshold temperature \( T_{threshold} \) in group \( i \), \( \text{Pop}_i \) the population size and \( \text{CDR}_i \) the crude death rate in group \( i \)

Findings

• Temperature affects human mortality with increasing levels at the upper and lower end of the distribution

• Temperature effects vary over different subpopulations with strongest effects observed in the elderly above the age of 65 years, in urban populations as well as in areas with a high socio-economic status

• Climate projections show a persistent increase in mean and extreme temperatures in Bangladesh over all models

• With the projected increases in temperature as well as the increase in population and particularly vulnerable populations such as urban populations and those above the age of 65 years heat-related excess mortality is projected to triple by the mid-century

• While only a small share of heat-related excess mortality occurs in the elderly above 65 years and in urban populations in the 1990s and 2020s these groups will strongly be affected in the 2050s

References
