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The impact of past and future climate change on global human mortality due to ozone and PM2.5 outdoor air pollution.

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Title:
The impact of past and future climate change on global human mortality due to ozone and $PM_{2.5}$ outdoor air pollution.

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Brief description:
Climate change can adversely affect air quality, through changes in meteorology, atmospheric chemistry, and emissions. Future changes in air pollutant emissions will also profoundly influence air quality. These changes in air quality can affect human health, as exposure to ground-level ozone and fine particulate matter ($PM_{2.5}$) has been associated with premature human mortality. Here we will quantify the global mortality impacts of past and future climate change, considering the effects of climate change on air quality isolated from emission changes. The Atmospheric Chemistry and Climate Model Intercomparison Project (ACCMIP) has simulated the past and future surface concentrations of ozone and $PM_{2.5}$ from each of several GCMs, for emissions from 1850 ("preindustrial") to 2000 ("present-day"), and for the IPCC AR5 Representative Concentration Pathways (RCPs) scenarios to 2100. We will use ozone and $PM_{2.5}$ concentrations from simulations from five or more global models of atmospheric dynamics and chemistry, for a base year (present-day), pre-industrial conditions, and future scenarios, considering changes in climate and emissions. We will assess the mortality impacts of past climate change by using one simulation ensemble with present emissions and climate and one with present emissions but 1850 climate. We will similarly quantify the potential impacts of future climate change under the four RCP scenarios in 2030, 2050 and 2100. All model outputs will be regridded to the same resolution to estimate multi-model medians and range in each grid cell. Resulting premature deaths will be calculated using these medians along with epidemiologically-derived concentration-response functions, and present-day or future projections of population and baseline mortality rates, considering aging and transitioning disease rates over time. The spatial distributions of current and future global premature mortalities due to ozone and $PM_{2.5}$ outdoor air pollution will be presented separately. These results will strengthen our understanding of the impacts of climate change today, and in future years considering different plausible scenarios.

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