

NIEHS Human Health Implications of Climate Change Research Projects

Pediatric Asthma, Photochemical Oxidant Air Pollutants, and Climate Change Vulnerability (R21ES020237)

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This project is taking an innovative focus on photochemical oxidants and social determinants of vulnerability by examining the association between secondary organic aerosols (SOAs), ozone (O₃), nitrogen dioxide (NO₂), and other air pollutants on emergency department visits and hospitalizations for pediatric asthma, and then using this information to predict impacts of climate change on photochemical oxidant air pollutant exposure levels and future pediatric asthma morbidity.

Using Medication Purchases to Measure the Health Consequences of Air Pollution (R21ES019375)

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This study is assessing the association between air pollution and respiratory illness using data on medication purchases to predict future medication-related costs of health effects of climate change due to increased pollution.

Respiratory Health Impacts of Wildfire Particulate Emissions under Climate Change (RC1ES018612)

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This project is working to create a comprehensive descriptive and predictive wildland fire particulate emissions model that will allow quantification of the exposure of populations to particulate emissions during fire events and the effect of wildland fire emissions on public health by linking exposure estimates with public health records. It is also attempting to model realistic changes in the fire regime under different climate change scenarios and estimate the impact that changes in particulate emissions will have on public health.

Space-Time Modeling for Linking Climate Change, Pollutant Exposure, and Built Environment (R01ES014843)

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This joint collaboration between North Carolina State University, Duke University, and the University of North Carolina at Chapel Hill is developing broad spatial-temporal statistical models to study the impact on pregnancy outcomes and mortality of air pollution under climate change. The project is developing models to simultaneously account for different pollutant types and periods of susceptibility to exposure as well as social determinants including the perceived physical and built environment.

Extreme Heat Events: Evolving Risk Patterns in Urban and Rural Communities (R21ES020205)

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This study is looking at the impacts of extreme heat events and ozone exposure on urban versus rural populations in Alabama, including forecasting the health impacts of urban versus rural populations over the next 20 years. The study is building a strong partnership with the local health department and community organizations to integrate study findings into a "public health" plan for particularly vulnerable populations in the Deep South.

Climate Change and Cardiac Vulnerability in Humans (R21ES020194)

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This project is examining health impacts of air pollution on diabetic individuals with implantable defibrillators, with the aim of defining "high risk days" for patients with cardiovascular and cerebrovascular diseases by analyzing the interactions of multiple climate parameters and air pollution. Another aim is to project similar health impacts of climate change over the next 30 years under future climate scenarios.



Projected Heat Wave Magnitudes And Public Health Impacts (RC1ES019073)

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This project is examining the association between heat wave changes and morbidity and mortality in California, using secondary data sources and extensive analytic modeling strategies. This project will advance knowledge of heat-related morbidity and mortality (HRMM) and ambient heat, particularly extreme heat events, and the underlying determinants of risk, and translate this information into public health policy guidelines that reflect current climatological conditions, and conditions that are projected to exist under different climate models and scenarios.

The Impact of Environmental Conditions on the Productivity of Agricultural Workers (R21ES019670)

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The goal of this project is to analyze the impact of environmental conditions on agricultural worker labor productivity, as well as potential factors that may modify this relationship. Potential modifying factors being looked at include time of day and worker experience, gender, and age. This study is also investigating how adaptation to repeated exposures to higher temperature and ozone affects the same workers over time.

Climate Change Impacts on Power Plant Emissions, Air Quality, and Health in the United States (R21ES020232)

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This project is modeling the potential impact of climate change on particulate matter (PM_{2.5}) exposure levels related to increases in emissions from electric power plants due to increased demand for electricity with hotter summers. The model seeks to quantify associated health impacts of climate driven air pollution changes, taking into consideration the complex relationship between climate change, air quality, societal adaptation, and public health.

Extreme Heat and Human Health: Characterizing Vulnerability in a Changing Climate (R21ES020152)

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This project is using Medicare data to examine the effects of extreme heat episodes on cardiovascular mortality and morbidity among elderly people in the United States, as well as the modifying effects of biological, environmental, and socioeconomic factors on this relationship. The project will also project future impacts (for the years 2020–2100) of different climate and emissions scenarios, as well as changes in population structure, disease incidence, climate adaptation, and other parameters.

EpiMapVis: A Dynamic Web-Based Climate Change and Remote Sensing Visualization and Distribution System (R43ES019484)

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This project is developing an online, interactive system called EpiMapVis to integrate climate information including NASA satellite data, historical climate information, and current weather station data and Geographic Information Systems (GIS) with National Environmental Health Tracking Programs and broader epidemiological and environmental health applications that track the health effects of climate change. The system will enable improved monitoring and modeling of climate-related health outcomes.

Individual and Community Factors Conveying Vulnerability to Weather Extremes (R21ES020695)

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This project is examining Medicare data from 135 cities to determine the individual and community characteristics that influence vulnerability to weather-related mortality. This project is focusing on multiple climate parameters including heat and precipitation. A risk assessment pilot that is part of the study aims to project potential vulnerabilities through 2030.

Uncertainties in Modeling Spatially-Resolved Climate Change Health Impacts (R21ES020225)

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This study focuses on identifying and quantifying uncertainties in estimating vulnerability to future climate change in four areas: greenhouse gas emission scenarios, meteorological and air quality modeling, exposure-response characterization, and future population distribution and age structure.