

Guest Editors' Introduction to the Special Issue on Climate Change and Human Health

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The September 2012 issue of the *Journal of Agricultural, Biological, and Environmental Statistics* is dedicated to the topic of climate change and human health. The topic of climate change and its effect on human health is one of growing interests in the scientific community. Evidence of human-caused climate change over the past half-century has been well-documented by the Intergovernmental Panel on Climate Change and its potential impacts on environmental and ecological phenomena have been studied extensively. The effects of climate change on human health, however, are less well-understood, but are generally thought to result from a change in the distribution of known risk factors such as extreme weather, air pollution, and vector-borne diseases.

Developing a fuller understanding of the human health impacts of climate change will require a substantial multidisciplinary and collaborative effort from the scientific community. A report from the National Research Council on restructuring the U.S. Climate Change Science Program concluded that a top priority is to “reorganize the program around integrated scientific-societal issues to facilitate crosscutting research focused on understanding the interactions among the climate, human, and environmental systems and on supporting societal responses to climate change.” The U.S. National Institutes of Health recently convened an interagency working group that published a report titled *A Human Health Perspective on Climate Change*. In that report the NIH outlined many different research priorities and additionally emphasized the need for “a more complete catalogue of climate change health impacts, increasing the power of prediction tools, enhancing integration of climate observation networks with health impact surveillance tools, and improving interactions among stakeholders and decision makers.”

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Statisticians are uniquely suited to make substantial contributions to all aspects of the climate change and health area. The highly multidisciplinary nature of the field is natural for statisticians, who routinely work with and bring together people in different disciplines. The clear lack of methodology for integrating complex climate and health databases and for quantifying inferential uncertainties presents numerous opportunities for statistical innovation. Finally, climate change and health is a “big data” field as data, including output from climate models, are being collected on a global scale. As a field, statistics has a tremendous opportunity to take a leadership position in this area by making both substantive and methodological contributions.

Although the area of climate change and human health is still in its infancy compared to other areas, we decided to edit this special issue of *JABES* to highlight the numerous contributions that statisticians are currently making to this area. These contributions cover a wide range and demonstrate the enormous potential for statisticians in this area. We highlight a few papers here.

Andrew Lawson and colleagues develop a Bayesian 2-stage space-time mixture model to handle spatial misalignment in estimating effects of air pollution on asthma. Jingwen Zhou and colleagues develop a Bayesian spatial quantile regression approach to calibrate climate model output for examining to the risks of future temperature on adverse health outcomes. These two papers highlight the need for statistical insight when connecting disparate datasets to address a health-related question. Roman Jandarov and colleagues develop a novel statistical approach to test the competing hypotheses that increased incidence of meningitis in Africa is due to increase in the risk of transition from being an asymptomatic carrier to invasive disease during the dry season as opposed to higher transmission of the infection through migration. Ge Lin and Tonglin Zhang look at the effect of aggregation when estimating the association between extreme weather and birth weight.

Xuming He and colleagues propose a downscaling method for temperature and precipitation together based on a notion of bivariate ranks and positions. Ying Sun and Marc Genton focus on the functional analysis of variance for climate data using functional median polish, which provides robust estimation of climatic region effects and extracts important information in understanding the model scenarios and interpreting model output. Both works can facilitate the research on the close link between local climate and the occurrence or severity of some diseases and threats to human health. Matt Heaton and Roger Peng use a flexible class of distributed lag models to analyze the effects of heat on mortality in four major metropolitan areas in the U.S. The analysis found evidence of excessive heat related death of at-risk individuals, and threat from highly variable temperatures as well as longer heat-waves. Perla Reyes and her colleagues evaluate the impact of temperature, precipitation and elevation on the bark beetle in British Columbia, Canada, which identified the appropriate components that features the factors that propagate an out-break of MPB.

Our hope is that this special issue raises the awareness of the problem of climate change and human health in the statistical community and exhibits the wide range of problems that need to be addressed. We are excited by all the contributions to this special issue and look forward to seeing more statisticians getting involved in this area.