Columbia University
MAILMAN SCHOOL
OF PUBLIC HEALTH

Climate and Health Program
Department of Environmental Health Sciences

NEWSLETTER Volume 4, Issue 2 *Spring 2015*

The ***Climate and Health Program***, launched in 2008, has a mission to foster innovative scholarship on the human health dimensions of climate change impacts and vulnerabilities, and to provide information of direct value in climate adaptation and mitigation planning. We train PhD and DrPH students, and postdoctoral scientists in the design and conduct of cutting edge research on mechanisms linking climate to ill-health as well as on methods for assessing health impacts and benefits of future climate policy scenarios. We also offer the first ever MPH certificate in climate and health.

PROGRAM UPDATES

New Partnership with Tsinghua University Underway

The EHS Department and the Climate and Health Program are working to establish a joint research and teaching program related to climate change, air pollution and human health with Tsinghua University in Beijing, the top technology university in China, and with the Chinese Academy of Environmental Planning, which is responsible for air quality planning for China. We are working to finalize arrangements in 2015.

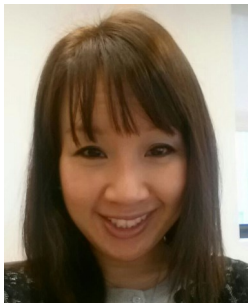
Dr. Patrick Kinney gave lectures on Climate, Air Quality, and Human health to the Tsinghua University School of Environment and to the Nanjing University School of Environment in November. He also attended and presented a talk on air quality in China at the Ecological Civilization conference in Xiamen city in China. Ecological civilization is a concept being developed in China that seeks economic development pathways in cities that are consistent with a healthy and sustainable environment.

New Staff as of Fall 2014

Kai Chen is a visiting doctoral student under the supervision of Dr. Patrick Kinney. He started his PhD in fall of 2013 in School of the Environment, Nanjing University, China. He received a BA in Environmental Science from Nanjing University in 2011. His research focuses on the health effects of temperature and air pollution under a changing climate. Currently, he is working on the relationships between climate and mortality at the Climate and Health Program.

Dr. Julia Reis is a new Associate Research Scientist working with Dr. Jeffrey Shaman. She completed her doctorate in water resources engineering at the University of Virginia. She developed simulation and optimization models of hydropower reservoirs in Lao PDR and Ethiopia, and used these tools to analyze interventions for improving rural livelihoods and health. As one research area, she targeted malaria transmission originating from a water reservoir and analyzed the water resources implications of a proposed intervention under the influence of climate change. Julia is interested in developing mathematical models, using particle filters and other data assimilation methods, to generate skillful, ensemble -based predictions of influenza and other infectious diseases.

Dr. Victoria Lee is an Earth Institute Postdoc Research Fellow, partially funded by the recently awarded NIH T32 Training Grant for Interdisciplinary Training in Climate and Health. She received her PhD in Architecture from the University of Cambridge. Her dissertation focused on exploring new ways to assess and predict the indoor thermal environment, with a particular interest in health implications. Her current research will examine the association between building types and heat-related health consequences.



Dr. Jennifer Nguyen received her ScD from the Harvard School of Public Health in Environmental Health and Epidemiology. Her primary research interest focuses on how seasonal weather patterns may influence patterns of infectious disease and cardiorespiratory morbidity and mortality. She is collaborating with the NYC Department of Health and Mental Hygiene to better understand the inter-relationship between cold and dry winter conditions, seasonal influenza, and cardiovascular mortality. She is also funded by the NIH T32 Training Grant for Interdisciplinary Training in Climate and Health.

CERTIFICATE UPDATES

New Master's Students

Alyssa Espiritu, from Orange County, CA, studied Public Health Sciences at the University of California, Irvine. Her past experiences include interning at a local non-profit organization focusing on water quality, working as a laboratory assistant, and working as a teaching assistant during and after her undergraduate career. She is excited to embark on this new journey at Columbia, hoping to further study how the effects of climate change, including its impact on water sources and air pollution, may adversely affect the health of populations across the globe.

Maddy Cohen, from North Palm Beach, Florida, most recently worked as a research analyst for Closed Loop Advisors where she focused on corporate sustainability, specifically estimating emissions for supply chains. As a Climate and Health student, she looks forward to studying preparedness and response for complex emergencies that are specific to climate change. She plans to follow this program with medical school to be a practicing clinician in the fields of preparedness and emergency response for natural catastrophes.

Kate Burrows, from Northport, NY, is a first year SMS MPH student. She received her B.A. from Columbia University (CC 2013) in sustainable development and American history. She is interested in how sea level rise will influence human migration and impact the health of low-income populations. She hopes to pursue her PhD upon completing this program.

Jalisa Gilmore is from Farmingville, New York. She graduated from SUNY Albany in 2013, where she received her BS in Environmental Science with a concentration in biology. Prior to coming to Mailman, she was a full-time intern at a managed care organization and worked part-time in retail. She is excited to gain more insight of the role that the environment plays on human health, particularly the role that climate change has on infectious disease.

RESEARCH UPDATES

Proposals

Submitted:

- **Dr. Patrick Kinney** worked with a large team of scientists at Columbia, Rutgers, Cornell, Rice, and the University of Colorado to submit a proposal in September for a USEPA Air Quality, Climate and Energy (ACE) Center.
- **Dr. Darby Jack** submitted a proposal for the Interdisciplinary Research and Training in Global Environmental and Occupational Health (GEOHealth) U2R Research Training Grant to support research that measures cardiovascular benefits of interventions that reduce exposure to household air pollution. The grant will also fund a training program for doctoral students in Ghana and at Columbia.
- **Dr. Jeffrey Shaman** submitted a grant to NSF Ecology and Evolution of Infectious Diseases (EEID) through Pediatrics, for which he is co-investigator, to study the effects of heavy metals on community acquired multi-drug resistant Staphylococcus aureus.

Funded:

- **Dr. Jeffrey Shaman** received funding from bioCSL to support his influenza prediction website: http://cpid.iri.columbia.edu/
- **Dr. Jeffrey Shaman** received funding from the Defense Threat Reduction Agency, Department of Defense (DOD), for a project entitled, "Developing Real-Time Forecasts of Infectious Diseases," to develop and validate new models for forecasting both vector-borne and respiratory pathogens, including West Nile virus, malaria, Dengue, influenza and respiratory syncytial virus.

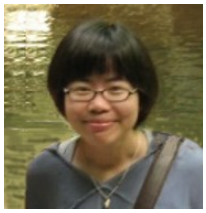
Conference Presentations

Eliza Little
PhD candidate

Poster presentation at the American Society of Tropical Medicine Conference in New Orleans, Louisiana on November 2-6th: "Validation of a predictive model: Environmental influences on the prevalence of West Nile Virus in Culex mosquitoes, Long Island, New York"

Kate Weinberger
PhD candidate

Abstract accepted for 2015 American Academy of Allergy, Asthma & Immunology Annual Meeting in Houston, Texas on February 20-24th: "Tree canopy cover modifies the association between daily tree pollen concentrations and emergency department visits for asthma in NYC"



Wan Yang
Associate Research Scientist

Two presentations for an Epidemiology Course Series on Surveillance of Influenza-like illness in Ho Chi Minh City, Vietnam on November 17-21st: "Real-time situation awareness during epidemics" and "Prediction and forecasting."

Ashlinn Quinn
PhD candidate

Presentation at the NYC Healthy Homes Summit at the Milano School on November 21st, organized by WE ACT for Environmental Justice: "Preliminary Results of the NYC Heat and Humidity Pilot Study "

Recent Findings

Heat-Related Mortality in a Warming Climate: Projections for 12 US Cities

Affiliated Investigators: Elisaveta Petkova, Kim Knowlton, and Patrick Kinney
Journal: International journal of environmental research and public health

Heat has claimed more lives than floods, lightning, and storms combined per year in the US, and climate change is predicted to increase global average temperatures by 2 degrees F by 2050. This study assessed future heat-related mortality in 2020s, 2050s, and 2080s, in 12 US cities with population greater than 250,000, using downscaled temperature projections from 16 global climate models driven by two greenhouse gas emissions scenarios. Heat-related mortality was found to increase in all 12 cities, and the increase was greater under the high emission scenario. By the end of the century, 200,000 excess deaths are projected, but with the low emissions scenario, 22,000 less deaths were predicted. This suggests that reducing greenhouse gas emissions could be beneficial to public health.

Inference and Forecast of the Current West African Ebola Outbreak in Guinea, Sierra Leone, and Liberia

Affiliated Investigators: Jeffrey Shaman, Wan Yang, and Sasi Kandula
Journal: PLOS Current Outbreaks

Whether the Western Ebola outbreak in Guinea, Sierra Leone, and Liberia outbreak can be contained, and ultimately, extinguished, depends highly on optimal resource allocation and implementation. Recent developments in infectious disease modelling have enabled estimations of epidemiological characteristics of past disease outbreaks. This study assessed the applicability of such models to the Ebola outbreak. Models show continued epidemic growth with some diminution in Liberia, which was corroborated by 6-week forecasts. Forecasts with no future intervention changes have provided more accurate predictions for Guinea and Sierra Leone only.

Health Benefits of Improving Air Quality in Taiyuan, China

Affiliated Investigators: Frederica Perera
Journal: Environment International

This study quantified health benefits from air quality improvement between 2001 and 2010 resulting from factory shutdowns starting in the year 2000. Results show that 2810 premature deaths, 951 new cases of bronchitis, 141, 457 cases of outpatient visits, 969 emergency room visits, and 31,810 hospital admissions were avoided with the air quality improvements. The disability-adjusted life years decreased by 56.92% to 22,807 mil Yuan in 2010. The results suggest that air pollution abatement can have significant health benefits.

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Intra-urban Vulnerability to Heat-related Mortality in New York City, 1997-2006

Affiliated Investigators: Patrick Kinney
Journal: Health & Place

Summertime heat poses a significant health impact in NYC with the increasingly warming climate. This study evaluated the association between place-based characteristics (socioeconomic, demographic, and health factors; built environment) and heat-related mortality for seniors during heat events in NYC. Positive significant associations were found between mortality rate ratio among those aged 65+ and poverty, poor housing conditions, lower rates of access to air-conditioning, impervious land cover, and seniors' hypertension.

Other Recent Publications

Acclimatization across space and time in the effects of temperature on mortality: a time-series analysis.
Lee M, Nordio F, Zanobetti A, **Kinney P,** Vautard R, Schwartz J. (2014). Environmental Health, 13(1), 89.

Ebola: mobility data
Halloran ME, Vespignani A, Bharti N, Feldstein LR, Alexander KA, Ferrari M, **Shaman J,** Drake JM, Porco T, Eisenberg JN, Del Valle SY, Lofgren E, Scarpino SV, Eisenberg MC, Gao D, Hyman JM, Eubank S, Longini IM Jr. (2014). Science (New York, NY), 346(6208), 433.

Gestational Age Assessment in Ghana Randomized Air Pollution and Health Study (GRAPHS): Ultrasound Capacity Building, Fetal Biometry Protocol Development, and Ongoing Quality Control
Boamah EA, Asante K, Ae-Ngibise K, **Kinney PL**, **Jack DW**, Manu G, Azindow IT, Owusu-Agyei S, Wylie BJ. (2014). JMIR research protocols, 3(4), e77.

Global Health Impacts of Future Aviation Emissions under Alternative Control Scenarios.
Morita H, Yang S, Unger N, **Kinney PL**. (2014). Environmental science & technology.

Chapter 12: Wildfires, air pollution, climate change and health.
Morita H, Kinney PL. (2014). In: Climate Change and Global Health. Butler, C. (Eds.). CABI. Pp: 114-123.

Does exposure to poultry and wild fowl confer immunity to H5N1?.
Yang W and **Shaman J.** (2014). Chinese medical journal, 127(18), 3336.

Environmental impacts on immune responses in atopy and asthma.
Miller RL and Peden D. (2014). Journal of Allergy and Clinical Immunology, 134: 1001-8, 2014.

Domestic airborne black carbon levels and 8-isoprostane in exhaled breath condensate among children in New York City.
Rosa MJ, Yan B, Chillrud SN, Acosta LM, Divjan A, Jacobson JS, **Miller RL**, Goldstein IF, Perzanowski MS. (2014). Environmental Research, 135C:105-110, 2014.

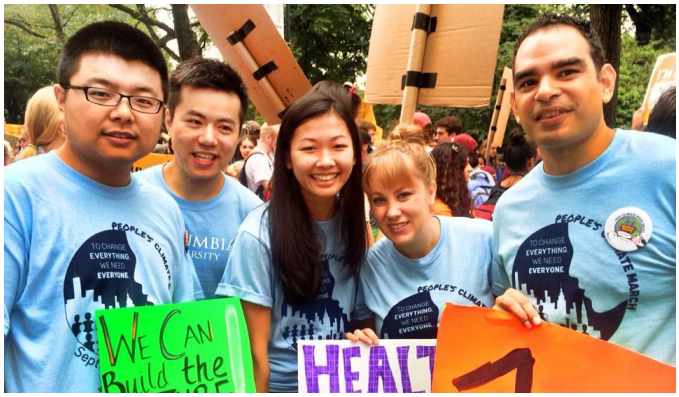
Opinion: Mathematical models: A key tool for outbreak response.
Lofgren ET, Halloran ME, Rivers CM, Drake JM, Porco TC, Lewis B, Yang W, Vespignani A, **Shaman J,** Eisenberg JN, Eisenberg MC, Marathe M, Scarpino SV, Alexander KA, Meza R, Ferrari MJ, Hyman JM, Meyers LA, Eubank S. (2014). Proceedings of the National Academy of Sciences,111(51), 18095-18096.

PAST EVENTS

Integrating Prediction and Forecasting Models for Decision-Making: Dengue Epidemic Prediction

Dr. Jeffrey Shaman was invited to attend a workshop organized by the White House Office of Science and Technology Policy (OSTP) on "Integrating Prediction and Forecasting Models for Decision-Making: Dengue Epidemic Prediction" held on September 15th. This was the second in a series convened by the OSTP as part of the Predict the Next Pandemic Initiative, launched by John Holdren, Assistant to the President for Science and Technology. The goal is to improve models that can predict infectious disease outbreaks, such as dengue fever, and to contribute to the broader objective of strengthening infectious disease prediction and forecasting models to support public health decision-making.

People's Climate March



Leading up to the UN Climate Summit, a march took place on September 21st in NYC. Various NY based community groups, international NGO's, grassroots networks, churches, and faith-based organizations collaborated to start a social movement calling for action on the climate crisis. Students and staff from the Climate and Health Program joined the march. Pictured from left to right Kai Chen (visiting PhD scholar), Haruka Morita (Program Coordinator), Kate Weinberger (PhD candidate), and Rich Remigio (PhD candidate).

The Tropics Rule: a symposium honoring Mark Cane's contribution to climate science

Dr. Jeffrey Shaman co-organized an NSF-sponsored two-day workshop 'The Tropics Rule: a symposium honoring Mark Cane's contribution to climate science.' It was held on October 20-21st at Lamont-Doherty Earth Observatory. Dr. Shaman presented a talk titled "Forecasting Infectious Disease Outbreaks," in which he shows that accurate and reliable predictions of seasonal influenza outbreaks can be made using a mathematical model representing population-level influenza transmission dynamics that has been recursively optimized using ensemble data assimilation techniques and real-time estimates of influenza incidence.

ACCEPTED Project Meeting

Dr. Patrick Kinney attended and presented recent work on climate and heat-related deaths at an advisory meeting of the ACCEPTED (Assessment of changing conditions, environmental policies, time-activities, exposure and disease) project in Augsburg Germany in September. The project seeks to improve current understanding of future exposure situations in cities and their impact on health using various state-of-the-art atmospheric models and measurements and epidemiological studies and reviews. He also presented findings on climate change, air quality, and premature deaths for global, European, and Paris regions at a climate and health workshop in Paris in October. Discussions are underway to expand these collaborations with funding from the European Union.

Public Health Issues for Ebola: Modeling for Policy

Dr. Jeffrey Shaman attended a workshop in Washington D.C. on December 15th entitled, "Public Health Issues for Ebola: Modeling for Policy," sponsored by National Institute of General Medical Sciences (NIGMS) and Biomedical Advanced Research and Development Authority (BARDA). The focus of this meeting was on actionable goals to inform the federal response to the Ebola outbreak in West Africa by identifying critical policy issues related to federal Ebola outbreak response, identifying issues in mathematical and statistical models, and developing a modelling infrastructure to address these issues.

CDC Grand Rounds Presentation

Dr. Kim Knowlton presented a talk entitled "Climate Change and Health - From Science to Practice" on climate change's effects on human health in the US, as part of CDC's Public Health Grand Rounds on December 16th. The session was distributed widely to hundreds of thousands of government workers, physicians and other healthcare providers, and public health workers. The session and an associated feature, "Beyond the Data," are available online at CDC's web portal.

FEEDBACK

Please email the Program Coordinator, Haruka Morita, at hm2487@cumc.columbia.edu with questions and suggestions about future newsletter content. For more information about the Program, please visit our website.