Columbia University
MAILMAN SCHOOL
OF PUBLIC HEALTH

Climate and Health Program
Department of Environmental Health Sciences

NEWSLETTER Volume 5, Issue 1 *Fall 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.

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PROGRAM NEWS

Successful thesis defense by PhD candidate, Kate Weinberger

Kate Weinberger will become the first PhD graduate of the Climate and Health Program when she receives her degree this October. Kate's dissertation characterizes both the temporal and the spatial distribution of tree pollen in New York City and examines how these distributions are linked to allergic disease outcomes, including the development of allergic sensitization and the exacerbation of allergic asthma. Her work highlights the importance of understanding these relationships as massive urban tree planting programs progress, and as the length and severity of the pollen season change in response to increased temperatures and carbon dioxide concentrations.

During her five years in the program, Kate participated in interdisciplinary collaborations with researchers at the NYC Department of Health and Mental Hygiene, Fordham University, the Mount Sinai School of Medicine, and the MSPH Department of Epidemiology. Her publications include Weinberger et al., "A review of spatial variation in allergenic tree pollen within cities" published in Arboriculture & Urban Forestry (2015), Sheffield et al., "The association of tree pollen concentration peaks with over-the-counter allergy medication sales" published in ISRN Allergy (2011), and Ito et al. "The associations between daily spring pollen counts, over-the-counter allergy medication sales, and asthma syndrome emergency department visits in New York City, 2002-2012" published in Environmental Health (2015).

This fall, Kate will be a postdoctoral research associate at the Institute at Brown for Environment and Society at Brown University, where she will be examining vulnerability to extreme temperatures and storms in New England.

Dr. Jeffrey Shaman, recipient of the Tow Scholars Award

Dr. Jeffrey Shaman was selected as one of four Tow Scholars, a new prize awarded to mid-career scholars in recognition of their innovative research and leadership. He was awarded for his work in developing models to forecast infectious diseases, such as the seasonal flu in the US. Last summer, Dr. Shaman and his team won the CDC "Predict the Influenza Season" challenge for their methods in influenza forecasting. Through this award, he will receive $25,000 annually for three years to support his research.

Read more on the Tow Scholars Award here.

New Staff as of Fall 2015

Dr. Katrin Burkart

Postdoctoral Research Fellow

Dr. Burkart received her doctorate from the Humboldt University in Berlin, Germany. Her major research interests focus on the effects of weather and climate on human health. She is particularly interested in how these effects are modified by different atmospheric and non-atmospheric influences. Her current research aims at projecting future heat-related mortality in Bangladesh under different climate change scenarios, considering trends such as population aging, urbanization and epidemiological transition.

Dr. Zheng Zhou

Postdoctoral Research Scientist

Dr. Zhou received his ScD from Harvard School of Public Health in Global Health & Population and Environmental Health. During his doctoral study, Zheng conducted exposure assessments and investigated the sources of air pollution in Sub-Sahara Africa. His current research will focus on quantifying the effects of clean cookstoves and fuel intervention on birth weight and pneumonia incidence in Ghana.

Dr. Teresa Yamana

Postdoctoral Research Scientist

Dr. Yamana completed her PhD in hydrology at MIT in the department of Civil and Environmental Engineering. Her research interests lie at the intersection of environment and infectious disease, with a focus on vector-borne disease. Her doctoral research explored the relationships between climate, entomology, and malaria transmission in West Africa using a framework of detailed mechanistic modeling. This framework was used to assess the impacts of climate change on malaria transmission. At Columbia, she is developing transmission models for dengue and other vector-borne diseases to be used in conjunction with data assimilation methods to generate ensemble-based forecasts of disease outbreaks.

Dr. Nick DeFelice

Postdoctoral Research Scientist

Dr. DeFelice completed his doctorate in environmental science and engineering at the UNC Chapel Hill Gillings School of Global Public Health. His dissertation research examined the intersection of infrastructure, environmental exposures, and public health by constructing mathematical models to quantify the burden of disease attributable to exposure to contaminated drinking water in North Carolina. Through these models, he explored how changes in public policies affect the probability of harm from contamination. At Columbia, his work focus is the development of dynamic disease transmission models in conjunction with data assimilation methods to generate ensemble-based predictions of West Nile virus and other vector-borne infectious diseases.

CERTIFICATE UPDATES

MPH'15 graduates — where are they now?

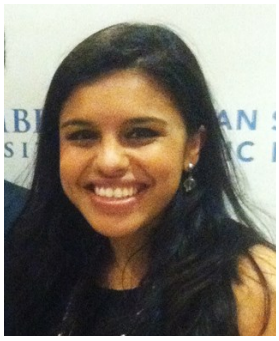
Augusta Williams

Augusta moved to Cambridge, MA shortly after graduating from Mailman. Before officially starting her doctoral program at Harvard's TH Chan School of Public Health, she worked with a post-doc on a project that he is currently doing through Harvard's Dean's Climate Change Solutions Funds. The study examines the impact of heat on sleep and health in the low-income, elderly population throughout Cambridge. Along with her doctoral studies, she is working on a project about urban greenspace and health.

Alia ElKadi

Alia ElKadi is currently an Environmental Sustainability Intern at UNFPA. She is responsible for developing an Environmental Management System for the organization, calculating the total greenhouse gas emissions of headquarters and helping UNFPA become climate neutral by the end of 2015. She is enjoying her time there and hopes to pursue a career in environmental sustainability and climate change mitigation following her internship.

Erika Eitland



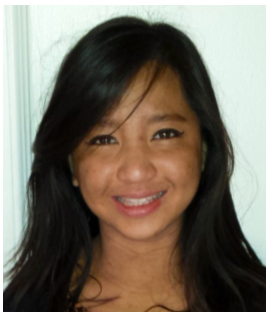
Erika started her Doctorate of Science at Harvard T.H. Chan School of Public Health this past July. Her research will focus on analyzing and promoting healthy built environments. In a recent publication, she analyzed with her team different green building certifications (i.e. LEED and WELL) and their relevance to health. She is excited to work closely with low-income communities in Boston to monitor the fine geo-spatial variations in air quality through new innovative sensor technology. However, despite graduating, Erika continues to enthusiastically work and publish with Columbia faculty on a variety of climate and health topics.

Denise Patel

Denise Patel is Coordinator of the Divest-Invest Network, a network of individuals and organizations calling upon all sectors of society, including higher education, public health organizations, governments, and businesses, to divest assets from the fossil fuel industry. The D/I Network also calls for investment in clean, affordable, renewable energy to accelerate the transition to a low-carbon economy that will protect public health, ensures equal access to energy across the socioeconomic spectrum, and focuses to address the needs of vulnerable populations and those at the forefront of the effects of climate change first.

Second years' summer practicum experiences

Kate Burrows worked at the American Museum of Natural History in NYC. She has been assisting with research on a new project related to building community resilience to climate change in the Solomon Islands. Kate's work has been largely focused on reviewing literature surrounding the use of indicators to measure community resilience – she will continue this work in the fall when the team will begin to develop their own "biocultural" indicators that will attempt to jointly capture the cultural/ social and biological aspects of resilience.



Alyssa Espiritu interned at the California Department of Toxic Substances Control, working with their Brownfields and Environmental Restoration Program and Targeted Site Investigation (TSI) grant program. In addition to conducting program evaluation and public outreach with city officials, she also assisted with the selection process of potentially hazardous waste sites that may pose a risk to human health and necessitate an environmental assessment for redevelopment purposes.

Cara Smith worked with Drs. Darby Jack and Steven Chillrud at Columbia on the NYC biking and air pollution project. The study focuses on potential inhaled dose and cardiovascular indicators and recruits everyday healthy NYC residents who bike to work for their commute. Cara deployed about 20 riders by preparing the equipment, training the participants on how to use the equipment, and uploading the data they collected.

Maddy Cohen worked as a research assistant to Dr. James Shultz at the Center for Disaster & Extreme Event Preparedness at University of Miami. Her work has focused around the mental health and psychosocial support of natural and man-made disasters including hurricanes, floods, earthquakes, armed conflict, and epidemics.

Jalisa Gilmore worked at ARCHIVE Global (Architecture's for Health in Vulnerable Environments) as a Project Officer. She worked on a publication on sustainability, housing, and health in the developing world. In addition, she wrote blog posts and did research on public health issues to support different projects that the organization is doing in a number of different countries.

RESEARCH

Recent findings

Impact of School Cycles and Environmental Forcing on the Timing of Pandemic Influenza Activity in Mexican States, May-December 2009

Affiliated Investigators: Jeffrey Shaman
Journal: PLoS Computational Biology

The 2009 influenza pandemic virus that emerged in North America spread globally within months. However, the timing of the peak flu activity across the world varied by almost a year. Data on this pandemic flu suggests that the peak activity did not occur with the first arrival of the virus in a location, but that the transmission was affected by social and environmental factors. The differences in peaks between the two pandemic outbreaks in the summer and fall of 2009 in the southeast and central/northern regions of Mexico, respectively, were likely a result of a complex interaction between regional variations in specific humidity, population level susceptibility, and school term cycles. A better understanding of the factors that impact regional transmission patterns will improve future flu forecasts.

A case-only study of vulnerability to heat wave-related mortality in New York City (2000-2011)

Affiliated Investigators: Patrick Kinney
Journal: Environmental Health Perspectives

Climate change is likely to increase the frequency of extreme temperature events, and consequently, increase the associated morbidity and mortality linked to these events. Vulnerability patterns vary between communities and therefore, adaptation strategies are most useful when tailored to specific locales. This case-only analysis of NYC resident mortality between 2000 and 2011 found that during heat waves, compared to warm-season days, deaths were more likely to occur in non-Hispanic blacks, at home rather than in institutions and hospitals, and among those living in census tracts receiving greater public assistance. Vulnerability patterns are unique to each local level, and understanding who are the most vulnerable can inform local preparedness efforts to prevent deaths due to extreme heat.

Daily indoor-to-outdoor temperature and humidity relationships: a sample across seasons and diverse climatic regions.

Affiliated Investigators: Jennifer Nguyen
Journal: International Journal of Biometeorology

Studies on the health effects of extreme weather events typically utilize meteorological measurements collected at weather stations; however, people spend the majority of their day indoors. This study examined the association between indoor and outdoor temperature, apparent temperature, dew point, relative humidity, and specific humidity through data collected from convenience sampling in the northern hemisphere in 2012. Indoor specific humidity aligned closest with outdoor airport measurements throughout the year, suggesting that outdoor measures of actual ambient moisture content better captures indoor conditions than the other parameters in this study.

Other recent publications

Alexander KA, Sanderson CE, Marathe M, Lewis BL, Rivers CM, **Shaman J**, Drake JM, Lofgren E, Dato VM, Eisenberg MC, and Eubank S. What factors might have led to the emergence of Ebola in West Africa?. PLOS Neglected Tropical Diseases, 9(6): e0003652.

Kinney PL, Matte T, **Knowlton K**, **Madrigano J**, **Petkova E**, **Weinberger K**, **Quinn A**, Arend M, and Pullen J. (2015). New York City Panel on Climate Change 2015 Report, Chapter 5: Public Health Impacts and Resiliency. Annals of the New York Academy of Sciences 1336 (1): 67–88. doi:10.1111/nyas.12588.

Li T, Ban J, Horton RM, Bader DA, Huang G, Sun Q, and **Kinney PL**. Heat-related mortality projections for cardiovascular and respiratory disease under the changing climate in Beijing, China. Scientific Reports, 2015.

Li Y, Henze DK, **Jack D**, and **Kinney PL**. The influence of air quality model resolution on health impact assessment for fine particulate matter and its components. Air Quality, Atmosphere and Health. Published online: 23 February 2015. DOI 10.1007/s11869-015-0321-z.

Likhvar VN, Pascal M, Markakis K, Colette A, Hauglustaine D, Valari M, Klimont Z, Medina S, and **Kinney PL**. A multi-scale health impact assessment of air pollution over the 21st century. Science of the Total Environment 514: 439-449, 2015.

Madrigano J, **Jack D**, Anderson GB, Bell ML, and **Kinney PL**. (2015). Temperature, ozone, and mortality in urban and non-urban counties in the northeastern United States. Environmental Health, 14(1), 3.

Nguyen JL, Link MS, Luttmann-Gibson H, Laden F, Schwartz J, Wessler BS, Mittleman MA, Gold DR, Dockery DW. Drier air, lower temperatures, and triggering of paroxysmal atrial fibrillation. Epidemiology. 2015, 26 (3):374-80.

Uejio CK, **Tamerius JD**, Vredenburg J, Asaeda G, Isaacs DA, Braun J, **Quinn A**, and Freese JP. (2015). Summer Indoor Heat Exposure and Respiratory and Cardiovascular Distress Calls in New York City, NY U.S. Indoor Air, June. doi:10.1111/ina.12227.

Wylie BJ, Singh MP, Coull BA, **Quinn A**, Yeboah-Antwi K, Sabin L, Hamer DH, Singh N, and MacLeod WB. 2015. Association between Wood Cooking Fuel and Maternal Hypertension at Delivery in Central East India. Hypertension in Pregnancy, July, 1–14. doi:10.3109/10641955.2015.1046604.

Yang W, Cowling BJ, Lau EHY, and **Shaman J**. (2015). Forecasting Influenza Epidemics in Hong Kong. PLoS Comput Biol, 11(7), e1004383.

Yang W, Lipsitch M, and **Shaman J**. (2015). Inference of seasonal and pandemic influenza transmission dynamics using 'big' surveillance data. Proceedings of the National Academy of Sciences, 112(9):2723-2728.

Zebiak S, Orlove B, Vaughan C, Munoz A, Hansen J, Troy T, **Thomson MC**, Lustig A, and Garvin S. (2015). Investigating El Niño Southern Oscillation and Society Relationships. WIRES Climate Change 6 (1) 17-34.

Proposals

Submitted:

- **Dr. Jeffrey Shaman** submitted a proposal to the Defense Advanced Research Projects Agency entitled, The Virome of Manhattan: a Testbed for Radically Advancing Understanding and Forecast of Viral Respiratory Infections

- **Eliza Little**, PhD candidate, applied for the EPA STAR grant. Her proposal, Modeling Mosquito Borne Disease Risk in an Urban Environment to Inform Integrated Sustainability Initiatives, aims to understand how urban ecology and human behavior modify climatic drivers to influence *Ae. albopictus* abundance and chikungunya disease transmission risk.

Funded:

- **Dr. Darby Jack** received funding for an NIEHS R21 grants entitled, Potential Inhaled Dose of Particulates, Biking and Cardiovascular Indicators. This study aims to examine personal exposure of bike riders to air pollution and ultimately create a pollution map for not only bikers but for city planners as well.

- **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.

- **Dr. Madeleine Thomson** received two seed funding competitions from the Earth Institute: 1) Cross Cutting Initiative award for a project entitled Health and Climate Colloquium, and 2) Earth Clinic funding for a project called Climate information for malaria elimination in Ethiopia. She also received funding from the International Food Policy Institute to write IFPRI Chapter 6 of the Global Nutrition Report 2015, as well as two awards from the WHO for a project called Global Framework for Climate Services, Tanzania and Malawi Health Technical Support.

PAST EVENTS

Heat-health surveillance workshop

Dr. Kim Knowlton, on behalf of the Natural Resources Defense Council (NRDC) and NRDC's Science Center, organized a Heat-Health Surveillance Workshop hosted by the Climate and Health Program and EHS Department in March 2015. This workshop convened experts and practitioners engaged in tracking and surveillance of the health effects of extreme heat in the US to further discuss the systems in place, challenges encountered, and how to move toward expanded, improved systems. The one and a half day workshop included lectures from the experts and practitioners as well as breakout group discussions. The agenda and presentations can be found here. A manuscript on workshop proceedings for journal submission is in development.

Impacts of climate change on children's health

Dr. Perry Sheffield gave a talk at the Impacts of Climate Change on Children's Health conference in March, organized by the California Office of Environmental Health Hazard Assessment. The aim of the conference was to set the stage for dissemination of public health messaging and action to protect children's health in California. Her talk was titled "Adaptation strategies for protecting children's health from climate change." Videos of all presentations are available here.

Deepening and expanding heat-health in India

Dr. Kim Knowlton organized a workshop co-sponsored by Ahmedabad Municipal Corporation (AMC); Indian Institute of Public Health, Gandinagar; and NRDC, on Deepening and Expanding Heat Health in India – Early Warning Systems and Heat Action Plans. The two-day workshop was held in March in Ahmedabad, Gujarat, India. In 2013, AMC launched the Heat Action Plan (HAP), the first comprehensive early warning system and preparedness plan for extreme heat events in South Asia. The Plan involved stakeholder trainings and capacity building, community outreach activities, interagency communication, and an evaluation of the Plan's early effects in reducing heat-related health impacts. The workshop focused on deepening action in Ahmedabad and scaling activities to the state-level in Gujarat, key cities in India, and central government involvement through disaster risk management.

MIDAS national network meeting

Several of our staff attended the annual Models of Infectious Disease Agent Study (MIDAS) National Network meeting in Atlanta in April. The NIH-funded Network is a collaborative among research scientists who use computational, statistical, and mathematical models to understand infectious disease dynamics. The following Program staff and student gave a presentation:

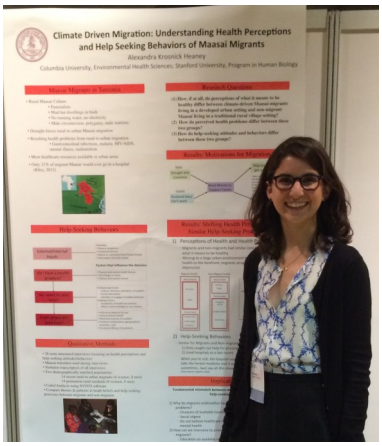
Dr. Wan Yang Associate research scientist	Transmission Network of the 2014-15 Ebola Epidemic in Sierra Leone
Eliza Little PhD student	Mapping and Modeling Socio-ecological Drivers of Mosquito-Borne Disease Risk in the Urban Environment
Dr. Julia Reis Postdoctoral research scientist	An Association between the Onset of Respiratory Syncytial Virus Outbreaks and Anomalous Temperature and Humidity in the United States

Invitation to the White House OSTP

Drs. Patrick Kinney, Jeffrey Shaman, and Madeleine Thomson were invited to participate in the Symposium on Data & Innovation at the Climate-Health Nexus, a roundtable discussion with senior administration officials in April at the White House Office of Science and Technology Policy. This Symposium coincided with National Public Health Week, which President Obama made official through his Proclamation.

In June, Kate Weinberger, PhD'15, along with the aforementioned faculty, were invited to participate on the Dean's panel, "Your Health and Our Environment: How Can We Protect Both?" discussing how to train health sciences students to address the human health dimensions of climate change.

Human health in the face of climate change: Science, medicine and adaptation



A few of our Program staff attended a meeting on Human Health in the Face of Climate Change: Science, Medicine and Adaptation in Barcelona in May. The meeting was sponsored by the Caixa Foundation and the New York Academy of Sciences, and focused on the latest research on climate change and human health. The following Program members gave presentations:

Alex Heaney PhD student	Climate Driven Migration: Understanding Health Perceptions and Help Seeking Behaviors of Maasai Migrants
Dr. Jeffrey Shaman Associate Professor	Forecasting Infectious Disease Outbreaks
Dr. Madeleine Thomson Senior research scientist	Climate information for better health preparedness: what do we need to improve? Integrating Climate Information into Surveillance Systems for Infectious Diseases

AGCI workshop on high resolution climate modeling

Dr. Patrick Kinney attended the Aspen Global Change Institute workshop on Impact Relevance and Usability of High Resolution Climate Modeling and Datasets in Colorado in August. The aim of the workshop was to convene physical climate scientists, impacts modelers, and research managers to foster dialogue on the need for, and sources of, high resolution climate information. The potential benefit of utilizing high resolution climate information is to support climate impacts modeling and use of climate information in adaptation and mitigation decision making. Some questions explored include "Which features of the climate system are better modeled at high resolution? Which are not well represented? How significant are the effects of increased resolution on climate model output and specific impact diagnostics?"

Regional climate tutorial at NCAR

Kate Weinberger, PhD'15, and Kai Chen, visiting research scholar from Nanjing University, attended the three-day Regional Climate Tutorial at the National Center for Atmospheric Research (NCAR) in Boulder, Colorado in July. The aim of the Tutorial was to provide an overview on best practices for developing regional climate data and its application for impact assessments. The three main topics of focus included: 1) dynamical climate downscaling and NCL language; 2) statistical climate downscaling and R language; 3) spatial analysis and extreme weather analysis.

ISEE conference

Many of our staff and students attended the International Society for Environmental Epidemiology (ISEE) in Brazil in the beginning of September. The following abstracts were accepted:

Dr. Jenn Nguyen Postdoctoral research fellow	Meteorological conditions and influenza-related emergency department visits: A retrospective analysis of syndromic surveillance data The relationship between indoor and outdoor temperature, relative humidity, and specific humidity in a subway and hospital environment in a northeast US City The association between Meteorological conditions and respiratory syncytial virus activity in the northeast United States, 2007-2014
Dr. Julia Reis Postdoctoral research scientist	From detecting an association between the onset of respiratory syncytial virus outbreaks and anomalous climate conditions to predicting its incidence in the United States
Ashlinn Quinn PhD candidate	Household air pollution exposure and blood pressure among pregnant women in rural Ghana Residential temperature, humidity, and heat stress symptoms: results from a pilot study of 21 households
Dr. Patrick Kinney Professor	Personal exposure to black carbon and acute respiratory responses among children in a large northeastern us city Development of a land use regression model for tree pollen exposure Modeling past and future mortality effects of temperatures accounting for adaptation Heat-related mortality in urban and non-urban counties of China

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.