COLUMBIA UNIVERSITY | MAILMAN SCHOOL of PUBLIC HEALTH | CLIMATE AND HEALTH PROGRAM

Department of Environmental Health Sciences

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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Dr. Jeffrey Shaman on Science Friday

Dr. Jeffrey Shaman appeared on Science Friday with Ira Flatow and Rumi Chunara, assistant professor of global public health and engineering and computer science at New York University, to talk about flu forecasting. Dr. Shaman discussed the three ingredients necessary in making flu predictions: 1) flu incidence data, 2) weather data, and 3) statistical methods. He likened flu forecasts to weather forecasts and hopes to be able to predict flu with a level of fidelity similar to that of weather forecasts, so it can be said, for example, that there is an 80% chance that flu will peak next week.

Listen to the podcast here.

Dr. Kim Knowlton receives APHA award

Dr. Kim Knowlton received the Distinguished Service Award from the American Public Health Association's (APHA) Environment Section at their annual meeting held in Chicago last November. This award recognizes a Section member who provides noteworthy and important contributions to the Section. It was also announced in Chicago that Climate Change will be the theme of APHA's 2017 annual meeting.

New doctoral students
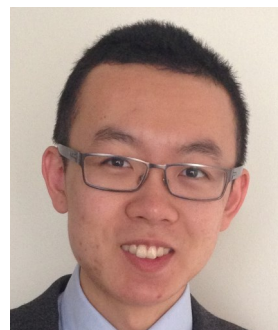
Mike He

Mike received his BA in Earth & Planetary Sciences and an MHS in Environmental Health Sciences from Johns Hopkins University. He has previously been involved in a number of eclectic research projects, from investigating the distribution of particulate matter in different regions of China to a study of vocal hygiene and vocal handicap in conservatory level singers. At Columbia, Mike looks forward to studying the effects of climate change and air pollution on mortality in international settings.

Sarah Kramer

Before coming to Columbia, Sarah studied Biology of Global Health at Georgetown University, where she evaluated influenza control measures using contact network models. After college, she spent a year in Berlin on a Fulbright grant, working with the Robert Koch Institute to analyze data on HIV risk behaviors among men who have sex with men. At Columbia, Sarah looks forward to continuing her work with mathematical models, this time with a focus on environmental and climate-related factors.

Dr. Mary Boyle
Study Coordinator

Mary received her medical degree from the University of Dublin, Trinity College in 2009. She has practiced medicine in Ireland, the UK, and Australia, specializing in Pediatrics. She undertook a Diploma in Tropical Medicine and Hygiene at the London School of Hygiene and Tropical Medicine in 2012, and was an Accelerated MPH Student in the Heilbrunn Dept. of Population and Family Health 2014-15. With Dr. Shaman, she acts as Study Coordinator on his new three-year project, "The Virome of Manhattan: a Testbed for Radically Advancing Understanding and Forecast of Viral Respiratory Infections".

Dr. Melissa Gervais
Postdoctoral Research Scientist

Melissa completed her PhD at McGill University in the Dept. of Atmospheric and Oceanic Sciences. She is interested in the remote influences of high-latitude climate change on sensible weather. At Columbia, Melissa plans to conduct global climate model experiments to investigate the dynamical mechanisms by which changes in North Atlantic sea surface temperatures may impact European winter weather. Other research interests include the dynamical impact of western Arctic sea ice loss on North American weather and the attribution of extreme weather events to climate change.

Dr. Chuanxi Fu
Visiting Postdoctoral Research Fellow

Chuanxi's doctorate dissertation research examined the persistence of Live Attenuated S79 Mumps Vaccine's protection using case-control studies. By employing data from different sources, he evaluated the effectiveness of the rotavirus, seasonal influenza, varicella and measles vaccines. He also studied epidemiological characteristics of antibodies against certain infectious diseases (H5 and H9 avian influenza, measles). At Columbia, using integrated analysis including mathematical models, he plans to study herd protection from rotavirus vaccination in low coverage areas. He will also study the rates at which maternal antibodies (hand-foot-mouth disease, measles, polio and meningitis) in infants wane.

Ruiyun Li
Visiting PhD scholar

Ruiyun is enrolled in the doctoral program in the Dept. of Global Change and Earth System Science at Beijing Normal University, and is pursuing interdisciplinary work studying biogeography and the environmental determinants of infectious disease transmission. From September 2015 until September 2016, she will study in the Shaman research group and focus on epidemiology and computational methods, learn data assimilation methods, and study the design of model-inference systems for the spatial-temporal analysis of the epidemiological properties of infectious disease.

New Staff as of Fall 2015

Miaomiao Liu
Visiting PhD scholar

Miaomiao is a two-year visiting research scholar working under Dr. Patrick Kinney. She started her PhD in fall of 2014 at the School of the Environment, Nanjing University, China. She received her BA in Environmental Science from Nanjing University in 2012. Her previous research focused on the spatial-temporal characteristics of health and well-being impacts attributable to air pollution in China and its nexus with socio-economic determinants like urbanization and industrialization. At Columbia, she looks forward to continuing these research, while exploring the impacts of China's climate change mitigation policies on air quality and health.

Dr. Sen Pei
Postdoctoral Research Scientist

Sen received his PhD degree in Mathematics from Beihang University (Beijing University of Aeronautics and Astronautics) in Beijing, China. His previous research focused on the modeling and empirical study of spreading dynamics in social networks, including information propagation and outbreaks of infectious diseases. At Columbia, he is examining the predictability of the nonlinear dynamics of influenza transmission and developing skillful ensemble-based prediction systems for infectious diseases.

Staff transition

Hannah Smith
Lab technician

Hannah received her BA in Biology from Reed College and has been employed as a laboratory technician at Columbia University Medical Center since 2013. Her previous research explored the molecular biology of the evolution and virulence of Staphylococcus aureus. Hannah is currently occupied with developing protocols for an upcoming study integrating total RNA sequencing with respiratory virus surveillance.

Kai Chen
Visiting PhD scholar

Kai Chen, visiting PhD scholar from Nanjing University, has completed his 16 months of research in the Climate and Health Program this past December under Dr. Patrick Kinney. He worked on the mortality risks of outdoor temperature and ambient ozone pollution in China under a changing climate. He plans to continue working with Dr. Kinney on the health effects of air pollution and climate change while finishing his PhD degree at Nanjing University. He will be defending his thesis this summer.

CERTIFICATE UPDATES

Meet our new master's students

Laura Buckley is excited to join the Climate and Health Program to explore further the link between environmental determinants and health disparities. She originally hails from the suburbs of Philadelphia and received her BA in Biological Sciences and Anthropology from Fordham University, where her studies in ecology and global health practice inspired her to pursue an MPH degree. While at Mailman, she is hoping to build on her understanding of how climate shapes health and social conditions, while also learning how policy can aptly respond to resulting challenges

Maggie Rice is from Milwaukee, WI. She received her undergraduate degree from the University of Wisconsin-Madison in Conservation Biology, Environmental Studies, and Global Health. While in undergrad, she worked for the Wisconsin Dept. of Health Services in their Climate and Health Program as a part of the CDC Building Resilience Against Climate Effects (BRACE) program. She looks forward to having engaging conversations with other Climate and Health students and faculty, as well as collaborating with them to understand and address pressing climate related public health issues.

Mayra Cruz is from Houston, TX and received her BS in public health from the George Washington University. She has previously worked at the local government level and is now interested in experiencing work at the non-profit level. She hopes to get a better idea of what a career in climate and health entails and how public health practitioners can fight climate change.

Tina Wang is from Qingdao, a beach city in North Eastern China. She received degrees in both Mathematics and Chemistry from the University of North Carolina at Chapel Hill. Through the program, she hopes to gain an integrated understanding of the relationship between climate and health, and how to use technology to predict, improve, prepare for current and future climate and health issues.

Shanna Keown grew up in NYC and went to Kenyon College in Ohio, where she majored in international studies. After college, she worked for a lung cancer research foundation and then later for the Wildlife Conservation Society, a global conservation non-profit. She hopes to develop her quantitative and science skills to better communicate the connections between climate and health.

Recent findings

Modification of Heat-Related Mortality in an Elderly Urban Population by Vegetation (Urban Green) and Proximity to Water (Urban Blue): Evidence from Lisbon, Portugal

Affiliated Investigators: Katrin Burkart
Journal: Environmental Health Perspectives

Intra-urban variations in heat-related mortality are likely due to differences in urban characteristics and socioeconomic status. Burkart et al. investigated the influence of urban green and urban blue on heat-related excess mortality among those over 65 years in Lisbon, Portugal between 1998 and 2008. They found a strong association in heat-related mortality and a 1°C increase in Universal Thermal Climate Index (UTCI) above the 95th percentile (19.9°C) was strongest for parishes in the lowest quartile of Normalized Differenced Vegetation Index (NDVI), indicating the least amount of vegetation. The same association was stronger for parishes > 4 km from water than parishes ≤ 4 km from water. The findings suggest that increasing vegetation may help to mitigate adverse effects of extreme heat and reduce mortality in the elderly population.

Climate-driven migration: an exploratory case study of Maasai health perceptions and help-seeking behaviors

Affiliated Investigators: Alex Heaney
Journal: Environmental International Journal of Public Health

This study examines how climate-driven migration impacts the health perceptions and help-seeking behaviors of Maasai in Tanzania. Increasing frequency and intensity of drought is killing livestock and forcing Maasai to migrate to urban centers. Semi-structured qualitative interviews were administered to explore migrant and non-migrant beliefs surrounding health and healthcare. Migrants emphasized the importance of mental health in their overall health perceptions, whereas non-migrants emphasized physical health. Although non-migrants perceived more barriers to accessing healthcare, migrant and non-migrant help-seeking behaviors were similar in that they only sought help for physical health problems, and utilized hospitals as a last option. These findings have implications for improving Maasai healthcare utilization, and for future research targeting other climate-driven migrant populations in the world.

Proposals

Submitted:

- **Dr. Patrick Kinney** submitted an R01 to NIH in October on "Assessing future Chinese air pollution impacts on mortality in China and the US", in collaboration with Professors Shuxiao Wang at Tsinghua University, Jun Bi at Nanjing University School of the Environment, and Dr. Arlene Fiore of the Dept. of Earth and Environmental Sciences at Columbia. This study will quantify the effects of PM2.5 and ozone on mortality in China under a range of future emission and climate conditions, and investigate the impacts of Chinese emission policies on pollution and health in the U.S.

Other recent publications

Miller RL. Chapter 7: Environmental medical epigenetics: A review of epigenetically-induced medical risks generated from exposures in our air, food, and personal products. In T. Tollefsbol (Ed.), *Medical Epigenetics.* Elsevier, 6459. Accepted

Kinney PL, Weinberger KR, Miller RL. (2016). Interactions among climate change, air pollutants, and aeroallergens. In: Beggs, P. J., Ed. Impacts of Climate Change on Allergens and Allergic Diseases. Cambridge University Press. In press

Quinn A, Ae-Ngibise K, Jack DW, Boamah EA, Enuameh Y, Mujtaba M, Chillrud S, Wylie BJ, Owusu-Agyei S, **Kinney PL**, Asante KP. Association of household air pollution exposure with blood pressure among pregnant women in rural Ghana: evidence from GRAPHS. *International Journal of Hygiene and Environmental Health.* In press

Knowlton, K. (2015). Chapter 5: Ozone, Oppressive Air Masses, and Degraded Air Quality. In G. Luber Luber & J. Lemery (Eds.), Global Climate Change and Human Health: From Science to Practice (pp. 137-170). John Wiley & Sons.

Seager RJ, Chiang CH, **Shaman J**. Do the tropics rule? Assessing the state of tropical climate science. *Bulletin of the American Meteorological Society.* In press

PAST EVENTS

Dengue prediction challenge

Drs. Jeffrey Shaman and Teresa Yamana participated in the Dengue Prediction Challenge, hosted by the White House Office of Science and Technology Policy, the Centers for Disease Control and Prevention the Department of Defense, and the National Oceanic and Atmospheric Administration. They were tasked to develop a dengue prediction model for two cities, one in Peru and another in Puerto Rico, using historical surveillance data. Dr. Yamana presented her model at the White House last September. Dr. Shaman participated in a panel discussion on challenges in forecasting.

Climate, data, and journalism

Ashlinn Quinn and Richard Remigio attended the Climate, Data, and Journalism event, hosted by IRI and Brown Center for Media Innovation, during Climate Week this past September. The aim was to address challenges and opportunities associated with data-informed story telling — identifying promising sources of information, innovative visualization methods, and avenues for the climate and journalism communities to come together to use narrative to raise awareness of and access to climate information.

Indian delegation meets Mailman and EHS

Mailman School of Public Health and the EHS Dept. were visited by members of a delegation from India who visited NYC from Sept. 13-18, 2015. Key government, academic and civil society leaders from India met with their counterparts in NY to discuss best practices on climate-health and extreme heat preparedness. With Natural Resources Defense Council (NRDC) and partners, the city of Ahmedabad in western India launched a Heat Action Plan in 2013, becoming the first early warning system and preparedness plan for extreme heat events in South Asia, and an example of local climate resilience in action.

For many of the delegates, the highlight of their trip was visiting Mailman and the EHS Dept., where they met and spoke about climate resilience with Dean Linda Fried, Drs. Tomas Guilarte, Patrick Kinney, and Frederica Perera, community leaders like Peggy Shepard of WEACT, and municipal leaders from the Mayor's office. The gathering in NYC of experts and leaders was part of the "India-US Climate Resilience Partnership: High-Level Knowledge Leadership Exchange Forum on Heat-Health and Climate Preparedness," hosted by NRDC, the Public Health Foundation of India-Indian Institute of Public Health (IIPH) and the Icahn School of Medicine at Mount Sinai, and supported by the Indo-US Science & Technology Forum (IUSSTF). Lead hosts included Dr. Kim Knowlton; NRDC's Anjali Jaiswal, Meredith Connolly and Sameer Kwatra; Mount Sinai and EHS's Dr. Perry Sheffield; and IIPH's Dr. Partha Ganguly, Dr. Priya Dutta and Dr. Abhiyant Tiwari.

Read on the Indian delegation's entire stay here:
http://switchboard.nrdc.org/blogs/ajaiswal/photo_essay_india_and_us_leade_1.html

AAAS 50th anniversary symposium

On October 29th, Dr. Kim Knowlton attended the American Association for the Advancement of Science (AAAS) 50th Anniversary Symposium on Climate Change in Washington, DC: Climate Science, 50 Years Later: Agenda Commemorating the 50th Anniversary of the First Official Climate-Change Warning to a U.S. President. This day-long symposium reviewed what scientific research has revealed about climate change over the past 50 years, and offered a forward-looking assessment of the range of scientific, technological, communication, and policy options for the future.

ASTMH annual conference

Ashlinn Quinn attended the American Society for Tropical Medicine and Hygiene (ASTMH) annual conference last October in Philadelphia and gave an oral presentation titled "Assessing the Impact of Household Air Pollution on Health: Feasibility of Ambulatory Blood Pressure Monitoring and Repeat-Assessment "Home" Blood Pressure Monitoring in a Rural Ghanaian Setting."

Extreme heat: Hot cities – Adapting to a hotter world symposium

Ashlinn Quinn and Dr. Victoria Lee attended the Extreme Heat: Hot Cities – Adapting to a Hotter World Symposium in November hosted by the AIA NY chapter. A broad constituency involved in building and urban design, science, research, policy, innovation, mitigation, and adaptation convened to discuss how to address growing threats from extreme heat through planning, design, and construction.

Epidemics[5]

Four of us attended the Epidemics[5] conference on infectious disease dynamics in Clearwater Beach Florida in December. Dr. Wan Yang spoke on the inference of seasonal and pandemic influenza epidemiological characteristics and presented work on influenza prediction in Hong Kong and a space re-probing method for improved data assimilation. Dr. Nicholas DeFelice presented on the retrospective forecast of West Nile virus; Dr. Julia Reis presented a system for the inference and forecast of respiratory syncytial virus; and Dr. Teresa Yamana presented a system for ensemble prediction of Dengue.

Annual AGU meeting

Two of us attended and presented at the annual fall meeting of the American Geophysical Union in San Francisco last December. Dr. Teresa Yamana presented work on the real-time forecast of Dengue and spoke about simulating malaria transmission in West Africa. Dr. Jeffrey Shaman presented on the superposition of eastward and westward Rossby waves in response to localized forcing and spoke about the forecast of infectious disease.

COP21 in Paris

In December 2015, the 21st Conference of Parties to the United Nations Framework Convention on Climate Change, better known as COP 21, was held in Paris, France.

In conjunction with the White House, Dean Linda P. Fried, Dr. Patrick Kinney, and other leaders from Columbia, hosted a side event entitled "Educating Tomorrow's Leaders in Climate and Health." At this event, the Mailman School of Public Health announced the establishment of a Global Consortium on Climate and Health Education, which will carry forward the Health Educators Climate Commitment. Schools that have signed on commit to training the next generation of health professionals to effectively address health impacts of climate change. Ashlinn Quinn played a critical role in reaching out to the international schools that have signed onto the pledge.

Dr. Kim Knowlton helped organize a National Resources Defense Council (NRDC) side event on City Resilience: Real World Measures that Save Lives and Reduce Carbon, during which Dr. Frederica Perera spoke about her work on the health effects of air pollution on children's health. NRDC also launched a "City Resilience Toolkit: Response to Deadly Heat Waves and Preparing for Rising Temperatures" to support adoption of urban heat solutions in cities around the world. This toolkit was based on the Indian city of Ahmedabad's "heat action plan," which became India's first early warning system and preparedness plan for extreme heat in 2013, as well as international experiences and best practices.

Dr. Perera also spoke at the Health and Environmental Alliance offsite side event under the topic "Health professionals in action for Healthy Energy and Climate."

The conference resulted in the adoption of the Paris Agreement by over 190 countries, setting national targets for greenhouse gas emission reductions through shifts to clean, renewable sources of energy.
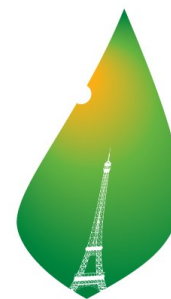
FEEDBACK

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.