COLUMBIA UNIVERSITY | MAILMAN SCHOOL of PUBLIC HEALTH

CLIMATE AND HEALTH PROGRAM

Department of Environmental Health Sciences

NEWSLETTER Volume 6, Issue 1 *Fall 2016*

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.

TABLE OF CONTENTS

PROGRAM NEWS……..2

- Letter from the Director
- Successful thesis defense by PhD candidate, Ashlinn Quinn
- Successful thesis defense by DrPH candidate, Eleanne van Vliet
- New staff as of Spring 2016

CERTIFICATE NEWS……..5

- MPH'16 graduates—where are they now?
- Second years' summer practicum experiences

RESEARCH……..7

- Microbe swabbing at the American Museum of Natural History
- Mike He, visiting research scholar at China CDC
- Proposals
- Recent findings
- Other recent publications

PAST EVENTS……10

- Public Health in Asia Symposium
- Dr. Wan Yang on Reddit's Ask Me Anything
- Big Data Tsunami at the Interface of Statistics, Environmental Sciences and Beyond
- Influenza forecast workshop
- MIDAS national network meeting
- CDC Predict the Influenza Season Challenge
- Joint Statistical Meeting
- Workshop on air pollution and health in China

PROGRAM NEWS

Letter from the Director

Dear Colleagues,

After 22 years at Columbia, and eight as the director of the Climate and Health Program, it is with very mixed emotions that I have decided to leave Columbia in early 2017, to assume a new leadership position at Boston University as the inaugural Beverly Brown Professor of Urban Health. It has been very gratifying to witness the growth of the Climate and Health Program since its creation in 2008, the recruitment of new faculty, the granting of the first NIH training grant focused on climate and health, and the growing host of talented students and postdocs. We now have a half dozen PhD students and numerous postdocs working on a range of research projects focused on understanding, anticipating and responding to the significant risks that climate change poses for public health. The innovative Climate and Health certificate for MPH students has been a great success.

I look forward to maintaining collaborations and interactions with the Program in the coming years, and to work with Dr. Jeff Shaman to ensure a smooth transition under new leadership. I am confident that the Program is poised for further expansion and growing impact in the coming years.

Sincerely,
Patrick Kinney

PROGRAM NEWS

Successful thesis defense by PhD candidate, Ashlinn Quinn

Ashlinn Quinn graduated with a PhD in May. Her dissertation, titled "Modifiable Risk in a Changing Climate: Linking household-level temperature, humidity, and air pollution to population health," combined research from two distinct projects having to do with the relevance of exposures in the domestic environment to health and well-being. The first project, conducted under the guidance of Drs. Patrick Kinney and Darby Jack, was located in Ghana, West Africa, and focused on the connection between blood pressure and household air pollution from cooking with biomass fuels. The second project, conducted with Drs. Jeffrey Shaman and Patrick Kinney, focused on the residential environment of NYC, where she monitored temperature and humidity conditions in homes during the summer and winter seasons and related these to heat wave risk in the summertime and to the survival and transmission of respiratory viruses in the wintertime. Each of these projects relates to the complex relationship between climate change and health: reducing hazardous air pollutants to improve health will simultaneously reduce climate change through a reduction in emissions of short-lived climate pollutants into the atmosphere; while understanding current heat and humidity levels inside urban residences will be crucial to our ability to protect health in light of the more extreme weather events that are projected to occur under a changing climate.

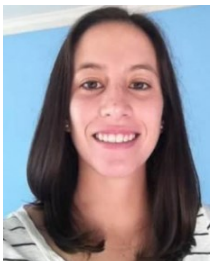
After graduating, Ashlinn moved to the Fogarty International Center of the National Institutes of Health in Bethesda, MD. In her role as the Health Scientist for the Clean Cooking Implementation Science Network, she conducts research on factors that influence the adoption and sustained use of clean cooking interventions in the developing world.

Successful thesis defense by DrPH candidate, Eleanne van Vliet

Eleanne van Vliet successfully defended her dissertation in July, and will receive her DrPH in October. Eleanne's dissertation examines personal exposures to cooking and non-cooking sources of household air pollution, characterizes the composition of the fine particulate matter across common biomass fuels, and assesses acute respiratory symptoms in pregnant women cooking with biomass fuels in rural Ghana. Her work intends to inform improved cookstove design, as well as policies aimed at reducing harmful emissions and exposures from biomass smoke. Her publications include "Personal exposures to fine particulate matter and black carbon in households cooking with biomass fuels in rural Ghana" in Environmental Research (2013), "A Review of Alternatives to Di(2-ethylhexyl) Phthalate-Containing Medical Devices in the Neonatal Intensive Care Unit", in Journal of Perinatology (2011), and "Impacts of roadway emissions on urban particulate matter concentrations in sub-Saharan Africa: new evidence from Nairobi, Kenya" in Environmental Research Letters (2007). During her time in the program, she also worked as Director of Research for As You Sow, an environmental health organization based in San Francisco.

Eleanne spent her summer in Ghana to implement a feasibility study assessing children's air monitors to measure fine particulate matter from biomass smoke. Starting in October, she will be a Research Associate at the University of Southern California, Dept. of Preventive Medicine to examine local air pollution and respiratory outcomes in children.

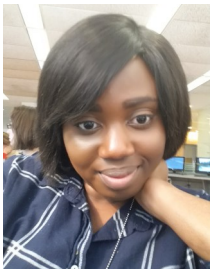
New Staff as of Spring 2016



Devon Comito

Laboratory Technician

Devon received her BS in Biology and MS in Physiological Science from UCLA. Her previous research focused on neuroendocrinology and avian biology. At Columbia, she will be studying respiratory virus transmission as she helps work on the "Virome of Manhattan" project.



Theresah Fiagbe

Study Coordinator

Theresah received her medical degree from the Kwame Nkrumah University Of Science and Technology, School of Medical Sciences, Ghana, in 2011. After completing medical school she practiced as a general and emergent care physician for 3 years and subsequently completed her MPH in Epidemiology at Columbia in 2016. She is currently working with Dr. Shaman as Study Coordinator on his new three-year project, "The Virome of Manhattan."

Sadiat Ibrahim

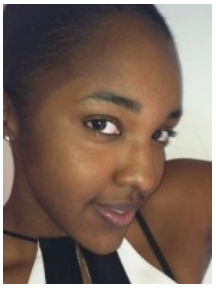
Study Coordinator

Sadiat obtained her MD from Igbinedion University Okada, Nigeria in 2012. She practiced medicine as a Medical officer in the biggest General Hospital in Lagos, Nigeria, after which she served as the only Medical Doctor in a Primary Healthcare center in Lagos. She completed her MPH degree in General Public Health at Columbia in 2016. With Dr. Shaman, she has worked as a research assistant for his study, "The Virome of Manhattan", helping with data entry, swabbing, and offering surveys to study participants at the American Museum of Natural History. Now, she is one of the Study Coordinators of this project.

Benjamin Lane

Laboratory Technician

Ben graduated from the University of Vermont in 2013 with a Bachelor's degree in microbiology. Previously, he worked at the CDC developing an in situ hybridization assay to enhance the detection of the bacterium Streptobacillus Moniliformis in formalin-fixed, paraffin-embedded tissue samples. At Columbia, he is working as a research technician to advance the understanding and forecast of viral respiratory infections in Manhattan.



Chanel Ligon

Laboratory Technician

Chanel received her BA in Biology at Swarthmore College. Her previous research projects include developing a reporter mycobacteriophage to diagnose Mycobacterium Tuberculosis and exploring heart progenitor cell development in Ciona Intestinalis. At Columbia, she is working as a Research Technician on the "Virome of Manhattan" project, which focuses on the transmission and incidence of respiratory viruses in an urban environment.

CERTIFICATE UPDATES

MPH'16 graduates — where are they now?

Laura Buckley

Laura is working as a Research Associate at the Center for Climate Change and Health through the Public Health Institute in Oakland, CA. She is crafting a "research roadmap" for the California Energy Commission on potential health impacts of emerging electricity generating systems by identifying gaps in current knowledge and working towards prioritizing future research in the life cycles of renewable, storage, and efficiency technologies likely to be rolled out in CA in the next decade. Much of the focus is on occupational exposures and hazards, but they are also working to prioritize based on health equity considerations.

Kate Burrows

Kate spent the summer in New York working as a Research Assistant at the American Museum of Natural History in the Center for Biodiversity and Conservation (CBC). Her work focused on developing local-level indicators for sustainability with a particular focus on resilience in the context of climate change. In the fall, Kate will continue working remotely as a Visiting Scientist at the CBC and will begin her PhD at the Yale School of Forestry and Environmental Studies. While at Yale, Kate will work with Dr. Michelle Bell on a project related to climate change and health.

Maddy Cohen

Maddy works at the NY Emergency Department (ED) as a medical staff facilitator. The position includes coordinating with the entire team of providers to help patients plan their follow-up care, establishing telehealth appointments with patients, and focused research projects to reduce patient's 24- and 72-hour returns to the ED. She is also continuing her work as a sexual assault and domestic violence patient advocate for the Crime Victims Treatment Center at two other New York Hospitals: St. Luke's and Mt. Sinai West.

Cara Smith

Cara is at Columbia working with Drs. Darby Jack and Steven Chillrud on the NYC biking and air pollution study as Project Manager. She has deployed over 30 riders since the project began by preparing their equipment, training the participants on how to use the equipment, and uploading the data collected by the participants. In addition, she has begun analyzing the collected data.

Second years' summer practicum experiences

Shanna Keown worked on campus with the Ghana Randomized Air Pollution and Health Study (GRAPHS) team. Pregnant women were randomized into intervention arms to determine if different cookstoves improve birth weight and respiratory health in infants. Household air pollution from inefficient burning of solid fuel is attributed to millions of premature deaths. Women, who are often the primary cooks, and their infants are particularly vulnerable. I researched studies on exposure response assessments and pneumonia etiology and helped analyze data comparing birth outcomes across the intervention arms.

Maggie Rice worked for an environmental and sustainability consulting company in New York City, called Terrapin Bright Green. Throughout the summer she collected research on the intersection of green infrastructure and public health. With the research and the help of her coworker's expertise in urban planning, Maggie wrote up a report on how specific green infrastructure strategies can be incorporated into a neighborhood and the associated public health benefits that may arise from such strategies. In her time working with architects and urban planners she learned about the large language and knowledge gap between public health and outside agencies, as well as the need for more integration of research across the various fields.

Mayra Cruz worked at the National Center for Disaster Preparedness through the Earth Institute at Columbia this summer. She worked as a Graduate Research Assistant on the Resilient Children Resilient Communities initiative on the communications aspect of the project by creating and enhancing existing communications strategies for coalition members to use when approaching important stakeholders. She also spearheaded social media campaigns around hurricane preparedness and extreme heat through Twitter, Facebook, and LinkedIn.

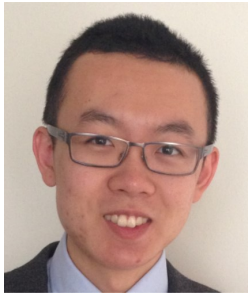
Tina Wang interned at Time Equities, Inc. in New York, primarily working on LEED consulting projects. Her job included performing and analyzing indoor air quality test as well as providing health perspectives into the LEED buildings.

RESEARCH

Microbe swabbing at the American Museum of Natural History

This past summer, through a collaboration with the American Museum of Natural History, Dr. Jeffrey Shaman and his team launched a part of their project, titled "The Virome of Manhattan: A Testbed for Radically Advancing Understanding and Forecast of Viral Respiratory Infections." Adult museum guests from all over the world were invited to get their hands, tongue, and nose swabbed to provide their microbes to study respiratory viruses carried by both symptomatic and asymptomatic people. Preliminary findings were presented at an event at the museum in July. They hope to continue swabbing museum guests during the upcoming influenza season and to expand the sampling to children as well. An "Only Human" podcast with Mary Harris, featuring Dr. Shaman and Dr. Paul Planet from the Children's Hospital of Philadelphia, on this study and a swabbing demonstration can be found here.

Mike He, visiting research scholar at China CDC



Mike He, second year PhD student, spent his summer in Beijing working at the China CDC as a visiting research scholar under Dr. Tiantian Li. Using a children's cohort from Jinan, China, he analyzed whether respiratory and infectious disease symptoms measured in wintertime was worsened on days with worse pollution. In addition, they are working on developing a RCT based on the same children's cohort, evaluating the effects of air purifiers and air pollution prevention education on health. This project is still in the planning stages and is planned to be initiated later this year.

While in China, Mike had the opportunity to attend two conferences hosted by the China CDC—an air pollution and health conference in Nanjing in June, and an environmental risk assessment symposium in Hohhot in July.

Proposals

Funded:

- **Dr. Patrick Kinney** received a two year grant from the Columbia Global Policy Institute in June. The project is entitled "Assessing future Chinese air pollution impacts on mortality in China and the US." It will quantify changes in the health effects of PM2.5 and ozone air pollution resulting from future air pollution emissions policies in China in the context of a changing climate, including an assessment of the impacts of Chinese emission policies on pollution and health in the US. He will be collaborating with Arlene Fiore at Lamont, and with Chinese partners at Tsinghua and Nanjing Universities, China CDC, and the Chinese Academy of Environmental Planning.
- **Dr. Julia Reis** was awarded the Earth Institute's Cross-Cutting Initiative 2016-2017 for a project titled "A smartphone application for active citizen surveillance of mosquito populations within New York City."

Recent findings

Development and validation of a climate-based ensemble prediction model for West Nile Virus infection rates in *Culex* mosquitoes, Suffolk County, New York

Affiliated Investigators: Eliza Little and Jeffrey Shaman
Journal: PLoS Computational Biology

West Nile Virus is maintained by the enzootic cycle driven by virus transmission between mosquito vectors and bird hosts. Many of those infected show no symptoms, but about 20% develop flu-like symptoms and less than 1% develop neuro-invasive diseases. To better understand WNV transmission dynamics, Little et al. validated a statistical model using meteorological and hydrological conditions that describes the spatial-temporal distribution of positive Culex mosquito pools, and improved upon the model to develop a multi-model prediction framework. This was used to make retrospective predictions of WNV infection rates for 2013-2015. The improved model suggests that warmer, drier early spring conditions increase *Culex* mosquito WNV infection rates. This link allows for the prediction of annual WNV infection rates early in the season and informs vector control efforts.

Urbanization Level and Vulnerability to Heat-Related Mortality in Jiangsu Province, China

Affiliated Investigators: Patrick Kinney
Journal: Environmental Health Perspectives

Adverse health effects of heat exposure have been studied widely in urban areas due to the increased risk from the urban heat island effect. Chen et al. compared heat-related mortality risk in urban and rural regions of Jiangsu Province. They pooled urban and rural counties using a Bayesian hierarchical model, and found that the mortality risk comparing the 99th and 75th percentiles of temperature was 1.43 and 1.26 in rural and urban counties. This is contrary to the notion that people are more vulnerable to extreme heat in urban areas. However, the study found that heat-related mortality is greater in areas with high elderly populations, people with lower education, lower air conditioning prevalence, and lack of hospital infrastructure, all of which were true of the rural areas. The findings suggest the need for improved adaptations to extreme heat in the rural counties of Jiangsu Province.

Meteorological variability and infectious disease in Central Africa: a review of meteorological data quality

Affiliated Investigators: Alex Heaney, Eliza Little, and Jeffrey Shaman
Journal: Annals of the New York Academy of Sciences

Studying the link between meteorological conditions and infectious diseases is particularly important where climate change may have a great impact. Further, it is important that the data used are of high-quality and that the geographic scale of the exposure and outcomes are aligned. Out of the 66 papers included in the analysis, 23% of studies meteorological data that mismatched with the disease spatial scale and were most common among analyses using meteorological station data or gridded data products. The scientific community must remain apprised of the limitations of the datasets available in this region and work to improve the collection, abundance, and availability of meteorological and infectious disease data for credible analyses of climate impacts and infectious diseases.

Other recent publications

Liu, M., Huang, Y., Hiscock, R., Li, Q., Bi, J., **Kinney, P. L.,** & Sabel, C. E. (2016). Do Climate Change Policies Promote or Conflict with Subjective Wellbeing: A Case Study of Suzhou, China. International journal of environmental research and public health, 13(3), 344.

Burrows, K., & Kinney, P. L. (2016). Exploring the Climate Change, Migration and Conflict Nexus. International journal of environmental research and public health, 13(4), 443.

Asante, K. P., **Kinney, P.,** Zandoh, C., **Van Vliet, E.,** Nettey, E., Abokyi, L., ... & **Jack, D.** (2016). Childhood respiratory morbidity and cooking practices among households in a predominantly rural area of Ghana. African Journal of Infectious Diseases (AJID),10(2), 102-110.

Likhvar, V., Hauglustaine, D., **Kinney, P.,** Colette, A., Valari, M., Markakis, K., ... & Medina, S. (2016). Estimation des impacts sanitaires futurs de la pollution de l'air dans le monde, en Europe et Île-de-France: le projet AC HIA.Rubrique: Environnement. .

Li, T., Horton, R. M., Bader, D. A., Zhou, M., Liang, X., Ban, J., ... & **Kinney, P. L.** (2016). Aging will amplify the heat -related mortality risk under a changing climate: projection for the elderly in Beijing, China. Scientific reports, 6.

Petkova, E. P., Vink, J. K., Horton, R. M., Gasparrini, A., Bader, D. A., Francis, J. D., & **Kinney, P. L.** (2016). Towards more comprehensive projections of urban heat-related mortality: estimates for New York City under multiple population, adaptation, and climate scenarios. Environmental health perspectives.

Hernández, D., Jiang, Y., **Carrión, D.,** Phillips, D., & Aratani, Y. (2016). Housing hardship and energy insecurity among native-born and immigrant low-income families with children in the United States. Journal of Children and Poverty, 1-15.

Biggerstaff, M., Alper, D., Dredze, M., Fox, S., Fung, I. C. H., Hickmann, K. S., Lewis, B., Rosenfeld, R., **Shaman, J.,** ... & Velardi, P. (2016). Results from the centers for disease control and prevention's predict the 2013–2014 Influenza Season Challenge. BMC Infectious Diseases, 16(1), 1.

Shaman, J. (2015, December). The Superposition of Eastward and Westward Rossby Waves in Response to Localized Forcing. In 2015 AGU Fall Meeting. Agu.

DeFelice, N. B., Johnston, J. E., & Gibson, J. M. (2016). Reducing Emergency Department Visits for Acute Gastrointestinal Illnesses in North Carolina (USA) by Extending Community Water Service. Environmental health perspectives.

Reis, J., Culver, T. B., Block, P. J., & McCartney, M. P. (2016). Evaluating the impact and uncertainty of reservoir operation for malaria control as the climate changes in Ethiopia. Climatic Change, 1-14.

DeFelice, N. B., Johnston, J. E., & Gibson, J. M. (2016). Reducing Emergency Department Visits for Acute Gastrointestinal Illnesses in North Carolina (USA) by Extending Community Water Service. Environmental health perspectives.

Nguyen, J. L., Yang, W., Ito, K., Matte, T. D., **Shaman, J., & Kinney, P. L.** (2016). Seasonal Influenza Infections and Cardiovascular Disease Mortality. JAMA Cardiology.

Gervais, M., Atallah, E., Gyakum, J. R., & Tremblay, L. B. (2016). Arctic Air Masses in a Warming World. Journal of Climate, 29(7), 2359-2373.

Yamana, T. K., Bomblies, A., & Eltahir, E. A. (2016). Climate change unlikely to increase malaria burden in West Africa. Nature Climate Change.

PAST EVENTS

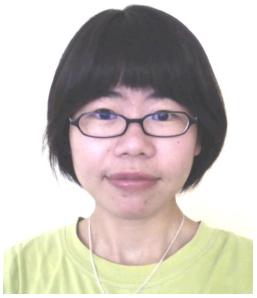
Public Health in Asian Symposium

Miaomiao Liu, visiting research scholar from Nanjing University, and Mike He, PhD student, attended the Public Health in Asian Symposium at Johns Hopkins University in February. The purpose of the symposium is to provide a platform for undergraduate and graduate students to share their research and to receive feedback from professors and peers. This year's theme was "Growing Burdens: Persistent and Emerging Health Issues in Asia." Miao gave a talk titled, "Refined Air Pollution Exposure Assessment Based on Dynamic Activity Patterns Model: A Case of Nanjing, China" and Mike gave a talk titled "Regional Differences in Fine Particulate Matter Concentration in Urban Chinese Cities: A Systematic Review ."

Image source

Dr. Wan Yang on Reddit's Ask Me Anything

Dr. Wan Yang, associate research scientist, was a guest on PLoS Science Wednesday for Reddit's Ask Me Anything (AMA) in March. The guests are experts in their field, and Reddit users can ask the featured expert questions relevant to their field. Dr. Yang answered questions regarding influenza outbreaks, transmission dynamics, and forecast models. Questions posed to Dr. Yang and her responses can be found here.



Big Data Tsunami at the Interface of Statistics, Environmental Sciences and Beyond

Dr. Teresa Yamana participated in a workshop entitled Big Data Tsunami at the Interface of Statistics, Environmental Sciences and Beyond held at the Banff International Research Station (BIRS) in March. Three tightly woven themes were highlighted: Climate, Infectious Disease Epidemiology and Social Media; Weather, Climate and Complex Socio-Ecological Networks; and Climate Change Vulnerability, Risk Mitigation and Adaptation. Dr. Yamana presented on the superensemble prediction of infectious disease.

Influenza forecast workshop

Dr. Jeffrey Shaman and Haruka Morita organized a one and a half day workshop in April titled "Preparing for and Responding to Influenza Outbreaks: Healthcare Preparedness and a Role for Influenza Forecast," held on the Columbia University campus. Participants represented CDC, Office of the Assistant Secretary for Preparedness and Response, military, hospital coalitions and healthcare facilities. The agenda focused on the role and need for analytics and forecasts in managing patient surges at hospital facilities. Dr. Shaman, Sasi Kandula, Alex Heaney, and Haruka Morita presented at the workshop.

MIDAS national network meeting

Several of our staff attended the annual Models of Infectious Disease Agent Study (MIDAS) National Network meeting in Reston, VA in May. 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	Forecasting influenza outbreaks in boroughs of New York City
Eliza Little PhD candidate	Socio-ecological mechanisms supporting the invasive mosquito *Ae. Albopictus* and arbovirus transmission risk in temperate north America
Dr. Julia Reis Postdoctoral research scientist	Retrospective parameter estimation and forecast of respiratory syncytial virus in the United States
Dr. Nick DeFelice Postdoctoral research scientist	Retrospective ensemble forecast model of West Nile virus in Long Island, New York
Dr. Sen Pei Postdoctoral research scientist	Improving influenza forecasts by counteracting structural errors
Dr. Teresa Yamana Postdoctoral research scientist	Superensemble prediction of infectious disease outbreaks

CDC Predict the Influenza Season Challenge

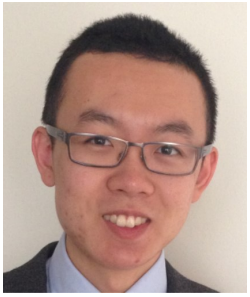
Dr. Jeffrey Shaman and his team participated in the Predict the Influenza Season Challenge hosted by the CDC for the 2015-16 season. Dr. Wan Yang attended a wrap-up workshop for the challenge in Atlanta, GA in August to meet other teams, learn forecasting methods used by other teams, and to discuss broader topics regarding influenza forecasting. The Shaman team plans to participate in this upcoming season's challenge again with improved models.

Joint Statistical Meeting

Dr. Sen Pei, postdoc research scientist, attended the week-long Joint Statistical Meeting in Chicago, IL in August. It is known as the largest gathering of statisticians in North America and was attended by over 6000 people this year. Dr. Pei gave a talk titled "Improving influenza forecasts by counteracting structural errors."

Workshop on air pollution and health in China

Mike He and Dr. Patrick Kinney hosted a workshop on air pollution and health through the Dept. of Environmental Health Risk Assessment of China CDC. The purpose was to exchange research ideas regarding air pollution and chronic disease, and to identify research areas for future collaborations with China CDC. Dr. Xiaoming Shi, director of the Institute of Environmental Health at China CDC, gave a welcome address. Dr. Kinney followed with an overview lecture on air pollution and chronic disease. Dr. Tiantian Li and colleagues described ongoing projects on temperature-related mortality, air pollution and blood pressure, and mortality estimates of PM2.5. Mike gave a talk titled "The Effects of Air Purifiers and Education on the Jinan Children's Cohort: Preliminary Study Design."



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.