

Climate Changing

China Pursues
Bold Solutions

by Alexander Gelfand



This summer, the journal *PLOS ONE* published a chilling analysis of publicly available air-quality data collected by a nationwide network of sensors maintained by the Chinese government. Levels of ozone, carbon monoxide, nitrogen oxide, and other airborne contaminants are so high, the scientists found, that they are responsible for 17 percent of all fatalities in China—4,000 deaths every day.

Amid the stark findings, Chinese scholars and government officials alike have expressed their commitment to understanding the effects of climate change on health and planning for future climate-related risks. To speed their efforts, Patrick Kinney, ScD, a professor of Environmental Health Sciences and director of the Mailman School's Climate and Health Program (CHP), is helping to establish a joint research and teaching program on air pollution, climate change, and human health with Tsinghua University and the Chinese Academy of Environmental Planning.

Working alongside Tiantian Li, PhD, a former postdoctoral researcher with CHP now employed at the Chinese Center for Disease Control and Prevention, Kinney will also estimate future temperature-related mortality rates in China using global climate models and projected rates

of greenhouse gas emissions. Through such efforts, Kinney hopes to encourage integrated climate and air-quality planning, efforts which will allow the Chinese to simultaneously address the immediate effects of their high levels of air pollution and the long-term impact of their emissions—the latter being a matter of concern not only for China, but for the rest of the world as well. “If we care about controlling climate change,” he says, “we care about having China do it well.”

None of his projects would be possible, of course, if the Chinese government weren't increasingly willing to confront major public health issues head-on—something that Kinney notes is rarely reported by the Western press, which tends to focus on the severity of China's problems while ignoring the search for solutions. Nor, for that matter, would such collaborations be underway if Chinese investigators didn't possess what Kinney describes as a “thirst for knowledge and collaboration.”

Projects like Kinney's—in which academics, healthcare professionals, and government officials in the most populous nation on earth join forces with American university professors to explore issues ranging from air pollution and climate change to urban planning and hospital management—have been underway for years. The

opportunities to address such internationally relevant challenges have never been greater. Industrialization, urbanization, and the graying of China's population of 1.4 billion are transforming the country in ways that will be felt for generations. “China is about to have as many older adults as the United States has people,” says Mailman School Dean Linda Fried, MD, MPH. “Public health wisdom has never seen more fertile ground.”

For Mailman School scholars, China's synergy of economic and demographic shifts affords a unique opportunity to apply public health scholarship. In 2014, Fried made two trips to China—laying the groundwork for a broad initiative to strengthen the School's relationships with Chinese academics and government officials and to furnish scientific evidence in support of such policy issues as building healthier cities, controlling environmental pollution, and transitioning to an aging world—all priorities for the U.S. as well. “China is unique in its recognition of what its leading challenges are,” says Fried, “and its ability to enact bold solutions based on science and evidence.”

On her 12-day trip in March 2014, Fried met with hematologist Chen Zhu, MD, PhD, formerly China's minister of health and now the vice chair-



man of the Standing Committee of the National People's Congress, and participated in an urban health roundtable. In October, Fried attended the U.S. China Health Summit in Nanjing.

This year, she traveled to Dalian for the World Economic Forum's Meeting of the New Champions, previewing a project underway by Mailman School faculty and scientists at Nanjing University to analyze the return on investment of air-quality improvements in China. During the same trip, Fried traveled to Beijing for a Columbia Day hosted by Tsinghua University, a leading research institution known as the MIT of China. As part of the festivities, Fried and university administrators signed an

agreement committing Tsinghua and the Mailman School to pursue joint initiatives related to environmental health. And next year in Shanghai, the Mailman School will co-host the Columbia-Fudan Global Summit on Population Aging.

Fried cautions that it may be too early to speak of results. But molecular epidemiologists Deliang Tang, MD, DrPH '96, and Frederica Perera, MPH '76, DrPH '82, PhD '12, both professors of Environmental Health Sciences, have already demonstrated the impact that investigations by American scientists can have in support of policy decisions in China.

Working with colleagues at Chongqing Medical University, Tang and Perera, founding director of the Columbia

Center for Children's Environmental Health, recruited two cohorts of women in the city of Tongliang: One group had become pregnant while a coal-burning power plant

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was operating in the center of town; the other, after the plant was shuttered. Children born to mothers in the second group showed lower levels of

pollutant exposure and higher levels of a key brain protein. Furthermore, the researchers no longer saw the significant adverse effects of pollutant exposure on cognitive development that was observed in the first cohort. The study, published by *PLOS ONE* in 2013, demonstrated not only the harm to children caused by high levels of air pollution but also the benefits of reducing it.

As reported in December 2014 in the journal *Environment International*, Tang and Perera subsequently ran another serial cohort study in Taiyuan, the capital of Shanxi province, where the government had enacted a series of policies designed to improve air quality. Together with colleagues at Shanxi Medi-

cal University and the Fudan School of Public Health, Tang and Perera demonstrated that falling levels of air pollution over a ten-year period were associated with fewer hospital admissions and premature deaths. The economic impact of reduced death and disability, they found, translated to several billion yuan.

Research in both cities continues. Already, Tang says, Tongliang has become a textbook case for environmental health interventions in China, and Chinese officials now hold up Taiyuan as an example of the gains that can be achieved through sound environmental policies. “The most exciting thing,” he says, “is that you can see them using our data in their debates.”

Chinese officials have sought out data to inform other thorny policy debates, as well. Peter Muennig, MD, MPH '98, an associate professor of Health Policy and Management, has advised government officials on healthcare reform in Beijing and on urban planning tactics to promote health in Sichuan province. He has also designed an ambitious set of randomized clinical trials to test the effects of housing on health status and child development. Over time, 2.5 million lower-middle-income families in Chongqing will participate in a housing lottery for 1.2 million units, with the winners moving into government-subsidized residential developments with health-promoting features like exercise facilities



and green space. Together with colleagues at Chongqing University, Muennig and his team plan to use molecular assays, questionnaires, and other methods to explore how social policy and the built environment influence the well-being of children and their families. This past spring, Muennig, who speaks fluent Mandarin, returned to China, where he's been building a local client base for the Mailman School's Global Research and Analytics for Population Health (GRAPH), which aims to use big data and computational modeling techniques to optimize public health investments on a country-by-country basis.

Michael Sparer, PhD, JD, chair of the Department of Health Policy and Management and a founding director of GRAPH, has also turned his eye toward tactics the Chinese might deploy to improve their health systems. In 2014, Sparer and physician David

P. Roye—founder of International Healthcare Leadership, a nonprofit that gives Chinese healthcare professionals the tools and training to improve health services back home—organized the China Healthcare Leadership Training Program, which brought 30 senior Chinese healthcare executives to New York for a three-week course on topics that included health policy and management. Sparer, who attended a follow-up symposium in Suzhou this past May, hopes to make the program an annual event. He's already developing a similar program with Zhejiang University, in Hangzhou, with help from Joan Kaufman, ScD, former director of the Columbia Global Centers | East Asia and a senior lecturer in Health Policy and Management.

In another project, Sparer has been investigating how lessons from the American healthcare reform experience

might prove useful to the Chinese, and vice versa. In 2009, the Chinese government introduced its own comprehensive reforms. Implementing them has meant confronting many of the same issues

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that have emerged as part of healthcare reforms in the U.S., such as balancing regulation against the role of markets. The goal of such comparisons, however, is not to suggest that American solutions be implemented in China, says Sparer. Rather, it's to fashion the right fit with China's own culture and politics, all while learning from solutions that the Chinese have already developed.

The work of Lawrence Yang, PhD, also features cross-cultural exchange based on mutual respect and shared learning. For more than 15 years, Yang, an associate professor of Epidemiology with training in clinical psychology and anthropology, has been investigating psychosis among





Chinese and Chinese-Americans with colleagues in China and the U.S. Currently, along with collaborators at Harvard, he is seeking strategies to reduce stigma among the families of people with psychosis in Shanghai and Beijing using an intervention that he first developed for Chinese immigrants in California and New York. To extend the effort, he's in talks to develop a national anti-stigma program in China. (Negative associations and stereotypes about mental illness can be barriers to effective treatment and tend to be especially high among Asians and Asian-Americans.)

In another study—with colleagues at Harvard Medical Center and the Shanghai Mental Health Center—Yang is

investigating the public health implications of identifying Chinese who are at high risk of psychosis, in hopes that clinicians might be able to prevent the disorder from emerging in the first place. In a third project, he is analyzing a vast data set collected by a Canadian psychiatrist that includes information on an unusually large number of untreated schizophrenics among the adult Chinese population. “We don’t know anything about what untreated schizophrenia looks like,” Yang says. “It’s a chance to rewrite our understanding of psychosis.”

As with the many other initiatives underway by Mailman School faculty partnering with Chinese collaborators, Yang’s work involves a wide network

of participants and offers benefits all around. Perhaps most important, its relevance expands outward in a series of ever-widening circles encompassing scientists, public health systems, and ordinary citizens around the globe.

In an era when one nation’s policies governing air pollution and greenhouse gas emissions, healthcare, and urban design can have repercussions far from home, research underway in China could have profound implications for the entire global community. “China’s decisions,” says Fried, “affect the rest of the world.” 

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