In 2004, the Chinese government closed the Tongliang coal-fired power plant, launching a natural experiment to reveal the effect of air pollution on prenatal growth and early childhood cognitive development. From 2002 to 2005, Deliang Tang, MD, DrPH, an associate professor of Environmental Health Sciences, and colleagues monitored two groups of mother-child pairs in the district. In one group, the mothers had been pregnant while the power plant was still operating; in the other, pregnancy followed the plant’s closure.

In March 2014, the journal PLOS ONE published the team’s finding: Decreased exposure to air pollution in utero is linked with improved childhood developmental scores and higher levels of brain-derived neurotrophic factor, or BDNF, a key protein for brain development. A second longitudinal study of particulate matter and adult health in Shanxi province, published in Environment International, demonstrated significant savings associated with decreased air pollution levels. “The key to limiting the health impacts of environmental exposures is policy change supported by scientific evidence,” says Tang, who leads the China studies at the Columbia Center for Children’s Environmental Health. “These findings indicate that regulation can rapidly decrease exposure and improve health outcomes among the most sensitive populations.”
Independent Agents

“The perk matters more than the paycheck.”

Using data collected in the wake of Medicaid changes in Tennessee, Assistant Professor of Health Policy and Management Tal Gross, PhD, projects that between 500,000 and 900,000 people may choose to stop working due to the implementation of the Affordable Care Act. “There are many people out there who look for work simply because they need health insurance,” says Gross. “For them, the perk matters more than the paycheck.”

Gross’ analysis—a collaboration with economists from Northwestern University and the University of Chicago—was published in March by the Quarterly Journal of Economics. In its Budget and Economic Outlook: 2014 to 2024, the Congressional Budget Office cited the study as a clue for predicting how changes to Medicaid precipitated by the healthcare law might affect childless adults. “Historically, health insurance in the United States has been tightly linked to employment,” says Gross, “and the ACA weakens that link.”

More recently, Gross and his collaborators have turned their attention to another facet of the Tennessee data for clues about the law’s effect on hospitals, which must provide care regardless of a patient’s ability to pay. “A lot of people who have been receiving care for free will be covered by insurance due to the ACA, and hospitals will face a lower burden,” says Gross. “We’re trying to quantify how many billions of dollars are at play; there’s been surprisingly little research.”

Immune Response

THE PRIMARY IMMUNIZATION SCHEDULE for young children in the U.S. can require as many as 20 unique doses spanning at least four separate visits to a healthcare provider. By the time they turn 19 months old, only 75 percent of children have received all of their immunizations. Those who miss out risk illness, as well as restricted access to day care and school.

To boost kids’ prospects, Melissa Stockwell, MD, MPH ’07, an assistant professor of Population and Family Health, and Sally Findley, PhD, a professor of Population and Family Health and Sociomedical Sciences, surveyed parents for insights. “This study,” they write in the resulting Clinical Pediatrics report in which they detail their findings, “highlights factors that may help urban families keep immunization visits: open communication with providers, flexibility in scheduling appointments, and individual and community education.”

Hate Kills

LESBIAN, GAY, AND BISEXUAL PEOPLE LIVING IN COMMUNITIES WITH HIGH LEVELS OF ANTI-GAY PREJUDICE have a shorter life expectancy of 12 years on average, compared with their peers in the least prejudiced communities, according to a paper published in Social Science & Medicine. “Our results were comparable to differences that have been observed between individuals with and without a high school education,” says lead author Mark Hatzenbuehler, PhD, an assistant professor of Sociomedical Sciences.
A Simplex Take on Big Data

In a paper published by the journal *Advances in Data Analysis and Classification*, Sara Lopez-Pintado, PhD, and co-authors detail a new approach to ordering multivariate functional data—such complex observations as height and weight measurements of children over time. “We wanted to find a way of measuring how extreme a particular curve is within a sample,” says the assistant professor of Biostatistics, “and use this method to detect the most representative data and the outliers.”

Lopez-Pintado’s concept—dubbed simplicial band depth—builds a set of three-dimensional tubes, each determined by three different curves from the sample, and quantifies the depth of a given curve by measuring how many of the tubes contain the curve. “It’s very important to have a tool to find outliers when the data is multivariate and complex, since there are many types of outliers and they are not easy to identify visually,” says Lopez-Pintado. She is now collaborating with R. Todd Ogden, PhD, a professor of Biostatistics (in Psychiatry), to apply the proposed method to functional magnetic resonance imaging of healthy and depressed research participants.

“With such complex observations as functional imaging data we need new tools.”

Viral Vectors

An estimated three-quarters of camels in Saudi Arabia have evidence of infection with the Middle East respiratory syndrome coronavirus, the bug behind human cases of MERS, according to a coalition of scientists that includes researchers at the Mailman School’s Center for Infection and Immunity. Their work both establishes for the first time that direct camel-to-human transmission is possible and provides a pathway to control the spread of the disease.

The journal *mBio* published two reports on the investigation, which was a collaboration with scientists at King Saud University, the National Institutes of Health, and EcoHealth Alliance. Since the first documented case in Saudi Arabia in September 2012, more than 800 people have developed the illness, whose symptoms include fever, cough, and shortness of breath; 319 have died. In the last two years, cases have since been reported throughout the Arabian Peninsula. Cases related to travel to the Middle East have been reported in France, Germany, Italy, and the United Kingdom. The source of the disease had been a mystery.

“Camels carry the same MERS virus that infects humans, which indicates that they have the potential to transmit the virus directly to humans,” says study co-author Thomas Briese, PhD, an associate director of the Center for Infection and Immunity and an associate professor of Epidemiology who in 2013 co-authored a study that implicated bats in MERS transmission. “The roles of bats and camels in human infection remain an area of active research for our group.”
Water Worries

At a high enough dose, arsenic kills. Even at trace amounts, the element leaves its mark. Among schoolchildren who ingest nearly imperceptible doses in household well water, for example, the element wreaks its havoc on cognitive function. In data from three Maine school districts, Joseph Graziano, PhD, a professor of Environmental Health Sciences, has confirmed effects comparable to those his team had previously documented in Bangladesh.

Using the Wechsler Intelligence Scale for Children, the researchers documented decreased scores on indices for working memory, perceptual reasoning, and verbal comprehension among children exposed to more than 5 parts of arsenic per billion of household well water, even after adjusting for such factors as maternal IQ and education. The report was published in Environmental Health.

“Our findings in a U.S. sample gives confidence to the generalizability of findings from our work in Bangladesh, where we also observed a steep drop in intelligence scores in the very low range of water arsenic concentrations,” says Graziano. “Collectively, our work in Bangladesh and in Maine suggests that aspects of intelligence, particularly perceptual reasoning and working memory, are compromised by exposure to arsenic in drinking water.”

Soda Studies

Approximately 40 percent of young children consume at least one soda every day. Among teens, the habit is associated with aggression, depression, and suicidal thoughts. The picture is no prettier for younger kids. They exhibit aggression, withdrawal, and attention problems, according to research by Assistant Professor of Epidemiology Shakira Suglia, ScD, published in The Journal of Pediatrics.

“We found that the child’s aggressive behavior score increased with every increase in soft drinks servings per day,” says Suglia, who worked with colleagues at the University of Vermont and Harvard University to assess approximately 3,000 5-year-olds living in 20 large U.S. cities. “Soda consumption among children is also associated with health problems such as obesity; limiting or eliminating it from children’s diets may be best for their health.”
PTSD Piles on Pounds

Women with post-traumatic stress disorder risk another hazard beyond the flashbacks, insomnia, depression, numbness, and disrupted memory associated with PTSD. According to a report published in *JAMA Psychiatry*, women with PTSD also gain weight more rapidly and are more likely to be overweight or obese than women who experienced trauma but did not develop PTSD.

Karestan Koenen, PhD, a professor of Epidemiology and the study’s senior author, collaborated with investigators at Harvard University to analyze data collected from 50,504 participants in the Nurses’ Health Study, a longitudinal study of women aged 22–44, conducted between 1989 and 2009.

“PTSD is not just a mental health issue … Along with cardiovascular disease and diabetes, we can now add obesity to the list of known health risks of PTSD.”

One in nine women will develop PTSD at some time over the course of her lifetime—at twice the rate of men. Women are also more likely to experience the kinds of extreme traumatic events that carry a high risk for the disorder.

Aging, Delayed

RESEARCH TO DELAY AGING and its associated infirmities would have better population health and economic returns than advances in treatments for individual fatal diseases such as cancer or heart disease, according to an analysis published by the journal *Health Affairs*. Investigators including John W. Rowe, MD, a professor of Health Policy and Management and chair of the MacArthur Foundation Research Network on an Aging Society, assumed research investment leading to a 1.25 percent reduction in the likelihood of age-related diseases in their calculations. With even such modest investment, an additional 5 percent of adults over the age of 65 would be healthy rather than disabled every year from 2030 to 2060. Such delayed aging would mean 11.7 million more healthy adults over the age of 65 in 2060. In contrast to treatments for fatal diseases, slowing aging would have no health returns initially, but would have significant benefits over the long term.

Counseling Conundrum

Brief counseling of all clients at the time of a rapid HIV test was not effective for reducing new sexually transmitted infections during the subsequent six months, according to the *Journal of the American Medical Association*. “Without evidence of effectiveness, counseling as an essential adjunct to routine HIV testing cannot be considered an efficient use of resources,” says lead author Lisa Metsch, PhD, Stephen Smith Professor and chair of Sociomedical Sciences. “A more focused approach to providing information at the time of testing may allow clinics to use resources more efficiently, potentially detecting more HIV cases earlier and linking and engaging HIV-infected people with care.”