Shelters from the Storm

Sex-Based Defenses Against Disease
THINK FUTURE


GIVE TO THE FUTURE: JHSPH.EDU/GIVING
APPLY TO THE FUTURE: JHSPH.EDU/PROSPECTIVE_STUDENTS/
I was in Australia, at a conference of academic health leaders, when the earthquake and tsunami struck Japan on March 11. My Japanese public health colleagues at the conference soon faced the challenge of how to best help their country.

As the disaster evolved into a nuclear crisis, they did just what we would have done. They provided evidence-based recommendations about how to reduce the risk of infectious disease, prevent post-traumatic stress disorder and minimize radiation dangers.

The first mission is always preparedness, ensuring that skilled professionals and infrastructure are in place and ready before disasters occur. The Bloomberg School’s Public Health Preparedness Programs, for example, have trained more than 60,000 U.S. public health and safety professionals in disaster preparedness and response. And our Center for Refugee and Disaster Response (whose work is documented on page 16) has trained more than 500 people from governments and NGOs worldwide in preparing for population-level health emergencies. At least a half-dozen of our Japanese and South Korean alumni were directly involved in Japan’s response.

Immediately after a disaster, people need information almost as much as they need food and water. They need to know what they should and shouldn’t do, where they can get shelter and safe water, and so on. Risk communications is incredibly important, but it can be hard for government leaders to balance their message so that people are motivated to do the right thing but not so frightened as to panic.

In search of that kind of knowledge, the media often seek out our faculty. Case in point: As Japan’s nuclear crisis unfolded, journalists did multiple interviews with Jonathan Links, a radiation expert and director of the Public Health Preparedness Programs. He explained the immediate risks from Japan’s nuclear disaster (including when it’s appropriate to take potassium iodide) and shared his insights into our own country’s nuclear power infrastructure.

And, in 2006, our Center for Communication Programs conducted media campaigns in the Baltimore region to persuade people to assemble home emergency response supplies (including water, a portable radio and flashlight). This way, people in the community—not just the government and NGOs—know their responsibilities in preparedness.

Another key area is coordination. When a disaster shatters normal life, humanitarian groups of all stripes flood into the country. Each may have a different focus and a different agenda. In a sense, they are competing with each other to help. Their commitment to others is admirable, but to have the greatest impact, these groups need to be coordinated. And that takes trained leadership and a command structure.

In the long term, Japan will recover from this blow to its infrastructure and its economy, but a serious aftershock looms: psychological trauma. I know personally how these memories stay with you. In 1972, I was helping my best friend protect his house during Hurricane Agnes. As rain poured down, floodwaters filled the basement, spilled onto the kitchen floor and swiftly rose in the house. We fled upstairs and escaped through the second-floor window where we were rescued by firefighters in a boat. Others who have worse experiences or have lost loved ones in disasters can suffer lasting mental trauma. Delivering counseling and other services to thousands of people presents a difficult challenge. Our Applied Mental Health Research Group is working to bring evidence-based mental health services to developing countries where such care is all too rare or nonexistent.

During my travels in Australia, and later China and Kuwait, everyone felt an overwhelming sadness and great concern for the Japanese people. The experience emphasized to me that we really are a global village. It also made me appreciate once again the importance of public health and the work of our School. We have some of the world’s top experts in preparedness, refugee assistance, mental health, radiation science and many other disciplines—and they all are dedicated to our mission of saving lives millions at a time.

Every day when I pick up the newspaper, the headlines provide great affirmation of the importance of our work. Public health tackles big problems and that is perhaps never more true than when our global village is tested by disaster.

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While many things can make Sabra Klein smile, the typical journal article does not. Too often, scientists lump males and females together in a single, androgynous data set—and miss potentially revelatory differences between the sexes. For a dozen years, Klein has advanced a simple message to fellow researchers: Sex matters. (Photo: Chris Hartlove, March 9, 2011)
Thomas Glass, PhD, knows precisely where to find the letter on his desk, crowded though it is with piles of paper.

“This letter is one of the most interesting things in my career,” says the associate professor in Epidemiology.

The correspondence is from a 59-year-old Baltimore woman, who wrote to Glass about her neighborhood in response to a 2008 newspaper story about his research; the article was headlined “Where You Live Can Harm Health.”

“It’s a battleground,” Glass reads from the letter. “Drug dealing and gun violence. We cannot sit on our porches or front steps for fear of robbery and drive-by shootings. You can’t even take a walk around the neighborhood on a beautiful sunny day or a lovely summer evening. When you have to leave for work before sunup and come home after sundown, you just say a prayer and go with God.”

“That’s why I study neighborhoods,” says Glass, who, for 10 years, has researched Baltimore neighborhoods to answer the question, How does where you live affect your health? Since 2001, as part of the Baltimore Memory Study (BMS), Glass and other researchers at the School have tracked 1,100 older Baltimore residents in 64 contiguous neighborhoods—from dangerous to middle class to affluent—studying the connections between neighborhood characteristics and residents’ health. They’ve published papers on how hazardous neighborhoods adversely affect cognition, cardiovascular health and obesity.

But Glass has long been troubled by the accuracy of traditional data-gathering methods in social behavior research—mainly interviews by researchers and surveys completed by study participants, known as pen and paper surveys. “We basically have used that method since the 1950s, even though we’ve learned in the meantime that human memory does not work like a tape recorder,” he says.

Five years ago, Glass got the opportunity to test another approach to data collection when he was awarded a National Institute on Aging grant to use wireless sensors in his Baltimore Memory Study research. Unable to find the technology he needed at a reasonable price, Glass and his colleagues designed their own system to measure social, physical and cognitive functioning.

Over the past five years, 100 participants in the BMS wore three sensors—a GPS, a voice recorder and an accelerometer, neatly bundled in a hip pack—for five days, as the devices collected real-time data.
data on physical activity, geographical location and speech patterns.

The sensed information translates into “millions of data points,” Glass says, that when analyzed as a whole using specially designed computer algorithms, will allow researchers to create movies, rather than isolated snapshots of people’s lives. By studying the data, Glass will be able to answer questions such as, Did they stay home during the day or leave the house? Where did they go? Did they socialize or remain isolated?

Glass says that the project—the first of its kind to gather audio, motion and geographical data in real time—is an important step in building a case for using sensors more widely in research. “The idea of getting increased accuracy and validity by removing the human brain as the mediator between us and the information is, I think, going to be a revolution in behavioral science,” he says.

In the field of gerontology, for example, the mining of data patterns through computer analysis could potentially identify seniors at risk for cognitive decline at an earlier stage than is now possible.

“We currently have no way to treat Alzheimer’s disease, and we’re not really good at preventing it once symptoms start. Part of that is that tests only reflect changes when it’s too late,” Glass says. “If we can flag people in time, we can do things like lower blood pressure, prevent minor strokes and other things that might slow down cognitive decline.”

Michelle Carlson, PhD, associate director of the Center on Aging and Health, views sensor-captured data as a path to answering complex questions about functioning “from the standpoint of integrating the body and the brain.”

Says Carlson, an associate professor in Mental Health, “I think it’s the future of data collection in terms of helping us find targets for intervention.”

In Glass’s work on neighborhoods, he has a particular interest in the theory that living in a dangerous environment increases a person’s chances of becoming disabled as an older adult. He’s excited about being able to combine information on neighborhood safety—911 calls, violent crime numbers, vacant buildings and other statistics—with sensor data that measure social interactions and that can indicate stress through voice patterns.

“The idea is to provide stronger evidence that where you live matters for health, so that we have more reason to worry about it as a society and make different choices about how we allocate resources,” he says.

Glass has applied for grants to study stress in young drug addicts with sensed, real-time data. Ultimately, he hopes to establish a center for sensor-based research in public health to improve the measurement of complex human behaviors. “Everything we care about in public health—fundamental rock bottom—is about complex behaviors,” he says, “taking drugs, what we eat, physical activity, who we have sex with, who we love—and they’re all extremely difficult to measure the way we’ve been doing it.”

—Jackie Powder

HIGHWAY CONGESTION
Living near busy roadways increases the odds of developing allergies and asthma, according to a January report in the Journal of Allergy and Clinical Immunology. In a study of teens living next to a busy road in Lima, Peru, William Checkley, MD, PhD, assistant professor of Medicine and International Health, and colleagues found that the youths showed a 30 percent greater chance for allergies to dust, pet hair and mold and potentially twice the risk of having asthma symptoms and/or requiring medications than those who lived a quarter mile away.

KIDS, PARENTS AND FOOD
Contrary to popular belief, parents may have a limited influence as role models on their children’s eating behaviors, writes International Health and Epidemiology associate professor Youfa Wang, MD, PhD, MS, lead author of a study in the December 2010 Journal of Epidemiology and Community Health. The analysis of research from different countries published since 1980 found weak parent-child resemblance in dietary intakes. This indicates that factors such as schools, peers and the local food environment may have a greater influence on children’s diets.

A TROUBLING TREND
Baltimore’s persistently high rates of HIV prevalence and unrecognized HIV infection among African-American men who have sex with men (MSM) indicate an urgent need for increased prevention strategies, according to a February study published in the Journal of Acquired Immune Deficiency Syndrome. Lead author Danielle German, PhD ’09, MPH, assistant scientist in Health, Behavior and Society, reports that in 2008, 45 percent of black MSM were HIV positive—making them 2.5 times more likely than white MSM to be infected—and of this group, 77 percent were not aware of their HIV status.
Though obesity has reached epidemic proportions in the U.S.—nearly one in three adults falls into that category—60 percent of physicians in a recent study did not give obese patients weight-related counseling. And, as it turns out, physicians are even less likely to offer such guidance to obese patients who are black.

That finding was a surprise for Sara Bleich, PhD, an assistant professor in Health Policy and Management, who led a study to see if race concordance (when a doctor and patient share the same race) affects weight-related counseling. She wanted to know, for example, would a black doctor talk more about healthy lifestyle choices with a black patient? Bleich found that blacks received less weight-related counseling regardless of their physician’s race. “That result was pretty striking,” she says. She found, for example, that white physicians were 50 percent less likely to offer exercise counseling to black obese patients as compared to white obese patients. And black physicians were 65 percent less likely to offer weight-reduction counseling to blacks compared to whites.

The study, published online in January in *Obesity*, focused on obese patients and looked at survey questions that asked physicians whether they gave counseling about weight reduction, diet and nutrition, or exercise. Pulled from a national survey, the 2,000 randomly selected physicians and their patients represented all geographic regions of the U.S. The surprising findings left Bleich and her colleagues with more questions than when they started. “We don’t know exactly what’s going on there,” Bleich says. “If you’re a black obese patient, why are you getting inferior care?”

The answer undoubtedly involves a variety of complicating factors, including social and economic issues, says Bleich. She speculates that physicians on the whole may have a more negative perception of obese black patients—they might think these patients are less likely to follow through after counseling, lack resources like healthy food options or access to gyms, or are more likely to engage in risky behaviors.

This latest finding comes as Bleich continues to push toward her larger goal of finding ways to improve obesity care.

Bleich wonders whether time-pressed doctors, faced with patients who have chronic illnesses such as hypertension and diabetes, find it too daunting to spend precious minutes on weight-related counseling—even though such problems often stem from obesity.

“Should it really be in the hands of physicians?” Bleich asks. Would dietitians or nutritionists—people with time to provide ongoing support—be better suited to providing obesity care?

To find out, Bleich is surveying physicians, this time to find out what assistance they need to provide better weight-related counseling, as well as the extent to which they feel it is their job to do so in the first place.

—Amy Dusto

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Findings about race and weight counseling surprised researcher Sara Bleich and her colleagues.

"If you’re a black obese patient, why are you getting inferior care?"

—Sara Bleich

For urban youth suffering from social-emotional difficulties, behavior problems and poor academic performance, a school-based mindfulness intervention involving yoga-based movement can be a positive antidote, according to a new study by Tamar Mendelson, PhD, assistant professor in Mental Health.

A pilot randomized-controlled trial conducted in four Baltimore public schools suggests that the 12-week intervention (held four times per week, for 45 minutes each) significantly reduced stress responses such as rumination, intrusive thoughts and emotional arousal. Mindfulness practices may help the students’ ability to regulate thoughts and emotions, says Mendelson.

Her research appeared in the October 2010 issue of the *Journal of Abnormal Child Psychology*.

—Christine Grillo
Sometimes hunger is the mother of invention. In 1991, when Cuba lost its comradely support from the collapsing Soviet Union, the island country faced a sudden food crisis. It had no choice but to reinvent its agriculture. Once a sugar crop monoculture, this socialist nation now puts mostly organic, sustainably farmed fruits and vegetables on Cuban tables 365 days a year.

At the time of the USSR’s collapse, Cuba had relied for 30 years on trade with the Soviets, receiving above-market price for sugar, while buying heavily discounted oil, pesticides and fertilizers, and importing much of its food. Without Soviet support, Cubans found themselves largely unable to import, farm or even put gasoline in their tractors.

A decade of dire straits followed. Dubbed by Fidel Castro the Special Period in Peace Time, this era precipitated an involuntary reduction in the average Cuban diet from about 2,900 calories a day to 1,900. Some research suggests that the average Cuban lost 20 pounds during the Special Period.

But during this time, Cuban agriculture metamorphosed. Forced to use the resources available, and unable to transport sufficient food from rural to urban areas, farmers found ways to bring agriculture into the cities, improving both food access and food security.

Earlier this year, two senior research program coordinators from the Center for a Livable Future (CLF) traveled to Cuba as part of a delegation to learn from models in the agricultural metamorphosis. Jesse Kurtz-Nicholl and Sarah Rodman observed the intensive growing systems that yield 11 crop cycles a year.

“Everything is planted by hand,” says Kurtz-Nicholl, MPH ’10. “And the second they harvest, they infuse the soil with nutrients so they can start again.” Says Rodman, MPH ’10, “Cuba is actively working on research that hopes to show a diversified, organic, sustainable system can be just as productive while protecting the soil and using fewer inputs.” (In March, the UN published a report attesting that eco-farming can double food production in 10 years in low-income countries.) The researchers will share their findings in lectures for food production and sustainability courses, and Rodman will present findings about Cuban systemic support of urban agriculture at the annual meetings of the Agriculture, Food, and Human Values Society in June.

While there, the researchers studied Cuban farming methods. Via vermicomposting, farmers use worms to create fertilizer from waste. By planting multiple species of plants in the same bed—intercropping—soil is enhanced and pests are confused. And for further pest control, farmers rely on crops such as oregano, marigolds, roses and basil to either repel or lure away invasive insects. In rural areas, oxen, not tractors, pull carts and plow fields.

It’s not unusual to see farms outside of apartment buildings, or in former parking lots, or even in reclaimed dumps, say the researchers.

The Ministry of Public Health conducts regular soil testing and provides farmers with rat poisons that are made from natural materials and can be placed alongside gardens. The Ministry of Agriculture sends specialists four times a year to every growing site to share information and gather data on pests. Also, farms are obligated to provide a quota of food directly to institutions such as schools or hospitals, guaranteeing food access and security for citizens.

“If you wanted to start an urban farm here [in the U.S.],” says Rodman, “you’d have to be your own advocate. In Cuba, you can be part of a co-op that shares seeds, shares tools, buys together…. I think we can learn from these models.”

Although the country has succeeded in the produce market, protein still poses a problem. Cuba imports much of its poultry, mainly from the U.S. (The current U.S. embargo of Cuba prohibits the import of Cuban products but allows exports.) The next hurdle for those who want to further develop sustainable agriculture and self-reliance in Cuba is to sustainably incorporate farm animals into the current organic agriculture systems.

—Christine Grillo
Needle-Free Measles Vaccine

Vaccines are a key way to reduce childhood mortality. But getting vaccines to those who need them, especially in countries with limited resources, continues to pose a public health challenge. A new method of delivery could hold a solution: Bloomberg School researchers have conducted the first successful test of a dry powder measles vaccine. While such systems are used to administer medications and antivirals, there are currently no dry powder vaccines in use. Their employment for vaccines could mark a sea change in how other childhood vaccines—such as mumps and rubella—are delivered.

"It's a single dose, and the dry powder is quite stable. This would just make delivering vaccines much easier—for both regular immunizations and mass campaigns," says Diane E. Griffin, MD, PhD, one of the researchers who led the recent test.

The current liquid form of the vaccine poses further problems during delivery—injections require a trained health worker and there are many well-documented problems involving safe use of needles and syringes, particularly in developing countries with limited health resources. "All of these things are hindrances to getting the kind of coverage with measles vaccines that you need. It isn't that you can't, but in developing countries it's a problem."

Though the prevalence of measles has decreased, it continues to be one of the top 10 causes of childhood mortality worldwide. Vaccination is the most effective means of preventing measles. Recent measles outbreaks in sub-Saharan Africa indicate that maintaining immunization levels is still a battle in the developing world.

Griffin and researchers tested the dry powder vaccine on rhesus macaques using two types of inhaler models with masks.

The formulation of the live vaccine is the same as with the liquid version—what is new is the size of the particles. The dry powder tested by Griffin and colleagues was developed by Aktiv-Dry, a Colorado company specializing in stable dry powder formulations. "The trick with dry vaccines is that they need to be fine enough to get deep into the lung—not get stuck up in the nose, mouth and throat," says Griffin. Aktiv-Dry received funding from a 2005 Grand Challenge grant from the Gates Foundation to develop the dry powder vaccine.

Perhaps most promising, in the initial trial the dry powder vaccine appeared to be more effective in producing antibodies than the injected version. "Measles is usually spread by the respiratory route, and the idea is perhaps you would induce a better, or a more natural, immune response," says Griffin.

She notes that further testing is required to demonstrate whether the increased antibody response is the result of increased efficacy or simply higher concentrations of the vaccine due to the different delivery method. The vaccine will now undergo clinical trials in India, where it is manufactured.

—Phoebe Connelly

MSPH Degree Debuts

A renamed master’s degree program—the Master of Science in Public Health (MSPH)—debuted at the Bloomberg School this academic year as a way to better define the professional degrees that were previously offered through the Master of Health Science (MHS) program.

"It's really bringing clarity to it as more of a professional degree," says associate dean for Student Affairs Michael Ward, MEd, of the MSPH. The degree—which is offered by the departments of Environmental Health Sciences; Health, Behavior and Society; Health Policy and Management; International Health; and Population, Family and Reproductive Health—is geared toward students who want to combine a more focused classroom experience with practical training to begin or advance their public health careers. MSPH alums may go on to hold positions in health departments, international disaster relief organizations, health education programs or other practice-oriented roles in public health, says Ward.

The MHS academic degree programs continue to prepare students for further graduate study or research careers and are offered by all academic departments at the School.

—Jackie Powder
Tradition can exact a heavy toll on women’s health.

In the cities and villages of northern Nigeria, for example, cultural taboos forbid pregnant women from eating certain nutritious foods like milk or eggs. Other traditions dictate that women have their first child at home—making it more difficult for a skilled birth attendant to be present for delivery and increasing risks for mother and baby. Perhaps most dangerous of all, girls often marry very young and sometimes conceive as early as age 11—creating grave risks for girls not yet physically ready to have a baby.

In such cultures, outsiders’ efforts to change traditions often are rebuffed. “It’s not likely that a technical professional from overseas would be able to pass the message across in a culturally acceptable way to the community,” says Oladosu A. Ojengbede, MBBS, a professor of Obstetrics and Gynecology at the University of Ibadan in Nigeria.

The solution? Work with traditional rulers. Ojengbede and the Bloomberg School’s Bill and Melinda Gates Institute for Population and Reproductive Health are collaborating with Nigerian emirs. The political and religious leaders wield enormous power. In traditional communities, their words carry the weight of decrees that must be obeyed. “The emirs are the very strong bridge between the government and community members,” says Ojengbede, a longtime Gates Institute collaborator. “They are also agents of change. They can transform old, negative practices into progressive new practices that improve health at the community and household level.”

The collaboration began in 2008 when Gates Institute director Amy Tsui, PhD, Ojengbede and others were introduced to the Emir of Suleja by Nigerian Rep. Saudatu Sani and soon began exploring options for collaboration. In November 2010, the Gates Institute and the International Vaccine Access Center brought the emirs of Suleja, Birnin Gwari and Damaturu to Baltimore to learn about maternal and child health issues. Faculty experts, including Janet DiPietro, David Paige and Henry Mosley, briefed the emirs on fetal and child development, risk factors for maternal mortality and morbidity, and other topics. The rulers also learned about the science behind public health staples such as attended births, child spacing, breastfeeding, immunizations and nutrition. In addition, the emirs saw a documentary about the risks for obstetric fistula and even death that pregnancy poses for girls.

The November meeting helped the emirs understand the significant role they could play in the health of their people. “They never knew how helpful their involvement could be,” says Ojengbede, director of the Centre for Population & Reproductive Health at Ibadan. They learned that a community’s health depends on much more than doctors and hospitals.

“I learned a lot. I can tell my people what they can do to lead a better life, a healthier life,” says His Royal Highness Zubair Jibril Maigwari II, Emir of Birnin Gwari. “Some of the things we saw made us feel there is need for intervention. Even though we can’t do it directly ourselves, in concert with the state and local governments, we can.”

The emirs who visited Baltimore will present what they have learned to the Sultan of Sokoto. The Sultan is both the cultural leader of more than 100 traditional rulers in the northern part of the country and the spiritual leader of all Muslims in Nigeria. The hope, according to Ojengbede, is that the Sultan and the other emirs will endorse maternal and child health efforts for their people. The emirs can also mobilize communities to create and maintain specific health programs, for example, increasing community immunization coverage to improve child health.

The three emirs who visited Baltimore have become greater advocates for maternal and child health, says Tsui.

“A statement by an emir who says girls shouldn’t be married so young or prioritizes women getting adequate obstetric care will go a long way,” Tsui says. “An emir who says it’s appropriate to use contraception between births to space the births sends a tremendously powerful message.”

—Brian W. Simpson
Warning: Deadlier Heat Waves Ahead

In the second week of July 1995, a high-pressure air mass stalled over the Midwestern U.S. In the cities and countryside below, the temperature began to climb. On July 12, the temperature reached 98 degrees in downtown Chicago. The following day, it hit a searing 106, with a nighttime low of 84. Over the next two days, the high stayed around 100.

In the city’s poorer neighborhoods, elderly people who either had no air conditioning or could not afford to use it suffered, and some died.

“Subsequent studies have estimated that more than 700 excess deaths occurred in the hottest part of that summer,” says Roger Peng, PhD, MS, author of a new analysis suggesting that deadly hot spells in cities like Chicago could get much hotter and deadlier before this century is out.

Peng, an associate professor in Biostatistics, took an interest in future heat wave mortality after reading a climate-modeling paper in Science in 2004, which predicted worse and more frequent heat waves for two exemplar cities, Chicago and Paris, as human-caused climate change increased. “I thought that was a very interesting paper, and wondered about the implications in terms of public health,” Peng says.

Peng had previously done analyses linking air pollution indices to increases in mortality—increases that show up as statistically significant moves above the normal background death rate.

“I thought, why don’t we use the same tools to estimate excess mortality risk from past heat waves, then use climate models to project those estimates into the future? There haven’t been many studies showing how climate change will affect human health,” he says.

Peng worked with several co-authors, including Claudia Tebaldi, who is a climate statistician at the University of British Columbia and senior author of the 2004 Science paper. They calculated excess hot-weather mortality for the Chicago area in the final two decades of the 21st century, under several climate scenarios. “Naturally, our excess mortality estimates varied with these [scenarios],” says Peng. “But under every scenario, excess mortality was greater than what one would expect from population growth alone. In fact, for some climate projections, we could expect the mortality equivalent of more than one 1995-type heat wave every year.”

The study, which appeared online in December in Environmental Health Perspectives, estimated that Chicago summers in the years 2081-2100 would claim between 166 and 2,217 excess deaths annually, depending on the climate scenario and model used.

The analysis didn’t take into account a number of factors, including the possible mortality offset from warmer winters. But Peng observes that “climate change in general is thought to be pushing the weather to greater extremes, so hotter summers could end up being only part of the climate-change health problem.”

—I Jim Schnabel
Better Times for Vital Statistics

The top-cited paper in the journal *Pediatrics* every year is usually the “Annual Summary of Vital Statistics,” a compendium of data of interest to pediatricians, obstetricians and other health care trend watchers. However, the Summary’s popularity tends to obscure a significant problem, says Bernard Guyer, MD, MPH, an emeritus professor in Population, Family and Reproductive Health (PFRH), and a senior author of the Summary since 1994. “The data we’re publishing now in 2011 are from 2008—and they’re preliminary data at that, showing that our vital statistics reporting system is hopelessly untimely.”

Currently, the CDC obtains the data from state governments, which take them from birth and death certificates and similar documents, primarily collected for legal record-keeping reasons.

“When you’re thinking in a legal mode, a case doesn’t get closed until every ‘i’ is dotted and ‘t’ is crossed. So the data end up being delayed until every case is accounted for,” he says.

Guyer has been urging policymakers to change the system into a surveillance-oriented public health data system based on the electronic records that states increasingly use. “We now have the tools to create a data system that could tell us how many births and deaths occurred in the nation as recently as yesterday!” he says.

Even delayed data, however, have value, and the article makes the best use of the vital statistics data that are available at the time. On the radar screen this year is a continuing increase in the proportion of births to older women.

“The increase has been the largest for women over 40, who showed a 3 percent jump in fertility between 2007 and 2008,” says Donna Strobino, PhD, Guyer’s co-senior author on the Annual Summary and a fellow PFRH professor. “Women 35 and over now account for a larger proportion of births than do teenagers.”

Women who delay motherhood into their 30s and 40s may be satisfying other life goals, but Strobino notes that this delay seems to be coming at a cost. “Although rates of low birthweight and preterm births have been stagnant or slightly declining for all mothers, they generally have been rising for non-Hispanic white mothers, whose over-40 birth rate is higher than that for most other groups,” Strobino says. “Older women in general are more likely to have low birthweight babies, preterm births and multiple births.”

At the same time, the birth rate for America’s teens—“the highest teen birth rate in the developed world,” says Strobino—has resumed its long-term decline after an alarming uptick in the 2007 statistics. “I suspect that the move from 2006 to 2007 was just a hiccup, rather than a real reversal of the downward trend we’ve been seeing since 1990,” she adds.

The downward trend has not, however, brought the U.S. close to the relatively low average teen birth rate for other developed countries.

The Annual Summary this year was produced with the help of co-authors T. J. Mathews, MS; Arialdi M. Miniño, MPH; and Michelle J. K. Osterman, MHS, of the CDC’s National Center for Health Statistics.

—Jim Schnabel

### REPRODUCTIVE SHIFTS IN THE U.S.

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<th>Metric</th>
<th>2008</th>
<th>1990</th>
<th>1915</th>
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<td><strong>GENERAL FERTILITY RATE</strong> (births per 1,000 women ages 15–44)</td>
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<td><strong>LOW BIRTHWEIGHT BABIES RATE</strong> (percent)</td>
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<td><strong>CESAREAN DELIVERY RATE</strong> (percent)</td>
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<td>22.7</td>
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Source: "Annual Summary of Vital Statistics: 2008," Pediatrics; Published online December 2010
CAAT Celebrates 30 Years

Thirty years ago, when the cosmetics industry was under fire for animal use in routine safety testing, the Johns Hopkins Center for Alternatives to Animal Testing (CAAT) was founded. Since then, CAAT has promoted alternatives to animal use in research, product safety testing and education. Its guiding principles are the three Rs: replace animal tests when possible, reduce the number of animals to the minimum necessary and refine methods to reduce pain and distress.

Since CAAT’s inception, there has been a dramatic increase in the number of animal replacement technologies, especially those involving in vitro cell cultures. CAAT will celebrate its 30th anniversary at the 8th World Congress on Alternatives and Animal Use in the Life Sciences in August, in Montreal. The first World Congress, held in 1993 in Baltimore, was organized by CAAT.

—Christine Grillo

Not Tonight, I Have Autonomy

When African women have more decision-making power, they tend to have less sex.

The finding, based on standard survey data from about 24,000 married women in six sub-Saharan countries, appears online in February in the *Journal of Sex Research*, and is the first to link sex frequency to women’s autonomy, according to lead author Michelle J. Hindin, PhD, MHS, an associate professor in Population, Family and Reproductive Health.

What causes this linkage isn’t clear, but Hindin suggests that African women’s lack of sexual enjoyment is a possible factor. “It’s not to say that sex is never enjoyable for women in these countries,” she says. “But there is some research indicating that cultural practices make it less enjoyable than it could be.”

The United States Agency for International Development (USAID) sponsors periodic Demographic and Health Surveys throughout sub-Saharan Africa, and Hindin and PhD student Carie Muntifering used the most recent survey data from representative countries in the region—Ghana, Malawi, Mali, Rwanda, Uganda and Zimbabwe. They compared women’s answers about the time since their most recent intercourse—a proxy for sex frequency—to answers about their roles in typical household decisions, such as everyday purchases.

The researchers then took into account several factors already known to influence sexual frequency, such as women’s age and employment status, and whether their husbands were living with them. “Even after accounting for these confounding factors, we found signs of a strong relationship between higher autonomy and lower sex frequency in the survey data from each of these countries,” says Hindin.

The findings represent an epidemiological snapshot of women’s responses, and while they suggest that autonomy and sex frequency are somehow related, they don’t prove that one directly causes the other. However, other studies have shown that in some of these countries, sexual pleasure tends to be enjoyed primarily by men. Some African women even engage in practices, including the use of herbs to dry the vagina, that are aimed at improving men’s pleasure—but can make their own experience of sex a painful one.

Research in this area could enable more effective programs for preventing unwanted pregnancy and sexually transmitted diseases. “Women who have more autonomy may be able to have a more important role in deciding when to have sex,” says Hindin. “This, in turn, could influence their risk of unwanted pregnancy and STIs.”

It also suggests that women’s sexual enjoyment is a potential public health issue. “We haven’t often looked at sex this way, but with data like these, I think we need to consider doing so.”

—Jim Schnabel

“Women who have more autonomy may be able to have a more important role in deciding when to have sex. This, in turn, could influence their risk of unwanted pregnancy and STIs.”

—Michelle Hindin

African women who are empowered tend to have sex less frequently, according to a new study.
Women Benefit from Male Circumcision, Too

Rakai researchers may make new breakthroughs in prevention by drawing on what is possibly the world’s largest foreskin collection.

Women in the developing world looking for protection from cervical cancer have another reinforcement to add to their arsenal: male circumcision. Bloomberg School researchers Maria Wawer, MD, MHSc, and Aaron Tobian, MD, PhD, have finished a multiyear study that shows the efficacy of male circumcision as a means of reducing the rate of HPV infection among women.

Human papillomavirus (HPV) can cause genital warts and cervical cancer. In the developing world, where 85 percent of infections occur, the situation is dire: WHO estimates that about 33 percent of East African women are harboring HPV. Cervical cancer is the leading cause of cancer death among women in Uganda, where the study took place.

Women partnered to circumcised men have a 25 to 30 percent reduction over time in the number of HPV infections, according to Wawer, a professor of Population, Family and Reproductive Health, and Tobian, an assistant professor of Pathology at the School of Medicine. Though encouraged by the finding, Wawer cautions that couples should still practice other forms of safe sex. “Don’t think of this as a magic bullet,” she says. “It’s part of a program of protection.”

In the study, 5,000 uncircumcised HIV-negative men enrolled, together with their HIV-negative female partners. Then researchers randomly assigned men to be circumcised, either immediately or at the end of two years. Everyone was tested for infections at the beginning, middle and end of the study. Circumcised males had lower rates of HPV infection, likely because the procedure makes carrying the disease more difficult, says Wawer. And, as suspected, so did their female partners.

The parallel effect occurred because male circumcision both reduced the number of new male infections and increased the proportion of men with HPV at the time of enrollment who subsequently cleared the virus. “We hypothesize that the foreskin mu cosa is an important site for infection,” notes Wawer. “Without this focal site, there is higher clearance at other sites along the male genital tract and less reinfection of other sites by the virus when it is no longer shed by [cells within] the foreskin mucosa.”

Since fewer men were infected, fewer transmitted HPV to their partners. A bonus: Wawer says that about 40 percent of women in the study reported being more sexually satisfied after the man’s circumcision, mainly because of better hygiene.

She and her colleagues have been studying a broad range of HIV-related matters since the late 1980s in the Rakai region of Uganda, where they founded the Rakai Health Sciences Program. The researchers made headlines several years ago with a study showing that circumcision dramatically reduced men’s chances of contracting HIV from infected female partners.

The Program provides thousands of circumcisions at no cost to men through PEPFAR funding. As a result, the site has what is possibly the world’s largest collection of foreskins, which are “immediately whisked away,” says Wawer, “because we do have a real kick-ass lab right there in rural Uganda.” The Rakai researchers are using the tissues to study how immune defenses in the mucous membranes protect the body from infections. Inadvertently, they are also discovering hundreds of new bacteria under the foreskins—enough that “everybody working on the project could probably have a bacterium named after them,” Wawer says. —Amy Dusto

In Memoriam

Frank Garland, PhD ’81, an epidemiologist and professor of family and preventive medicine at University of California, San Diego, died in August at age 60. His work with his brother, Cedric Garland, helped establish a link between vitamin D deficiency and colon cancer, and other cancers.

Alison Geyh, PhD, an associate professor in Environmental Health Sciences, died on February 20 at the age of 52, after a long battle with cancer. A chemist, Geyh was known for her work on air pollution and its impact on health. After the attacks on the World Trade Center on September 11, 2001, she researched the health of cleanup workers, setting up air monitoring stations and collecting data.

John “Jack” Griffin, MD, founding director of the Johns Hopkins Brain Science Institute, professor of neurology, neuroscience and pathology, and husband of Diane Griffin, chair of MMI, died on April 16 at age 69. He and Diane were elected to the Institute of Medicine in 2004.

Kathleen Polk, retired T. Rowe Price vice president and activist, died in December at age 65. Mrs. Polk’s late husband was Frank Polk, an Epidemiology professor known for his extraordinary work in HIV/AIDS. The School is establishing the B. Frank and Kathleen Polk Faculty Support Endowment Fund to support junior Epidemiology faculty. (Donations may be made to JHU and mailed to the Dept. of External Affairs, JHSPH, 615 N. Wolfe Street, E2132, Baltimore, MD 21205.)

Andrew A. Sorensen, PhD, MPH, MPhil, senior vice president for university development at Ohio State University and associate dean at the School from 1984 to 1990, died on April 17 at age 72. Previously, he served as executive director of the AIDS Institute at Johns Hopkins and as dean of the School of Public Health at the University of Massachusetts at Amherst. He served at the University of South Carolina, the University of Alabama and the University of Florida, as well.
Global Health Snapshot / Neglected Tropical Diseases

They disfigure, blind, disable, stigmatize and kill an estimated 1 billion people worldwide—the poorest of the poor. Yet neglected tropical diseases (NTDs) have traditionally ranked low on health agendas.

WHO’s first report on 17 NTDs—published in October 2010—rejects the notion of “waiting for the diseases to gradually disappear as countries develop.” Instead, it recommends preventive chemotherapy, intensified case management, vector control, veterinary public health, and safe water, sanitation and hygiene.

Buoyed by new interventions and research, as well as recent support from donors, pharmaceutical companies and NGOs, WHO asserts that control of NTDs is possible and elimination is a feasible goal.

TRACHOMA
A chronic conjunctivitis caused by the bacterium Chlamydia trachomatis and transmitted by contact with infected secretions.

Symptoms: Inflammation under eyelid. Multiple untreated infections can cause scarring, turned-in eyelashes leading to corneal damage and, ultimately, blindness.

Treatment: Community-wide administration of single-dose antibiotics; surgery for turned-in eyelashes

Prevention: Hand- and face-washing; sanitation improvements

Location: Concentrated in Africa

Prevalence: 41 million cases

Trending: Prevalence has fallen sharply since 1985 when 360 million people were infected.

Fact: Women are four times more likely to have blinding trachoma than men (largely because of frequent proximity to children, who are reservoirs of infection).

Target the Community: “Antibiotics, increased water availability and keeping face, hands and clothes clean are really what I see as the approach targets to removing infection in these communities.”

Sheila West has conducted clinical trials on trachoma treatments for the disease in Tanzania, Ethiopia and Niger.

LYMPHATIC FILARIASIS
The disease, which can lead to elephantiasis, is caused by parasitic worms and transmitted by mosquitoes. Adult worms nest in a person’s lymphatic system, producing millions of larvae that circulate in the blood.

Symptoms: Swollen arms, legs or genitals; also damage to kidneys and lymphatic system

Treatment: Swelling of arms and legs can be reduced by rigorous hygiene or reduction surgery.

Prevention: Mass administration of drugs to at-risk populations to reduce parasite burden and interrupt transmission via mosquitoes

Location: Africa, Southeast Asia and South America

Prevalence: 120 million cases in 81 countries

Trending: WHO aims to eliminate it by 2020.

Fact: Over half of infected people have no outward signs of infection.

Secretive Parasites: “[I study] how filarial parasites establish decades-long infections and not generate a reaction that causes them either to be rejected or cause significant pathology.”

Alan Scott focuses on the immunobiology of host-parasite interactions.

LEPROSY
A chronic bacterial infection caused by Mycobacterium leprae and transmitted by droplets from the nose and mouth. The pathogen has an incubation period of about five years.

Symptoms: Mild skin lesions. Untreated, leprosy can cause severe and disfiguring skin lesions and permanent damage to nerves, upper respiratory tract and eyes.

Treatment: Multidrug therapy

Prevention: Early diagnosis and treatment of infected individuals

Location: Mainly Asia and Africa

Prevalence: 211,903 registered cases worldwide (2009)

Trending: New cases dropped 4 percent between 2007 and 2008.

Observation: Some new leprosy cases in China appear to have been transmitted via infected water or soil, not by close contact with leprosy patients—the traditional route.

Early Detection: “Our research focuses on developing a diagnostic test to detect the disease early enough and start treatment before the nerve-damaging lesions occur.”

Ying Zhang, an expert on drug-resistant TB, is conducting leprosy research in southern China, with Huan-Ying Li, MD, MPH, ’52.

LEISHMANIASIS
A spectrum of diseases caused by the protozoan parasites (Leishmania), transmitted by sand flies.

Symptoms: Four types of disease range in severity, from skin sores on exposed areas to lesions that can destroy mucous membranes. In severe form, parasites cause swelling of spleen and liver.

Treatment: Antimony-containing compounds; also used: amphotericin B and fluconazole

Prevention: Bednets

Location: Southeast Asia, Middle East and South America

Prevalence: 12 million people infected worldwide

Trending: 1 to 2 million new cases each year

Fact: Drug-resistant Leishmania strains have been identified; need for new therapies is growing.

Devastating Loss: “As a student, I was struck by the amount of tissue destruction this parasite can cause. Skin breakdown [sometimes] can result in permanent disfigurement.”

Jay Bream focuses on the role of cytokines (soluble proteins) in disease susceptibility.
Why do the diseases still exist? One reason is that they lack the attention given high-mortality diseases, says International Health professor William Brieger, DrPH ’92, MPH. “Of course, there are societal costs of disabilities, but they’re not as widely documented as deaths from HIV, TB and malaria,” Brieger explains.

Another reason is that health services are difficult to access in remote areas and urban slums. Surgery is an option in some cases, but medical facilities and health workers are in short supply. Brieger recently returned from Chad, where there are only several hundred doctors serving 11 million people. “And about 20 percent of the health facilities are not functional,” he says. “When a situation is that extreme, how can you deliver the services?”

—Jackie Powder

### CHAGAS DISEASE

A life-threatening illness caused by the parasite Trypanosoma cruzi and transmitted by the feces of the blood-sucking triatomin, known as the "kissing bug."

**Symptoms:** Fever, headache and muscle pain; also can be asymptomatic in acute phase. In latent phase, parasites hide in heart and other cells, often leading to cardiac arrest and premature death.

**Treatment:** Benznidazole and nifurtimox for acute phase

**Prevention:** Insecticides (indoor), blood-bank screening, screening of pregnant women and children of infected women

**Location:** Mainly in Latin America

**Prevalence:** 10 million people infected

**Trending:** Decreased from 20 million cases in 1981 to 10 million in 2009

**Fact:** Of 10 million people infected, 2 to 3 million will die prematurely of heart disease.

**Better, Safer Drugs:** “At least 60 percent of children with chronic T. cruzi infection can be cured, and treatment of adults decreases progression and mortality. But the drugs have significant toxicity and better, safer drugs are urgently needed.”

Robert Gilman, a tropical disease expert, conducted research in Peru for more than 25 years.

### DENGUE

A mosquito-borne viral infection causing a severe, flulike illness. Multiple infections may lead to the potentially lethal dengue hemorrhagic fever.

**Symptoms:** Flulike symptoms; severe form may result in shock caused by leaking blood vessels

**Treatment:** No specific treatment; supportive care only

**Prevention:** Insecticides and environmental management; personal protection

**Location:** Originally concentrated in Southeast Asia, it has spread rapidly to Central and South America over the past 20 years, as well as India, Australia and the Caribbean (most recently, Florida).

**Incidence:** 50 to 100 million dengue infections worldwide every year

**Trending:** 30-fold increase in incidence in last 50 years

**Fact:** Virus comprises four serotypes. After infection with one serotype, an infection by another increases risk of dengue hemorrhagic fever.

**A Quadruple Threat:** “A vaccine has to protect against all four serotypes. If it doesn’t, you could actually set up a vaccinated population to have more severe disease [later]. That’s not something we see with other human diseases.”

Anna Durbin is collaborating on a clinical trial in Brazil that tests the safety of a tetravalent vaccine against dengue.

### BURULI ULCER

A severe skin disease caused by Mycobacterium ulcerans.

**Symptoms:** Toxin mycolactone, produced by M. ulcerans, causes large, deep ulcers that can attack muscles and bones. Untreated, it can cause permanent disability.

**Treatment:** Antibiotics streptomycin and rifampicin; surgery for advanced cases

**Prevention:** Researchers are working to understand how infection is transmitted and to develop a vaccine.

**Location:** Mainly in West Africa, including Ivory Coast, Ghana and Benin

**Prevalence:** Very little accurate information; disease has been reported in 33 countries.

**Trending:** No clear trend; increase in cases in West Africa in past decade

**Fact:** Method of transmission is unclear, however, most patients live in marshy areas, indicating that infections may occur in aquatic environments.

**A Disease of Development:** “I think there is a lot of evidence that development in rural areas [including construction that creates slow-moving water and bad drainage] has a role in the expansion of the disease.”

Jacques Grosset is an international authority on Buruli ulcer and is developing an early diagnostic test and a shorter treatment course.

### OTHER NTDs:

- Cysticeriosis
- Dracunculiasis (guinea-worm disease)
- Echinococcosis
- Endemic treponematoses
- Foodborne trematode infections
- Human African trypanosomiasis (sleeping sickness)
- Onchocerciasis (river blindness)
- Rabies
- Schistosomiasis
- Soil-transmitted helminthiases (intestinal parasitic worms)

Sources:

- Jay Bream, PhD, assistant professor, Molecular Microbiology and Immunology (MMI);
- Paul Converse, PhD ‘84, MHS ‘80, research associate, Johns Hopkins Center for Tuberculosis Research; Anna Durbin, MD, associate professor, International Health; Robert Gilman, MD, professor, International Health; Jacques Grosset, MD, professor, Johns Hopkins Center for Tuberculosis Research; Alan Scott, PhD, professor, MMI;
- Sheila West, PhD, PharmD, professor, Epidemiology, El-Maghraby Professor of Preventive Ophthalmology, Wilmer Eye Institute;
- Ying Zhang, MD, PhD, professor, MMI;
As the truck carrying Tom Kirsch crossed the Dominican Republic’s border into Haiti, the nation’s telltale signs of poverty—the primitive shacks, bare brown earth—came into view. There was no evidence of further catastrophe, of things that are even worse than the usual, grim day-to-day reality. That would change a few hours later when he wheeled into downtown Port-au-Prince, the Haitian capital. Two weeks earlier, on January 12, 2010, an earthquake had shaken the capital to its core, killing 237,000 people and leaving more than half of the city’s 2.5 million people homeless.

“The closer you got to downtown the more you saw people sleeping in any open space, including highway medians,” says Kirsch, MD, MPH ’87, an associate professor of International Health at the Bloomberg School and of Emergency Medicine at the Johns Hopkins School of Medicine. He serves both schools as an expert in disaster response. “Downtown itself was just horrible,” he recalls. Buildings were leveled. Streets were blocked by rubble, further hampering any relief efforts. The human toll was much worse, with harrowing examples of tragedy around each corner. An entire school of nursing students immersed in an exam—save one—was killed by the quake, which struck seven minutes before test time was up.

Even two weeks after the quake, one
in three injured or ill Haitians had not been treated. “We’re talking about terrible bone breaks and deeply infected wounds,” Kirsch says. People needed water. Food riots had erupted when some earthquake victims thought aid wasn’t being distributed equitably enough.

In the past year, Kirsch has traveled three times to Haiti, the poorest nation in the Western Hemisphere, not just to deliver emergency medical care but to ask questions about how the world and the Haitian leadership, also decimated by the quake, had responded to the crisis. Had there been enough concern about finding housing for people? How was aid being distributed? Why was health care being delivered so slowly? What were the nonprofit relief groups that regularly swarm to disaster sites doing right in Haiti? Where were they coming up short?

As co-director of the Center for Refugee and Disaster Response, a collaboration of the School of Medicine and the Bloomberg School, where it is housed, Kirsch oversees grant-funded research projects aimed at finding out what goes wrong after everything goes wrong. Which is to say, Center investigators look for ways to evaluate and, ultimately, improve the quality of relief efforts and government services during refugee crises and after tragic mega-events.

It’s painstaking work. “The trouble with trying to do research is that everyone is over-
whelmed by the need to respond immediately,” says Kirsch. “It’s hardly an ideal situation to investigate things. What we want to do at the Center is improve the way we collect data in the midst of that chaos.” Because “disaster science” is an emerging field of inquiry, the Center is still working to figure out how best to do that, he adds.

In search of a method for evaluating how dire situations can be rapidly improved, Kirsch and the other 20 or so Center-affiliated investigators study the effects of disaster relief months, even years, later in hope of uncovering similarities between emergency responses in far-flung nations. They also train disaster responders to take advantage of the latest knowledge.

Too often, programs devised and carried out by NGOs, governments or the United Nations don’t do enough to get people back on their feet. Experts say that many countries don’t have the “capacity”—money or human resources—to deal with mass tragedies. Many developing nations lack disaster plans that would take full advantage of coordination and logistics. Security concerns slow the flow of aid to places where it is most needed. In many cases, getting people back to work isn’t emphasized, leaving people in poverty for longer than necessary. And even when a disaster elicits an outpouring of support, much of it never ends up on the ground. For example, only 20 percent of the $10 billion pledged by individuals, groups and governments to post-earthquake Haiti has been delivered.

What’s more, the lessons learned from one disaster often aren’t remembered during subsequent catastrophes. “What we’ll see is that different groups and nations will collect post-disaster information in different ways,” Kirsch says. “The field cries out for standardization.”

“We want to be able to describe the longer-term impact on people’s lives, health and economic status,” Kirsch says. “When a disaster happens and the CNN cameras are rolling, there’s a lot of attention paid. But after the news trucks leave, people are often left homeless and jobless for years. People forget that.”

Adds Courtland Robinson, PhD ’04, an assistant professor in International Health and at the Center: “What I’m hoping we can bring to this field are measures that go beyond profiles of a population or risk assessments, measures that can give us what I call a durable solution. Each time we do this, we shouldn’t have to reinvent the wheel. We should be able to take those approaches that have been validated by research and put them to work.”

Even though an earthquake in the Caucasus hardly resembles a drought in the Horn of Africa, the range of disasters presents many of the same challenges. “We want to be able to standardize what we do while having a customizable approach built in,” adds Robinson.

The Right Questions
In the course of their research, Center faculty and students find approaches that work. In Indonesia, for example, Robinson and his colleagues continue to measure the effects of emergency aid that followed the tsunami that steamrolled the Aceh region six years ago.
They found that an NGO program designed to put people back to work cleaning up their neighborhoods in exchange for cash did much to encourage people to return to their ravaged communities, and accounted for 93 percent of their household income, on average, as they put their lives back together.

Specialization within the disaster research field also appears to have value, Robison adds. “What we’re learning is that if you’re going to measure the effect of an emergency on a household, you use demography to determine a rate of mortality, morbidity or other things,” he says. “For food security in a crisis, you can look to the assessments of nutritionists. The next question is whether there is a set of modules we can use across disasters that would prove effective at measuring response.”

The aim of the studies in Indonesia, as well as Haiti and Pakistan, is to find that set of comparative metrics. Investigators asked basic questions: How many people died following a disaster? How many households were affected? How many meals has each household eaten during an average day? How did the catastrophe affect a family’s finances and ability to earn a living?

Using cluster surveys, demography and other tools, scientists mine the surviving population for information that points up when help was made available and when it wasn’t, and whether people feel their needs have been served overall. In Haiti, for example, early results from a January study of households show that people there are greatly disappointed in the quality of relief services.

Others at the Center have continued years-long investigative stretches in war-torn areas, including Afghanistan and Iraq, and seven nations in East Africa that are regularly inundated by floods and landslides. In those countries, their work has led to concrete recommendations. A handful of doctors and public health scientists track disaster and response efforts in Japan, Singapore and South Korea, or examine food aid strategies in South Sudan, or monitor outflows of refugees from starved North Korea into China, or work on ways to improve the health and household economies of Iraqi refugees and displaced people in Jordan and Lebanon, as well as Gaza and the West Bank.

The Center has also helped educate disaster relief workers and planners. The Johns Hopkins School of Public Health and the Center authored The Johns Hopkins Red Cross Red Crescent Public Health Guide in Emergencies, now in its second edition. An ongoing program—Health Emergencies in Large Populations, or HELP—run by the Bloomberg School in conjunction with the International Federation of the Red Cross, has trained 500 people from a variety of countries and universities in the latest disaster response techniques, as well as in relief planning and handling refugee crises.

Although Kirsch and others will visit disaster-stricken areas right after an event hits, the Center does not function as an emergency responder, notes Gilbert Burnham, MD, PhD, MS, an International Health professor and Center co-director. “Our purpose is to analyze the depths of a crisis and point out where the response to it may be lacking, and how it might be improved,” he says.

The Center was founded in 2004 with

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_Tsunami-shattered homes in Sri Lanka, 2005_
the merger of separate programs—each run jointly by Kirsch and Burnham—at the schools of Medicine and Public Health. Since then, it has grown markedly. Before 1998, when Burnham began his own group within the School of Public Health, “there was little in Baltimore that dealt with refugees and disasters, even though our students were very interested,” says Burnham.

“We knew we needed to grow something like the Center because some students see working internationally with refugees or during disasters as a major part of their careers,” he says. “Then there are other students who know they’ll need to learn something about working overseas in general. And there’s a third group that has already been overseas, and [the students] were floored by what they saw and need to understand it more before they go back.”

Kirsch himself became drawn to disaster scenes at an early age. (When a tornado hit Omaha in 1975, Kirsch, then in high school there, joined the response efforts.) His interest continued as he pursued his MD. “Like any medical student, I wanted to save the world, so when I had the chance to work in Cambodian refugee camps in 1984, I jumped at it,” Kirsch says.

He returned to the U.S. to get his MPH at the School, steered there by James Cobey, MPH ’71, who had organized the Red Cross’ refugee relief efforts along the Thai-Cambodian border (and who still teaches in the HELP course). “Jim told me, ‘If you want to do this kind of work, you have to go to Hopkins,’” Kirsch recalls. In 1986, he took a seminar course put together by Melvyn Thorne, a School of Public Health professor and former Peace Corps doctor. “The students literally met in his living room,” Kirsch remembers. “It was one of the first attempts to quantify and teach refugee response from a public health perspective—I mean anywhere, not just Hopkins.”

The type of work the Center does is still rarely found in academia. Governments mostly welcome Center researchers—even despotic leaders want to appear competent in the eyes of the public during times of distress, Burnham says. To grease the skids, Center faculty will often arrange partnerships with government agencies to help them set up and run their research programs. Not that they’re always greeted with open arms.

“We have had staff questioned by authorities,” Robinson says of his work in China interviewing traumatized North Korean refugees. “We tell them we’re working with vulnerable populations.” China shut down data collection during the 2008 Summer Olympics. When such edicts are handed down to researchers, they have to do their work under the radar, Robinson says: “You have to hide in plain sight.”

Elsewhere, their work has spun into controversy. Burnham’s 2006 study that pinned the numbers of Iraqi civilian war deaths during the U.S. occupation at 655,000, published in the British journal The Lancet, became a political football among those defending U.S. policies. His work in Iraq since then has focused on health care systems.

“Our intention is not to get into the political side but to improve situations,” he says. Burnham’s team investigated the effects of the war on social sciences and medicine to see whether they were recovering from the war. The team found that 29 percent of Iraq’s medical specialists had left the country during 2006.

“But many had left because of assassination attempts,” Burnham says. “If you want to destabilize a country, you go after the intellectuals.” Fortunately, the situation is now looking slightly better in 2011, he adds.

The same can’t be said for Afghanistan, which Burnham calls “an ongoing humanitarian disaster.” Relief workers and disaster researchers around the world can’t do anything to shore up dicey political situations, Burnham notes. But they believe they can learn enough to prevent some types of catastrophes, or at least minimize how many people are affected by them and for how long.

He and a small team of International Health department scientists, supported by 90 full-time workers on the ground, have tracked the performance of the Afghan health system for the past nine years. Some of the team’s research on water sources and diarrhea has led to the development of national water protection policies. An assessment of hospital performance speeded up hospital reform in the nation. Their work on the spread of HIV led to major changes in Afghanistan’s HIV policies.

**Early Warning Systems**

Although countries riven by civil strife, refugee crises or war take up much of the Center’s attention, it is well acquainted with natural disasters. A five-year Center project involving several countries in East Africa has encouraged public health professionals there to develop their own plans for local disaster preparedness and response.
“There are a lot of floods and landslides in these countries,” explains Daniela Lewy, MPH ’06, a research associate for the Center who spends part of each year in East Africa working on the project. “And they are increasing, possibly because of climate change.” Lewy and Center personnel train district-level public health practitioners to assess their country’s risk for disasters and develop action plans for dealing with them. They make sure that those practitioners, who are also teachers at public health schools, have some link to national ministries, so that government policymakers take their plans seriously.

Last spring, when landslides were scarring the faces of mountains and killing villagers in eastern Uganda’s Bududa district, Lewy’s project intersected with another one run by Shannon Doocy, PhD ’04, an assistant professor in International Health and at the Center. Students from Lewy’s East African program and others began to devise inexpensive ways to measure shifts in hillsides that could portend landslides nearby. “We taught people how far apart to place two poles on a hill,” she says. “If the [poles] move a certain distance apart, that’s a sign of instability. It’s something that local people can use.”

Doocy’s group had traveled to Uganda to see if studying the terrain could somehow foretell landslides—a lifesaving early warning system of sorts that could allow people to move to safe ground before disaster strikes. A newly developed (and decidedly higher-level) technology that utilizes geographical data taken during space shuttle missions, along with a topographical mapping scheme that was aided by global positioning satellites, allowed them to find a crack in a village hill adjacent to a camp for people displaced by another landslide. “We warned the local authorities of the risk and advised them that if there was further change in the slopes, they should move people out,” says Doocy, who adds that landslides did indeed occur nearby later.

Many who have come to study in the School of Public Health enroll in the master’s-level Health in Crisis concentration, which Doocy co-directs. But the Center’s reach extends beyond Hopkins students, thanks to the Health Emergencies in Large Populations course, run by Burnham.

Craig Jaques, now a program strategy consultant with a U.S. Department of Defense agency that prepares health professionals for disaster response, took the intensive three-week course at Hopkins during the summer of 2009. Since then, he has trained dozens of people from Southeast Asia on how to construct health and medical programs during an emergency—including lessons he learned during his time at Hopkins.

“The HELP course broadened my views on the international response to disasters and got me thinking about how to deal with public health concerns,” Jaques says.

Now he regularly teaches other HELP alumni. “They utilize the course’s tools and knowledge to train others,” he adds. “They respond with confidence to health emergencies.” Recent HELP graduates have gone on to devise health systems in strife-torn Somalia, develop preventive health programs in rural Pakistan and run HIV programs in South Sudan.

Yet others, like Paul Perrin, a doctoral candidate in International Health, come to the School to study so that they can continue their work amid disasters. Perrin, formerly a missionary for the Mormon Church, began disaster work when he was 19, helping victims of an Armenian earthquake.

Now 30, Perrin believes he and others are on the cusp of some exciting findings. “It’s a young field,” he says. “Most of the research done by NGOs isn’t robust because they measure their own idea of success. They’ll ask people who get their services what they think of their work but often don’t do the same for those who haven’t. They don’t use population-based methodologies. That’s the strength of what Hopkins does.”

Biostatistics and epidemiology classes give students a broad knowledge base with which to construct studies and work them out in the field, he adds. “Hopkins teaches you that this is a scientific discipline above all, one that takes a hard look at individual disasters and how they are dealt with.”

In Haiti, Perrin personally trained locals to do interviews in the field, overcoming a language barrier. (He doesn’t speak Creole.) He says that gathering such data from the 60 sites that Center personnel systematically chose is vital in improving NGO performance. “I suspect many relief groups think we’re looking over their shoulders, but I also think they’ll be very interested in our findings,” he says. “When you get down to it, they really want to do the right thing.”
Though she doesn’t take credit for it, Joanna Cohen may have prevented her first tobacco-related death at age 5. As she and her sister climbed on their grandfather who was lying on a couch, they broke one of his ribs. His doctor did a chest x-ray and detected lung cancer. The discovery—and subsequent surgery—helped her grandfather live another three decades. Today, Cohen is taking a more conventional approach to preventing tobacco deaths. She is the new director of the Institute for Global Tobacco Control (IGTC) at the Bloomberg School. Cohen, who previously led research at the University of Toronto’s tobacco research unit, brings a scientist’s zeal for data: “Evidence is key to moving forward in tobacco control, and that’s what our role is.” During a March interview with Johns Hopkins Public Health editor Brian W. Simpson, Cohen touched on global tobacco control trends, smoke-free cigarettes, “nanny-state” accusations and her priorities for IGTC.

Where are we in terms of tobacco use globally?
It’s actually not such a pretty picture, and if current trends continue it’s just going to get a lot worse. Right now we estimate about 1.1 billion smokers in the world. The trends are for 1.6 billion by 2025. What’s more, 80 percent of those smokers would be in lower- and middle-income countries.

Why the surge in developing countries while prevalence is falling in developed countries?
Good question. The fuel of this pandemic is the tobacco companies. They have realized that the market is not growing in developed countries so they’ve really turned their attention to lower- and middle-income countries. They see them as untapped markets, and they get very excited about those markets.
Does this dramatic increase in smokers mean the WHO Framework Convention on Tobacco Control (FCTC) is a failure?
No, definitely not. It just came into force in 2005, and it requires that countries start implementing some of the protocols. They’re built around protecting people from secondhand smoke, helping people quit and preventing people from starting to smoke. We see particular support for the Framework Convention in lower- and middle-income countries because they really want to stop the spread of this scourge.

How long will it take for the FCTC to have a real impact?
It really depends on how quickly countries can implement best practice interventions. I just came back from a few days in Vietnam talking about their draft legislation to enact smoke-free public places. They’re also talking about raising taxes on tobacco and putting picture warnings on their cigarette packs. But that’s a country where the government also owns the tobacco company and so there are lots of political pressures to go slowly.

Since 1965, the U.S. has cut smoking prevalence in half. Are more regulations really necessary?
It is remarkable what we’ve been able to accomplish in the last 50 years. Who would have thought even 10 years ago that you would be able to go into smoke-free bars? The challenge in front of us is that we still have millions of smokers in this country, and there’s still the pipeline of children turning into adolescents, turning into young adults—that doesn’t stop. So there’s still more things we can do in this country.

How do you respond to people who say these are “nanny-state” regulations that limit individual choice?
I think it’s a challenging question and a fair question. I don’t think anyone would like to go into a restaurant and not have public health officials who make sure that raw chicken is kept at cold enough temperatures in the refrigerators or that you have good food-handling practices in restaurants. The government does have a responsibility to protect its citizens. We have pounds of evidence dating back to the 1950s that [cigarettes are] a toxic and defective product that kills half of long-term users. It’s just unacceptable.

What are your priorities for the Institute?
The Institute has a tremendous history. It was led by Jon Samet, who is a giant in tobacco control. As we move forward, we want to provide the evidence base for the most effective and efficient tobacco control policies, programs and activities. Building leadership capacity in countries around the world is also a key focus. Every year, we bring 100 people from lower- and middle-income countries here to Hopkins for a two-week summer institute where they are exposed to some of the best and brightest, and learn leadership skills and the evidence to be able to push tobacco control forward in their countries.

What’s the Institute’s connection with the Bloomberg Initiative to Reduce Tobacco Use?
We’re one of five partners in the Bloomberg Initiative; we are really the academic arm of this partnership. And we’re here to generate the evidence, synthesize it and translate it so that other partners can really do what they’re good at, which is advocating for change at the political level.

What do you think about smoke-free cigarettes?
These products are new, and it’s unclear actually what level of nicotine someone would get from these cigarettes. Theoretically it might be really helpful in supporting people in quitting. In practice, though, I don’t think we’re there yet.

Were you ever a smoker?
I tried smoking (laughs) almost behind the barn sort of thing, but you know those pictures of black lungs just scared me enough that I didn’t want to continue. But my parents smoked when I was growing up. There were still ashtrays in the house. They actually quit in the late ’60s, soon after the Surgeon General’s report. My Dad had an awful night, sort of a smoker’s cough, felt he was going to die and said, “If I wake up in the morning I’m not going to smoke anymore,” and he was able to do that.

If you could change one thing in the tobacco environment in the U.S., what would it be?
I’m sorry I can’t answer “one thing” because human behavior is so complex and there’s no silver bullet. You need a physical environment where these products are much harder to get than they are now, that they’re not available 24/7 on every corner. You also need an environment where you don’t see tobacco advertising and promotion wherever you go, and you need an economic environment where these are costly products. And you need a political environment where our leaders can really take this problem seriously and do something good for public health. Tobacco control in particular is an area where we really can save lives millions at a time. We really have the tools at our disposal. We now know what we need to do. We just have to do it.  

**Tobacco: The Global Killer**

- **5 million** Annual tobacco deaths, currently
- **8 million** Annual tobacco deaths by 2030, if trends continue
- **100 million** Tobacco deaths in the 20th century
- **1 billion** Tobacco deaths in the 21st century, if trends continue
- **600,000** Premature deaths from secondhand smoke annually
- **4,000** Chemicals in tobacco smoke
- **50** Carcinogenic chemicals in tobacco smoke

Joanna Cohen explains how to make a great cigarette warning label: magazine.jhsph.edu/extras
Sabra Klein forgoes a handshake, coughs by way of greeting. “Would you like one?” she rasps, sharing a bag of mentholated lozenges. “It’s not the flu. I don’t think.”

Flushed and weary, Klein plans to retreat early from her office and lab in the Bloomberg School, quarantine herself at home, rest and drink lots of fluids. But not before she infects you, via this article, with the germ of an idea she has long championed: Sex matters. In ways we never fathomed.

It matters, for instance, with the flu that Klein hopes she doesn’t have. Her ongoing studies show that females have a bigger and badder inflammatory response. They don’t just feel worse. They don’t just visit doctors more or complain more. They literally experience worse disease than males. Klein’s talking sex-based biology, not gender issues. (Although “sex” and “gender” often are used interchangeably, sex is biology while gender refers to the social constructs related to one’s sex.) Molecularly speaking, females respond differently to flu than males. They mount a more robust immune response—which sounds like a good thing, until you delve into Klein’s data and see that this heightened immunity contributes to tissue damage and even death. Females respond so differently to immunizations, she concluded, that a woman needs about half the flu vaccine dose of a similarly sized male.

Klein coughs, pops another lozenge and launches into why she loves the flu. For a dozen years, the assistant professor in the W. Harry Feinstone Department of Molecular Microbiology and Immunology has investigated infectious diseases, first focusing on hantaviruses, then malaria, now flu. The constant throughout her career has been her dogged insistence that sex matters.

That concept, neither new nor original, holds that every cell in us—indeed, every cell in the H1N1-infected mice languishing in Klein’s lab—has a sex. Advocates of sex-based biology contend that maleness or femaleness in humans as well as rodents needs to be considered, compared and contrasted in order to uncover basic biological truths about everything from heart disease and depression to lupus and liver cancer.

Klein’s data always have spoken louder to her than naysayers. As an infectious disease expert working in nonreproductive tissues and cells, Klein sensed for years that her grant submissions or research papers focusing on sex differences didn’t so much pique reviewers’ interest as annoy them. Fellow researchers who ignore sex differences have distinguished careers and mountains of data invested in their way of doing things. Some told her flat out: Sex did not matter.

Still, she stayed the course, giving sex differences center stage instead of sloughing them off. She used both male and female animal models in her hormone-centric studies. She manipulated estrogen and testosterone, surgically removing the bird-seed-size ovaries and testes of mice, and then put hormones back, always looking for cause-and-effect relationships between sex and disease. She analyzed her results by separating the sexes in the statistics instead of lumping males and females together in one big androgynous data set, as was—and still remains—conventional practice. (In top-tier journals, it’s common for authors of clinical studies to demonstrate demographic correctness in Table 1, showing 50 percent of their subjects were male and 50 percent female. However, after that obligatory nod, the breakdown by sex simply goes away, never to appear again in Tables 2, 3 or 4, Klein says: “There’s no more mention of sex. No statistical comparison. It’s sooooo frustrating!”)

Klein saw firsthand, time and again, that sex was remarkably relevant to her research on animals’ susceptibility to infection and their response to pathogens. Indeed, sex often was the only difference between those that recovered and those that succumbed to disease. With influenza, for example, when she gave male and female mice a standard dose of virus, none of the females would survive past two weeks, while more than half of the males would recover, surviving the infection. For many infectious disease mouse models, if fewer than half of the mice of a particular strain survive an infection, then that strain is defined as “susceptible” and if more than half of the mice live, that defines the strain as “resistant.” But while working with two sexes of the same strain, Klein noted stark differences.

There are other people—not so many in infectious disease but more studying the...
heart and brain—who are as convinced as Klein that males and females differ in their basic physiology and, therefore, in the susceptibility to and progression of diseases. Arthur P. Arnold, a professor and chair of physiological science at UCLA who assumed editorship of the just-launched journal Biology of Sex Differences, has been doing sex-based biology since the mid-1970s when he was a neurophysiology postdoc at The Rockefeller University. He realized early on that gonadal hormones explained only part of the reason a brain structure in male songbirds was six times larger than in nonsinging females. Some sex differences, he has since discovered, are the result of direct action of genes encoded on the sex chromosomes: XX and XY cells differ functionally because of the action of X and Y genes intrinsic to the cells.

The fact that there are sex differences in disease implies that one sex has something protective about it, Arnold says. If that something could be enhanced or modified, it might make an attractive drug target, for instance, and only a lack of understanding of the biological basis of sex differences in disease keeps us from hitting that target with new therapies.

Researchers like Arnold and Klein quietly celebrated a milestone 10 years ago when the Institute of Medicine issued a report (“Exploring the Biological Contributions to Human Health: Does Sex Matter?”) concluding that every cell has a sex, and therefore sex matters in health “from womb to tomb.”

Heartening as that was, it more or less preached to the choir, Klein says. That choir subsequently formed a new academic society—the Organization for the Study of Sex Differences—to promote the interests of this emerging field, not least of which was to address the fact that only a pittance of NIH grants supported the study of sex differences.

Klein, with a small cadre of colleagues across various disciplines, proposed in 2008 to establish a center for the study of sex-based biology at Hopkins. Helping lead that effort was Pam Ouyang, a cardiologist based at Bayview Medical Center, who says, “Men and women are different in lots of ways that we don’t necessarily understand yet because we don’t study them. I thought it would be really nice to have a place where general conversations about sex differences could be discussed with people from various spheres of knowledge who would approach questions—such as why are men’s and women’s risks of heart disease different—from all angles.”

Ouyang no doubt would have been intrigued by DeLisa Fairweather’s perspective on autoimmune heart disease in men. A staunch advocate of sex-based biology who is based in the Bloomberg School, Fairweather is teasing out how inflammation induces chronic conditions in males and females.

Despite their common interests, Ouyang and Fairweather were not yet destined to meet. The proposal for a center was denied. The upstart field of sex-based biology limped along on its uphill trek.

“Sabra was the prepared mind in the right place at the right time.”
—Florence Haseltine
Then the flu hit.
Not just any old flu, but the H1N1 pandemic of 2009. The fact that it hit in the midst of a panic about vaccine shortages proved fortuitous for Klein. Steeped in sex-based biology à la influenza, she was ready with a kill shot. She leveraged interest in the pathogen, finessing a low-grade professional buzz about sex differences into a very public debate. Flu, once and for all, confirmed the legitimacy of her convictions.

“Sabra was the prepared mind in the right place at the right time,” says Florence Haseltine, MD, PhD, director of the Center for Population Research at the National Institutes of Health and a founding member of the Organization for the Study of Sex Differences. “H1N1 threw her—and sex-based biology—into the limelight.”

Klein, a mother of two girls, promptly co-authored an op-ed (“Do Women Need Such Big Flu Shots?”) published in The New York Times in October 2009. She wrote, “In all likelihood, we’d have a better H1N1 vaccine—and more of it—if in our preparations we had accounted for the biological differences between men and women.” That article sparked the WHO to enlist Klein’s help in preparing “Sex, Gender and Influenza,” a report issued in July 2010 that examines the 2009 H1N1 pandemic through the prism of sex differences in immunology.

Meanwhile, Klein also co-authored a review that appeared in the May 2010 edition of The Lancet Infectious Diseases (“The Xs and Ys of Immune Responses to Viral Vaccines”) that re-examined published data from a high-profile paper by analyzing it according to sex. The review revealed conclusions strikingly different from those of the original authors who had ignored sex. When Klein re-analyzed the genomic data by sex, she found that the transcriptional activity along immunological pathways—pathways that supposedly predict long-term protection following, in this case, yellow fever virus vaccination—was 10-fold higher in samples collected from female than from male volunteers, suggesting that females may be better protected than males.

About that same time, a landmark reference book Klein co-edited was published: Sex Hormones and Immunity to Infection.

Amid her publishing flurry, Klein accepted invitations to speak locally and abroad. She described how her female mice were mounting inflammatory responses up to a hundred-fold higher than males in the first week after flu infection. She cautioned audiences against assuming that a bigger immune response is better. Take the 1918 flu or the avian flu, for example: They caused profound sickness and death, she explained, not because of out-of-control viral replication but because the human hosts—and hostesses—initiated excessive immune responses to those pathogens.

Despite preaching about a pervasive lack of consideration for sex differences in the design of scientific studies, and therefore in the analyses of data, Klein never expected people to suddenly fixate on sex differences. She just wanted them to pause and question the assumption that males and females weren’t going to be different.

And then, out of the blue, a Hopkins
“In biomedical science, the dogma is that there are no differences between men and women. People like myself who design studies looking at both sexes are left with that uphill battle of challenging the dogma.”

—Sabra Klein
many men get it as women, according to Aucott.

“We know that equal numbers of men and women get Lyme to begin with, and twice as many men get late Lyme arthritis, so what happened to all the women?” Aucott asks. “Did they all just get better without treatment?”

He thinks not. Rather, he speculates that maybe the women who didn’t make enough antibodies to fit the diagnostic criteria for Lyme in the first place ended up getting diagnosed with something else: fibromyalgia, for instance.

Anecdotal information, now backed up by sex-based biology, informs his hunch: Acute Lyme disease is easily treated with an antibiotic. The rash and other symptoms disappear. However, 20 percent of people post-treatment—the majority of them women—develop a fibromyalgia-like syndrome some months later. The overall ratio of women to men with fibromyalgia is 7:1.

Aucott sees lots of patients who report having felt fine before their bout with acute Lyme, then recover, only to develop a vague constellation of disabling symptoms some time later. The majority of them are females.

“These are people who are told by their physicians that they are ‘just depressed,’” Rebman says. “Well if they weren’t depressed before the rash, there’s got to be more to it. That can’t be the end of the story.”

Sex differences complicate the story. No doubt about it. Marc Lipsitch, director of the Center for Communicable Disease Dynamics at the Harvard School of Public Health, will attest to that.

His lab was looking for evidence that early exposure to certain strains of influenza proved protective against infection in the 2009 pandemic. Lipsitch’s group noticed, as others had, that older people seemed at lower risk of being a confirmed flu case in 2009. Why would that be? Did they have antibodies from immune responses earlier in life? Did they have fewer children at home and therefore were less exposed to school kids, known transmitters of flu?

“We thought it would be important to know differences between men and women in the context of this drop-off in risk,” Lipsitch says, “because you might expect a bigger drop-off in women than men if it was due to exposure.” When his team separated out the data by sex, they realized that although the drop-off in risk is much stronger in women, it does not appear to be due to any lack of contact with flu-infected people.

Sabra Klein came to mind: Lipsitch recalled seeing a poster at a conference by one of Klein’s students, showing how the immune system behaved differently according to sex.

“We thought she’d be interested in our unpublished data,” he says, admitting that he originally intended to ignore sex. “We actually had hoped to reject the idea that what we were seeing had something to do with sex differences in the immune experience.”

“But it was really helpful that Sabra pushed us to look at both age and sex at the same time and make sense out of data of this sort, even though now it’s a more complicated story.”

OraLee Branch, an assistant professor of medical parasitology at New York University, studies the immune response to malaria infection. When her students, who
accompanied her to Peru for a field investigation, noticed sex-based trends in their data, she scrambled to find anything even remotely related in the malaria literature, finally unearthing a paper Klein published in 2006.

“I right away picked up the phone and explained to her what we were finding,” Branch recalls. “I wondered if she had followed up, if there was more information. Her work had since veered toward viral pathogens. But still, she offered to help.”

One of the things Branch had spent time investigating was differences in malarial symptoms based on differences in exposure.

Now she wants—no, she needs, she says—to go back into her data to reanalyze it, taking sex differences into account. “It’s really opened up a can of worms, it has,” Branch says. “We might find immunity is developing better in males than females, or maybe the other way around. But pretending sex differences don’t exist is just going to obscure the real mechanisms we’re all trying to find. Pretending differences don’t exist is not the answer.”

All was unusually quiet throughout the Bloomberg School of Public Health on the snowy holiday commemorating Dr. Martin Luther King.

Michael Coronado—winner of the Florence P. Haseltine Award for young investigators at the 2010 annual meeting of the Organization for the Study of Sex Differences—was hard at work in DeLisa Fairweather’s lab, however.

First, he was extracting blood from male and female mice that were infected with the same virus but producing different levels of cytokines—the signaling molecules that cells generate to communicate with each other. Then, he was removing their hearts to study the diseased tissue. Later, on other live mice, there were gonadectomies to perform.

By de-sexing the males and females, he was attempting to make them biological equals, at least in terms of the type of heart disease he’s studying. It’s apparent that testosterone drives the disease. But it also could be that estrogen protects from it. Or both could be true.

One thing’s for sure: Male and female mice are anything but equals in terms of their hearts, as the males’ floppy, scarred organs clearly show.

Some investigators would justify using only male mice to study disease that affects mainly males. They’d argue that it’s expensive and inconvenient to deal with female rodents because it means having to account for hormonal cycles.

For that matter, lots of researchers who study equal opportunity diseases such as cancer don’t use both sexes of mice either, no matter that half the population whom the research is ultimately meant to serve happens to cycle, too.

The converse is also true. Lots of researchers studying so-called women’s diseases such as lupus and multiple sclerosis use only female mice and therefore risk missing half the picture.
Both males and females always are used for comparative purposes in the Fairweather lab where sex differences have been shown to drive autoimmune disease.

Autoimmune diseases are notoriously lopsided in terms of whom they strike. Thyroid disease affects mainly women while dilated cardiomyopathy (the chronic type of heart disease that Fairweather’s studying) affects men more.

It’s not simply good practice to acknowledge sex differences, it’s outright dangerous to ignore them, says UCLA’s Art Arnold: “Treating one sex like the other may be as inappropriate as treating a child like an adult. The equitable treatment of females and males requires an understanding of their differences.”

When Sabra Klein gave presentations early on in her career and talked about the differences she saw between the sexes, she was invariably followed by a more senior colleague who would not mention any differences between males and females. Inevitably, an audience member would ask if he saw the same types of differences that Dr. Klein reported.

The answer, Klein recalls, always was curt and final: No. Absolutely not.

“That would be it, with no further explanation,” Klein says. “And I’d feel everything sink. I wasn’t born with thick skin. I’d take it personally and worry: What are people trying to say about me, my data, the quality of my work?”

“But as soon as I’d get back into the lab, into what we were doing, I’d get over the intimidation because I was excited by the research. I believed in it.”

It didn’t hurt that senior faculty in her department believed in her work as much as she did: “Diane Griffin, Al Scott and Greg Glass had a lot to do with my ability to stand up and be that lone voice in the wilderness. They took a risk hiring me. They told me I needed to lay claim to a field.”

These days, the very same people who made presentations after Klein and disavowed sex differences now are sending their data to her, reporting that they too are seeing trends. They now allow Klein to present their unpublished data in talks, which is a giant leap forward. But out there in the published world, sex differences remain largely ignored. “When you put your data out there, you are choosing to enter a debate,” Klein says. “It’s not some definitive conclusion; the book is not closed, the story not over. You put yourself out there to be judged, and to be open to people’s interpretations. I am always working to hone my arguments, to improve my logic.”

But as the long, cold flu season gives way to spring, Sabra Klein senses a thawing of attitudes toward sex-based biology. Her team recently resubmitted a research paper for consideration by a prestigious journal. Because the reviewers’ comments and concerns had been so constructive, Klein has reason to believe that she’ll hear good news back soon: “I think they might actually be rooting for us.”

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Sabra Klein describes “his and her” heart attacks: magazine.jhsph.edu/extras

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obscure the real mechanisms we’re all trying to find. ” —OraLee Branch
How to bring bullying into the light

It’s a cold, gray January morning in Edgewater, Maryland, and the 1,100 students in Central Middle School are rambunctious. Wearing coats, hoodies, T-shirts and jeans, they stop first at their powder-blue lockers and then head to their homerooms while carrying on conversations that compete with the din of a building filled with eager adolescents. They may be extra-amped because a snowstorm closed the school yesterday and delayed today’s opening; plus, it’s Friday—the weekend’s coming up. So, as Principal Mildred Beall kicks off the morning announcements, teachers have to spend extra time settling everyone down.

Soon, four eighth-grade girls gather round the microphone and wait for a fellow classmate to play the opening chords of Journey’s “Don’t Stop Believin’” on the piano. They sing utterly new lyrics:

I’m just a new kid at Central Middle School
I get laughed at every day at school
It’s just not fair, I’ve got no one here
Why doesn’t anybody care?

The lead-in to the chorus quickly answers:

BAC, we’ve got your back
We are right here, if you need us.

When the song’s over, two more members of BAC (Bully Awareness Crew) make announcements—one for a lunchtime art contest, the other a poem about “kindness” urging listeners to “pass it on.”

If this sounds too good to be true—a Hallmark moment in a Lake Wobegon-like middle school—consider this: The students in Beall’s office are just a handful of the 86 eighth-graders who have joined BAC since its inception in the spring of 2010. That’s when the class’s guidance counselor, Sandra Seward, asked several of its then seventh-grade members to come up with a student-led means to combat what the federal government considers an urgent problem.

“About 30 percent of youth report they’ve been involved in bullying, as a victim or perpetrator, on a frequent basis within the past month,” says the Bloomberg School’s Catherine Bradshaw, PhD, associate director of the Johns Hopkins Center for the Prevention of Youth Violence, and a renowned expert on bullying. In August 2010, she spoke at the first-ever Federal Partners in Bullying Prevention Summit in Washington, D.C.

By the time students graduate from high school, Bradshaw notes, 80 percent will have witnessed at least one bullying incident. At the middle school level—the peak time for bullying—more than 30 percent of students don’t feel safe from physical, verbal and/or indirect abuse, including cyber-bullying, she says.

Central Middle, like other schools in Anne Arundel County, Maryland, is doing something about the problem—in part because of state and school district mandates. Maryland is one of 45 states that, in the past few years, have passed anti-bullying laws, many requiring school systems to implement reporting, intervention and prevention procedures. While there are many reasons for the current focus on an age-old problem, headline-grabbing incidents have raised its profile. Last year, a Massachusetts high school freshman named Phoebe Prince committed suicide after being bullied for months by a handful of classmates. Her death prompted the state government to pass sweeping anti-bullying legislation in May 2010.

“This is a watershed moment,” says Deborah Temkin, research and policy coordinator for Bullying Prevention Initiatives at the U.S. Department of Education. “We’ve hit a point where the effects of bullying have struck such a chord with people that they’re really taking notice.”

The choice is to act or to continue to suffer adverse public health consequences, says Philip Leaf, PhD, director of the Johns Hopkins Center for the Prevention of Youth Violence. “On the one end, you have people dying from it, committing suicide,” he says of some bullying victims. As for the bullies themselves, he notes, “children in adolescence engaged in aggressive behavior are at much higher risk for both subsequent juvenile issues and substance use.”

Bradshaw has put together a list of potential effects of bullying. For victims, they include anxiety, depression, lack of sleep and dislike of school. Perpetrators tend to feel the same way about school, while assuming that aggressive behavior is acceptable. And both groups are at a higher risk than their classmates for low academic performance and/or dropping out.
Which is why Bradshaw, who’s been researching the subject for 10 years, has also advised federal, state and district officials on bullying prevention. Her relationship with Anne Arundel schools, in particular, is unique. With the district’s help, she designed a Web-based bullying survey, which serves as an annual data collection system on bullying’s effects on students, staff and parents in the district’s 120 schools.

The questions vary—depending on who, anonymously, takes the survey—but they cover common ground. Both students and teachers, for example, are asked where bullying occurred (e.g., classroom, hallway, playground, bus), in what form (name-calling, rumors, teasing, pushing), and what the student’s reaction was (ignored it, told an adult, bullied back). Among the questions asked of parents is how they reacted when their children were bullied (talked to the child, the bully, the bully’s parents or someone at the school).

“It’s a research-based measure [to describe] what bullying looks like,” explains Bradshaw, who’s featured the findings in numerous papers written since the survey was introduced in 2005. Theoretically, each school can use the survey results to target problems and improve prevention strategies, but they’re not required to, and many schools, like Central Middle, focus more on the number of incidents officially filed as “bullying.”

Chuck Buckler, director of Student Services and Alternative Programs in the Maryland State Department of Education, says, in many schools, that number has increased—and for good reason. “The data may suggest that schools have more incidents [than in previous years],” he explains, “but it’s really a matter that they have more kids, parents and friends willing to file a report. And that means the awareness is there.”

Awareness, Bradshaw says, is the first step in tackling the problem. But it’s not an easy first step for many schools, where the design and implementation of prevention programs vary. Part of the challenge, she says, is that the causes of bullying and the incidents themselves are extremely complicated and, thus, demand more than a disciplinary approach. Ideally, the entire school community—students, teachers, administrators and parents—should participate in an effort that’s sustained over time and not changed from year to year, depending on resources and who’s in charge.

It should also begin, at the very least, in elementary school. “You want to try to get in there early to get kids on track,” Bradshaw says, “because if you wait ‘til they have problems, then [behaviors] might be entrenched and harder to change.”

At Central Middle School, the effort includes what she considers key to a whole-school approach—students. Says one BAC member, “We’re just trying to be a good influence for other students, the lower grades and stuff, and say, ‘Hey, bullying’s not cool. You should try to be better people.’”

School meetings in which members discuss and formulate new ways to get the anti-bullying message out. The group, which has made presentations to parents and district officials, hopes to cap the school year with

“Sending kids [who’ve bullied] home for three or five or 10 days has no remedial impact in terms of changing their behavior. If they’re not in school, and not learning anything, there won’t be any changed behaviors.”

—Philip Leaf
an assembly featuring performances and a PowerPoint presentation. “This is our first year doing this,” says Seward, whose aim is to have half the eighth-grade class, or 150 students, join by year’s end. “So it’s very much a work-in-progress.”

Even so, the students say they’ve seen the school’s atmosphere change since implementation of the BAC, which welcomes new students—often prime bullying targets—and helps Seward recruit “borderline bullies”—those whose behavior tends toward aggression but can be changed, she says.

To appreciate how far schools like Central Middle have come, it’s worth looking back 10 years, when a series of school shootings, including one that took the lives of 12 students and one teacher at Columbine High School in Colorado, were met with extreme responses: metal detectors and zero-tolerance policies, among them. “We’ve since learned that the punitive route is not the way to go,” says Temkin of the U.S. Department of Education.

“Sending kids [who’ve bullied] home for three or five or 10 days has no remedial impact in terms of changing their behavior,” concurs Leaf, who, along with Bradshaw, is a co-director of the youth-focused Johns Hopkins Center for Prevention and Early Intervention. “If they’re not in school, and not learning anything, there won’t be any changed behaviors.”

The numbers play this out. The rate of bullying, according to Bradshaw, has remained stable, even as other forms of school violence have declined in the past decade.

Bradshaw first took up the anti-bullying crusade in the late ’90s, when she realized, as a graduate student counseling youth in detention centers, that they’d been subjected to various forms of violence, including bullying in schools. The attitude then was that bullying was a rite of passage to be endured. And the research was scant—one or two papers a year. Post-Columbine, however, there was a rush to investigate bullying, accompanied by state and federal grants. “Now, you see at least 100 papers a year,” she says.

BULLYING DEFINED ONLINE AND OFF

SO WHAT, EXACTLY, IS BULLYING? Most of the definitions used at the district, state and federal levels fall in line with three basic features that bullying expert Catherine Bradshaw, PhD, uses in much of her research:

• Involves aggressive behavior that intends to cause harm or distress
• Is usually chronic or repeated over time
• Occurs in a relationship where there is an imbalance of power or strength

In addition, its forms are verbal (e.g., threatening, name-calling), physical (hitting, kicking) and indirect (spreading rumors, influencing relationships), which includes cyber-bullying.

The latter, though just roughly 10 percent of the total, is on the rise—in part, according to Philip Leaf, PhD, and director of the Johns Hopkins Center for the Prevention of Youth Violence, “because most youth have cell phones, so they’re at risk 24/7.”

In a study on cyber-bullying at the middle school level (grades 6–8), the peak time for bullying activity, Bradshaw reports that 25 percent of girls and 11 percent of boys have been cyber-bullied at least once. The most common methods: instant messaging, chat rooms, emails, websites and texting. And the types range from "flaming" (online fights with angry language) to "outing" (sharing secrets or embarrassing information) to "cyberstalking" (intense harassment, including threats).
In general, Bradshaw reports, “the data suggest that you start to see bullying pick up in late elementary school—grades 4 and 5. Middle school tends to be the peak, and around 10th, 11th grade, it peters out.”

The exception is cyber-bullying, which is on the rise, even though it’s still a small slice of the pie, with roughly 10 percent, on average, claiming to be victims (see sidebar on page 35).

Whatever the form bullying takes, research indicates that a positive school environment is key to prevention. And, in 2007, Bradshaw and two colleagues reported disconnects between staff and student perceptions on this score. For example, more than 70 percent of staff in elementary schools, 40 percent in middle schools and 57 percent in high schools assumed that the number of students bullied in the previous month was 10 percent or less. But students at those grade levels indicated that 34, 33 and 23 percent, respectively, had been bullied in that time period. And at the middle school level, more than 30 percent of students felt that staff did nothing to follow up reports of bullying.

What makes middle school such a challenge is the timing. Sixth- through eighth-graders are sandwiched between elementary school, when students are supervised round-the-clock, and high school, where the primary focus is academics. Meanwhile, they’re encouraged to take on a host of responsibilities—juggling the demands of multiple classes and teachers, for example—even as their maturity levels are in flux.

“I don’t think [middle school] kids are natural bullies,” Principal Beall explains. “But, developmentally, they have so many social issues to deal with. Intimacy is important, but they’re very immature. They have feelings of jealousy and competition and sort of love-hate things going on. Generally, they get all mixed up.”

So it’s perhaps no surprise that Beall and her staff recently had to handle a “sticky situation.” A new eighth-grade student, a girl who’d just moved to the area, made the mistake of poking fun at a classmate who, with the aid of friends, retaliated verbally.

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A whole-school approach to bullying is exactly what district and state policies—and the U.S. Department of Education, which released policy recommendations this past December—endorse. Bradshaw, in fact, goes a step further, recommending a schoolwide framework, developed by the University of Oregon, called Positive Behavioral Interventions and Supports, or PBIS. Although it doesn’t target bullying specifically, PBIS is aimed at establishing—via data collection and positive reinforcements—a safe environment in which students thrive socially and academically.

“We love PBIS,” Buckler says of Maryland, where more than 800 schools have signed on, including half the schools in Anne Arundel County. He cautions, however, that if specific anti-bullying measures aren’t included, “PBIS isn’t going to cut it. It isn’t a stand-alone.” Schools, he says, need to make sure that they’re tailoring anti-bullying efforts toward the needs of their students.

At Central Middle, Beall has asked her best classroom managers—those skilled at keeping students engaged and out of trouble—to share their techniques with colleagues while giving counselors like Seward free rein to involve the students.

“With the announcements, the banners, the songs, what they’re doing is creating a culture,” explains Seward, who, like her fellow counselors, teaches anti-bullying lessons throughout the year. “What I’ve noticed with BAC is, kids are informally reporting things to me that they would not have done before. We’ve set up an environment that says, ‘This is not OK. We do not accept this in our school.’”

This is crucial for Beall. “Formal bullying is not a huge problem [at Central],” she says. “It’s the annoying kinds of behaviors that can lead to bullying that get to be a problem. And the guidance department and student involvement help curb it.”

A drop in bullying referrals—from 13 last year to two this year—is proof, as are Central’s latest bullying-survey results, released in January. In most categories, the school betters the district average. Only 54 percent of students (compared to 62 percent districtwide) feel that bullying is a moderate- to serious problem, and 78 percent (versus 72 percent) feel safe in school. Would Beall like to see those numbers improve? “Of course,” she says, “but we’re moving in the right direction.”

Bradshaw, who spoke at her second White House bullying summit earlier this year, is of the same mind. “Many anti-bullying policies focus more on documentation and responses than on prevention,” she explains. “They need more training opportunities and evidence-based interventions. And from the research field’s perspective, we’d like to know more about what really works and how to change behaviors. But it’s a start.”

With the announcements, the banners, the songs, what they’re doing is creating a culture. We’ve set up an environment that says, ‘This is not OK. We do not accept this in our school.’”

—Sandra Seward
The Monday Campaigns—dedicated to “the day all health breaks loose”—started with one great idea and are changing how people eat, exercise and make decisions about a host of other health-related behaviors.

Humble Beginnings
It all started with Meatless Mondays—the brainchild of former ad executive Sid Lerner, who in 2003 decided he wanted to do something about rising meat consumption. He remembered “meatless Mondays” from a World War II rationing campaign during his childhood and decided it was a catchy way to get Americans to give up meat—the source of most of the saturated fat in our diet.

In 2005, Lerner partnered with the Bloomberg School and Columbia’s Mailman School of Public Health to start a nonprofit to persuade Americans to adopt healthy behaviors on the first day of the week. And so Healthy Mondays were born. The Johns Hopkins Healthy Monday Project (jhsph.edu/clf/monday) provides scientific and technical assistance to the national Monday Campaigns (mondaycampaigns.org).

The Data to Back It Up
The wisdom of homing in on Monday was confirmed by a literature review in 2010. Researchers Jillian Fry, MPH, and Roni Neff, PhD ’06, MS, at the Bloomberg School’s Center for a Livable Future (CLF), looked at the effectiveness of periodic public health messaging prompts and the cultural significance of Mondays. A literature review of 19 studies, with a combined sample size of 15,655 participants, found that frequent, periodic messages are an effective way to get adults to adopt healthy behaviors.

A survey by a research firm also found that more than half of 1,500 surveyed adults over the age of 25 viewed Monday as “a day to get their act together.” It was the day most would start a diet or exercise regime. As Lerner has said, Monday is the “January of every week.”

Reinventing Monday
That Monday comes 52 times a year means the campaign has multiple chances to appeal to our better natures. The Johns Hopkins Healthy Monday Project has partnered with everyone from health insurance companies, like Wellpoint/Anthem Blue Cross Blue Shield in Virginia, to the food giant Sodexo to create wellness plans and promote lifestyle changes. “It’s about changing people’s default self-image,” says Ralph Loglisci, project director for the Healthy Monday Project at CLF. “The Monday concept works perfectly for that. If you say, ’I am someone who is healthy, it’s just that every once in a while I fall off the wagon,’ you can always hit restart on Monday.”

A survey by the Meatless Monday campaign in 2010 found that 30 percent of all Americans were aware of the campaign—more than double the number from two years previously. “Meatless Monday has just exploded,” says Loglisci.

The national Monday Campaigns promote seven Monday projects, including Man Up Monday, which encourages STD testing, and Quit and Stay Quit Monday, which targets smokers.

Getting the Oprah Shout-Out
Healthy Mondays got the coveted Oprah nod in February. The media mogul hosted a show about forgoing meat, at one point cheering to the camera, “Go Meatless Monday, Meatless Monday!” Loglisci says it was the most exciting pickup the project has gotten so far.

“The nontraditional approaches to push the message have included an appealing website, contests for meatless chili recipes, clever and humorous signage, and recruiting prominent health professionals, celebrity chefs and others,” says Robert Lawrence, MD, CLF’s director. Such pop culture venues offer exposure for health messages that traditional public health channels cannot match.

What’s Next
The Johns Hopkins Healthy Monday Project has partnered with Baltimore City Schools and its Education Channel 77 to launch the next Monday program: Kids Cook Mondays. It encourages children to take charge of food preparation and their own health. The Baltimore pilot program—including television spots with local kids—began in March.

by Phoebe Connelly

**Couch Potato Perils**

- One in three United States adults is obese.
- More than one-third of all adults in the U.S. do not get the recommended amount of aerobic physical exercise.
- In 2007, less than 25 percent of all adults reported eating five or more servings of fruits and vegetables each day.
- Americans today consume 7 pounds more red meat per person each year than in the 1950s.
- Dietary factors account for at least 30 percent of all cancers in Western countries and up to 20 percent in developing countries.

Sources: USDA, CDC, The Cancer Project
In the late 1980s and early 1990s, investigators at the Medical College of Wisconsin wondered if popular men in gay bars could effectively promote safe-sex messages. They designed a randomized-controlled trial (RCT) that was conducted in three small Southern cities. In Biloxi, Mississippi, where the intervention took place, the popular men were recruited to endorse condom use to bar patrons. The two comparison cities received no specific intervention and served as controls. The results were impressive. In Biloxi, the number of risky sexual encounters fell by about 30 percent over two months. In the other two cities, the risky behavior stayed the same. Another trial, this time in 16 cities, yielded the same results. A new, effective HIV/AIDS intervention had been identified.

Ten years later, epidemiologist David Celentano, a veteran in the field of HIV/AIDS prevention and of RCT design, did a similar trial with the same intervention in five countries on four continents. Over 24 months, the number of risky sexual acts decreased by 33 percent in the intervention group. But the number of risky sexual acts decreased by the same amount in the comparison group. Clearly, risk had been reduced all around, but there were no differences between the two study arms. (With dramatic downward shifts in risk in all five countries, it seemed unlikely that anything other than the trial itself had effected the risk reduction.) The results surprised Celentano. Because the intervention known to work seemed no more efficacious in the trial, it might be cast aside.

What happened?

The standards for ethical conduct of trials had changed, says Celentano, the Charles Armstrong Chair in Epidemiology at the Bloomberg School. In the intervening years, many new interventions had been proven effective, and ethical obligations required that they be offered to the control arm of the later trial. Celentano lists the services offered to participants: educational materials, free condoms, HIV and STI testing and treatment, pre- and post-test counseling, and extensive interviews about risk behavior. “And that’s just the control group,” he says.

The stakes for finding effective HIV preventions are high: An estimated 33 million people live with HIV, another 2.6 million are newly infected every year, and 1.8 million die of AIDS annually. Now 30 years old, the field of HIV/AIDS prevention draws scores of researchers who spend billions of dollars in a race to find ways to prevent transmission. Some want to identify biomedical interventions, such as microbicides, vaccines and male circumcision. Others are counting on behavior change programs—safe sex education, peer counseling, media campaigns—to slow down the epidemic.

But the field of behavior change, in particular, is tricky terrain for evaluation. As new interventions are shown to be effective, ethical obligations and aspirations evolve, making evaluations more challenging. And as real-world HIV/AIDS conditions become more complex, RCTs begin to seem less feasible.

Do the Right Thing

In HIV prevention trials, investigators compare the incidence of new infections among the control arm to those among the intervention arm. For an intervention to be deemed effective, the intervention arm must show significantly fewer infections than the control, which reveals the intervention’s impact. “No researcher wants people to get infected,” says Maria Merritt, a core faculty member in the Johns Hopkins Berman Institute of Bioethics, “but the expectation is that some participants will get infected.”

Researchers and ethicists agree: Investigators have an obligation to minimize risk to all participants. And in this field, there is an acceptable level of protection for all participants in a trial that has been generally agreed upon by experts. This standard of prevention guides what is offered to participants—known as “the prevention package”—in order to minimize risk. (Prevention packages often include counseling, testing and treatment, like the suite of services offered in Celentano’s trial.) But, notes Merritt, PhD, an assistant professor in International Health, some people would add that there is an obligation to maximize benefits for participants. This might take the form of making available as many known effective interventions as possible to all participants.

Not surprisingly, robust prevention packages tend to dilute the results of a trial. Overall, there may be fewer participants with new
HIV infections, which is a wonderful thing. “The paradox,” says Jeremy Sugarman, deputy director for medicine at the Berman Institute, “is that the more effective the basic package, the less likely that the research question will be answered.”

When faced with this challenge, some investigators and bioethicists invoke the “real world” or the notion of “usual care.” In theory, the control arm of a trial represents the local standard of care in the setting. “What is usual care in some developing countries? Nada,” says Celentano, ScD ’77, MHS ’75. “You want to do what’s right for the community, but these ethical imperatives make the science incredibly hard to do.”

Community trials of behavior change interventions are expensive and take years. With full-monty prevention packages, the results are sometimes unimpressive. “And then the basic science folks say, ‘See, behavior change doesn’t work,’” Celentano says.

Sugarman, MD, MPH, MA, who chairs the Ethics Working Group of the HIV Prevention Trials Network, cites ethical and pragmatic reasons for examining carefully the standard of prevention. Ethically, it might be irresponsible to introduce a prevention package that cannot be sustained or implemented locally after the trial has finished. Practically, he argues, it’s important to remember that just because something works in one setting doesn’t mean it will work in another setting. For example, while an antiviral drug may be useful in preventing HIV among men who have sex with men, it remains unclear whether the same drug will be effective in preventing heterosexual transmission. To include that in a prevention package among heterosexuals might be premature and presumptuous.

Yet another challenge is the adding on of new interventions mid-trial as they are shown to be effective—to maximize benefits to participants. “I worry that the ethics discussion got ahead of itself by not asking what we need to know before adding new interventions. You can’t always change a study design on the fly,” says Merritt.

“Heaping on interventions in the prevention package isn’t necessarily the right thing to do,” says Sugarman. “You need to make sure there’s an explicit reason for doing so and that there is reason to assume that more will necessarily be better.”

OBSERVATION VS. RANDOMIZATION

In an observational study, investigators observe rather than influence exposure and disease among participants. The combinations are self-selected or “experiments of nature.”

In a randomized-controlled trial, participants are randomly assigned to treatment groups (intervention or comparison) by investigators.

SOURCE: CDC

The Gold Standard

For the last 30 years, RCTs have been considered the gold standard in evaluating HIV preventive interventions. The RCT has been linked in our hearts and minds with the term “evidence-based medicine,” and thus, argues Steve Goodman, a core faculty member in both the School’s Center for Clinical Trials and the Berman Institute of Bioethics, the gauntlet has been thrown down. To be taken seriously, an intervention must prove itself in a randomized trial.

In biomedical interventions such as male circumcision, designing an RCT is challenging enough. In the circumcision trials, participants consented to take part in the trial without knowing if they would be assigned to the intervention arm (circumcision) or the control arm (circumcision only after it was shown effective). Because the assignments are randomized to reduce bias, neither the participant nor the provider has any say in who gets what done. “One could argue that the reason clinical trials are a new entry in the tools of medical investigation is that doctors and patients couldn’t countenance the notion of randomization,” says Goodman, a professor in Epidemiology. “There’s an ethical calculus in every trial.”

But at least with a biomedical intervention—circumcision, for example—investigators can more or less control both arms. One group gets the circumcision; the other doesn’t. It’s either yes or no, cut or uncut. No gray area.

Behavior change interventions, on the other hand, create gray areas. Take the example of a mass media campaign that encourages people to have fewer sexual partners. The first complication is that there’s no way to control who sees a billboard or hears a radio commercial; diffusion is inevitable.

Deanna Kerrigan, who directs a USAID R2P (Research to Prevention) project to evaluate HIV/AIDS intervention programs under way in several African countries, finds diffusion to be one of the many challenges in evaluating these types of interventions. “With a pill, you know—yes or no,” she says. “When you deal with a mass media campaign, it’s impossible to say this group got it, this group didn’t.”

There’s another wrinkle: many behavior change interventions are aimed at communities, not at individuals. (Individuals get circumcised; communities get the billboard.) And tracking outcomes in individuals is much more clear-cut than tracking outcomes on a village or town level.

Historically, the government agencies or NGOs that implement interventions such as media campaigns evaluate their own programs. Sometimes programs overlap, often inefficiently, with several interventions targeting the same people, and the effectiveness of the interventions is at the mercy of social factors such as migration or civil war. But, to avoid any perception of bias, independent evaluations should be made.

(continued on page 46)
Miriam Alexander, MD, MPH ’89, director, General Preventive Medicine Residency, director, Mid-Atlantic Public Health Training Center, assistant professor, Population, Family and Reproductive Health, was named the Association for Prevention, Teaching and Research Outstanding Educator of the Year.

Karen Bandeen-Roche, PhD, the Frank Hurley and Catharine Dorrier Professor and Chair in Biostatistics, was elected president of the International Biometric Society’s Eastern North American Region (ENAR), which is the second largest statistical society in North America. She will serve as president-elect this year, president in 2012, and past president in 2013.

Sara Bennett, PhD, associate professor, International Health, was appointed to the WHO Advisory Committee on Health Research and invited to chair the Wellcome Trust’s African Institutions Initiative Advisory Committee.

Chris Beyrer, MD, MPH ’90, professor, Epidemiology, was appointed to the newly established Scientific Advisory Board of the President’s Emergency Plan for AIDS Relief (PEPFAR). The board will advise the director of the Office of the U.S. Global AIDS Coordinator and the HIV/AIDS research agenda for PEPFAR.

Robert Wm. Blum, MD, PhD, MPH, the William H. Gates Sr. Professor and Chair of Population, Family and Reproductive Health, was the 2010 recipient of the Vince Hutchins Partnership Award, presented by the Maternal and Child Health Bureau, located in Rockville, Md.

The Lethality Assessment Program (LAP), run by the Maryland Network Against Domestic Violence, was selected

Ever wonder why the nutritional-content labels for some foods include mention of zinc, copper or manganese—elements forged in the hearts of ancient stars, and best known to us as ingredients in coins and wires and steel? As it turns out, all life—even single-celled bacteria—needs these metals to survive.

“And of course you can’t make them, you’ve got to get them from the environment,” says Valeria Culotta, PhD, a professor and a “metallobiologist” in Biochemistry and Molecular Biology as well as Environmental Health Sciences.

Culotta began research in this field in the late 1980s, and last December was made a fellow of the American Academy for the Advancement of Science (AAAS), in recognition of her pioneering work on the cellular processes that deliver such metals where they are needed.

These processes are crucial because zinc, copper and manganese, as well as their better-known cousin, iron, help cells cope with oxygen—a key player in efficient energy production, but also a highly reactive element that can damage DNA and other cell parts. Certain cellular enzymes can disarm hazardous oxygen-containing molecules, but these enzymes need atoms of metal to do their work. “The antioxidant enzyme is basically inert until it gets its metal,” says Culotta.

But how does such an enzyme get its metal—and precisely the metal it needs? “In a test tube, one of these enzymes will take up such metals indiscriminately; they all look alike to it,” she says. “Yet the enzyme usually will work properly only with a particular metal; the wrong one will kill it.”

Culotta and others have shown that there are specific metallochaperone proteins within cells that grab these metals and deliver them to the appropriate enzymes. Culotta has produced dozens of papers in this field, and is best known for her work in identifying metallochaperones that deliver copper to key antioxidant enzymes known as superoxide dismutases.

“We’ve been doing the very basic biology, using mostly yeast as a model organism, to define the genes and proteins that make up these metal-trafficking pathways,” Culotta says. Yeast is a single-celled organism and therefore relatively easy to study in the lab—and as Culotta and her colleagues have found, the genes involved in metal-trafficking appear to be so important evolutionarily that they are almost always found in similar forms in both lower and higher organisms.

Almost always. And the exceptions could represent an opportunity. “We’re now looking at how these metal-trafficking pathways differ in some disease-causing bacteria and fungi,” she says. “To the extent that they differ, they could be disrupted using drugs, thus killing these pathogens without harming the analogous pathways in humans.”

—Jim Schnabel
as one of four 2010 national recipients of the Celebrating Solutions Award given annually by the Mary Byron Project. Johns Hopkins Center for Injury Research and Policy faculty members Jacquelyn Campbell, PhD, MSN, professor, Johns Hopkins School of Nursing and Health Policy and Management (HPM), and Daniel Webster, ScD ’91, MPH, professor, HPM, developed the LAP along with law enforcement and members of service agencies.

Stephen Gange, PhD, professor and deputy chair, Epidemiology, was appointed for a four-year term as a member of the Department of Health and Human Services’ Panel on Antiretroviral Guidelines for Adults and Adolescents, a working group of the Office of AIDS Research Advisory Council.

Steven Goodman, MD, PhD, professor, Epidemiology, core faculty member, Center for Clinical Trials and the Johns Hopkins Berman Institute of Bioethics, was appointed early this year by the U.S. Government Accountability Office to the 15-member methodology committee of Patient-Centered Outcomes Research Institute (PCORI). Established by the 2010 Patient Protection and Affordable Care Act, PCORI helps to inform patients, clinicians, purchasers and policymakers of best results in health care prevention, diagnosis and treatment.

John Groopman, PhD, the Anna M. Baetjer Professor in Environmental Health and chair of Environmental Health Sciences (EHS), is the 2010 recipient of the American Association for Cancer Research’s Prevent Cancer Foundation Award for Excellence in Cancer Prevention Research. Groopman is honored for his discovery, validation and application of molecular biomarkers to probe the etiology of liver cancer and the means to prevent it in the economically developing world.

David Holtgrave, PhD, chair, Health Behavior and Society, was named in POZ magazine’s 2010 list of the top 100 AIDS fighters, and he also received a Positive Leadership Award from the National Association of People with AIDS.

Thomas Kensler, PhD, professor, EHS, received the Friendship Award of Jiangsu Province, People’s Republic of China, in recognition of cancer prevention and sustained commitment to improving the health of residents of the Qidong area of Jiangsu Province.

Anthony Leung, PhD, assistant professor, Biochemistry and Molecular Biology (BMB), is the recipient of a Department of Defense Idea Award; the award is designed to promote new ideas that are still in the early stages of development and have the potential to yield highly impactful data and new avenues of investigation.

Dan Morhaim, MD, associate, HPM, was re-elected in November 2010 to his fifth four-year term in the Maryland Legislature’s House of Delegates, where he serves as Deputy Majority Leader and is the only physician in the Maryland General Assembly. He is again joined by Shannon Frattaroli, PhD ’99, MPH ’94, assistant professor, HPM, and Keshia Pollack, PhD ’06, MPH, assistant professor, HPM, who have been part-time staff for the past four years.

Larry Moulton, PhD ’87, professor, International Health, was awarded the Statistics Section Award for Academia at the November annual meeting of the APHA.

Daniel Scharfstein, ScD, professor, Biostatistics, was the 2010 recipient of the Distinguished Alum Award given annually by the Department of Biostatistics at the Harvard School of Public Health.

Dory Storms, ScD, MPH, senior associate, International Health, is the winner of the 2010 Carl Taylor Lifetime Achievement Award from the APHA, International Health Section.

Moyses Szklo, MD, DrPH ’74, MPH ’72, professor, Epidemiology, was awarded the Physician’s Merit Medal in the Class of Comendador by the Brazilian president in Brasilia, in December.

Barry Zirkin, PhD, professor, BMB, was named the 2011 recipient of the Distinguished Andrologist Award by the American Society of Andrology, which is given annually to an individual who has made an outstanding contribution to the progress of andrology.

An Awards Trifecta

An international expert in the prevention of childhood mortality and illness, Robert Black, MD, MPH, received the 2010 Prince Mahidol Award in the field of public health. The award is presided over by Her Royal Highness Princess Maha Chakri Sirindhorn of Thailand. Black, the chair and Edgar Berman Professor of International Health, was also inducted into UCLA’s inaugural Hall of Fame in February with a Lifetime Achievement Award. And in March he received the Canada Gairdner Global Health Award, which recognizes individuals whose scientific work constitutes a discovery or a highly tangible sustained achievement toward improving our knowledge of and application to global health, especially in the developing world.

Magazine Nominated for Press Award

In April, Johns Hopkins Public Health garnered its second Utne Independent Press Award nomination for science/technology coverage. Utne Reader’s awards “celebrate those independent and alternative periodicals that give readers a fresh take on their world,” says editor David Schimke. Winners will be announced May 18. The magazine also was nominated in 2010.
Behavior on Trial (continued from page 43)

The goal of Kerrigan’s project is to provide objective, academic evaluation. She and colleagues will study dozens of interventions already under way in various villages and districts, which are implemented by dozens of different partners. Randomization is out of the question: in such complex situations, it’s impossible to conduct a conventional RCT. It’s messy, says Kerrigan, an associate professor in Health, Behavior and Society. “But this is real-world stuff,” she says. “We can’t slow down this train.”

Almost Gold?
The best she and her colleagues can hope for, says Kerrigan, is to identify solid control arms and conduct a valid observational study [see sidebar]. But there is some help for the herculean task ahead for her and other researchers. Where randomization is not possible, recently introduced statistical tools such as propensity score matching may help close the gap between observed and randomized trials, compensating somewhat for the loss of comparability between study arms when randomization is not possible. (Propensity score matching is one of many statistical tools used to make intervention and control arms similar enough to allow fair comparisons.)

“We have statisticians bringing some observational studies very close to RCTs in terms of confidence in their findings,” says Goodman, MD, PhD. Adds Kerrigan, PhD, MPH, “We want the most rigorous design feasible.”

But Kay Dickersin, who directs the Center for Clinical Trials at the Bloomberg School, advises caution when relying on observational studies to determine the effectiveness of new interventions. “Certainly we should use whatever data we have. But we’ve seen major mistakes that make us shy about using observational data” to determine intervention effectiveness.

The hormone replacement therapy controversy is a good example: Many observational studies showed a cardiac benefit for postmenopausal women treated with estrogen plus progesterone; when the treatment was tested in the context of a large RCT, however, it showed no cardiac benefit, and perhaps even a higher risk of heart disease. “That trial was like, ‘Oops, we blew it.’ … I’m intrigued that we might be able to emulate RCT findings using observational studies and special statistics. I’d like to see studies validating the modeling alternative, comparing findings to those of RCTs,” says Dickersin, PhD, professor in Epidemiology. “As far as I know, it’s still an open question.”

Goodman notes that a recent reanalysis of the largest observational study on estrogen showed that the observational results were quite similar to the clinical trial’s.

What’s an Investigator to Do?
Albert Einstein is credited with saying, “Things should be as simple as possible, but no simpler.”

Ethicists believe that studies should be designed to accommodate ethical obligations, and investigators agree. Celentano thinks that a larger sample size would help: “With reduced risk in the control arm, the anticipated difference between the two arms is smaller than anticipated, and so you need a larger sample size to demonstrate that one arm’s intervention is more effective than the other. … But we can’t always afford a larger sample size.”

Goodman, MD, PhD, suggests that in some cases, an RCT might be overkill; sometimes what we learn from an observational study is good enough. Dickersin acknowledges that “randomized-controlled trials are hugely expensive, and they can only address one question at a time, usually over the short term, whereas with huge data sets you can address multiple questions and rare, longer term outcomes. [But] I think we better be very careful if we rely on observational data to determine the effectiveness of an intervention.”

There’s no right or simple solution for measuring the effectiveness of behavior change interventions in the field of HIV/AIDS prevention. The virus is wily, and the epidemic entrenched. What kind of evaluation is the best evaluation? Says Goodman, “What you’ll learn is defined by the purposes at hand. … You measure the risk, the cost, the stakes, the consequences of being wrong. … A clinical trial cannot be done in all situations, regardless of the stakes.”

MAY 31 IS WORLD NO TOBACCO DAY

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JHSPH.EDU/GLOBAL_TOBACCO
The Drive to Give

Like many of you, I was saddened and horrified by the earthquake, tsunami and nuclear crisis that rocked Japan this spring.

That disaster was only one of the most recent tragedies that demanded global attention. During my relatively short tenure at the Bloomberg School, the world has suffered several disasters of similar magnitude. The list includes Cyclone Nargis in 2008, China’s Sichuan 2008 earthquake, Haiti’s earthquake in early 2010, Pakistan’s floods in mid-2010, and others.

The disasters may be a world away, but the immediacy of today’s media makes them very close to home. The images, the video and stories reach us in real time and somehow make them feel more personal and more painful.

And like you, when disasters like these strike, one of my first thoughts is, What can I do to help? Human beings may have many failings, but we all have a desire to help those in need. That common empathy drives many people’s commitment to philanthropy. In my 33 years of fundraising work, I have had the privilege of seeing this “better side” of human nature many times. I have witnessed many people share their wealth in order to create a better future for us all.

As associate dean for External Affairs at the Bloomberg School, I was fortunate to work both with generous individuals who wanted to contribute to improving public health as well as with faculty members and students who have dedicated their careers to making that kind of change happen. My proudest moments at the School were the times I was able to bring those positive forces together.

You have probably noticed that I’m writing about my tenure at the School in the past tense. With bittersweet feelings, I have left the Bloomberg School to take a development position in Florida that will allow me to spend more time with my young family.

It was a privilege to work under Mike Klag’s leadership and at the number one school of public health in the world. One of my greatest challenges in working with donors was to communicate what the School does. There are 60 centers and institutes; 10 departments and more than 1,100 full- and part-time faculty. The breadth and scope of the School are phenomenal. To be associated with an institution whose mission is to tackle the hardest problems that afflict humanity was tremendously rewarding and humbling.

I will always carry the School and everything that I learned about public health with me wherever I go. I wish you and the School the very best.

Paul B. Seifert
Former Associate Dean, External Affairs
Johns Hopkins Bloomberg School of Public Health

Letters to the Editor

Amazonian Issue with Malaria Tests

I found the Special Malaria Issue (2011) very thoughtful and successful in calling attention to key issues in malaria prevention and control. However, regarding rapid diagnostic tests (RDTs): They are a great tool, but now we know that some have a lower sensitivity in the Amazon Basin due to a high frequency of HRP-2 gene deletion among *P. falciparum* strains there. The issue is being addressed by the Amazon Network for the Surveillance of Efficacy of Antimalarial Drugs (RAVREDA). A prospective collection and testing of samples is under way to estimate frequency of HRP-2 deletion. We expect to disseminate results in the following months.

Dr. O. Jaime Chang N.
Amazon Malaria Initiative Coordinator
Office of Health, USAID Peru
Lima, Peru

Malaria in Korea

Kudos on your excellent issue devoted to malaria. One very minor error: Your map “Five Million Years of Malaria” is overly optimistic in declaring the Korean peninsula malaria-free. Areas of South Korea near the demilitarized zone have seen a dramatic reemergence of *P. vivax* since 1993.

Remington Nevin, MD, MPH ’04
Lake Charles, La.

Praise for Phil Thuma

“Mission Man” [by Mat Edelson] is an excellent article that accurately presents Macha and the incredible ways Dr. Phil Thuma has brought relief from malaria. Both of our children were born at Macha by C-section, and I had no complications, attesting to the quality of the medical care in the middle of the African bush. Now Dr. Thuma has added his malaria triumph. We eagerly await the time when malaria is controlled to such a degree where we live in urban Zambia. This is a wonderful story of hope for all malaria-ridden places, and it rightly honors the man who has given his life to pursuing this goal.

Kathleen Stuebing
Ndola, Zambia

Childhood Memories of Malaria

I enjoyed your special issue on malaria. It reminded me that when I was in high school [in Greece] in the 1940s, many farmers in my country were infected with *P. ovale* or *vivax*. They were so well aware of the typical 48-hour tertiary fever that they would retire under a shade and wait for its powerful attack. When it was over, they returned to their fieldwork as if nothing happened.

I was amazed at the ability of the female *Anopheles* to detect water to lay her eggs. At the time, office employees kept on their desks little pots with wet sponges to wet their fingers when separating papers. The lady mosquito flying well above was able to spot and land on it to deliver her eggs.

Malaria was eradicated in Greece by the early 1950s.

George Dellaportas, MD, DrPH ’70, MPH
North Royalton, Ohio

Intrigued? Irate? Impressed? Send us your comments: editor@jhsph.edu.
In Kenya, brightly colored beads and other jewelry mark a Turkana woman’s wealth and marital status. Many cultures adopt sex-specific dress codes, but biological differences run much deeper. Researchers are now discovering how one’s sex influences physiological responses to flu shots, malaria infection and more. (See page 24.)

Photo: Shehzad Noorani
Our students can’t see the future—but they will create it.

Join our lead programs and forge policies whose impact will be measured in lives saved and the improved health of today and tomorrow. In the lab, the field and the halls of government, our graduates will make discoveries, and the knowledge and experience gained here, they will apply creative, world-changing solutions to the great health problems of our time.

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TOP PUBLIC HEALTH SCHOOL

When U.S. News & World Report released its new rankings for U.S. public health schools in mid-March, the Bloomberg School topped the list once more. “We owe our reputation as the leader in public health education and research to the hard work and dedication of each of you to our School’s mission,” said Dean Michael J. Klag.

SIGHTS AND SOUNDS OF PUBLIC HEALTH

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NEXT ISSUE: AGING WITH HIV

Even with lifesaving antiretrovirals, people with HIV are aging faster than their peers. Is this the next frontier in HIV research?

ALSO IN THE FALL 2011 ISSUE

Stress levels soar among today’s youth
Before global health was cool: International Health at 50