

HARVARD PUBLIC HEALTH

Fall 2014

A black cast-iron skillet is centered on a solid red background. Inside the skillet, several yellow butter letters are arranged to spell out the phrase "IS BUTTER REALLY BACK?". The letters are partially melted, with some oil visible around them, suggesting they are being cooked. The skillet has a dark, textured surface and a handle visible on the right side.

IS
BUTTER
REALLY
BACK?



DEAN'S MESSAGE

Behind the Headlines

Reading the stories in the Fall 2014 issue of *Harvard Public Health*, I am struck by a well-known truth about our shared calling: When public health touches a raw cultural nerve—from a deadly new epidemic to our daily eating habits—it's a headline event. But most of the time, our ongoing endeavors never reach the news feed.

Like the shoemaker's elves in the Brothers Grimm fairy tale, we are "people who try to make my life, and yours, better—usually without our knowing who they are." So wrote David Hemenway, director of the Harvard Injury Control Research Center at Harvard School of Public Health, in his book *While We Were Sleeping: Success Stories in Injury and Violence Prevention*. In

captures the grand intellectual vision he brings to genomic data mining as well as the early-life adversities that have driven and informed his scientific quest. The portrait of alumna Angela Diaz ties her firsthand experience as a struggling immigrant from the Dominican Republic to her highly innovative—and successful—approaches to helping marginalized teens and young adults in New York City; as a result of her unwavering focus, countless young people have regained physical and emotional wholeness and have found a foothold in society. The feature on HSPH's unprecedented collaborations with public health students in a refugee camp along the Thailand-Burma border likewise reveals

In public health, our progress is measured study by study, insight by insight, person by person, community by community.

academia and in the field, we tend to work quietly, behind the scenes. Our progress is measured study by study, insight by insight, person by person, community by community. Eventually, when all goes right, it ripples across populations and around the globe.

For example, the magazine's cover story asks the provocative question "Is Butter Really Back?" The query is enough to tantalize any palate. But as HSPH nutritionists make clear, improving the choices we make about how we nourish ourselves will require sustained scientific study and public education—activities that are largely unheralded and often invisible.

Other articles in this issue also illuminate the individual determination behind the headlines. The profile of computational biologist John Quackenbush

how genuine individual connections in the service of knowledge can make a difference in the world.

Every day, the mission of public health is carried out behind the scenes—small victories that, cumulatively, are distilled into bold headlines. At HSPH, this fact and its inspirational possibilities have helped make the world a healthier place.

Julio Frenk
Dean of the Faculty and
T & G Angelopoulos Professor of Public Health
and International Development,
Harvard School of Public Health

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IS CLIMATE CHANGE A NUTRITION DISASTER?

The most significant threat to human health posed by climate change may not be rising sea levels or heat waves, says a new HSPH study. When grains and legumes—important sources of zinc and iron for billions of people around the world—were exposed to levels of atmospheric carbon dioxide the world is expected to experience by 2050 during their growing season, they were found to contain far lower concentrations of zinc and iron upon harvesting. Given that an estimated 2 billion people around the world are already deficient in these nutrients—resulting in a loss of 63 million life years annually—damage to the nutritional value of staple crops represents a major public health threat, says lead author Samuel Myers, MPH '07, a research scientist in the Department of Environmental Health.

Don't Take Anger to Heart

People who have angry outbursts are more likely to suffer heart attack or stroke, especially within the first two hours of an outburst, according to a study by HSPH researchers and colleagues. Individuals with cardiovascular disease are particularly vulnerable. Reviewing data from nine studies involving thousands of people, the researchers found that heart attack risk increased about five times in the two hours after an outburst and the risk of stroke more than tripled. The transiently higher risk of heart attack and stroke immediately after outbursts of anger are likely to boost the lifelong risk of these conditions for people who get angry more frequently, and for people already more vulnerable to cardiovascular disease because of such risk factors as smoking, obesity, and a sedentary lifestyle.

VEGGIES: LUNCH OR LANDFILL?



Healthier school lunch standards launched two years ago by the U.S. Department of Agriculture appear to be working, according to an HSPH-led study.

The new guidelines

require schools to offer more fruits and vegetables, remove trans fats, and limit total calories and sodium levels. To see how this worked in the real world, lead author Juliana Cohen, SM '07, SD '12, a research fellow in the HSPH Department of Nutrition, and colleagues collected plate-waste data from 1,030 students in four schools in an urban, low-income school district both before and after the new standards went into effect.

The results were promising: With more fruits and vegetables available under the new guidelines, students selected 23 percent more fruit and 16.2 percent more vegetables. And despite anecdotal claims that healthier food is destined for the garbage, overall waste levels decreased.

Top, iStock; left, Michael Floreack

Centennial Fellows Debut New DrPH Degrees



Centennial Fellows with Peter Berman, professor of the practice of global health systems and economics (sixth from left); HSPH Dean Julio Frenk (front row, center); and Ian Lapp, associate dean for strategic educational initiatives (third from right).

In July, Harvard School of Public Health welcomed the inaugural class of 15 doctor of public health (DrPH) candidates. Known as the Centennial Fellows, they are an unusually diverse group, hailing from Argentina, Brazil, Pakistan, Saudi Arabia, and the United States. The Fellows have worked in settings ranging from federal governments and private consulting agencies to global nongovernmental organizations and even a newspaper, and have launched their own for-profit business and nonprofit agencies.

Some of these men and women have shown promise in the early stages of their careers, while others have been practicing in public health or medicine for many years and seek to work at a higher level. A unifying priority for each student is a commitment to helping underserved and vulnerable populations.

The program will prepare the Centennial Fellows for creative leadership roles directing government agencies, NGOs, research institutions, and corporations that focus on helping people live longer, healthier lives. The three-year interdisciplinary program features coursework in essential public health topics—such as biostatistics, epidemiology, and social sciences—as well as classes in leadership, management, innovation, and communications. Instead of a dissertation, the program's hallmark is the DrPH DELTA Project, a 9- to 18-month culminating experience focused on achieving a significant public health outcome by working at a public health-related organization or agency.

Tune In for a Bad Night's Sleep

Each additional hour of TV watching may knock seven minutes off a child's nighttime sleep, according to an HSPH study that followed more than 1,800 children from ages 6 months to nearly 8 years. Boys were more likely than girls to have their sleep disturbed by television. Racial and ethnic minority children were much more likely to sleep in a room where a television was present, and among those children, the presence of a bedroom television reduced average sleep time by around 30 minutes a night. Television watching and insufficient sleep can raise the risks of depression and obesity, noted senior author Elsie Taveras, MPH '03, associate professor in the Department of Nutrition.

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What Common Chemicals Can Do to Kids' Brains

The recent rise in childhood neurodevelopmental disabilities such as autism, attention-deficit hyperactivity disorder, and other less apparent conditions may be linked to widely used industrial chemicals. New research from Philippe Grandjean, adjunct professor of environmental health at HSPH, and Philip J. Landrigan, dean for global health at the Icahn School of Medicine at Mount Sinai in New York, linked a range of common chemicals—including pesticides found in the garden or everyday foods and flame retardants widely used on furniture and clothing, as well as better-known hazards like lead and mercury—to toxic damage during brain development in children. The authors called for a global prevention strategy to identify and control the use of these substances.

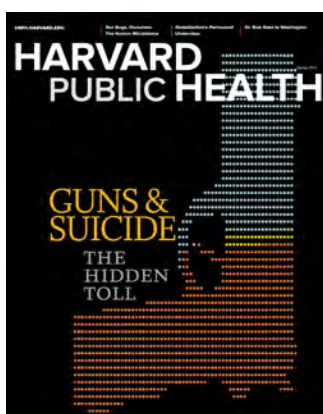
Does Universal Health Insurance Save Lives?

In the first four years after Massachusetts instituted comprehensive health reform in 2006, deaths of adults ages 20–64 in the state dropped by 2.9 percent, compared with similar populations in states that didn't expand health coverage. HSPH researchers estimate



that Massachusetts' health reform law, which provided near-universal coverage, has prevented approximately 320 deaths per year—one life saved for every 830 people gaining insurance. The drop in deaths was most significant among patients with illnesses likely to benefit from increased access to health care, including infections,

cancer, and cardiovascular disease. "Given that Massachusetts' health reform was in many ways the model for the Affordable Care Act, it is critical to understand the law's potential implications for population health," says Benjamin Sommers, assistant professor of health policy and economics at HSPH and lead author of the study.



Magazine Wins Three Prestigious Awards

"Guns & Suicide: The Hidden Toll," by *Harvard Public Health* editor Madeline Drexler—the cover story in the Spring 2013 issue of the magazine—was named the Grand Gold Winner for Best Article of the Year in the CASE (Council for the Advancement and Support of Education) 2014 Circle of Excellence Awards. The story also received the 2014 Neil Duane Award of Distinction and the 2014 Will Solimene Award for Excellence in Medical Communication, both from the New England chapter of the American Medical Writers Association.

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WHAT CAN MICROBES TEACH US ABOUT CANCER?

WENDY GARRETT
ASSOCIATE PROFESSOR
OF IMMUNOLOGY AND
INFECTIOUS DISEASES

Wendy Garrett specializes in studying the human gut—the part of our anatomy that carries the greatest number of microbes—and the possible links between these hordes of bacteria and colon cancer.

“ I’m fascinated by the fact that we are a multispecies self. That sounds kind of highfalutin, but what it means is that we as humans need to have a larger view of ourselves as a life-form. We have our human self. We also have a microbial self. We harbor other kingdoms of life, including single-celled organisms in the two scientific domains formally known as Bacteria and Archaea. And we have viruses and parasites that live within us and within our bacteria. If we counted up all our microbial cells, they would outnumber our human cells 10 to one.

The intestinal tract is a very complicated place in the body. The colon is actually the most densely populated bacterial ecosystem on the planet. You have a single lining of human epithelial cells and this rich network of immune cells. And both the immune system and the epithelium have a tricky task: They have to parse which microbes are symbiotic—they live as a part of us—and which are threats and make us sick.

In cancer research, there’s a big push to think about the unique relationship that cancers have with the immune system. This is especially relevant to colon cancer, which harbors bacteria. At times, these tumors have the ability to evade recognition, detection, and immune response. They also trigger certain kinds of inflammation that promote the growth and spread of the cancer. What’s intriguing is that *microbes do the same exact thing*. They evade the immune system, they trigger special kinds of inflammation that provide them with a selective advantage. And like cancer, bacteria have the ability to mutate their own genes—they are genetically very unstable. What this means is that if we learn about how microbes work, it could complement our understanding of how cancers evolve, develop, and spread.”

Q&A

When Lab Research Threatens Humanity

Is bench research that creates a lethal, contagious bird flu virus worth the risk that the virus could escape the lab? Not according to Marc Lipsitch, professor of epidemiology at Harvard School of Public Health. With Alison P. Galvani, an epidemiologist at Yale School of Public Health, Lipsitch co-authored a paper in *PLoS Medicine* arguing that experiments in which scientists manipulate bird flu viruses to make them transmissible in mammals, such as ferrets, deserve intense scrutiny as to whether the risks outweigh the benefits.

Harvard Public Health editor Madeline Drexler recently asked Lipsitch to discuss his concerns.

Q: You describe influenza as probably the most frightening potential pandemic pathogen, or PPP. Why?

A: Flu has demonstrated many times over history that we are unable to control its spread—even with modern medicine—until we produce a large

how many of them there are, and how that will change over time. What we do know is that there is a 20 percent risk that at least one laboratory worker will get infected over 100 laboratory years of work in a Biosafety Level 3 lab, which has special safety features for handling lethal agents.

human transmissible and retained some level of virulence in humans. It wouldn't have to kill 60 percent of victims, like the parent strain of the H5N1 bird flu. It would be bad enough if the virus killed 2 percent of victims, as did the 1918 flu. That epidemic killed 50 to 100 million people worldwide.

“There is a 20 percent risk that at least one laboratory worker will get infected over 100 laboratory years of work in a Biosafety Level 3 lab.” —Marc Lipsitch

quantity of vaccine. Although a virus such as Ebola is extremely worrisome if you get it yourself, it doesn't pose the same level of threat to humanity because it is less transmissible, at least in developed countries.

Q: When experts think about the release of PPPs, they often focus on malevolent actors in the lab, such as the biologist who allegedly manufactured and distributed highly refined anthrax spores in the fall of 2001. But you're more worried about an accident in the laboratory, especially in light of reports earlier this year of mishaps at a federal lab with anthrax bacteria. Does that seem a more likely scenario?

A: It's the one that I can quantify. We don't know how bad the bad guys are,

If one worker gets infected, that doesn't mean the world is at risk. The pathogen would have to become widespread, and the only published estimate for that occurrence is in the 10 to 20 percent range. I would expand that range to 5 to 60 percent, because it depends on things that are hard to predict: how long a person is infectious, how many contacts they have, whether their infectiousness is reduced by antivirals.

Q: Describe a nightmare scenario of an experiment with a deadly flu virus gone awry.

A: The worst outcome would be if a laboratory worker got infected and it turned out that the virus was human-to-

Q: How do the scientists who are conducting risky gain-of-function experiments justify their research?

A: One general reason they cite is that science always holds the promise of discoveries we can never imagine, so you should not clamp down on any particular kind of science. A specific claim for public health is the possibility of improving vaccine design and of improving our ability to detect and stamp out a dangerous virus if it were found to be circulating, for example, in birds.

Q: And you counter that those justifications are invalid?

A: Yes. For one thing, a genetic change can have different biological properties in different flu viruses. So knowing

that one nucleotide has changed will not reliably predict how the virus will behave. As for detection and response, we have seen in the response to H7N9 flu in China how much we're willing to do when we see a pandemic threat—and the answer is: not very much. We have identified potentially dangerous flu viruses in domestic fowl in Asia, but we haven't permanently closed bird markets or changed agricultural practices. The prospect of unforeseen benefit is certainly a reason to do science, but not a reason to choose risky forms of science over safer ones that many believe are more likely to yield benefits.

Q: To experiment or not to experiment with potentially lethal organisms: Is this a scientific or an ethical question?

A: Ethics needs to catch up with science. We have a complex regime of ethics for doing risky experiments on individuals. These principles are expressed in the Nuremberg Code for human subject research. What we don't have is a way of thinking about laboratory experiments that are not on people but present potentially devastating risks for the human population. *

To read Marc Lipsitch's *New York Times* op-ed and his other commentary on the avoidable risks of laboratory research, go to www.hsph.me/Lipsitch

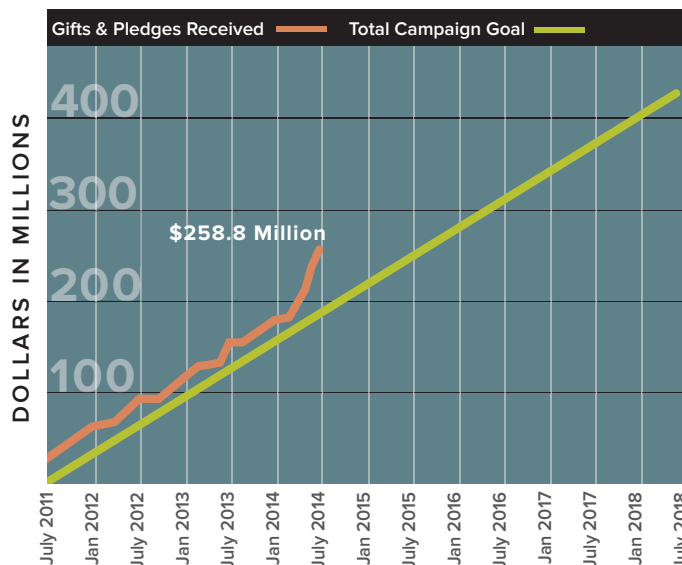


CAMPAIGN UPDATE

On October 25, 2013, HSPH publicly launched the Campaign for Harvard School of Public Health, and Campaign co-chair Jonathan Lavine announced the School's intention to raise \$450 million by 2018. We went on to enjoy a record-breaking fundraising year thanks to our many very generous donors, raising \$103.3 million in fiscal year 2014. This, combined with the funds raised during the two-year "quiet phase" prior to launch, brought total Campaign fundraising to \$258.8 million as of June 30, 2014—57.5 percent of our goal.

These funds are already working to support Campaign priorities such as student financial aid, professorships, and innovative education and research programs, as well as research funds to support efforts to combat four major global health threats: harmful physical and social environments; old and new pandemics; poverty and humanitarian crises; and failing health systems.

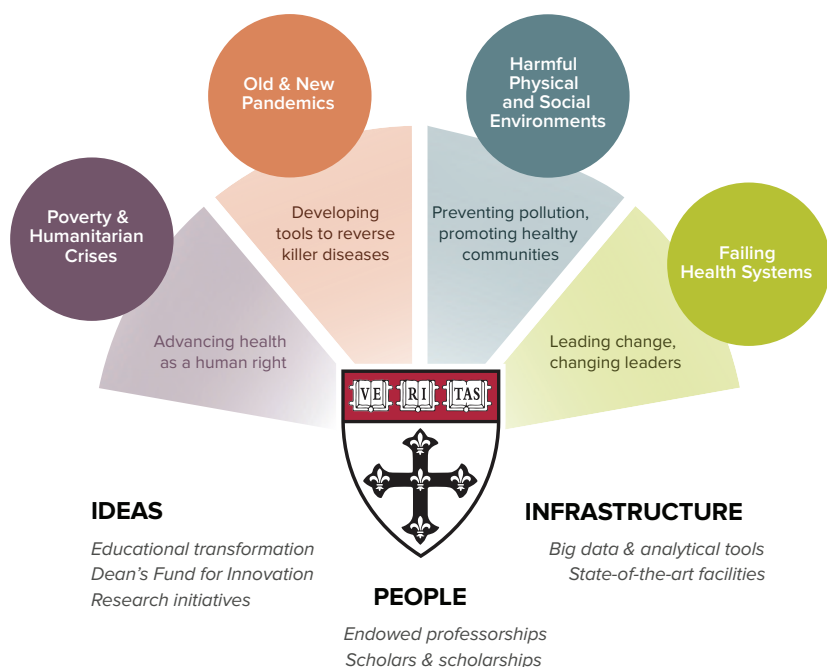
Giving in fiscal 2014 included five seven-figure gifts from generous philanthropists, two eight-figure commitments from international donors, and annual fund contributions from well over 3,000 alumni and friends



Progress toward the Campaign for Harvard School of Public Health's \$450 million goal, July 1, 2011 to June 30, 2014.

of the School. The 2014 figure also reflects the remarkable generosity of our faculty and staff, who gave a total of \$613,000 in new gifts and pledges—an increase of 19 percent over the previous year.

With the dramatic increase in giving, the School has also witnessed a sizable decrease in the cost of funds



The HSPH Campaign is focused on supporting people, ideas, and infrastructure at the School and addressing four central challenges to public health around the globe: poverty and humanitarian crises, old and new pandemics, harmful physical and social environments, and failing health systems. For more on the Campaign for Harvard School of Public Health, visit:

www.hsph.harvard.edu/campaign

raised, from \$0.19/dollar in fiscal 2011 to just \$0.08 in fiscal 2014.

The Campaign for Harvard School of Public Health is part of the \$6.5 billion Harvard Campaign.

By almost every measure, we have just completed the most successful year in the history of the HSPH Office for External Relations. I am very proud of our office's accomplishments, especially our efforts—along with many others in the HSPH community—to organize a memorable celebration of the School's first century of impact, and successfully launch a Campaign that will ensure strength and innovation at HSPH far into the future.

It is with profoundly mixed emotions that I have decided to leave HSPH, effective August 15, 2014, to pursue my own long-time dream of starting a new social enterprise in Boston. Drawing on what I have learned over five wonderful years at HSPH and 20 years in the not-for-profit world, this new enterprise will sell local, healthy, gourmet foods, while helping to feed low-income families and providing employment for at-risk youth and people who traditionally have a hard time finding work. At the heart of the enterprise is the simple idea that that everybody deserves a good job and a great meal.

To everyone who has contributed to the Campaign, to everyone who has supported and worked alongside me over the past five years, and to the remarkable faculty, alumni, students, and friends of HSPH whose commitment to public health has been a daily source of inspiration for me, thank you from the bottom of my heart.



Ellie Starr
Vice Dean for External
Relations

FACULTY GIVING SPOTLIGHT

A Boost for Patient Safety

A new gift from Lucian Leape, longtime faculty member in the Department of Health Policy and Management, will establish the Patient Safety and Quality of Care Fund. The fund will support both research and education in the areas of patient safety and quality improvement, with no restrictions on the activities to which it can be applied.

Leape has been recognized as a leader in the movement to make medical care safer since his seminal 1994 article, "Error in Medicine." His gift was motivated by a desire to inject fresh thinking into this rapidly developing field. "Patient safety has a huge agenda to address, and it's critical that we bring in new blood to advance the field," Leape says.

Leape's gift is a vote of confidence in what he calls "the best department of its kind in the country." He and his wife believe strongly in the importance of unrestricted gifts to universities and have been making such gifts to HSPH for nearly 20 years.



"Patient safety has a huge agenda to address, and it's critical that we bring in new blood to advance the field."

*Lucian Leape,
adjunct professor of
health policy,
Department of Health
Policy and Management,
HSPH*

**FACULTY AND STAFF GIVING TO THE SCHOOL
TOTALLED \$613,000 IN FISCAL 2014, A 19 PERCENT
INCREASE OVER THE PREVIOUS YEAR.**

The opportunity to have a measurable impact on the future of a field to which he is so committed inspired him to make a contribution that would make patient safety more attractive for students and junior faculty just starting in public health. The department chair will have substantial flexibility to direct the use of the fund. As Leape puts it, "I want my contribution to be an asset, not a barrier."

Flexible Resources Maximize Public Health Impact

Monell Foundation Dedicated to Unrestricted Giving at HSPH



Flaminia Catteruccia, associate professor of immunology and infectious diseases, Department of Immunology and Infectious Diseases

Flaminia Catteruccia wonders: Is it possible to fight malaria by making the mosquitoes that spread the disease sterile?

William Mair wants to know: Can we identify the molecular mechanisms that increase people's disease susceptibility in old age—and thus more effectively treat disorders such as Alzheimer's or cancer?

Catteruccia and Mair are just two examples of junior faculty members who have benefited from unrestricted gifts received from generous donors and distributed at the Dean's discretion in recent years. Dozens of junior faculty members, postdoctoral fellows, visiting scholars, and researchers across the School have also benefited, along with departments, research studies, and programs such as Defeating Malaria: From the Genes to the Globe, the François-Xavier Bagnoud Center for Health and Human Rights, the Center for

Global Tobacco Control, and many more. Discretionary funds are also a critical source of financial aid for students.

The Ambrose Monell Foundation has long recognized that one of the most effective ways to expand the impact of Harvard School of Public Health is by contributing unrestricted funds, which allow Dean Julio Frenk to respond quickly to emerging opportunities, invest in pioneering new initiatives, and sustain important projects when there are gaps in funding from other sources. The foundation has been a loyal supporter of HSPH since the early 1980s and for the past 24 years has made an annual unrestricted gift to the School of at least \$500,000. To date, the foundation has made gifts to the School in excess of \$17 million.

Foundation President Ambrose Monell says the foundation first learned about HSPH during the deanship of Howard Hiatt, when Harvey Fineberg—who would later become dean himself—applied for a grant. “We were impressed by his presentation and continued to support Harvey’s research through the years,” says Monell. “By the time Harvey became dean, our relationship was such that we felt perfectly comfortable making the grant available to him to distribute, at his discretion, to various HSPH projects. We felt that Harvey was in the best position to assess where the grant money was most needed and to apply it accordingly—and we have placed the same level of trust in his successors: Interim Dean James Ware, Dean Barry Bloom, and Dean Julio Frenk.”

Unrestricted funding also provides key support for fields of inquiry for which there may be few federal research dollars available. “It is often in neglected areas that great discoveries are made,” Monell says.

“The long-standing support of the Monell Foundation has helped the School in immeasurable ways,” says Dean Frenk. “Such unrestricted funding sustains a mix of activities that are critical to ensuring the health of the School, and a healthy future for people all over the world.”



William Mair, assistant professor of genetics and complex diseases, Department of Genetics and Complex Diseases

Marc Roberts

Marc Roberts, a professor in the Department of Health Policy and Management and the Department of Global Health and Population, died July 26 at age 71. He began his career at Harvard 54 years ago as a freshman, graduating *summa cum laude* in social studies in 1964. Except for a Fulbright fellowship in Great Britain the next year and a brief tenure as a visiting professor at Stanford, he never left the University.



At the time of his passing he was professor of political economy and health policy *emeritus*.

Over his career, Roberts taught economics, statistics, ethics, management, environmental policy, health policy, and global health at Harvard's Faculty of Arts and Sciences, Harvard Kennedy School, Harvard Law School, and for the last nearly 40 years, at HSPH. In the past decade, he became a core faculty member in the HSPH global health group on health systems and helped develop the doctoral program in that field.

Although his official faculty status was *emeritus*, he continued to play a leading role with other HSPH faculty in the World Bank's training efforts on health sector reform around the world, having over the course of his career taught

courses and seminars for senior government leaders in more than 30 countries on every continent except Antarctica. Indeed, he had plans to teach in Spain, South Africa, and Turkey this fall. In the U.S., he remained an active consultant, helping both public and private organizations adjust to changing market and policy conditions.

Roberts authored seven books and numerous papers on health care reform and health care ethics. His most widely known book, written with three HSPH co-authors, was *Getting Health Reform Right: A Guide to Improving Performance and Equity*, which is used internationally in courses and in guiding reform. One former minister of health referred to the book as his "Bible for health reform."

In March 2013, in a packed auditorium, the HSPH and Harvard community held a retirement celebration and symposium in Roberts' honor that drew many of his former students who have gone on to hold important posts in health policy all over the country and the world. One former doctoral student, Karl Lauterbach, now a member of the Bundestag in Germany, noted in his comments at that event: "A lot of what I currently do is inspired by Marc. I have had many brilliant teachers. The best teacher of all teachers I've had is Marc. There is no one I have learned more from than him. We did not always agree on all issues, but he taught me how to think, not what to think."

Added Michael Reich, Taro Takemi Professor of International Health Policy, who worked alongside Roberts for 35 years, "Marc's insights, his intellect, and his humor on all sorts of issues will be sorely missed by his colleagues and his students around the world." 🌟



Clarifying the facts on fat

Is Butter Really Back?

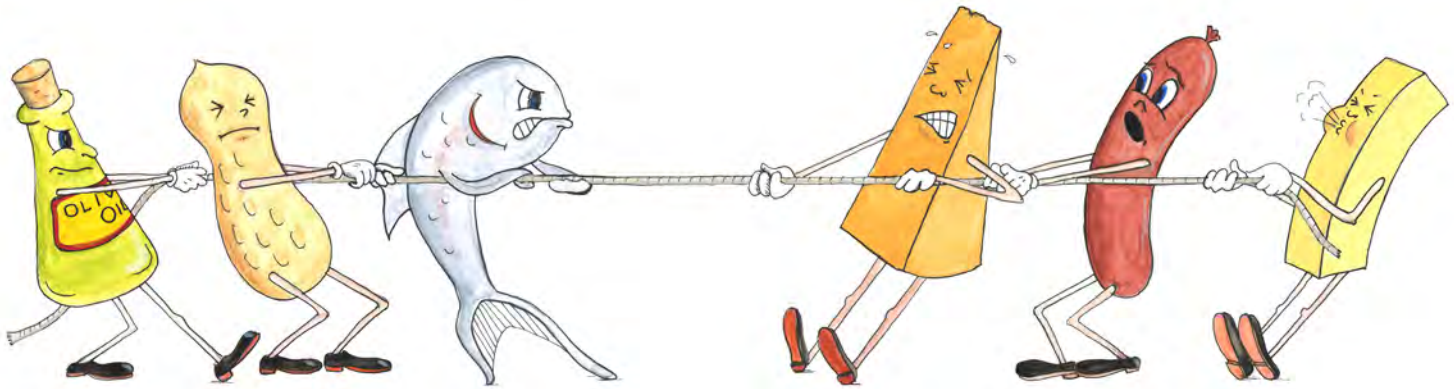
In March 2014, an article appeared in the *Annals of Internal Medicine* that sent the food-obsessed public into gastronomic raptures. Though saddled with a drab title—“Association of Dietary, Circulating and Supplement Fatty Acids with Coronary Risk”—the article reported a seemingly stunning result: eating less saturated fat, the dietary demon that makes buttery croissants so irresistible, doesn’t actually lower a person’s risk for heart disease.

The finding was reported widely in the media, hitting all the cultural hot buttons: food and fat, death and disease, bacon and Brie. As Mark Bittman’s column in *The New York Times* rhapsodized: “Butter is Back. Julia Child, goddess of fat, is beaming somewhere.”

The *Annals* article, and the subsequent news coverage, set off a national conversation about dietary fat. Indeed, there is debate within the scientific community itself over how important it is to focus on certain types of dietary fat—and that debate existed long before the *Annals* article appeared. The debate exists even among professional colleagues—and friends—within Harvard School of Public Health’s Department of Nutrition.

But there are also broad areas of continuing agreement around what constitutes a “healthy diet.” The consensus: We all need to shift our collective nutritional thinking toward an emphasis on food-based, rather than nutrient-based, recommendations. The fact is, not all fats are bad, and concentrating too much on eliminating “fat” from our diets has, in many cases, led us to replace even healthy fats with sugars and other simple carbohydrate foods that may actually be worse for our health.

continued



FAT WARS: A SHORT HISTORY

It's hard to pinpoint exactly when fat started to become the enemy on our plate, but a good guess may be January 13, 1961. On that day, a University of Minnesota physiologist named Ancel Keys appeared on the cover of *Time* magazine, glowering at the gluttonous American public through horn-rimmed glasses.

Keys had made a name for himself during World War II by developing the K ration, and after the war turned his attention to the relationship between diet and health, particularly heart disease. He actually spent several years after World War II at HSPH examining this thorny problem. Then, as now, heart disease was the leading cause of death in America, but nobody knew exactly why. Keys led the seminal Seven Countries Study, which for the first

Keys delivered his opinions with the force of fact. (Obesity? “Disgusting,” he said. “Maybe if the idea got around again that obesity was immoral, the fat man would start to think.”) He found that nations where people ate lots of saturated fat—think of the Finns smearing butter on their cheese—suffered higher rates of heart disease. Keys’ work also suggested that diets high in saturated fat and cholesterol increased total cholesterol levels.

Yet based on the well-recognized limitations of cross-country studies, Keys was smart enough to conclude that this early evidence did not prove cause and effect, but rather suggested a need for further research, especially in cohort studies examining individuals within populations. Indeed, many better-designed studies have since proven that total dietary fat has no effect on heart disease.

It’s hard to pinpoint exactly when fat started to become the enemy on our plate, but a good guess may be January 13, 1961.

time documented that the incidence and mortality rates of coronary heart disease varied as much as tenfold among countries, with the lowest rates in Crete. The study, which began in the 1950s, continues even today.

Keys’ work provided some hints about the culprit behind this yawning gap. He found that saturated fat consumption was strongly associated with regional rates of heart disease, but that total fat intake was not. Indeed, total fat intake in Crete was just as high as in Finland, which had the highest rates of heart disease at that time. Keys suggested that it was the type of fat, as well as the Mediterranean diet in general, that spelled the difference in heart disease risk.

Numerous other investigations building on Keys’ work focused on specific types of fat. Scientists fed monkeys diets high in saturated fat and watched them develop atherosclerosis. Researchers in Finland fed butter to patients in one mental hospital, while those in another got soybean oil—and the patients eating the vegetable oil had a lower risk of heart attack. On the other hand, several other trials around that time replaced butter and other saturated fats with vegetable oils and saw no significant benefits. In a recent study conducted in Spain, scientists gave subjects a free supply of either olive oil or mixed nuts for five years and watched both groups’ risk of heart disease drop.

Epidemiologists established large investigations like the Framingham Heart Study, monitoring people's health for years. Decades passed; data accumulated.

Keys also conducted controlled feeding studies, in parallel with the HSPH Department of Nutrition's Mark Hegsted, which showed that polyunsaturated fats (the kind found just in plants) reduced blood cholesterol levels. This led to recommendations to replace saturated fat with polyunsaturated fat—a trend that some scientists believe has been responsible for significant declines in rates of cardiovascular mortality in the United States.

VERDICT: NOT ALL FATS ARE BAD

By the 1970s, Keys and Hegsted, among other scientists, concluded that different types of dietary fat had varying effects on blood cholesterol levels, and that different types of cholesterol had varying effects on heart disease. Unsaturated fats, especially polyunsaturated fatty acids like those in walnuts, decrease the “bad” LDL cholesterol and raise the “good” HDL cholesterol. In the early 1990s, Walter Willett, now chair of the HSPH Department of Nutrition, and others determined that trans fats—liquid vegetable oils transformed into shelf-stable solids (think Crisco)—were associated with greater risk of heart disease and are a double metabolic whammy, raising “bad” LDL and decreasing “good” HDL. Scientists around the world

simultaneously showed that saturated fat—the kind in butter and lard—increases both “bad” LDL cholesterol and “good” HDL cholesterol, making it similar to carbohydrates overall but not as beneficial to health as polyunsaturated fats from nuts and vegetables.

A COMPLICATED MESSAGE GETS OVERSIMPLIFIED

Unfortunately, amid all these nuanced research results, during the 1980s and 1990s conventional wisdom and national guidelines in the U.S. shifted the spotlight to reducing total fat—period—despite little or no evidence that this simplistic advice would prevent disease.

The complicated message—that some fats are good for you and others are bad—didn't reach the general public. Instead, doctors and scientists running the National Heart, Lung and Blood Institute's National Cholesterol Education Program in the mid-1980s decided to simplify it, explains Lilian Cheung, director of health promotion and communication in the HSPH Department of Nutrition. “They thought of a shortcut: Just cut down fat.”

In 1987, the Henry J. Kaiser Family Foundation launched a social marketing campaign called Project LEAN (Low-Fat Eating for America Now), encouraging Americans to reduce total fat intake to 30 percent of their diet, and spreading the message through advertising and supermarket promotions. The public ate it up, so to speak.

continued

The Latest Line on Fats



Food rich in mono- and polyunsaturated fats (like olive oil, soybean oil, peanut oil, and canola oil) will lower your heart disease risk. Foods high in saturated fats (such as lard and animal fats like well-marbled meat) will not lower heart disease risk, and much research indicates they increase your risk of heart disease.



Don't replace foods rich in saturated fats with processed foods rich in refined carbohydrates (such as white bread and pastry).



Choose minimally processed foods with healthy fats—including nuts such as walnuts and peanuts, and fish such as salmon.

“There’s a simplistic, intuitive appeal to that message: ‘Fat has more calories per gram, so if I eat fat, I’ll get fat,’” says Willett. The food industry jumped on board, removing fat from food and replacing it with sugar and carbohydrates, filling supermarket shelves with fat-free salad dressing, fat-free ice cream, and low-fat SnackWell’s cookies.

“FAT-FREE” MESSAGE A PUBLIC HEALTH DISASTER

It was one big, happy, fat-free feeding frenzy—and a public health disaster.

“We didn’t know as much then about the bad effects of refined carbohydrates,” says Cheung. “For example, low-fat yogurt is loaded with sugar. Our bodies digest these

“This was really a paradigm shift in terms of the fat message,” says Hu. “Not all fats are created equal.” Dariush Mozaffarian, newly named dean of the Friedman School of Nutrition at Tufts University, notes that in 2005, an updated report from the Nurses’ Health Study by Hu and other HSPH researchers showed that neither overall fat, saturated fat, nor monounsaturated fat intake was linked to heart disease. Polyunsaturated fat intake, however, was found to be clearly protective.

Unfortunately, by the time Frank Hu’s first study made the front page of the *Times* in 1997, our anti-fat bias had become entrenched. Perversely, the low-fat message helped feed America’s obesity epidemic, as carbohydrates replaced

“Instead of emphasizing one nutrient, we need to move to food-based recommendations. What we eat should be whole, minimally processed, nutritious food—food that is in many cases as close to its natural form as possible.”

—Dariush Mozaffarian, dean of the Friedman School of Nutrition, Tufts University and HSPH adjunct associate professor of epidemiology

refined carbohydrates and starches very quickly, causing an insulin spike.” Insulin tells the body to store fat and causes our blood sugar to drop, which makes us feel hungry. These relentless sugar highs and lows lead to overeating and weight gain, raising the risk for heart disease and diabetes.

In 1997, HSPH’s Frank Hu—at the time a postdoctoral fellow at HSPH, now professor of nutrition and epidemiology—published a landmark epidemiological study in the *New England Journal of Medicine*. Hu’s report told a more subtle story about dietary fat and heart disease. His data, collected from 80,082 women enrolled in the long-running Nurses’ Health Study—a collaboration by HSPH, Harvard Medical School, and Brigham and Women’s Hospital—suggested that replacing a mere 5 percent of saturated fat calories with unsaturated fat would reduce one’s risk of heart disease by a whopping 42 percent. Replacing only 2 percent of trans-fat calories (the kind found in packaged pastries) with unsaturated fat would reduce one’s risk of heart disease by 53 percent. In other words, it wasn’t total fat that mattered, but type of fat.

The discovery was so surprising that *The New York Times* splashed it on Page 1.

fat in many foods to make them “low-fat” or “no-fat” but still tasty to American and global palates.

A DIFFERENCE OF OPINION

It was against this backdrop that the 2014 *Annals of Internal Medicine* study created such a stir. The article discussed the results of a “meta-analysis,” a type of statistical analysis that gathers data from many different studies and crunches them together. Hu first learned of the *Annals* meta-analysis a few days before it was published, when *The New York Times* sent him a copy and asked for comment. At the same time, Willett got a call from an NPR reporter questioning the study’s results, especially the conclusion that eating more polyunsaturated fat failed to lower the risk for heart disease.

“I knew something was fishy,” says Willett. He requested a data supplement from the journal and noticed that the authors had pulled incorrect numbers from some of the original studies, including the long-running Nurses’ Health Study, which Willett helps direct. Willett also saw what seemed to him to be another problem: the authors had omitted important studies from their analysis. Adding to the complications: One of the study’s authors was a respected

What **SHOULD** We Worry About?

HERE'S WHAT NUTRITIONISTS INTERVIEWED FOR THIS STORY AGREE ON:

EAT **LESS**



Processed meats and cold cuts



Processed snacks that are low in fat but high in sugar and refined carbohydrates



Diets high in sodium

EAT **MORE**



Diets high in fruits, vegetables, nuts, seeds, whole grains



Diets high in omega-3 fatty acids, which are found in seafood

Adapted from talk given by Dariush Mozaffarian, April 25, 2014

colleague in HSPH's Department of Nutrition: Mozaffarian, who was then still an associate professor at the School.

As Willett and Hu saw it, the glaring problem in the article was one of the findings: that replacing saturated fat with polyunsaturated fat does not necessarily reduce your risk for heart disease. According to Willett, "People don't just remove saturated fat from their diets. They replace it with something else." And this replacement, also called a "comparator," can make all the difference. Exchanging a hot buttered cheesesteak for a half-dozen doughnuts does not help your heart; swapping it for grilled salmon with greens and olive oil does. That's the full message. But Willett quickly realized that the full message of replacement was complex and not likely to make it into news media reports.

Willett contacted the journal editor. "I knew this was going to cause huge confusion," he recalls. With HSPH colleagues, Willett scrambled to write a response to *Annals* and sent it to the journal before the paper was published. The journal posted their letter online several days after publication and, subsequently, a version of the article in which some of the specific errors were corrected.

Mozaffarian, a co-author on the paper, agrees with Willett and Hu that eating polyunsaturated fat reduces the risk of heart disease. He believes that the evidence indicates that, compared to the average diet consumed by

Americans, polyunsaturated fat is more beneficial to heart health than any other major macronutrient. Saturated fat, on the other hand, turns out to be neutral from a heart health perspective when compared to the average diet—so that campaigns which prioritize reducing saturated fat consumption, rather than focusing on foods and overall diet quality, are a misplaced and misleading public health strategy.

He adds: "Frank Hu had published nearly identical findings in 2010 in the *American Journal of Clinical Nutrition*, demonstrating that people who eat the highest levels of saturated fat have the same risk of heart disease as those who eat the lowest."

THE MEDIA MESSAGE

Willett felt that his efforts to provide clarification and context came too late to enable the media to uniformly provide the nuanced reporting this new study required. Some reporters covered the issue with context and balance. Others merely reprised the lead from the original tip sheet for news reporters from the *Annals*, headlined: "Evidence does not support guidelines on fatty acid consumption to reduce coronary risk."

Emanuele Di Angelantonio, a university lecturer in the Cardiovascular Epidemiology Unit at the University

continued

of Cambridge, who was the senior author on the *Annals* study, was surprised at how the message got distorted. “It was reported as ‘butter and burgers,’ and that’s not what our paper said,” he notes. “What the paper said was that the story on saturated fat is slightly more complicated than we thought.”

In July 2014, Di Angelantonio published a detailed response to scientists’ criticisms. In the letter, he did not change any conclusion, but added additional context. “Our paper summarizes the evidence so scientists can plan future research,” he says.

“I sympathize with the press’s predicament, because they’re not experts in this,” says Frank Sacks, professor of cardiovascular disease prevention in the HSPH Department of Nutrition. “They see a well-known medical journal publishing a meta-analysis and pronouncing a very important result that goes against our current guidelines. So I don’t

In other words, the problem isn’t just what we eat, but also how we think about food. We fixate on the nutrient of the day, even those that confer benefits (Lycopene to prevent cancer! Phytoflavonoids to fight inflammation!); we eat mindlessly in the car and in front of the TV; we value volume of food over the quality of the ingredients, the beauty of presentation, and even taste.

Researchers say we should focus on healthy dietary patterns, rather than glorify or demonize specific nutrients. A healthy pattern includes heaps of fresh fruits and vegetables, whole grains, nuts, legumes, poultry, and fish. An unhealthy but all-too-frequent pattern: piles of processed meat, mounds of french fries, lots of white bread and potatoes and processed breakfast cereals, giant sugary drinks, and packaged cupcakes for dessert.

“Food is about enjoyment and nourishment to the body as well as the soul,” says Cheung. In her view, the goal isn’t

“People don’t just remove saturated fat from their diets. They replace it with something else,” says Walter Willett, chair of the HSPH Department of Nutrition. Exchanging a hot buttered cheesesteak for a half-dozen donuts does not help your heart; swapping it for grilled salmon with greens and olive oil does.

feel the press really should be expected to understand the science at the level that it would take to critique the study. On the other hand, things like this are very attractive to the press, because everybody is interested in it. It’s a story.”

FOCUSING ON FOODS, NOT NUTRIENTS

But there’s a deeper issue beyond the recent media ruckus, explains Mozaffarian. “The findings demonstrate that, in practice, when people lower their saturated fat intake, they don’t necessarily eat healthier diets. Saturated fat is found in a range of foods—including not only butter and meats but also milk, yogurt, cheese, nuts, and vegetable oils. Each of these foods has different effects on heart disease. Instead of emphasizing one nutrient, we need to move to food-based recommendations. We’re not going to artificially create healthy diets by manufacturing low-fat, low-saturated-fat packaged foods. What we eat should be whole, minimally processed, nutritious food—food that is in many cases as close to its natural form as possible.”

to be grimly disciplined or morally virtuous, but rather to be mindful when negotiating today’s dazzling cornucopia. “Choose what you eat mindfully and enjoy,” she says. “Be aware and sensible about your choices, because it’s your health and well-being.”

THE BOTTOM LINE

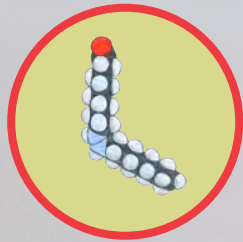
Complicated questions about diet and health require evidence from many different types of studies over many years before the weight of evidence shifts toward consensus.

In the case of dietary fat, most scientists do agree on a number of points. First, eating foods rich in polyunsaturated fat will reduce the risk of heart disease and prevent insulin resistance. Second, replacing saturated fat with refined carbohydrates will not reduce heart disease risk. Third, olive oil, canola oil, and soybean oil are good for you—as are nuts (especially walnuts), which, while they include some saturated fat, are also high in unsaturated

continued page 24

a primer on **FATS**

All fats have the same basic chemical structure: a molecule of glycerol (a simple sugar alcohol) bound to three long chains of carbon atoms. If each carbon is holding as many hydrogen atoms as it can, then the fat is “saturated” and the carbons form a long, straight chain. Unsaturated fats have one or more double bonds, which cause kinks in the carbon chain. The shape of the carbon chain helps determine the properties of the fat and how it interacts with cells. All foods contain a mix of fat types, but one type usually predominates.

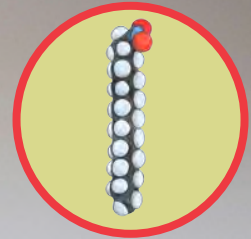


UNSATURATED FAT

Examples: Vegetable oils, nuts, fish (animal fats also contain modest amounts of monounsaturated fat)

There are two types of unsaturated fats: mono and poly. Monounsaturated fats have one double bond in the carbon chain; polyunsaturated fats have between two and six. These double bonds change the shape of the molecule, adding bends and kinks that cell membrane receptors can recognize. Our bodies cannot make essential polyunsaturated fats (alpha-linolenic acid and linolenic acid from plants or plant oils), so we have to eat them.

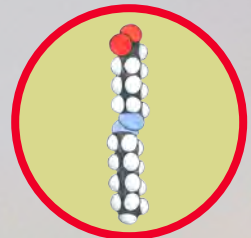
Polyunsaturated fats trigger mechanisms in the liver for removing cholesterol from the body. First they activate LDL receptors, which pull “bad” LDL cholesterol from the bloodstream. Then they trigger the liver to excrete cholesterol in the bile, rather than dump it back into the bloodstream.



SATURATED FAT

Examples: butter, lard, bacon grease, dairy fat

Because saturated fats contain straight chains of carbon, the molecules are able to pack closely together and cling tightly to one another. This makes them very effective for energy storage (i.e., high in calories). Saturated fats raise the total blood cholesterol by raising the harmful LDL (low-density lipoprotein), but they also raise beneficial HDL (high-density lipoprotein) in comparison to carbohydrates, although researchers dispute how helpful this increase is.



TRANS FAT

Examples: partially hydrogenated oils such as traditional Crisco, which until recently were found in many packaged baked goods and other processed snacks.

In food production, hydrogen atoms are forced onto the carbon chains of liquid unsaturated fats, turning them into solid saturated fats. This is how cottonseed oil is transformed into Crisco, and it's useful for making shelf-stable snacks.

The rigid structure of trans fats causes them to interact differently with cell membranes, telling the body to make more LDL and excrete less. Trans fats also suppress the production of “good” HDL cholesterol.

What's for Lunch?

We asked four nutrition experts to describe an ideal meal. Here's what they said:



WALTER WILLETT

MEAL: Quinoa with mixed vegetables, prepared with olive oil, broccolini sautéed with a little bit of garlic and olive oil, and nuts. I often eat these with fish or tofu. If I'm in a hurry, I may just grab some whole wheat bread and peanut butter with low-sugar blueberry jam.

DRINK: Tea or coffee.

DESSERT: An apple and maybe a bit of plain yogurt.



LILIAN CHEUNG

MEAL: I love tofu and cut it up on a plate of mixed vegetables. I love sage, which I cut up very fine. I add olive oil plus balsamic vinegar dressing, some nuts, sometimes sesame seeds.

DRINK: Coffee or tea. I use soy milk because I'm allergic to dairy—and I love to put a teaspoon of honey in it.





FRANK HU

MEAL: I'm rediscovering some of the ancient grains, like quinoa and freekeh. I have a generous amount of vegetables. And I put nuts in everything, basically. We eat fish at least three or four times a week, and some poultry.

DRINK: I used to drink tea, but now I drink three or four cups of coffee per day, because we have found more and more evidence that coffee is good for you. And, of course, water is always good.

DESSERT: Fruits. I like different varieties.



DARIUSH MOZAFFARIAN

MEAL: Salmon, fresh berries, grilled asparagus with extra-virgin olive oil, some slivered almonds on top.

DRINK: Seltzer water with ice.

DESSERT: Dark chocolate. I eat dark chocolate every day.



The Lure of Meta-Analysis

The 2014 *Annals of Internal Medicine* study on saturated fat raised questions about the growing use of meta-analyses in scientific research. Having first gained popularity among social scientists in the 1980s, meta-analyses are useful for discerning patterns or trends and offering a big-picture view of the science on a particular subject. “They’re most exciting if there’s a public policy issue and there are studies that could inform the issue,” says Nan Laird, HSPH professor of biostatistics. “As a public, we’re really tired of hearing news story x and news story y and news story z. So it’s attractive to say, ‘Hey, we’ve put everything together and here’s the answer.’”

Scientists investigating nutrition have several ways to conduct their initial research. They can follow a large group of people for a while, take notes on what the volunteers eat, and see what happens to the group (a prospective cohort study). They can gather people with a specific disease, such as type 2 diabetes, and see what dietary habits those individuals have in common (a retrospective cohort study). They can totally control people’s diet for a time and see what happens (a feeding study). Or they can go for the “gold standard”: a randomized, double-blind, placebo-controlled study. In this type of research, subjects are randomly assigned to two groups, one of which receives the food or drug under study, while the other receives a placebo. Neither the subjects nor the scientists know who is in the active or control group.

Each type of study has advantages and disadvantages. A randomized, double-blind, placebo-controlled study is easy to do if you are giving people a round white pill to lower cholesterol—but more complicated if you want to test the merits of eating, say, salmon vs. beef. Feeding studies yield exquisite data—but are expensive and difficult. Cohort studies can extend for decades and suggest many links between diet and disease—but the conclusions may be muddled by many other factors.

Overcoming these problems is the attraction of meta-analyses, which combine data from all these types of studies to give the big picture. Or at least, that’s what they are supposed to do.

So, **IS** Butter Really Back?

WALTER WILLETT:

“Butter is not back.

Long term health will be better with olive and other oils (sorry, Julia).”



DARIUSH MOZAFFARIAN:

“Definitely not. Although saturated fat content is unhelpful for judging foods, people should prioritize those foods that we know improve health, and butter is not one of them.”



fat, tipping the balance in their favor. Finally, omega-3 and omega-6 fatty acids are essential for many biological processes—from building healthy cells to maintaining brain and nerve function—and we should eat a variety of healthy foods, such as fish, nuts, seeds, and vegetable oils, to obtain adequate amounts of both fatty acids.

Other, finer points are still unclear. For instance, monounsaturated fat is believed to lower risk for heart disease. But it’s difficult to study in Western populations, because most people get their monounsaturated fat from meat and dairy, which are also full of saturated fat. Still, people can choose from a variety of monounsaturated-fat-rich foods, such as peanuts and most tree nuts, avocados, and, of course, olive oil. And though scientists agree that omega-3 and omega-6 fatty acids are essential, they debate how much of each we actually need.

While meta-analyses are relatively inexpensive, they require meticulous effort to find the original literature, distill the data, and combine them meaningfully. “It’s not like there’s a magic statistical crank that can be turned that suddenly turns mush into enlightenment,” says Laird. “It’s a big, complicated issue.”

In addition, because meta-analyses strive to be comprehensive, they tend to attract media attention. For this reason, Willett and others argue, scientists must take extra care with them and should possess a deep understanding of the original data.

Willett had taken a similarly strong stand against a meta-analysis published in the *Journal of the American Medical Association (JAMA)* in 2012, which reported that overweight people were 6 percent less likely to die than those of normal weight. Willett says the analysis did not properly account for factors like the tendency of frail elderly people to lose weight (not healthy), smokers to be skinny (also not healthy), and people with serious diseases to lose weight before they die.

Willett also noted that the National Cancer Institute, partly in response to the *JAMA* paper, later sponsored a pooled analysis on the same subject. A pooled analysis, in which scientists gather raw data directly from the source rather than using data summaries from published papers, is more time-consuming and expensive than a meta-analysis, but the results can be more meaningful. The study, published in the *New England Journal of Medicine*, said that being overweight was indeed deleterious. According to Willett, it got almost no press.

Similarly, an international collaboration of investigators had examined the relationship between type of fat and coronary heart disease—the same topic of the recent meta-analysis—by combining the original data from large cohort studies (more studies than in the recent *Annals* meta-analysis). Because they had access to the original data collected on individuals, the researchers were able to compare calories from saturated fat with the same number of calories from carbohydrates (which showed no difference in risk) and from polyunsaturated fat (which showed lower risk). They, too, received virtually no media attention.

While the public may find such uncertainty disconcerting, there are always unknowns at the forward edge of science. And scientists will sometimes disagree—even when they work at the same institution, as Willett and Mozaffarian demonstrate. Much as we’d prefer clear-cut answers, pure and simple truths, they are not always easy to come by.

“There’s a lot of uncertainty in data. And it’s the job of those of us who work in science to try and simplify answers as much as possible,” says Nan Laird, Harvey V. Fineberg Professor of Public Health and professor of biostatistics at HSPH. “But you don’t want to lose the accurate representation. And an accurate representation may be that we don’t really know the answer. That’s not something that people necessarily want to hear.”

Compounding the problem is the fact that dietary advice, even from august bodies like the National

Institutes of Health (NIH), can lag the scientific evidence. The NIH takes years to adopt new guidelines, and astoundingly is still stuck on a low-fat, high-carb message, say HSPH researchers. The NIH’s Healthy Cooking and Snacking website suggests snacks to children and families like fat-free cheese on crackers and fat-free chocolate milk. The agency’s “GO, SLOW, and WHOA” food chart labels avocado and olive oil as “sometimes” foods, while ketchup and fat-free creamy salad dressing as “almost anytime” foods.

“It’s absurd. It’s still completely focused on lowering total fat,” says Mozaffarian. “We need to bridge the gap between scientific consensus and current policy.”

Barbara Moran is a science writer based in Brookline, Massachusetts.

The thatched bamboo huts sprawling up the side of a mountain near Thailand's border with Burma could at first be mistaken for a tranquil rural village. Surrounded by a lush forest, Umpiem Mai hums with life. Roosters dodge motorbikes whizzing by on the carless streets. Laughing children play ball in front of a market where women in colorful skirts balance babies on their hips as they shop for vegetables. It is a community of more than 13,000 people, densely packed and tightly knit. A wooden pole operated by hand is raised and lowered for entering cars. The only permanent structure is the main road, and even that is just partially paved.

HSPH pairs with refugee public health students to create a healthier Burma.

The people who live in Umpiem Mai and in the eight other camps along the border are Burmese refugees, mainly from Karen state, who have fled turmoil in the eastern part of their homeland and are seeking asylum from sectarian violence. Decades of civil war in Burma have created one of the most protracted refugee crises in modern history. Some people have lived in the camps for nearly 30 years and an entire generation has known no other life.

The end of military rule in Burma (also known as Myanmar) in 2011 signaled new hope that a resolution was in sight. But even if ceasefires hold between the Burmese government and ethnic minority groups, the conflict has left a legacy of devastation that will linger for years. While some predict that the Thai border camps (which are separate from the refugee camps housing another persecuted minority, the Burmese Rohingya Muslims) will close within the next three years, the future of the 130,000 people who call them home remains uncertain.

Students at Harvard School of Public Health who are training for humanitarian careers often study life in refugee camps, but few have seen these settlements in person. Fewer still have the opportunity to work with refugees as colleagues and get to know them. In January 2014, eight HSPH students traveled to Umpiem Mai for the School's first experiment with a "twinning" class in a refugee camp. For three weeks, they studied alongside 21 refugee students at the camp's Public Health Institute (PHI) and developed a joint research project that would be carried out remotely during the first half of the spring semester.

continued

AN EQUAL EXCHANGE



SHYNESS EVOLVES TO SHARING

The selection process for students participating in such a unique experience had to be thorough, says Parveen Parmar, MPH '10, who designed and led the course and is associate director of the Brigham and Women's Hospital International Emergency Medicine Fellowship and an associate faculty member at Harvard Humanitarian Initiative. She looked for students with the spirit and experience to deal with squat toilets and other austere realities of fieldwork.

But more important, "Understanding how to work with colleagues in a respectful and egalitarian way when they don't speak your language and have different skill sets and backgrounds—that's not something a lot of researchers do

FORMIDABLE NEEDS, FEW TRAINING OPPORTUNITIES

The HSPH students traveled to the camp each morning in the back of a truck after spending the night at a nearby home in a Hmong village. Daily lectures by faculty members from both institutions covered water and sanitation, women and children's health, and tools used to develop and assess public health programs—skills the PHI students will need after they graduate and join the region's public health workforce. With one of the highest rates of maternal death in the world, along with high rates of malnutrition and drug-resistant malaria, the public health needs are formidable and the opportunities for training are few.



HSPH's Phillip Summers video chats with Public Health Institute students.



Inside the Public Health Institute, near the Thailand-Burma border.

well, even very experienced researchers," Parmar says. "The students appreciated that they weren't the experts in this situation. This was intended as an equal exchange."

While the PHI students were initially shy around the HSPH newcomers, barriers broke down during the daily meals the group shared at the camp. "They opened up about their lives from the first day," says Corey Peak, SM '14. "I heard about students who had left their families behind to get an education. Some had crossed over a landmined border to come here because there were no other opportunities. They wanted to share their stories and hear ours, too. And to understand that while we may be different, we're all just people."

The twinning course grew out of Parmar's work with Community Partners International, a nongovernmental organization that has operated the camp's Public Health Institute for the past two years in collaboration with the Karen Refugee Committee Education Entity and the Karen Department of Health and Welfare. It was offered by the Humanitarian Academy at Harvard through HSPH's Department of Global Health and Population.

Parmar plans to develop an evaluation component for the course next year, so that its success can be demonstrated and eventually replicated elsewhere. "The ideal situation would be for refugee students to access education back

home,” she says. “But in the absence of that opportunity, programs like this are a great way to ensure that a group of well-trained individuals can carry out the necessary services to rebuild when peace does return to their homeland.”

The Public Health Institute provides students with internships in the region that often lead to permanent placements. Students graduate from the program motivated to give back to their damaged communities. (See sidebar, page 31: “In Their Own Words.”)

HELP VS. SELF-RELIANCE: STRIKING A BALANCE

Today, the idea of closing the camp and repatriating the refugees is gaining political traction in Thailand. International donors are turning their attention to other hot spots, and

SOAP AND CHARCOAL

Peak, an infectious disease epidemiologist, noticed right away that many toilets in public places such as schools and government offices did not provide soap, in part because money for soap had been cut. For many refugees not accustomed to having soap, its absence didn’t seem worrisome—but from a public health perspective, individual cleanliness was paramount to preventing the spread of infection. So Peak worked with his PHI colleagues to document hand-washing capabilities in every public toilet in camp. Back in Boston, he stayed in touch remotely with his team as they systematically gathered data—contending with a 12-hour time difference and spotty Internet service in the camp. Meanwhile, the students continued meeting each

“Understanding how to work with colleagues in a respectful and egalitarian way when they don’t speak your language and have different skill sets and backgrounds—that’s not something a lot of researchers do well, even very experienced researchers.”

—Parveen Parmar, MPH ’10
associate faculty member, Harvard
Humanitarian Initiative



PHI student Hai Gay Htoo with HSPH student Julia Hellman.

agencies that provide camp services have seen their funding cut. Monthly rice and charcoal rations have in turn fallen. The key question—how to strike a balance between providing for refugees’ needs and fostering their self-reliance—has no easy answer.

During the course, students met with the NGOs and community-based organizations that deliver public health services to the camp and divided into teams to develop a research project to support their work. The aim was to create a snapshot of health-related practices, such as rubbish management and condom use, to help the organizations decide how to best allocate dwindling resources.

week for joint lectures (delivered through videoconferencing) and drew up a comprehensive map of the camp’s sanitary facilities.

Kelsey Gleason, SM ’14, worked in a group that investigated how fuel usage could be made more efficient and less risky to health—results that will be shared with refugees during classes at the camp. But as Gleason conceded self-deprecatingly, another of her ideas did not pan out. After studying fuel usage for household cookstoves, she had determined that it would be healthier if the stoves were raised higher so that the women who did the cooking did not have to lean over the stoves. An American Refugee

continued



At this year's graduation, HSPH members of the twinning course received the James H. Ware Award for Achievement in the Practice of Public Health. (From left) Corey Peak, SM '14; Kelsey Gleason, SM '14; Jean Nepomuceno, MPH '14; Rachel Whelan, SM '14; Julia Hellman, MPH '14; Courtney Cox, SM '14; Parveen Parmar, instructor and Harvard Humanitarian Initiative associate faculty member. Not pictured: Phillip Summers, MPH '14, and Jami King, SM '15.

Committee representative pointed out, however, that this small change would pose a fire hazard. Building materials in the camp are highly flammable and have erupted in serious fires over the years. For Gleason, it was a lesson in humility. There also were lessons in another virtue that can be hard to master for high-achieving Harvard students: patience. "Every time I got frustrated by a communication issue, I realized it was my fault," Gleason says.

"In the camp, there were weird oscillations between things that were exciting and new and things that would bring home the reality of how hard life is there," says Peak. "You'd see beautiful kids being kids, playing games that you recognize, next to people scraping by. The emotional highs and lows were very close. It was hard—but I learned so much."

The course was an equal exchange of passion and expertise, Peak adds. Unlike typical fieldwork, which might employ locals simply to collect data, the course made PHI students full collaborators. "They were invested in the study and plugged us into the community," says Peak. "I saw them gain in confidence just during the three weeks we were there. I think they are well equipped to make a difference for health, both in the camps and back in Burma."

— Amy Roeder is assistant editor of Harvard Public Health.



PHI students Say Say Htoo, left, and Aye Aye Myint

In Their Own Words:

Stories from Refugee Students



The Harvard teachers explained that in public health, "prevention is better than cure."

I really like that meaning. My ambition is to become a good health worker. When I was living in my village in Burma, I saw many pregnant women die from postpartum hemorrhage problems. I saw many children delivered by village midwives come out yellow on the whole body—and three days later, the newborn died. So I feel very sad and I want to give education about family planning, hygiene, and washing methods to control disease.

— Kyi War Khaing, 20

→ In 1997, the Burmese military attacked our Karen people, killed them, burned our house. At that time, my parents could not do anything for us. We didn't have shelter or enough food to eat, so we moved to the refugee camp.... When the Harvard students arrived, I was very excited to see them. They were patient and explained the lesson when we didn't understand. They have a good relationship with us.

— *Naw Eh Tu Lo K'mwee, 23*

→ When I was a child, I wanted to become a doctor and my parents encouraged me. My family and villagers often had to escape from the military. I had to finish my school in the jungle because of the military. When I was eleven and a grade four student, there was a day that I have never forgotten. The troops came to my village and burned all the houses in the village and killed the villagers. Since that day, I fled to Thailand and a refugee camp to continue my education. I graduated high school with high motivation and strong courage from my

parents.... I decided to study public health because you can help many people at the same time. [In the HSPH course] I learned how to manage and how to be a leader. Now we are using public health training in our internship. We figure out root causes of diseases and work with different stakeholders to set up sustainable public health projects. I hope one day public health will succeed.

— *Saw Tei Htoo, 22*

→ When I was 10 years old, I told my parents, 'I want to go to school.' But we didn't have the money. Almost all the children in my village could not pay the school fee, so we had only primary school. I faced many problems: no food, no umbrella, also no shoes because my parents are poor. In 2002, I moved to the refugee camp and had the opportunity to continue my studies.... I chose the public health program so I can promote health and give education to the public about prevention.

— *Saw Maung Pay, 28*

→ I learned at PHI that if we spend 1,000 baht, we can cure only one person—but we can prevent many people from becoming sick and injured.

— *Naw Hsa K' Pru Paw, 22*



Clockwise, from left:

PHI students (from left) Hai Gai Htoo, Mu Kaw, and Tei Htoo

PHI student Hai Gay Htoo

PHI students Mu Kaw and Hsa Yei Paw with HSPH student Julia Hellman

PHI student Hsa K' Pru Paw (front) at the the HSPH twinning course



BIG DATA'S BIG VISIONARY

As cholera swept through London in the mid-19th century, a physician named John Snow painstakingly drew a paper map indicating clusters of homes where the deadly waterborne infection had struck. In an iconic feat in public health history, he implicated the Broad Street pump as the source of the scourge—a founding event in modern epidemiology.

Today, Snow might have crunched GPS information and disease prevalence data and solved the problem within hours. And in a cellphone text, he might also have sought advice from a certain professor of computational biology and bioinformatics at Harvard School of Public Health, who likely would have spun off dozens of ideas about study design, data analysis and modeling, and interpretation. That's how John Quackenbush operates.

continued



PRRX2

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Boyish-looking at age 52, with long hair, a fashionably scruffy beard, and a wardrobe stocked with jeans, black T-shirts, hiking boots, and a black leather jacket, Quackenbush looks more like an indie band member than someone at the forefront of mapping modern insights into the causes of disease. He has created novel methods of analyzing today's relentless flood of digitized information that is itself scourge or salvation, depending on how it is harnessed.

"We're making huge investments in technology to generate data. We're making huge investments in electronic medical records," he says. "What's surprising is not what we've done, but what we haven't done. We haven't made a parallel investment in tools to make sense of all this information."

WHAT MAKES A REVOLUTION?

Tucked in a warren of labs and wooden cabinets housing glass flasks, Quackenbush's scientific lair is a casual repository of digital data, stored on black computer towers lying helter-skelter. It is also an homage to domestic bliss, festooned with photographs of his wife, Mary Kalamaras, an editor and photographer, and his 8-year-old son, Adam.

Mulling the megatrend that big data represent, Quackenbush likens today's genomics revolution—kindled by the sequencing of the human genome in 2000—to other turning points in the history of science. In the early 17th century, when Galileo built a telescope and pointed it at Jupiter, he found that the planet was circled

by moons—an observation that confirmed Copernicus' theory that the earth revolved around the sun, and thus shuffled humankind's rank in the cosmic order. Likewise, in the 19th and 20th centuries, experiments conducted at the extremes of velocity and distance enabled physicists to unveil the structure and interactions of nature's tiniest particles.

In essence, these turning points forced us to reimagine ourselves and the world around us. Today's genomics revolution will have the same effect.

The science is being driven, in part, by economics. In 2001, it cost

"WE ARE AWASH IN DATA. BIOLOGY IS EVOLVING FROM BEING A PURE LABORATORY SCIENCE INTO AN INFORMATION SCIENCE."

—John Quackenbush

about \$100 million to figure out the order of DNA nucleotides—the billions of A's, C's, G's, and T's—in an individual's genome; and it took months for armies of researchers around the world to generate and interpret the data. By 2009, the cost had dropped to \$100,000 and the time required to a few weeks. Today, it costs between \$1,000 and \$2,000—an easy credit-card purchase—and takes a day or two.

Put simply, genetic sequencing has become a commodity. "We are awash in data. Biology is evolving from being a pure laboratory science

into an information science," says Quackenbush. "And when you look at all the great scientific revolutions, it's data that drive new ways of thinking about problems. We all have ideas. We all think we know about how the universe operates. But when you start to get empirical data, you realize that your hypotheses aren't true. In biomedical research, we've had a lot of ideas about everything, from 'What are the origins and evolution of humans?' to 'What is the basic nature of disease?' Genomic data are fundamentally changing the way we think about those questions."

AMASSING DATA FROM DISPARATE SOURCES

Indeed, says Quackenbush, big data may represent a treasure trove of potential solutions to countless medical and public health problems. In a few years, researchers will be able to conduct large observational cohort studies that yield whole-genome sequences on hundreds or thousands of volunteers. They could then link the genomic information to diet and lifestyle, health records, environmental exposures, and other data. Once this digitized information is amassed, synthesized, distilled, and analyzed, it could offer clues to how our genetic profiles raise the risk of certain diseases or protect us, and how our genes interact with what's inside and around us.

"Environmental exposure such as cigarette smoking or obesity have much greater relative risks than

almost any genetic factor you can imagine,” says Quackenbush. “But everyone has weird Uncle Bob who smoked until he was 90 and never coughed. Or, on the other hand, a friend or relative who never smoked but developed spontaneous lung cancer at 40.”

WHO TRANSMITTED INFECTION TO WHOM?

Big data may help scientists detail the spread of HIV more reliably than through contact tracing, which is based on first-person recollections. “Today, we ask people about their sexual partners to track the movement of the infection. Or we collect empirical data and map the flow of disease in social networks,” observes Quackenbush.

“But someday, we will be able to sequence the virus and in that way actually pinpoint who has transmitted the infection to whom, by tracking the mutations that the virus has picked up. Why is that important from a public health viewpoint? Because

understanding how the disease is transmitted in networks helps you develop strategies to stop it. Even today, tracking diseases like SARS, MERS, and Ebola involves analyzing combinations of modern molecular and social interaction data.”

Big data might even reveal hidden associations between apparently disparate afflictions. “One of the things I would love to be able to do is look at all the different diseases that co-occur in people,” says Quackenbush. “If we had genetic information, we could combine all that data together to understand if certain genetic risk factors predispose you not to one disease, but to a host of seemingly different diseases.” For instance, a genetic twist in an epithelial cell in the colon that raises the risk for cancer might also raise the risk of asthma or chronic bronchitis in an epithelial cell in the lung. “If we start to see such connections,” says Quackenbush, “we can think about common risk factors and even common therapies.”

“I LOVED THE MAD SCIENTISTS.”

Quackenbush was 5 when he performed his first bold scientific experiment: mixing cleaning chemicals in the bathtub. “That kid is still at the core of who I am,” he says. “When I was little, I watched Batman on TV and I loved the mad scientist villains the best. I came to be excited about science because it involved this process of discovery. I want to understand how things work.”

The quest to understand how things work—and to solve problems by discerning connections—has also been a theme in Quackenbush’s own life. “My father was extremely abusive. We had a lot of domestic violence.” After his parents divorced, he lived with his mother, who worked as a nurse. When he was 12, his father briefly kidnapped him and his sisters. Quackenbush says he hasn’t had contact with his father since, adding, “He was at the far end of the spectrum of acceptable behavior. His

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Medical staff working with Médecins Sans Frontières (MSF) don protective gear before entering an isolation area at the MSF Ebola treatment center in Kailahun, Sierra Leone, July 2014.

“Tracking diseases like SARS, MERS, and Ebola involves analyzing combinations of modern molecular and social interaction data.”

—John Quackenbush

antics didn't create a healthy environment for any of us.

"Would I change any of that? I don't think I would. The road we take is a big part of who we are. The experiences we have are what make us. All of us face different adversities in our lives, and the challenge is to overcome them. The most important lesson I've learned is how to fail."

The lesson also applies professionally. "As a scientist, if you are working at the edge of your understanding, you are going to come up with ideas that are just plain wrong. If you are a successful scientist, you have to be prepared to quickly figure out why you're wrong and then try something else. And if you do that enough, you develop an intuition that can help you be wrong less often. But if you aren't failing, you aren't trying."

PHYSICS TO BIOLOGY

Quackenbush's first scientific passion was theoretical physics. "In physics, we draw conclusions about things we can no longer see and observe. We collect data and plug them into theoretical models. Then we refine those models to see where they break down, so that we can reinterpret the data and build a better understanding of how some particle or force functions."

In the 1980s, in graduate school at the University of California, Los Angeles (UCLA), he toiled for months on a particularly elusive problem. By the end, he had written a 60-page calculation. "I kept going back to my adviser, who kept telling me it was wrong. The third time,

when I went through it and got the same answer, I knew that I was right all along. It was an epiphany. I was sitting in this little office. The weather was dreary. And I had this feeling of sheer joy at discovering a tiny little corner of the universe that no one else knew existed."

At the time, however, interest in his blissful theoretical corner of the universe was waning. With the Cold

QUACKENBUSH
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War drawing to a close, government funding for physics research dried up. By 1990, Quackenbush's fascination with high-energy physics had mutated. "I had been on an experiment at Fermilab outside of Chicago. I had just come back to UCLA from weeks—including Thanksgiving—of manning the experiment on the midnight-to-8 a.m. 'owl' shift. I walked into my office and was greeted with the news that our funding had taken a severe cut and that, as a postdoctoral fellow, I was

expendable. It was a devastating experience. I spent that night feeling like a complete failure. But the next morning, I woke up and asked myself where the most interesting unsolved scientific problems were."

Helping a girlfriend, who was a PhD student in biology, analyze her data, he discovered a seamless fit between the burgeoning field of molecular biology and his physics training, which had taught him a two-step approach: distill the question to a problem one can solve, then generalize the answer into universal principles.

Quackenbush soon moved swiftly through the most prestigious molecular biology and genomics programs in the country. In 2005, his scientific peregrinations brought him to Boston, with dual appointments at HSPH and at the Dana-Farber Cancer Institute.

At all these posts, the animating impulse behind Quackenbush's science was transparency. In 2013, he was named a White House Open Science Champion of Change for making open sharing of scientific data a reality. "We don't publish a paper without ensuring that both the software and the data are accessible, so that other people can reproduce our work," he says offhandedly. The award committee couched the achievement in grander rhetoric: "Since the Human Genome Project began in the 1990s, new technologies, producing previously unimaginable quantities of data on human health and disease, have been driving a revolution in medicine and biomedical research. John Quackenbush has been a pioneer in

Are active genetic circuits being switched on and off differently in men and women? Quackenbush and a colleague found that in Alzheimer's patients, certain genes were indeed activated differently in men and women.



A daughter cares for her 85-year-old mother who suffers from Alzheimer's disease.

ensuring that these data, and the tools needed to access them, are available, accessible, and useful.”

EXPLAINING WOMEN'S GREATER RISK OF ALZHEIMER'S

One of the emerging mysteries in medicine is why women and men face different risks for a number of common deadly conditions, from heart disease to chronic obstructive pulmonary disease. Alzheimer's disease reflects one of the starkest gender imbalances: two-thirds of sufferers are women.

Focusing on Alzheimer's, Quackenbush and his colleague Kimberly Glass are applying new computational tools to a data set that had been around for more than a decade and had already been extensively analyzed. But they are asking a new question: Are active genetic circuits being switched on and off differently in men and women? What they found was that in Alzheimer's

patients, certain genes were indeed activated differently in men and women—and these genes were highly responsive to estrogen and testosterone. As Quackenbush sees it, “There are subtle hormonal balances that appear to hold the system in check.”

It was a startling discovery, and for Quackenbush it opened up fresh avenues of research. “If the genes activated in Alzheimer's disease are hormonally responsive, would something like hormone replacement therapy (HRT) in women have a protective effect—or might it actually increase risk? We don't know.”

To arrive at the answer, he envisions using epidemiological data from large cohorts—such as from the Framingham Heart Study or from the Center for Medicare and Medicaid Services—to tease out whether women who received HRT are at higher or lower risk for Alzheimer's disease. If HRT is proven to lower the risk of Alzheimer's, “then we can provide women with the option of

considering whether they want to take on the known risks of HRT—an increase in breast cancer—to mitigate the risk for Alzheimer's. But first we need to conclusively establish the link.”

Deploying big data in this manner may transform the way science is conducted. Rather than dissecting the function of individual genes and then carrying out years of clinical trials to confirm a hypothesis, investigators may simply be able to analyze existing data. According to Quackenbush, “There are certain questions where, if the big data evidence is strong enough, doing the clinical trial may not be practical or even necessary.”


PERSONALIZING MEDICINE

The most immediate application of genomics will likely be in personalized medicine. Even today, genetic profiles are being used to target treatments for everything from breast tumors to heart disease to neuropsychiatric disorders.

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A Survivor's Empathy





Angela Diaz, MPH '02, knows what it's like to overcome nearly impossible odds—and to pay forward the hard lessons she learned along the way. She spent her childhood in extreme poverty in the Dominican Republic, where her single mother worked punishing hours in a hotel laundry room to support her and her siblings. Diaz also survived two serious childhood accidents. In one, boiling water spilled on her; in the other, Diaz tripped on a glass jar, lacerating her stomach and leading to a long hospital recovery. “That’s when I first decided I wanted to be a doctor,” she says.

Her next trauma came at age 8, when her mother left the country to find a better life in America. Diaz stayed unhappily behind with her father’s second family. At 12, she rejoined her mother in the Bronx, New York, where she overstayed her visa and spent a year terrified that she would be deported. Eventually, she got her papers in order and—after a year back in the Dominican Republic—started high school in New York City. She rarely saw her mother, who spent most of her time working at a garment factory. Diaz had to take on three jobs herself—at a beauty salon, at a luncheonette, and as a tutor.

HSPH alumna’s immigrant journey inspires career transforming teens’ health.

Despite these setbacks, she worked hard at high school, piling on the math and science classes, keeping up her grades. Eventually, though, the accumulated stress caught up to her. “By 12th grade, I couldn’t hold it together. I just stopped going to school,” she says. “I was obviously depressed. I wouldn’t leave the house.”

But then Diaz made one of the most fateful decisions of her life: She showed up at the doors of the Mount Sinai Adolescent Health Center.

continued

SANCTUARY IN THE CITY

It was the early 1970s, shortly after the center, located in the lower part of Harlem in New York City, opened as one of the first clinics dedicated to the physical, mental, and even practical needs of teenagers.

Diaz first met with a mental health counselor, who talked her through her depression. The staff then got in touch with her high school, where her teachers wanted Diaz back. Encouraged by her newfound support team, Diaz returned to her studies and graduated.

Her social worker pushed her to go on in her education, and she soon enrolled in City College, three blocks from home. One day, before she'd even graduated, Diaz stopped in at Columbia University's College of Physicians and Surgeons—also in her neighborhood—and picked up an application. She'd never given up her dream of becoming a doctor, so she met with an admissions officer and made the case that even though she hadn't taken the standard medical school exams and didn't have the \$15 application fee, she could handle the work.


"I had not thought about adolescent medicine as a career," says Diaz. "But once I worked with these kids, I fell in love with them. I know who they are. This is the person I was—the person that, in many ways, I still am."

FROM DEPRESSION TO HIV TO RELATIONSHIP VIOLENCE

The teens may come in for a cough or cold, but that's just a jumping-off point.

"If we just ask them, 'Do you have a headache? Do you have a fever?,' that's all we are going to get back," Diaz explains. "But we ask them, 'How do you feel? Has anyone ever touched your body when you didn't want them to? Do you feel sad or depressed? What's in your soul? Why are you really here? How can we help you?'"

That's how providers learn what adolescents are grappling with—from depression to HIV to relationship violence. And Diaz tells her staff not to dance around the details. "We ask them very specifically, 'Are you having sex?' And we will say 'penis,' 'vagina,' 'anus,' 'oral sex.' Because otherwise, they will not tell you and you will not



"We ask them, 'How do you feel? Has anyone ever touched your body when you didn't want them to? Do you feel sad or depressed? What's in your soul? Why are you really here? How can we help you?'"

Within months, still without an undergraduate degree, Diaz was accepted into the class of 1981. At first, she had planned to become a neurosurgeon. But after a rotation in pediatrics and, later, a residency at the Mount Sinai center, her gift for working with troubled teenagers became clear. In 1989, she accepted an offer to run the center.

Now 59, Diaz has built one of the country's largest and most respected programs for adolescent care, based on an integrated approach that gives equal weight to physical health, mental well-being, and social welfare. The center treats more than 11,000 youths every year—and thanks to Diaz's initiatives, the cost of care has shifted from sliding scale to free, and the age range now extends to 24. The center has also grown into a premier research and training institution.

be able to help, because you won't know what they are really involved with."

BRIDGING SEXUALITY GAP FOR TEENS' FAMILIES

A large percentage of the center's patients are gay or lesbian, and worry that the news won't go down well with their families. "One of the first things that we ask is, 'How do you get along with your parents? Do you tell them everything?'" Diaz says. "They may say, 'Oh no, they would kill me.'" So while the center guarantees complete confidentiality, the staff offers to act as a bridge within families, especially in the case of gay or sexually active teens. "Bring your parents here," says Diaz. "We will sit down with you and your parents and help you tell them. And we will not let you go home if we think you're in danger."



At the Mount Sinai Adolescent Health Center, the staff doesn't care how many appointments their young clients blow off, how many doses of medication they forgot to take, or what sort of trouble they've gotten into with the law. "If they come back for the seventh time with the same thing that we have been trying to help them with," says director Angela Diaz, "we still receive them open-handed and open-armed."

The center has also become a well-known resource for teenagers who feel they are living as the wrong gender. "We help them transition, even physically," Diaz says. "We give them the hormones, we give them the emotional support, and they evolve. And we work with the parents, because sometimes it's hard for parents to accept or understand."

Without the center, Diaz says, many adolescents would likely cope with their problems in more destructive ways—substance abuse, violent behavior, joining gangs. That's why it so important to reach them at this critical juncture in their lives, when many behaviors and patterns become established.

She also creates policies and programs that take into account the unpredictable nature of adolescence. Unlike some health centers, which blacklist patients for missing appointments, Diaz doesn't care how many dates her young clients blow off, how many doses of medication they forgot to take, or what sort of trouble they've gotten into with the law. "If they come back for the seventh time with the same thing that we have been trying to help them with," she says, "we still receive them open-handed and open-armed."

In keeping with teen culture, the center offers a 24-hour texting service, called Text in the City, so young

people can ask on-call doctors questions any time of day or night—say, what to do if they had unprotected sex, or what to give their baby for a fever. Preoccupied teens can even get daily texts when it's time to take their HIV medication or birth control pills, or to come in for a vaccine or a routine checkup. They are even texted reminders to exercise regularly and to eat fruits and vegetables.

ACQUIRING A RESEARCH FOCUS AT HSPH

After years of getting to know her patients' stories, Diaz thought there must be a way to tie them all together and improve her center's programs. "I was always interested in population health," she says, "and how you change systems so that individuals can make better health choices."

In particular, Diaz wanted to understand trends in adolescent health. What's the rate of HIV infection? How many low-income teens have been sexually abused and what kinds of services help them? Which programs succeed at getting kids off drugs or keeping them in school? How effective is the HPV vaccine if, as is common with teens, it is not taken on schedule?

continued



“The one safe place I’ve known.”

It was the cutting and drinking that first brought Izamar Gallardo to the Mount Sinai Adolescent Health Center. She had endured years of bullying. By the time she was a teenager, living undocumented in New York, she was depressed, failing her classes, and had entered a physically abusive relationship with another girl.

“For the most part, I dealt with it on my own,” says Gallardo. “Eventually, I just didn’t want to feel the way that I was feeling.” She couldn’t talk to her parents, who considered homosexuality a sin. So a high school counselor suggested she go to the modern brick building in Harlem. “The center has been the one safe place I’ve known,” says Gallardo.

FINDING REFUGE

Most mornings before the doors open, teenagers are already lining up outside. On any given day, the line could include a 13-year-old girl who’s pregnant, a 15-year-old boy who’s been beaten by his stepfather, a 17-year-old addicted to heroin.

There may be teens forced into sex-trafficking rings. Some are undocumented immigrants living in fear of deportation. Some are refugees from war-torn countries, still traumatized by violence. Almost all are low-income

teens of color—African-American, Asian, or Hispanic—with no health insurance and few other sanctuaries from their challenging lives.

But once the center opens, they have more than 100 nurses, doctors, health educators, psychologists, lawyers, social workers, and other professionals at their service.

A GROUP EFFORT STOPS CUTTING AND DRINKING

In Gallardo’s case, the center offered weekly therapy for the whole family. The legal department showed the teenager how to apply for a restraining order against her abuser and then helped her secure documents to avoid deportation. Gallardo, who is uninsured, also started seeing a physician for the first time and began getting regular checkups. “It’s been a group effort, to be honest with you,” she says.

As her anguish subsided, she stopped cutting and drinking. Her mother, who grew to accept Gallardo’s sexuality, now feels so comfortable with the center that she calls her daughter’s counselor there when she’s worried that Gallardo may be slipping back into depression. But Gallardo says that’s become a rare occurrence.

Now, at 21, Gallardo is enrolled at York College in Queens, New York, studying genetics and hoping to become a medical researcher. In a couple of years, she’ll age out of the Mount Sinai Adolescent Health Center, but she’s OK with that.

“I used to be a little bit more afraid of what it’s going to be like when I no longer have them as a support system,” she says. “Over the years, they have given me a lot of—not just confidence, but methods of coping with my emotions. When the time comes, I feel like I will be able to cut the umbilical cord.”


“When pharmaceutical companies develop vaccines, usually it’s in an ideal population and under ideal circumstances. Volunteers are compliant,” Diaz says. “But what if you are immunizing teenagers in their natural habitat, with all the complications of their lives? Does the vaccine yield the same protection?”

Mount Sinai was situated perfectly to conduct this kind of research. But medical school had not given Diaz the skills to design studies or understand statistics or epidemiological methods. So while running the center and raising three children as a single mother, she spent several summers taking courses at Harvard School of Public Health, with financial support from Mount Sinai’s Department of Pediatrics. That helped her learn the soup-to-nuts of conducting research, from formulating a ques-

violence. To me, if you want a healthy population, you need to see people whole, not just diagnose their pneumonia.”

DRAMATIC TURNAROUNDS

Building on the center’s close personal involvement with its young clients, Diaz’s staff has been able to change the odds for this singularly at-risk population. The center’s high school dropout rate is about 6 percent—much lower than the average for urban, low-income youth, which Diaz puts at 30 percent. She notes that while the center’s teen pregnancy rate is hard to pin down, Diaz is confident it’s lower than the national average—something she attributes to the center’s candid approach to sex education, as well as modern (and free) contraceptive methods, including the IUD and hormonal implants.



Without the center, Diaz says, many adolescents would likely cope with their problems in more destructive ways—substance abuse, violent behavior, joining gangs.

tion and recruiting subjects to collecting biological samples and writing grant proposals.

As a result, the center has been able to develop effective interventions for sexual abuse victims, better teaching tools for sex education, and alternative schedules for STD vaccines. And thanks to Diaz’s training at HSPH, Mount Sinai is now a hub for National Institutes of Health studies on adolescent health—bringing in close to \$20 million over the past decade in federal research funding. Diaz is also a member of the prestigious Institute of Medicine and consults internationally on issues of adolescent health and mental health, child abuse, sex trafficking, and birth control.

But mostly, she hopes to demonstrate an integrated model of health care that goes well beyond diagnosing clinical symptoms.

“I don’t see how anyone can look at health other than holistically,” she says. “It’s important to consider the context of a patient’s life, whether they have the money to buy their medication, whether they are facing domestic

Some transformations really stand out. Diaz remembers one Asian teenager who was being forced by her family to skip school and work long hours in a nail salon—with all her earnings funneled back to her relatives. When the girl came in for a medical visit, the staff saw she was deeply depressed and figured out that she was trapped in a state of servitude. The on-staff lawyer kicked into action and was able to both free her from the job and help forge independence from her family. The counseling staff assisted with her application to an Ivy League college, where, Diaz says, the young woman is doing well.

ADVOCATING FOR BETTER POLICIES

Diaz recently gave up her own patient caseload; she found the electronic record-keeping too daunting, and now spends her time as administrator and fundraiser-in-chief. She needs to bring in \$11 million a year to keep all of the center’s services free and another \$3 million for training and research.

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COMMENCEMENT

May 29, 2014



It's not always comfortable being a person committed to what others see as an impossible goal, Harvard School of Public Health Dean Julio Frenk told graduates at the School's Centennial Commencement Ceremony. But, he added, "I cannot imagine a group more well equipped to tackle this challenge—and make the impossible possible."

At the ceremony, 537 degrees were awarded: 33 Doctors of Philosophy, 56 Doctors of Science, 264 Masters of Public Health, 176 Masters of Science, and 8 Masters of Arts. Graduates came from 63 countries and from 43 U.S. states. Fifty-eight percent of the graduates were women.

Tom Frieden, director of the U.S. Centers for Disease Control and Prevention, delivered the Commencement address. He cautioned graduates not to "fall into a trap of self-righteousness" while carrying out work that it's natural to feel good about. "Overconfidence can kill," he warned. "It's so important to recognize the limitations of our knowledge and recognize that whatever we accomplish is accomplished because of the work we do with others."

Photographs: © Tony Kirdilo, Kent Dayton / HSPH



Student speaker Jacqueline Murdoch, who earned an MPH in the Department of Social and Behavioral Sciences, said she hadn't planned on a career in public health—until she was raped as an undergraduate. She became a doctor and then realized she wanted to do more than “be on the patching-up end of health.” She wanted to combat what she realized was a systemic problem—“to work to stop the violence from happening in the first place.”

Frenk recalled the tragic death last September of 33-year-old Elif Yavuz, who received her doctorate from HSPH in May 2013. Yavuz was weeks away from delivering her first child when she and her partner were among 69 killed in a terrorist attack on a Kenyan shopping mall. “As we mourn the senseless loss of this bright light,” Frenk said, “let us use it as an inspiration to recommit to doing all we can to create a better, healthier world.” 🌸



Top left: Commencement speaker Tom Frieden, director of the U.S. Centers for Disease Control and Prevention.

Top right: Meredith Rosenthal, professor of health economics and policy and associate dean for diversity, places a hood on a graduate.

Bottom: Dean Julio Frenk congratulates a graduate.

continued

CENTENNIAL CLOSING SYMPOSIUM & PORTRAIT UNVEILING May 28, 2014



The life sciences revolution, big data, healthier urbanization, and complex health problems—topics pivotal to the future of public health—set the agenda for a panel discussion that closed the Centennial year of Harvard School of Public Health. Panelists included Francesca Dominici, senior associate dean for research and professor of biostatistics; Wendy Garrett, associate professor of immunology and infectious diseases; Ashish Jha, professor of health policy and management; and Francine Laden, Winkler Associate Professor of Environmental Epidemiology. HSPH Dean Julio Frenk served as moderator.

After the Centennial Symposium, members of the HSPH community gathered in the Kresge Atrium for an unveiling of a photo of the School's founders—Milton J. Rosenau, William T. Sedgwick, and George C. Whipple—on the wall with the School's other deans. The atrium was renamed in Rosenau's honor and will now be referred to as the Rosenau Atrium. 🌸

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Second row from left: Ashish Jha, professor of health policy and management; Francesca Dominici, senior associate dean for research and professor of biostatistics.

Bottom: Dean Julio Frenk unveils the HSPH Founders' portrait.

ALUMNI NEWS



1966

Donald Goldstone, MPH, died on March 1, 2014 in Washington, DC, at age 77. Before attending HSPH, Dr. Goldstone was a Peace Corps physician in Pakistan and headed the Peace Corps medical program in Latin America. His post-HSPH career centered on health care policy, with more than 40 years at the National Center for Health Services Research in a variety of executive roles.

1976

Lawrence “Bopper” Deyton, SM, was named senior associate dean for clinical public health at the George Washington University School of Medicine and Health Sciences. In this new role, Deyton will promote education and training for clinicians on public health, population health, and the clinical applications of these principles to their professional responsibilities; provide guidance on curricular efforts; mentor students, trainees, and faculty; and foster the development of funded research programs.

1986

Andrew Steele, MPH, was named chief medical information officer at Denver Health. Steele will be responsible for the oversight and optimization of computerized clinical systems, including the electronic health records system.

1990

Richard Bail, MPH, was selected by the Bowdoin College Board of Trustees as one of three Bowdoin alumni to receive a 2014 Common Good Award. Bail was recognized for outstanding service to the field of medicine and for the

delivery of educational opportunity and health care to people around the world who are in greatest need and at greatest risk.

1995

Robert Koffman, MPH, was presented the U.S. Special Operations Command Patriot Award in December 2013 for treating 68 Special Forces operators for traumatic brain injuries and psychological health conditions. The award recognizes not only the care Koffman provided the Special Forces operators while they were in treatment at the National Intrepid Center of Excellence in Bethesda, MD, but also for follow-up on their care after they returned home.

2009

Charles Lockwood, SM, a member of the Institute of Medicine, was named the new dean of the University of South Florida’s Morsani College of Medicine. Lockwood assumed the post on May 5, after three years as dean of the Ohio State University College of Medicine. He also serves as senior vice president for USF Health.

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FACULTY NEWS



Howard Koh rejoins the faculty this fall after serving five years as assistant secretary for health in the U.S. Department of Health and Human Services. He will serve as professor of the practice of public health leadership in the Department of Health Policy and Management and direct the Leading Change Studio, a program of the School’s new Doctor of Public Health program. Koh will also advise on leadership curriculum efforts across the School’s doctoral and master’s degree programs, and play a liaison role with Harvard Business School and the Harvard Kennedy School to strengthen faculty and student collaborations among the three institutions.

AWARDS AND HONORS



John Briscoe, visiting professor of environmental health at Harvard School of Public Health, was selected by the Stockholm International Water Institute to receive the Stockholm Water Prize, known informally as the “Nobel Prize of water.” An expert in water policy and development issues,

continued

AWARDS AND HONORS *continued*

Briscoe also holds appointments on the faculty of the Harvard School of Engineering and Applied Sciences and at the Harvard Kennedy School.



Gökhan S. Hotamisligil, chair of the Department of Genetics and Complex Diseases and James S. Simmons Professor of Genetics and Metabolism, received the ninth Danone International Prize for Nutrition for outstanding research in immunology and metabolic diseases. He is an internationally recognized leader in nutrition science, and through his discoveries has generated major insights about the underlying causes of obesity, diabetes, and atherosclerosis.



David Williams, Florence Sprague Norman and Laura Smart Norman Professor of Public Health in the Department of Social and Behavioral Sciences, received the Lemuel Shattuck Award by the Massachusetts Public Health Association (MPHA) on June 6. In presenting the award, MPHA cited Williams' groundbreaking research on the social determinants of health, his successful work to reduce health disparities, and his creation of the Everyday Discrimination Scale—currently one of the most widely used measures in health studies to assess perceived discrimination.

K. “Vish” Viswanath, professor of health communication in the Department of Social and Behavioral Sciences, has been awarded the American Society of Preventive Oncology's Joseph W. Cullen Award for distinguished contributions to tobacco-control research and the National Communication Association's inaugural Dale E. Brashers Distinguished Mentorship Award.

APPOINTMENTS & PROMOTIONS

Joseph Allen

Assistant professor of exposure assessment science

Robert V. Farese, Jr.

Professor of genetics and complex diseases

Tobias C. Walther

Professor of genetics and complex diseases

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Leadership Development for Physicians in Academic Health Centers

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A SURVIVOR'S EMPATHY *continued from page 43*

Diaz also advocates for more progressive state and national health policies for adolescents—including stricter confidentiality practices, which she considers a major factor in whether teens seek health care, and an insurance reimbursement system generous enough to allow other doctors' offices to replicate Mount Sinai's model.

Diaz is pleased the Affordable Care Act will deliver insurance to many more young people, but she's concerned that the designers of Medicaid and the state health exchanges have placed onerous eligibility demands on low-income adolescents, who are unlikely to have access to all the legal papers they need to sign up for health insurance. She'd much rather see a single-payer model that insures all teenagers by default.

The more people enter adolescent medicine with a clear comprehension of teen culture, she says, the more likely such policies will follow. "If you just see the young people as patients, you will miss this other stuff. You have to be in tune with them and understand them developmentally. You have to love working with that population. These kids feel that they come to a place where they are loved, they are nurtured, they are respected and not judged. It's about the teenagers. It's not about us."

Karen Brown, a freelance writer and public radio reporter based in Western Massachusetts, was a Knight Fellow in Science Journalism at MIT, a Rosalynn Carter Fellow in Mental Health Journalism, and a Kaiser Media Fellow in Health Reporting.

BIG DATA'S BIG VISIONARY *continued from page 37*

Quackenbush sees more possibilities. He is currently exploring cancer treatment through a reversed lens: asking whether a tumor's genetic profile correlates with its size, shape, density, and, most important, invasiveness. If it does, then doctors could potentially determine the genetic profile of a malignancy based on simple CT scan images, which in turn would inform treatment.

"If I can test your tumor for \$1,000 and tell you that you're not likely to respond to a particular therapy that would cost \$30,000, that's a huge public health win," he notes, "because that money can be used for other potentially effective therapies, or to support other parts of the health care system. And hopefully we can then help you move more quickly to a treatment with a greater likelihood of being effective."

Quackenbush's commitment to the data revolution is not merely

theoretical. "My grandmother died of Alzheimer's. I don't know if she carried an APOE [apolipoprotein E] mutation—which raises the risk of the disease—or not. But I guarantee you that at some point, I'll be sequenced. From my personal perspective, there is tremendous power in information."

LIKE LEARNING A LANGUAGE

For all the popular enthusiasm surrounding big data, the diatribes against it are growing: that it's noisy and rife with false associations; that it doesn't necessarily equate to knowledge or understanding; that it doesn't reflect the real, messy world—dubbed "thick data"; and that it won't solve complex human problems.

"I would say all of those things are true," concedes Quackenbush. "Data by itself is not a panacea. But that doesn't mean we can't use it. We just need to be smart about how we use it. My experience over the course

of my lifetime is that the more information we have, the greater is the opportunity to learn new things. The challenge—and the opportunity—rest in separating meaningless correlations from causal relationships."

Getting a handle on big data and genomics is like mastering a language, he adds. "There are tens of thousands of words. You can get by just fine with a few hundred. But the subtleties and complexities of what we can convey by using the entire spectrum of the noisy lexicon is part of the joy of being able to speak and communicate."

Quackenbush clearly revels both in doing the science and in talking about the adventures and misadventures along the way. Hands resting on head, eyes widening, he says, "The most exciting moment is when the data don't agree with the model. We're always looking to be surprised."

Madeline Drexler is editor of Harvard Public Health.



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INCOME FOR FAMILY & FELLOWSHIPS

Dr. Joseph M. Miller, AB '42, MD '45, MPH '60 made a planned gift to the HSPH Campaign that provides his daughter with income for a set number of years. The remainder will fund fellowships for Central American students.

“After a career as an internal medicine physician in the U.S., helping people in need of medical care in Central America gave my life greater depth. I hope to make it possible for Latin American students to have a Harvard education, so that they can help their families and society as a whole.”

*Dr. Joseph M. Miller,
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