ESSENTIAL NEWS & VIEWS
What’s going on in global health?
Subscribe to our new free weekday email
and you’ll be in the know.
Global Health NOW:
www.jhsph.edu/global-health-NOW

MAGAZINE IDEAS? SUGGESTIONS?
Contact editor Brian W. Simpson:
bsimpso1@jhu.edu

BRIGHT FUTURE
EXCITING CHANGES ARE COMING.
THIS FALL JOHNS HOPKINS PUBLIC HEALTH WILL
HAVE A NEW DESIGN AND A NEW EDITORIAL STRUC-
TURE. OUR MISSION, HOWEVER, REMAINS THE SAME:
DELIVER A GREAT MAGAZINE FULL OF COMPELLING
STORIES AND IMAGES FROM THE NUMBER ONE SCHOOL
OF PUBLIC HEALTH.

SEE THE FUTURE IN OCTOBER 2014.

PHOTO: MICHAEL J. KLAG

THE TRUCK STOPPED
AT 2 A.M. SOMEWHERE
IN THE SUDANESE DESERT.

MERHAWIT’S JOURNEY
WAS JUST BEGINNING.
IN THE SINAI,
THINGS WOULD GET MUCH WORSE.
You never stop pursuing answers to protect the health and safety of our global community. There are always possibilities to explore, theories to test and lives to save. Stay connected in the exchange of knowledge and study the latest breakthroughs in public health in our worldwide classroom. With more than 120 online courses and a host of specialty-focused institutes and certificate programs, we are committed to your lifelong learning. Enroll. Take the next step to advance your career and save lives—millions at a time.

Manday Eggersdorfer
Senior Vice President
DSM Nutritional Products

William Flumenbaum
Senior Vice President
Capital Guardian Trust Company

Irene C. Frary
Howard E. Friedman
Managing Partner
Lax Capitil, LLC

Douglas B. Givin
Partner
Bay City Capital

Dean Goodermote
Former Chairman and CEO
Double-Take Software

Donald A. Henderson*
Dean Emeritus
Johns Hopkins Bloomberg School of Public Health

Margaret Conn Hilmelfarb*
Frank L. Hurley**
Chief Scientific Officer and Co-Founder
RDR International, LLC

John J. Hutchins
Founder and Managing Director
PinnacleCare International

Christopher L.M. Jones
Chairman and CEO
J. Walter Thompson Fund, Inc.

Ambassador James A. Joseph
Professor and Director, United States-Southern Africa Center for Leadership and Public Values
Duke University

Michael J. Klag*
Dean
Johns Hopkins Bloomberg, School of Public Health

Roger C. Liptiz*
Managing Member
Oxen Assets, LLC

Kathy Ludwig
Educator

Stephen G. Moore*
President and CEO
CarDon & Associates

Morris W. Ofit**
Chairman
Ofit Capital Advisors, LLC

Caroline Popper
Co-Founder and President
Popper and Company

Karl P. Ronn
Managing Director
Innovation Portfolio Partners

Ira M. Rutkow*
Huntington Sheldon**

Michael J. Silver
Hogan Lovells US LLP

Alfred Sommer**
Dean Emeritus
Johns Hopkins Bloomberg School of Public Health

Shale D. Stiller**
Partner
DLA Piper

Adena Wright Testa, Esq.**
Protecting health, saving lives—millions at a time eloquently describes the Bloomberg School’s mission. Now, however, we may need an equivalent motto for our recent accomplishments in online teaching.

On March 31, 2014, we reached a remarkable milestone: One million people had enrolled in one of our 23 massive online open courses (MOOCs) offered on the Coursera website.

Imagine: In less than two years, a million people across the world explored biostatistics, the U.S. food system, global disease control and other topics near and dear to our collective heart. For faculty dedicated to the transmission of knowledge to protect health, it’s pretty heady stuff.

Let me put it into perspective. Since the Bloomberg School was founded almost a century ago in 1916, we have educated 64,931 degree and nondegree students. Of course, there’s a huge difference between MOOCs and our regular courses—more on that in a minute. Still, that stark comparison is what drives our faculty who are dedicated to MOOCs. They relish the opportunity to transmit essential knowledge about public health to millions of people.

MOOCs do have their limitations. Most do not offer college credits or count toward a degree. Course completion rates are low—less than 10 percent. Lectures are pre-recorded, and faculty interaction is minimal. Grading is done by machine or peers. And it takes additional effort to verify that the work is being done by the actual registrants.

Critics who focus on these issues, however, don’t understand the nature of MOOCs or the people who enroll in them. Most MOOC learners are “browsers.” They are trying out a new field: learning a new vocabulary and gathering some big picture concepts in an area that interests them. For a small percentage, their MOOC experience will lead them into more concentrated academic study.

MOOCs do have their limitations. Most do not offer college credits or count toward a degree. Course completion rates are low—less than 10 percent. Lectures are pre-recorded, and faculty interaction is minimal. Grading is done by machine or peers. And it takes additional effort to verify that the work is being done by the actual registrants.

Critics who focus on these issues, however, don’t understand the nature of MOOCs or the people who enroll in them. Most MOOC learners are “browsers.” They are trying out a new field: learning a new vocabulary and gathering some big picture concepts in an area that interests them. For a small percentage, their MOOC experience will lead them into more concentrated academic study.

As we see it, our MOOCs do two things. One, they spread public health knowledge to persons outside of our field, which we believe is an inherently good thing. Second, they provide a gateway for some to a university education. This powerful technology is able to reach millions, find the relative few who want a more in-depth experience and bring them to the traditional model of university education.

Where is all of this headed? What does it mean for the future of the Bloomberg School and for public health? I don’t know—my desk isn’t outfitted with a crystal ball—but I can offer a few insights.

In less than two years, a million people explored topics near and dear to our collective heart. For faculty dedicated to the transmission of knowledge to protect health, it’s pretty heady stuff.

Our incredibly innovative Biostatistics faculty have taken the MOOC ball and are running with it. They love having 50,000 students in a class with study groups in Russia, Africa and Asia.

Brian Caffo, Jeff Leek and Roger Peng have created a series of nine MOOCs called the Data Science Specialization. These MOOCs will give learners an introduction to data science, which involves the management, analysis and visualization of large-scale and complex data. People can earn an identity-verified certificate by paying a fee, finishing all nine MOOCs in the specialization and completing a project-based course. Learners will have a wide range of skills to enable them to start answering questions by using data. Certificate earners are then eligible for a partial tuition scholarship on the first for-credit course they take at the Bloomberg School.

This is the kind of experiment that the MOOC platform makes possible, and I am sure that it is only the first of many. Such offerings will give basic public health training to legions of committed, hungry minds around the world.

Although MOOCs offer unparalleled reach, they are no substitute for our School’s degree programs. Through intensive interaction and mentorship with faculty, our students adopt the ethos of public health and the Bloomberg School. Our faculty inspire our students to take on big problems, to go out and change the world—and teach them how to do it. That core interaction is irreplaceable. It happens through the day-in, day-out sharing of ideas, through feedback and conversations over coffee in the Daily Grind or via an online chat. I hear about the impact of these interactions from our students all the time. They love our great teachers and the opportunity to learn from them and be inspired by them.

Because of the high quality of our 120 online courses, our online students enjoy the same transformational experience as those in our face-to-face classes. The School pioneered online education, offering for-credit online courses since 1997 and an online, part-time MPH degree program since 1999. Almost two decades of innovation and experimentation have made our online education experience so rich that most online courses are taken by our full-time students here at the School.

So, what’s the future? Online or face to face? Massively open or degree-based?

The answer is yes.
Bodies in the Desert  20

Thousands of asylum-seeking Eritreans, Ethiopians and Sudanese have been kidnapped and tortured in the Sinai Peninsula. Survivors suffer years of mental anguish and live a stateless, hand-to-mouth existence. The human trafficking chain must be stopped.

A Special Report.

By Tsega Gebreyesus

Welch Wanderings  4

Opener: This spring, e-cigarettes steamed onto the national stage and seemed to be ubiquitous in ads and in the hands of “vapers.” Are they the solution to anti-tobacco efforts or gateway gadgets?

More: Bhutan has 10,000 people with epilepsy, one EEG and not a single neurologist. Farrah Mateen has a solution. And still more: cross-border malaria, gauging gun violence, music and Alzheimer’s, what’s behind U.S. maternal mortality increases and the “how” of ALS.
Connected 16
An in-the-trenches epidemiologist and academic researcher, Aruna Chandran bridges two worlds in her positions as chief epidemiologist for the City of Baltimore and an associate scientist at the Bloomberg School.
By Brennen Jensen

Telomere Express 30
How an evening conversation on the Acela train to Baltimore and almost a decade of research are reshaping the science of prostate cancer.
By Andrew Myers

More Features

The Governor 12
As the new senior policy scholar at the Bloomberg School, Ronnie Musgrove advises researchers on how to transform evidence into lifesaving policies.
By Brian W. Simpson

Dream Maker 14
I’m not a scientist. I’m not a researcher or practitioner, but I’ve brought the talents I do have to public health.
By Ricky Fine

Still Waters 28
It’s difficult to resist the lure of cool water on a hot day. For children in Bangladesh, however, a frolic in a pond or river turns tragic all too often.
By Jackie Powder
All Steamed Up  ARE E-CIGS THE ANTI-TOBACCO OR GATEWAY GADGETS?

Electronic cigarettes are everywhere: on commercials, in magazine ads and in the hands of their users—who are not called smokers, but “vapers.” That’s because while cigarettes burn tobacco, creating smoke, e-cigarettes heat liquid nicotine, creating vapor.

Some say the gadgets are a gateway to the greater danger of smoking, while others hope they might help eradicate that cancer-causing habit. Bloomberg School researchers interested in this issue—and a host of others posed by e-cigarettes—led a symposium on the topic May 2.

Patented in the U.S. in 1962, the nicotine-vaporizing device was commercialized by a Chinese pharmacist and for a decade has been marketed aggressively. Today, e-cigarettes come in some 250 varieties that resemble everything from cigarettes and cigars to pipes, hookahs, flutes and flasks. Their prices vary, as do the flavors—from mint to mango.

They differ from standard cigarettes, which burn tobacco, paper and additives to create smoke that delivers nicotine to the lungs—and ultimately the brain—in seconds. Traditional “combustibles” throw off about 7,000 toxins, more than 60 of which are known carcinogens.

E-cigarettes, on the other hand, heat liquid nicotine, water and other chemicals, creating vapor.

“E-cigarettes expose the user and those around them to nicotine and a few other chemicals,” says K. Michael Cummings, PhD, MPH, a professor in Psychiatry and Behavioral Sciences at the Medical University of South Carolina. “But the aerosol generated is clearly less toxic than cigarette smoke.”

E-cigs are “much, much safer than cigarettes,” says symposium keynote speaker David B. Abrams, PhD, a professor in Health, Behavior and Society at the Bloomberg School and executive director of the Schroeder Institute for Tobacco Research and Policy Studies. “They are much less likely to cause the big diseases: heart disease, cancer, and chronic pulmonary disease.”
Joanna Cohen, director of the Bloomberg School’s Institute for Tobacco Control and an organizer of the event, agrees. “The expert opinion at this point is that they are much less harmful to the individual,” she says. “The question you have to ask from a public health perspective is, What are the implications at the population level?”

A primary public health concern is that e-cigs will renormalize smoking. “Young people say it’s not cool to smoke cigarettes right now. With this new device, we worry they will say it is cool,” says Maciej L. Goniewicz, PhD, PharmD, assistant professor of Oncology in the Department of Health Behavior at the Roswell Park Cancer Institute.

Cool, and wildly accessible. E-cigarettes, largely unregulated, are used where cigarettes now are forbidden; they are advertised in media where cigarettes have long been taboo. Some call it “the Wild West”—lawless and possibly full of potential.

“This is a disruptive technology,” says Abrams. “For the first time in a century we have a product that could make cigarettes obsolete. It’s the beginning of a revolution.”

Those who stand to benefit are smokers who make the switch from cigarettes, Cohen says, citing small studies that suggest that they might help some to quit smoking. While FDA-approved smoking-cessation products like gum, patches and lozenges are slow to deliver nicotine to the blood stream, some e-cigs have the potential to mimic the quick-hit of standard cigarettes. That, plus the fact that e-cigs can look and feel like the “real thing,” might make them helpful to the can’t-quit contingent.

“A nicotine patch is not a very good reward for a smoker craving nicotine,” explains Cummings. “It’s like telling my dog to wait two hours to get her treat. She learns much better if I give her the reward right away.”

However, if smokers keep on smoking and take up e-cigarettes, there’s no health gain. In fact, this kind of “dual use”—smoking when permitted and vaping when not—might extend rather than curtail a smoking habit.

“If you smoke an e-cig rather than a Marlboro, that’s a good thing,” says Cummings. “The problem is people who add an e-cigarette to their Marlboro smoking might not get any benefit.”

Researchers concur that regulating the sale and content of e-cigs is a good idea, as they can be packed with contaminants. While foes want to see them taxed and restricted like standard cigarettes, proponents of the product say careful regulation can help shape a healthier future. “I call it the Goldilocks formula,” says Abrams. “Not too hot and not too cold.” If e-cigs can be positioned at a lower price point with a higher nicotine punch, consumers may abandon cigarettes altogether, he says.

That sounds just right to some, but others are proceeding with caution. “There aren’t a lot of data yet,” Cohen says. “People can give a lot of opinions; they aren’t right or wrong. We don’t know yet.”

—Leah Eskin

Sales of e-cigs more than doubled from 2012 to 2013 to $1.7 billion. In 2011, 5% of high school students said they’d tried e-cigs. In 2012, 10% had. Second-hand exposure from e-cigs is about 1/10th that of cigarettes. About 40% of American smokers have tried e-cigs.
When a school kid in just about any developing country has an epileptic seizure, chances are that fellow students and even teachers will shy away instead of trying to help.

Tenacious superstitions that epilepsy sufferers are either possessed or contagious surround this disease, which afflicts 65 million worldwide.

Of that number, almost 90 percent live in developing countries where causal factors are not addressed and cases remain severely under- and misdiagnosed despite effective and available and relatively affordable treatment.

“This is a disorder of children, youth and working-age adults mostly, and when there is inadequate diagnosis and limited treatment, the cost to society is potentially very high,” says Farrah Mateen, MD, PhD ’14, who started working in the Kingdom of Bhutan in 2009. She has been back several times and plans to go again this summer.

Mateen is focused on interventions and low-cost diagnostics for brain disorders with the goal of facilitating a “technological leap” in resource-limited settings. Along with doctoral studies at the Bloomberg School, Mateen simultaneously completed a fellowship in the Division of Neuroimmunology and Neurological Infections at the Johns Hopkins School of Medicine. “This training allowed me to develop clinical expertise with vulnerable populations in Baltimore and abroad,” she says.

Now a neurologist and faculty member at Massachusetts General Hospital of Harvard Medical School, and the University of Ottawa, Mateen is conducting a clinical trial in Bhutan to test a low-cost mobile electroencephalography (EEG) device that could become a routine tool in developing countries for the diagnosis of people with seizure disorders. There are an estimated 10,000 cases of epilepsy in Bhutan.

The device takes the form of a “shower cap,” with roughly a dozen leads that are attached to a patient’s scalp for 20–30 minutes to monitor the brain’s electrical signals. The signals are fed into a smartphone app that records the EEG.

Health care workers who give the test don’t require formal medical training, and the data are easily transmitted for expert interpretation. That’s helpful in a country like Bhutan, which has not a single neurologist and just one non-functioning, stationary EEG machine at the main hospital in the capital Thimphu, days of walking away for many of the country’s 900,000 citizens.

The device, operating on open software developed at the Technical University of Denmark, costs $275, compared to approximately $15,000 for current stationary EEGs. The work is funded by Grand Challenges Canada, which rewards technological innovations in projects with other social and economic benefits, as well as the Thrasher Foundation.

Mobile technologies particularly benefit young children who can suffer small, non-violent seizures that might be mistaken for staring spells, according to Mateen.

Once a diagnosis of epilepsy is made, doctors can then prescribe a medication. The government of Bhutan provides anti-epileptic drugs free of charge.

This technology has the potential to improve the diagnosis of epilepsy in other developing countries, including in Africa where a dozen countries with a combined population of 26 million lack a neurologist, and 23 other countries have four or fewer neurologists.

“Populating the world with neurologists, which involves training of a decade or more, is impossible, but we can roll out technology that is cheap and simple to use,” says Mateen.

—Ken Stier
Danger: Plasmodium Crossing

It’s not easy to study and prevent malaria transmission because people are always on the move.

From home to work, or village to country, they can pick up and carry the *Plasmodium* parasite. Traditional surveys often fail because they capture only what people remember and care to share. And public health programs often end abruptly at national borders not recognized by *Anopheles* mosquitoes. All this leads to glaring information gaps and sets the stage for malaria's resurgence. Cross-border foot traffic, in particular, can reignite epidemics.

How big is this threat? And how can it be prevented? These are issues epidemiologist William Moss, MD, MPH, wants to investigate at three NIH-funded sites in sub-Saharan Africa that belong to the International Centers of Excellence for Malaria Research. Each site has a distinctive history that's influenced by the presence—or absence—of cross-border foot traffic.

Recently, a tiny pocket of rural Zambia lit up with GPS signals. Each belonged to a community member going about everyday activities with a wristwatch-like GPS device in tow. Moss remembers how cautiously his colleagues approached study participants about the project. "It turns out that they thought it was really cool to wear [the devices]," Moss says. Before long, other people were asking to wear a bracelet. It was an auspicious start to a series of studies Moss plans to conduct, exploring how both small- and large-scale human movements impact malaria prevention efforts.

The GPS study is being run out of Choma District, a region in southern Zambia where recent antimalaria efforts have been successful. Yet even here, transmission hotspots remain, threatening to reverse the region’s gains. By tracking participants’ daily routines, and then overlaying them on a malaria risk map, Moss and his colleagues hope to discover how local travel can promote hotspots.

The program's second site, Mutasa District, lies on Zimbabwe’s eastern border with Mozambique.

Family ties transcend these political boundaries, and cross-border trips are second nature to residents. For 40 years, public health programs in Zimbabwe loosened malaria’s grip. But since the programs ended in 1990, malaria’s made a comeback. Although cross-border transmission is frequently blamed, no one really knows if it’s playing a major role in the area. Using samples from 2012 and onward, Moss and colleagues plan to genotype the parasites found in patients, distinguishing “local” parasites from “imported” ones. Their results could benefit other border regions attempting to sustain public health gains in the face of dwindling budgets.

The third NIH-funded research site, in northern Zambia, also lies on an international border—this time with the Democratic Republic of Congo (DRC). For years, political instability has led the international community to steer clear of the DRC, leaving Africa’s fourth most populous country to fight malaria largely on its own. Despite the country’s violent reputation, Moss envisions creating a sister research program in the DRC to share ideas and information. Moss traveled with Peter Agre, MD, director of the Johns Hopkins Malaria Research Institute, to the DRC in February 2014. They found the country’s health minister and counterparts at Kinshasa’s Congo Protestant University eager to collaborate. Now the issue is finding funding for a DRC site. Moss is hopeful. “I think everyone recognizes that malaria can’t be controlled in sub-Saharan Africa without addressing malaria in the DRC. It’s a place where there are huge needs but also huge opportunities.”

—Rebecca Widiss

Among the challenges in preventing malaria transmission: People move, and mosquitoes don’t recognize borders.
After the rash of mass shootings in recent years, some politicians and pundits have lobbied for sweeping policies barring people with mental illness from owning guns. But that may not be the most effective strategy. A history of violent acts or serious substance abuse, not mental illness alone, should determine who is allowed to own a gun and who isn’t, according to new recommendations by the Consortium for Risk-Based Firearm Policy. The report recognizes that the vast majority of people with mental health conditions are not violent and calls for developing evidence-based criteria for determining who is more likely to commit acts of violence and prohibiting them from owning guns.

“Past behavior is the best indication of future behavior, and that’s where we’re going to be effective in concentrating our efforts on gun violence prevention policy,” says Shannon Frattaroli, PhD ’99, MPH ’94, an associate professor in the Center for Gun Policy and Research, who served on the consortium.

The consortium—composed of approximately 30 of the country’s leading researchers, practitioners and advocates in gun violence prevention and mental health—convened last spring at the Bloomberg School and in December 2013 issued two reports with recommendations for both state and federal policymakers.

Looking at current epidemiology, the group concluded that strategies focused solely on restricting access to guns by those diagnosed with a mental illness are too broad and therefore unlikely to significantly reduce overall rates of gun violence.

“When we think about the risk factors for gun violence, and where we can intervene, what we really need to be doing is focusing on behaviors and not diagnoses,” says Frattaroli. Center for Gun Policy and Research colleagues—Daniel Webster, ScD ’91, MPH; Jon Vernick, JD, MPH ’94; Beth McGinty, PhD ’13; and graduate assistant Anna Grilley who will earn her MSPH this May—also participated in the consortium.

The report calls for temporary restrictions on the purchase and possession of firearms by people subject to temporary domestic violence restraining orders, and restrictions of up to five years by individuals convicted of violent misdemeanors, or more than one drug or DUI/DWI within a certain period. These behaviors are all associated with an elevated risk of violence, even when not accompanied by a record of mental illness. Researchers recommended maintaining current provisions that permanently disqualify individuals from possessing firearms following involuntary commitment to a mental health facility.

Josh Horwitz, executive director of the Education Fund to Stop Gun Violence and a visiting scholar at the Bloomberg School, says that in the wake of the Sandy Hook shooting, the time was right.

“We were having these shootings by people who were clearly affected by mental illness, but at the same time, I was cognizant that most shootings aren’t committed by the mentally ill,” says Horwitz, who organized the consortium. “I thought it was really important to get everybody in the same room and ask, ‘What is the state of knowledge, and what can we confidently say about the intersection of guns and mental health that would potentially reduce gun violence?’”

—Joe Sugarman

Gauging Gun Risks

**Guns, Mental Illness and Violence**

- On the day of the Sandy Hook Elementary School massacre, an estimated 85 others died from gun-related injuries in the U.S.
- Only 4% of violence in the U.S. is attributable to mental illness.
- Mental illness is much more strongly linked with suicide. 60% of gun deaths in the U.S. are suicides.
- In the U.S., an estimated 31,000 people die and 74,000 suffer non-fatal gunshot injuries annually.
- Unless they have other risk factors, individuals with common mental health conditions are not much more likely than others to be violent.
- Most people with serious mental illnesses are more likely to be victims than perpetrators of violence.
- Congress enacted the Gun Control Act of 1968, following the assassinations of Dr. Martin Luther King, Jr. and Robert F. Kennedy.
Sound Medicine

Three years ago, at a conference involving traumatic brain injury, Linda Maguire’s two worlds—music and neuroscience—merged in a particularly dramatic fashion.

There was a flurry of urgent text messages: Was she available in a few hours to fill in for a soloist who was ill?

“I had to leave the conference and sing Verdi’s ‘Requiem’ that night at the Strathmore concert hall in North Bethesda, Maryland, and darn if I didn’t pull it off,” recalls Maguire, who cut back her performing schedule to study cognitive and behavioral neuroscience, earning a master’s in psychology last year.

Now she’s working to harness the power of music—using a science-based approach—to improve the lives of Alzheimer’s patients.

Maguire’s focus is on the use of “prescriptive” music to elicit specific physiological changes that, in turn, bring about positive and measurable responses such as decreases in blood pressure, heart rate and stress hormones.

It’s well established that music can powerfully benefit dementia patients. What’s missing from the equation is an understanding of how musical characteristics—including rhythm, structure, tone, instrumentation, melody and vibration intensity—drive behavioral and cognitive changes.

She likens her “prescriptive music model” to a physician’s use of prescription drugs. “There’s a difference between entertainment and prescriptive value,” says Maguire. “I’m working on developing a foundation to use music as a true and legitimate clinical intervention.”

Nancy Hodgson, PhD, RN, an assistant professor at the Johns Hopkins School of Nursing and Maguire’s thesis advisor, says that her research into music as a precisely targeted clinical intervention holds promise as an effective non-pharmacological approach to enhance Alzheimer’s care.

“I think she’s onto something very innovative,” Hodgson says. “Her proposed design is attentive to detail, and she brings the perspective of a well-established, highly regarded musician.”

Maguire is currently conducting a review of the literature on the physiological response to develop a computerized prototype targeted to dementia patients. Her model relies on a comprehensive physiological and psychological assessment to design personalized music prescriptions that “escort” patients to desired outcomes in mood, cognition and activity levels.

One component of her thesis focuses on “sundowning syndrome” in Alzheimer’s patients to mitigate problematic behaviors that typically occur with more frequency in the late afternoon hours.

The music selection might start with a favorite hymn, a selection that often connects with dementia patients in an agitated state.

“You can build from that point to take them to other arenas,” Maguire says.

Continuing to alleviate the anxiety, Bach’s “Air on G” or Josef Rheinberger’s “Cantilena”—pieces that can trigger relaxation responses—might figure in the repertoire.

“It gradually establishes a physiological domain where anxiety can’t happen because it doesn’t have the physiological ingredients to happen,” Maguire explains.

Although her primary focus is on Alzheimer’s disease, Maguire says that the medical music model is applicable to patients with PTSD, depression, schizophrenia, autism and other conditions.

“A lot of vets with PTSD love heavy metal because that’s what they’re living,” she says. “If you play something sweet and classical, they’re going to reject it.”

Looking ahead, Maguire hopes to develop a website of archived clinical music programming that can be accessed by healthcare providers and delivered on a professional level.

“I’m just putting together a very logical model, based on empirical research,” she says. “It might serve as a turning point in music medicine.”

—Jackie Powder
Finally, the “How” of ALS

If gene mutations were people, the mutation commonly found on a gene called \textit{C9ORF72} would be a notorious criminal. About two years ago, researchers first linked this mutation to the fatal, muscle-wasting disease amyotrophic lateral sclerosis (ALS)—Lou Gehrig’s disease. Since then, the mutation has been implicated in an ever-expanding list of ailments including Alzheimer’s disease, frontotemporal dementia and Huntington’s disease. But, like detectives without a murder weapon, researchers haven’t understood how the \textit{C9ORF72} mutation derails normal cell functions. Now, Jiou Wang, PhD, an assistant professor in Biochemistry and Molecular Biology, and colleagues may have an answer. In a study focused on ALS and recently published in \textit{Nature}, the team reports discovering a cascade of molecular events from mutation to pathology, potentially opening avenues to treat the disease’s root cause, not merely its symptoms. In recognition of this finding, Wang was awarded the 2014 Shikani/El Hibri Prize for Discovery & Innovation.

Like all genes, \textit{C9ORF72} consists of a sequence of bases (represented by letters) within a larger strand of DNA. A normal \textit{C9ORF72} gene contains a string of six letters, GGGGCC, which may be repeated a few times. In its mutated counterpart, this sequence repeats dozens to tens of thousands of times. Yet the familiar mutation story—alter a gene, alter the protein it codes for—doesn’t necessarily apply, as this region doesn’t code for a protein. Still, Wang’s team thought the repeats must be up to something. It took two years to confirm this hunch.

Step one in the team’s process was to create artificial DNA sequences with GGGGCC repeats. In these regions, the two strands of DNA pulled apart. One side folded over itself to form G-quadruplexes, stacks of square-shaped molecules that resemble a miniature, low-rise building. Meanwhile, the other side formed rare, long-lasting bonds with RNA, called R-loops.

In cells taken from patients, this bulbous, hybrid RNA-DNA crippled the machinery used to make standard RNA, which acts as a template for protein production. It’s as if the machinery hit “a series of speed bumps or the occasional roadblock,” says Wang (above left, with ScM student Tushar Chakravarty). Rather than creating one long RNA strand, the machinery produced many stunted ones. Worse still, these mini-strands attracted and diverted proteins that would otherwise be performing important cellular functions. When the team compiled a list of 280 proteins waylaid by this “toxic RNA,” a protein called nucleolin stood out as highly susceptible.

The team was onto something big. In healthy cells, nucleolin is concentrated in the nucleolus, a chamber within the nucleus where protein assembly begins. But in the cells of ALS patients, nucleolin is widely dispersed throughout the entire nucleus. Though the details aren’t clear yet, this dispersion puts stress on cells, sometimes causing their death. And it’s cell death that manifests in ALS patients as progressive movement problems. In short, by focusing on the structure of the \textit{C9ORF72} mutation, the team had found a probable root cause for ALS.

There’s much more to study. But Wang and his colleagues are eager to put their insights to use developing therapies. And they’re hopeful that, as researchers study over 30 other diseases linked to similar repeat regions, the basic process they’ve discovered will prove to be a “smoking gun” many times over.

—Rebecca Widiss
Maternal death is dropping in many countries—globally the number of women dying from pregnancy-related causes has fallen from 376,000 in 1990 to 293,000 last year. However, the rate in the U.S. doubled during the last decade, and the incidence of near-death has also spiked.

Maternal mortality has not declined in the U.S. for a quarter century, according to Andreea Creanga, MD, PhD '09, who leads the CDC’s Pregnancy Mortality Surveillance System.

"It’s an alarming statistic," she says.

Creanga’s job involves collecting vital statistics data from all 50 states and then painstakingly analyzing each individual case of maternal death. About 650 women die annually nationwide; about a third of these deaths are preventable.

Generating a clear and up-to-date picture of the problem at a population level is no easy feat. The death rate rise in the U.S. can, at least in part, be attributed to improvement in how maternal deaths are identified, Creanga notes.

But that’s hardly the whole story.

Among the significant risk factors for maternal death is a mother’s age; the number of U.S. women delaying childbearing has increased in recent years. Obesity is another risk factor. So is having hypertension and diabetes, both of which contribute to high-risk pregnancies. Being foreign-born as opposed to U.S.-born is a risk factor. So is race. Black women have a three- to four-times higher risk of maternal mortality, but no clear evidence exists to explain the disparity.

Ascertaining the true nature of the problem can be tricky given the relatively small number of cases of maternal death, Creanga explains. “We need larger numbers to be able to draw reliable conclusions.”

The complexity of maternal death at the population level is heightened by the fact that it’s a moving target, Creanga explains. “Things are changing every year, and we want to know about these changes.”

To help provide an all-important context for understanding what’s behind the trend, Creanga has co-authored research that measures the incidence of maternal near-death cases to combine with mortality data.

One notable new finding: Traditionally, hypertension, hemorrhage and embolism were the leading causes of maternal mortality. Lately, there’s been a shift to cardiovascular conditions as the main contributor to maternal death, Creanga notes.

“The more we know about risk factors and causes of deaths, the more we can do something to prevent maternal deaths,” she says.

Her office is now collaborating with a wide assortment of clinical and professional partners on an initiative that focuses on “patient safety bundles”—standardized sets of evidence-based guidelines, practices and tools that health care practitioners and hospitals can employ to improve outcomes. The first bundle involves a hemorrhage management protocol to prevent death. “We are now putting together bundles for hypertension and embolism,” Creanga says. “Going forward, we’ll be creating bundles that address obesity and cardiovascular disease.”

Her work can be very sad, Creanga says, especially recreating scenarios involving the death of young mothers. “But it’s what we have to do. No woman should be dying from pregnancy-related complications in the U.S. in 2014. And yet, many are dying every year. We need to know why.”

—Andreea Creanga, CDC

An Alarming Trend in Maternal Health

In Memoriam

Timothy D. Baker, MD, MPH ’54, who in the 1960s was instrumental in founding the world’s first Department of International Health, died December 17, 2013, at age 88. A professor in International Health, he also founded the General Preventive Medicine Residency Program and helped to establish the School’s first endowed professorship. Baker’s work as a health systems consultant and his pioneering health workforce studies took him to dozens of countries on five continents.

Baker came to the School in 1959 as the assistant dean and an associate professor of public health administration.

Alan Ross, PhD, MS, professor emeritus in the Department of Biostatistics, which he joined in 1964, died September 7, 2013, at age 87. Chair of Biostatistics from 1967 to 1981, Ross also served as chief biostatistical consultant to the Federal Aviation Administration and advised WHO on medical care utilization and designing and analyzing population surveys.

Raymond Seltser, MD, MPH ’57, a professor in Epidemiology and associate dean at the School from 1967 to 1976, died February 16, 2014. The author of seminal studies on the risk factors involved in smoking, radiation exposure and stroke, Seltser was deputy director of the Johns Hopkins Oncology Center from 1977 to 1981, and later served as dean of the University of Pittsburgh Graduate School of Public Health.
As the Department of Health Policy and Management, it’s a huge value-added to bring in someone with real policy experience whom we can learn from, and use that knowledge to inform our research.
—Sara Bleich, PhD, associate professor, HPM (left)

I’ve met with [Gov. Musgrove] several times—it’s a great opportunity to understand how policymakers use and consume research. He’s been really helpful to us as we seek to translate our research into policy.
—Beth McGinty, PhD ’13, assistant professor, HPM
When Ronnie Musgrove became governor of Mississippi in 2000, the federal Children’s Health Insurance Program (CHIP) had been in place for more than a year, yet fewer than 1,000 children were enrolled. The Democratic governor and his team expanded outreach through public schools and increased their marketing and communications efforts. Within a year, 60,000 children were added to CHIP. It’s both a commendable achievement and a handy instructional tool for Musgrove, who joined the Bloomberg School in November 2013 as a senior policy scholar.

Musgrove’s experience as governor, lieutenant governor and state senator made him a natural for the first policy scholar in the Department of Health Policy and Management (HPM), according to Ellen MacKenzie, PhD ’79, MSc ’75, Fred and Julie Soper Professor and chair of the Department. “He’s inspirational [and] so committed. He’s already beginning to open doors for us,” says MacKenzie.

Musgrove does public affairs communications consulting work and splits his time between Washington, D.C., and Jackson, Miss., spending an average of four days a month in Baltimore. He’s met with faculty, spoken to classes about policy issues, is advising HPM on specific policy initiatives and will be connecting faculty with policymakers, and then to understand the connection is an important goal of mine here at Hopkins.

In an era that seems to be dominated by distrust of government, how do you advance public health?
It goes back to what’s important. Education is important, and just because government doesn’t work as well as you would like it to, you don’t abandon educating our people. Likewise, now is not the time to abandon ensuring that our people are healthier, more productive and, in fact, are less costly because they are well.

It’s no secret that many in public health are progressive, left of center. What should they understand about those who are in power on the right?
All the officials that I’ve had an opportunity to work with want to see improvements in education, in job opportunities, in health care. So it’s important to understand there are different points of view. But that’s the thing about good research. It doesn’t matter what the point of view is, the research stands on its own. And it creates and states facts irrespective of philosophy.

Many in public health see the city or state level as proving grounds for programs that can be adopted by other states, and maybe nationally.
Having solutions that work is persuasive. When you see the bottom line reduced, when you see the quality increase, or you see access to quality health care increase, those things get your attention. If they do all three, they really get your attention.

Mississippi and a lot of Southern states have some of the nation’s most serious health issues like obesity and hypertension. What will it take to turn things around?
I’ve said enacting more policies from Johns Hopkins research would be one. (Laughs.) Access is a problem sometimes in the South. Lifestyle is a problem, and I think we have some uniqueness in terms of our diets, etc. So those are all variables and factors in improving quality of life. But those are things that are part of any policy initiative that need to be considered.

How does one make those kinds of big, population-level gains without being accused of being the “nanny state”?
Going back to the example about the children’s health insurance policy, all we did was change the implementation procedure, and then we had 60,000 more children with health care. We didn’t change the law, we just changed the implementation. And so those things are important in the way you carry out policies. Sometimes, they can be broad to cover and help more people, or sometimes they can be narrow and restrictive, and fewer people are helped. I think that’s a matter of leadership.

How do you advise researchers who want to not only generate evidence but also advocate for change based on it?
Make sure of the credibility of the data before you say anything. And, from everyone that I’ve talked to here, to a person, they all agree that that’s the most important. And then, you can look at the various policy issues that could be derived from the research. What would be solutions, as a result of the research? And then, I think most researchers advocate, in some shape, form or fashion, for solutions that come out of the research.

Any plans to return to elected office?
One of my law partners once said this about being in public office: You’re never cured, you’re just in remission. But no, I enjoy doing what I’m doing right now. It gives me an opportunity to focus on some policy issues like here at Johns Hopkins. To open a dialogue with researchers, academic people, and connect them with policymakers—it’s outstanding. It’s a great time in my life.
In late February 1970, my new husband Eric and I arrived in what was then East Pakistan. We had been married just weeks before.

We had come to the northern part of what is now Bangladesh so Eric could study tropical medicine during his pediatrics residency. I volunteered to work on the children’s ward of the main hospital there.

What I witnessed shocked me. We met young patients afflicted with malnutrition, blindness, diarrheal disease and other severe illnesses. One 5-year-old’s growth was so stunted he looked like a 9-month-old. Many children lost their vision because of vitamin A deficiency.

I grew up in comfort in Montgomery County, Maryland, outside of Washington, D.C. This was a new world to me. I had never before encountered people ravaged by a lack of clean water, vaccines, health care and proper nutrition. The reality of a developing country was traumatic and terribly common. The first time we walked into the hospital, my husband saved a child’s life by adjusting his IV fluids. Leprosy plagued the area. I often saw a beggar on the train who did not have a nose.

During our stint there, I saw the full power of public health—its necessity, its importance, its potential to solve the problems of the world. Public health was already in my blood: my mother worked at the D.C. health department. Our time in East Pakistan and later in Japan made me a passionate believer in and advocate for the discipline.

Public health would come to define my career and, in fact, my life.

I’m not a scientist. I’m not a researcher or practitioner of public health, but I’ve brought the talents I do have—creativity, passion and commitment—to public health. I serve public health in a very different way than most. I contribute by raising funds to support it.

People often ask me, “How do you ask for money? Isn’t that uncomfortable?”

No. It’s an honor. Asking for money to support public health was never a problem for me. I don’t even see my job as raising money. I see it as connecting people with their dreams.

Let me give you an example. One of the things I’m most proud of is working with alumnus Stephen Moore, MD, MPH ’93, and his wife Julia to create The Moore Center for the Prevention of Child Sexual Abuse. Established in October 2012, it is the first and as yet only academic center in the world devoted to a problem that affects countless individuals. As a physician whose family has been terribly scarred by sexual abuse, Dr. Moore wanted to do something to prevent the same thing from happening to others. He knew the power of public health.

When he asked me if our School would take on this challenge, I said absolutely we would. The Bloomberg School is not afraid to shine the public health light on the most difficult issues. That’s what we do.

To do my part to make this happen, I build relationships. To do that, I travel. I’ve flown countless miles and had countless meetings during my 29 years at Johns Hopkins. I’ve traveled everywhere from Texas to Tokyo, visiting alumni and donors—many of whom ultimately have become dear friends. Right now as I begin thinking about this essay, I’m 1,200 miles away from East Baltimore, in Florida. I just finished having lunch with a lovely woman. We talked about her parents’ life and their public health work in Nigeria. We worked together to document a student scholarship in her father’s name in the Department of International Health. Next I spoke with an MPH alumnus about establishing a new MPH scholarship in his family’s name.

These gifts represent the future: They may support a student who someday will solve a basic science problem important to the eradication of malaria; or one who plays a role in establishing a policy that will save the lives of malnourished children.

Who knows?

I do know that my work over these many years has been an honor and a joy. What else can you say about a job that allows you to help make people’s dreams a reality?

Ricky Fine, MS, MEd, the director of Major Gifts and Governmental Relations, will retire in May 2014 but says she will never leave public health—it’s in her blood.
FOR SEVEN YEARS, ARUNA CHANDRAN, MD, MPH ’04, WAS EVERY BIT THE GLOBETROTTING PUBLIC HEALTH PROFESSIONAL. A JUNIOR FACULTY MEMBER IN INTERNATIONAL HEALTH AND AN IOWA NATIVE, SHE HAD A DOG-EARED PASSPORT AND A PUBLIC HEALTH CAREER MEASURED IN PUBLISHED ACADEMIC PAPERS AS WELL AS FREQUENT FLYER MILES.
In Mexico and Brazil, she examined interventions designed to reduce high rates of traffic injuries and deaths. She studied bacterial meningitis in children in southern India, and in Pakistan she assessed childhood nutrition issues and strategies for mitigating household injuries. Her interest in childhood respiratory disease among Native Americans led her to Navajo and Apache reservations in the Southwest.

Then everything changed. In January 2012, her focus shifted from global to local. Instead of addressing needs around the planet, she chose to confine herself to a mere 92 square miles of it—Baltimore City. That month, she became chief of Epidemiological Services for the Baltimore City Department of Health.

“One thing I missed [while travelling] was living in or near the community I was working for,” Chandran says, explaining her reasons for making the change. “This idea of doing something for my immediate surroundings and local population was appealing.”

Two more compelling reasons to stay put (for now) are due to be born this spring: Chandran is expecting twins, a boy and a girl.

A CAREER TIMES TWO

The city health department resides in a low-slung brick building on East Fayette Street in the Jonestown neighborhood. To the west is a phalanx of downtown office towers and the city hall dome. Looking eastward presents the cluster of Johns Hopkins buildings on the hilltop East Baltimore campus, site of the Bloomberg School and Hopkins Hospital. This location is symbolic for Chandran be-
cause, though she has traded red-eye flights for rush-hour traffic, she has not severed ties to Johns Hopkins. Instead, she transferred to the Department of Epidemiology where she continues to teach as an associate scientist.

Now she divides her time between the two symbolic domes in a hybrid public health position.

“I think it’s working out fantastically,” said former Baltimore City Health Commissioner Oxiris Barbot, MD, who recently took over as New York City’s first deputy commissioner of health. “The city [of Baltimore] benefits from a top-notch epidemiologist who is very comfortable both in academia and working in an environment where the demands are coming from all over the place—from constituents and elected officials.”

Chandran isn’t the first epidemiologist to divide her time between the city and the Bloomberg School. Her position, vacant for three years, had earlier been held by research scientist Caroline Fichtenberg, PhD ’07, in a joint arrangement. Johns Hopkins pays Chandran’s salary and the city reimburses the school for time she spends in the Health Department.

Chandran’s office at the Health Department is windowless, so see can’t see the Baltimore skyline or either dome from her desk. It really doesn’t matter since she spends her days looking at Baltimore through the prism of data—the numbers, stats and figures that provide a picture of this city’s overall health. Her job is to “collect, compile and analyze” such data, she says, be it the density of liquor stores, the rate of new HIV infections or the percentage of Baltimoreans lacking health insurance.

“It’s a lot of crunching numbers and interpreting those numbers and attending meetings where I share those numbers,” Chandran explains. “If you look at my life here versus the life of an academic epidemiologist it probably doesn’t look all that different except that now, I have to be ready to answer quickly and be willing to accept some uncertainty and incomplete knowledge because the city doesn’t wait for you to have perfect numbers.”

FROM CLASSROOM TO OFFICE

The seat-of-the-pants reality of serving as head epidemiologist in a big city health department is something Chandran strives to share with students through the pair of classes she teaches at the Bloomberg School: Public Health Practice, and Public Health Surveillance.

“We really have them work on problems of Baltimore City as if they were a health officer at the Health Department,” she says. “It’s a practical and applied approach versus a theoretical and research approach.”

Standing in a fourth-floor classroom before 20 Public Health Practice students who peer at her over their laptop computers and tablets, she launches into a lesson: “The Baltimore Health Department was actually founded in 1793, so it is the longest continuously running health department in the United States,” Chandran tells the future public health professionals. But she quickly leaves 18th-century Baltimore behind to engage the class in the realities of life here in the 21st century.

One of her first duties as chief epidemiologist was to create an interim update to Healthy Baltimore 2015, the city’s 50-page health policy agenda released in 2011. It outlined targeted health improvements sought by 2015 in 10 different priority areas, including better access to health care, reducing the spread of HIV and redesigning communities to prevent obesity.

These Health Department priorities are now the students’ priorities as well. Each will select one to be the focus of assignments for the rest of the class. While this is a practice course, today is one long lecture as Chandran expounds on each priority area. For instance, when discussing the city’s obesity problem she brings up the concept of “food deserts”—areas in the city without ready access to supermarkets or other sources of healthy food. Residents within them often rely on mom-and-pop places that focus on selling candy and snack food. An extensive analysis by multiple city agencies and the Johns Hopkins Center for a Livable Future determined that 1 in 5 Baltimoreans live in these deserts.

“[Researchers] actually physically walked into every corner store and marked off if they have fresh food, do they have produce, and does it look edible,” Chandran tells the class.

Chandran adroitly moves back and forth between being public health professor and in-the-trenches epidemiologist. Days later she is in her Health Department office holding a meeting on the topic of food deserts.

Joining her are Bloomberg School student intern Janani Veluchamy and health department co-worker Laura Flamm, MHS ’11, who coordinates a unique response to this issue: The Baltimarket Virtual Supermarket Program. The innovative online grocery ordering/delivery system is one strategy for reaching a 15-percent reduction in the obesity rate by 2015.

Is the program influencing eating habits and having an impact on the obesity epidemic? Finding evidence-based answers to these complex questions is one of Chandran’s jobs.

The other is to engage students in the issues.

REALITY CHECK

David Celentano, ScD ’77, MHS ’75, chair of the Bloomberg School’s Department of Epidemiology, says Chandran’s dual role brings a new richness to the classroom. “One of the things I’ve been trying to do over the last five years is get much closer to the practice of public health and move our department away from strictly an epidemiological research focus,” he says. “It turns out that over half of our graduates do not go into academia so we really need to be training half of them for life in a health department or an applied epidemiologic setting.”

Chandran prepares her students for real-world topics in the under-the-gun atmosphere that exists outside academia. She assigns her students to write policy briefs, a standard public health document she often is called on to create.

“It’s a document that they have written for other classes before, but instead of them getting two weeks to do it, we give them only 24 hours,” Chandran says. “That is the reality of how the Health Department works, where you have to turn things over very quickly.”

Chandran has been a conduit for many
Hopkins students to work for and with the Health Department through research projects and internships—from PhD students to undergraduate Public Health Studies majors. “I try to find ways to make the students really feel like they have their finger on the pulse of the Health Department,” Chandran says.

Daily, Chandran faces the health realities of Baltimore City where nearly one in four citizens lives in poverty. Updating the Healthy Baltimore report was a “crash course” in the dynamics of this city’s health, she says. Among its dozens of goals: a 10 percent decrease in the rates of premature death from cardiovascular disease; reducing rates of gonorrhea and chlamydia in adolescents by a quarter; cutting the rate of alcohol- and drug-related hospital admissions by 10 percent; and a 15 percent increase in colon cancer screenings by adults 50 and older.

The report demonstrates that Baltimore is a city of haves and have-nots when it comes to health issues. For instance, those with personal incomes of less than $15,000 a year are more than twice as likely to be obese as city residents making $75,000. African-Americans in Baltimore are nearly three times as likely to suffer from type 2 diabetes than whites, and twice as likely to suffer from hypertension. People with college diplomas, are much more likely to get certain cancer screenings.

“Health is not strictly defined by disease condition,” Chandran says. “You can’t be thinking about health without the perspective of poverty and race and ethnicity and gender and all of these things. Academic centers now are finally teaching it that way, getting students to think about a broader perspective of health and public health work.” Chandran’s dual role affords her a balanced view of the big picture, she says. That’s exactly what she hopes to convey to Bloomberg School students as she engages them in assessing and addressing the health issues of this city, and beyond.

“There are lot of positive things happening,” she says. “Maybe the Health Department needs to do a better job of promoting the good things that are happening.”

**1932:** The School and the Health Department establish the Eastern Health District, a 1-square-mile research and training area that served as a site for health clinics and research studies.

**1941:** As head of the Health Department’s Tuberculosis Bureau, faculty member Miriam E. Brailey helps design Maryland’s TB control program and launches a TB screening program.

**1951:** Epidemiological studies on pediatric lead poisoning conducted by faculty member Anna Baetjer prompt Baltimore to ban the use of lead paint inside homes, the first ordinance of its kind.

**1971:** Department of Mental Hygiene faculty member Wallace Mandell conducts the first evaluation of federally funded drug treatment programs, including the Health Department’s methadone maintenance clinic.

**1980s:** Faculty members demonstrate that the provision of contraceptive services in STD clinics can reduce rates of unintended pregnancy and STDs. They also develop innovative STD surveillance and control systems.

**1994:** Health Commissioner and alumnus Peter L. Beilenson initiates a needle exchange program based on research from the School’s AIDS Linked to the Intravenous Experience (ALIVE) Study.

**2002:** BCHD with the police department and Johns Hopkins Center for Gun Policy and Research launches the Youth Ammunition Initiative to prevent illegal firearm ammunition sales to youth.

**2008:** Faculty member Donna Strobino works with the Health Department to develop the B’More for Healthy Babies initiative to unite disparate services for pregnant women and their newborns.

—Karen Thomas
BODIES IN THE DESERT

THOUSANDS OF ASYLUM-SEEKING ERITREANS, ETHIOPIANS AND SUDANESE HAVE BEEN KIDNAPPED AND TORTURED IN THE SINAI PENINSULA.

SURVIVORS SUFFER YEARS OF MENTAL ANGUISH AND LIVE A STATELESS, HAND-TO-MOUTH EXISTENCE.

THE HUMAN TRAFFICKING CHAIN MUST BE STOPPED.
The truck stopped at 2 a.m. somewhere in the Sudanese desert. The trafficker called to the six women in the back of the truck he was driving, telling them to send out the dark-skinned girl. “I knew he meant me,” recalled Merhawit (not her real name). “The other women gave me up. You have to understand that when people are afraid for their lives, they often do not make noble decisions.”

The trafficker told Merhawit, then 17, to follow him. She told him that she preferred to be killed rather than raped and that he should “pick his best weapon to do so.” The trafficker grabbed a metal pipe and hit her over the head. “I felt my hands go numb and then slowly the rest of my limbs. I was drenched in a dark blood that covered my entire body. I eventually fainted on the spot in the desert. He left me alone thinking I was dead,” Merhawit said.

After the man left her, one of the women risked leaving the relative safety of the truck to check on Merhawit. When she saw that Merhawit was still breathing, she returned to the others and begged them to help her carry the wounded woman to the truck. If the trafficker noticed, she would tell him that she couldn’t leave a “sister’s corpse to rot in the desert.” The body, she would say, must be properly buried. The others agreed, creeping out to retrieve Merhawit and lift her into the truck. To prevent the trafficker from noticing their stowaway, they hid her under their seats, praying she would survive.

The truck rumbled on across the border into the endless desert in Egypt, where the man sold the women to traffickers who would take them to the Sinai Peninsula. The new traffickers noticed Merhawit’s condition and gave her some milk to revive her. She’ll never know if altruism or the desire to protect a newly purchased commodity motivated them.

Merhawit’s journey was just beginning. In the Sinai, things would get much worse.

Like many of the women and men I interviewed in Israel as part of my doctoral research, Merhawit is an Eritrean asylum seeker who fled her home in the hope of finding freedom and security. She left Eritrea with her sister who died of an illness while they were crossing the border into Ethiopia. She is one of countless thousands of Eritrean, Ethiopian and Sudanese people who in their flight have fallen victim to a human trafficking chain that, since 2009, has been a source of misery, abuse and torture.

Merhawit’s journey was just beginning. In the Sinai, things would get much worse.

Like many of the women and men I interviewed in Israel as part of my doctoral research, Merhawit is an Eritrean asylum seeker who fled her home in the hope of finding freedom and security. She left Eritrea with her sister who died of an illness while they were crossing the border into Ethiopia. She is one of countless thousands of Eritrean, Ethiopian and Sudanese people who in their flight have fallen victim to a human trafficking chain that, since 2009, has been a source of misery, abuse and torture.

Merhawit’s journey was just beginning. In the Sinai, things would get much worse.

Like many of the women and men I interviewed in Israel as part of my doctoral research, Merhawit is an Eritrean asylum seeker who fled her home in the hope of finding freedom and security. She left Eritrea with her sister who died of an illness while they were crossing the border into Ethiopia. She is one of countless thousands of Eritrean, Ethiopian and Sudanese people who in their flight have fallen victim to a human trafficking chain that, since 2009, has been a source of misery, abuse and torture.

Before I arrived in Tel Aviv in 2012 to research access to family planning by Eritrean asylum-seeking women in Israel, I knew almost nothing about these horrors even though like Merhawit, I am a member of the Tigrinya-speaking people from the area along the Ethiopian and Eritrean border.

I was born and raised in a tightly knit community of Eritreans and Ethiopians in the U.S. who were resettled from Sudanese refugee camps in the 1980s. Stories of war permeated my childhood. Members of my own family fled the despotic Ethiopian regime that decimated villages where people opposed it. I knew little, however, about the suffering and hardship my family and people in my community endured. I didn’t know how hard it was for them to regain the physical, psychological, economic and political security taken from them.

It was only by speaking with hundreds of asylum seekers like Merhawit that I began to better understand my own family, my own community. Although they are separated from today’s asylum seekers by time, experience and geography, both share the struggle to obtain the basic essentials for a full life. My work with asylum seekers in Israel and my new understanding of my own family’s experiences have reshaped my future and made me commit to helping asylum seekers in their struggle to maintain their resilience in the face of suffering.
A BITTER JOURNEY

Since gaining independence from Ethiopia in 1993, Eritrea has been led by an increasingly authoritarian regime with a zero-tolerance policy to opposition. In addition to forced military conscription, the regime has expelled international NGOs, closed its main institution of higher learning (the University of Asmara) and persecutes anyone who challenges government policies or does not belong to the four state-sanctioned faiths (Eritrean Orthodox, Roman Catholic, Lutheran, and Islam). Today under the military dictatorship, Eritrea is one of the most socially, politically and economically restrictive countries in the world, according to Dan Connell, PhD, an expert on Eritrea and a professor of journalism and African politics at Simmons College in Boston. As a result, more than 200,000 Eritreans have fled the country since 2004, according to Human Rights Watch estimates.

The journey for those who flee is long and often beyond human endurance. Many report going without food for up to two weeks and drinking urine to survive. Every point along the hundreds of miles of roads and open desert is dangerous because of the threats of kidnappers and bandits. Some asylum seekers pay smugglers to guide them from their homelands to refugee camps in Sudan and Ethiopia or other places of relative safety. Yet, according to European and Eritrean researchers and activists, a significant number of those who cross the Eritrean-Sudanese border fall prey to human traffickers roaming the area. Some people are intercepted while en route to or from a refugee camp, while others are abducted while working in nearby agricultural fields, living in border cities like Kassala or even within Eritrea itself.

They are then held in the Sinai while kidnappers extort money from their families—often torturing them as their loved ones listen by cell phone. The ransom demanded for each captive ranges from $25,000 to $50,000, and is largely financed by family members who sell property, beg in churches and take loans from banks and friends, said Sweden-based journalist and human rights activist Meron Estefanos. When the ransom payment arrives via an international network of collaborators, some captives are released, some are sold to another trafficker and others are simply killed. Those who survive torture in the Sinai are taken by traffickers to Egypt’s border and told to run toward Israel.

I REMEMBER ONE PATIENT WHO WATCHED EGYPTIAN SOLDIERS SHOOT AND KILL HER BEST FRIEND AND ONE OF HER CHILDREN. SHE HAD NO WORDS FOR HER PAIN.
Asylum seekers who escape the bullets of the Egyptian border guards and make it onto Israeli soil are stopped by Israeli soldiers. They are taken to a detention facility in the Negev desert. The first wave of Eritrean asylum seekers who arrived in Israel in 2007 were held briefly and then sent in buses to Tel Aviv and expected to fend for themselves. By 2012, Israel responded to the influx of African asylum seekers by building a fence on the border with Egypt, implementing strict immigration policies and detaining asylum seekers for at least three years without trial (since changed to a minimum of one year). The official stance of the Israeli Ministry of the Interior is that the majority of Eritreans are economic migrants who do not deserve the protection and social support afforded to asylum seekers and refugees under international law.

**THE PRICE THEY PAY**

I began to learn about the asylum seekers’ plight as I conducted my qualitative study of the factors affecting the sexual and reproductive health of Eritrean asylum-seeking women. In addition to the interviews for my research, I volunteered as a translator at the Physicians for Human Rights-Israel Open Clinic and at the African Refugee Development Center in Tel Aviv, where I met many survivors of human trafficking and torture in the Sinai.

I translated for people who were filing legal requests for resettlement. They were demanding the release of detained victims of human trafficking or seeking services for disabled asylum seekers so they could continue living in Tel Aviv. The more I heard, the more I learned that their suffering didn’t end in the Sinai. People continued their fight to endure on a daily basis.

Every step I took getting to the clinic each afternoon became increasingly difficult. What would I hear today?

I remember one patient who watched Egyptian soldiers shoot and kill her best friend and one of her children. She had no words to describe her pain. I recall a patient who watched his wife, then eight months pregnant, raped repeatedly by traffickers while they were held in the Sinai. When they were finally released, she gave birth to a dead baby in the desert. She was hemorrhaging so they had to run towards Israel where they could seek emergency care, forcing them to leave the infant’s body behind. The husband begged the health care workers to recover his son’s body from the desert so that it could be buried.

The bullet wounds, burns and electrocution marks left on the survivors never ceased to stun me. The traffickers even electrocuted and burned people’s genitals. One patient asked me why my eyes widened every time I heard about the torture. “Ajokhee. It’s okay, halefu Tiega haftey. It has passed,” he said. I could not believe that he was setting aside his own pain in order to comfort me.

**GIRMAY’S STORY**

One night I was at Physicians for Human Rights–Israel, borrowing the gynecologist’s examination room as a makeshift office. A young Eritrean man came in. Girmay (not his real name) was handsome and in his mid-20s, yet he seemed haggard, fatigued beyond his years. He quietly said that he felt obligated to share his experiences if it could help call attention to horrors experienced by asylum seekers. He spoke almost without interruption for three hours.

Fleeing indefinite military conscription in Eritrea, he crossed the border into Sudan, wearing a jelebaya (a long robe typically worn in many parts of the Middle East and Africa). Things fell apart quickly. He joined other migrants who paid smugglers to take them north, but the smugglers later abandoned them in the desert. Shortly thereafter, traffickers scouring the area for new victims abducted them.

Girmay and a group of 30 asylum seekers were stuffed into bags, thrown into a truck in Kassala, Sudan and taken to the Sinai Peninsula. He tried repeatedly to escape, jumping from the truck and attempting to camouflage himself in the sand. Each time he was returned to the truck, he and the others were beaten. The last time they smashed his head with a rock and beat him until he vomited blood. During his seven months of captivity, Girmay did not see the light of day.

“They asked for a $44,000 ransom to release me. I told them to do whatever they wanted to me, because I couldn’t come up with the money. ‘We don’t kill quickly,’ they told me.”

Captives were moved from location to location. Girmay and others (including infants and children) were shackled, often naked, and kept in different torture houses. They starved. They were covered in lice.

“[The traffickers] beat us so badly. All of the scars on my legs are from them walking over my body and beating me senseless. They walk on your wounds, you know,” Girmay told me. During his long months of captivity, Girmay was burned with boiling plastic and electrocuted. It was common for women’s vaginal areas and nipples to be burned. Captives were also forced to torture others, including raping their female and male counterparts. This torture would last through the night. He recounts vividly the day that two of the traffickers raped two young Eritrean women in the adjacent room. When one trafficker pulled down his pants and asked for the virgin first, Girmay and his fellow detainees clanked their shackles and screamed for them to stop. “They were taken away and raped anyway,” he said. He recalled sadly the fate of a young Ethiopian woman who was raped and tortured, taken forcibly as a trafficker’s wife, and then, after many months, dragged by her chains to a holding cell to be raped, burned and strung from the ceiling by her arms. Girmay watched countless people murdered, even after their ransoms of up to $35,000 were paid.

To find a way to pay their ransoms, the captives dialed random phone numbers abroad. Many calls were to Israel where many survivors live. In the beginning, Girmay said, he didn’t want to call his family in Eritrea; it was a holiday and he didn’t want them to spend the time mourning for him. When they refused to call anyone for help, the traffickers beat them more, dragged them by their chains and hanged them upside-down. After one man fainted, the traffickers poured water on his face to see if he was alive. When they saw that he was breathing, they told Girmay to choke him to death. “I was horrified. I did it. I pretended to choke him. Thankfully, he didn’t die,” Girmay said. When the newly arrived captives saw those living in the torture houses they were shocked. “Our skin hung from our bodies as...
if we were 90 years old. I had lost all of my hair,” he said.

Girmay paused for a moment as he explained that he remained in the Sinai Peninsula torture houses until, after the seven long months, his family paid $25,000. “When I was freed, I had no strength left in my body,” he said.

The traffickers released Girmay, two men and three women at night. “These people were not as abused as I… I was so weak, the wind blew me over and even the darkness of night was too bright for my eyes,” he said. The traffickers wanted to take the women separately, but Girmay and the other men refused, knowing what would happen to them. Repeatedly, and even at the end, they tried to separate the women and rape them. Finally, a trafficker was charged with taking them all to the Israeli border.

Girmay and the others crawled under the border fences. Israeli soldiers detained them, bandaged and fed them. He and the others were put in a tent. It was January, freezing cold and raining. “Despite the harsh weather I couldn’t feel because all of my nerves were no longer working, and I felt as if all of my skin cells were dead,” he said. “To this day my nerve endings feel permanently damaged.” Finally, he was taken to a hospital and eventually to Tel Aviv.

I recount these details not to shock but to share the reality of the ongoing torture that asylum seekers experience in the hands of human traffickers.

Both Girmay and Merhawit arrived in Israel before 2012, so their detention period was short. Like many asylum seekers during that time, they had significant psychological

“I WAS SO WEAK, THE WIND BLEW ME OVER AND EVEN THE DARKNESS OF NIGHT WAS TOO BRIGHT FOR MY EYES,” GIRMAY SAID OF HIS RELEASE FROM THE TORTURE HOUSE.
and physical trauma, no understanding of their surroundings and no social support. Many had nowhere to go and, until they found shelter, slept in the park near the central bus station.

After my interview with Girmay, we walked together to the bus stop. I didn’t know what to say to him, other than to express the horror that I felt. I asked him what I should say to other survivors in the future, when they shared their experiences with me. He said “tsinaat nay Iyob yi habkum” or, “May the strength of Job be with you.”

“TELL EVERYONE”
Merhawit declined to talk about the month she was held by traffickers in the Sinai. I can only imagine what horrors she endured in the torture houses. Instead, she continued her narrative after she made it across the Egyptian-Israeli border.

She spoke fervently for more than an hour, and often seemed unable to register the questions that I asked her. As she shared her story with me, she cried. She told me she feels vulnerable, depressed and anxious and often dreams of her sister. Now a young mother in her early 20s living in Tel Aviv, with a husband in detention, Merhawit struggles to raise her child without support.

I did my research and translation work in Tel Aviv from November 2012 until September 2013. After my interviews and translation work ended every day, I would walk or bike the seaside route home. I always felt sad, angry and anxious. What could be done to break the trafficking chains in the Sinai and elsewhere? My feelings were heightened by the knowledge that such atrocities would not be tolerated if the victims were citizens of a nation that advocated effectively on their behalf.

Throughout my time in Israel I was constantly reminded that so much of what I have is based on timing, immigration policies and the geographic location of my birth. Luck. This struck me often when I saw asylum seekers, my age or younger, sweeping streets, working in restaurants and at construction sites. I often ran into community activists whose intellectual vitality rivaled that of people I had met in the most prestigious universities in the U.S.—and they were cleaning toilets to earn money to survive. When our eyes met and we greeted each other with “Selam,” pangs of guilt flooded me.

Memories of these encounters still keep me up many nights.

Once, while I was in Tel Aviv, I was talking with a young friend whom I will call Gebre. He told me about his hopes for the future. When he said he wanted to open a bar, I told him that it was a dangerous line of work for a teenage boy like himself. He gave me the strangest look that said, “Do you know what I have been through?” He showed me his wounds, where he had been burned in the torture houses. At work every
day he is insulted because he is African. His boss and co-workers tell him, “You are stupid and black. You are dirty.”

Gebre is a tall and thin 18-year-old, but with the persona of a grown man who is as hard as a rock. He has no choice. To survive, he has to be hard. Then he started to talk about his mother, whom he hasn’t seen in years. In that moment he looked vulnerable, like a little boy. “Before the desert, I was different. I don’t recognize myself now,” he told me.

I am back in the U.S. now, working on my dissertation, but I am not the same. I too have been transformed. The experiences that so many asylum seekers shared in interviews, in conversations, in late night phone calls broken by sobs—they are a part of me now. What do I do with these narratives?

The narratives illustrating the many barriers faced by asylum seekers clarified for me the importance of contextualizing behavior within the wider political, economic and historical framework in which people live. I have resolved to complete the study about access to reproductive health care and to disseminate my findings. I hope my work will serve as an evidence base for improving female asylum seekers’ access to reproductive health services. But I also want to do more. I must speak out about the atrocities that they continue to face. African migrants, including those seeking asylum, continue to be tortured in the Sinai today. It is now, more than ever, essential for my life and work to advance human rights. I will find a way to join researchers and activists who are working toward dismantling this human trafficking chain—and calling attention to the circumstances that force people to take risks that can lead them into the hands of traffickers.

Merhawit’s words during one of our conversations come back to me.

She exhorted me to do something, to use the skills, knowledge and resources I have to make a difference. She told me she didn’t know how to use a computer and that I did, that I could reach many more people than she ever could. This is your responsibility, she told me. Then crying, she said, these words:

“Tell everyone. Tell everyone. I am expecting you to do so. Write it online. Write it everywhere.”

Tsega Gebreyesus is a doctoral student in the Social and Behavioral Interventions Program in the Department of International Health. She wishes to thank the people who made her research possible, her friends and family for their support, friends who read and edited revisions patiently, and all of those—who despite the pain it caused them—shared their experiences wholeheartedly with her.

Photos, Misha Vallejo: Once they survive the Sinai, Eritrean and Sudanese asylum seekers survive a stateless life in Tel Aviv.
FOR KIDS IN BANGLADESH’S SIRAJGANJI DISTRICT—AND ANYWHERE, REALLY—IT’S HARD TO RESIST COOL WATER ON A HOT DAY. YET A FROLIC IN A POND OR RIVER TURNS TOO OFTEN TRAGIC. DROWNING IS THE LEADING CAUSE OF DEATH AMONG CHILDREN IN BANGLADESH, CAUSING 43 PERCENT OF DEATHS IN CHILDREN AGES 1–4.
Each year, drowning claims the lives of 12,000 children in Bangladesh—the equivalent of 32 deaths every day. Globally, drowning is the third leading cause of unintentional death, with approximately 359,000 fatalities a year.

Bloomberg Philanthropies is taking steps to prevent needless drowning deaths among children, starting with a $10.5 million initiative in Bangladesh to address two major contributors to child drowning: lack of supervision and easy access to water.

The Johns Hopkins International Injury Research Unit (JH-IIRU) is leading the project, which will evaluate the effectiveness of community day care centers and locally manufactured playpens in reducing drowning deaths. The idea is to provide child supervision during parents’ working hours and restrict child mobility in a safe, affordable manner. The project also includes family and community education programs.

“It is imperative that we explore the feasibility of appropriate and cost-effective drowning prevention interventions for child survival,” said Adnan A. Hyder, MD, PhD ’98, MPH ’93, director of JH-IIRU (www.jhsph.edu/IIRU).

Researchers plan to monitor 80,000 children between ages 1 and 4 over two years.

Hyder is also co-authoring a WHO global report supported by Bloomberg Philanthropies on effective drowning-prevention strategies.

—Jackie Powder
TELOMERE EXPRESS

By Andrew Myers
Illustrations by Dung Hoang

HOW AN EVENING CONVERSATION ON THE ACELA TRAIN TO BALTIMORE AND ALMOST A DECADE OF RESEARCH ARE RESHAPING THE SCIENCE OF PROSTATE CANCER
On an otherwise nondescript evening in 2005, a team of three investigators huddled in the quiet car of an Acela train headed back to Baltimore. They were on the trail of an elusive foe, an important clue in the deaths of countless men across the world. These were not police detectives, however, but prostate cancer researchers from Johns Hopkins.

On this night, their muffled discussion veered in a novel direction that seemed particularly promising. Soon, whispers rose to an excited chatter about a new hypothesis. Because the quiet car was an inviolate sanctum for business travelers, it wasn’t long before a conductor emerged in the half-light to quell the spirited discussion.

Eight years later the outburst on the Acela would lead to a notable discovery in prostate cancer research: a prototype test to predict aggressiveness of the disease.

The resulting study, published in October 2013 in the journal Cancer Discovery, would implicate otherwise-harmless DNA fillers known as telomeres as key factors in predicting prostate cancer mortality in men with this cancer.

**A TALE OF TWO OUTCOMES**

From a public health perspective, the costs of prostate cancer are profound.

Aside from nonmelanoma skin cancer, prostate cancer is the most common cancer among men in the U.S., according to the CDC, and one of the leading causes of cancer death among men. It accounted for 28,560 deaths nationwide in 2010. One in seven American men will be diagnosed with prostate cancer in their lifetimes.

Every one of those diagnoses will hit like a sledgehammer.

A typical course of action involves surgery. In the past, prostate cancer surgery was bloody and complex. Pioneering work by Patrick C. Walsh, MD, at Johns Hopkins revolutionized this surgery, substantially reducing complications. However despite these improvements, and the advent of less invasive laparoscopic and robotically assisted techniques, potential side effects still include incontinence and impotence. A small number of surgeries result in patient death.

“These are serious quality-of-life issues. Prostatectomy is not something you want to go through if you don’t have to,” says Alan Meeker, PhD, an associate professor of Pathology at the Johns Hopkins School of Medicine.

Meeker and Elizabeth Platz, ScD, MPH, a professor of Epidemiology at the Bloomberg School, were the lead investigators on a perplexing cold case that had stumped medical professionals for years: Two men can have prostate cancers that look identical even to expert pathologists, but result in wildly divergent outcomes.

Pathologists review prostate cancers for their characteristics including size (volume) and the Gleason sum, which is based on the degree to which the cancer cells differ in appearance and growth pattern from normal cells. A treating physician can then consider these indicators in combination with the man’s age and the stage of his cancer along with the PSA test, which measures prostate-specific antigen (PSA) in the bloodstream, to estimate the man’s prognosis.

“Take two patients who are the same on paper. Their Gleason score is the same. The volume of the tumor is the same. They’re the same age. They have the same PSA level. And yet, one patient will be dead in seven years, and the other will live two decades and die of old age,” Meeker says flatly.

Balanced against this is the reality that most prostate cancers grow slowly. Current research shows that many men live with it for years and later die of something else.

“Most patients, understandably, want the cancer out. Recent data suggest, however, that for some men surgery can wait or is not needed at all. The trick is to be able to know which men,” says Angelo De Marzo, MD, PhD, a professor and prostate cancer pathologist at the Johns Hopkins School of Medicine and the third investigator on the Acela that night.

From the outset, the trio was looking to address shortcomings of the currently used prognostic tools by finding a biological marker for the severity of this cancer. Like a fingerprint to a homicide detective, such a biomarker would help identify prostate cancer patients with aggressive cancers who require immediate removal of the prostate and those suffering less threatening forms of the disease who might forgo treatment in favor of disease surveillance.

“We thought telomeres might be that biomarker and we got a little carried away on the Acela that night,” Platz says.

Eventually, the team hopes to apply the test they are developing to men whose cancers are detected at a very early stage by screening. “Some of these guys may have a cancer that probably shouldn’t even be picked up, but if it is, now they face the difficult decision about whether to be treated, and if so, the type of treatment,” Meeker says.

“Tissue-based markers like this have the potential to greatly improve treatment and decision-making in men with prostate cancer. This study is an important advance,” says Jerry W. Shay, PhD, an expert in telomeres and cancer at the University of Texas Southwestern Medical Center. Dr. Shay was not involved in the research but penned a commentary accompanying the study in Cancer Discovery.

**TELLTALE TELOMERES**

Telomeres cap the ends of human chromosomes, like the plastic aglets at the end of a pair of shoelaces. They are part of the DNA structure, but their role is protective; they prevent the loss of genes during cell replication and keep the ends of chromosomes from fraying.

In healthy cells, each time a cell divides, small bits of DNA naturally get lost from the ends of the chromosomes. Fortunately, those ends are the telomeres, which do not contain genes. As cells replicate over the course of their lives, telomeres naturally grow shorter, bit by bit. Oxidation from smoking and other causes can also lead to shortened telomeres.

Whether it’s due to aging or oxidation, telomere shortening plays a key role in genetic instability—whole chromosomes spliced end-to-end, cells missing entire chromosomes and others with chromosomes severed at odd places where mother and daughter cells engaged in a tug-of-war over a fused chromosome. Such abnormalities are at the heart of many cancers, not just in the prostate.
Human cells have built-in mechanisms to fight cancer. Some shut down their own reproductive ability as they age, a process called senescence. Others kill themselves when they grow too old, a form of genetic suicide known as apoptosis. Malignancies somehow bypass these protective mechanisms, allowing genetically damaged cells to replicate until things go awry.

In prostate cancer, extensive telomere shortening had been noticed in comparisons with nearby healthy cells. Meeker, De Marzo and Platz were aware of this back in 2005, but the prostate cancer field as a whole had largely ignored telomeres as a potential biomarker. The team’s hypothesis, hatched on the train, was simple: If shortened telomeres play a role in cancer, tumors with the shortest telomeres would be the most chromosomally unstable, and thus the most aggressive cancers.

“We had been working on telomeres for years for different reasons and we thought we should be testing whether telomere length could tell us more about the prognosis of prostate cancer,” Platz explains.

At the time, the team lacked a way to measure the length of telomeres in individual prostate cancer cells, in nearby noncancerous cells including stromal cells, and in healthy appearing epithelial and stromal cells far removed from the tumor.

These three cell compartments make up what is now understood as the cancer ecosystem. Once controversial in the cancer research community because it incorporated otherwise normal-appearing cells outside the tumor, this view has gained wide acceptance. The ecosystem approach—a fundamentally new way of looking at cancer—has opened intriguing lines of scientific inquiry.

Meeker, a telomere biologist by training, developed the method for telomere measuring with De Marzo. Adapting a well-known fluorescent staining technique known as FISH, he tags specific sections of DNA—in this case the telomeres—with fluorescent labels. With proper lighting, the stained telomeres fluoresce bright red when viewed under a microscope. The ember-like glow is an unmistakable indication of their presence and, more importantly, their length. Longer telomeres naturally attract more fluorescent label. Measuring telomeres, then, is as “easy” as measuring the intensity of the glow—brighter glow, longer telomere and vice versa.

The real beauty of the method, however, is not that Meeker can stain telomeres, nor even that the stain could be quantified; these features were well known to science. The big advance is being able to measure telomere length, cell by cell, in patient tissue samples. Earlier systems were able only to resolve broad average telomere length from a mash of ground up cancer and non-cancer cells—somewhat helpful but hardly revolutionary.

Cell-specific resolution allows the team to measure telomere length by type
of cell. They can measure telomeres not only in cancer cells, but also in stromal and epithelial cells, the nearby, noncancerous cells—the all-important ecosystem. This capability was vital to the study’s success.

At this point, scientifically speaking, the research team was halfway home. They had a way to measure the telomeres. Now they needed telomeres to measure. Fortunately, Platz knew of the perfect resource that would allow them to test their hypothesis.

Harvard University, where Platz trained years ago, maintains a cohort known as the Health Professionals Follow-up Study, which was designed to study diet, lifestyle and chronic disease risk. Harvard identifies and stores tissues from participants in that cohort diagnosed with prostate cancer and meticulously tracks each man’s medical history over time, noting how and when they die, among many other health-related factors. The study reaches back to the mid-1980s and includes some 50,000 men. Not all of them have prostate cancer, of course, but enough do for the team to conduct a meaningful study.

Using this cohort, the team—now expanded to include their Harvard colleagues—in effect traveled back in time, studying real tissues from real patients to learn which men subsequently saw their cancers return, how many died of those cancers, exactly how long after recurrence these men died and how many died of causes other than cancer.

Out of this rich vein, their Harvard colleagues were able to identify a group of 596 men who had undergone prostatectomies, some dating back 20 years or more. The men averaged 65.3 years of age at the time of surgery.

In addition to Meeker’s cell-by-cell measuring technique, these other pieces—the population, study design and tissue—were paramount to success. The researcher’s enemies are bias and chance. Bias can take many forms, Platz says. For example, “observer bias” occurs when the data collector, aware of the hypothesis, consciously or unconsciously skews the data in favor of the objective. Chance, on the other hand, is a different sort of beast.

“Sometimes you pick the right study cohort and what look like promising results just don’t hold up,” Platz says. “My job as an epidemiologist is to preempt and root out the bias and chance.”
were the most likely to progress and die of their disease.

All of the men had abnormally short cancer cell telomeres, but those with the worst outcomes were those with more cell-to-cell variability in telomere length among the cancer cells. Perhaps in cancer, like in other biological systems, genetic variability increases adaptability and the likelihood that the population survives and evolves new abilities. These can include aggressive behaviors like the capability to invade surrounding blood vessels and spread to other areas of the body—the lethal process known as metastasis.

During their next meeting, De Marzo suggested looking at telomere length variability in the cancer together with telomere length in the stroma.

“That’s when this phenomenal result appeared,” Platz says.

Greater telomere length variability in the cancer, when paired with shorter telomeres in the stroma, is the very worst combination to have.

At the other end of the spectrum, less variable telomeres in the cancer combined with longer telomeres in the stroma is the best type of cancer. “If one can call any cancer good,” she hedges.

Men with the more-variable/shorter combination had eight times the risk of progressing and 14 times the risk of dying of their prostate cancer. Of the men with the less-variable/longer combination, one died of prostate cancer when, statistically, about six deaths would be expected. That patient lived more than 16 years after first diagnosis—twice as long as men with the more variable/shorter combination.

The numbers were dramatic for what the team now refers to as the “telomere biomarker,” showing clear evidence that it has the potential to distinguish between men in need of aggressive treatment, and men who can forgo treatment altogether.

“Among all of their findings, the most stunning outcome of the team’s research was the clue as to how the cancer microenvironment predicts the cancer’s behavior,” says William Nelson, MD, PhD, director of the Sidney Kimmel Comprehensive Cancer Center at Hopkins, who did not take part in the research. “The cancer-associated stroma is a co-conspirator in the crime. Shortened telomeres are simply an indication of damage. We now have a new place to look to intercept the process of cancer,” Nelson says.

DOWN THE LINE

Though the Platz-De Marzo-Meeker team has ascertained the suspect, more sleuthing remains.

Their first priority: validating the findings. Eventually, an important goal will be to establish thresholds for the telomere biomarker by which to evaluate various tumors to recommend surveillance over treatment. The team is currently developing technologies to automate the evaluation process—necessary if a widely used clinical test is to materialize.

“This is a provocative study that adds to our predictive capability and could result in significantly less-aggressive therapy for men at low risk,” says cancer researcher Shay.

Platz reflects on the sheer scale of team effort necessary to make this discovery. The study included investigators from two major institutions working in several disciplines—biological, clinical and population sciences. It also took essential resources in the form of many federal grants, available participant data, and tissue and other existing infrastructure.

Not least, it took time. Almost a decade passed from the day on the Acela to final publication.

The team now has momentum, and is emboldened by broader implications of their discovery. Their findings about telomeres and prostate cancer prognosis may also apply to other cancers.

The economics of their discovery is striking. Fewer unneeded prostatectomies could result in big health care savings. At an average cost of $19,214, prostatectomies cost some $2.6 billion annually, according to the CDC.

“From the perspective of optimizing population health and best using limited health care dollars toward that goal, the development of better prognostic tools for the most common cancers in men is imperative,” Platz says.
Transformational Take on Kidney Disease

Chronic kidney failure, or end-stage renal disease (ESRD), is about three times more common in African Americans than whites even though the prevalence of mild kidney disease is similar in these groups. Most research to understand why has focused on differences in risk factors, such as high blood pressure and diabetes. Linda Kao, PhD ’99, MHS ’97, and colleagues have a different take. Previously they have shown that an area on chromosome 22 explains much of the higher prevalence of ESRD in African Americans compared to whites. In a study published in the *New England Journal of Medicine* in December 2013, Kao, a professor of Epidemiology at the Bloomberg School, and her team have now shown that mutations in a gene in this region, APOL1, are associated with a faster progression of kidney disease in African Americans. The mutation in APOL1 is relatively common in African Americans, but nearly absent in whites.

David B. Abrams, PhD, professor, Health Behavior and Society (HBS), and executive director, the Schroeder Institute for Tobacco Research and Policy Studies, was awarded the 2014 American Academy of Health Behavior (AAHB) Research Laureate Award, which honors an individual who has made a significant and enduring contribution to health behavior research.

Robert Black, MD, MPH, professor, International Health (IH), was awarded the Dr. C. Gopalan Oration Gold Medal from the Nutrition Society of India for outstanding contributions in the field of nutritional sciences. Sight and Life also presented him with its Annual Nutrition Leadership Award for two landmark *Lancet* nutrition series he led.

Patrick N. Breysse, PhD, ’80, ’85, professor, Environmental Health Sciences (EHS), was awarded the Annual Nutrition Leadership Award for two landmark *Lancet* nutrition series he led.

Karen Davis, PhD, the Eugene and Mildred Lipitz Professor in Health Policy and Management (HPM), has been asked to serve on U.S. Senator Ben Cardin’s Health Advisory Group.

Lilly Engineer, MD, DrPH ’08, MHA, associate director, DrPH program in Health Care Management and Leadership, and Certificate in Quality, Patient Safety and Outcomes Research, HPM, and assistant professor, ACCM, JH SOM and HPM, was selected as a Baldrige Performance Excellence Award examiner by the Maryland Performance Excellence Foundation.

Fannie Fonseca-Becker, DrPH ’00, associate scientist, HBS, received the Henry Montes Presidential Award for leadership in improving the health of Latinos in the U.S., from the Latino Caucus for Public Health of the American Public Health Association.

Debra Furr-Holden, PhD ’99, associate professor, Mental Health (MH), received the Joseph Cochin award.

Andrea Gielen, ScD ’89, ScM ’79, professor, HBS, and director of the Johns Hopkins Center for Injury Research and Policy, received the 2013 American Public Health Association Award for Excellence.

Diane Griffin, MD, PhD, professor and chair, Molecular Microbiology and Immunology (MMI), received the Rudolf Virchow Medal and delivered an honorary lecture at the University of Wurzburg, Germany.

The Center for Communication Programs was among a group of partners honored when United Against Malaria was named Global Campaign of the Year at the 2014 PRWeek Awards ceremony. CCP received the 2013 Community Partners Award from the Family League for its role in the B’more for Healthy Babies Initiative. Tanzania Capacity and Communication Project (TCCP) received the Mobile Health at Scale award from the USAID/Tanzania Health Team.

David Jernigan, PhD, associate professor (HBS) and director of the Center on Alcohol Marketing and Youth, was selected to deliver the Basil Hetzel Oration at the Public Health Association of Australia’s 43rd Annual Conference in Perth, Western Australia, in September 2014.

Philip Jordan, PhD, assistant professor, BMB, received the Ho-Ching Yang Memorial Fund award.

Alain Labrique, PhD ’07, MHS ’99, MS, associate professor, IH, was appointed to the WHO eHealth Technical Advisory Group.

Thomas A. LaVeist, PhD, the William C. and Nancy F. Richardson Professor in HPM and founding director of the Hopkins Center for Health Disparities Solutions, will receive the 2014 ICON Award from Associated Black Charities in June.
Kao’s study provided such transformational insights that she found herself being toasted recently by the Clinical Research Forum, which awarded her one of its Top 10 Clinical Research Awards for 2013 and said Kao’s study was “an important contribution that should lead to changes in approaches to evaluating and classifying end-stage kidney disease.”

In the study, patients already had evidence of chronic kidney disease. More than one in five African Americans had two copies of these particular variations in APOL1, which were associated with faster kidney disease progression, leading to a substantially increased risk of kidney failure. African Americans with two copies of the mutations had the highest risk of progression of kidney disease and ESRD compared to whites while African Americans with one copy of the mutation had an intermediate risk.

And yet, as promising as the study is, back in 2000 when Kao; Josef Coresh, MD, PHD ’92, MHS ’92, an Epidemiology professor; and Michael J. Klag, MD, MPH ’87, dean of the Bloomberg School, first wrote a grant to explore the genetic aspects of kidney disease, the concept generated some controversy in the scientific community.

“Many of the reviewers worried the study had racist overtones, but we pressed ahead looking at both the genetic and social components of the disease,” Kao says.

“Linda’s work is important in that it not only identifies a specific gene associated with more rapid progression of kidney disease in African Americans compared to whites, but shows that the mutation appears to act independently of glucose level, protein in the urine and other risk factors for disease progression,” says Lawrence Appel, MD, MPH ’89, a professor at the Bloomberg School and senior author of the study. “The award is well deserved.”

———Andrew Myers

Robert S. Lawrence, MD, Center for a Livable Future Professor in EHS, received a 2014 Johns Hopkins Alumni Association Heritage Award.

Philip Leaf, PhD, professor, MH, was voted the Baltimorphosis Adult Nominee Winner.

Elizabeth J. Letourneau, PhD, associate professor, MH, has been elected president of the Association for the Treatment of Sexual Abusers.

Paul A. Locke, DrPH ’98, MPH, JD, associate professor, EHS, was appointed by Lewis & Clark’s Northwestern School of Law as its first Distinguished Visiting Professor of Animal Law and Science.

Kunihiro Matsushita, MD, PhD, assistant scientist, Epidemiology, received the Sandra A. Daugherty Award for Excellence in Cardiovascular Disease or Hypertension Epidemiology from the American Heart Association, and the Early Career Best Science Award for Abstract Poster Presentation from the American Heart Association.

Ana Navas-Acien, MD, PhD ’05, associate professor, EHS, was invited to be editor-in-chief of the new journal Current Environmental Health Reports.

Kate O’Brien, MD, MPH ’94, professor, IH, was selected as the Robert Austrian Lecturer at the next International Symposium on Pneumococci and Pneumococcal Diseases in Hyderabad, India.

A SABIN FOR SANTOSHAM

Mathuram Santosham, MD, MPH ’75, professor, International Health, was awarded the 2014 Sabin Gold Medal award for his pioneering role in the prevention of deadly Haemophilus influenzae type b (Hib) diseases, including pediatric bacterial meningitis and pneumonia. Santosham’s leadership in conducting groundbreaking research, vaccine efficacy trials and advocacy to prioritize Hib vaccines spans more than 40 years and has saved millions of children’s lives worldwide.

Henry Perry, MD, PhD ’76, MPH ’71, senior associate, IH, received the Ronald McDonald House Charities 2013 Medical Awards of Excellence, which carries with it a gift of $100,000 to the nonprofit group Perry founded Curamericas Global.

Elizabeth Selvin, PhD ’04, MPH, associate professor, Epidemiology, received the Harry Keen Memorial Award from the International Diabetes Epidemiology Group of the International Diabetes Federation and delivered the Harry Keen Memorial Award lecture in Melbourne, Australia.

A. Richey Sharrett, MD, DrPH ’79, adjunct professor, Epidemiology, received the Council on Lifestyle and Cardiometabolic Health’s Epidemiology and Prevention Mentoring Award.

Donald Steinwachs, PhD ’73, professor, HPM, was appointed to serve on the Department of Veterans Affairs National Research Advisory Council.

Elizabeth Stuart, PhD, associate professor, MH, was named to a new National Academy of Sciences panel, Research Methodologies and Statistical Approaches to Understanding Driver Fatigue Factors in Motor Carrier Safety and Driver Health.

Moyses Szklo, MD, MPH ’73, DrPH ’74, professor, Epidemiology, received the Robert S. Gordon lectureship award from NIH for his contributions to cardiovascular research and for training a generation of epidemiologists.

Wietse Tol, PhD, assistant professor, MH, was named program director of the Peter C. Alderman Foundation.
START YOUR WEEKDAY WITH THE LATEST GLOBAL HEALTH NEWS, SMARTLY CURATED AND DELIVERED IN AN EASY-TO-SCAN EMAIL.

From outbreaks to breakthroughs, global health is a diverse, fast-moving field. Our editorial team scours the Web for the most important news and distills the essentials for you. We compile the most valuable global health articles and commentaries so you can get a quick take for the day and dive into the stories most important to you.

SUBSCRIBE FOR FREE TODAY.

www.jhsph.edu/global-health-NOW
The Public Health Narrative

On November 5, 2013, I welcomed a young doctoral student into my office. Students occasionally find their way to me to talk about a project or their desire to write about public health issues. All are smart, driven and committed to public health.

Tsega Gebreyesus is all of the above—and persistent as well. She had written me months previously asking to meet. The delay was my fault. She politely sent along requests until we finally met. That November afternoon, she told me about African asylum seekers and the human trafficking chain of misery and death that entrap so many in the Sinai. She told me about the survivors and their stories of unimaginable cruelty and unimaginable resilience. She said she had to tell the world about these horrors.

Tsega is soft-spoken, and she is fierce. I told her magazine writing is different from scholarly writing. She said she understood. I told her the article would likely go through a lot of edits and rewriting. She said, no problem. Convinced of the story’s importance and her dedication, I told her I was committed to publishing the story. She said thanks and asked when could she get started.

Twenty drafts later, the result of that conversation is Tsega’s cover story in this issue, “Bodies in the Desert,” on page 20.

Tsega’s unwavering commitment to a public health narrative reminded me strongly of another student, Varsha Ramakrishnan. She also had a story to tell. As the inaugural Johns Hopkins-Pulitzer Center Global Health Reporting Fellow last year, Varsha penned a remarkable piece about dowry violence in our Fall 2013 magazine. She exposed the plight of young brides in India who are beaten, killed or even killed when their dowry gifts do not satisfy their husbands and in-laws. After training with journalists at the Pulitzer Center on Crisis Reporting, Varsha went to India to document this issue firsthand.

We learned recently that her story, “A Broken Promise,” won the 2014 Robert F. Kennedy College Journalism Award. Days later, the Society of Professional Journalists bestowed on her its 2013 Mark of Excellence national award for student journalism.

Tsega and Varsha demonstrate the importance of storytelling to the public health enterprise. They both witnessed an injustice, an affront to human rights—to health and dignity—and they both responded. The tools they chose were not vaccines or mosquito nets but words. Words carefully crafted into a story that can move readers and make a difference.

Brian W. Simpson, MPH ’13
Editor, Johns Hopkins Public Health
bsimpo1@jhu.edu

Letters to the Editor

All About Food

I agree totally with Mr. Spence [“Paradise Lost”]. I was raised on a ranch in North Dakota and when I moved to the big city it was quite a shock. I wholeheartedly believe in organic farming and humane practices for animals raised for food. If not for clean air, clean water and healthy food, we have nothing. Thank you so much for your efforts and for your standing up for all of us like minds.

Rebecca via Magazine Comments

Missouri is great. I loved that article [“Paradise Lost”].

I started an organic farm in 2001 and turned it over to some young farmers 5 years ago. I remain involved in farming as a volunteer, managing 140 acres at a job training program for at-risk teens in Brookeville, Maryland.

Edwin Gould
Brookeville, Maryland

An End in Sight?

A recent report by the USDA reveals that 141 trillion calories worth of edible food is thrown away in the U.S. each year. Among the mind-boggling quantity of wasted food are foods discarded by restaurants and retailers, including spoiled and perishable food.

The annual total is enough to add about 1,200 extra calories to every American’s daily calorie intake.

Lack of food security and access in the U.S is a multifaceted problem with no silver bullet. But if we can focus just a bit more attention and effort on reducing wasted food, we may see significant progress.

Marjorie Phan
Los Angeles, California

BRAVO on a splendid issue of Johns Hopkins Public Health! The fact that the whole issue is devoted to food is a wonderful achievement and the content is excellent. The essay by Terry Spence [“Paradise Lost,” Winter 2014] was perfect.

I am grateful for this needed attention to a looming public health crisis.

Polly Walker
Senior Fellow and former Associate Director Center for a Livable Future

Great article [“Paradise Lost”]! We are stalling the battle too. A CAFO (concentrated animal feeding operation) was just built across the street from my home, less than a half mile from a small town. When will people wake up and realize how it hurts our environment and the people?

Roxanne via Magazine Comments

Edwin Gould
Brookeville, Maryland

Missouri is great. I loved that article [“Paradise Lost”].

I started an organic farm in 2001 and turned it over to some young farmers 5 years ago. I remain involved in farming as a volunteer, managing 140 acres at a job training program for at-risk teens in Brookeville, Maryland.

Edwin Gould
Brookeville, Maryland
LOOK TO THE FUTURE

Like the silhouetted visitors to an ancient fort in Agra, India, you’re pausing at the threshold of old and new. This last page of the last issue of our years-old design for *Johns Hopkins Public Health* opens the door to possibility. Look for our new design in October 2014.

Photo: Michael J. Klag
CURIOUS INGENUITY
INSPIRES LIFETIME LEARNING

You never stop pursuing answers to protect the health and safety of our global community. There are always possibilities to explore, theories to test and lives to save. Stay connected in the exchange of knowledge and study the latest breakthroughs in public health in our worldwide classroom. With more than 120 online courses and a host of specialty-focused institutes and certificate programs, we are committed to your lifelong learning. Enroll. Take the next step to advance your career and save lives—millions at a time.

Visit: www.jhsp.edu | Call: 410-955-3543 | Email: admin@jhsp.edu | Tour: 615 N. Wolfe Street, Baltimore, MD 21205

Health Advisory Board
Robert J. Abernethy** President and Owner Amsterdam Standard Development Company
Ashok Agarwal* Trustee and Founder Indians Institute of Health Management Research
Lenox D. Baker, Jr.** Kenneth R. Banks President, CEO and Founder Banks Contracting Company, Inc.
Joseph A. Boydstun** President and CEO Brighamwaters Capital, LLC
Michael G. Bronfein President and CEO Remedi Senior Care
C. Sylvia Brown George L. Bunting, Jr.** President and CEO Bunting Management Group
Constance R. Caplan** President and Chair The Time Group
Robert W. Carr* Senior Vice President & Corporate Medical Director GlaxoSmithKline
William C. Clarke, III President The Ogden Foundation
Catherine C. Derrier Senior Technical Advisor RRD International, LLC
Manuel Duphin II** Former President and Chairman Johnston Laboratories, Inc.
Manfred Eggersdorfer Senior Vice President DSM Nutritional Products
William Flumenbaum Senior Vice President Capital Guardian Trust Company
Irene C. Frary Howard E. Friedman Managing Partner Laxm Capital, LLC
Douglas B. Given Partner Bay City Capital
Dean Goerdeman Former Chairman and CEO Double-Take Software
Donald A. Henderson** Dean Emeritus Johns Hopkins Bloomberg School of Public Health
Margaret Conn Himmelfarb* Frank L. Hurley** Chief Scientific Officer and Co-Founder RRD International, LLC
John J. Hutchins Founder and Managing Director PinnacleCare International
Christopher L.M. Jones Chairman and CEO J.Walter Thompson Fund, Inc.
Ambassador James A. Joseph Professor and Director, United States-Southern Africa Center for Leadership and Public Values Duke University
Michael J. Klag* Dean Johns Hopkins Bloomberg, School of Public Health
Roger C. Lipitz** Managing Member Oxam Assets, LLC
Kathy Ludwig Educator
Stephen G. Moore* President and CEO CarDon & Associates
Morris W. Olin** Chairman Olits Capital Advisors, LLC
Caroline Popper* Co-Founder and President Popper and Company
Karl P. Ronn Managing Director Innovation Portfolio Partners
Ira M. Rutkow* Huntington Sheldon**
Michael J. Silver Dean Emeritus Johns Hopkins Bloomberg School of Public Health
Shale D. Stiller**
Adena Wright Testa, Esq.*

International Honorary Committee
Markus Altewegg Chairman of the Board of Directors Sigfried Holding AG
Clateo Castellini Former Chairman and CEO BDI (Beatrice, Dickinson and Company)
J.P. Garnier Former CEO GlaxoSmithKline
William H. Gates, Sr. Co-Chairman Bill & Melinda Gates Foundation
Raymond Gilmartin Former Chairman, President and CEO Merck & Co., Inc.
Barbara A. Mikulski U.S. Senator Maryland
HM Queen Noor of Jordan
Nafis Sadik Special Advisor to the United Nations Secretary-General
Yohei Sasakawa Chairman The Nippon Foundation
Feike Sijbesma CEO Royal DSM NV
HRH Princess Maha Chakri Sirindhorn of Thailand

* University Trustee
** University Emeritus/Emerita Trustee
† Honorary Member
‡ Chair of the Health Advisory Board
* Alumnus/a

Magazine Team
Managing Editor Susan L. Sperry
Editor Brian W. Simpson
Associate Editor Maryalice Yakutchik
Consulting Editor Sue De Pasquale
Staff Writer Jackie Porer
Senior Art Director Robert Olinger
Design and Production Kristal Crittenden
Online Magazine Team David Croft Spencer Greer Mike Raly Ranjan Vellalmani
Associate Dean, External Affairs Joshua D. Elie
Senior Director, Development and Alumni Relations Heath Elliott

Johns Hopkins Bloomberg School of Public Health 615 N. Wolfe Street, E352 Baltimore, MD 21205 Phone: 410-955-5194 Fax: 410-614-2405 Email: editor@jhsp.edu Web: jhpmag.jhsp.edu Free Subscription magazine.jhsp.edu/subscribe
THE TRUCK STOPPED AT 2 A.M. SOMEWHERE IN THE SUDANESE DESERT.

MERHAWIT’S JOURNEY WAS JUST BEGINNING. IN THE SINAI, THINGS WOULD GET MUCH WORSE.