JOHNS HOPKINS PUBLIC HEALTH

THE JOHNS HOPKINS BLOOMBERG SCHOOL OF PUBLIC HEALTH MAGAZINE

SPRING 2016

A CENTURY OF SAVING LIVES 100 MILLIONS AT A TIME

SPECIAL CENTENNIAL COVERAGE 1916/2016

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Behind every successful scientist is a visionary.

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Open Mike

A NOTE FROM DEAN MICHAEL J. KLAG, MD, MPH '87

THE TOMORROW STRATEGY

We're maximizing our impact by unleashing the power of academic public health worldwide.

ALMOST 1.4 BILLION PEOPLE. THAT'S THE current population of China. A lot of mouths to feed, people to employ, health care to deliver... If you care about global public health, you must care about the health of China.

Back in 2008, I was wrestling with a strategic question: How does our School bring its resources to bear to improve public health in China? After consulting with our faculty in Baltimore, officials at the Chinese Embassy in Washington D.C., and partners in China, we decided we could best maximize our impact by strengthening Chinese academic public health. There were already several world-class schools of public health in China, and the number of schools was increasing rapidly. We decided to create a multilateral network to engage leaders of Chinese schools of public health. Periodic meetings would allow us to learn from each other. Since our first leadership meeting in Baltimore in 2009, we have met at Peking University in Beijing twice, at Fudan University in Shanghai, and again back in Baltimore.

We talk about the esoteric details of academic administration that only deans care about (academic appointments, accreditation, etc.), but we also look at the big picture. In the aftermath of the terrible Sichuan earthquake of May 12, 2008, for example, we discussed how research and evaluation of disaster response allows design of the most effective disaster interventions.

These discussions have spawned collaborations between our School and Chinese schools, created a pathway for visiting faculty from China and provided deep insights about the challenges to ensuring public health in China. We looked with envy at the Chinese government's commitment to schools of public health. At the time of our first meeting, for example, research budgets were increasing by 30 percent per year.

At the most recent meeting in November, I asked the pregnant question of our Chinese colleagues: Was all this effort, travel and time away from our day jobs worth it for them as well?

The answer was incredibly warm and positive, but the reasons underlying that resounding affirmation were unexpected. The Chinese deans meet relatively frequently, but those meetings are taken up with packed agendas related to finances, curricula and government initiatives. Our meetings, in contrast, encourage us to think strategically about leadership, how to strengthen our institutions and how to best meet the public health challenges of the 21st century.

When I was in China for the most recent gathering of deans, we also met with Johns Hopkins Beijing alumni. Almost 200 alumni from across the University attended. It was a wonderful way to mark our School's Centennial and our long history of working in China. (Be sure to see the photos in the magazine's inside

CENTENNIAL CONNECTIONS » **The Bloomberg School began celebrating its Centennial year last summer. This magazine issue and future ones will link today's research with historic public health efforts in our new Centennial Connection feature. Look for the 100!**

CRYSTAL CLEAR
Snow drapes an idyllic part of Beijing's Tsinghua University, a partner in the Bloomberg School's efforts to build global academic public health.

back cover that testify to this.) An alumnus told me that while many foreign universities collaborate with Chinese schools of public health, we are the only one that took the approach of convening leaders from many different universities with the goal of building strong institutions. His observation was a wonderful affirmation of one of our core strategies: We strengthen public health around the world by building local capacity and infrastructure.

Indeed, this is a global strategy for the Bloomberg School. We have also reached out to schools of public health in Latin America, a region with a long legacy of academic public health with strong schools. For example, the University of São Paulo (USP) School of Public Health was founded in 1928 and was funded by the Rockefeller Foundation (as were we). In April 2014, we met on the USP campus with leaders of 10 of the top schools of public health in Latin America to discuss how we might accomplish more together. We came out of that meeting with an affirmation of our shared commitment to improving equity and a decision to begin collaborating through a virtual network of academics committed to studying health inequities. Universidad del Norte in Colombia took on the leadership role of creating a website and a listserv that unites faculty from all of the schools. Since then, follow-up meetings have strengthened the bond that began in São Paulo.

It is this same belief in the power of public health that motivated Amy Tsui, when she led the Bill and Melinda Gates Institute for Population and Reproductive Health, to invest in a number of schools of medicine in Africa, inviting their faculty and leadership to Baltimore for short courses and establishing research collaborations. From these seeds, six schools of public health have sprouted or expanded their degree programs—Addis Ababa University School of Public Health (Ethiopia) and Kwame Nkrumah University's School of Public Health (Ghana), University of Ghana, University of Ibadan (Nigeria), Obafemi Awolowo University (Nigeria), and Assiut University (Egypt), with additional research centers for reproductive health established in Makerere University (Uganda) and the University of Malawi.

We believe that these efforts, tailored to the local context, serve to identify and prepare future leaders who will solve the challenges of the coming century. In strengthening academic public health around the globe, we are making a better, healthier tomorrow.

Michael J. Klag

FEBRUARY 2016

MICHAEL J. KLAG

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PLOWING AHEAD
Rural Bihar is ground zero for India's sanitation crisis.
Pg 34.

ANN SCHRAUFNAGEL

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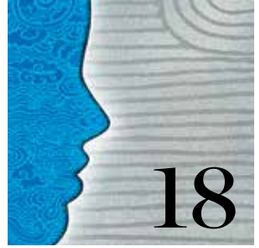


Forum
IDEAS + DISCUSSION

» Cover: Salt Lake City artist Dung Hoang's take on Public Health duets

/JohnsHopkinsSPH

React & Respond

ONE SIZE HELMET DOESN'T FIT ALL

I am a British motorcycle instructor who has been asked . . . to help address the issues (in Thailand). Thailand has a helmet law ["Crossing to Safety," Fall 2015], however in rural areas, the majority still will not use them. Some training schools offer off-road training but nothing in the way of defensive riding skills like those that are available in the UK. Complex cultural differences in Thailand mean the standard Western approach of enforcement simply will not work, as the rising statistics continue to prove. Thailand needs a new approach that works with the Thais rather than against them.
» Carol Jadzia / Via Magazine Comments

The "Crossing to Safety" article captures the current condition of traffic accidents in my country, Indonesia. Laws and rules seem unworkable. Its about behavior, manner and culture.
» Susiana Nugraha / Via Magazine Comments

KUDOS!

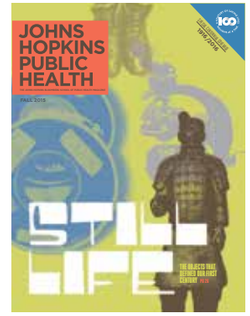
I compliment you on the great layout of the magazine as well as the well-written, very interesting articles. Needless to say, I read the Fall 2015 issue from cover to cover!
» Betty Addison / Via Magazine Comments

A DEGREE OF PHILOSOPHY

I received my PhD approaching 20 years ago and felt at the time, as you do now, that it was too narrow. ["Putting the Ph Back in PhD," Summer 2015] I hope that the current fad of awarding PhDs only after finishing in the allotted time, irrespective of the value of the thesis, will also be countered.
» Richard / Via Magazine Comments

I got my PhD in Computer Science so long ago—and so early in its development—that my fellow candidates and I were expected to know all of the engineering practice and all of its logical, linguistic and mathematical theoretical underpinnings. ["Putting the Ph Back in PhD," Summer 2015] I'm still awestruck that at one point in time we did indeed know everything there was to know about the discipline.
» R. Wexelblat / Via Magazine Comments

Dr. Arturo Casadevall, please be prepared for the long road. ["Putting the Ph Back in PhD," Summer 2015] We have been tutoring at the graduate level for a few years and see the narrow attitude in students. I hope this is a turning point in education. May God bless your effort!
» Tutor Sentih / Via Magazine Comments



SMALL DATA

Top stories from the Fall 2015 online issue based on average time spent on page.

7:23 The Dream

5:18 Objects of Affection

4:08 Snip vs. Shred

4:06 Bountiful Baltimore

3:27 Future Perfect/Open Mike

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JOHNS HOPKINS
BLOOMBERG SCHOOL
of PUBLIC HEALTH

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Agenda

DATES + DEADLINES

UNLOCKING AUTISM'S MYSTERIES

Global experts gather to share the latest research avenues.

MANY OF THE WORLD'S LEADING AUTISM researchers will gather in Baltimore **MAY 11 to 14** at the International Meeting for Autism Research (IMFAR). The annual conference lets researchers share new work and explore innovative research avenues into autism's causes, diagnosis and management.

M. Daniele Fallin, PhD, director of the Bloomberg School's Wendy Klag Center for Autism and Developmental Disabilities, and Stewart Mostofsky, MD, an investigator at the Kennedy Krieger Institute, are the scientific program co-chairs. Presentation topics include optogenetics—the use of genetics and light to control neurons—as applied to brain disorders, environmental causes of autism and adults living with autism.

"It's an opportunity for autism researchers across a broad spectrum of disciplines to come together," Fallin says of IMFAR, "yet it's small enough that you can actually spend quality time with leaders in the field—to discuss details of recent papers, hear each other's latest research findings and discuss future projects and ideas." » JACKIE POWDER

PATRICK KIRCHNER; SOURCE ART: ERHUI1979/ISTOCK

AWARENESS
World Autism Awareness Day on APRIL 2 aims to spread awareness and understanding of the disorder and to promote early diagnosis and intervention.

100 PARTY LIKE IT'S 1916

The Bloomberg School Centennial sparks learning, sharing—and fun.

TIME FLIES WHEN YOU'RE CLOSING IN ON 100 YEARS.

Seven months in, the School's Centennial celebration is in full swing, with Lunch-and-Learn public health history talks, Centennial Policy Scholar seminars and department feature months—just to name a few activities.

There's a lot happening, and there's still more to come. Here's a look at some save-the-date events and updates on continuing activities. » JACKIE POWDER

ONE HUNDRED DINNERS

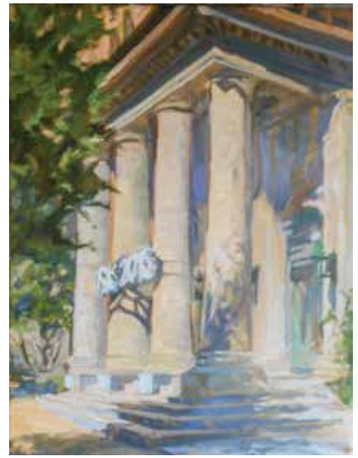
We topped 100 dinners in **DECEMBER 2015**—way ahead of schedule!

Across 50 cities, 24 countries and 6 continents, the Bloomberg School's global community of alumni, students, faculty, staff and friends gathered to share meals, network, honor the School's legacy—and have fun. Pictured above is a dinner from Seoul, South Korea.

We may have hit our target, but that's no reason to stop eating our way around the world—Centennial style. With this kind of momentum, we'll have to rename it the Two Hundred Dinners project. (BTW, there's still time for an Antarctica dinner!)

HOST YOUR OWN DINNER: JHSPH.EDU/100DINNERS

THE ART OF PUBLIC HEALTH
Biostatistics department administrator and artist Debra Moffitt received an invitation to show her Centennial painting (above, middle) in the Mid-Atlantic Plein Air Painters Association juried exhibit.



DEPARTMENT MONTHS

Here are some upcoming highlights academic departments across the School are celebrating in honor of the Centennial:

On **FEBRUARY 8,** International Health and the Johns Hopkins Berman Institute of Bioethics host a joint seminar, "The Ethics of International Research."

Biostatistics holds a **FEBRUARY 10** discussion with Philip E. Bourne, NIH's first permanent associate director for Data Science, and presents the inaugural "Ross-Royall Symposium: From Individuals to Populations" on **FEBRUARY 26**.

On World Malaria Day, **APRIL 25**, Molecular Microbiology and Immunology's Johns Hopkins Malaria Research Institute hosts a symposium featuring researchers from the 10 International Centers of Excellence for Malaria Research—the first gathering of all the centers at Johns Hopkins.

FUTURE OF PUBLIC HEALTH

On **JUNE 9,** find out what's next in public health.

The School will look ahead—way ahead—to priority public health issues and innovative solutions on the horizon. We're gathering a group of top-level leaders, doers and thinkers from diverse fields for an afternoon of informative, provocative and energizing discussions. Details to follow soon.

HAPPY BIRTHDAY!

The Centennial birthday party takes place **JUNE 13**—the School's official birthday.

The School will also deliver birthday gifts to babies born on this day in our East Baltimore community as well as to local residents celebrating their own Centennial birthdays.

FULL SCHEDULE OF EVENTS: JHSPH.EDU/CENTENNIAL

DISMANTLING RACISM

A look at the social determinants of health in Baltimore.

THE TURMOIL IN BALTIMORE triggered by Freddie Gray's death last April has been years in the making.

"That event and the responses of the community highlighted the racial divides that plague Baltimore," says Robert Wm. Blum, MD, PhD, MPH, director of the Johns Hopkins Urban Health Institute.

Stark divisions persist in rates of graduation, incarceration—even heart disease. Life expectancies in some urban Baltimore communities are 20 years shorter than neighborhoods five miles away.

The Institute hopes to shed more light on the city's stark disparities at its 2016 Social Determinants of Health Symposium.

The **APRIL 25** conference will examine structural racism, including inequalities in education, neighborhood services and law enforcement, Blum says.

While the topic is complex, the symposium aims for practical solutions as neighborhood organizations, city agencies and Baltimore's academic community share evidence-based strategies.

"The goal is to help build the city we will all be proud of," Blum says.
» KATE BELZ

DANIEL HERTZBERG

BALTIMORE RACIAL DISPARITIES
BY THE NUMBERS

black **78.2%** / white **91.1%**
High school graduation rates (2013)

black **12.5** / white **6.8**
Infant mortality rate, per 1,000 live births (2013)

black **38.1%** / white **11.3%**
Childhood asthma, ever diagnosed (2012)

black **18.5%** / white **7.4%**
Diabetes, ever diagnosed (2012)

black **30.5** / white **6.3**
HIV/AIDS mortality rate per 100,000 residents (2012)

black **49.8** / white **6.9**
Homicide mortality per 100,000 residents (2012)

black **38.4%** / white **18.8%**
Obesity (2012)

SOURCES: BALTIMORE CITY HEALTH DISPARITIES REPORT CARD; MARYLAND PUBLIC SCHOOLS; MARYLAND VITAL STATISTICS

TRENDING
THE WORD ON WOLFE STREET

FOLLOW

It's not "immutable fate that 32,000 Americans die from firearms each year," *New York Times* columnist Nicholas Kristof wrote **JANUARY 7**. Kristof argued for an evidence-based public health approach to reduce U.S. gun deaths. His ammo: research by Daniel W. Webster and other Bloomberg School faculty.

FOLLOW THIS STORY: BIT.LY/JHSPHGUNS

LISTEN

A slow-moving disaster like Ethiopia's unfolding famine means no immediate, dramatic TV images, no screaming headlines. This makes it really tough for aid groups to raise the money needed. The tragedy, Tom Kirsch told NPR's *Morning Edition* on **JANUARY 1**, is that early intervention could prevent widespread death.

STREAM IT: BIT.LY/JHSPHETHIOPIA

READ

"POLICIES BARRING PARTICIPATION IN INTERROGATION AND FORCE-FEEDING ARE NECESSARY TO ENABLE HEALTH PROFESSIONALS TO FULFILL ETHICAL OBLIGATIONS."

The Department of Defense should prohibit its health professionals from being part of interrogations or force-feeding detainees on hunger strikes, explained Leonard Rubenstein in a **JANUARY 5** Reuters article. Such a policy would protect the rights of military health professionals and detainees, he said.

READ IT: BIT.LY/JHSPHDETAINEES

SHARE THIS
MY NAGGING QUESTION

HEENA BRAHMBHATT
POPULATION, FAMILY AND REPRODUCTIVE HEALTH
"In sub-Saharan Africa, we struggle with how to reduce the risk of HIV transmission to women, and from mothers to children. Our challenge is testing women in time and continuing antiretroviral therapy during breastfeeding."

FENGYI WAN
BIOCHEMISTRY AND MOLECULAR BIOLOGY
"How do bacterial infections in the colon lead to inflammation and potentially colorectal cancer? It's a very complicated system, and I want to dissect key interactions between pathogen and host cell."

EVENTS WATCH
BREAKFAST AT BAETJER'S

3 QUESTIONS FOR PHILIP JORDAN, PHD

ON **MARCH 25** PHIL JORDAN'S LAB hosts Breakfast at Baetjer's, a monthly colloquium where Biochemistry and Molecular Biology students and faculty share projects in progress. After launching his lab three years ago, Jordan won a 2015–16 Johns Hopkins Discovery Award for his work on cancer and alternative ways to repair DNA.
» INTERVIEW BY SALMA WARSHANNA-SPARKLIN

What is your lab's research focus?
Deciphering mechanisms that help to maintain the genome throughout development and to accurately pass on the genome to the next generation.

Which mechanisms in particular?
We study (1) structural maintenance of chromosomes (SMC) protein complexes and (2) cell cycle kinases, which are proteins that ensure accurate DNA repair and chromosome segregation.

How do they impact public health?
If these proteins aren't working properly, people may face mental and physical developmental defects, infertility and cancer. That makes understanding how the proteins function and mutations arise all the more critical.

MORE INFO: JHSPH.EDU/PHILJORDANLAB

CHRIS MYERS

Briefings

EVIDENCE
+
BREAKTHROUGHS

NEW HORIZONS
A view of of Inner Harbor and the Baltimore skyline looking north, captured by Bloomberg School student Ruchita Pillai.

RUCHITA PILLAI

FROM TRAGEDY, A RENEWED COMMITMENT

Engaging Baltimore brings the tools and actions of public health to help the city.

BY JACKIE POWDER

THE DEATH OF 25-YEAR-OLD FREDDIE GRAY LAST spring cast a harsh light on Baltimore's staggering inequities.

The aftermath has been a time of soul-searching for those who call the city home—including the Bloomberg School.

Dean Michael J. Klag, MD, MPH '87, immediately challenged the School to do more. To that end, students, staff, faculty and community members gathered in May to discuss challenges and opportunities for public health in Baltimore.

Students resurrected the group SPARC, or Students for a Positive Academic Partnership with the East Baltimore Community, dedicated, in part, to addressing injustices in health. And the School partnered with the School of Nursing on a major expansion of the Student Outreach Resource Center (SOURCE) to involve more student, staff and faculty volunteers in community partnerships. In addition, the School launched Engaging Baltimore, an institutionwide effort to improve the city's health and well-being.

"Every part of the School is stepping up to strengthen its commitment to the city," says Joshua M. Sharfstein, MD, associate dean for Public Health Practice and Training. "There is a real sense of mission when it comes to Baltimore."

SNAPSHOT: ENGAGING BALTIMORE

» **BIOSTATISTICS will develop two projects to introduce city high school and university students to education and career opportunities in statistics.**

» **BIOCHEMISTRY AND MOLECULAR BIOLOGY will design sex and reproductive health education courses for two youth-focused city groups.**

» **The OFFICE OF THE ADMINISTRATIVE DEAN will run workshops on information technology and career paths.**

» **MENTAL HEALTH will offer summer training programs for students, parents and community leaders as part of a larger effort to foster a more positive environment in city schools.**

» **The chairs of HEALTH, BEHAVIOR AND SOCIETY and HEALTH POLICY AND MANAGEMENT will award faculty grants—based on project proposals—for new community-based initiatives.**

» **ENVIRONMENTAL HEALTH SCIENCES will expand its "Day at the Market" healthy eating program to also help residents sign up for health insurance.**

CENTENNIAL CONNECTION: BALTIMORE

IN 1968, Johns Hopkins University and WJZ-TV jointly produced a local television program to encourage Baltimore residents to unite and solve pressing social problems. School faculty members Matthew Tayback and Cornelius Krusé (above) appeared in the first episode, "Rats, Rats? Rats!"

CREATE AND LEAD

Sommer Scholars have a knack—and a need—for founding NGOs.

BY VALERIE CONNERS

"BOLDNESS HAS MAGIC."

That, says Raj Panjabi, sums up the single most important leadership lesson he learned at the Bloomberg School. Panjabi, MD, MPH '06, is founder and CEO of Last Mile Health, a Liberia-based NGO with the mission to save lives in the world's most remote villages by recruiting and training community health workers.

"The courage to pursue boldness," he adds, "is a moral choice."

Panjabi credits the Bloomberg School's Sommer Scholars Program with bolstering his ability to found his NGO.

The Sommer Scholars Program, which awards full tuition and a stipend to selected students, provides unique leadership enrichment. Since 2005, nearly 250 scholars have graduated from the program.

"A common thread among many Sommer Scholars is an entrepreneurial spirit; they've been selected for having demonstrated leadership qualities," says program faculty director Lainie Rutkow, PhD '09, MPH '05, JD, herself a member of the first class of Sommer Scholars. "They saw a problem, saw it wasn't being addressed in a way they thought was effective and decided to do something about it."

Case in point: former Sommer Scholar Lynn Huynh, DrPH '12, MPH/MBA '07. In 2002, she co-founded VietHope, an NGO providing education access to disadvantaged students in Vietnam. Huynh recognized the empowering role that education played in her life and strove to bring similar opportunities to children in Vietnam.

After launching the NGO, Huynh says, the co-founders faced their greatest challenge: keeping it sustainable. She attributes VietHope's success to the dedication of the group of friends who created it.

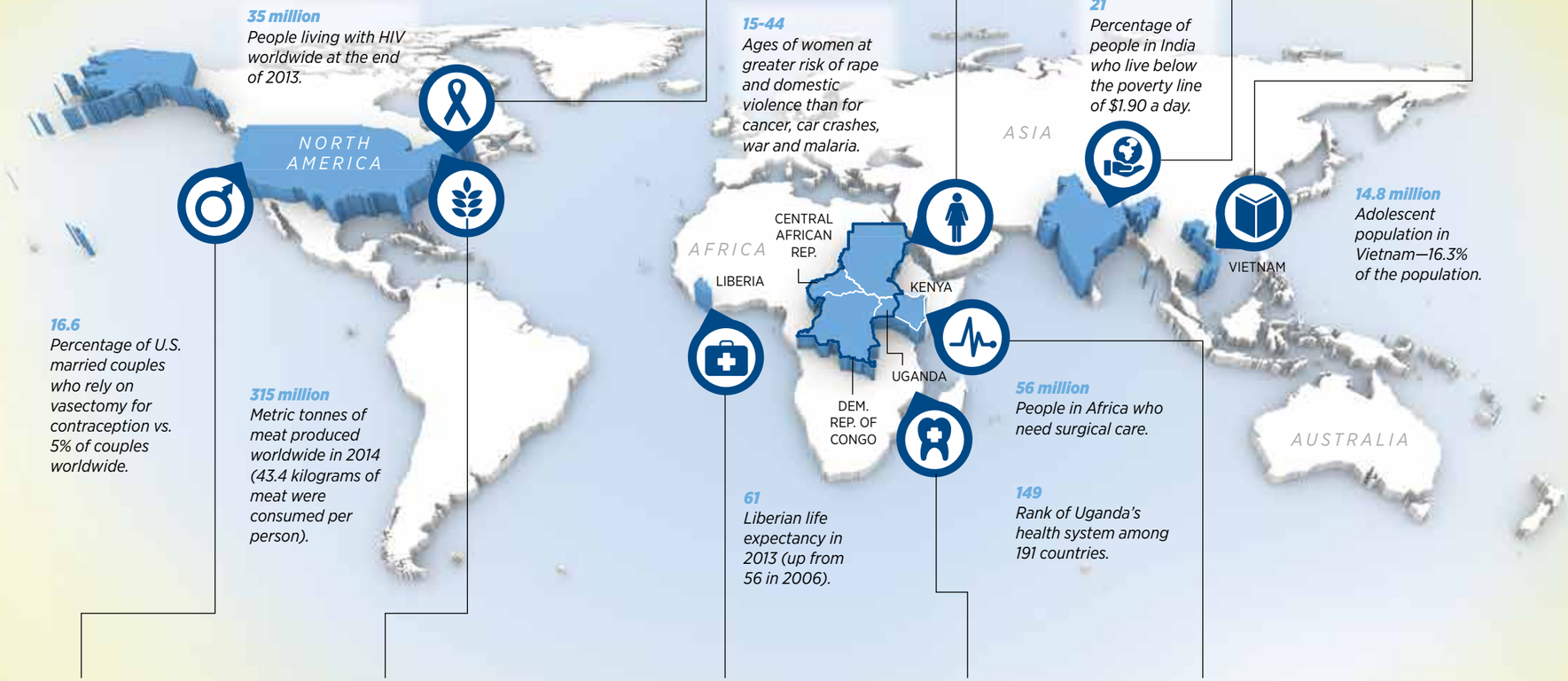
"For anyone starting a new nonprofit, consider whether you have a good group of core individuals who will be there in the next five to 10 years," she says. "That becomes more important than fundraising."

Huynh's experience in the leadership program inspired her to develop an enrichment program, the Youth Development Summit.

"It's a domino effect," says Huynh. "You're not teaching a single skill set; you're teaching something to sustain people for the remainder of their lives."

Starting Up

Sommer Scholars are creating startups that have impact all over the world. Here's a roundup of their work and where they're doing it.



FACE AIDS

Katie Bollbach, MPH '13
Boston, MA
Mobilizes high school and college students to fight to end AIDS

Women in War Program, Harvard Humanitarian Initiative

Jocelyn Kelly, PhD student
Cambridge, MA
Investigates and addresses women's needs in conflict settings such as South Sudan, Uganda and Democratic Republic of Congo

The HEAL Foundation

Jordan Ash, MPH '10
Andhra Pradesh, India
Works in India's slums, empowering underserved residents to overcome obstacles

VietHope

Lynn Huynh, MPH '07
Ho Chi Minh City, Vietnam
Provides access to education for disadvantaged students in Vietnam

Male Contraceptive Coalition

Kirsten Thompson, MPH '08
San Francisco, CA
Works to help speed the development of new contraceptives for men

New Harvest

Jason Matheny, PhD '14
New York, NY
Kickstarting a post-animal bioeconomy where animal products are harvested from cell cultures

Last Mile Health

Raj Panjabi, MPH '06
Boston, MA/Monrovia, Liberia
Partnering with Liberia's Ministry of Health to save lives in the most remote villages

Bridge to Health

Bill Cherniak, MPH '16
Toronto, Canada/Rural Uganda
Provides medical and dental care while building sustainable health care solutions

RJW Foundation

Awori Hayanga, MPH '08
Eldoret, Kenya
Addresses disparities in the provision of surgical/critical health care in East Africa and beyond

SOURCES: UNFAO, WORLD BANK, WHO, SURGEONS OVERSEAS

KARBEL MULTIMEDIA

CHRIS HARTLOVE

ONE HOT ISSUE

How does climate change impact the global food system? Cindy Parker aims to find out.

INTERVIEW BY JACKIE POWDER

THE TOPIC OF CLIMATE CHANGE FREQUENTLY CONJURES IMAGES OF melting glaciers, thick smog and super El Niños.

Cindy Parker, MD, is more likely to think about how climate change can disrupt myriad aspects of the global food system. Potential scenarios include destroyed crops and fisheries, animal deaths and food transportation failures.

As co-director of the Bloomberg School's Program on Global Sustainability and Health, she's leading an ambitious research study to better understand the consequences of climate change on the food system—one of 23 projects to have received a Johns Hopkins Discovery Award to fund work across the University.

The multidisciplinary effort is "absolutely needed in order to solve these big global environmental problems," says Parker.

How do current models looking at the impacts of climate change on the global food system fall short?
They are very limited in scope, mainly looking at temperature and precipitation.

There *are* some estimates of how much climate change will affect particular crops, but most of those predictions are based on lab studies or highly controlled field studies. The number bandied about is for every 1-degree Celsius increase in global average surface temperature, we can expect a 10 percent decrease in crop yield.

Ten percent doesn't sound devastating, but when you factor in 2 billion more people between now and 2050 and consider that we're looking at a best-case scenario of at least a 2-degree Celsius increase in global average surface temperature, it becomes a lot more concerning.

There's a need to look at the entire food system, and no one is putting it all together. Not a lot is known about food and climate change interrelationships—how food and water scarcity, for example, can contribute to political instability, migration and violent conflicts.

What's the backstory for taking on this monster of a topic?
I started talking to modelers at Homewood about two years ago and over time generated some interest [among them]. Modeling is their thing, and the complex relationship between climate change and the global food system is a really big, messy problem with potentially a bazillion different variables. They were intrigued and interested in contributing to this effort to illuminate and estimate these relationships.

> "IT WILL BE REALLY USEFUL TO TAKE A RANGE OF CLIMATE PROJECTIONS AND MATCH THOSE UP WITH A RANGE OF FOOD SUPPLY PROJECTIONS. … IT'S WORK THAT COULD POSSIBLY HAVE SHOCK VALUE FOR POLICYMAKERS TO … [LIMIT] GREENHOUSE GASES."

Adequate planning and precautions for avoiding the most serious effects—malnutrition, hunger, famine—cannot occur without reliable and regionally detailed projections of how and by how much climate change could affect the global food system.

The project brings together faculty from across Hopkins—experts in migration and conflict, food and energy technology, earth sciences, the social sciences, engineering and many others.

In what type of scenario might a mathematical model be applied to accurately predict food system disruption?
It will be really useful to take a range of climate projections and match those up with a range of food supply projections and be able to tell policymakers, "If climate change follows this particular trajectory, it could result in an X-percent decrease in the global food supply, and some key areas will be hit much harder than others." [Our projections] also might show that a region is excessively dependent for its food supply on a particular place that is vulnerable to climate change.

It's work that could possibly have shock value for policymakers to get them to take steps to reduce harm by [limiting] greenhouse gases enough to get the climate stabilized, by helping local communities become more resilient or by managing precious resources such as forests and watersheds for long-term sustainability.

You've chosen Ethiopia as a proof-of-concept location to test a downscaled version of the model prototype. What do you hope to learn?
It's a good place to look at the country's experience with extreme weather and a lack of resources. For example, there's another severe drought right now that's displacing farmers and killing cattle in parts of Ethiopia.

Moreover, this is a place that relies on food aid brought into the country, but fossil fuels are a finite resource and susceptible to short-term price shocks and longer-term scarcity. When this is combined with more extreme weather disrupting food supplies around the world and transportation networks, just getting that food to places in need could become a lot more challenging. This is something we want to investigate in Ethiopia to illustrate the insights that can be gained from the methodology.

The School of Arts and Sciences' Ben Zaitchik, a co-principal investigator on the study, has used remote sensing and other data to analyze the impact of downscaled climate scenarios in Ethiopia, so we have his data, and he has a lot of contacts and experience on the ground.

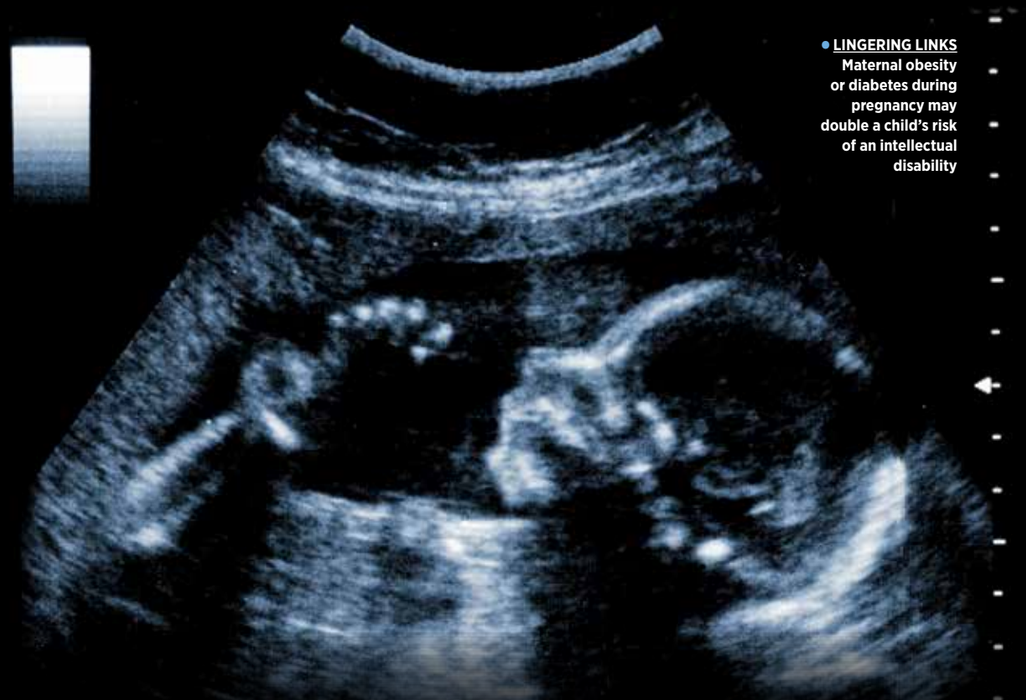
The Discovery Award is intended as a launching pad to secure future external funding. What are your next steps?
We're putting together a workshop for the spring to bring in people from around the world who we think are key to helping us identify and better define food system and climate change relationships. We hope to establish relationships with other research centers to collaborate on building and implementing a full version of the modeling methodology.

The increased attention to climate change and the connections between climate change and food and water has made it more likely that a project like this could get funding. The National Science Foundation has a new initiative on the nexus of food, energy and water that could be a good fit for our project, and the Department of Defense could be interested in using this kind of information to help understand and prevent future conflict.

100 CENTENNIAL CONNECTION: CLIMATE CHANGE

GERALD TAPP

IN 1951, DOUGLAS H.K. LEE offered a course in physiological climatology that focused on climate's effects on "man's well-being, and particularly the implication of climatic factors for his development of those regions of the world—tropic, arctic, high altitude—in which the climatic stress is unusual or marked."



LINGERING LINKS
Maternal obesity or diabetes during pregnancy may double a child's risk of an intellectual disability

KICKSTAND/ISTOCK

UNINTENDED LEGACY

A kid's autism risk skyrockets when mom is obese and diabetic.

BY ALEXANDER GELFAND

FOR YEARS, RESEARCHERS HAVE KNOWN THAT maternal obesity and diabetes can lead to a long list of complications for mother and baby during pregnancy and beyond.

But a new study co-led by Xiaobin Wang, MD, ScD '91, MPH, and M. Daniele Fallin, PhD, suggests that list should include autism spectrum disorder (ASD) and intellectual disability.

In a *Pediatrics* paper published in January, the investigators show that women who are either obese or diabetic are almost twice as likely to bear a child who will be diagnosed with ASD or an intellectual disability. When obesity and diabetes go hand in hand, those risks skyrocket: Women with both conditions are four times as likely to have a child on the spectrum and nearly 10 times more likely to have one who is both autistic and intellectually disabled.

This study of 2,734 mother-child pairs is the first to sort out the independent and joint contributions that maternal obesity and diabetes make to ASD and other developmental disorders, says Wang, the Zanvyl Krieger Professor in Child Health and director of the Center on the Early Life Origins of Disease.

Why maternal obesity and diabetes should be so strongly associated with ASD and intellectual disability is not entirely apparent. But lead author Mengying Li, a PhD student in Population, Family and Reproductive Health, notes that other studies have linked maternal obesity to low levels of micronutrients such as folate in women, and also to a maternal inflammatory response that may impact the developing fetal brain.

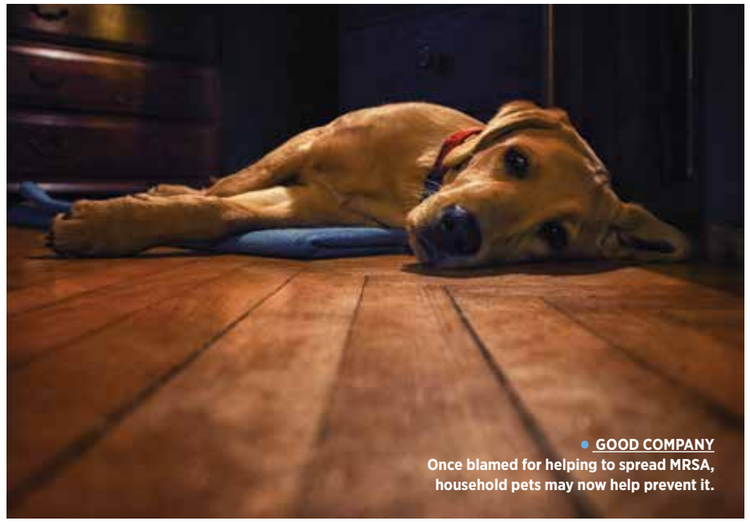
The takeaway is clear, says Fallin, director of the Wendy Klag Center for Autism & Developmental Disabilities and chair of Mental Health. Identifying and managing obesity and diabetes is important for women—and their future offspring.

"We know that obesity and diabetes aren't good for mothers' own health," says Wang. "Now we have further evidence that these conditions also impact the long-term neural development of their children."

PET PROTECTION

Furry friends might be immunity boosters against MRSA.

BY SALMA WARSHANNA-SPARKLIN



GOOD COMPANY
Once blamed for helping to spread MRSA, household pets may now help prevent it.

OWNING A PET MEANS sharing everything from beds to bacteria. Don't grimace: "The human immune system could actually benefit," says veterinarian Meghan Davis, PhD '12, MPH '08, one of the few scientists in the U.S. studying this give-and-take, particularly with regard to methicillin-resistant *Staphylococcus aureus* (MRSA).

Community-associated MRSA spreads in gyms, schools and other places where people congregate, driving the rising epidemic of human-to-human transmission in the U.S. for the last 20 years. Researchers have blamed furry friends for helping MRSA colonize and infect humans.

"While pets can be MRSA vectors, they often get it from people first," says Davis, assistant professor in Environmental Health Sciences.

Her latest findings from the Pets and Environmental Transmission of Staphylococci (PETS) study suggest that over time, pets contribute microbial diversity to the household, and this actually benefits owners. As to why, Davis isn't sure yet. "So far, research in both people and animals appears to support that higher diversity is good," she explains. "Lower diversity systems are more fragile, more likely to succumb if threatened by a disruption like a pathogen."

In fact, having two or more pets was associated with a protective effect against MRSA colonization, her research shows.

Based on the data, household surfaces harbored more MRSA than family pets and posed a bigger transmission threat. Among pet-owning MRSA patients, only 15 percent of them had MRSA-positive animals at home. A whopping 70 percent had the bacterium on household surfaces.

Davis's animal-loving bottom line: "We should definitely keep our pets—and keep them healthy—so they can contribute to the good health and well-being of our families."

WELL VETTED

AS AN ENVIRONMENTAL MICROBIOLOGIST, Meghan Davis studies the interface of bacteria and hosts to reduce disease in humans and animals. In between research, lectures, grading and conferences, she also mentors fellow veterinarians who are Bloomberg School MPH students. Davis—whose former students work for the Epidemic Intelligence Service at the CDC and the Center for Veterinary Medicine at the FDA—is enthused about the class of 2016 vets: "We've got a bumper crop this year!"
» Salma Warshanna-Sparklin

» **Caitlin Cotter**, Wisconsin, U.S.
Interests: Emerging infectious diseases and tropical medicine

» **Kathryn Dalton**, Pennsylvania, U.S.
Interests: Food safety and infectious disease management

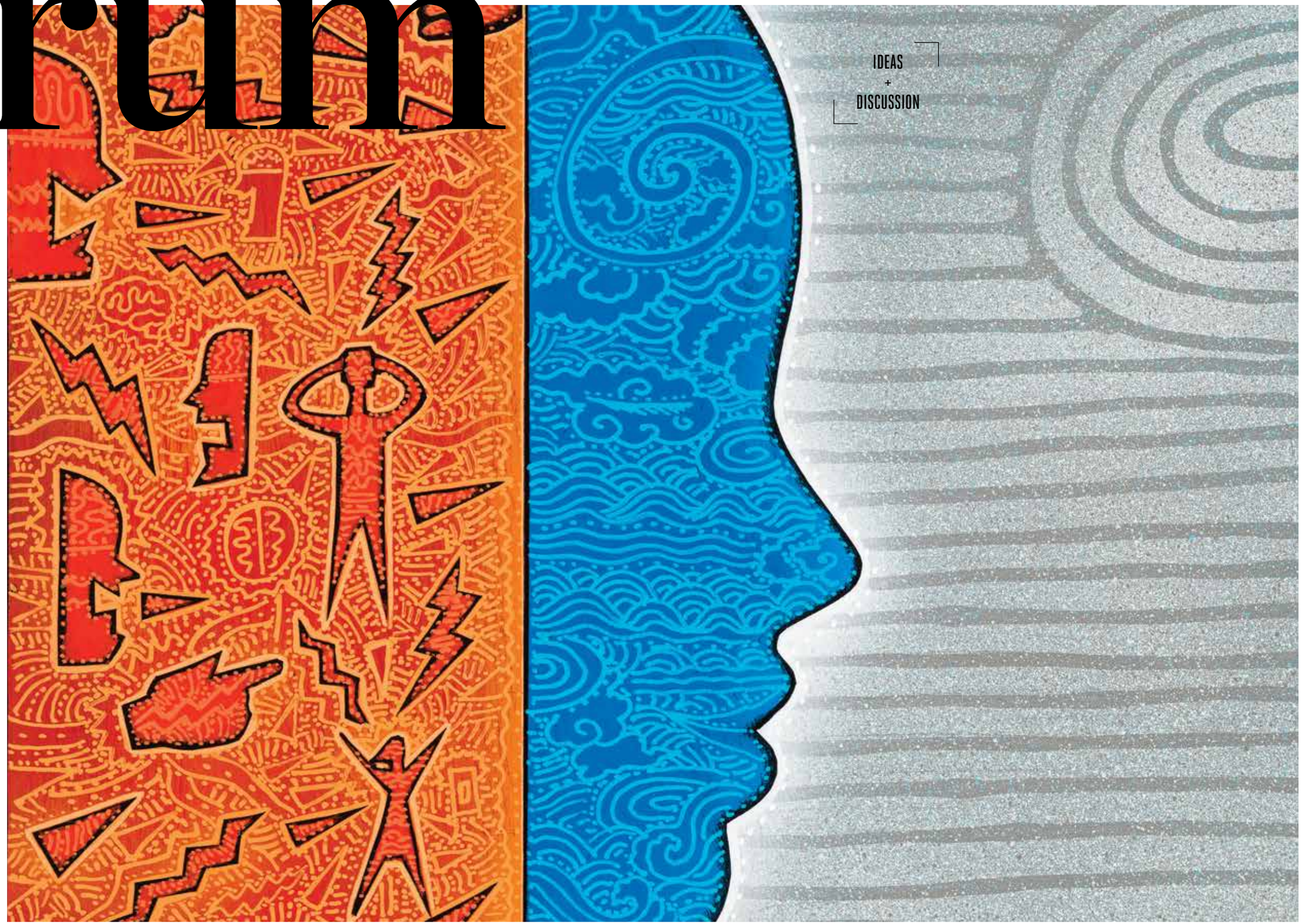
» **Camille Effler**, New Mexico, U.S.
Interests: Food insecurity, water scarcity and sustainable agriculture

» **Matthew Ferreira**, New Jersey, U.S.
Interests: Relationships between human, animal and environmental health

» **Ricardo Millan**, Bogotá, Colombia
Interests: One Health, policy and infectious diseases

PHOTO: GOJAI/ISTOCK; ILLUSTRATION: MERIEL JANE WAISSMAN/ISTOCK

Forum



JOEL NAKAMURA

RETHINKING

THE NEW SCIENCE OF THRIVING

Our well-being—individually and as a society—depends on mindfulness.

BY CHRISTINA BETHELL

IN THE EARLY 1970S, MY grandmother had a disagreement with the Beatles.

When she heard "All You Need is Love" play on the radio, she would reply, "All you need is inside of you."

When I was a PhD student in the early 1990s, these messages bounced around in my mind along with my epidemiology and econometrics lessons. It was then that I began amassing evidence that led me to two conclusions: First, public health, medicine and public policy needed to address long-neglected social and emotional determinants of health; and second, we could not medicate our way to health. Rather, our relationships and what's inside our hearts and minds matter most to health and have

everything to do with love. My grandmother and the Fab Four were both right.

The realization that our relationships and experiences in childhood profoundly shape our lives changed my career path. I became determined to put social and emotional well-being on the public health policy agenda.

One of the great touchstones for me is "the largest public health study you never heard of." In 1996, the CDC and Kaiser Permanente began a long-term study illuminating the consequences of exposure to Adverse Childhood Experiences. ACEs primarily consist of childhood emotional or physical neglect, abuse or household dysfunctions such as alcohol abuse. Fifty publications to date on the study have shown the more ACEs people have, the more likely they are to have chronic physical or mental illness, die early and have children with ACEs.

Without awareness and healing, the trauma and stress from ACEs can accumulate and perpetuate. This only makes sense: Ours is a social brain, and neurons that fire together, wire together. Moreover, ACEs can impact not only early brain development but also lifelong health.

In a December 2014 *Health Affairs* study, my colleagues and I estimated that half of all U.S. children have ACEs. Nearly a quarter have two or more. As with adult studies, our research found ACEs were linked with higher rates of health problems among kids and youth, including asthma, ADHD, depression, anxiety, obesity and autism spectrum disorders. We also found alarming negative effects on school engagement.

The good news is resilience—self-regulation of emotions, optimism and hope—can trump ACEs. (In fact, regardless of ACE status, children lacking resilience fare worse.) Children with ACEs who also have resilience had one-fifth the odds of having mental or emotional problems like ADHD or depression.

Luckily, a new science of thriving is emerging that suggests that resilience specifically, and well-being overall, can be learned. Mindfulness plays a central role.

As acclaimed Harvard mindfulness researcher Ellen Langer says, "Wherever the mind is, the body will follow." Mindfulness is a mental state achieved by focusing one's awareness on the present moment. No small feat.

That's why it is called a "practice." Practicing mindfulness helps unlock, integrate and heal embedded stress, interrupt harmful reactions to daily stress, open possibilities to rewire the brain and begin to heal the heart. Based on neuroscience research dating back to the early 1970s, mindfulness meditation is the best-researched method for developing mindfulness. Even after a short while, mindfulness meditation has been shown to engage a cascade of beneficial neurological, physical and mental benefits.

Both the self-reflection and body awareness learned by practicing mindfulness seem to engage what might be called "the presence effect," which is at the heart of interrupting our autopilot and retraining our nervous system.

Simply put, our well-being—as individuals and as a society—depends on mindfulness. You wouldn't be the first to raise an eyebrow at that statement, but I'm no advocate of woo-woo pseudoscience. The data are strong and growing. Adding to the neuroscience findings, epigenetic research now demonstrates the role of both negative and positive emotions on gene expression. Nobel laureate Elizabeth Blackburn and colleagues in 2011 found that mindfulness meditation may slow the rate of cellular aging and extend life expectancy. The new science of thriving and the role of mindfulness show us the possibilities to flourish despite adversity.

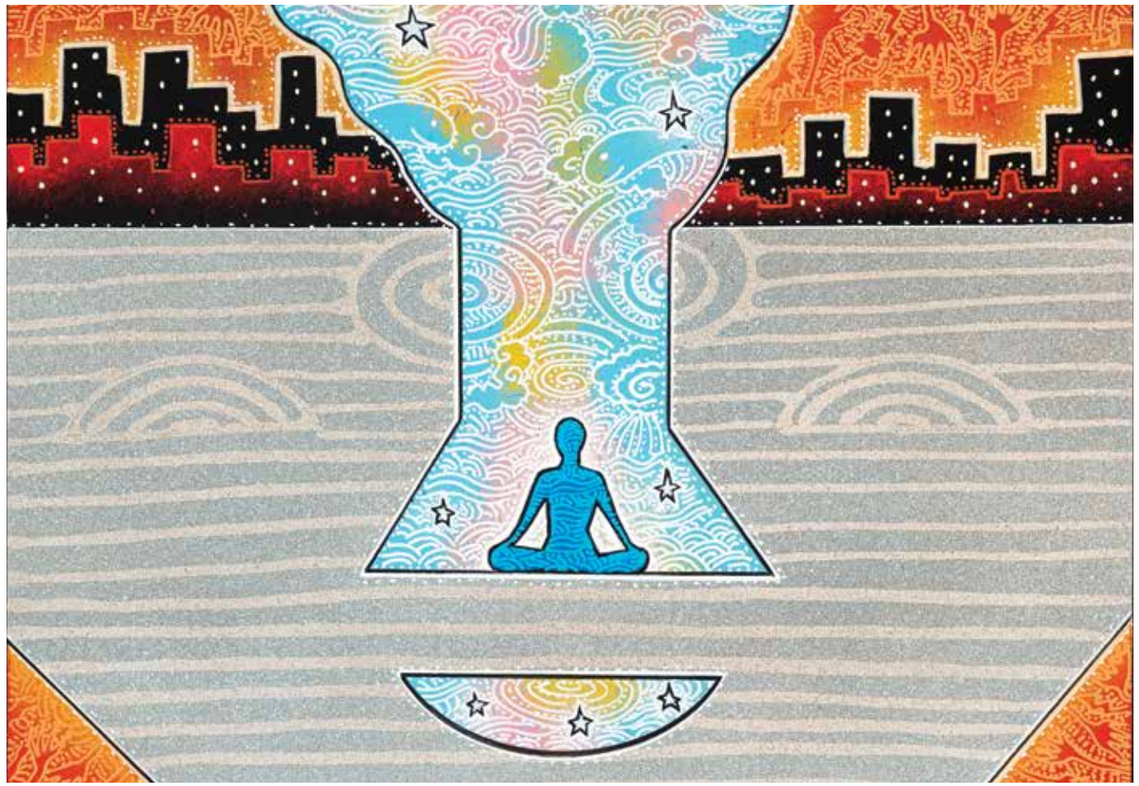
This brings me back again to my grandmother's admonition that "all you need is inside of you." My evidence-based, public-health-oriented take on her sage advice is that we need to really put the "we" in wellness. We need public health approaches and policies that prioritize fostering safe, stable and nurturing relationships in early life, prevent ACEs and promote resilience, mindfulness and positive health in populations.

For those of us already carrying ACEs, mindfulness can help us reduce stress reactivity and harmful emotion-driven health behaviors like "self-medicating" with alcohol, drugs or food. Mindfulness—and addressing our own ACEs—is fundamental for all who are interested in recognizing and helping children, families, adults and communities heal from trauma and interrupt the cycle and effects of toxic and chronic stress. This is so important that we distill our mindful mission this way: *Your Being, Their Well-Being*.

Globally, mindfulness is gaining traction. An October 2015 British parliamentary report called "Mindful Nation UK" advocates mindfulness across health, education, workplaces and justice. Likewise, the international Organisation for Economic Co-operation and Development has launched an initiative to advance the very social and emotional skills—such as resilience, optimism, perseverance and self-worth—that mindfulness supports.

Public health can increase its impact by recognizing the importance of ACEs and making use of the benefits of mindfulness and resilience. While still focusing on the big picture, public health needs to build mindfulness awareness and skills in individuals, families and organizations. We need to infuse all of our interventions with these mindful, evidence-based approaches. In the new science of thriving, public health has a powerful tool to improve the well-being of populations. Let's use it.

» *Christina Bethell, PhD, MPH, MBA, is a professor in Population, Family and Reproductive Health and director of the Child and Adolescent Health Measurement Initiative.*



JOEL NAKAMURA

WHEN WE WERE YOUNG

2 IN 3
Adults who had 1 or more adverse childhood experiences (ACEs)

1.7
Times more likely that adults are to experience heart disease if exposed to emotional abuse as a child

65
Percentage of adults whose alcohol abuse is statistically attributable to ACEs

› 75
Percentage of U.S. children with emotional/mental/behavioral problems who were exposed to ACEs

2 OF 3
Children in Baltimore estimated to have ACEs

124
Billions of dollars of lifetime costs estimated to be due to child maltreatment like ACEs

SOURCES: CDC; NIH; FELITTI AND ANDA, AJPM 1997; KIMBROUGH, J CLIN PSYCHOL. 2010; AND BETHELL, 2014.

OPEN SOURCE

HOW CAN PUBLIC HEALTH STOP TERRORISM?

JOIN THE CONVERSATION: MAGAZINE.JHSPH.EDU

MY PERSPECTIVE ON TERRORISM COMES FROM HAVING SERVED AS A SENIOR ADVISER ON PSYCHOLOGICAL RESEARCH TO the Office of His Highness the Amir of Kuwait after the liberation of Kuwait; as a consultant to the NYPD from 2001 to 2003; and as a consultant in Oklahoma City after the federal building bombing. I saw terrorism used as a weapon in asymmetrical warfare and witnessed its effects on individuals, organizations and communities. I also saw that community cohesion and a resilient medical/psychological infrastructure foster strength and resilience. A sense of belonging and identity, as well as feeling part of something greater than oneself, is empowering. It not only fosters resilience in the wake of terrorism but also, I believe, serves to prevent it. By providing health, safety and education, and by working for justice for all, [we can make] terrorism become obsolete. Public Health is uniquely positioned to lead in these initiatives.

» George S. Everly Jr., PhD, is on the faculty at the Johns Hopkins School of Medicine and the Bloomberg School.

PUBLIC HEALTH CANNOT NECESSARILY stop acts of terrorism. Fundamentally, terrorism is a mental health assault on populations; its ultimate intent, from terrorists' standpoint, is to instill wide-scale fear and societal capitulation in the face of that dread. However, public health can play a vital role in identifying and implementing strategies to enhance communities' resilience to terrorism's psychosocial impacts. Psychological First Aid (PFA), for instance, is a public health-oriented intervention to enhance community resilience in the face of terrorism. PFA—designed for use by nonmental health practitioners—can help identify and triage those survivors at particular risk of adverse mental and behavioral outcomes. Research strongly suggests that terrorism preparedness trainings for public health and health care responders can and must enhance these workers' willingness to respond to terrorism through efficacy-focused training to bolster their resilience as a complement to knowledge- and skills-based preparedness training.

» Daniel Barnett, MD, MPH, is an associate professor in Environmental Health Sciences at the Bloomberg School.

PUBLIC HEALTH SHOULD WORK WITH others to better understand the epidemiology behind violent extremism. By focusing on the root causes and working to address them, public health can assist humanity to mitigate the prevalence of terrorist events. In addition, each community must also have in place a comprehensive public health system that has the capacity for early recognition of a new health threat in community and the ability to effectively respond to it. On a global basis, public health diplomacy, which works to mitigate the social conditions that allow violent extremism to thrive, must also be used.

» Georges C. Benjamin, MD, is the executive director of the American Public Health Association.

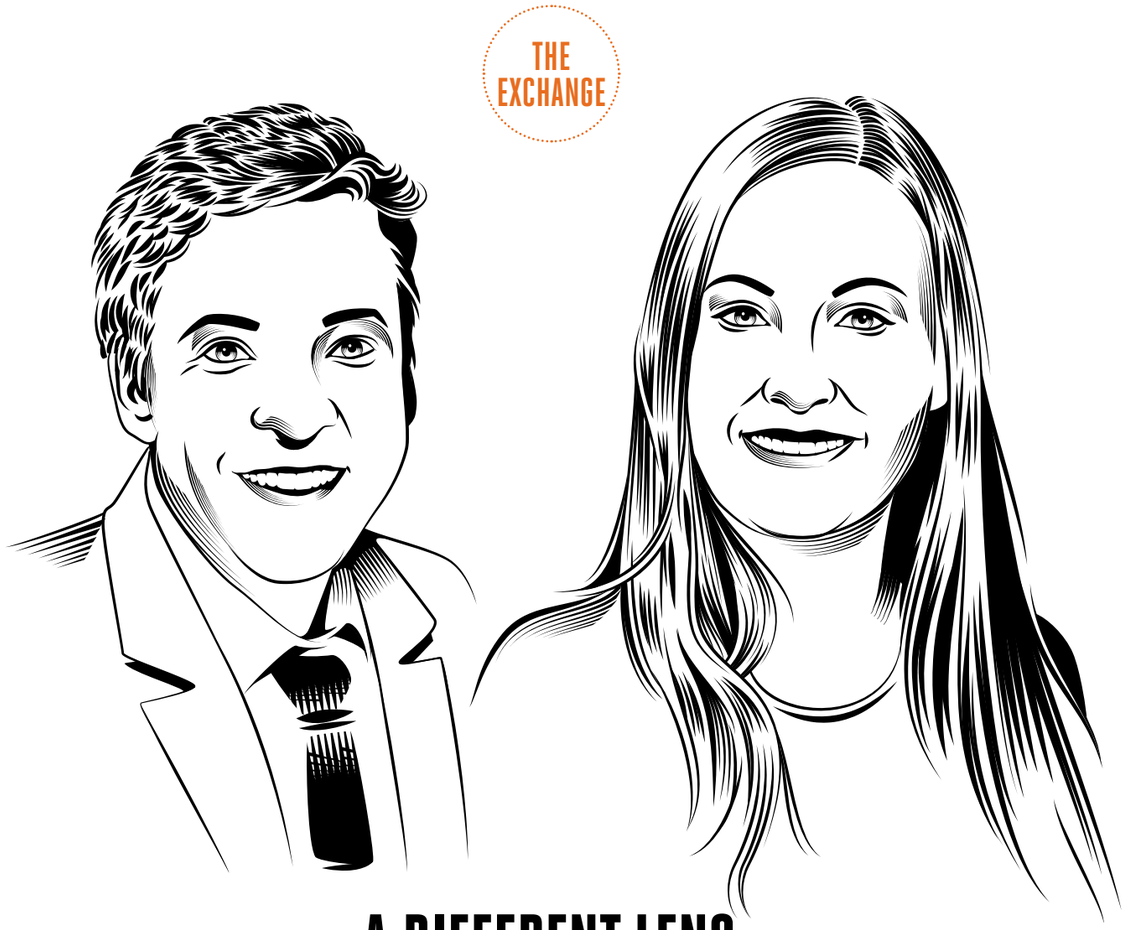
THERE ARE MYRIAD REASONS A person may be driven to commit an act of terror: lack of basic human rights, discrimination, social injustice, poor socioeconomic conditions, mental health and behavioral issues, or a scarcity of food, water and housing. The resulting dehumanization has a significant impact on mental well-being, leaving a person vulnerable to extremist ideology. Investing in mental health services and resources is one way to intervene. If mental health providers are able to diagnose and treat behavioral disorders, it can mitigate the potential for destructive behavior and preempt violence.

» Arshia Wajid, MBA, MPH, is the founder and president of American Muslim Health Professionals.

THE ANSWER TO THIS QUESTION IS: PUBLIC HEALTH CANNOT STOP TERRORISM. MY experience includes over a decade of service to first responders post-9/11. As participants in the U.S. public health system, our most significant contribution may be emphasizing the truth about our limits and capacity. In addition, the media has impeded any positive movement made by our efforts by distorting the truth and promulgating fear, the core of terrorism. Operationalizing "lessons learned," fostering resilience in this "new normal" and accurate information sharing may be the best we can do.

» Cherie Castellano, AAETS, LPC, is the program director of Cop 2 Cop, Rutgers University Behavioral Health Care, and co-author of Psychological Counterterrorism & World War IV.

THE EXCHANGE



A DIFFERENT LENS

Drug safety expert G. Caleb Alexander and Clinton Health Matters Initiative CEO Rain Henderson focus on solutions to America's prescription opioid epidemic.

YANN LEGENDRE

THE STATISTIC IS AS STARK AS IT IS FRIGHTENING. FORTY-FOUR Americans die each day from prescription opioids. The Clinton Health Matters Initiative (CHMI), a Clinton Foundation initiative, has made finding solutions to the prescription opioid epidemic a priority, as have the Bloomberg School's Center for Drug Safety and Effectiveness (CDSE) and the Center for Injury Research and Policy. Just before leading a November 2015 town hall at the School and releasing an expert report with more than 40 evidence-based recommendations for action, Rain Henderson, CEO of CHMI, and G. Caleb Alexander, CDSE co-director, discussed the epidemic's genesis and strategies to reduce opioid-related injuries and deaths.

CA: There are so many challenges to optimizing the health of our country. Why did CHMI take on prescription opioids as an issue to tackle?

RH: We know that substance misuse is a huge and growing epidemic, and we see it just undercutting people's economic prosperity, their mental health and well-being, and the ability for families to thrive. So we were watching the trends and seeing the data, and then simultaneously President Clinton knew three young people (whom he'd known since they were very small) who suffered from accidental overdose. It compelled us to look much more closely at the issue.

CA: Naloxone is so important to reversing overdoses that have actually happened, and it really can save lives. On the other hand, once someone is receiving or requiring Naloxone, to some degree the horse is out of the barn. How does CHMI think about primary prevention and about preventing new cases of opioid addiction?

RH: We have a focus on Naloxone because we think it's important in terms of reducing the number of immediate overdoses, but we know we have to move much further up the prevention pipeline.

You can't do anything within a perfect, isolated silo. That's why we work at both a national and local level in communities where we have a focus on supporting systemic health improvement. We also work with partners focused on curricula and programs in K–12, college, and what's happening with young people who are transitioning out of the home and are going into college, the workplace or perhaps the military. This goes beyond just substance use. It is looking at other, related issues when young people no longer have their peer groups, or they're making a stressful transition.

CA: There are millions of patients living in pain, some of whom raise concerns that efforts to reduce our over-reliance on prescription opioids may have a "chilling effect" on the quality of care that they receive.

RH: The best way to ensure that there's not an oversimplification of these issues is to continue to include these stakeholders in the conversations and in the planning of additonal forums and the rollout of these recommendations. I think we can figure out a path to move forward and that we don't have to implement any of these recommendations at the expense of those who suffer from chronic pain.

CA: Did you see the [November 2, 2015] *New York Times* article that discussed the increasing rates of death among middle-aged white Americans without a college education? And it's the only demographic in the United States where mortality rates have increased substantially over time. The authors attributed it, largely, to the opioid epidemic.

RH: This is a key topic at our upcoming Health Matters Summit, and I think it's going to be a rallying cry for a lot of people who have not been paying attention to this epidemic. Because when you talk about drug addiction and drug users, they're instantly stigmatized. [This research] is only going to help the work that we're trying to do and to get people to look at this through a different lens.

CA: It's remarkable, the amount of stigma that does exist toward prescription drug addiction and abuse. This morning I was speaking with someone, and they asked, "Why do people become addicted to these?" And I said, "Well, they're highly habit-forming. It's an inherent feature of the drug." And they said that they thought, essentially, that it was a lack of willpower on the part of the individual. I think this is a very common perception still, despite the incredible amount of data and scientific knowledge that we have about the habit-forming nature of these products.

> "SINCE WE'VE STARTED THIS WORK—I'VE NEVER RECEIVED SO MANY PERSONAL CALLS FROM PEOPLE I'VE KNOWN AND WORKED WITH FOR 20 YEARS, WHO SAY, 'I'M SO GLAD YOU'RE WORKING ON THIS. BY THE WAY, I WANT TO TELL YOU MY STORY.'"

RH: I'm still surprised by it. Since we've started this work, I've never received so many personal calls from people I've known and worked with for 20 years, who say, "I'm so glad you're working on this. By the way, I want to tell you my story." We know what the data tells us about how pervasive it is, but if you asked everybody in the room to raise their hand if they know someone who has been affected, every hand would go up.

CA: So our report is, as you know, very comprehensive, and we worked hard to develop concrete and evidence-based recommendations for action. Let's fill in the number: 42 recommendations. How do we move these to action?

RH: Our whole goal coming into this was to reach as many people as possible with real solutions. Because we've involved a broad range of stakeholders from the beginning, that informs the process, but it also informs the implementation, right? So we take that group of stakeholders, and we now expand it to the next tier of stakeholders to talk about the mechanics of implementation and start to prioritize where we think we have the most traction and readiness.

GENERATIONS

100 special

CENTENNIAL SECTION

TODAY'S RESEARCHERS FULFILL THE DREAMS OF THEIR PIONEERING ANCESTORS

words **BRENNEN JENSEN**
photos **CHRIS HARTLOVE**
illustrations **DUNG HOANG**

HEALING MENTAL SCARS: **JUDY BASS**

NEARLY 40 PERCENT OF WOMEN IN THE DEMOCRATIC Republic of Congo report having experienced sexual violence, a brutal legacy of decades of civil war and ethnic conflict. Medical help of any kind can be hard to come by outside urban centers—and mental health services are generally nonexistent. A staggering amount of trauma, grief, anxiety and depression goes untreated, leading to suicides, social exclusion and family instability.

For 15 years, associate professor Judy Bass, PhD '04, MPH, has worked to address the mental health challenges in impoverished and strife-torn countries—an effort that builds on the pioneering advances of Paul V. Lemkau, the founding chair of what is now the School's Department of Mental Health.

Bass studies the feasibility of adapting culturally relevant group and individual psychotherapies. She also assesses the impact of training local staff with little or no mental health experience to conduct them. In the DRC, the results of that kind of intervention were promising. Studies showed that fewer than 10 percent of women who had received such group therapy still had mental health issues six months afterward.

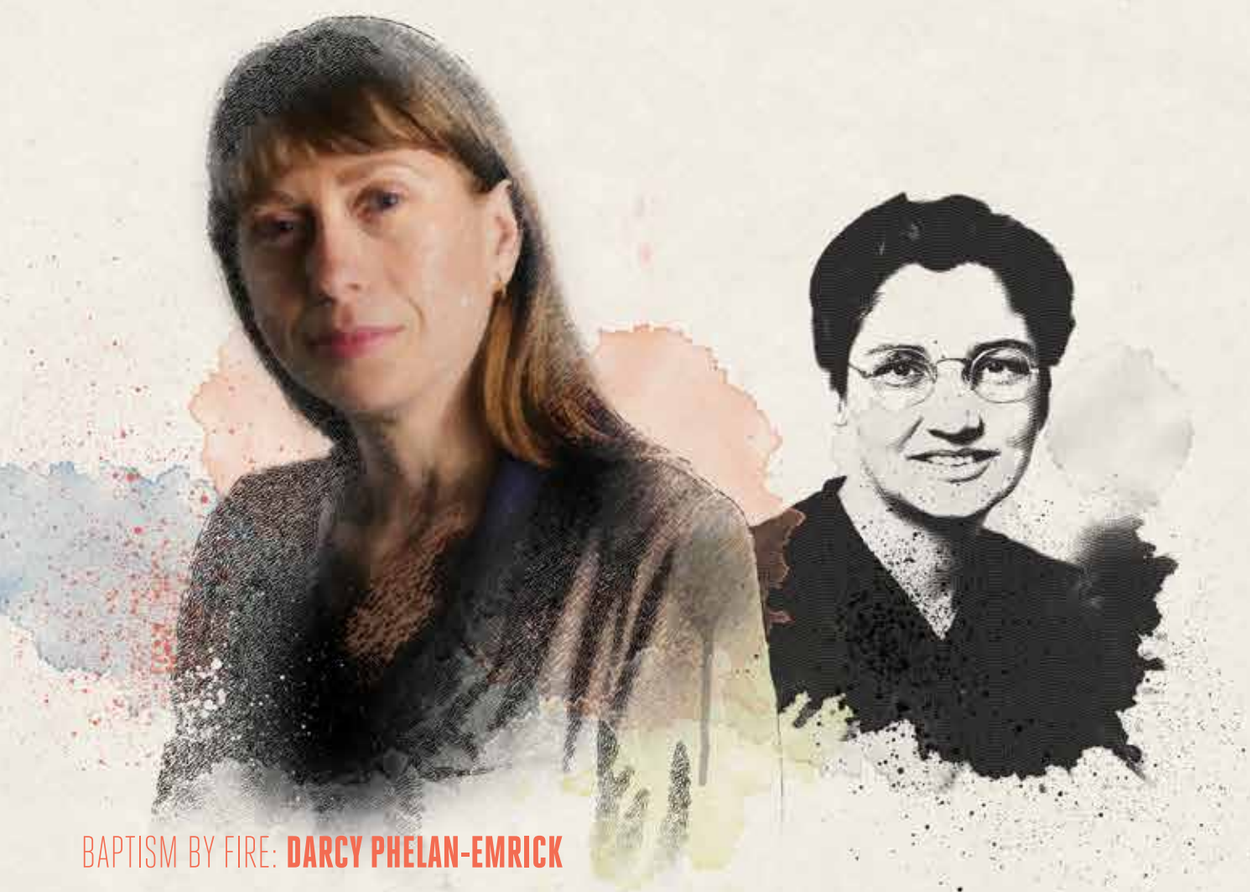
Similar trials have also been conducted in Kurdistan, Uganda, Burma, Indonesia and Colombia.

PAUL V. LEMKAU

AS A WHO CONSULTANT, PAUL V. LEMKAU, MD, conducted surveys of mental health in Japan, Yugoslavia, Italy, Venezuela and Mexico, and other Latin American countries.

"AMID POVERTY AND YEARS OF ONGOING CONFLICT, IF THERE IS ANY HELP AT ALL AVAILABLE FOR WOMEN IT'S PRIMARILY SERVICES TO MITIGATE THE PHYSICAL SCARS—THERE IS NOTHING FOR THE MENTAL SCARS."

» JUDY BASS



BAPTISM BY FIRE: **DARCY PHELAN-EMRICK**

LAST APRIL, WHEN VIOLENT PROTESTS ERUPTED AFTER the death of Freddie Gray, assistant scientist Darcy Phelan-Emrick, DrPH '09, MHS '05, was on her way to a meeting in downtown Baltimore. She never made it.

Instead, she heeded the Baltimore City health commissioner's request to report immediately to the City's Emergency Operations Center. As parts of Baltimore burned, Phelan-Emrick received a baptism of fire for her new job as chief epidemiologist for Baltimore City.

Phelan-Emrick now spends the bulk of her time at the City health department while also teaching an epidemiology course for the undergraduate public health program. Her work echoes that of Miriam E. Brailey, one of her predecessors whose epidemiological expertise benefited both the School and the health department.

Since last spring, Baltimore's soaring homicide rate has been an urgent issue for her department, she says. "Baltimore is [experiencing] an historic high in the number of homicides, and we're treating this violence as an infectious disease—as a public health problem that can be understood and interventions made," says Phelan-Emrick.

The department oversees the Safe Streets program that supports trained "credible messengers" to mediate disputes that are likely to escalate into shootings. The program is presently moving into the Sandtown-Winchester neighborhood, where Gray lived.

MIRIAM E. BRAILEY

MIRIAM E. BRAILEY, MD, DRPH '31, WAS THE first female Epidemiology faculty member and first full-time director of the Baltimore health department's Bureau of Tuberculosis from 1941 to 1950. She authored the first comprehensive study of racial disparities in pediatric tuberculosis incidence and treatment.

> "IN THE ACADEMIC SETTING, YOU GENERALLY DO THINGS AT YOUR OWN PACE AND FOCUS ON YOUR OWN RESEARCH, BUT AT THE HEALTH DEPARTMENT, IF THE MAYOR'S OFFICE OR HEALTH COMMISSIONER NEEDS DATA, YOU DROP WHAT YOU ARE DOING AND FIGURE IT OUT RIGHT AWAY."
> » DARCY PHELAN-EMRICK

ANNA BAETJER

ANNA BAETJER, SCD '24, LINKED OCCUPATIONAL chromium exposure to cancer, leading to improved workplace standards worldwide. She also established Johns Hopkins' research and training program in environmental toxicology, one of the nation's first.

> "DEEP IN OUR LUNGS THERE ARE THESE TWISTS AND TURNS LEADING INTO LITTLE ALVEOLI. AND IF YOU IMAGINE WHAT A PIECE OF FOAM LOOKS LIKE, IT DOES THE SAME THING. SO WE CAN ENGINEER OUR FOAM SAMPLER TO HAVE CHARACTERISTICS THAT BEST MIMIC WHAT HAPPENS IN YOUR BODY."
> » KIRSTEN KOEHLER

THE ANATOMY OF EXPOSURE: **KIRSTEN KOEHLER**

NEARLY EIGHT DECADES AFTER THE SCHOOL'S ANNA Baetjer conducted groundbreaking occupational health studies, Kirsten Koehler, PhD, MS, is investigating the risks that welders face on a daily basis.

"Welders are exposed to variety of metals—such as chromium, lead and manganese—that are known to be toxic, with some suspected to be related to cancer," says Koehler, an assistant professor in Environmental Health Sciences.

Mere "exposure" might not tell the whole story of these risks, however. So Koehler has developed a new air sampler that mimics the anatomy of the human lung. The goal: More accurately measure the impact of the actual doses of a hazardous substance to which a worker is exposed.

While current measuring devices simply capture the total concentration of a given substance in the air, Koehler's new foam-based sampler is imperfect by design. It simulates the human respiratory system, including the partial exhalation of inhaled particles. She expects that her sampler's findings will be more strongly related to dose and health effects than traditional devices.

Small enough to be worn on a welder's lapel, the sampler is being tested now to compare its findings with metal concentrations found through worker urine tests.

TARGETING CELLULAR STRESS: **ANTHONY LEUNG**

STRESS IN HUMANS IS LINKED TO ALL MANNER OF negative health outcomes, from sleeplessness to depression. Individual cells can experience stress too, and understanding how they express it might lead to breakthrough interventions in treating cancer and other diseases.

"Cancer is usually in a very stressful environment, and that is why we are interested in understanding it for therapy," says Leung, PhD, MBiochem. Cancer cells can be "stressed out," for instance, when they are in tumors far away from blood vessels providing oxygen and nutrients.

His lab uses biochemical, cellular imaging and genomics approaches to study the relationship between stress in cancer cells and microRNAs, a family of small, noncoding ribonucleic acids (RNA). Research shows that more than 90 percent of the human genome is transcribed to RNA—the working copy of our DNA—but most are not encoding for proteins. Leung's work on these noncoding RNAs follows the pioneering DNA research of Roger Herriott.

Under study is how microRNA may lead stressed cells to have different gene expressions. Leung's goal is to be able to discover cancer cells by their stress marker and destroy them—and only them—with targeted drugs.

ROGER M. HERRIOTT

ROGER M. HERRIOTT, PHD, A FORMER BIOCHEMISTRY chair, introduced the first courses on DNA at Johns Hopkins University. He elucidated the role viruses play in spreading infection by injecting bacteria with their DNA.

> "WITHIN THE HUMAN GENOME YOU HAVE A LOT OF SWITCHES—REGULATORS THAT TURN ON GENES AND TURN OFF GENES. MICRORNA IS ONE OF THESE MASTER GENE REGULATORS. IF WE CAN UNDERSTAND HOW THESE MASTER REGULATORS ARE REGULATED, WE MAY BE ABLE TO HARNESS THIS FUNDAMENTAL KNOWLEDGE TO HELP US WITH MANY TYPES OF DISEASES, NOT JUST CANCER."
> » ANTHONY LEUNG

SMART SURVEYING: **LINNEA ZIMMERMAN**

MORE THAN HALF OF YOUNG WOMEN IN DEVELOPING countries who want to avoid pregnancy are not using contraception. In some low-income nations, a quarter of girls drop out of school due to unplanned pregnancies.

A global partnership, Family Planning 2020, seeks to improve access to contraception for 120 million women and girls in 65 countries by 2020. But how to tell if the 2020 goal is being met? Think smartphone.

Charged with quantifying the partnership's successes, Performance Monitoring and Accountability 2020 (PMA2020) embraces mobile technology. While in-country surveys using paper forms once took as long as a year, they now can be done in as little as six weeks, says PMA2020 technical adviser Linnea Zimmerman, PhD '14, MPH.

"We hire women from the communities in which they live, train them to conduct surveys on smartphones, and then send the information to a cloud server for aggregation," says Zimmerman, an assistant scientist in Population, Family and Reproductive Health. Her department traces roots to a division founded in the mid-1960s by family planning pioneer Paul Harper.

PMA2020 is also examining GPS data to see how the proximity of family planning delivery points might affect individual women's use of such services.

PAUL HARPER

PAUL HARPER, MD, MPH '47, ASSISTED IN founding Pakistan's national family planning program and helped gain widespread acceptance for the IUD as a simple, highly effective, inexpensive form of contraception, ideal for population-level campaigns in the developing world.

> "A LOT OF AFRICAN WOMEN ARE SHIFTING AWAY FROM TRADITIONAL FAMILY PLANNING METHODS, SUCH AS RHYTHM METHOD OR WITHDRAWAL, AND USING HIGHLY EFFECTIVE AND LONG-ACTING METHODS."
> » LINNEA ZIMMERMAN

MARGARET MERRELL

MARGARET MERRELL, SCD ’30, WAS the principal statistician for the multisite trials of penicillin treatment of early syphilis, headquartered at the School during World War II.

> “IF WE CAN SHOW THAT A CERTAIN GROUP IN AN ONGOING RANDOMIZED TRIAL IS NOT BENEFITING, MAYBE IT DOESN’T MAKE SENSE—OR IS EVEN UNETHICAL—TO KEEP ENROLLING THEM.”
> » MICHAEL ROSENBLUM

POWER TO THE TRIAL: **MICHAEL ROSENBLUM**

RANDOMIZED CONTROLLED TRIALS ARE THE GOLD STANDARD for evaluating new drugs, medical devices, disease prevention interventions, etc. Biostatistics associate professor Michael Rosenblum, PhD, MS, is developing adaptive randomized trials that have the potential to generate stronger evidence about who benefits from an intervention.

“It’s a new approach, motivated by the goals of personalized medicine,” says Rosenblum, the latest in a long line of innovative biostatisticians at the School, including Margaret Merrell, who worked in clinical trials. “But these new designs, in some contexts, provide more power to detect treatment effects.”

Randomized trials seek to determine, on average, if it’s better to give everyone in a target population an intervention—or no one. But this approach can miss subpopulations who benefit more than others or who are harmed by an intervention.

With an adaptive randomized trial, researchers first identify some subpopulations, such as by ranking participants by the severity of their disease, and then monitor the incoming results over time. If an intervention effect differs in a subpopulation compared to all enrollees, enrollment of participants can be adjusted later in the trial based on a preplanned rule.

Rosenblum is developing new adaptive designs and is creating open-source software to help clinical investigators tailor these designs to their scientific questions.

GEORGE G. GRAHAM

GEORGE G. GRAHAM, MD, A renowned expert in preventing early childhood malnutrition, established the Institute for Nutrition Research in Lima, Peru, in 1961, which he directed for 29 years.

> “STUNTED MOTHERS CAN GIVE BIRTH TO STUNTED CHILDREN, RESULTING IN A VICIOUS CYCLE.”
> » YUNHEE KANG

HOPE FOR STUNTED CHILDREN: **YUNHEE KANG**

NEARLY HALF OF ALL CHILDREN IN MALAWI HAVE STUNTED GROWTH due largely to undernourishment. And their stature isn’t all that’s affected. Stunted children also suffer from reduced cognitive development, higher morbidity and increased risk of noncommunicable diseases in their adulthood.

In 2014, the Malawian government and a group of NGOs launched a novel prevention program to reduce stunting in young children. The program provides children with nutritional supplements and their mothers with counseling about proper diet and hygiene practices.

The job of supporting data collection, analysis and program evaluation falls on postdoc Yunhee Kang, PhD ’15, MS, fresh off spending four years doing similar work in Ethiopia. “The data include child weight, height, upper-arm circumference and also information about feeding practices and basic household hygiene characteristics,” says Kang, a researcher in International Health’s Program in Human Nutrition, founded in 1976 by George G. Graham.

One year into the project, a mid-impact evaluation of enrolled children shows they have a healthier weight. “This is a good sign as we expect that at the end of three years there may also be a reduction in stunting among program children,” Kang says.

If proven successful, the project may serve as a model for a national implementation.

IN A GOOD PLACE

WHAT'S THE SOLUTION TO INDIA'S SANITATION CRISIS? IT'S NOT JUST MORE TOILETS.

words **ANN SCHRAUFNAGEL**
photos **EMILY H. JOHNSON**

NEXT TO GODLINESS
Sunita Kumari sits outside a community toilet facility where she cleans the women's latrines. Lacking a toilet at home, she relieves herself at work and avoids going outside as much as possible.

• **ABOVE, FROM LEFT** **Bihar's field workers often toil miles from the nearest toilet; Sunita Kumari, a Dalit, cleans the women's portion of a communal facility; Khailash Kumar stands in the shell of a household latrine in rural Bihar.**

"DON'T YOU KNOW WHAT A TOILET IS?"

The rusty auto-rickshaw flew over a pothole on the broken concrete road. Though I was hunched over in the backseat of the tiny, three-wheeled vehicle, my head slammed the ceiling. Eyes tearing, the sights around me blurred: Women in bold-colored saris working in the surrounding fields looked like smudges of blue and purple in an endless sea of bright, brilliant green. Dazed, I wondered whether I'd heard the translation correctly.

"I mean, don't you know what a toilet is used for?" Laleshwor Kumar shouted at me over the roaring engine of the rickshaw. He looked taken aback.

With a fellowship from the Bloomberg School and the Pulitzer Center on Crisis Reporting, I'd come to Bihar, India, in June 2015 to report on open defecation. Bihar is a hotbed for this practice: In rural Supaul, the district where I stayed, only 30 percent of homes have toilets. Despite years of effort to curb it, the practice of relieving oneself outside has persisted in India. Recent studies showed that many Indians have a stated preference for open defecation.

Yet here I was with Laleshwor, a janitor at a local bank, on a quest to build a toilet. On this unbearably hot, sticky summer day, we rode into town from his rural home and I had asked why. What set him apart, I wondered, and made him want a toilet in his home when, according to the research I'd conducted from an air-conditioned American cubicle, so many Indians did not?

For the next four weeks, I set out to answer the vexing public health question central to India's current sanitation crisis: Why would an individual choose to not use a toilet even when one is available?

FIELD PHOTO: ANN SCHRAUFNAGEL

WHEN LOGIC FAILS

OVER 600 MILLION INDIANS defecate outside every day. Although India is not the only country where the practice of open defecation occurs, more than half of the people worldwide who relieve themselves in the open live in India. The practice has disastrous and well-recognized public health consequences. It results in premature death from diarrheal illness. It also leads to opportunistic violence against women and girls as they search for a place to relieve themselves, often alone at night. In 2012, a Bihar police official estimated that 400 rapes would have been avoided had women had a toilet in their homes. Furthermore, the economics of poor sanitation astound. In 2006, inadequate sanitation cost India an estimated 6.4 percent of its GDP ($53.8 billion USD) due to losses in education, productivity, time and tourism.

Tragically, poor sanitation contributes to physical and cognitive stunting of children. UN statistics estimate that 48 percent of Indian children under the age of 5 are stunted—this equates to more than 60 million children. The association between poor sanitation and stunting is complex and not completely understood. However, it is believed that repeated exposure to germs found in fecal matter during infancy causes permanent changes to the structure of the intestines, impeding absorption of essential nutrients and causing long-term inflammation throughout the body. This impairs growth of the body and brain.

Physical stunting, the most visible sign of these changes, seemed almost ubiquitous in rural Bihar. A baby in my host family, 16-month-old Abhinav, had big, watery eyes often made bolder by charcoal outline. He weighed just 7 kilos (15.4 pounds). He spent my first night in India in the hospital. Despite his mother's diligent feeding, the doctor said he was malnourished. Weeks later, after he'd recovered from his acute illness, I found him quietly playing with his own feces as his mother scrubbed laundry nearby.

In recent years, the disastrous effects of poor sanitation have gained global recognition. Major philanthropic organizations such as the Bill and Melinda Gates Foundation now include water, sanitation and hygiene as key areas of work. In 2015, the UN made universal access to water and sanitation and an end to open defecation by 2030 one of its Sustainable Development Goals.

The Indian government has long acknowledged its sanitation woes but just recently launched a nationwide campaign against open defecation. Prime Minister Narendra Modi promised improvements in sanitation during his election campaign and has since launched Swachh Bharat, or Clean India Mission. Swachh Bharat will spend $22 billion to build 110 million toilets, with the goal of achieving universal sanitation and ending open defecation in India by 2019—well ahead of the UN's target date.

I'd wondered why open defecation was gaining traction as an issue in public health now, when the Indian government had introduced rural sanitation programs to address open defecation six decades earlier, in 1954. My friends and family also wondered why this topic warranted a month of study in India. My sister-in-law said, "The solution is simple enough, right? Just build more toilets."

Her argument seemed so logical, but this has not panned out in India. From 2005 to 2011, despite persistent toilet-building efforts, there was no change in the percent of households that used any kind of toilet or latrine. In some states, declining rates of open defecation have not kept up with population growth, leading to an increase in the overall number of people who defecate in the open.

Andrés Hueso, policy analyst for international NGO WaterAid, believes that earlier government sanitation efforts were lackluster, leading to poor outcomes. Underfunded and unable to meet the enormous need, programs provided poor services. "Households didn't even get a decent toilet in most of the cases. Half-built toilets, toilets without paint, there were a lot of issues," says Hueso.

More concerning to Hueso, however, is the supply-driven nature of sanitation programs. Historically, the government or an NGO constructed pit latrines (see sidebar) for households. Studies have shown, however, that many of these toilets—even those that are structurally intact—sit unused. Anecdotes about people who have access to toilets but don't regularly use them prompted studies on why individuals don't use toilets.

The influential 2014 Sanitation Quality, Use, Access, and Trends (SQUAT) report reinforced the strategy of generating demand for toilets. It found that "40 percent of households with a working latrine have at least one member who defecates in the open." The study noted, "Many respondents told us that defecating in the open provides them an opportunity to take a morning walk,

see their fields, and take in the fresh air. Many people regard open defecation as part of a wholesome, healthy, virtuous life."

While conducting his PhD research on sanitation, sustainability, and policy in India, Hueso reported similar findings. "I think there is a real preference [for open defecation]," he says. "There are many reasons why and they vary for each individual. You can call it religion or culture or tradition or some kind of disgust of having to handle feces. So a lot of people prefer to go somewhere, drop it and leave instead of having it near the house and having to figure out what to do when [the toilet pit] fills up."

Traditionally, the task of clearing human waste was performed by Dalits, or "untouchables." Although the caste system has been illegal in India since the country's independence in 1947, Hinduism's social structure remains deeply ingrained in parts of the country, including in much of Bihar. The aversion to handling human waste or bringing Dalits into one's home to perform these tasks is one proposed explanation for why some Indians continue to prefer open defecation.

The SQUAT report caught the attention of key philanthropists. Two years before the report, the Bill and Melinda Gates Foundation gave an $8.5 million, five-year grant to Population Services International (PSI). The project, which started as an effort to increase the supply of sanitation products and services, shifted focus after SQUAT was released, says Genevieve Kelly, PSI Water, Sanitation and Hygiene coordinator. "Given the findings in the report and emerging evidence [suggesting] that demand and use for toilets are intrinsically linked with ingrained cultural factors, Gates encouraged us to develop a strategy to address the social norm of open defecation in Bihar," Kelly says. "Strengthening the supply … may not be enough."

Many sanitation experts hope that behavior change programs, or "generating demand" for toilets, will help change the course of sanitation in India.

BEYOND HARDWARE

BOTH BEHAVIORAL AND HARDWARE COMPONENTS must be addressed to improve sanitation, says Professor Tom Clasen, PhD, a sanitation expert at Emory's Rollins School of Public Health. "It's like when you started seeing seatbelts in cars. Some regulation required automobile companies to put seatbelts in cars, but it took years before people actually started using the seatbelts. If the program is all about putting seatbelts in cars, that's what you're going to get done. It doesn't mean that people are going to use them."

In India, he says, "you have generations, if not millennia, of people practicing open defecation. And now you're giving them this hot, dark, stinky place that's full of flies, and they're supposed to go in there and defecate. You know, most of us would probably use open defecation over that alternative … and I'm pretty convinced if these folks had a bathroom to use like the one I have at home … they'd probably use it."

Another important component of sanitation, Clasen argues, is fecal sludge management. Most toilets in Supaul are pit latrines, which must eventually be emptied. Faced with the eventuality of having to empty the pit or paying someone to empty it, people use them less. "It's the same thing with people using septic systems in the States: They don't flush as often. Or, if you have an unlimited data plan, you never think about how much you're downloading. But if you have a limited data plan, you'll think, 'Maybe I don't have to download that.'"

Furthermore, families with latrines are often not trained on how to safely empty them. While doing research, Clasen met people who rubbed kerosene on their bodies to minimize the smell of feces, then "they'll jump in the pits and start shoveling it out. They use it for fertilizer in many cases. So, there's a real question of whether [using this kind of toilet is] really minimizing exposure [to pathogens] at all."

GETTING THE NUANCES RIGHT

I MET KHAILASH KUMAR (not related to Laleshwor) and his boss, a weather-beaten construction manager whose first name is Islam, on a toilet construction site. They were building a community toilet facility where the human waste from a series of pit latrines would collect in a tanker. As the feces decomposed, methane gas would be trapped, converted to electricity and used to power a water filtration system that would sell clean water back to the community members. Khailash, a young, single construction worker, laid bricks quietly but precisely. Islam was loud and lighthearted as he directed his workers around the compound.

With the scraping sounds of men shoveling concrete in the background, Khailash and Islam described how they use toilets selectively. Khailash usually relieves himself outside, but uses the pit latrine outside his family's home when it is pouring rain. Islam uses his family toilet at home but relieves himself outside when he's at work.

Neither Khailash nor Islam had ever heard of the SQUAT report. But when I told them about it, they disagreed with its findings. Islam does not believe that open defecation is associated with a healthy and virtuous rural life. "This is not the case."

Khailash agrees, and with a mirthless laugh, says, "It's too inconvenient to go outside. There are snakes, and we get yelled at when we use other people's fields."

Why, then. would Khailash continue to relieve himself outside when there is a toilet in his home? "If the men use the toilet," he explains, "the pit will fill too quickly. Then where will the ladies go?" His family faces the challenges that Clasen has described; Khailash doesn't appear to know what he'll do when his pit fills, and he worries that his family will have to scrape up savings to pay someone to deal with it.

Islam only uses a toilet at home but not at work because, as a construction manager for small village projects, there are rarely toilets at the sites where he works. Only the big companies provide onsite toilets for workers. "You end up having to go out in the open. If you are working at someone's home, they won't even let you use their toilet," he says, shaking his head at the irony: Even when working on a toilet-building project, he and his construction team usually have nowhere to relieve themselves except in the fields near the site.

Sunita Kumari (unrelated) cleans the women's side of a community toilet block in Nimua, a village a few miles away from the one Khailash and Islam are constructing. As a woman and a Dalit, Sunita belongs to two of the most marginalized social groups in her society. When she tells me she only uses the toilet when she's at work but not at home, her voice is barely above a whisper. She casts her eyes down at her work-worn hands and explains she does not have a toilet at home. She walks 40 minutes to work each day, so she often has no choice but to relieve herself outside.

Many others—teachers in schools, priests in temples, unemployed men in their homes—echoed the sentiments of Khailash, Islam and Sunita. They believe that poor sanitation is a huge issue in their communities and that most people would use toilets if they were convenient and their pits did not have to be emptied regularly. People in Nimua talked eagerly about their toilet facility. They felt pride that—with more than 750 users daily—their community had become much cleaner.

The mass construction of toilets has not ended open defecation in India. Behavior change efforts are important, yet they will not solve the problem if those who want toilets cannot afford to build them. Perhaps the government and NGOs need to consult more people like Khailash, Islam and Sunita, to customize toilet construction projects to the individual and community. However, the challenges of affordability and scalability of customized toilets will remain. The path forward is far from clear.

Still, Khailash looks hopeful when he discusses his family's plans to eventually replace their temporary toilet with a more private, permanent one. "We'll all be able to use it then."

» Ann Schraufnagel earned her MPH from the Bloomberg School in May 2015 and is a medical student at the University of Illinois at Chicago. Her reporting for this story was supported by the Johns Hopkins-Pulitzer Center Global Health Reporting Fellowship.

TOILETS: A PRIMER

GET UP TO DATE ON YOUR TOILET LINGO

» **Improved Sanitation Facility:** A structure that offers privacy and ensures hygienic separation of human excreta from human contact. Examples: Flush/pour flush (to piped sewer system, septic tank, pit latrine), pit latrine with slab and composting toilet.

» **Flush Toilet:** Often known as a "Western-style toilet." When flushed, water enters the toilet bowl and the contents are piped away, usually to a sewer or septic system.

» **Pit Toilet:** A pit covered by a slab with a hole, toilet seat, or toilet pan. This is a preferable option when water availability is low. When the pit fills, it can be emptied and reused or covered, and a new hole dug. Pit size can be limited by a high water table because the liquid leaching out of the pit contains fecal pathogens.

» **Temporary Toilet:** Any structure that is used as a toilet but that cannot be maintained for a long time. Example: A hole in the ground lined by a tarp.

» **Permanent Toilet:** Although many types exist, in Bihar, these are commonly built with bricks and sand, and covered with a concrete slab and a porcelain toilet pan.

» **Individual Household Latrines:** A toilet in the family compound. This is often a separate structure—similar to an outhouse.

» **Shared Sanitation Facilities:** Facilities shared by two or more households. Examples: Public and community toilets. *» Ann Schraufnagel*

100 CENTENNIAL CONNECTION: ABEL WOLMAN

LEGENDARY SANITARY engineer Abel Wolman wrote in 1977 that Baltimore's shift during his childhood from "outdoor toilets over a cesspool" to a central sewage system in 1909 "was due to the fact that living in a morass of sewage was unbearable."

DANCING WITH DANGER

SUSAN SHERMAN WANTS THE HIGH-RISK WORLD OF BALTIMORE'S STRIP CLUBS TO BE SAFER FOR THE WOMEN WHO WORK IN THEM

words LAURA WEXLER
illustrations JOE CEPEDA

The first time K. danced at a strip club on The Block, she was nervous taking off her clothes in front of strangers. She was 18, long and lean, with straight brown hair and a smattering of piercings and tattoos. She would have liked to work with computers, but she didn't have the skills coming out of high school. She'd recently received an eviction notice. So she went to the only place where she knew she could earn money fast: the 400 block of East Baltimore street, a stretch of 20-odd strip clubs, bars and adult stores that is home to Baltimore's infamous red light district.

Two things shocked K. when she began working at the club. One was the money. At the end of an eight-hour shift, she'd walk out with $150 in cash—nearly as much as her entire two-week paycheck from McDonald's, her previous employer.

The other was the drugs. "I had heard that The Block was a lot of drug use and nasty girls, but I didn't imagine it being like that," K. says. "I would walk in the bathroom and interrupt dancers shooting up or snorting."

K. had been addicted to "percs," a street name for prescription opiates, since she was beaten up by a group of girls when she was 14. Her brother gave her a pill to ease her pain and, she says, "it was off to the races after that." She had never used heroin. But a few months after starting at the strip club, she was snorting heroin when she couldn't get perks. Heroin was always available on The Block. And it was cheap and convenient—"runners" deliver it to dancers during their shifts.

After 10 months working in the club, K. decided she had to leave. The money wasn't as good as it had been at first; she wasn't a "new face" anymore. And she worried about what would happen to her if she stayed. "I don't want to be around all those drugs," she says. "It's a bad influence on me."

THE BLOCK WAS OPPORTUNITY

For K., The Block was opportunity, and The Block was danger. This central contradiction is the reality for many exotic dancers, says Susan Sherman, PhD '00.

Sherman has devoted the past eight years to documenting the lived experiences of the roughly 800 women who work as exotic dancers in Baltimore city and county. Supported by the National Institute on Drug Abuse (NIDA), her research is the most extensive study of exotic dancers in the nation. It reveals what happens when a vulnerable population encounters a high-risk workplace. "Women start working at the clubs because they have limited options," says Sherman, a professor in the departments of Epidemiology and Health, Behavior and Society. "Once they get there, their vulnerability—from poverty, homelessness, abuse, addiction—makes them susceptible to the influences of the environment, namely drug use and sexual risk behavior." Sherman develops HIV prevention programs in high-risk populations, and in both her international and domestic work she targets the environmental factors that influence individual behavior. In a microfinance project she developed in India, she helped train sex workers to make and sell cotton bags, thus reducing the economic pressure to sell sex and empowering the women to advocate for themselves if they did choose to sell sex. In an eight-year project she worked on with drug users in Thailand, she identified peers as a main push toward drug use and targeted them with outreach programs. Sherman is guided by a deep respect for people's autonomy. Her mission is to expand people's choices—not tell them how to live. "We're never in the business of saving anyone," says Sherman. "We're in the business of providing options."

In her work with exotic dancers in Baltimore, Sherman's goal is twofold: to strengthen their ability to make safer, healthier choices on an individual level and to help them build their collective strength as a group. To do that, she's applied for a five-year, $500,000 per year grant from NIH to develop and evaluate a community empowerment intervention for street- and venue-based sex workers. The anchor of the proposed intervention will be a center that offers everything from showers to free legal assistance to GED classes to referrals for drug treatment to reproductive and mental health care to HIV testing and Pre-Exposure Prophylaxis, or PrEP. "The idea is to help make the ground these women stand on steadier," says Sherman. "Everything will be there, under one roof, without the judgment. You can leave your shame at the door."

The services are key, but the fact that they'll be offered in a single, dedicated space is essential, Sherman says: "Having their own space is a first step for the dancers to mobilize their individual and collective strength to advocate for themselves."

The center, which Sherman hopes to open in downtown Baltimore this year, will be the first of its kind in the U.S. Her project's name is Studying the Influence of Location and Environment – Talking through Opportunities for Safety.

The space will be called the Stiletto Center.

A DEVASTATING LINE TO CROSS

In the heyday of The Block, roughly 70 years ago, soldiers, working people and elected officials alike flocked to its grand theaters and elegant clubs—the Oasis, the Harem, Club Pussycat, the 2 O'Clock Club—to see vaudeville and burlesque at its finest. The Block was a little naughty, a little taboo and a lot of fun. "Respectable" couples went there for an exotic night on the town.

Many of the clubs remain today. But they no longer offer vaudeville or burlesque, or an exotic escape from the ordinary. "They are essentially unsanctioned brothels," Sherman says.

She got her first glimpse of The Block's modern reality on the day in February 2008 when she went with the director of the Baltimore City Health Department Needle Exchange Program to the office of Christopher Welsh, an associate professor of psychiatry at the University of Maryland School of Medicine, to meet one of his patients, a recovering heroin addict who had danced on The Block for years.

That day, the dancer drew a map of the clubs and, one by one, detailed the hard drug use and selling of sex in each. She was telling the story because she wanted people to know what things were really like on The Block, she said—and she wanted to help her fellow dancers.

Sherman is an extrovert. But listening to the dancer, she was speechless. She found it "absolutely surreal" (and still does, eight years later) that the illicit behavior the dancer described was happening in the heart of downtown Baltimore, a block from City Hall and police headquarters, and 1.5 miles from Johns Hopkins' medical campus. There are strip clubs in every city and an estimated 3,500 in the nation. Yet Sherman says The Block is unique in the amount of sex sold in such a concentrated central location.

Sherman was also shocked that the dancers who worked in the clubs were essentially invisible in plain sight. "They were not on anyone's radar," she says. At the time, Sherman, an expert on harm reduction, was advising the health department's drug overdose and needle exchange programs. So the first thing she did after hearing the dancer's story was to work with the city to send a needle exchange van to The Block.

"Susan's the one who said, 'Let's set up a way to help right there.' Before that, there were no services right on The Block," says Joshua Sharfstein, Baltimore's health commissioner at the time and now associate dean for Public Health Practice and Training at the Bloomberg School. "Susan's fearless in the way she looks at the needs people actually have and tries to help them."

In spring 2008, the needle exchange van began parking at the corner of Baltimore and Gay streets on Thursday nights, offering clean needles, free contraceptives, pregnancy and sexually transmitted infection testing and overdose prevention training. Using the van as a base, that summer Sherman and a team of graduate students launched a pilot survey of dancers on The Block. "We had no money," she says, "but we wanted to get a broad picture of the situation." The results, which are likely lower than the actual percentages because the survey relied on self-reporting, revealed illicit drug use and sex for money in the clubs was prevalent: 55 of the 100 dancers surveyed reported using heroin and crack inside the clubs, and 42 reported exchanging sex for money.

The survey was anonymous, but almost certainly it included D., a 43-year-old dancer who has visited the needle exchange van on and off since it first arrived. In 2002, when D. was 31 and living in Virginia, she spent $10 for a dose of heroin and a pack of clean needles, gauze and alcohol to discover what so many do: heaven on earth, a cheap high. When she moved to Baltimore in 2003 to dance on The Block, her addiction escalated. "The accessibility to heroin in this city was so vast that anyone who had a taste for it was like a kid in a candy store," she says. Six months after her arrival in Baltimore, the money she made stripping and performing lap dances was no longer enough to support her habit. "Finally, I did it," she says—she began selling sex in the private rooms of the club. It was a devastating line to cross. "Prostitution comes in when the overhead gets too much to handle," she says. "It's not anything anyone wants to do."

D. began selling sex for the same reason dancers sell sex in nearly every club on The Block, Sherman says: It's the way to make the most money. "I'm constantly reminded of that phrase 'a line drawn in the sand,'" says Sherman. "It's not [drawn with] a Sharpie. Once these women get into the clubs, the line in the sand between what they will and won't do shifts. Especially if there's a drug habit thrown in."

The clubs' economic structure dictates that bartenders or managers negotiate the price for illicit sex and take a cut of the fee. While none of the dancers Sherman and her team interviewed said they were forced into prostitution, an economic structure in which bartenders and managers profit from the selling of sex creates "tacit pressure" for dancers to engage in prostitution, Sherman says. And it can also create a situation in which management enables dancers' addictions (by allowing runners to deliver drugs to them during their shifts, for example)—because the more desperate dancers are to make money, the greater the financial gain for the club.

As D. says, "Some owners like your behavior when you're on drugs. It's a crazy, vicious circle."

At a high-end club on The Block, it might cost $1,000 to visit a private room with a dancer. At a low-end club, such as the one where D. works, it can cost $100, or less. One afternoon last November, D. worried she wouldn't make enough during her shift to pay for the $70-a-day hotel out on Route 40 where she's been living since being kicked out of a friend's house.

She also worried about what would happen once evening fell. She's currently on methadone, but that morning she'd received only half of her daily dose because she failed a Breathalyzer test at the clinic where she's a patient. (Since alcohol and methadone are both depressants, it is dangerous to combine them.) It's a Catch-22: She needs methadone to stave off heroin withdrawal, but she needs alcohol to numb herself while she works in the club. "Wouldn't you want to be numb if you have to touch some weird man you don't want to?" she asks. Without her full dose, she'll be sick by about 6 p.m. If she can't find black market methadone, she says she'll shoot heroin.

D. knows her days as a dancer are numbered. "I won't pretend," she says. "Time's catching up. I've damaged my body with drugs. I hurt so badly." But even as she contemplates leaving the club, some part of her imagines things could be different. "If you could have a troupe of professional dancers who were trained and ran their own business, they could do great," she says. "But coming from the backgrounds that we have—molestation, rape, getting beat—it's a whole different channel."

Sherman doesn't pretend her intervention will erase the harms dancers have suffered years before they stepped into the clubs. But, she says, the resources she hopes to offer at the STILETTO Center could build the dancers' resilience so that, once they're in the clubs, they can lead safer and more productive lives.

THE LIVES OF DANCERS

Sherman's initial survey offered an introduction to the lives of dancers, but to really understand the clubs, she and her team had to get inside them. That meant getting past the managers and doormen, who often stand as sentries at the door.

"When we first came down here it was sort of like no-man's land," says Nathan Fields, a health department outreach worker who has worked on the needle exchange van since it came to The Block. "The people who ran the clubs didn't want any outsiders."

But Fields became a familiar face on The Block through his work, and with his and other field researchers' help, Sherman's team got access to the clubs to document everything from their physical layouts to the acceptance of transactional sex and illicit drug use to the Byzantine economic system in which dancers are paid by the number of "drinks" they've sold—with drinks functioning as units of currency that relate to beverages as well as sexual acts. A lap dance might be worth four drinks, for example, while a trip to a private room is worth eight.

Sherman's ethnography of the clubs, published in *Social Science and Medicine* in 2011, paints a vivid portrait of The Block as an alternate universe with its own rules and codes, its own internal logic and culture. And it makes it clear that that clubs play a central role in perpetuating and enhancing the health risks that dancers face.

"Susan is not just exclusively looking at health from the perspective of an individual's behavior," says Mishka Terplan, MD, medical director of Behavioral Health System Baltimore and an OB-GYN and addiction specialist who volunteers on the needle exchange van. "She's really asking how the environment of the clubs determines the landscape of an individual's opportunities for risk reduction."

To answer that question, Sherman expanded her focus beyond The Block in 2012, undertaking a two-year research project funded by the National Institute on Drug Abuse. In the first phase, Sherman developed a measurement tool to characterize the risk in exotic dance clubs along five domains: physical, social, economic, drug and policy. This tool, the STILETTO Risk Assessment, can be used to quantify the risk factors of any environment where sex work occurs, including massage parlors and bars.

Sherman's team then went into 26 of the 35 exotic dance clubs licensed in Baltimore city and county and asked staff members—bartenders and managers, as well as dancers—to complete a 15-minute survey that described everything from safe sex practices in the club to the prevalence of hard drug use. After entering participants' responses into the STILETTO Risk Assessment, Sherman was able to rank each club along a continuum from "least risky" to "most risky." (It came as no surprise to her that the highest concentration of "most risky" clubs is on The Block.)

Then the team embarked on the most challenging phase of the project: recruiting 117 dancers who were new to dancing in order to examine their exposure to the clubs over a six-month period. Even though the researchers had been working in strip clubs for several years by then, getting access was still often difficult. "I saw one doorman one day and he said he'd get the girls together and I could interview them," says Katherine Footer, a research associate in Epidemiology who was a lead member of Sherman's team. "The next day he was aggressive and wouldn't let me in."

Even after the team successfully recruited dancers, navigating their chaotic lives required patience, flexibility and determination. Dancers missed appointments, changed cellphones and moved more than twice a month, on average. “It is really hard starting something new with a population who’s not accustomed to being studied,” says Sherman. “There’s lots of ways we’re breaking ground. ”

And beyond the logistics, the actual research took its toll on Sherman’s team. “What was most shocking to me were the conditions in many of the clubs,” says Footer. “Women are working in conditions that are unhygienic, oppressive and coercive. The negative feedback that such an environment generates is palpable every time you visit a club.”

Sahnah Lim, a doctoral student who worked on the study, saw physical fights between dancers, as well as between customers and angry wives and girlfriends who burst into the club to attack them. Several times while Lim was conducting research, men propositioned her, assuming she was a dancer. Once she witnessed oral sex performed onstage. Lim could only tolerate staying in the clubs for a maximum of two hours.

SEX FOR MONEY

It is tempting to generalize, to say that every dancer who works at a strip club in Baltimore—or elsewhere—is threatened by the club environment. The truth is that though the majority of the 500 dancers Sherman’s team interviewed encountered some form of risk in the clubs, others achieved their goal of making fast money without sustaining significant harm. A. is one of them. She worked on The Block in summer 2012. On her best night, she says she made $1,300. By the time she left after two months, she’d saved $5,000.

At the time, A. was 21, petite, tan, and in great shape—but her most valuable asset, she says, was that she was “clean.” “Customers can tell the difference between which dancers do drugs and which don’t,” says A., who estimates that out of 12 dancers working on a weeknight shift at her club, 10 were doing hard drugs, mostly cocaine. “The girls who are clean are in high demand, especially with the clientele who have money.”

Like many dancers, A. had sex for money in the club’s private rooms. But she did so only with customers she found attractive, and she always convinced them to pay her directly rather than the bartender, which allowed her to negotiate her own price. “I hustled,” she says. “I played the system.”

If a customer A. didn’t find attractive asked to buy a half-hour with her, she set a higher price and invited other dancers to perform the sex work while she danced. If a customer refused to wear a condom, she’d tell him, “You forget, I don’t have a drug addiction so I don’t need to have sex with you,” she says. “A lot of homeless dancers were desperate for money so they’d do anything.”

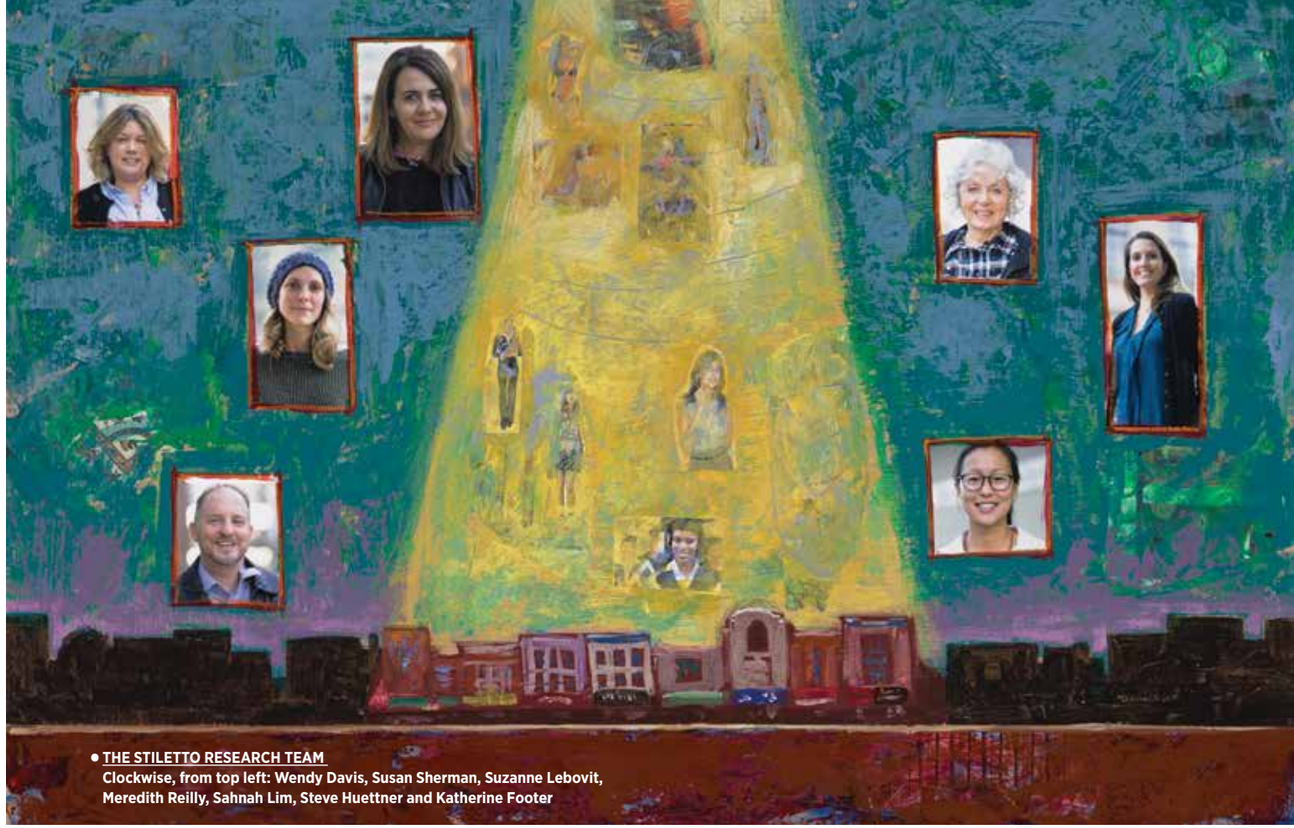
A. says she was desperate the summer she worked at the club—dancing was “a last resort” to pay her rent while she completed an unpaid internship in college. But there’s a stark difference between A.’s definition of desperate, and that of K. and D.—and most of the dancers in Sherman’s study. A. entered the club at a desperate time in her otherwise stable life. She’d been valedictorian of her high school class; she didn’t use hard drugs; she didn’t have a history of abuse or poverty. That meant she could avoid the “bad influences” K. succumbed to before she left the club. And it meant she had the ability to treat dancing as a business and herself as an entrepreneur: to enact a reality for herself in the club that D. can only imagine.

“If you are coming in relatively stable, you’re better equipped with the resources to handle the exposures of the club,” says Meredith Reilly, a doctoral student on Sherman’s team. “You have a higher level of resilience.” But the majority of dancers the team surveyed are entering the club not from a position of stability but from what Footer calls “a general accumulated vulnerability.”

The summer after she worked on The Block, A. graduated from college, and she now has an office job in Washington, D.C. Looking back, she views her time working in the strip club as a strange interlude: something she never would’ve chosen to do, something she’ll never do again, yet something she’s oddly grateful for.

“I ended up with no scars, no abuse, no drug addictions, no kids, no STDs,” she says. “And when you’re not spending your money on crack and heroin, you can make a lot of money.”

> “D. KNOWS HER DAYS AS A DANCER ARE NUMBERED. ‘I WON’T PRETEND,’ SHE SAYS. ‘TIME’S CATCHING UP. I’VE DAMAGED MY BODY WITH DRUGS. I HURT SO BADLY.’ BUT EVEN AS SHE CONTEMPLATES LEAVING THE CLUB, SOME PART OF HER IMAGINES THINGS COULD BE DIFFERENT.”



THE STILETTO RESEARCH TEAM
Clockwise, from top left: Wendy Davis, Susan Sherman, Suzanne Lebovit, Meredith Reilly, Sahnah Lim, Steve Huettner and Katherine Footer

"IT IS WHAT IT IS"

On a recent Thursday night, the sidewalks on The Block are mostly empty. It’s early. The only action is at the corner of East Baltimore and Gay streets, in front of the Big Top adult store, where the needle exchange van is parked at the curb, as it has been every Thursday night since 2008.

About 7 p.m., the dancers begin to line up. They are young and beautiful, and old and ravaged. Some are new to dancing; some have worked at several clubs on The Block over the years. Some hold bags containing 30 syringes; some 100 or more. Some have abscesses from the impurities in the drugs. Some have legs and hands swollen with edema, a symptom of long-term injection drug use. A few minutes after they enter the van, they leave with clean needles, contraceptives and perhaps a bag of toiletries. If they stay a bit longer, they can get trained to use a naloxone injector, which reverses the effects of opiate overdose. D. got trained a few years ago and has saved the lives of three dancers since then, she says. She recently completed 40 hours of additional training in HIV prevention, safer drug use and drug treatment, and she is now a harm reduction peer educator through Behavioral Health System Baltimore. “I’m struggling to pull myself out of this addiction,” D. says, “but there should be a way for others to be safe while they’re in it.”

The Block, everyone says, is not what it used to be. The resident authority on this might be a white-haired woman named Misty who works behind the bar at a club called The Jewel Box. Back in the 1950s, Misty was a burlesque dancer on The Block. She wore hundred-dollar custom gowns; an agent booked her appearances; she danced seductively onstage without ever taking it all off. Now she works at a club where women have sex for money and use hard drugs, where dancing is beside the point. Asked what she thinks about the state of The Block today, Misty shrugs, saying, “It is what it is.”

Sherman believes the STILETTO Center and the resources it offers can change “what it is” by creating a critical consciousness among the dancers to advocate for themselves. “Our ‘eyes on the prize’ is the intervention. Otherwise, how do you witness all of this?” she says. “The clubs will always exist. But they don’t have to violate people’s rights.”

As the hour grows later and the sidewalks fill with potential customers, the doormen on The Block begin to sing their chants: *“Girls, girls, girls.”* Behind the neon signs and darkened doorways of the clubs, dancers undress, put on makeup, shoot up or snort, and calculate how much money they need by the end of the night—and what they’ll have to do to make it.

Then they put on their stilettos and go to work.

HEALTH + HISTORY

Collections

PEOPLE IN PLACE

FOR 33 YEARS, GERARD ANDERSON, PHD, HAS JOURNEYED TO LOW-, MIDDLE- and high-income countries to design hospital systems that respond to the needs of the people. He couldn't do his job well, he says, without meeting and talking to locals. His camera has been a steadfast travel companion from the golden savannas in Kenya to the gleaming slopes of Mount Everest in Nepal. "The people are what make the place, not the landscape or buildings or food," he says. "It's the people." Anderson, in his own words, narrates the photographs that follow. » SALMA WARSHANNA-SPARKLIN

SERENGETI PLAIN, KENYA, 2004
To provide her village with protein, this woman used a bow and arrow to bleed a cow and then shared the blood.

TURKEY-IRAQ BORDER, 1990
The Gulf War was underway while I climbed Mount Ararat. From this man's village, we looked down to see the Iraqi Army.

SERENGETI PLAIN, KENYA, 2004
This woman was drinking the blood of a cow. At the time, HIV/AIDS was the top killer disease in the country.

NEAR MOUNT EVEREST, NEPAL, 1979
This Nepali artist had just been selected to design the UNICEF 1980 holiday card.

BEIJING, CHINA, 1982
This family was one of millions impacted by the one-child policy that the Communist Party instituted two years earlier.

YOGYAKARTA, INDONESIA, 1989
My travels have shown me that children all over the world enjoy making mud pies. Happiness doesn't require video games.

MOUNT ARARAT, TURKEY, 1994
Outside the *hamam* (Turkish bath) I was visiting, I spoke with this wonderful man, who embraced life by making the simple things special.

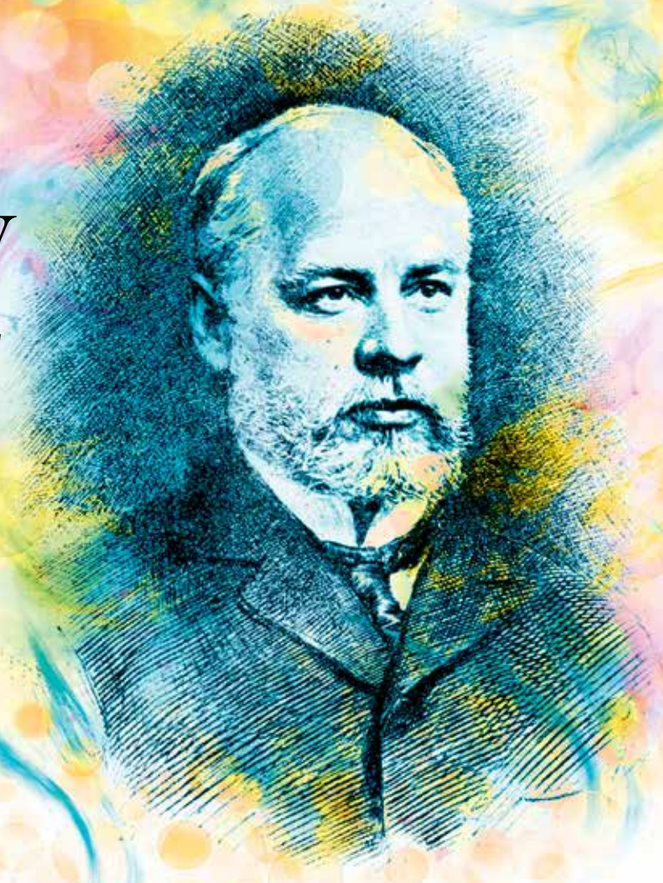
KATHMANDU, NEPAL, 1981
I encountered this worried woman right before she visited a relative in a hospital where I was working to improve operations.

GUANGZHOU (CANTON), CHINA, 1981
Everywhere I went, people wore the Chinese tunic suit and spoke about the 1949 revolution.

CHRIS MYERS

Back Story

BY BRIAN W. SIMPSON, MPH '13, EDITOR



THE MASTER CONNECTOR

William Henry Welch is the School's origin story, the point-source of the chain reaction of discovery from one cohort of researchers to the next.

PERHAPS ON CERTAIN SPRING EVENINGS, WILLIAM Henry Welch steps down from the famous John Singer Sargent painting in the Welch Library building and crosses Monument Street in his great, flowing black robe to check on his baby.

I can see "Popsy" pass through the tinted glass entrance and stroll through the School he founded a century ago. I can see him roam the familiar halls of the original building, wrinkle his brow as he stares up at the atria of the new reading rooms and poke around in the state-of-the-art labs (likely just as cluttered as they were when he was a pathologist).

By the time he founded the School in 1916, he was 66 years old. A portly lifelong bachelor, he piled correspondence on chairs in his office and found respite in weekends in Atlantic City (he liked his resorts "vulgar," he told his sister). He was, in short, a very real person.

He's also the School's origin story—the first faculty member, the first dean, the point-source from which our history flows. He set the vision that would propel this remarkable enterprise into the future. A master connector of key people to positions, he achieved this by selecting the right people like physiologist William H. Howell and the legendary E.V. McCollum.

Our "Generations" story (page 26) got me thinking about Welch and the chain reaction of discovery from one cohort of researchers to the next. Each generation has added knowledge, resulting in incremental and sometimes astounding progress over the last century.

If you ever happen to see Popsy strolling the halls of the Bloomberg School, please say hi… and thanks.

PATRICK KIRCHNER

The Last Pixel

NOW AND THEN

A century after founding Dean William Henry Welch visited Beijing, Dean Michael J. Klag (top, center in snappy white suit) and colleagues found the exact same spot at Peking Union Medical College. "I've known this picture for a long time. It's an affirmation of the mission he gave us. We look around the world for partners and to build capacity," Klag says.

HEATH ELLIOTT (TOP); ALAN MASON CHESNEY MEDICAL ARCHIVES

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KRIT PONGPIRUL

100 DINNERS

There's still time to get a bite of history and savor new connections. Join the 100 Dinners initiative: jhsph.edu/100dinners

MORE CENTENNIAL EVENTS COVERAGE PG 7