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One day when he was 9 years old, Amartya Sen’s worldview changed. First one, then thousands of starving people streamed through the campus of his elite school on the way to Calcutta in search of food. The Bengal famine of 1943 was on its way to killing three million people, yet Sen was completely unaware of it. No one in his social circle had even been affected. (Sen later learned that an inflationary surge in food prices, not vast crop failures, caused the famine.) This experience taught the future Nobel laureate in economic sciences how systemic social inequalities have powerful effects on human life and death.

I remembered Sen's story as I was contemplating what to say about death for this special issue of the magazine. His intellectual awakening exemplifies a familiar tension in public health. While we take a 30,000-foot, population-level view of mortality so that we can see patterns and advocate for policies to save millions of lives, we also recognize that each death is a profound experience for those who are left behind. The effect of a loss of a parent on the future health and wellbeing of a child, for example, can be overwhelming. And likewise the loss of a child exacts a terrible toll on parents and siblings.

It is this “right-brain” recognition that such data represent suffering and lives lost that drives public health professionals’ passion for prevention, while we use our “left-brain” analytic ability to interpret numbers and synthesize data. This combination of analysis and compassion strikes at the heart of what we’re trying to do in this special issue of the magazine. We examine the fragile balance between public health’s strengths in measuring and changing the great societal influences on health and the realization that each data point represents a human life.

As you read the articles in this issue, I know that you will be struck by the “right-brain” images, the stories of personal suffering and loss. For me, the article on “near misses”—women who almost die during childbirth—resonated incredibly because it mirrored what my first wife experienced during the birth of our first child. We were fortunate that the availability of intensive care and 15 units of packed red cells saved her life, an opportunity that women in many low- and middle-income countries do not have.

When I put on my epidemiologist’s hat, however, I know that the major influences on health and longevity may have more to do with the societies in which we live than the quality of health care we receive. Important drivers of the health of populations include factors like where we are born, what environmental exposures we experience, what our parents’ income and educational levels are, where we work, how effective our government is in responding to its people’s health needs, and how much autonomy we have in life. For example, my risk of getting malaria in the U.S. is nil because I’m fortunate to live in a society that has eliminated it.

On the other hand, I am at much higher risk of being overweight and obese living here than in some other societies because our policies promote cheap, calorie-dense foods and a built environment that inhibits walking and other physical activities as part of our daily routine.

Public health professionals, however, do not usually have the power to create jobs or change societal infrastructure. Instead, we generate evidence for how to improve health and prevent unnecessary death. These insights bring with them the responsibility to advocate for social and policy changes that make it easier for people to enjoy good health and make the right choices to avoid disease.

Our response to the recent unspeakable tragedy in Newtown, Connecticut is a poignant example of this approach. Daniel Webster, Jon Vernick and colleagues at the Johns Hopkins Center for Gun Policy and Research, with the strong support of President Ronald J. Daniels and faculty and staff from the School and the University, convened a Summit on gun policy just one month after the Sandy Hook school shootings. They brought together experts from around the world, including Mayor Michael R. Bloomberg, to highlight the evidence to prevent gun violence and to inform legislation being considered in Washington. In addition to presenting more than two-dozen policy recommendations at the close of the Summit, the experts worked with Johns Hopkins University Press to publish a book of research and legal analysis just 10 days later. It was a remarkable effort that demonstrates our commitment to bring science to decision making.

Death is an inevitable part of life. But death from preventable causes like cervical cancer, early heart disease, or gun violence is a tragedy. Whether expressed in dry, cold numbers or by the images of first graders smiling at the camera for their school picture, these tragedies will continue to motivate us to use both left-brain science and right-brain passion to improve human health and prevent unnecessary death.
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Cover photo: Suffering from heart disease, 50-year-old Nyati Sarkar ran out of a critical medication and died in her Hindu village in Bangladesh. Following custom, relatives placed *tulsi* (basil) leaves over her eyes.
*(Photo: Shehzad Noorani/August 23, 2006. 8:30 a.m.)*

*Photos above: Christopher Myers (left) and Thinkstock*
"IT WOULD BREAK YOUR HEART"

Science vs. experience in a cancer cluster investigation

Story by Brian W. Simpson, Beth Resnick & Patti Truant  Photography by Christopher Myers
Citizens united: Bob Roberson, Bill Krantz, Jim Krantz and Jennifer Peppe Hahn gather outside Fort Detrick’s Area B in central Maryland (December 11, 2012).
He calls it the best farmland in the world.

All around him, the dark soil of Central Maryland’s Frederick Valley rolls in meadows and hills over porous, fractured limestone.

On a late summer day as he stomps through grass and weeds along Shookstown Road in Frederick, Maryland, Bill Krantz says, “Take a look at the soybeans across the road. Look how big they are. You won’t see them that big in the Midwest.”

Krantz has spent most of his 79 years on the land. He swam and fished in the stream, listened to the bullfrogs croak at night, played in the shade of trees his granddaddy planted and baled countless tons of hay. Mostly though, he tended dairy cattle. “We didn’t go on vacation. We just milked,” he says.

At first glance, his pastoral Eden remains. The soybeans, the green hills and trees still stretch to the horizon, but history and geology offer a different reality. In 1944, as part of the war effort, the U.S. government claimed some of the Krantzes’ land as well as acreage from other families, dubbing it Area B. The 399 acres became part of the nearby Fort Detrick. The U.S. Army base, about 45 miles northwest of Washington, D.C., would become a center for biomedical research. From 1943 to 1969, work there would also include biological weapons development and testing.

The Krantzes occasionally glimpsed Area B’s research. They saw giant concentric circles cut into a field to measure the effect of the mysterious substances sprayed at the site. They remember smoke from burning pits rising above their houses at night. And Bill Krantz recalls the summer day in 1951 when some of his dad’s cattle suddenly died. (A recent Army report blamed an arsenic-based herbicide for the deaths of eight cows that August.)

Over the decades, Fort Detrick expanded, becoming a renowned research center and the county’s largest employer with 9,200 workers. While the base thrived, however, the Krantz family suffered repeated tragedies. Bill and his cousin Jim say that 13 of the 18 members of their extended family (in their 50s and older) were diagnosed with cancer. “My dad died of pancreatic cancer. My sister died of brain cancer. My wife died of ovarian cancer. My dog died—he was ate up with cancer. My cows had cancer. So they can’t tell me that they didn’t do something,” says Bill Krantz.

Jim Krantz points to the house Bill built in the 1970s (and lived in until his wife got sick) and two next to it and says an occupant of each had a rare blood disease. “Rare is not three in a row. Something caused that,” he says. “All three houses used well water.”

The Krantzes believe that the area’s groundwater was contaminated by the radiological materials, laboratory waste and drums of chemicals buried in Area B. Agent Orange was tested on Area B as well. According to the EPA report, a 2004 Army effort to remove contaminated

Bill Krantz links his family’s cancer deaths to chemicals buried by the U.S. Army.
American Cancer Society estimates about one in two men and one in three women will develop an invasive cancer in their lifetimes.

When investigating a possible cluster, experts analyze data to uncover unusual cancer patterns. Do cases cluster in time and space? Are there more cases of a rare cancer than expected? Are cancers striking the young or otherwise healthy? Are there known carcinogens in the area? It's a difficult task: Consider that it can take 20 or 30 years for cancer to develop after exposure.

In the interim, an individual encounters innumerable other chemicals in water, air, their diet, the workplace and so on. “We’re starting at a scientific disadvantage,” says Burke. “For instance, if we have an outbreak of a foodborne disease, you can go to the refrigerators of people and see what they ate the night before. That’s not the case for 30 years ago when there may have been environmental exposure … that would lead to increased cancer incidence in a community.”

The difficulty involved is borne out in the scientific literature. Of the more than 400 investigations of perceived cancer clusters since 1990, only 13 percent found a statistically significant increase in the cancer rate, according to a 2012 article in Critical Reviews in Toxicology. And only one investigation found a clear cause. (That investigation found that “an excess in pleural cancers” in coastal South Carolina was due to asbestos-exposed shipyard workers.)

And a CDC review of 108 investigations of perceived cancer clusters from 1961 to 1982 found that none could identify a cause, according to a 1990 American Journal of Epidemiology article.

Such long odds mean little to people like Carroll Rice, whose family, with deep roots in Frederick, has been decimated by cancer. Fourteen immediate family members have developed a rare form of leukemia, erythroleukemia. Thirteen have died from it.

“Dammit, my family alone is a cluster,” he says.

Jennifer Peppe Hahn recalls long summer days playing in a natural spring in her friend’s backyard just east of Area B. From when she was a young girl until she got sick at age 12, Hahn and her friend splashed in the water, drank lemonade and invented adventures for their Barbies. They also may have been exposed to tetrachloroethylene (PCE) and trichloroethene (TCE).

In 1997, the Army found that levels of PCE (a chemical solvent linked to breast, lung and other cancers) spiked at 20,000 parts per billion (ppb) in the spring though the level returned to less than 1 ppb a month later. (The increase may have been caused by nearby excavation work in Area B.) The EPA’s maximum contaminant level of PCE for drinking water is 5 ppb. Hahn thinks the chemicals were in the spring long before monitoring began. Had she been warned, she says, she might not have become sick.

Hahn, now 39, was diagnosed with
Hodgkin lymphoma in 1985 and suffered through a year of treatment that included radiation and the removal of her spleen. She later developed breast cancer. “I’ve spent my whole life getting very sick and in and out of the hospital,” says Hahn. “Now I have tumors in my thyroid. I have a mass on my pancreas that gets biopsied every six months, and I have no breasts. And I believe that this was all caused by environmental exposure that nobody will even do any critical thinking long enough to look into.”

For decades, people in Frederick appreciated the base’s economic engine but were wary of its secret work. Although bioweapons research ended in 1969 by order of President Richard Nixon, biomedical research by the Army, other agencies and companies continues at the base today.

Concern about the environmental exposures from Fort Detrick increased in April 2009, when the EPA added Area B to its National Priorities List (NPL), part of the Superfund cleanup program. The NPL designation initiated a raft of meetings, investigations, studies and remedies that will likely play out over more than a decade.

By June 2010, worry about a possible cancer cluster had spread through Frederick. Started by a concerned family, the Kristen Renee Foundation (KRF) began mobilizing people. It held large public meetings, placed newspaper ads and later conducted its own cancer survey.

After hearing the community’s concerns, Frederick County health officer Barbara Brookmyer, MD, MPH ’94, launched an investigation with the Maryland State Department of Health and Mental Hygiene (DHMH). In August 2010, she began a series of community meetings. At the first meeting, people vented decades’ worth of frustration for more than three hours. Brookmyer’s staff wrote down every question, solicited answers from the Army and other agencies and posted responses on the Department’s website. She also formed a Technical Advisory Committee (TAC) of concerned individuals like Hahn.

Clifford Mitchell, MD, MPH ’91, MS, director of the DHMH’s Environmental Health Bureau and a former Bloomberg School faculty member, analyzed data from the Maryland Cancer Registry, which collects cancer incidence information and patient demographics. “You’ve got specific addresses, you’ve got specific diagnoses and you’ve got really good clinical information,” he says. Without the registry, it would be almost impossible to know specific cancer rates (number of cases divided by the population at risk) in Maryland—and thus ascertain whether the rates near Fort Detrick are unusual.

However, like all cancer registries, the Maryland database has limitations. It does not, for example, track cancer cases before its 1992 inception. This concerned some residents because the registry would not include people who may have been exposed to carcinogens in the 1940s and 1950s and died from cancer by the 1980s. Hahn believes the registry misses the years when the cluster would have been most evident. “Just because there wasn’t enough efficiently available data does not mean there was not an issue,” Hahn says.

Mitchell acknowledges the issue but says there is no practical way to identify all the cancer cases from that era, track down people who have died or moved away, gather their health histories, determine population details, etc. The registry data, he says, is still the best data source given the circumstances.

While Mitchell pored over the data, KRF began to amass its own. Randy White, who founded KRF and named it after his daughter who died of cancer in 2008, says they spent more than $300,000 on a survey mailed to 30,000 people near Fort Detrick. From 15,000 responses, they said they learned of 1,200 cancer cases within 10 miles of the Fort. Although it was based on self-reported data (which is far from the scientific gold standard), the finding raised alarm among the public.

Brookmyer points out, however, that number is not remarkable given how many people were at risk. In fact, she says the cancer registry documented 1,059 cases within a 1-mile radius of Fort Detrick in just eight years. “If we’re talking about collecting cancer information spanning 40 years you’d expect in this area there would be more than just a 1,000 cases,” says Brookmyer. “So that’s one of the challenges: to make good use of the data and to be able to understand the rate.”

The Way Forward

I vividly remember speaking with the parents of childhood leukemia victims in New Jersey in 1978. These were parents who lost their kids. They had a tremendous sense of loss, a tremendous sense of anger and suspicion about industry, about exposures, about things that may have contributed to that cluster.

At my first public meeting, there were hundreds of people jammed into this grammar school auditorium. As I began to say what we would do, a woman stood up and said, “Mr. Burke, I don’t care what you’re going to do. You’re never going to bring my baby back!” It stopped the meeting. She stormed out crying.

Having been in a family where there have been people I love who died, I can understand the human part of that, but I also had to be an epidemiologist, a scientist responding to communities.

We have to have a way to scientifically move forward. What we can do is do the best investigations possible so that if we identify risk factors, we reduce the risk for future children, so they won’t be lost. And that’s the promise of the future. We know there are environmental exposures from Fort Detrick. It held large public meetings, placed newspaper ads and later conducted its own cancer survey.

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The long-awaited October 2011 report from DHMH and the Frederick County Health Department (FCHD) found that there were no statistically significant increases in specific types of cancer within 1 mile of Fort Detrick—except for lymphoma. Rates for lymphoma near Fort Detrick were higher than Maryland’s rates, but not higher than Frederick County’s, she says, adding that lymphoma rates will continue to be scrutinized as new data become available.

Few in the community were satisfied. “It is the saddest thing I’ve ever witnessed. You’ve got the state of Maryland trying to put together evidence that there is no cancer cluster,” says White. “I think it’s all smoke and mirrors to protect their ass. I think there’s a day of reckoning coming because the citizens of Frederick are tired of the song and dance, the pony show.”

Mitchell understands people’s frustration. They want to know if a specific exposure caused the cancer that’s afflicted them, and he can’t say for sure. “Sometimes it might be a family that has a genetic risk. Sometimes it might be that they are people who are very long lived and so they might have died of other causes, but they didn’t. … And after a while nature takes its course—something happens, and oftentimes that’s cancer,” says Mitchell. “At the end of the day, I can’t answer the question, ‘Can you promise me that this wasn’t an environmental exposure?’ What I can say is, this is what we know, this is what we don’t know. And I have to admit the limits of my own knowledge.”

From the front porch of his hilltop house, Bob Roberson can see Area B. The view may be idyllic, but Roberson is worried about what is below the ground, what chemicals may taint the groundwater and make their way into his home’s 500-foot deep well. He says the Army has tested his well water and deemed it safe. Roberson has his doubts, but he drinks it.

“I just hope the day doesn’t come when something down there gets out and we all regret that something wasn’t done before. I firmly believe that’s a possibility, and I don’t want to see that happen,” he says.

He was disheartened by the cluster investigation, but he continues to meet with Brookmyer and other TAC members. They are launching a case control study that compares cancer incidence among former students of an elementary school near Area B with those from another school farther away. He’s not optimistic. “I don’t think there’s ever going to be an answer of, yeah, Detrick caused these cancers,” says Frederick resident Bob Roberson.

In March 2012, a National Academy of Sciences committee essentially agreed with Roberson in its review of the cluster investigation and a 2009 report on Area B’s groundwater by the Agency for Toxic Substances and Disease Registry. The committee found there was simply not enough historical data on exposures and cancer incidence to determine whether or not people’s health was harmed by toxins from Area B’s groundwater. Given that lack of data, the experts said, additional studies “would not be useful.” DHMH and FCHD, meanwhile, will continue to examine lymphoma and total cancer rates in Frederick as more recent data are added to the Maryland Cancer Registry.

Editor’s note: This article is based on research conducted for “Fort Detrick, Maryland: A Case Study of Disease Cluster Investigations,” by principal investigator Beth Resnick, MPH; MPH student Brian W. Simpson; and PhD student Patti Truant, MPH.
When I received the invitation to contribute to this magazine on the topic of death, a flurry of ideas came… and went.

As a clinician and a public health grad, I could have written about health care, death and dollars. All tired topics, all underwhelming. So I decided not to write anything at all.

Until this morning.

I live on a small farm in Maryland with my girlfriend and two dogs. During their early morning walk, the three of them spotted a badly wounded buck inside our field. (For readers abroad, buck is the American term for male deer.) His hind leg had been mangled, likely by a car. He was in pain and terrified. The dogs were beside themselves, overwhelmed by curiosity, territorialism and the smell of blood.

I was urgently summoned to help contain the dogs and deal with the buck. Grabbing my field jacket and cowboy gloves while still in my pajama pants, I marched with total detachment and strong determination (indispensable personality traits for surgical types like myself) toward the far end of the field to assess the situation. I was convinced it could not possibly be as bad as my girlfriend was describing it. I was wrong.

Wounded, trembling, exhausted and with labored breathing, the poor animal raised himself, wobbling back and forth from one end of the field to the other, with me in comic pursuit on the slippery, frosted grass. It was clear the deer needed to be corralled somewhere before we could decide what to do.

Once cornered in the most remote area of the field, the desperate buck looked at both of us and made a final run for the fence, managing to get his head and single antler trapped in the railing. Gently, while leaning my body against his to prevent further damage—to him or us—we lassoed and disengaged his head. Then we walked him like a dog on a leash for a few yards before he fell to the ground, unable to get up.

That’s when the discussion started. I should clarify that my girlfriend has been an orthopedic surgeon for many years, and I have practiced cardiac surgery most of my professional life, so we have strong opinions and a good understanding of what is fixable. She argued for euthanizing him. I contended—I have no idea why, because she was right—that given a safe place, water, wound care and antibiotics, perhaps he could be saved. Obviously, I was no longer objective.

The argument continued, with the buck still lassoed on the ground, until I heard myself saying in a self-delusional but nevertheless convincing tone: “I will not kill this animal as long as there is hope for him to recover.”

Then I added: “He must be thirsty after all the struggle so at least let me get some water before I decide what to do.”

My girlfriend, now late for an appointment, had to leave. Meanwhile, I grabbed a shallow container at the house and collected water from the nearby creek.

When I got back, I realized the deer’s condition had deteriorated. His breathing became faster and deeper. Then it stopped. I stood beside him, in my pajamas, with a water container in my hand, watching life come to its end, feeling awful about my inability to do something else for the beautiful young buck with one antler, on the far side of the field.

It struck me then how often I found myself in similar situations, standing by a patient, in my surgical pajamas, watching life slip away, feeling awful about my inability to do something else; maybe one more drug, one more test, one more procedure.

I couldn’t help thinking that perhaps when my own end is near and inevitable, all I really want, all I will really need is a compassionate human being to order one less test, one less procedure, while taking the time to stand by me and help me take that last sip of water before I die.

Marcelo Cardarelli, MD, MPH ’06, is the former director of pediatric cardiac surgery at University of Maryland and scientific advisor to a health information technology company. He lives in Lutherville, MD.

Read on: More than two dozen alumni responded to a magazine challenge and contributed remarkable essays and poems about death and life. magazine.jhsph.edu/extras.
Demographer Vladimir Canudas Romo uses beautiful equations to study living populations.

THE MATHEMATICS OF MORTALITY

INTERVIEW BY MARYALICE YAKUTCHIK
PHOTO BY MICHAEL DAUGAARD
Is the big increase in life expectancy in the last 160 years attributed to reduced child mortality?

The first “big steps for humanity” occurred when child and infant mortality started to reduce, and the demographic and epidemiological transitions started their long road of change.

For developed countries until the 1950s, changes in infant mortality were the main reason [behind] the life expectancy change. Today, improvements at older ages [are why] we keep gaining years of life. For many developing countries, reducing infant mortality will give them many extra years. A population that has a life expectancy around 40 is actually divided into two big groups: those that die in the first years of life and those that not only make it to 10 but will likely reach a life span of around 70.

Can you explain the gender gap in life expectancy?

Life expectancy for females is probably about four to five years higher than that of males. Japanese females—who live, on average, longer than anyone else—have a life expectancy of 86.5, compared to Japanese males, at 79.5.

It was just recently, probably in the first decade of the 21st century, that life expectancy for females passed that of males in every single country in the world. In some countries, female life expectancy had been lower than, or about the same as, that of males. Indian females, for example, passed their male counterparts in terms of life expectancy in the early 2000s. But still, if you go to certain Indian states, there is higher mortality among females than males at ages below 5. Biologically it would be hard to explain [that] since in other populations, females have lower mortality at every single age compared to males. Are we then observing some sort of sex preference for boys over girls in terms of care of children under 5? Life expectancy aggregates all the mortality information. So even though there are certain ages in India where females have not surpassed males in terms of survival, life-expectancy-wide they have.

Tell us about another pivotal moment in demography.

In terms of mortality alone, it was an exciting moment when the United Nations declared it wouldn’t put any more ceilings on life expectancy projections. It may not seem groundbreaking to many, but for demographers like me who are called to look at projections of populations, it made us realize a few things. Among them was that life expectancy has been very badly predicted, and so too future population.

What do demographers base their predictions on?

We look at mortality, fertility, population growth, migration, mathematics and change. Permanent change. Demography is a moving target. To study it, we use lots of mathematical methods and beautiful equations.

Tell us about a project you’re working on now.

I come from Mexico, and one of the things that interests me is how many years of life expectancy have been lost due to violence resulting from almost a whole decade of tragic atrocities. Many of these deaths are among young people, so also, I wonder about how much of the workforce in Mexico has been lost because of violence.

You teach a course in mortality. What do your students learn?

Mortality is probably the best predictor of how healthy your population is. If you have exact numbers that tell you the ages people were when they died, then you have the information that you need to determine the health of that population, namely its mortality level.

My students address questions like: How will life expectancy change if HIV is eliminated? How many years of life are lost in a population because of smoking? Can you come up with a whole mortality pattern for a country that has only a little information on infant mortality and no census data or vital statistics?

I couldn’t, but I bet you could.

Well, I can give you a guess! 🍀
After learning that suicide recently had surpassed motor vehicle crashes to become the leading cause of injury deaths in the U.S., Holly Wilcox, PhD, set out in search of specifics.

She knew the kinds of questions she wanted answered. Are males or females largely responsible? Is there an increase among certain ethnicities or age groups? What methods did they use?

Identifying both the who and the how behind the 38,364 suicide deaths reported by the CDC in 2010 is vital to prevention efforts, says Wilcox, a School of Medicine assistant professor with a joint appointment in Mental Health at the Bloomberg School.

Working with a team led by injury prevention icon Susan Baker, MPH ’68, Wilcox teased apart various threads of the data to learn the specifics behind the 16 percent increase in suicides during the previous decade. Among the trends revealed in the November 22 American Journal of Preventive Medicine:

• Suicide by hanging rose by 52 percent—the greatest increase of any method. Rates rose by 19 percent for suicide by poisoning but remained flat for suicide by firearm, the predominant method for all ages.
• The rate of suicide among people ages 45 to 49 increased by 39 percent, the most of any age group.
• Rates for suicide among females increased faster than for males.
• Rates for whites, Asians and Native Americans rose by 20, 12 and 10 percent, respectively, while rates for blacks decreased by 6 percent.

“I just knowing that the rate of suicide
has increased doesn’t tell us a whole lot,” says Baker, a Health Policy and Management professor and the founding director of the Johns Hopkins Center for Injury Research and Policy. “We need to understand the detailed epidemiology for insight into the causes, and to know where to focus prevention efforts.”

Baker explains that effective prevention strategies reduce access to the means that individuals use for suicide—availability of handguns, for instance. Innovations such as fingerprint recognition systems on firearms can be used to save many depressed teens, she adds.

“Focusing on the means and methods of suicide is a logical and successful approach,” concurs William Eaton, PhD, the Sylvia and Harold Halpert Professor and Chair in Mental Health. “Why? Because, although lots of people don’t believe it, suicide is so often impulsive.”

Eaton relates an anecdote about a young man who survived jumping off the Golden Gate Bridge. The instant after jumping, he realized it was the worst decision he had ever made. After his miraculous survival, he went on to lead a long, productive life. The point: Restricting the means for suicide saves lives. Successful interventions include barriers installed on bridges, reduced emissions standards for cars and modernized gas ovens that cut out when there is no flame.

Public health can save more lives, says Wilcox, by emphasizing early intervention. The goal is to alter the trajectory of risk well before individuals pose any danger to themselves.

Currently, there’s no gold standard method for identifying those at future risk of suicide, says Wilcox. However, a proactive screening tool for suicide risk called the Columbia Suicide Severity Rating Scale is being used in several military and clinical settings, including here at Johns Hopkins. The task of screening is complicated because of the multitude of risk factors, few of which are exclusive to suicide. For instance, although the overwhelming majority of people who take their own lives have depressive disorders, only a fraction of people with depression ever attempt suicide.

“It’s difficult to predict which individuals will die by suicide,” Wilcox says, adding that this argues for deploying a coordinated range of screening and intervention strategies. “The recognition and treatment of mental illnesses like depression help to enhance resilience, needed at all ages to cope with the unavoidable stresses of life.”

Universal prevention programs can affect suicide risk factors, according to Wilcox. With Sheppard Kellam, MD, she investigated the fates of young adults who had participated two decades ago in a behavior management method called the Good Behavior Game. (Described by others as a “behavioral vaccine,” the game targets aggression and disruption by treating the classroom as a community. It was implemented in 1985 in 41 first-grade classrooms in Baltimore City schools.)

Wilcox’s research, published in 2008 in the journal Drug and Alcohol Dependence, found that students who had played the game were 50 percent less likely to report suicide ideation in young adulthood and 30 percent less likely to report a suicide attempt.

“It taught kids to self-regulate and that their behavior had consequences that affected others,” she explains.

Given that finding, the Good Behavior Game was cited as a promising program in the newly revised National Suicide Prevention Strategy.

The recent rise in suicide rates emphasizes the need for all to be vigilant and proactive at a personal level as well, Wilcox says. If you think someone might be suicidal, it’s important to ask him directly, she advises.

“And if someone is suicidal, she should not be left alone and should be connected with mental health resources such as a crisis line or an emergency psychiatric assessment,” she says.

The key is to get the person through the crisis. Wilcox says: “If they have the chance to take a deep breath and think about it, there is hope.

“However, the ultimate goal is to prevent not only the crisis moments from happening but also all the stuff—the mood disorders and the alcohol and drug abuse, for instance—that lead to these moments.”

Mom’s Second Chance

My mother, Kathy Webster, was an amazing woman. She held our family of seven together though she struggled with bouts of depression and anxiety through much of her adult life. Her mental health worsened in 1983, soon after both of her parents died. Seeing no way out, she drove her car into the Ohio River. Thankfully, a brave young man dove into the river and saved her.

Following her suicide attempt, my mother was treated for depression; she awakened spiritually and shored up a frayed relationship with my father. She lived another mostly happy 27 years, welcoming five grandchildren to the family. In 2010, when she was very ill, she sensed that she was nearing the end of her life. “But it’s okay,” she said, “I’ve lived a good life because I married a fun man.” Mom hung on long enough to attend the wedding of her first grandson before leaving this world.

I will forever be grateful to the man who rescued my mother from the river. I’m also thankful that there were no guns at home when she felt so desperate. Even the most talented surgeons can rarely rescue someone who attempts suicide with a gun.

Some believe that if a person wants to take their own life or someone else’s, it is fruitless to limit their access to a gun. My research and personal experience suggest otherwise.

Daniel Webster, ScD ’91, MPH, is a professor in Health Policy and Management and directs the Johns Hopkins Center for Gun Policy and Research.
“Enough is enough. It’s time for Congress and the White House to put public health above special interest politics. And it’s time for Congress to stop gagging our scientists, military leaders, and law enforcement officers and stop trying to hide the truth from the American people.”

—Michael R. Bloomberg, Mayor of New York City and Co-Chair of Mayors Against Illegal Guns

Less than a month after the idea surfaced, the two-day Summit on Reducing Gun Violence in America: Informing Policy with Evidence and Analysis convened in mid-January and yielded not only policy recommendations but also a published book.

More than 450 people attended and thousands more watched on the Web and C-SPAN as U.S. and international gun policy experts presented research and personal experiences about gun violence and its prevention. New York City Mayor Michael R. Bloomberg, Maryland Gov. Martin O’Malley and Johns Hopkins University President Ronald J. Daniels opened the Summit.

Since its close, Summit organizers Daniel Webster and Jon Vernick, along with Stephen Teret, of the Johns Hopkins Center for Gun Policy and Research have handled numerous media interviews and requests from policymakers interested in improving gun laws. “I’ve been working on this issue for 22 years and I’ve never seen the ground shift so quickly, creating an opportunity to make change,” says Webster, noting the December 14 Sandy Hook school tragedy changed the public’s attitudes toward gun violence as well as the political dynamics.

The breadth of papers and topics presented at the Summit addressed key policies as well as new ideas that merit federal and state policymakers’ attention, says Webster. The experts’ research was almost instantaneously published in a 320-page book/e-book by Johns Hopkins Press (see below) that was delivered to every member of Congress.

As they propose policies to stem gun violence, policymakers want solid evidence, expertise and experience behind them, Webster says, adding that nothing says credibility more than a group of world experts.

As the Summit’s aftermath continued swirling around him, Webster stole a moment for reflection: “This is why people gravitate to public health. There’s an aspect of intellectual curiosity. But a far bigger driver is, you want to make an impact.”


By Maryalice Yakutchik  Photos by Will Kirk
"We want to use this opportunity to cut through the din of the shrill and the incendiary, the rancorous and the baseless, by identifying specific recommendations that evidence-based analysis shows will work."

Ronald J. Daniels, President, The Johns Hopkins University

"Our gun laws make it easy to profit from selling guns to criminals and traffickers. Universal background checks and strong regulation of gun dealers reduce the flow of guns to criminals."

Daniel Webster, Director, Johns Hopkins Center for Gun Policy and Research

"I hope that some kind of bipartisan solution [like Australia’s] can be found for the U.S. and will enable policies to be based on what actually will save lives rather than anything to do with money or politics."

Rebecca Peters, Surviving Gun Violence, Australia

"Those of us who lost children at Dunblane were deeply shocked by the shooting at Sandy Hook. I wish you strength, and I wish you success in improving the gun laws in this country."

Mick North, Advocate, Dunblane, Scotland

"The United States is not a more violent nation than other high-income nations. We are not more violent but when we’re violent, we kill. With guns."

Matthew Miller, Harvard School of Public Health

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BULLET POINTS GUN USE IN THE USA

GUNS CLAIM MORE THAN 31,000 LIVES EVERY YEAR IN THE U.S.

THE U.S. FIREARMS HOMICIDE RATE IS 20X HIGHER THAN THAT OF OTHER ECONOMICALLY ADVANCED NATIONS.

MORE AMERICANS UNDER 40 DIE FROM GUNFIRE THAN FROM ANY SPECIFIC DISEASE.

89 PERCENT OF AMERICANS SUPPORT BACKGROUND CHECKS FOR ALL GUN SALES.

TWICE AS MANY U.S. KIDS DIE FROM GUN INJURIES AS FROM CANCER.

1 PERCENT OF U.S. GUN DEALERS SOLD MORE THAN HALF OF GUNS USED IN CRIMES.

61 PERCENT OF FIREARMS DEATHS IN THE U.S. ARE SUICIDES.

Data Investigations

Road Work Ahead

For many working in public health, economic development is a wind at their back. As incomes rise, for example, the incidence of infectious disease tends to diminish.

But for the experts at the Johns Hopkins International Injury Research Unit (IIRU), economic development sometimes creates dangerous headwinds. This is particularly true of road traffic injuries. “As development proceeds, you have more roads, but not necessarily safer roads,” says JH-IIRU director Adnan Ali Hyder, MD, PhD ’98, MPH ’93. “So you have roads where people actually drive faster and not necessarily safer.”

Hyder first became interested in road traffic injuries (RTIs) 20 years ago as a young physician in northern Pakistan, where he treated many motor vehicle–related injuries. RTIs kill more than 1.2 million people annually. Yet they attract far less attention than HIV or malaria, a gap that Hyder set out to fill.

Hyder established IIRU to collect data and train new practitioners. One of the Unit’s major projects is a multicountry collaboration with other institutions called Road Safety in 10 Countries Project (RS-10), supported by Bloomberg Philanthropies.

RS-10 has already yielded new data on the prevalence of seatbelt use and speeding rates in major developing countries that had not been previously available. In Kenya, where the project also addresses trauma care, IIRU has identified key areas for improvement, developed a trauma care registry and helped strengthen trauma care legislation.

And IIRU has trained more than 550 individuals worldwide—from researchers, to health specialists, to transportation professionals, to data collectors. IIRU is now in the process of developing a free online training program to reach many more, says Hyder.

“The other thing that is happening as a result of this project is that health [researchers are] working very closely with police and transport, and that has not traditionally happened much,” says Hyder, adding that this cross-sectoral collaboration is important to any project seeking to improve global road safety in the future.

—Ted Alcorn

The Virtual Patient

If mice and rats were fortunetellers, we’d fire them. They only succeed in predicting whether a drug will be found toxic to humans 43 percent of the time—yet animal testing is the backbone of our safety system. Little wonder, then, that adverse drug reactions cause the death of one in a hundred hospitalized patients.

Thomas Hartung, MD, PhD, director of the Hopkins Center for Alternatives to Animal Testing (CAAT), says he’s on to an approach that’s better for people and animals.

The trouble with animals is “they can hardly substitute for the variety of humans,” says Hartung, the Doerenkamp-Zbinden Endowed Chair in Evidence-Based Toxicology. Our sensitivities morph over time, and many people, especially the elderly, take several drugs at once. When vetting a single substance can require $10 million to $20 million with traditional toxicology tests, vetting combinations simply isn’t affordable.

What’s the alternative? Studying human toxicity in human cell systems, one pathway at a time. As a test case, Hartung is exposing induced pluripotent stem cells to chemicals suspected of leading to autism early in life. “We only get one small piece of info,” says Hartung, but his approach—identifying critical molecular interactions—yields insights that apply readily to new challenges.

Ultimately, Hartung’s vision is to compile a catalog of human toxicology to guide therapy decisions. Someday, he says, “[when] you come to the hospital, an avatar will be produced, with all of your genetic background, your disease, your physiology, your body weight.” Doctors will use this computer-based avatar to simulate treatments—heading off adverse drug reactions and fine-tuning dosages.

“The virtual patient project… will be a very big job,” he recently told the Dutch journal Medicines, “but I don’t think it belongs in the world of science fiction.” In fact, CAAT has been working with more than 140 other organizations to create a sophisticated virtual patient.

—Rebecca Widiss
The Health Zone
In 2008, Jacky M. Jennings (right), PhD ’03, MPH ’98, and Rachel J. Thornton, MD, PhD ’04, took on an unusual mission: Find ways to tweak Baltimore City’s proposed zoning code to improve health and save lives.

The researchers, both assistant professors in Pediatrics at the School of Medicine, worked with Baltimore City officials on a health impact assessment (HIA) of the proposed major revision of Baltimore’s zoning.

Reducing violent crime—a major cause of death in the city—was a top priority. The researchers found several studies noting the strong connection between the location and density of liquor outlets and increased violent crime.

In the world of zoning, “mixed-use” development is usually desirable, but the HIA found that the new code’s proposed increase in mixed-use zoning could lead to more alcohol outlets. So Jennings, who has a joint appointment in Epidemiology, and Thornton recommended decreasing the concentration of outlets.

Some of the researchers’ recommendations became part of the comprehensive rewrite now under consideration by the Baltimore City Council. Their work includes a provision to prevent new liquor outlets within 300 feet of existing ones, and another to give 98 liquor stores in residential areas two years to relocate, close or stop selling alcohol. The City Council is expected to vote on the new code by late 2013.

Earlier in the process, when the number of affected outlets was estimated at 128, a “crimes averted analysis” suggested that the new policies had the potential to prevent 871 violent crimes over two years—a 31 percent reduction—in the 300-foot areas around the closed outlets.

But Thornton and Jennings say what’s most important is that public health researchers, planners, and health department officials are at the table together, looking ahead for opportunities to evaluate long-term policy impacts and demonstrate how zoning can be used to promote health.

—Rachel Wallach

Clues to Longer Living
“How long will I live?”

It is a tantalizing question, and one for which there is rarely a satisfying answer until it is too late. Now a group of Bloomberg School faculty and students is teaming up with an insurance giant to try to get answers, by collaborating on a study of mortality of unprecedented scale and scope.

The academic researchers are interested in understanding past increases in life expectancy so they can anticipate future increases, says Gerard Anderson, PhD, a professor of Health Policy and Management who is leading the group.

For the insurer (which did not want to be identified) a data-driven understanding of mortality may improve its decision making in a number of important ways. The results could also have profound implications for the Social Security and Medicare trust funds. A one- or two-year difference in Americans’ life expectancy in 2025 and beyond will have major implications for how long the trust funds will be solvent, says Anderson.

The insurance giant has made a unique dataset available to the researchers: records of the 14 million current and former policyholders, with all personal identifiers removed to protect privacy. “Nobody has ever had this large a dataset looking at mortality from a research point of view,” says Anderson, “so we’re kids in a candy store.”

Even more important than the dataset’s breadth is its collective depth. It contains remarkably detailed information from driving records to minutia like whether or not policyholders are scuba divers. “All the other datasets have limitations,” says Anderson. “This one has all the pieces.”

While the researchers are still a year from publishing any results from the partnership that began in March 2012, Anderson is confident the findings will be important. “We’re going to be able to predict in much better specificity and much better ways how long people are going to live,” he says.

—Ted Alcorn
What separates mothers who die from those who survive?

Story by Cathy Shufro  Photography by Nana Kofi Acquah and Cathy Shufro
Waiting to deliver, Veronica Arhin joins new mothers in a maternity ward in Ghana, where maternal mortality is 22 times higher than in developed countries (January 9, 2013).
The handwritten notes in the hospital logbook are sparse, but they tell the story of how a woman named Amina Seidu nearly died giving birth at one of the best hospitals in Kumasi, Ghana.

Seidu (whose name has been changed to protect her privacy) lives in a dusty settlement of cinderblock family compounds clustered beside a green-roofed mosque on the periphery of Ghana’s second-largest city. In one of those compounds, she shares two rooms with her husband and their daughters, 8 and 4.

On a late summer afternoon, she serves visitors water from a hand-cranked well and tells how her fourth pregnancy nearly killed her.

Labor pains woke her before dawn one morning last May, says Seidu, a 29-year-old woman with broad cheekbones and a turquoise floral headscarf. For this baby, she tells how her fourth pregnancy nearly killed her. "God gives and God takes away,” she says.

If Seidu had followed her son to the grave—and she came close—she would have been among the hundreds of thousands of women whose deaths cut a red swath across the world map in a recent Lancet assessment of maternal mortality. UN Millennium Development Goal 5 calls for a 75 percent reduction in maternal deaths between 1990 and 2015. The red on the Lancet map indicates countries that, at current rates, won't reach that goal by 2015, or by 2025, but rather after 2040. Red covers most of Latin America and the Arabian Peninsula, much of Central and Southeast Asia, and nearly everywhere in Africa south of the Sahara. More than half the women who die from pregnancy-related complications worldwide are Africans, according to WHO.

In narrowly avoiding death, Seidu became what researchers call a “near miss”—a woman who nearly dies because of complications of pregnancy or birth. While the study of maternal death has long been a public health priority, researchers are increasingly studying near misses. They hope this research will help forestall severe complications, improve care when complications do occur and increase their understanding of what leads to deaths.

"Maternal mortality is 'the tip of the iceberg,'” says Michelle Hindin, PhD '98, MHS '90, an associate professor in Population, Family and Reproductive Health (PFRH) at the Bloomberg School. "Women who nearly die but survive are much more common, and their needs are not being addressed.”

Near misses almost always occur in clinics and hospitals; medical interventions are what prevent crises from becoming deaths. However, the health care facility is a "black box,” says Özge Tunçalp, MD, PhD '12, who studied near-miss cases globally and in Ghana for her doctoral work with Hindin.

Near-miss researchers look inside that box both to suggest improvements as well as learn about maternal mortality. The circumstances and events that lead to a near miss resemble those that end in a death, says Tunçalp, who now works for WHO in Switzerland. A woman in a life-threatening condition will become either a maternal near miss or a maternal death; the distance between the two is “a thin line,” says Tunçalp.

Numbers for near-miss cases also can serve as “proxy indicators” for maternal mortality, which is likely underestimated because one in three women in developing countries gives birth without medically trained attendants, and deaths at home often go unreported. Because near misses occur in clinics and hospitals, however, researchers capture them all.

Although interest in near-miss research dates back to the 1990s, it wasn't until 2009 that WHO defined a near-miss case as “a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy.” Linda A. Bartlett, MD, MHSc, an associate scientist in International Health, served on the WHO working group that defined near miss. She also helped develop the WHO data collection form for near misses. And Tunçalp was one of the first scientists to use the tool in sub-Saharan Africa.

Tunçalp did her research at Korle Bu Teaching Hospital in Accra, the capital of Ghana. The relatively prosperous West African country reduced its maternal mortality ratio per 100,000 live births from 550 deaths to 350 deaths from 2000 to 2010. Still, Ghanaian women face a risk of maternal death 22 times that of women in developed countries.

"Even though the numbers are going down, we are still losing a number of women,” says Tunçalp’s Ghanaian colleague, Kwame Adu-Bonsaffoh, MD, a senior ob-gyn at Korle Bu. He, Tunçalp and colleagues prospectively analyzed medical records for 3,438 pregnant women who passed through
Even though she went to a referral hospital for delivery of her fourth child, Amina Seidu is lucky to have survived.
Korle Bu during five consecutive months beginning in fall 2010. They found that 94 of those women were near misses (while another 37 died). Of the 94 women who nearly died, 29 suffered from severe pre-eclampsia (pregnancy-induced hypertension coupled with protein in the urine). All but one of the women who developed eclampsia received the recommended treatment, magnesium sulfate.

Care was not as good for women with life-threatening bleeding or infections. Of the 121 women with severe postpartum hemorrhage, Tunçalp found that only 67 percent got medications like oxytocin that can slow or stop bleeding. She also found that among 32 women with sepsis, a life-threatening response to infection, only 40 percent got intravenous antibiotics. Fewer than half survived. “Even the doctors at the facility didn’t realize that there was such a big issue with sepsis,” says Tunçalp. “If you look at cases one by one and then don’t look at the aggregate data and the trends, it’s really easy to miss even if it’s happening in front of you.”

When women endure a near miss, Hindin says, “it impacts their whole life: their family life and their ability to work. It may impact their future childbearing. Women who experience near misses often have serious complications that have long-lasting physical and mental health outcomes. These women need health care services, and monitoring near-miss rates will help governments and ministries of health plan better.”

Qualitative studies can help with this, particularly because women who survive life-threatening complications live to tell the tale. Tunçalp and Adu-Bonsaffoh interviewed 32 of the women from the larger study. “At first they are very happy and very grateful because they are alive,” recalls Tunçalp. “But then you probe them and ask them how they were treated, and all the staff-related issues or physical environment issues come out.”

The women’s testimony pointed out both interpersonal and structural problems not evident from morbidity and mortality data. Some women complained about disrespect from the hospital staff. A 36-year-old woman who nearly died described being ignored by the midwives: “They don’t attend, even when you are crying and the baby’s head is coming. They’d be sitting down and chatting and laughing at you.”

A 34-year-old woman who lost her baby and whose uterus ruptured after a 24-hour labor didn’t find out until 12 days later that she’d had a hysterectomy. As a physician told her, she began to cry, fearing her boyfriend would leave her because she could no longer have children.

Several women objected to recovering from surgery while lying on a mattress on the floor. (Patients often outnumber beds and end up on the floor.) One woman was incredulous that the ward had no water. (While Tunçalp was at Korle Bu, the water in the maternity block stopped working for several days.)

Tunçalp’s next step is to return to Ghana and share her results with the managers of the ob-gyn department at Korle Bu. She will recommend that they audit near-miss cases to assess the quality of care and solve problems. Whereas most U.S. hospitals schedule frequent morbidity and mortality conferences, the only systematic assessment of maternal care at Korle Bu is a monthly review of deaths. Discussions of near misses have the advantage of being less fraught than discussions of deaths, says Tunçalp. “It’s easier to talk about what went wrong when you know at the end of it the woman actually survives,” she says.

Tunçalp will also recommend that the hospital work to improve the system for referring and transporting women to Korle Bu from other facilities. Ghanaian public health researcher Easmon Otupiri, PhD, MPH, MSc, agrees that delays in referrals constitute the biggest barrier to good emergency obstetric care in Ghana.

Several roadblocks (besides the rough roads themselves) stymie efforts to move a woman with a complication from a local health post to a referral hospital with specialists and a blood bank. The most obvious problem is a lack of ambulances.
staffed by skilled technicians, says Otupiri, a professor of community health at the medical school at Kwame Nkrumah University of Science and Technology in Kumasi (and a former Gates Visiting Scholar at the Bloomberg School). Another challenge: communication. When a patient with complications is moved to a higher-level hospital, doctors and nurses must use their personal phones to call an acquaintance at the destination hospital. If the colleague’s phone is out of order, the call doesn’t go through.

And women facing life-threatening emergencies sometimes wait on gurneys in the hallway while less-urgent cases enter the OR, Otupiri says, adding “we don’t seem to have a well-organized system of who goes in when.”

Complicating triage is “a mal-distribution of cases,” says Roderick Larsen-Reindorf, MD, an ob-gyn at Kumasi’s main referral hospital, Komfo Anokye Teaching Hospital. “We have a huge mix of normal labors that a midwife could have handled in an outside hospital, combined with a huge number of complicated cases. Our midwives can be overwhelmed with numbers,” says Larsen-Reindorf, adding that five midwives sometimes must manage 25 women in labor.

PFRH associate professor Cynthia Stanton, PhD ’96, MPH, points out that the “brain drain” contributes to a shortage of midwives. “Particularly in Anglophone countries [which include Ghana], the U.S. and the U.K. have been poaching nurses for many years,” says Stanton. “It’s really a crisis in many countries.”

Better family planning could reduce maternal mortality. As Larsen-Reindorf puts it, “If a woman doesn’t get pregnant, she doesn’t die of it.” Tunçalp reports that although most women she met wanted contraceptives, many went home without them. That’s what happened to Amina Seidu in Kumasi. Not only did she leave the hospital without contraception, but she was told that she could try to conceive again in six months.

Seidu’s situation disturbs Amy Ong Tsui, PhD, MA, director of the Bill & Melinda Gates Institute of Population and Reproductive Health, on two counts. First of all, “she should have left with some kind of contraception, that’s for sure,” says Tsui, a PFRH professor. The story does not surprise her, however; only 23 percent of Ghanaian women use modern contraceptives, including condoms.

Second, Tsui would recommend that Seidu wait four times longer before conceiving again: A woman can improve her odds of a healthy pregnancy if she waits at least 27 months between pregnancies.

If a new pregnancy follows too quickly, says Tsui, the mother may be nutritionally compromised and therefore more vulnerable to infections and to anemia.

Tsui says that in much of sub-Saharan Africa, couples once abstained from sex for several months after a birth. “You weren’t supposed to resume sex until the baby reached a certain milestone of growth, usually when it could sit up or walk. Sitting up is six months, walking is 12 months.” Nowadays, she says, fewer Africans follow the custom of postpartum abstinence.

What Tunçalp has initiated in Ghana is what WHO advocates worldwide: that clinics and hospitals track and analyze maternal near misses, determine what might prevent them, make changes and then repeat the cycle.

Tunçalp says that the near-miss approach is gaining traction. “More and more articles are being published in journals, and the majority of these are coming from low- and middle-income countries. At the most recent [international ob-gyn] conference I attended, there were many oral presentations and sessions on near-miss morbidity and near-miss audits.” Paradoxically, she says, “when you start improving maternal health, you might actually start getting more near misses because you are preventing deaths.”

Meanwhile, the nurse-midwives at Komfo Anokye hospital in Kumasi keep patient records by hand, entered into the bound logbooks. They record vital signs in the left column and progress notes on the right. In each book, more than once, a midwife has drawn a cross in red ink at the end of a patient narrative, with a woman’s name and this inscription:

“May her soul rest in perfect peace.”

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Survival Story

Joy: I was nine months pregnant when my pains began. I walked with my husband from the cocoa camp to the village. We went to the district hospital, and the baby was born. At sunrise, I ate a bowl of porridge and then saw that I was bleeding heavily. The nurses came over. After that, I was unconscious.

Clement: We went to the hospital in Kumasi. My wife was in a coma for four days. They gave her seven bottles of blood, but I knew she would not come back again. I knew she would die.

Joy: They operated on me so I could not give birth again. I thanked God I was alive and not giving birth again because I have enough children.

Clement: The blood cost 600 cedis [about $320]. I borrowed money. I won’t have any income until January after the cocoa harvest. Then I will owe 1,200 cedis [with the 100 percent interest]. Lately I have been sick: I lost 15 kilos in three months. I haven’t gone to a doctor; we already owe so much money.

Joy: I hope our daughter will become a doctor or a nurse. She can take care of us during our illnesses.

Editor’s note: Joy Soka and her husband, Clement (not their real names), manage a cocoa grove near Kumasi, Ghana. They live with four of their six children in a mud-and-pole house and eat two meals a day. [This account is an approximate translation from the Kusaal language.]
Imagine living in the 19th century. Now imagine dying.

Death is a frequent visitor. It stalks your family, your neighbors—everyone—especially infants and young children. From your parents, you inherit a kind of fatalism, a resignation to death’s commonness as God’s will.

When a family member dies, you prepare the body in your own home. You plan for an elaborate last photograph. You carefully arrange her clothes and hair so she appears to be sleeping. Like many people of your era, you weave a wreath of her hair to keep as a constant reminder. If your child dies, you pay for the gravestone to be adorned with a lamb, a daisy, a vacant chair or other Victorian symbol for children.

By the turn of the century, however, this romantic view of death was about to be swept away.

Change came slowly at first. Public health reformers in the U.S. began to systematically collect statistics on births, deaths and disease. Their data exposed the appalling scope of disease and death. In 1885, one in every four infants born in New York City died before their first birthday. In Atlanta in 1900, an astonishing 45 percent of African-American infants died before age 1. And that year, one in every 500 Americans died of tuberculosis.

At the same time, mass sanitation, modern water and sewer systems, and immunization programs began slashing rates of the deadliest infectious diseases. By the 1920s, vaccines against diphtheria, tetanus, typhoid and other diseases had begun to make a difference. The combined result was extraordinary. From 1885 to 1915, New York City cut its infant mortality rate by two-thirds. Such statistics fueled public health efforts to convince the public that disease was preventable, death not inevitable. State health departments sent “health trains” into the countryside extolling the benefits of window screens, hand washing and safe food handling. Lantern slide shows and a circus midway atmosphere attracted crowds eager to hear the gospel of public health.

Reflecting the era’s growing confidence, the great health reformer Hermann Biggs proclaimed in 1911, “Public health is purchasable. Disease is largely a removable evil.”

The public health revolution, while amazing, was far from equitable. People in cities enjoyed nearly twice as great a reduction in mortality as rural residents. Whites in Northern cities benefited most of all. In the South, poverty and the lack of access to health care ensured that diseases like malaria, dysentery, typhoid, influenza and tuberculosis flourished. It would take World War II’s economic boom and government programs by leaders like U.S. Surgeon General Thomas Parran to push Southern mortality rates close to the national average.

Public health’s success in raising life expectancy by 20 years in most Western countries during the first half of the 20th century spurred efforts to extend those gains globally in the century’s second half.

Once again, public health would have to change attitudes toward death to save lives. Carl E. Taylor, later chair of the School’s Department of International Health, argued in The Atlantic in 1952 that adequate family planning would be a boon to maternal and child health. But he knew it wasn’t feasible to work on lowering the birth rate without also addressing the death rate. In India, for example, 45 percent of children died before age 5 in the early 1950s. Until parents could be assured that more of their offspring would survive, they would never accept birth control. This insight became an essential tenet of the child survival revolution, which began in the 1980s and would achieve historic reductions in infant and child mortality.

While public health still has much work to do, death is more of a stranger to us than it was to our ancestors. We can rejoice with public health pioneer Charles V. Chapin who wrote in 1921: “Figures do not measure the terror of epidemics, nor the tears of the mother at her baby’s grave. …To have prevented these not once but a million times justifies our half century of public health work.”


NO DEATH, NO LIFE

In the secrets of cells, J. Marie Hardwick discovers philosophy

INTERVIEW BY ALEXANDER GELFAND
PHOTO BY CHRIS HARTLOVE
Apoptosis, the genetically instilled suicide of cells, offers a brutally clear lesson in survival. It has also yielded other valuable discoveries to **J. Marie Hardwick, PhD**, who has probed cells and extracted their secrets to existence for more than a quarter century. Along the way, the David Bodian Professor of Molecular Microbiology and Immunology acquired a new appreciation of the importance of cell death to creatures both great and small.

By illustrating just how essential the purposeful suicide of individual cells is to life, Hardwick has shed light on the life-giving nature of cell death. (Without apoptosis, unfettered proliferation can lead to cancer in complex organisms, and to wholesale population loss in simple ones.) Her work has led her, in spare moments away from the bench, to muse on the apparently universal phenomenon of altruistic self-sacrifice and the implications it may have for society.

**Is apoptosis really so important? What would happen if we eliminated it?**

It’s crucial. The death of cells is required for the survival of organisms. We can make mutants of any complex organism, like a fly or mouse, and inhibit this natural process of cell limitation, and the outcome is either early mortality, or some drastic malformation, or cancer.

**Why must cells die?**

We need to have new cells born all the time—to repair wounds, to recover from an infection—but we also need to have a secure method for eliminating them after they’ve done their job. If there weren’t a balance between proliferation and death, things would rapidly get out of control.

**Is it true that even single cell organisms like yeast kill themselves for the greater good?**

There is still some disagreement about [this], but I think it’s pretty clear that even for single-cell species to survive, some of the individual cells need to die: the infected ones, the less fit ones, the ones that in cases of overpopulation would otherwise consume all resources and cause the entire population to die. If you have a death-resistant population of yeast, they’re less likely to survive in the long run; if you have a death-prone population, they’re much more likely to do so. It’s the opposite of what you’d expect, but it just speaks to the importance of altruistic death.

**Your studies into cell death in yeast yielded some unexpected results, didn’t they?**

We thought that some of the genes found in both yeast and humans might have some role in regulating cell death. But whenever we removed one of those genes from yeast, a mutation cropped up in another, different gene. We didn’t predict that, and we think it is a model for how cancer tumors form: You have one mutation [i.e., a deleted gene] that drives the creation of another mutation, and another, and another.

Then we discovered a family of human genes that are similar to the mutated yeast ones and related to human disease: Several of them have shown up in cancer, and one of them is a new epilepsy gene.

**Something similarly unexpected cropped up in an apoptosis study involving a genetically engineered mouse.**

There’s a protein called Bcl-xL that normally inhibits apoptosis, but when it’s cleaved by a protease called caspase, it becomes a killer and triggers cell death.

We engineered a mouse to prevent Bcl-xL from being cleaved, and shared it with collaborators at Yale University and Albert Einstein College of Medicine, who used the mouse to study strokes. And they found that the mice with uncleavable Bcl-xL protein were strikingly resistant to neuronal death after a stroke.

That generated some interest because there’s a drug that inhibits Bcl-xL that’s now in clinical trials to kill cancer cells—if you inhibit this normally protective protein with the drug, the tumor cells die. So we used that same drug [the one that kills cancer cells by inhibiting Bcl-xL] to treat mice after a stroke, and it turns out that it protects against cell death in the brain.

Therefore, this drug can inhibit both the survival form and death form of Bcl-xL, and applying this drug to those specific conditions like cancer and stroke is beneficial.

That’s a pretty cool idea: A chemotherapeutic agent might be beneficial in protecting neurons in the brain. I got a few phone calls from excited colleagues about that one. There are diseases like Alzheimer’s where we suffer a lot of neuronal loss. I think if we could improve the survival of neurons in Alzheimer’s, we could improve quality of life.

**So will this drug work in Alzheimer’s patients? Or could it be helpful to people with other types of neurodegenerative processes?**

[That] is not known. Many different mechanisms can cause neuronal loss, and we are currently seeking [funding] to identify the culprits responsible.

Ours is a great example of how pure basic science leads to important findings for human health.

**What does it mean that the same molecule can either kill cells or preserve them?**

Evolution has put into place the best security mechanism: What better way to link cell proliferation to cell death than to use the same molecule? Bcl-xL inhibits death, and if it does that too much, you have cancer; but cleave it with caspase, and you can make it kill.

**How have these discoveries affected your outlook on biology, and on the balance between life and death in general?**

One, death is a good thing because it’s required.

Two, maybe we are like these yeasts that have begun to deplete their resources and are going to have to make some tough choices … like slowing population growth, reducing wasteful practices and cutting excesses to preserve remaining resources.
When Sydney Dy, MD, MSc, arrived a decade ago at the Bloomberg School, she wondered how her work as a hospice physician and end-of-life researcher would fit in. “I could see how some people in public health might look at what I was doing and end up feeling it wasn’t about getting people healthier,” she says.

Then she looked at the question through the lens of her clinical work with inner-city patients. “I’d find myself caring for a family member, and in the same house you’d have a teenager with a baby and a partner in prison,” says Dy, now an associate professor in Health Policy and Management (HPM). “Everyone is wondering who’s going to help take care of the child after this patient dies. The end of this one life was a really important piece of the whole situation for the family—everything was interrelated.”

Few people in the U.S. die quickly and unexpectedly. For more than four in five of us, the end comes after one or more diagnoses and plays out over weeks, months or years. As Dy observed in those inner-city households, this is not a journey we make alone—loved ones are along for the ride as well, managing their own issues and stresses.

In medicine, end-of-life issues are the focus of more and more attention. Not long ago the vast majority of Medicare patients who died did so in the hospital. Today, about 45 percent choose hospice—and that number is rising.

Palliative care is growing nearly as fast. This field moves hospice concepts upstream, with the goal of helping patients be healthier throughout a serious illness. Two-thirds of U.S. hospitals now have palliative care programs.
initiatives, according to the nonprofit Center to Advance Palliative Care.

However, the subject still receives scant attention from the public health establishment. “Our physician and nurse friends have done marvelous work over the last 30 years—when you’re starting at one and you move the dial up to 40 percent, that’s huge,” says Dale Lupu, PhD ’96, MPH ’88, an HPM associate who is also on the faculty at George Washington University. “But we’re behind the curve in public health. There are so many questions out there—about what payment models are best and what delivery systems work and how to train the workforce we need. But at this point the scholarship just isn’t there.”

When Dan Morhaim, MD, an adjunct faculty member in HPM, tried a few years back to look up data on how many Americans have completed advance medical directives to guide the care they’d receive in the event they become incapacitated, he was surprised to find that it didn’t exist. “That kind of basic counting is what public health is good at,” says Morhaim, a physician and Maryland state legislator. “But no one had done the study, except among small, limited populations.” A team of Bloomberg School colleagues soon found that two-thirds of Marylanders had no such directives.

In 2011, Johns Hopkins University Press published The Better End: Surviving (and Dying) on Your Own Terms in Today’s Modern Medical World. The book aims to empower the public to be a driving force in the revolution in end-of-life care.

“Ours is the first generation in history that has a say in how we die, and everybody needs to prepare,” says Morhaim. “When the end comes, do we want to be getting pummeled in the intensive care unit long past any hope it’ll do much good? Or is it more appropriate to be at home?”

Dy’s team is currently studying the best ways to deliver palliative care to advanced lung cancer patients starting at diagnosis. (Currently, most patients are not seen by palliative care until very late in their illness.) They are looking to bring to Hopkins Hospital the results of a blockbuster 2010 study at Massachusetts General. There, researchers found that patients receiving early palliative care had less depression, less pain, fewer complications, and lived three months longer than a control group that received more traditional hospice care in their final days.

“A lot of us in the field see research as a real need, especially focusing on what strategies work and which ones don’t,” she says. “Part of what makes this field so exciting is that we have such great strides to make. There is so much out there just waiting to be accomplished.”

That work has growing momentum at the School. Joseph Gallo, MD, MPH ’91, a Mental Health professor, has been studying the end-of-life care preferences of aging physicians and how and why they change over time. In HPM, researcher Christine Weston, PhD, has launched a project to improve training strategies when teaching physicians how to conduct the difficult discussions that need to happen with dying patients and their families.

In Lupu’s view, professional education in public health is as pressing a need as research. The course she and Dy co-teach to HPM students is one of just a handful in the U.S. focused on end-of-life policy.

“We’re graduating all these public health students from all these schools, and most leave without any meaningful understanding of something that accounts for a lot of avoidable suffering and makes up a big piece of the costs in our health care system,” says Lupu who runs a consulting firm for hospice and palliative care programs.

An estimated 30 percent of Medicare costs go toward care in the final months of life. With much of that being spent on hospitalizations, multiple providers and intensive care units, the shift in end-of-life care toward offering hospice and palliative care to more patients has important implications not just for delivering better care but also for cost reduction in the system.

“There really shouldn’t be any question anymore about whether this belongs,” Morhaim says. “What we’ve been talking about here is how to deliver care defined according to personal values that helps people be healthier and live longer—and it’s care that costs less money. Those are all pure public health outcomes.”

Good Endings

I met a patient I’ll call “Hazel” in the 1970s. She was like the grandmother I wish I’d had, so caring and thoughtful. Hazel went from one major catastrophe to another until she told me she no longer wanted further treatment. She wanted to be allowed to die.

I reported that to the ICU team. The next morning on rounds, doctors stood outside her room, presented her case and then went on their way. They didn’t even say hello. The chaplain stopped them and said, “She doesn’t want treatment, and now we don’t even say good morning to her?”

They all went back and said hello, but I remember thinking, “There has to be a better way.” That’s how I got interested in end-of-life care.

I’ll give you another story. “Anne” was really worried that she’d be forgotten after she died. We talked about things that were important to her, and one turned out to be a collection of beautiful scarves. She went home and attached to every scarf the name of a loved one who should receive it after she died. Simple, right? But she was a different woman afterward—this was about Anne’s truly facing up to the fact she was going to die and taking control.

I can’t emphasize enough how important it is that we pay attention to the end of life and help people make the most of the time they have.

Helene Goldberg, MPH ’81, RN, CS-P, has worked with dying patients since the 1970s and is now a nurse psychotherapist specializing in loss and grief.
NO. 1 TOP KILLER

CARDIOVASCULAR DISEASE As a killer, cardiovascular disease (CVD) is in a class by itself: Worldwide, it's responsible for 30 percent of all deaths—about 17 million a year. In developed countries, it's the principal cause for half of all deaths.

There's an irony about this apex killer: Mortality from CVD is down by 50 percent over the past several decades. "Heart disease is definitely an amazing success story," says Josef Coresh, MD, PhD '92, MHS '92, an Epidemiology professor and director of the George W. Comstock Center for Public Health Research and Prevention. Changes in diet and exercise as well as the use of statin drugs have sent rates of fatal heart attacks plummeting.

STATS Women are more likely to die of heart disease than men. That's partly because women live longer than men, increasing their chances of dying from this persistent killer.

TRENDS CVD mortality rates have declined dramatically in white men and women; less so in black women and least of all in black men, according to Coresh and others. Why? Half a century ago, it was a disease of affluence, says Coresh, when affluence was associated with excessive smoking and eating, and little exercise.

FINAL TAKE "In terms of survival, we in the U.S. have been doing better for the past 40 years when it comes to heart disease. Not so for those who are now behaving like we once did—eating high-fat diets, moving less, smoking more. Heart disease is a growing problem in Eastern Europe, China and the Middle East."

MOST UNDERESTIMATED

DIABETES When it comes to top killers, diabetes is the most underestimated. The chronic disease underlies a significant percentage of fatal heart attacks and strokes, says Elizabeth Selvin, PhD '04, MPH, associate professor, Epidemiology.

STATS Worldwide, 347 million people have diabetes, and diabetes deaths globally will increase by two-thirds between 2008 and 2030, according to WHO. Overweight and obesity are now linked to more deaths worldwide than is underweight, WHO reports. Some developing nations are dealing with dual epidemics; malnutrition/famine and obesity/diabetes, Selvin says, adding: "Diabetes and obesity start among the well-to-do, then settle in the middle- and low-income classes."

TRENDS Selvin is amazed—and alarmed—by data from the National Health and Nutrition Examination Survey that compares the body mass index of Americans today with that of just three decades ago: "It's remarkable to see such a complete and dramatic shift of distribution of body fat, indicating a tremendous increase over just these past 25 years of people who are overweight or obese." Especially sobering: In the 1970s, about 5 percent of American kids were overweight or obese; now, almost 20 percent are.

FINAL TAKE "It's scary to think that the obesity/diabetes epidemic potentially could, in the near future, impact life expectancy by wiping out some major gains we've made in cardiovascular disease."

By Maryalice Yakutchik
Illustration by Dung Hoang
**DEATH AND LIFESPAN**

**PNEUMONIA/PREMATURE**  Staggering numbers of young children die preventable deaths. Of the 7.6 million worldwide who died in 2010 before reaching their fifth birthday, 1.4 million succumbed to pneumonia. Prematurity, the next leading cause of death in children, takes the heaviest toll on neonates and babies up to about 6 months, says Robert Black, MD, PhD, chair and the Edgar Berman Professor of International Health.

**STATS**  Pneumonia deaths of children are declining faster (3 percent) than deaths from preterm birth complications (2 percent). Although Black’s most recently published data suggest a decline in the total number of deaths between 2000 and 2010, it’s not sufficient, cautions the researcher, to reach Millennium Development Goal 4, seeking by 2015 to cut child mortality by two-thirds.

**TRENDS**  Local community health workers bearing antibiotics now are treating and diagnosing much of the world’s pneumonia and diarrhea cases. India has upward of 600,000 community health workers, and Ethiopia, 20,000, according to Black.

**FINAL TAKE**  "We don’t yet have good interventions to reduce the rates of premature birth. But we can address some complications resulting from prematurity [with kangaroo-care which promotes immediate breast feeding and skin-to-skin contact with the mother] as well as mortality from pneumonia [with newly implemented vaccines, for instance, and cook-stoves engineered to reduce indoor air pollution]."

**TOBACCO** Joanna Cohen, PhD, MHSc, collects cigarette packages. With beveled edges and holograms, some exude sophistication. Others, named "Long Life" or branded with panda bears, convey health and innocence. "They don’t look like death," observes Cohen, who holds the Bloomberg Professorship in Disease Prevention. Tobacco will claim 1 billion lives in the 21st century if current trends continue, says Cohen, director of the Institute for Global Tobacco Control. Smoking, she says, is a major underlying risk factor for death from heart attacks, strokes and cancers, to name-drop a few of the primary killers appearing on people’s death certificates.

**STATS**  Worldwide, almost 6 trillion cigarettes are produced—and consumed—annually. Every six seconds, someone dies because of tobacco products.

**TRENDS**  More than 40 countries now require graphic pictures on packages that convey tobacco’s dangers. The U.S. is a different story. Tobacco companies have sued over new package picture-warnings, which Cohen considers wholly inadequate to warn U.S. consumers.

**FINAL TAKE**  "Public health is hard enough; convincing people to change behaviors that may result in AIDS, for instance, or malaria, is difficult, despite [the fact] that no one’s cheering for the virus or financing the mosquito. With tobacco, we have multinational companies, the top six of which had combined profits upward of $35 billion in 2010, pushing to sell the products that kill one out of every two of long-term users."

**SUICIDE/OLDEST OLD** Worldwide, the highest suicide rates occur among those over the age of 75—one of the fastest growing age groups.

Having examined suicide trends among the old (65 to 79 years) and the oldest old (80-plus years), Annette Erlangsen PhD, adjunct assistant professor, Mental Health, says that certain life events, such as illness or losing a partner, are associated with increased suicide risk. In fact, the oldest-old men who had been hospitalized had the highest suicide rate among the elderly. Her research suggests that hospital staff could help identify those at risk.

**STATISTIC**  Using national data from Denmark, Erlangsen discovered that about half of the oldest old who commit suicide are not receiving antidepressant medication though it might be indicated.

**TRENDS**  The number of suicides among the oldest old is likely to increase as more people live longer. New prevention efforts need to address the fact that suicide among the oldest old is rarely impulsive. In fact, more than half of older adults who die by suicide have mentioned their plans to others.

**FINAL TAKE**  "It’s very peculiar that people who are approaching the natural ends of their lifespans are very carefully and determinedly planning to take their own lives. We need to address the issues that make life no longer worth living."
DOVE in the Time of Cholera

The more things change, the more they stay the same.

Epidemic cholera has been eliminated from Europe and North America, and rehydration therapy and antibiotics have significantly reduced mortality rates in Africa and Asia. Yet International Health Professor David Sack, MD, estimates that Vibrio cholera still infects more than 2.5 million people each year, killing more than 200,000. (The disease causes diarrhea so severe that death by dehydration can result in a matter of hours.)

While inexpensive oral vaccines are available, they have yet to be widely used—a situation Sack hopes to remedy through a new project, Delivering Oral Vaccine Effectively (DOVE), which recently received nearly $5 million in support from the Bill & Melinda Gates Foundation.

Sack helped run the initial field trials for the vaccines, which require two doses, back in the mid-1980s. Despite offering 70 percent protection with no known side effects, adoption has been slow. Some have held out for a live, single-dose vaccine or questioned the utility of vaccines with less than 85 percent protection. To Sack, who directs the Enterics Laboratory of the Center for Immunization Research, this represents a clear case of “the ideal being the enemy of the good.”

“Public health benefit is not measured by efficacy,” he says. “Public health benefit is measured by the number of deaths averted.” And with a disease as common as cholera, even 70 percent protection will save many lives.

DOVE will therefore help governments and health agencies deploy the existing vaccines as effectively as possible. With funding from the Gates Foundation and help from organizations like the International Vaccine Institute; the International Center for Diarrhoeal Disease Research, Bangladesh; and WHO, DOVE will document the implementation of pilot programs in places such as Haiti, India, Bangladesh and Africa. The goal is to learn how best to include the new oral vaccines in an integrated strategy for cholera control.

—Alexander Gelfand

A Simple Solution for Saving Infants

Some of the most gratifying experiences in public health come when years of research yield effective new policies and programs. That moment came last fall for Joanne Katz, ScD ’93, MS, professor in International Health (IH), when representatives from several South and Southeast Asian countries met in Nepal to recommend the application of the antiseptic chlorhexidine to infants’ umbilical cords after delivery in their countries.

The recommendation follows two studies conducted from 2002 to 2005 by Katz and her colleagues in IH, associate professor Luke Mullany, PhD ’05, MHS ’02, and Professor James Tielsch, PhD ’82, MHS ’79. The researchers were working in a field site in Nepal where most babies are born at home. Infant mortality due to sepsis was high, with cord infections posing a particular challenge. The team hoped that chlorhexidine—affordable and widely available as a liquid or ointment—would act on a series of pathogens entering the infants’ bloodstream through the open portal.

“Our primary interest was to see whether we could reduce infectious mortality in infants,” Katz says.

The researchers conducted a randomized trial of 15,804 newborns who received varied care from community-based research workers: either a 4 percent chlorhexidine solution, soap and water, or dry cord care. Mortality in the group receiving chlorhexidine was 24 percent lower than those receiving dry cord care, and if the antiseptic was applied within the first 24 hours of birth, the mortality reduction was 34 percent. Severe cord infection was reduced 75 percent.

The striking results have sparked several replication studies using slightly different designs. Studies have been completed in Pakistan by Aga Khan University and in Bangladesh by IH Professor Abdullah Baqui, MBBS, DrPH ’90, MPH ’85, and IH associate professor Luke Mullany PhD, ’05, MHS, ’02. Those studies had “comparable effects,” according to Katz. Other studies are under way in Africa.

—Rachel Wallach
Treat, Don’t Accept Kidney Disease

The role of chronic kidney disease (CKD) in deaths among older adults has been a source of controversy in the medical community.

The debate: Is this a treatable disease process that puts those 75 and older at a greater risk of death than other seniors, or is kidney damage simply a natural part of the aging process?

Research by Bloomberg School scientists leading the global Chronic Kidney Disease Prognosis Consortium, resolved the issue with definitive findings published December 12, 2012, in *JAMA*. In older adults, CKD increases the risk of death, according to the study, which implies a call to action by researchers and clinicians.

The refuted view attributes CKD to so-called “normal aging,” citing the prevalence of this disease that affects 54 percent of adults ages 75 and up. “That certainly is not the case,” says Josef Coresh, MD, PhD ’92, MHS ’92, the Consortium’s principal investigator and an Epidemiology professor. “We have assembled the world’s data and the data spoke clearly.”

The study analyzed data from more than two million people ages 18 to 108 participating in 46 cohort studies conducted from 1972 to 2011.

Coresh, Kunihiro Matsushita (right), MD, PhD, and other investigators determined that in a comparison between two groups of 1,000 people 75 and older—one group with CKD, the other without—27 more people will die in the first group than in the second. The excess risk is present in all age groups but actually increases with age.

The study calls for increased attention from health care providers in identifying and managing CKD in older patients, who may be more vulnerable to adverse drug interactions—and are at greater risk of complications from conditions such as high blood pressure and diabetes.

“With kidney disease, risk of many causes of death is higher at every age,” says Coresh. “It’s important to address this higher risk.”

—Jackie Powder

The Health in Mental Health

Schizophrenia isn’t fatal. Depression itself won’t kill a person. In fact, psychiatric illnesses are altogether absent from official lists of top causes of death.

Then why do people with severe mental illnesses have a 25-year shorter lifespan than the general population? That question has driven longstanding research by William Eaton, PhD.

“Repeatedly, we find that people with schizophrenia have higher rates of mortality; but they’re not dying from schizophrenia. They are dying from failing to present with, and get treatment for cardiovascular disease, cancer and diabetes,” says Eaton, PhD, the Sylvia and Harold Halpert Professor and Chair in Mental Health.

Eaton reviewed a quarter-century’s worth of literature on four common mental disorders and summarized their effects on mortality for the 2012 book *Public Mental Health*. Depressive disorder, he reveals, raises the risk for mortality by 70 percent. “Our research was among the first to show in population-based samples that a history of depressive disorder was associated with a raised risk for Type-II diabetes, cardiovascular disease and stroke,” Eaton says.

Eaton describes all-too-common scenarios. An individual with schizophrenia consults with a psychiatrist about his mental disorder instead of visiting a primary care physician who would diagnose and treat his hypertension. Likewise, a patient with major depressive disorder who has suicidal ideation might not be asked by her primary care practitioner if she is taking her cholesterol medication.

Both depression and schizophrenia are known to influence behaviors associated with risk factors for a range of chronic medical conditions. For example, a lack of regular exercise combined with psychoactive drugs can lead to weight gain and contribute to obesity and diabetes.

The bottom line: Even though individuals with mental illness have high suicide rates, especially those with depressive disorders, most die from largely preventable diseases, and die earlier from those diseases than others.

—Maryalice Yakutchik
LESSONS FROM THE DEAD

Why investigating deaths means saving lives

Story by Linell Smith  Photography by Chris Hartlove
In autopsy findings, Susan Baker, Carolyn Cumpsty-Fowler, David Fowler and Andrea Gielen discover priorities for public health (December 3, 2012).
Carolyn Cumpsty-Fowler, PhD, MPH ’96, remembers five children who never had a chance to grow up—and how they changed her life.

At the time, she was in her 20s, a neurosurgical nurse at Groote Schurr hospital in Cape Town, South Africa, and part of a team researching clinical factors that could improve survival of children with traumatic brain injury. The most severely harmed were children struck by cars while crossing the road or playing in the streets. Roughly 70 percent of the victims who died never reached a hospital, while others were admitted with catastrophic injury. One of the young nurse’s duties was to counsel parents when a decision was made to terminate life support.

In September 1984, she reached her limit. After witnessing the anguish of five families in six days, she realized her research was chasing the wrong answers.

“I walked out of the intensive care unit that Friday night with the neurosurgery professor who was my adviser and told him, ‘Nothing we can do in the hospital is really going to make a difference for these children. We’ve got to stop these deaths. We’ve got to prevent them.’ And he basically said, ‘Do it.’”

Cumpsty-Fowler changed the focus of her study from injury recovery to injury prevention. Eventually her doctoral work became the basis of a successful, developmentally appropriate pedestrian safety program that she and traffic safety colleagues implemented throughout South Africa.

Now an assistant professor in the Johns Hopkins School of Nursing with a joint appointment in Health Policy and Management at the Bloomberg School, Cumpsty-Fowler serves on the Baltimore County Child Fatality Review Team, an interprofessional group she helped create.

Her husband, David Fowler, MBChB, MMed, is the chief medical examiner for the state of Maryland.

Together, the couple developed a

Before Sue Baker, no one had ever thought to look in medical examiners’ dusty filing cabinets, analyze the findings and learn how to prevent severe injuries.
course at the University of Baltimore, Forensic Medicine and the Public’s Health, that illustrated the many ways that death investigation and public health professionals’ use of forensic data can impact health, including reducing preventable death in children.

A careful reading of individual deaths, they contend, can make life safer and healthier for all.

The Fowlers belong to several generations of researchers who have gained inspiration from the work of an injury prevention pioneer whose legendary career was launched in the break room of the medical examiner’s office.

Back in the 1960s, Sue Baker was working toward her MPH at the School when she decided to examine the relationship of automobile accidents to chronic diseases such as alcoholism. Her idea was to compare the autopsy records of drivers who were responsible for their fatal crashes with those of drivers who were merely victims.

She found a willing partner in forensic pathologist Werner Spitz, then Maryland’s deputy chief medical examiner.

“Before Sue, no one had ever suggested or thought of using files of people who had sustained severe injuries and died, then analyzed them and thought, ‘Well maybe this can be changed or prevented,’” Spitz recalls. “Nowhere in this country was that material ever touched. It filled up the drawers and the filing cabinets and there it stayed, collecting dust—until Sue brought it back to life.”

In the early days, before she had her own office, Baker would pore over records at a big square table in the room where residents changed out of their scrubs and dictated notes from their autopsies.

“I had big ears and lots of questions, and they were nice about answering them,” recalls the 82-year-old Baker today. “They helped me understand what I was reading in the reports. Although I was pre-med in college, and had taught anatomy and physiology to student nurses after graduation, this was a whole new world with its own vocabulary.”

To identify cases to study, she worked her way through ledgers where cases were entered with numerical codes to identify the cause of death. Looking into the choking risks that balloons posed to children, for instance, she might search the code assigned for choking on objects as well as the one assigned for choking on food. Then she would pull the manila folder files that supplied details of the autopsy findings, the toxicology findings and the police report. (Eventually, in that case, she identified hot dogs as the leading cause of childhood choking deaths.)

Spitz remembers Baker quietly gathering data on the adequacy of medical care received by 33 drivers, passengers and pedestrians who died at hospitals following severe abdominal injuries in motor vehicle crashes. Her research showed that half of the deaths may have been prevented by proper diagnosis and prompt treatment, leading to the effort to transport such patients to major trauma centers rather than local hospitals. Spitz was an author on that early study, as well as on papers on highway safety and alcohol published in The New England Journal of Medicine and JAMA.

“Sue was like a paper mill, publishing something every few months,” he says. “Not only did she need that, but we forensic pathologists needed to show the community of physicians and institutions of higher learning that there is something to be looked at in the medical examiner’s office. It’s not just a place where you cut up bodies.”

Over the next four decades, Baker published more than 250 papers, most of them spurred by data from death records. In addition to helping secure mandatory child safety seats in cars and graduated driver’s licensing for new drivers, her research also led to ways to decrease fatalities in aviation and house fires, and to reduce incidents of carbon monoxide poisoning, drowning, childhood asphyxiation and falls among the elderly.

Along the way, she also founded the nation’s first injury control research center to promote injury prevention as a scientific discipline. The Johns Hopkins Center for Injury Research and Policy (CIRP), which celebrated its 25th year in 2012, works to reduce injuries through research, education, policy and practice.

Saving Others
My 19-year-old son died in an arson fire set in the hall of his dorm at Murray State University in 1998. Michael was a gifted musician and broadcast journalism student with a 3.9 GPA. He also had an autism spectrum disorder. He had issues with remembering and organizing and also had some spatial deficits. He was very safety conscious and would unplug his lamps at night.

Four days before his death, he escaped a fire set in the same dorm by crawling out on his hands and knees. But on September 18, 1998, he died in the doorway of his room of smoke and soot inhalation from a second fire, even though he had stuffed towels under his door. We found out later that his room was not up to the fire code and that smoke had entered both under and over the door. Fourteen other people were injured.

After Michael’s death, I helped get legislation passed in Kentucky that requires colleges to report campus crimes and ongoing threats on a timely basis and to alert fire authorities about any fire. I also started a foundation to raise awareness and standards of campus fire safety.

I can’t save Michael, but I can do what I can to minimize the risk for other young people. This gives me some sense of healing. They’re not my children, but they’re someone’s children. This is what Michael would expect his mom to do.
In 2010, Baker became the first injury control researcher to receive the Frank A. Calderone Prize in Public Health, one of the highest honors in the field. And this year the National Association of Medical Examiners established an annual award in Baker’s name to recognize research that demonstrates the greatest potential for public health impact.

The award is a key feature of what chief medical examiner Dave Fowler calls “the Sue Baker Wall” at the state’s $54 million forensic medical center. Under his leadership, a staff of 15 forensic pathologists performs roughly 4,300 autopsies a year as part of the state’s investigation into any death occurring from violence, suicide or casualty, or in any other suspicious and unusual manner. Also reviewed are sudden deaths of people in previously good health who die unattended by a physician.

Nothing, perhaps, has proved more important than using such death records to protect children. In the 1970s, Baker gathered data that showed how infants in their first six months of life had a significantly increased risk of dying in a car crash because their mothers held them in their arms or laps. Evidence from the grim records she read contributed to the policy changes that require kids to ride in car seats today. From 1975 through 2008, child restraints saved the lives of an estimated 8,959 children under the age of 5, according to the National Highway Transportation and Safety Administration.

In the early 1980s, Andrea Gielen, who now directs CIRP, found herself using these data as a new School alumna working at the Maryland Department of Health and Mental Hygiene to create the state’s first child passenger safety program.

“I realized I found my passion,” says Gielen, who studied with Baker. “[Injury prevention] combined so many elements: studying risk and protective factors, educating the public and conducting community advocacy to get the law on the books and programs in place to make sure it was effectively implemented.”

For the past 15 years, Cumpsty-Fowler has served on national and state child death review committees as well as on the panel for Baltimore County. In Maryland, 24 teams
cover the state’s counties and Baltimore City. Composed of representatives from the medical examiner’s office, law enforcement, emergency medical services, social services, schools, pediatrics and public health, the groups review all cases of sudden and unexplained deaths.

In Maryland, the most common causes of death in children over the age of one year are motor vehicle crashes, homicides and suicides, according to the DHMH. For infants between one month and a year of age, the leading cause is related to sleep environments and includes sudden unexpected infant death, accidental suffocation and strangulation.

For the past several years, Cumpsty-Fowler has worked with pediatrician and child abuse expert Scott Krugman, now chairman of Baltimore County’s child death review panel, to educate the public and health professionals about safe sleeping environments for infants. Because research shows that babies who sleep in their parents’ beds are 20 times more likely to suffocate than those who sleep alone, Krugman and Cumpsty-Fowler are determined to change social norms and make bed sharing with young infants unacceptable.

“Most infants in Baltimore County who die, die from preventable sleep-related causes,” Cumpsty-Fowler says. “Most were in an adult bed.” She says suffocation can occur if a parent rolls over on an infant or a baby gets trapped under a pillow or caught between the bed and the wall. But death can also come merely from lying so close to a parent that there is only a small pocket of air for the child to breathe. When an infant lacks the motor skills to roll over or shift position, re-breathing the same air, increasingly filled with exhaled carbon dioxide, can lead to oxygen deficiency and death.

Franklin Square Hospital, where Krugman directs the department of pediatrics, now requires new parents to sign statements that they have received counseling about safe sleep before leaving the hospital with their newborns. (The Johns Hopkins Hospital has similar requirements for new mothers.)

Dave Fowler has pursued another avenue toward safe sleep. At the request of

Joshua Sharfstein, secretary of Maryland’s Department of Health and Mental Hygiene, he reviewed pathophysiological evidence of sudden unexplained infant deaths as part of a team of experts looking into the safety of crib bumpers.

Next June, Maryland will become the first state to ban the manufacture and sale of this padding, which is intended to cushion babies from injuring themselves on the crib slats. “Crib bumpers don’t prevent any substantial injuries. Limbs are rarely entrapped and even in those situations the worst that can happen is minor bruising,” says Fowler. “There is no benefit and there is a substantial risk.”

More than two dozen baby deaths across the nation have been attributed to bumper pads in the last 20 years, and Maryland’s records show one child who was asphyxiated. “A brand new child is ‘shifting’ about half an ounce of air, whereas an adult shifts about two or three quarts with each breath,” Fowler points out. “As an infant, you don’t actually have to have your face up against anything. You can be close to a soft toy, a blanket, a bumper, edge of a bassinette and you can breathe out the oxygen in that area until it won’t sustain human life.”

Fowler calls pediatrics one of the most challenging areas in forensic pathology. “When you have someone who has been shot multiple times or been in a motor vehicle collision, the cause of death is usually fairly apparent. But when you’ve got a pediatric case—a young person who dies suddenly and unexpectedly, who was normally previously healthy, it is much more challenging.”

Such cases sometimes disappear in the deluge of injuries afflicting the nation. According to the CDC, more than 180,000 Americans will die this year from injuries sustained in such events as fires, vehicle crashes, intimate partner violence, drowning, drug poisonings and falls.

As medical examiners collect evidence on new threats, such as emerging infections or unsafe products, the injury prevention researchers aren’t far behind.

“In this country, injury data often come from forensic investigation and death certification,” says Carolyn Cumpsty-Fowler. “The better your relationship with the investigators, the more likely you are to get at the real heart of the information.”

And the facts of a tragedy remain critical for finding the path toward prevention. Sue Baker remembers poring over the case of a teenager who committed suicide in the early 1980s by overdosing on anti-depressant pills brought into the house by her mother’s boyfriend. At the time the girl had just broken up with her own boyfriend and was feeling distraught.

“Today that young girl might be coded as suicide from a drug overdose—or whatever was on the death certificate—and people might miss the details of the incident,” Baker notes. “It’s gotten so easy to ‘spin the tapes,’ as we say, and just look at the [computerized] tables for the findings and analyses.”

Instead Baker read the suicide note and the investigators’ records. They pointed to another problem that demanded public attention: Teenagers were abusing adult medications. Baker began imagining another research paper. ✅
In the summer of 2010, when we were midway through the doctoral program in mental health, my brilliant, creative and soft-spoken friend took her own life.

Initially, there was a lot of guilt among those of us in the Department of Mental Health who knew her. We were psychiatrists, professionals trained in suicide prevention as well as fellow students and friends. We felt a special guilt that it happened here, among us. That we, of all people, didn’t detect warning signs and couldn’t prevent this tragedy.

I think D (as I’ll call her) was really good at not revealing this part of herself. She was a Fulbright Scholar who had studied at the top university in Pakistan; I’m certain she was aware of her own condition. After her death, I learned that she had sought treatment for bipolar disorder.

As two of just a handful of students in the same doctoral cohort, we became close after we met in 2008. We’d walk from classes together and talk about assignments. She would invite me over for a cup of tea, and we would talk. She was close to her mom and brother, but they were very far away. She was quiet but had a really good sense of humor. She also cared very deeply about injustice in the world—especially about women and people with mental disorders in her native Pakistan.

D was a perfectionist. She kept track of so many details that I often missed. She worked very hard and didn’t do much to reward herself. After that busy first term was over, I stopped by her room and suggested we go shopping or do something to celebrate. It was a bright and breezy day, perfect for a stroll around the Inner Harbor. She declined, saying something about having to prepare for the next term.

There were times when I’d ask her to wait so we could walk together back from class and she’d just disappear. But that didn’t seem unusual in a high-pressure academic setting where everyone is so busy, so overwhelmed.

In the spring of 2010, I left for New York for an internship. We kept in touch by email. I remember wishing her well on her comprehensive exam, telling her, “You’re almost done!” and that I was looking forward to seeing her after her exam and before she flew to Pakistan. She wrote me back two days before she died and said, “I hope to see you MAYBE in NY.” She also wrote: “Home is calling.”

Two days later, I got an email about her sudden passing. It shattered my world. I couldn’t contain the sadness in me.

How do I translate this experience professionally and personally? What do I do with D’s death? As a budding researcher, I struggle a lot with that.

We live in a fast-paced world. We don’t pause long enough to think through the value of each person and the consequences of death in our lives. It’s not cocktail party conversation, but perhaps we are supposed to stop and consider death a part of our lives instead of trying so hard to avoid it.

We need to focus as much on community building in work and school as we do on goals and outcomes. We need to establish a nourishing camaraderie with colleagues instead of letting competitiveness and individualism rule over us.

D is not the only one to feel isolated.

Since her death, I’ve been determined not to just fit myself in the frame of the “good” researcher—it’s not good to forget how precious a person in front of me is. I want to intentionally bring out my personal side, intentionally be more informal and intentionally reach out to people. I’ll always try to do my best work and seek excellence, but when it comes to doing life, it’s more like, “Hey! How are you doing?”

That takes more time. But it’s so worth our time.

Su Yeon Lee, PhD ’12, is an associate in Mental Health and a policy analyst at the Office for Research on Disparities and Global Mental Health, National Institute of Mental Health.
Rx FOR SURVIVAL
G. Caleb Alexander takes on the crisis of prescription drug abuse

INTERVIEW BY JACKIE POWDER
PHOTO BY DAN DRY
It may be the biggest public health epidemic that you’ve never heard of: prescription drug abuse. America’s fastest-growing drug problem claims a life every 19 minutes.

**G. Caleb Alexander, MD, MS**, co-director of the Bloomberg School’s new Center for Drug Safety and Effectiveness, says that pain is at the center of the epidemic’s trajectory, beginning with the medical community’s well-intentioned efforts in the 1980s and 1990s to more aggressively treat chronic pain. Sales of opioid painkillers like Vicodin and Percocet soared, as did abuse of the drugs, emergency room visits, drug treatment admissions—and deaths.

In 2008, there were nearly 15,000 prescription painkiller deaths—more than cocaine and heroin combined. Yet Alexander believes that the epidemic may have reached a “tipping point.” Federal and state agencies are stepping up enforcement and regulatory efforts, and many other stakeholders are also responding to a call to action.

“Finding a way to promote the appropriate treatment of pain while reducing opioid use and diversion is the holy grail,” says Alexander.

**You’re a general internist, what’s your approach to prescribing opioids?**

Generally, I’m very cautious about using opioids and won’t prescribe anything more than, in most cases, a short-term supply of a low-dose opioid. One of the striking things that I’ve observed as I’ve been training residents in the inpatient setting, is how comfortable they were writing prescriptions for heavy-hitting narcotics—Dilaudid, morphine, fentanyl. Now it’s true that patients admitted are often in severe pain. Nevertheless, I was surprised. And this extends to the outpatient setting as well.

Someone recently told me that they went in for a dental procedure, went to the pharmacy and there were 100 Vicodin waiting there. They only needed eight!

**How important is health care provider training for reversing the epidemic?**

It’s vital. There needs to be more education at every level of clinical training. Given that so many people who abuse or misuse opioids get them from friends or family members, the current epidemic also suggests that clinicians … have to ask themselves, “Are these opioids that I’m prescribing going to get into somebody else’s hands?”

**Don’t patients with chronic pain expect their doctor to give them a prescription for a powerful pain medication?**

I think we underestimate the degree to which patients are open to alternative treatment approaches. One of the important questions that clinicians have to ask themselves, and that patients have to be aware of, is have we tried all the appropriate alternatives prior to reaching for this type of medicine? We [can] use acetaminophen, nonsteroidal anti-inflammatories, topical treatments and a whole host of other agents.

**Who is abusing prescription drugs?**

Prescription drug abuse spans a wide spectrum of people, in part because opioids are so liberally dispensed and so prone to nonmedical use. Patterns of nonmedical use vary, ranging from a high school kid who may have picked up a few Vicodin from a family member, to an executive misusing OxyContin to manage chronic lower back pain, to a senior with chronic anxiety and headaches [who] is taking Percocet when other therapies would be both safer and more effective.

**Is there a particular group that is more at risk of death from prescription drug abuse?**

Deaths from prescription opioids are more common among adolescents and young adults, males, those with less education, living in rural areas, and individuals with a history of alcohol or substance abuse. This latter point is noteworthy because it is easy for people to underestimate the synergistic effects of combining opioids with alcohol or other drugs. But keep in mind, for every overdose death, 10 patients are admitted for treatment of abuse, 25 patients are evaluated in an emergency department, and more than 700 people report nonmedical use during the past year. So the deaths—while catastrophic and highly visible—represent just the tip of the iceberg of this public health problem.

**What research at your Center targets prescription drug abuse?**

We have a number of projects under way. In one recently completed investigation, we used nationally representative data from ambulatory office practices to characterize the treatment of opioid dependence with buprenorphine. In another, we are conducting a 10-year survey [2001–2010] of the diagnosis and treatment of chronic nonmalignant pain to look at how care patterns for chronic pain have changed over time, and to answer some key questions: Are we diagnosing more pain than we did a decade ago? Has our threshold for using opioids changed substantially? In a third, we are using pharmacy records to rigorously evaluate the policy impact of states’ prescription drug monitoring programs, one of the key ways that states are working to stem the epidemic.

**Why has this epidemic been so tough to get a handle on?**

This is a complex issue, and there are no magic bullets. Just consider one of many challenges—how to continue to improve the care of patients with pain, some with severe pain, while reserving these therapies for those who need them most. And consider the issue of diversion, which can take place at any point along the supply chain of prescription drugs, from warehouse robberies to a patient whose medicines are inappropriately taken by a family member. The epidemic also touches a huge number of different stakeholders: pharmaceutical manufacturers, health plans and health insurers, professional societies, patient advocacy groups, law enforcement, state departments of public health, pharmacies, pharmacy benefit managers, employers—and we’re just getting started.

DEATH AND LEARNING 45
When death comes to newborn children in Bangladesh, its causes often are distressingly familiar and highly preventable: respiratory infection, measles, tetanus, diarrhea, premature birth. Such deaths are also distressingly common: Bangladesh had a neonatal mortality rate of 36 deaths per 1,000 live births in 2004.

Arriving at that sobering statistic is difficult. Bangladesh numbers among the nations in which “vital statistics systems are not adequately developed to capture deaths,” says Henry D. Kalter, MD, MPH ’87, an associate in International Health (IH). “A lot of people die without even having seen a doctor, or if they saw a doctor, they did not die in a medical facility. The death is not captured [statistically].”

In fact, only one-third of the nearly 56 million deaths worldwide in 2004 had a medical certification of death, WHO reports.

That lack of data on deaths and their causes denies governments and researchers evidence that can help focus resources and set priorities for interventions.

The answer? Verbal autopsies. With a structured questionnaire and an open-ended recounting of facts surrounding the death, trained lay researchers interview surviving family members and elicit sufficient information for physicians to determine and record a cause of death.

“It’s a crude tool, but it’s the best we have available,” says Rolf D.W. Klemm, DrPH ’02, MPH ’85, an associate scientist in IH. “By knowing a proximate cause of death, however crude the method, we can advocate for earlier detection and treatment.” Klemm
A Child Lost

The mother’s water broke eight days before she delivered the child.

The Shaman came [before the delivery], gave her an amulet and performed exorcism. He put some sort of nasha [intoxicant] material on her nose and said that if the night passes without any difficulty then the child would survive. On the next day, the child was delivered. The child died one hour after birth. The mother was very ill at the time she delivered the child. As she was ill, hands were inserted to take out the child. The child was not fed anything after birth, not even her mother’s milk.

After birth, to save the child, she was blown in the mouth, the umbilicus was milked. … [The mother] was eight months pregnant at the time of delivery. Right after birth, the child cried in a low voice but did not stir. The child died [while] being blown in the mouth.

Editor’s note: Originally written in Bangla, this is an excerpt of a narrative written by a female data collector. She conducted the verbal autopsy interview with the parents of the infant following the report of a neonatal death in rural Gaibandha, Bangladesh, as part of the 2002–2007 JiViTa study. From this narrative, a physician would likely infer preterm birth, with possible premature rupture of membranes, followed by a complicated delivery leading to trauma and early neonatal death, according to Parul Christian, DrPH ’96, MPH ’92, MSc.
PostinG heaLth in Communities

Central to Niger’s dramatic child survival gains is the country’s 2000 presidential declaration to deliver more and better health care to women and children—especially in the most rural and remote communities—by ramping up its network of health posts to provide basic preventive and curative care.

Between 2000 and 2007, nearly 2,000 posts were established and staffed by community health workers trained to treat diseases that are frequently fatal in children. Severe cases are referred to centrally located health centers with professional staff.

During the study period, community workers continued to receive training, and when possible, the posts offered additional services, including nutrition screenings, educating parents on appropriate health care for sick children and distribution of contraceptives.

“If you look at the coverage data on how many children were taken for care for diarrhea, pneumonia and malaria, there are large increases that other countries have not been able to achieve,” says Bryce, who notes that change takes time.

“Looking for success in two to three years is really not enough time,” she says. “In Niger, it took three, five, seven years for sound policies to translate into strong programs and to save lives.”

IN NIGER, DEATH HAS LONG BEEN A WAY OF LIFE.

The people of this West African nation endure pervasive poverty, persistent food shortages and a punishing climate. Especially vulnerable are the young; many children in Niger perish before their fifth birthday.

“Sometimes when you ask people how many children they have, they’ll say, ‘I have five children—three living and two dead,’” says Sarah Dalglish, MA, an International Health (IH) doctoral student.

A new study, however, suggests things have changed. Researchers found a direct connection between the country’s child survival policies from 1998 to 2009 and a 43 percent drop in under-five deaths. The mortality rate plummeted from 226 deaths per 1,000 births to 128.

In 2009 alone, the measures saved the lives of nearly 60,000 children.

IH assistant scientist Agbessi Amouzou, PhD, MHS, the study’s lead author, partnered with UNICEF-Niger and Countdown to 2015 on the research. Jennifer Bryce, EdD, a study co-author and IH senior scientist, led the School-based group that analyzed the research data. The findings were published in The Lancet in September 2012.

“In Niger … has produced remarkable results for child survival that can set the bar for other countries in the region and worldwide,” says Amouzou.
NO CHARGE FOR MOTHERS & CHILDREN

A pivotal piece of Niger’s child survival initiative is a program, launched in 2006, to provide free health care to pregnant women and children. Earlier, expansion of the country’s rural health posts improved geographic access to care and led to steady increases in the use of health services among women and children. But visits to the posts spiked after the no-charge policy took effect, according to the study.

Removal of the cost barrier meant that mothers received antenatal care and children were treated earlier for life-threatening conditions and illnesses, including Niger’s leading child killers: malaria, pneumonia, diarrhea and malnutrition.

“You can’t separate free care from all the other successes—it underlies everything else,” Dalglish says. “It gets people in the door to treat their children, get vaccinated and diagnose disease.

With Niger’s widespread poverty and a fertility rate of seven children per woman, the country’s health officials recognized free care as a top priority.

“Even very small fees are going to be too expensive for people,” Dalglish says. “It’s particularly true [in Niger], for example, right before the harvest. People have very little or no cash on hand.”

“A” POWERFUL SUPPLEMENT

Niger’s impressive reductions in child mortality refute an old public health maxim that a country must increase its wealth before it improves its health, says Alfred Sommer, MD, MHS ’73, Bloomberg School dean emeritus.

“Since this School was founded, we’ve taken the position that there are ways to improve health, largely through methods that don’t require waiting until a country is wealthy,” says Sommer. “They [countries] can leapfrog ahead by effectively deploying inexpensive, proven interventions, which is critical, since many won’t be getting wealthy anytime soon.”

There’s no better example of a “health before wealth” intervention than vitamin A. Sommer’s discovery that vitamin A supplements dramatically cut child mortality has saved millions of children worldwide.

Integral to Niger’s child survival program are twice yearly mass campaigns to provide vitamin A supplements, along with insecticide-treated bed nets (see next story) and measles vaccinations. Of the strategies analyzed in the study, vitamin A supplementation and bed-net ownership showed the largest increases in usage.

“The question is, will this be a lasting change?” Sommer says. “While magic bullets are cheap, getting them to the people who need them is not cheap.”

NET GAINS AGAINST MALARIA

The use of long-lasting, insecticide-treated bed nets is a powerful malaria control weapon, even with a community coverage level just above 50 percent, says William Brieger, DrPH ’92, MPH.

“What’s important is that insecticide-treated nets are a community protection; they don’t just protect individuals,” says Brieger, IH professor and senior malaria specialist at Jhpiego. “If you get enough treated nets being used in a village, you start to see the effects even though not everybody is using them.”

In Niger, researchers found that the rapid scale-up of treated bed net distribution is responsible for saving one in four children in 2009.

Still, Brieger says that most demographic surveys on antimalarial nets show that even in households that have nets, the most vulnerable groups don’t use them enough. And there are frequent reports of people using nets for fishing, covering crops and even as wedding veils.

Another challenge relates to the lifespan of the long-lasting, insecticide-treated nets. After an international push for universal bed-net coverage between 2009 and 2011, Brieger says that millions of nets are nearing their expiration date.

“We’re now looking at 2013, and there needs to be a lot of replacements,” he says.
Robust Mosquitoes, Less Malaria

The mosquito’s immune system might be more sophisticated than anyone suspected. And that could help scientists to develop novel strategies to control malaria, a disease that annually kills more than 650,000 people worldwide.

Mosquitoes can’t produce antibodies like humans do to target specific infections with sniper-like precision. But, in a new study, Bloomberg School scientists have identified a single gene called AgDscam that makes it possible for the insects to destroy an array of pathogens—including the human malaria parasite, Plasmodium falciparum—with some degree of specificity.

“When the mosquito is infected with the human malaria parasite, this gene will produce a certain repertoire of proteins that have the ability to bind to the parasite in the [mosquito’s] gut tissue and mediate its killing,” says George Dimopoulos, PhD, MBA, the study’s senior author. It was published in Cell Host & Microbe in October 2012.

“It’s exciting because insects have been known not to have antibodies and people wonder how they can deal with a broad spectrum of bacteria, parasites and viruses,” explains Dimopoulos, a Molecular Microbiology and Immunology professor. “The AgDscam gene does not produce antibodies but the building blocks of antibodies, and can also combine them to produce diversity in defense specificity.

“It’s like casting a net, rather than shooting a harpoon,” he adds, comparing the mosquito and human immune systems. Mosquitoes use the AgDscam gene to “weave the net,” researchers discovered. It contains immunoglobulin domains—present in human antibodies—that theoretically can produce up to 32,000 protein combinations to resist pathogens, including different malaria parasite species. However, it’s unclear exactly how the AgDscam proteins kill the pathogens. “If we can understand this mechanism better at the molecular level,” says Dimopoulos, “we may be able to create a genetically modified mosquito that produces a repertoire of proteins capable of targeting a broader spectrum of malaria parasite strains, rather than just a single strain.”

—Jackie Powder

A Broken Heart

A 3-year-old with flu-like symptoms in the morning dies in her mother’s arms that evening.

A 32-year-old running a half-marathon collapses and dies at the finish line.

A high school athlete drops dead on a treadmill.

Myocarditis, often symptom-free, does out death suddenly and silently. The disease is frequently caused by viral infections that reach the heart and trigger a fatal immune response, says immunologist DeLisa Fairweather, PhD. This acute form of the disease is a leading cause of sudden death among seemingly healthy young people. In its chronic form, myocarditis causes inflammation of the heart muscle and can progress to chronic heart failure several months or years later.

“When you hear about an athlete who went for a run or went swimming, then dropped dead, often autopsy results show it’s due to myocarditis,” says Fairweather, an assistant professor in Environmental Health Sciences. The absence of obvious symptoms frequently means that the disease remains undiagnosed and, in the acute state, physical exertion becomes dangerous.

Currently, a heart biopsy is the most reliable method to diagnose myocarditis but it is an invasive and risky procedure, Fairweather says. It’s one reason why her work to identify biomarkers for earlier detection is critical in preventing myocarditis deaths.

“In animal models we have found a marker that can detect inflammation using noninvasive imaging techniques and are beginning a small clinical trial at Mayo Clinic to test it,” says Fairweather. “We’re trying to get our data in animals published now, and with the results from the trial will apply for NIH grant money to perform a larger study in patients.”

A Myocarditis Foundation board member, Fairweather says families always want to know what they could have done to prevent a child’s death. “There are all the regrets that come with a sudden loss,” she says. “Someone is ripped away before they’ve had a chance to live life.”

—Jackie Powder
Our Most Intimate Adversary

My father William, my brother Spearman, my uncles Jesse, David, James and Tom, my aunt Mercy, my father-in-law John, my grandparents Walter and Elnora and Jesse and Sarah, my childhood friends Clay and Darren …

Death claims ever-widening circles of family, friends and acquaintances until it envelops us. It is inescapable, inevitable and irredeemably sad. So why would we want to devote an entire issue to death?

I began to ask that question myself on Monday, December 3rd at 10:30 A.M. Art director Robert Ollinger, designer Konrad Crispino, photographer Chris Hartlove and I were in the Office of the Chief Medical Examiner (OCME) of Maryland in West Baltimore. We were there for the photo shoot for our “Lessons from the Dead” story (page 36). Robert had chosen one of the main autopsy theaters for the photo because it appeared empty from our vantage above the room. After we had corralled our live subjects for the photo, however, we discovered two autopsies were under way.

An OCME staffer asked renowned injury prevention expert Susan Baker if she would be comfortable walking past the autopsies. Not particularly eager myself to witness the bodies in various stages of forensic investigation, I hoped she would balk at the prospect. But the 82-year-old Baker, who spent the early years of her remarkable career in the ME’s office, didn’t hesitate. She said, “Sure, let’s go” and walked nonchalantly past the cadavers. As we walked through the room, I kept my eyes keenly focused on Konrad’s heels.

“Death is very democratic,” the staffer told us, nodding toward the autopsies. His point was that rich or poor, big shot or average Joe, everyone ends up the same. He’s right. One way or another, we will all be there. The breath will stop. The blood will stop. The spirit will depart. All that’s left behind will be muscle, bone, sinew, organ.

After a while, curiosity trumped queasiness. I stole a few glances at the autopsies in progress. Now, I see that moment as instructive. I wanted to avoid death and its unpleasant reality. However, that’s not what public health is about. Public health is not about flowers and sunshine. It’s not about eyes averted. Its purpose is not to avoid but engage with our most intimate adversary—to stare, to probe, to investigate, to understand, and then to fight. All with the promise of making a difference and saving lives.

Public health has delivered on this promise again and again. From safe drinking water to vaccines, vitamin A, smokefree public places and many other hard-won successes, public health has extended lives and secured health for millions of people.

And, as this special issue of the magazine demonstrates, still more thrilling work is being done. The stories gathered here (and in the powerful essays and poems by our alumni at magazine.jhsph.edu/extras) tell us more. They also demonstrate how final and personal death is.

Cousins Jim and Bill Krantz (above) know this as well as anyone. They count 13 of their 18 family members have been diagnosed with cancer. Like many others in Frederick, Maryland, they blame the nearby Army base that developed bioweapons and buried chemical waste. They quite reasonably want to know what killed their loved ones and how others can be spared in the future. Untangling genetics, behavior, exposures from decades past, and other factors in cancer represents one of the great challenges of public health. Armed with science, data, knowledge and intuition, researchers and public health professionals peer into that blackness, seeking light.

At some point after my visit to the medical examiner’s office, I had an enlightening (and lightening) conversation with my son. I often ask him big questions out of the blue to gain insight into a 7 year old’s world. I asked him what he would like to do with his life. He thought a moment and then said, “Spend more time with it.”

Yes! That’s what it’s all about. The hard work of public health, the experiments, the slow accumulation of knowledge, the journal articles, the grant applications, the meticulously planned interventions—all seek to ensure people have enough time in their lives to work, to add something to the world, to live to their potential, to realize their dreams.

To spend more time with life.

Brian W. Simpson
Editor, Johns Hopkins Public Health
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Because I could not stop for Death—
He kindly stopped for me—
The Carriage held but just Ourselves—
And Immortality.

We slowly drove — He knew no haste
And I had put away
My labor and my leisure too,
For His Civility—

We passed the School, where Children strove
At Recess — in the Ring—
We passed the Fields of Gazing Grain—
We passed the Setting Sun—

Or rather — He passed Us—
The Dews drew quivering and chill—
For only Gossamer, my Gown—
My Tippet — only Tulle—

We paused before a House that seemed
A Swelling of the Ground—
The Roof was scarcely visible—
The Cornice — in the Ground—

Since then — ’tis Centuries — and yet
Feels shorter than the Day
I first surmised the Horses Heads
Were toward Eternity—

—Emily Dickinson
$350 MILLION INVESTMENT
Philanthropist and New York City Mayor Michael R. Bloomberg has committed $350 million to Johns Hopkins University, anchoring a major initiative aimed at bringing significant innovation to U.S. higher education. More: ow.ly/h9Ruw

CELEBRATING OUR CENTENNIAL
How do you celebrate 100 years of lifesaving achievements? What are the priorities for the next 100? Send us your ideas as we begin planning for the Bloomberg School’s Centennial in 2016: centennial@jhsph.edu.

VISIONARY VIROLOGIST
A virus causes cervical cancer? The concept intrigued Keerti Shah who began his revolutionary studies of the human papillomavirus in the late 1970s. In our Spring 2013 issue, Shah and his protégés discuss past, present and future of HPV.

Photo by Chris Hartlove

“BECAUSE I COULD NOT STOP FOR DEATH”
the poetry of life
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