WHAT DO YOU THINK?
We want to know. We’ll be asking many of you to take part in an online survey about the magazine this spring. Stay tuned.

MAGAZINE IDEAS? SUGGESTIONS?
Contact editor Brian W. Simpson: bsimpson@jhsph.edu

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Think plastic caps at the end of shoelaces, and you’ll get a sense of how telomeres protect the gene-containing parts of chromosomes. Elizabeth Platz, Alan Meeker and colleagues are teasing secrets from telomeres that may change the way we understand cancer.

IMAGE: Carol & Mike Werner / Science Source
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Not quite sated with this issue? Enjoy a lite ending.

Cover and contents illustrations: Alex Nabaum
FARM

WHAT WE GROW

FACTORY FARMS, ANTIBIOTIC RESISTANCE, GARDEN PROJECTS, AQUACULTURE, URBAN SOIL, SUPER MAIZE
60% of the global population depends on agriculture for their livelihoods.

About 12% of the world’s land area is used for crop production.

Since the 1900s, some 75% of crop diversity has been lost from farmers’ fields.

Agriculture began about 10,000 to 15,000 years ago along the Tigris and Euphrates rivers.

Global agricultural production has grown by about 2-4% per year over the last 50 years.

To meet the estimated demand in 2050, global agricultural production will have to increase its 2005 levels by 60%.

A TEFF JOB
Under the warm Ethiopian sun, day laborers harvest the ancient grain known as teff from a small scrap of land near Addis Ababa. The crop will fetch a good price, says farmer Girma Sida, but he worries how people will be able to afford it. Prices have soared 70 percent in three years.

(Photo: David Colwell)
I farm 400 acres in Putnam County, Missouri. After 64 years of mostly working and tending the land, and a little fishing and hunting, I have a personal relationship with every acre of its beautiful rolling hills. I raise beef cattle and harvest hay for winter forage. My wife Linda tends her flower gardens of roses, hydrangeas, mums, asters and 62 different kinds of day lilies. We raised our two children here and hope to turn the land over to them one day.

Our farm was a paradise until our new neighbors moved in—80,000 hogs.

Everything changed in 1995 when Premium Standard Farms arrived and started putting up 72 buildings that would house the swine. Back then, we had no idea what concentrated animal feeding operations (CAFOs) would mean to a rural community. We soon learned. It displaced area farmers with a corporation that controls every aspect of animal production. It divided our community between those who saw economic benefit and those concerned about public health and environmental degradation.

Feces and urine from so many animals confined to such a small space inevitably pollutes streambeds and kills fish, but in many ways, the odor is the worst insult.

The odor comes and goes according to the weather and time of day. As the sun comes up, the smell rises up out of the valleys. Linda says it’s like the Angel of Death moving through Egypt in the movie The Ten Commandments. It snakes along like that. At its worst, it’s unbearable to be outside. The stench causes heaviness in my chest, headaches and foul sinus drainage that can linger for days. There are over 160 compounds in the particulate matter that enters our lungs with every breath. Sooner or later, it’s going to have an effect on our health.

People have asked me, why don’t you just move? Only other farmers would understand. A farm becomes a part of your life, a heritage of the past and the present, something you dedicate your life to and steward for the future. My roots are embedded on this farm, just like the plants.

Nineteen years ago, I chose to fight. After hearing about the corporation’s plans in 1994, I traveled to North Carolina, which pioneered CAFOs. I saw what they did to rural communities and became determined to hold the corporation accountable for its actions. That summer, our township adopted a zoning ordinance requiring the CAFO to have setbacks from residences and post a security bond to ensure the township wouldn’t be stuck with cleanup costs should the operation cease. Shortly after, the corporation filed a $7.9 million lawsuit against the 256 residents of Lincoln Township. On April 1, 1995, Willie Nelson traveled to Lincoln Township for a Farm Aid rally to defy the company’s injustice to our community. After the negative press, Premium Standard Farms dropped the lawsuit. Despite endless legal battles, consent decrees and environmental fines, the CAFO is still just over the ridge from my property.

The only good thing from this experience is the work I’ve done helping others. Before, I didn’t have a fax or a computer or even talk on the phone much. I just tended my farm. Now I work with community groups, speak before government committees and give talks on college campuses. Since 1999, I’ve worked with the Socially Responsible Agricultural Project assisting people throughout the U.S. in organizing and defending their communities against CAFOs. We’ve had many victories over the years because people have become educated and fought for their communities.

Consumers have the misconception that factory-farmed products are cheaper than those that are sustainably raised, but they’re not considering the true costs in terms of water and air pollution, human health, transportation, infrastructure and taxpayers subsidies. If all costs were calculated, sustainable production would be just as affordable as factory farmed.

The bottom line is that there are three elements of all life: clean air, clean water and healthy food. Everyone should understand that the CAFO model destroys all of these.

Here’s what I advise: Find a farmer and buy locally.

Terry Spence is a fourth-generation farmer and a consultant for the Socially Responsible Agricultural Project.
One Straw Farm’s Joan Norman and Andrew Norman check on a couple of their swine.
Our taste for cheap meat has industrialized agriculture, drained natural resources and hurt our health. There has to be a better way.

Story by Mat Edelson
Photography by Chris Hartlove
Our taste for meat is literally changing the American landscape. The farm belt is mostly corn and soybeans for animal feed—reducing biodiversity and diminishing the soil, says CLF’s Robert Lawrence.

CAFO, as defined by EPA, processes at least 2,500 swine, 1,000 head of cattle, 125,000 chickens or 10,000 sheep or lambs. Many CAFOs are much larger. (See page 7.) This industrial revolution of farming, which mostly has taken place since the 1970s, allows roughly 40 U.S. poultry companies to process 9 billion broiler chickens annually.

It has also made the retail price of meat more affordable. In 2005, Americans spent 2.1 percent of their annual income on red meat and poultry—half of what they spent in 1970, according to the Livestock Marketing Information Center. Reduced prices helped Americans increase their red meat and poultry consumption by almost 14 percent from 1970 to 2005.

Many would see more affordable meat as a good thing; however, public health researchers say IFAP has immense hidden costs. Environmentally, animal waste effects are enormous. IFAP-confined animals produce more than three times as much waste annually—500 million tons—as humans, according to the 2008 Pew report. Most surface water and shallow groundwater pollution by IFAP is through spraying waste on fields and excess manure application to croplands. The waste can overwhelm soil capacity for absorption, polluting waterways and creating algal blooms that suck the oxygen out of water and create fish-killing “dead zones.” Air pollution by ammonia and hydrogen sulfide, as well as by danders, endotoxins and dried manure, is also a major problem.

CAFO waste and CAFO-produced meat put humans at risk for antibiotic-resistant infections and other serious medical issues. IFAPs use a tremendous amount of antibiotics prophylactically at sub-therapeutic doses. (Some 80 percent of antibiotics in the U.S. are used in animal production, most administered through feed or water.) “The majority of the antibiotics sold for use in food animals are the same ones we use in clinical medicine,” says researcher Keeve Nachman, PhD ’06, MHS ’01. “That’s a big part of the worry.” Numerous investigations at the Bloomberg School and elsewhere are looking at the effect of all these antibiotics and their impact on human health. (See page 14.)

In addition, significant ethical issues involving animal treatment exist. In many cases, the animals live and/or meet their demise in appalling conditions. An October 2013 Washington Post story, based on USDA data, found that instead of being euthanized, “nearly a million chickens and turkeys are unintentionally boiled alive each year in U.S. slaughterhouses.”

Equally disturbing are so-called gestation crates, intended to manage conflict between sows in the crowded conditions of CAFOs and to protect piglets from being crushed by the sow. The crates, which tightly confine sows, limit movement and all normal behaviors. Though they’re being banned in many countries, University of Missouri researchers found in 2012 that, in U.S. CAFOs handling 1,000 or more sows, more than 80 percent of pregnant sows were put in gestation crates. A Humane Society of the United States report found that pregnant swine were so confined that they “could not turn around.” The result: Distress, disease and deformities.

“Nor, absolutely not.”

Robert Lawrence, MD, director of the Bloomberg School’s Center for a Livable Future (CLF), doesn’t mince words when asked if IFAP is sustainable or even desirable.

The economic, environmental and health factors that go into the large-scale production of animal protein often live under the public’s radar. Lawrence and 25 fellow CLF faculty researchers, students and staff delve into everything from massive use of arsenic and antibiotics in the industry to the amount of energy it takes to produce a pound of beef. (Hint: It’s awfully high.) They’re looking at both supply and demand,
Is there a truly viable alternative to industrial food animal production?
as well as changing American attitudes toward meat consumption.

Lawrence has few friends in the meat industry. “The Pork Council would call me a rabid vegetarian,” he says. Though he does occasionally eat meat—he calls himself a “flexitarian”—Lawrence comes by his opinions honestly. He spent two and a half years as co-principal investigator of the 2008 Pew report titled “Putting Meat on the Table: Industrial Farm Animal Production in America.”

The report came up with some startling conclusions. The industry had exploded on the back of cheap energy, low-cost/high-yield animal feed crops (notably corn) and free-flowing water—none of which will last forever. Intense confinement of large numbers of animals, necessary for fast, mass processing, makes the transmission of disease a distinct possibility, even to human handlers. Then there’s the animal waste, which has the very real potential to foul air, land and water, and harm people.

It’s not surprising that the commission concluded that, given “the dependence on chemical inputs, energy and water, many IFAP systems are not sustainable environmentally or economically.”

Things haven’t improved over the past five years. If anything, it’s only more obvious how our taste for meat is literally changing the American landscape, says Lawrence. “Because of the demands of concentrated animal production, most of our farm belt has turned into production for animal feed rather than feed for humans. The vast majority of the corn and soy crop goes to feed animals,” says Lawrence. “With that has come loss of biodiversity and reliance on unsustainable commodities such as synthetic fertilizer and pesticides. The carbon content in the soil is going down, and the incredibly rich microbial environment of healthy soil has diminished.”

CLF researches these and other hidden costs of CAFOs. Roni Neff, director of CLF’s Food System Sustainability and Public Health program, shares a breakdown of some of the inefficiencies inherent in IFAP. “We have to start with producing the animal feed. It takes about four and a half pounds of feed to produce a pound of chicken, nine and a half pounds to get a pound of pork, and 25 pounds of feed to get a pound of beef,” she says. The feed requires fertilizer, and that, too, is problematic.

“One important source of the yield increases we’ve had is from the affordable phosphorus we’ve been able to put into our fertilizer,” says Neff. “The supply is now a serious concern. We get most of our phosphorous from mines in just a few countries, and we could hit peak phosphorus production in the near future. That’s a real concern for future food security.”

Neff and her colleagues are also troubled by the human toll of IFAP, which takes many forms. A controversial USDA proposal would increase line speeds at chicken and turkey processing plants by more than 20 percent. The agency says the proposal is
aimed at lowering the risk of pathogens including salmonella, though some food safety advocates say the move is more about saving the industry money than safeguarding the public’s health. In an industry that Neff says has been notorious for a high-injury rate among workers, the additional line speed could also prove dangerous. “You’re doing repetitive motions, in often too hot or too cold temperatures, it’s slippery, you’re using sharp tools. You’re already doing it pretty fast [140 chickens per minute under current regulations]. Then picture doing it even faster. The risk for injuries can really escalate,” she says.

Others say the concerns about industry practices extend far beyond the workplace. Antibiotic-resistant bacteria shed by chickens being trucked to processing plants have been detected.

And Jay Graham, PhD ’07, MPH, MBA, now an assistant professor at the George Washington University School of Public Health, discovered that flies outside homes near poultry farms carried harmful bacteria, including antibiotic-resistant enterococci and staphylococci, matching those in poultry waste.

Low-dose antibiotics are not the only group of problematic drugs in the food chain. CLF’s Keeve Nachman has been looking at arsenicals, which allegedly increase a bird’s ability to absorb feed nutrients while protecting the bird’s GI tract against common parasites.

“On the human health risk assessment side, I had learned to recognize arsenic as a potent human carcinogen, and the idea that feeding even a different form of arsenic to something we intended to eat sounded crazy, so I pursued it,” says Nachman.

Nachman’s work initially put him into direct conflict with the FDA. According to Nachman, the agency wouldn’t test chicken muscle for arsenic, claiming, “Muscle tissue is more difficult to test. It guts up our mass spectrometers,” which is not a very good defense.”

Nachman took up the challenge. His study published in *Environmental Health Perspectives* in May 2013 showing that the use of arsenicals increased levels of carcinogenic inorganic arsenic in chicken breast meat led the FDA and two drug companies to pull three arsenic-based drugs off the market.

It’s a given that food systems are under tremendous pressure to increase production. The planet’s population is expected to jump past 9 billion people by 2050. Can meat production keep up? Can we meet increasing demand without sacrificing the public’s health? What’s the best way forward—wholesale abandonment? Or moderation of our impulse to eat meat?

Tough questions with immense ramifications. Some experts argue that industrialization is necessary to meet demand, but IFAP needs tighter oversight to safeguard the public’s health.

Lawrence argues we have little choice but to change production and demand. It’s a hard sell, he knows, one in which a body of public health research must be painstakingly built before analyzing current public policy and advocating for change.

“These are sloopooow disasters, the unsustainability of the high meat diet as the population grows and we diminish our soil resources and rely on fossil fuels [for fertilizer production]. We’re at peak oil production, and the prices are going to go up at some point,” says Lawrence.

Then, of course, there are the serious impacts on human health. Recent data from scientists at the Harvard School of Public Health and the Cleveland Clinic, among others, have shown the direct links of high meat consumption and increased cardiovascular disease, diabetes and some cancers.

“All of these things, the average person really struggles to get their arms around,” says Lawrence.

Still, Lawrence says he sees a world more in balance with nature and the environment, where a diminishing taste for animal protein can be met by smaller, diversified farms that also grow vegetables (like One Straw Farm).

But the USDA, for one, isn’t sure. A 2012 USDA report found that small producers of livestock are having great difficulties finding small rendering and processing plants to handle their animals. The control of slaughter facilities by the vertically integrated heavy-hitters like Smithfield and Tyson, shuts out small producers. (Solutions to the problem, however, do exist. Some small producers have partnered in developing mobile systems that process meat on site.)

Nor have the feds been much help. The six priority recommendations listed in the Pew report on IFAP have not been embraced by the current administration.

At an October 2013 event at the National Press Club, Lawrence bluntly summarized government efforts by saying, “There has been an appalling lack of progress. The failure to act by the USDA and FDA, the lack of action or concern by the Congress, and continued intransigence of the animal agriculture industry have made all of our problems worse.”

In addition, Big Meat has big money pushing against change. “It’s very tough,” admits Lawrence. “There’s a disinformation campaign that has Americans believing the only source of protein is animals.”

Still, Lawrence notes that as the body of research grows, the public’s attitude about meat production and consumption may indeed be changing. CLF’s partnership in the 10-year-old Meatless Monday campaign, aimed at getting Americans to consume 15 percent less meat (as recommended by a Surgeon General’s report), is on the radar of half of all Americans and has received extensive media coverage. (See page 50.) In the U.K., the “meat-free Mondays” idea is also catching on, and Lawrence points to a recent report from a food trends agency that predicted that U.K. vegetable consumption would rise by 10 percent over the next two years. “Not that any of us can predict the future, but this offers an encouraging view of [consumption of] less meat and more plant-based foods,” says Lawrence.

Domestically, there’s also a movement by some states to eliminate those gestation crates: Colorado, California, Maine, and Rhode Island passed bills that will eventually ban such crates. Similar bans passed previously in Michigan and Oregon.

Taken as a whole, Lawrence says, “the cracks are appearing in a lot of ways,” in the current model of meat consumption and production. Whether it’s protecting the health of our hearts, our planet or our wallets, he says, moderation may be inevitable.
The outbreak was predictable but still a shock. Salmonella infections emerged in California in March 2013, eventually spreading to 23 states. Although none of the 430 infected victims died, the illness was unusually severe. Nearly 40 percent of those infected required hospitalization. In October, the likely source was traced to people who had consumed Foster Farms chickens. When laboratory analysis discovered that strains causing the infections were resistant to several commonly prescribed antibiotics, the outbreak was seen as another demonstration of the dangers of mass use of antibiotics in industrial food animal production.

Antibiotic resistance has become such a widespread threat that The Lancet Infectious Diseases Commission recently warned: “…we are at the dawn of the postantibiotic era.” In the U.S. alone, at least 2 million people acquire serious resistant infections every year leading to 23,000 deaths, according to recent CDC estimates. This epidemic of drug resistance is happening as the pipeline of new antibiotics is dwindling.

Since the discovery of penicillin in 1928, antibiotics have heralded a new era in humanity’s war against pathogens. They also have been used extensively. An estimated 190 million doses of antibiotics are given to people every year in U.S. hospitals, according to the American College of Physicians (ACP). And up to half of all courses of antibiotics are unnecessary because the patient has a cold or other viral infection, according to ACP.

Misuse of antibiotics in clinical settings plays a role in antibiotic resistance, but the far greater contributor to the problem is the massive use of antibiotics in animal feed, says
Ellen Silbergeld, PhD ’72, who investigated the issue for 12 years and is writing a book on industrial farm animal production.

Eighty percent of antibiotics produced in the U.S. are used in industrial agriculture, according to the FDA. The sub-therapeutic doses of multiple types of antibiotics given to cattle, swine and chickens are leading to multidrug resistance, says Silbergeld, an Environmental Health Sciences professor. “Scientists who have looked at this issue have concluded that the major contribution to the problem is from animals because of the sheer amounts of antibiotics used in agriculture.”

Silbergeld has seen the quantities used firsthand. Told by an FDA official seven years ago that it wasn’t possible to buy large quantities of antibiotic feed additives, she went to a feed store on Maryland’s Eastern Shore, home to many large poultry-raising operations. When she inquired about purchasing feed additive antibiotics, she was offered several types—in 10-, 25- and 50-pound bags. “I bought 10-pound bags of penicillin and tetracycline. When I tell my clinical friends [this story], they begin to understand the magnitude of the problem.”

Robert Lawrence, MD, director of the Bloomberg School’s Center for a Livable Future, also finds current practices to be a serious concern. Never “have such large quantities of antibiotics been routinely used at doses destined to accelerate the emergence of resistance,” Lawrence says.

Early in his medical career, he says he could never have imagined such antibiotic profligacy. “As new antibiotics were introduced, it was common practice to mandate an infectious disease consultation before releasing the new drug from the hospital pharmacy … to preserve the effectiveness of the new antibiotic as long as possible,” Lawrence says.

Yet, the FDA took a different approach when it came to their use in agriculture and began approving antibiotics as additives to animal feeds in 1946, says Silbergeld.

While several countries in Europe have reduced or banned the practice of using antibiotics as growth promoters, U.S. regulators have done little in the last 40 years—only recently adding voluntary guidelines. Public health scientists generally attributed this glacial movement to the combined influence of the agricultural and pharmaceutical lobbies.

Some of their tactics remind Silbergeld of the lead industry in the 1980s challenging public health researchers to “link” lead in gasoline with lead poisoning in a specific child. “When the government actually removed and then banned lead in gasoline,” she says, “levels of lead in U.S. children declined in direct proportion to the reduction. Similar findings with respect to antimicrobials and drug resistance have been reported in several EU countries following bans on use in feeds.”

Following European bans of antibiotic use in animal feed more than a decade ago, for example, data collected by academic, government and industry scientists in several EU countries showed that rates of antibiotic resistance isolated from bacteria in humans, animals and food items decreased.

The U.S. could learn from the Europeans, Silbergeld says. “We collect such poor data, and industry and government have so successfully resisted legislation to improve data collection, that it is possible for [both government and industry] to continue their claims that absence of evidence is evidence of absence. The other problem is that we don’t do anything with the data we do have. This is stupidity in place of science.”

Investigators frequently find themselves stymied by industrial producers who deny researchers access to farms and production data, a problem known as the “ag gag.” But researchers like Silbergeld have been innovative. She and colleagues Ana Rule, PhD ’05, MHS ’98, and Sean Evans, a PhD candidate, followed trucks moving poultry to processing plants and detected drug-resistant bacteria on surfaces and in the air inside cars traveling behind trucks carrying broiler chickens. Johns Hopkins PhD candidate Joan Casey (with co-authors Frank Curriero, PhD, MA; Sara E. Cosgrove, MD, MS; Keeve E. Nachman, PhD ’06, MHS ’01; and Brian S. Schwartz, MD, MS) recently used a large database of health records from a major HMO and plotted the location of patients’ homes to show that people with more exposure to large animal operations were at greater risk of methicillin-resistant Staphylococcus aureus (MRSA) infection than those with less exposure. And Silbergeld and colleagues at Johns Hopkins’ Homewood campus are seeking grant funding to collect evidence of the history of antibiotic use in Eastern Shore poultry operations by digging core samples of Pocomoke River sediment.

While European countries have already forced the industry to abandon antibiotics as growth promoters, the FDA in the U.S. has yet to require industry to take action. New FDA guidelines released in December 2013 ask pharmaceutical companies to voluntarily revise their labels so that antimicrobial drugs are reserved for disease prevention and treatment under the supervision of a veterinarian rather than growth promotion. The FDA argues that the voluntary guidelines, which include a three-year transition phase, will avoid years of litigation. David Kessler, a former FDA commissioner, told The New York Times: “This is the first significant step in dealing with this important public health concern in 20 years.”

To many in public health, however, the voluntary effort seems a weak response. CLF researchers say the new FDA policy will still allow industrial food animal producers to use the same low doses of antibiotics in feeds by simply claiming they are for disease prevention rather than growth promotion.

The new guidelines are not “much of a step forward,” says Nachman, a CLF scientist. “Voluntary measures from regulatory agencies are rarely seen as a successful vehicle for making change. I’m glad the agency is paying attention; I’m just saddened that the nature of their attention is not really going to result in a whole lot.”

Illustration by Harvey Chan
Food grows in the ground. Yet it would be easy to presume our meals spring from the grocery store, drive-through or quick mart. Can reconnecting with food at ground level improve public health? Can nurturing a garden also nurture healthy habits in children, empower impoverished women and strengthen community bonds? Programs throughout the Bloomberg School are finding out.

“When you talk about gardens and food, you touch a light in people, a hope, a promise, a truth,” says Kristen Speakman, MA, MPH ’06, project manager at the Johns Hopkins Center for American Indian Health (CAIH). “It’s the cycle of life. You start with a seed—like we all once were—you have to nourish it, then it sustains you, and then it dies. It’s something that resonates with the human spirit. It touches us deeply.”

And, Speakman hopes, gardens can have a deep impact on communities that are returning, literally, to their roots. The Santo Domingo Pueblo, who live along the Rio Grande in New Mexico, have a long tradition of agriculture—one largely abandoned to modern times, modern foods and the modern epidemics of obesity and diabetes. According to the CAIH, American Indian children have the highest rates of obesity and diabetes in the U.S.

Now the Santo Domingo and two other Southwest tribal communities (the Navajo Nation in Tuba City, Arizona, and the White Mountain Apache in eastern Arizona) are returning to that heritage through a program called Edible School Garden, part of a larger nutrition program run by CAIH under the guidance of “community visioning” boards. For three years, students have been working in the greenhouses, open-air classrooms and raised beds built into the participating schools’ courtyards. They’re growing traditional crops including melon, corn and chili peppers, and unfamiliar crops including okra, broccoli and spinach.

“The goals are ultimately to reduce the incidence of obesity and diabetes,” says Speakman, who is based in Albuquerque. “You have to start somewhere. This is intuitive.” Though, in the public health model, intuition isn’t sufficient. Indeed, it’s suspect. “So much harm has been done with good intentions,” she says. “We want to

With garden projects, public health rekindles humanity's need for seed

Above: Salena Gonzales and Vernon Tenorio work on their garden. Right: Michael Martinez with his fave veggies.
make sure this program is done right and is effective.”

Which is why the garden, with its science-based curriculum for third-, fourth- and fifth-graders and its component of co-teaching by community elders, is being rigorously evaluated before it can be “packaged” for other tribal communities. The team is looking for evidence of improved knowledge about, attitude toward and behavior regarding healthy eating as well as connection to traditional agriculture.

Preliminary data looks promising. As does the anecdotal. Some students have even transplanted their gardening skills from school to home. Kaitlin Mosley, senior research program coordinator, says the students seem more relaxed and attentive in their outdoor classroom. “There was a boy at one of the schools who was totally shut down, he wouldn’t talk to anyone,” says Speakman. “He came into the garden program and just blossomed. This program is healing work.”

Half a world away, in Kabul, Afghanistan, public health workers are healing the land itself. They’ve carved out a 5,000-square-meter demonstration farm designed to grow one crop: women extension agents. Participants in the Women in Agriculture Training Center, part of the Afghanistan Agricultural Extension Project funded by the USDA, in turn educate some of the country’s most vulnerable women. The program focuses on those who are widowed, divorced or abandoned with a goal of helping them with their outdoor classroom. “There was a boy at one of the schools who was totally shut down, he wouldn’t talk to anyone,” says Speakman. “He came into the garden program and just blossomed. This program is healing work.”

On the Darulaman Demonstration Farm, Wilcox has carved out 100 plots. Once a week, 32 extension agents come to learn drip irrigation, crop rotation, composting and other basic skills. Each takes her lessons back to a Farmer Field School in an impoverished neighborhood, where she teaches 10 students. “They feel empowered,” says Wilcox. “They’re not afraid to make an extension visit and provide sound advice.”

Students in the Field Schools are now tending their own kitchen gardens, growing lettuce, tomatoes and beets in the walled enclaves behind their homes. For women who are often restricted from leaving home and from marketing their crops, it’s a direct route to improving family nutrition. And for those who can sell informally in the neighborhood, it’s a way to earn money.

Gardens are sprouting up closer to Baltimore as well. The Center for a Livable Future (CLF) is in its fifth year of seeding gardens through the Baltimore Food and Faith Project.

“In faith groups pretty much across the board—whether it be Christian, Jewish, Muslim or Buddhist—care for the earth, care for your neighbor is going to be included,” says Darriel Harris, program officer for the Baltimore Food and Faith Project. “It’s not a stretch for congregations to say ‘this is important to us.’”

Digging those values right into the dirt is a way to get people to rethink the food they eat. “We hope what happens is that congregations and individuals become better stewards of the earth, of food in particular,” says Harris. Which might mean a congregation sponsors a CSA drop-off, or an individual chooses locally grown, nutritious foods.

“Gardens literally provide a source of food,” says CLF program officer Allison Righter, MSPH ’12, RD. “But they also connect people back to the process of growing food and caring for the land.”

In 2013 the program made 16 grants to faith community gardens in Greater Baltimore, ranging from $122 to $750. Some 40 gardens have flourished, including one at the Weinberg Senior Village, where the beds are raised to wheelchair-access height. Some congregations shared their harvest with local food banks.

One grant recipient is Epiphany Episcopal Church, which sits on a winding street in suburban Timonium, Maryland. At the far end of the parking lot, a statue of Saint Francis of Assisi keeps watch over a 40-by-20-foot garden plot. Here, members of the congregation—ages 2 to 82—spent last summer tending tomatoes, green beans, sunflowers and zucchini.

The process was simple: “We dug the hole,” says 4-year-old Taryn Heist. “We planted the seed and covered it up.”

Then magic happened. Daycare students watched over the sprouts during the week. Sunday school students watered them on weekends. One summer Sunday, in the middle of worship, a 7-year-old burst into the sanctuary lugging a huge yellow squash. Rev. Kristofer Lindh-Payne paused to set the prize on the altar.

“It gave our congregation the opportunity to grow together,” says Lindh-Payne. “To literally grow food and to grow in relationship with each other and with God.”

By Leah Eskin
Photos by Kaitlin Mosley
**Water Farming**

If Dave Love has his way, we’ll all be eating Swiss chard and cucumbers fertilized by fish rather than by synthetic chemicals.

In the summer of 2012, Love, PhD, an assistant scientist in the Bloomberg School’s Center for a Livable Future, finished constructing an experimental aquaponics greenhouse at Baltimore’s Cylburn Arboretum. It uses a combination of aquaculture (fish farming) and hydroponics (soilless plant farming). The project demonstrates how such a system could be employed for raising crops and fish in an economically and ecologically sound way.

In the 1,200-square-foot greenhouse, tilapia swim in fish tanks while edible plants are raised hydroponically in nearby tanks. The 4,000-gallon system circulates water from tilapia, to plants and back. The plants scrub excess nutrients from the water, cleaning it for the fish.

“Aquaponics combines multiple species at different levels of the food chain, and that’s really exciting,” says Love, whose team sells whatever it harvests through city farmers’ markets. “That’s how I think agriculture should work. It’s mimicking natural systems, and if we can replicate that in a controlled environment—the greenhouse—then we’re doing a good thing.”

He also has been working with PhD candidate and CLF Lerner Fellow Ben Davis on a project that examines the relationship between land use, water quality and oyster food safety in the Chesapeake Bay. Davis, the recipient of the first Aquaculture, Public Health and the Environment Research Grant from CLF, has been collecting data on water contaminants, oyster diseases and land use throughout the Bay to create an accessible geographic information system (GIS).

As more aquaculture businesses sprout along the Bay, the water quality where aquafarms are sited becomes an issue that could affect public health. “The reason we’re interested in food safety from an ecological respect is that oysters filter the water and store what they filter,” says Davis, who notes that elevated levels of bacteria, like fecal coliform from farm runoff, have been measured in some areas of the Chesapeake.

“If there’s anything we don’t want to have in the water, we probably don’t want it in the oysters.”

“Scientists have long studied the epidemiology of oyster-borne diseases,” says Love, “but Ben brings a new perspective and mapping tools to answer the question: What makes an oyster safe to farm and eat?”

—Joe Sugarman

**From Staple to Lifesaver**

From breakfast porridge to nshima at dinner, the typical Zambian family meal often includes maize.

Now, Bloomberg School researchers are investigating how to turn this staple into a lifesaver. They are exploring the efficacy of a new type of maize bred to provide as much as 15 times the vitamin A found in standard varieties grown in Zambia today.

Earlier studies pioneered by Dean Emeritus Alfred Sommer, MD, MHS ’73, and colleagues at the School have established that this one nutrient, vitamin A, could reduce childhood mortality in at-risk populations by 23 to 34 percent and prevent afflictions like xerophthalmia, which can lead to blindness.

The new variety is known as orange maize for the distinct hue of its kernels—a departure from the white or yellow familiar to most. This new maize is not genetically modified, however, but rather biofortified—a hybrid carefully crossbred to maximize each kernel’s pro-vitamin A carotenoids, which can be converted to vitamin A in the body. (Genetically modified foods are banned in many countries.)

The study included approximately 1,000 Zambian children ages 5 to 8 years split into two groups. One group received...
regular meals of biofortified maize. The second received conventional white maize. The study was conducted in the central agricultural district of Mkushi, where maize is the primary energy source for children. The researchers measured blood levels of vitamin A to assess the efficacy of the maize. With the data-gathering phases complete, the team hopes to publish results soon.

“Maize is the dominant staple in Zambia, especially among the rural poor. It’s a perfect delivery mechanism for vitamin A,” says Amanda Palmer, PhD ’11, MHS ’06, an assistant scientist at the Bloomberg School who is overseeing field operations of the study. The study’s principal investigator is Keith P. West Jr., DrPH ’87, MPH ’79, director of the Center for Human Nutrition at the School.

In Zambia, existing vitamin A supplementation efforts include capsules given twice a year and fortified sugar. The capsule form, however, does little to address the underlying dietary inadequacy. Meanwhile, less than 20 percent of sugar in rural homes is properly fortified. Orange maize would complement both of these strategies.

“Orange maize could really transform lives,” Palmer says.

--- Andrew Myers

Growing Food in City Soil

It’s an increasingly common sight in neighborhoods in Baltimore, Detroit and other American cities: Residents have reclaimed abandoned lots by planting gardens. Those projects have been praised for building social solidarity and improving local access to fresh produce, among other benefits.

But planting urban gardens is not without risks. Today’s vacant lot may have been yesterday’s dry-cleaning operation, aluminum factory or bus depot. “Gardeners may not know what sorts of contaminants are there or how to test for them,” says Brent F. Kim, MHS ’08, a program officer at the Center for a Livable Future (CLF). With colleagues from the School and Baltimore’s Community Greening Resource Network, Kim recently conducted a study of what community gardeners know and believe about the risks of planting in urban soil. They found that gardeners have some awareness of specific dangers, but often have a spotty understanding of how to reduce exposure. Many overestimate the effectiveness of using raised beds, for example, and may be unaware of important practices such as not planting next to buildings that may shed old paint. The study was published in PLOS ONE in February.

In Baltimore and other urban settings, the most notorious soil contaminant is lead. But that is only the beginning: Arsenic, cadmium, cleaning solvents and many other contaminants have been found in soil in various parts of the city. CLF’s Maryland Food System Map team collaborated with the study authors on an online map of environmental hotspots in Baltimore.

Unfortunately for community gardeners, soil tests can be limited in scope. “The tests that are typically available only include a few chemicals and may not tell the whole story,” says Keeve E. Nachman, PhD ’06, MHS ’01, director of the CLF’s Food Production and Public Health Program and principal investigator on the project.

While the researchers note that the risks of contaminated soils should not be taken lightly, they emphasize the importance of not detering people from gardening. “Overall, participating in community gardening is a very healthy activity, one that benefits not just gardeners but their neighborhoods and the city as well,” says Melissa N. Poulsen, MPH, a PhD candidate at the Bloomberg School and co-author on the study. “We want to encourage people to garden. We just want them to do so safely.”

--- David Glenn
FORK

WHAT WE EAT
AFTER FAMINE, HIMALAYAN HUNGER,
ENDOCRINE DISRUPTERS, WIC STARTER,
A FLY DIET, FOLATE FOR ALL
ACRES OF PIZZA
Americans eat approximately 100 acres of pizza each day, or 350 slices per second.

VITAMIN POWER
E.V. McCollum, a faculty member from 1917 to 1944, discovered vitamins A and D.

HUNGER KILLS
Poor nutrition causes nearly half of deaths in children under 5—3.1 million children each year.

HUNGRY WORLD
842 million people in the world do not have enough to eat. This number has fallen by 17 percent since 1990.

FOODBORNE ILLNESS
Each year, about 48 million Americans get sick, 128,000 are hospitalized, and 3,000 die of foodborne diseases.

GLOBAL GAINS
Number of overweight/obese adults in developing nations rose from 250 million in 1980 to 904 million in 2008.

SOURCES: WFP, Agriculture Council of America, CDC, WHO, ODI

UGALI, YUM!
It’s time to eat at St. Monica Lodwar Girls Primary School in Turkana Province, Kenya. The girls are seeking bowls of UGALI, a maize porridge that is a staple food in many African countries where it is known as POSHO, NSHIMA and by other names. (Photo: Shehzad Noorani)
Human history is full of famine. The Irish famine, the Ukraine famine, the Chinese famines... countless famines over the millennia. Yet, when I landed in Bangladesh in December 1974 and saw people starving to death, it was surreal. This was not how human society is supposed to be.

I was, at the time, a U.S. Army major and registered dietitian on a brief leave to work with Concern. I knew about food, nutrition and health, and could surely help, I thought. Then I realized how very little I knew.

Modern famines are complex and related to a host of interlocking events like crop failures, food system and market failures, civil disruption, unaccountable governance and conflict—all superimposed on already fragile states. Many people perish but some actually benefit. The poor sell everything they have cheap. The rich buy, cheap.

Prior to my 1974 arrival in Dhaka, rumors that the rice crop would fail had set off speculative hoarding. This caused soaring food prices and, for the poorest masses, starvation and migration. That crop did not fail, but by the time I arrived the damage was done. I was unprepared as I was to escape hell. I made my way slowly along streets teeming with people to the Concern house in Dhaka.

Unprepared as I was, I knew I was meant to be there. As a child, I had pondered over maps while my mom would sigh, “Thursday’s child has far to go.”

I gravitated to nutrition at Drexel University because my older brother had studied it and then joined the Army because a recruiter had been looking for food and nutrition majors.

While based at Fort Dix’s Walson Army Hospital, I was moved by a short news article about amputee freedom fighters in Dhaka being retrained for careers in food service. So I sent a $5 donation to Concern and received an invitation to visit. Knowing I had to make that journey someday, I took a posting on Okinawa to get nearer to my destination. Finally, I convinced my commanding officer that attending a dairy conference in India and working with Concern in Bangladesh aligned with our military’s expanding role to help solve nutrition problems around the world.

What I encountered in Bangladesh changed my views about nutrition and my life. I visited Concern’s feeding and food-for-work programs in vast encampments near Dhaka. I saw people eat famine foods—roots, barks, plants, flowers and leaves—and spent time with amputees as they prepared meals at the Sher E Bangla Hospital. I left with a question pounding at me: Now that I’ve seen it, what do I do about it? I finished my tour of duty and joined Concern in Bangladesh to do surveys, train staff and set up food-for-work programs that brought dignity with critical sustenance.

I’ve been going to Bangladesh ever since. The country has changed in many ways for the better. The nutrition priorities have also evolved. The Hopkins-Bangladeshi research project JiVitA, begun in 2000, now focuses on quality of diet, food security and protecting each generation’s “human capital.” For example, a poor quality diet can lead to micronutrient deficiencies that thwart health in pregnancy, impair child growth and development, and potentially increase risks of chronic disease. Through our rural research network of 800 staff covering more than 600,000 people, we work with Bangladeshi institutions to develop and test locally produced food supplements as well as assess cognitive capacity and disorders that may have nutritional underpinnings. We keep the next generation in mind, knowing that women need good nutrition not only when they are pregnant, but even before they start to conceive children, as they go through puberty.

That seemingly insignificant $5 check I sent off in 1972 turned out to be a rich investment in my future and my ability to work at improving sustenance in a country to which I am forever indebted.

Keith P. West Jr., DrPH ‘86, MPH ‘79, RD, the George G. Graham Professor of Infant and Child Nutrition, directs JiVitA, a collaborative research project on maternal and child micronutrient deficiency prevention in northeastern Bangladesh.
Terraced rice fields feed the people of Sitapur and nearby villages in the hills of midwestern Nepal. Planting begins when the monsoon rains arrive.
In a nation of farmers, undernutrition leaves children stunted and at lifelong risk. Can a novel study help save Nepal’s next generation?

Story and Photography
by Cathy Shufro
The country cut both child and maternal mortality in half in the past 10 years despite ranking 157th out of 187 countries in the UN Human Development Index, and despite enduring a decade of political upheaval that only ended in 2006. This nation of 30 million also is a global model for preventing child deaths and blindness by giving vitamin A supplements to preschool children.

So why has undernutrition proved so intractable here? Why aren’t people well fed in a country where 70 percent of the workforce is engaged in farming—in growing food?

To answer that question, researchers from the Bloomberg School and Tufts University’s Friedman School of Nutrition have launched an ambitious nationwide study that pays attention not only to diet but also to a broad range of other factors that influence nourishment, including agriculture.

In May 2013, 66 interviewers and 30 supervisors and research assistants completed the first of three annual surveys. In 60 representative towns and villages and three neighborhoods in the Nepali capital of Kathmandu, interviewers talked to any woman who had a child under 5 or who had recently married. They also interviewed the head of each woman’s household (generally her husband or father-in-law).

In 4,288 households across Nepal, interviewers asked a broad range of questions about factors that can affect nutrition for young children and their pregnant or nursing mothers: what children and their mothers eat, and whether they have enough; which foods families grow, and which they buy. When an interviewer asked, for instance, how much rice a mother and her children under 5 ate during the past week, the interviewer also asked if the household grew rice, if they owned the land where it was grown, and whether they ever got so hungry that they ate seeds intended for planting the next crop.

The survey teams raced to finish data collection before the midsummer monsoons made travel difficult. They visited communities in all three ecological zones—in the southern plains near the Indian border, in small towns in the hills (including Sitapur) and in high-altitude villages near Mount Everest—one of them was a five-day trek from the nearest road.

“It’s a little breathtaking,” says Keith West, DrPH ’86, MPH ’79, RD, director of the Bloomberg School’s Center for Human Nutrition. West is the school’s principal investigator for the study, called PoSHAN, an acronym that means “good nutrition” in Nepali. The $15 million, five-year USAID grant is led by PoSHAN principal investigator Patrick Webb, PhD, of Tufts.

The aim of the Bloomberg School’s team is to apply public health methodologies to mapping the complex interactions between nourishment and what’s grown, what’s eaten and what efforts have been made to improve nutrition, health and farming. The Tufts team, meanwhile, is analyzing how well policies and programs for improving agriculture and nutrition translate into action as they move from Kathmandu to towns and villages.

The interdisciplinary focus of the research makes the study unusual, according to West. “There’s a deep sense that agriculture and nutrition have not talked to each other over the decades, and the centuries,” he says.

Governments, nonprofits and community groups have repeatedly tried to address malnutrition by improving farming. And yet no one really knows what, if anything, has worked. When Webb and a colleague studied 10 reviews that had closely examined 250 of the strongest studies, they found all 10 reviews concluded that the studies provided little or no evidence that agricultural interventions improve nutrition.

The reviewers found that most of the studies were badly designed or poorly analyzed.

“There are decades of claims that say, ‘Do this, and we’ll improve nutrition,’” but actually very, very few studies have succeeded in documenting it,” says Webb. “It’s astonishing.”

The stakes are high. Globally, undernutrition means death for 3.1 million children younger than 5 every year. It caused 45 percent of all child deaths in 2011.

Yet the factors affecting nutrition are numerous and difficult to isolate. For
Undernutrition causes stunting and increases the risk of death.
instance, a family might provide more protein for their children if they raised chickens. But that gain would be undermined if chicken droppings caused recurrent diarrhea in the children. Or, consider a family that chose to raise poultry rather than plant a garden. They would not have their own vegetables to eat but they might make enough money by selling eggs or meat to buy a mobile phone that would make a family business more competitive, increase income and allow them to buy vegetables. The linkages are complex.

With this study, says West, “we’re embracing the complexity.”

**SHORTER STATURE, SHORTER LIVES**

By September 2013, piles of completed surveys were stacked, waist-high, in an office in Kathmandu. There, Bloomberg School project scientist Swetha Manohar, MSPH ’11, RD, and colleagues had begun analyzing the data.

In part, they were looking for stunting. Everywhere they’d gone, the survey teams had weighed and measured children, and those numbers would show the prevalence of stunting.

Stunting signals trouble: It results from poor nutrition over the long term, not just small setbacks caused by a recent food shortage or a child’s transient illness. Stunting embodies chronic gaps between nutrition and agriculture. It is also important because it costs a child so much. For children who survive, the deprivations and insults that cause stunting not only hinder physical and intellectual development but also increase the lifetime risk of degenerative diseases and, ironically, of being overweight; genes are made “thriftier” by long-standing privation so that the body maximizes fat storage.

The 1,000 days that begin with conception are the most crucial: By age 2, stunting is largely irreversible. After that age, children can’t catch up, says International Health Professor Robert E. Black, MD, MPH, a veteran health and nutrition researcher who directs the Institute for International Programs.

And stunting is insidious. In societies where stunting is pervasive, it may go unnoticed, says Black, adding “everyone looks small, so it looks normal. It’s the usual pattern of growth.” Though it may appear to be the norm, it substantially increases the risk of death. Nearly 15 percent of under-5 deaths stem from stunting.
FINDING THE RIGHT KERNELS

Sabina Maharjan is out of breath when she arrives at a sturdy stone-and-mud house on a narrow terrace high above Sitapur. She has been climbing for half an hour to reach this place, one of 38 scattered homesteads that make up the roadless village of Durkatta. Maharjan has scheduled this interview for early on this summer morning, before the family's workday has begun in earnest.

She greets the head of the household, a relatively prosperous farmer in his mid-40s. He and his wife have four children. Maharjan perches on a shaded wooden veranda in front of the two-story house, and the man faces her on a woven bamboo stool. Maharjan asks him the first in a series of questions and follow-up questions that will require two hours to complete. Does he own this house? Does it have electricity? How many fans are in the house? Radios? Bicycles?

She marks answers on a form fastened to a clipboard.

How does the family treat its water: or haul it up from wells. “The poor don’t have time to find the kernels of information that are probably important.”

Maharjan is asking about household finances when the man’s teenage daughter brings out rice with milk, breakfast for her 4-year-old brother and a visiting child. The boys attack the rice, then tip up their bowls and contentedly slurp the milk. A typical meal in Nepal consists of a mound of rice and a dish of dal (lentil gravy), and perhaps a few tablespoons of vegetable curry. The diet tends to be low in micronutrients and in protein.

By the time Maharjan asks her last question, it’s mid-morning. She will return the following day to interview the man’s wife, who has by now departed for the rice fields. Maharjan will record what the woman has eaten in the past week, tick off a list of 49 foods that begins with rice and ends with Wai-Wai, packaged fried noodles that are popular in Nepal. She will ask how much the woman knows about keeping children healthy. What would she feed a child who was sick? When should she wash her hands? Maharjan will also ask about the woman’s power within the family. Who decides whether to use contraception? Who decides when the woman can visit her mother?

Time to find the kernels of information that are probably important.”

Maharjan will weigh and measure the woman and her 4-year-old son. If the mother was randomly selected to give a blood sample, to measure hemoglobin, Maharjan will take a few drops.

NO TIME TO WASTE

Enumerators will return to Sitapur and the other 62 communities in spring 2014 and again in spring 2015. To track seasonal

(Continued on page 54)
As part of our daily diet, most of us unwittingly consume a cornucopia of endocrine disrupting chemicals (EDCs). These compounds—you’ve likely heard of bisphenol A (BPA) for example—interfere with normal hormone function. They are in many fertilizers and pesticides and often in the linings of cans, on the nonstick surfaces of pots and pans, and in beverage bottles.

No problem, says Julie Goodman—at least not with BPA. Not even for infants or pregnant moms.

Goodman, PhD ’02, ScM ’00, represents one side of a debate about whether EDCs are contributing to obesity, heart disease, cancer and other public health problems. Her systematic reviews of published research—she works full time as an industry consultant evaluating health risks from chemicals in consumer products and the environment—indicate that low exposures to BPA are a nonissue.

She has testified to that fact before state legislative committees considering potential restrictions on BPA. And, to address any suspicions of bias, consider that as a new mother she sought out and used baby bottles made of polycarbonate (which contains BPA, a substance that manufacturers voluntarily stopped using even prior to a government ban).

“I need to walk the walk,” Goodman explains, “if I believe in my own scientific conclusions.”

Other scientists hold different conclusions. Investigated for decades by researchers focused on reproductive and developmental effects, BPA is one of about 800 chemicals known or suspected to...
be capable of interfering with hormone function. Endocrine disruption, a mounting concern since the 1980s, has been blamed for declining fertility rates as well for increasing rates of the endocrine-associated cancers, namely breast and prostate.

“The multiplicative effects of many chemicals on the endocrine system are difficult to predict,” says prostate cancer researcher Terry Brown, PhD, a professor in Biochemistry and Molecular Biology.

Brown represents that camp of scientists who contend that “dose” doesn’t matter because hormone receptors are exquisitely sensitive at critical times of human development.

Goodman’s not buying it. She attributes the BPA fervor to scientific cherry picking. What’s missing, she contends, are consistent, replicable results that indicate evidence of adverse effects on human health. People are exposed to much lower levels than are used in most experimental studies, she points out.

“One study looks at the effect of BPA on 30 things in live animals, and finds an effect on prostate weight but no effect on anything else,” Goodman says. “Another study looks at 30 things in live animals and doesn’t find an effect on the prostate, but finds an effect on mammary glands. The media interprets this as: Bisphenol A causes effects on prostate and mammary glands. That’s not solid science. That’s a whole bunch of studies that find one effect here, one effect there. But are the effects because of bisphenol or statistical anomaly, or poor methodology or something else? You can’t ignore that question.”

The human body naturally has high levels of hormones, she reasons. If you compare the potency of bisphenol exposure from water bottles or canned tomatoes, versus natural estrogen in a person, “it’s like nothing,” she says. “It’s like a grain of sand on a beach.”

Goodman’s former PhD advisor, James D. Yager, PhD, the Edyth H. Schoenrich Professor in Preventive Medicine, describes her as “brilliant” and her analyses as sophisticated. Meanwhile, he is collaborating on research to determine the effect of endocrine disruptors—beginning with BPA—on signaling and metabolic pathways. Yager, director of the Molecular and Translational Toxicology Program, is working with Thomas Hartung, MD, PhD, the Doorenkamp-Zbinden Endowed Chair for Evidence-Based Toxicology. Using a human cell culture model, they are employing mass spectrometry to detect cellular metabolites whose levels are altered by low concentrations of BPA and other EDC chemicals.

Hartung aligns with the faction that doubts the relevance of EDC contamination on human health. But it’s an exceedingly complex issue, concedes the director of the Center for Alternatives to Animal Testing. It requires a whole new method of investigation.

“In a situation of controversy, we need data,” Hartung says. He’s developing a new endocrine disruptor screening paradigm because, he says, the current toolbox (which relies largely on animal testing) is too costly, time-consuming and crude.

His strategy is to use emerging technologies to better understand the mechanism. This involves developing high-throughput human cell-based assays that show not just what binds to what receptor but also the results of that binding, the so-called downstream effects.

When we rush to get rid of substances like BPA, they are likely to be replaced with new compounds that have not been tested as much, or at all, Hartung cautions. Case in point: One replacement for BPA is BPS, another bisphenol compound. Some think it’s not a great choice given its tendency to leach out of the plastic (though less than BPA) and its staying power (greater than BPA). A recent Environmental Health Perspectives study showed that very low levels of BPS interfere with normal hormone activity in animal cells.

In addition to his work with Hartung, Yager is collaborating on a grant for a BPA project with DeLisa Fairweather, PhD, associate professor, Environmental Health Sciences. An immunologist and expert in the emerging science of sex differences, Fairweather is looking at EDCs through a new prism that’s decidedly different from any that toxicologists traditionally use. She’s exploring the effects of BPA in a mouse model of myocarditis (inflammation of the heart), a male-dominant disease that’s driven by sex hormones. Females are protected against heart disease by estrogen. Fairweather’s female mice are protected too—unless they sip water treated with low doses of BPA, which renders them male-like, immunologically speaking.

When exposed to coxsackievirus (the most common agent for myocarditis in the U.S.), they developed severe heart disease much more frequently than females who weren’t ingesting levels of BPA equal to “high human-relevant” doses.

A bit of BPA alone doesn’t cause heart inflammation in mice. But in tandem with a common virus, it alters a once-protective signal and leads more often to a worse disease state.

“BPA can act as a co-factor; alone it would probably never do this,” Fairweather says, crediting PhD candidate Katelyn Ann Stafford with that finding. “Receptors activated by the virus and sex hormone receptors work together to drive inflammation in the heart. BPA alters that process, allowing a heightened inflammatory response.”

Fairweather, like Brown, argues that any interference with hormones is disruption, and that’s likely to have negative consequences, if not right away, then sometime in the future. Meanwhile, toxicologists like Goodman and Hartung bristle at what they see as an inherent inaccuracy in the popular moniker “endocrine disrupting chemical,” preferring instead the more neutral endocrine-active chemical. These substances might act like hormones without actually disrupting or interfering with anything, they say.

Goodman says she will change her mind if persuasive data emerges. “But,” she adds, “that hasn’t happened yet.”

A comprehensive study in preschool-aged children suggested that dietary sources constitute 99 percent of BPA exposure.
DAVID PAIGE'S IDEA FOR "PRESCRIBING APPROPRIATE FOODS" IN 1969 LED TO THE FEDERAL PROGRAM THAT NOW HELPS HALF OF ALL INFANTS IN THE U.S.

INTERVIEW BY KAREN KRUSE THOMAS

PHOTO BY CHRIS HARTLOVE
As a pediatric resident at Johns Hopkins Hospital and an MPH student in the late 1960s, David Paige was frustrated. Iron-deficient infants with stunted growth routinely arrived at the Harriet Lane emergency room—many so sick they required hospitalization. At the time, breastfeeding was rapidly declining in favor of evaporated milk formula, which poor families frequently would dilute with water to make it last. Some mothers gave infants cow’s milk, which often led to gastrointestinal blood loss.

The solution pioneered by Paige, MD, MPH ’69, and colleagues evolved into the federal Women, Infants and Children (WIC) nutrition program. WIC is the third-largest federal nutritional assistance program (after food stamps and school lunches). Designed to prevent the serious health consequences of malnutrition, it provides nutritious foods, nutrition education and referrals to health care and social services. Today, almost half of all U.S. infants and one-quarter of children aged 1 to 4 participate in the program.

The affable and energetic professor of Population, Family and Reproductive Health recently talked about WIC’s origins and impact with Bloomberg School historian Karen Kruse Thomas, PhD.

**POWER OF PREVENTION.** In my public health courses, we learned that you prevent disease. You don’t wait to treat it. I was really annoyed. I said, “I’m writing prescriptions for everything. Why don’t we treat iron deficiency and undernutrition by prescribing appropriate foods?” That was really the dawning of the WIC issue for me. That clinical recognition of the futility in treating case after case.

In the School of Hygiene, I was taking a course on population statistics with Matthew Tayback [ScD ’53], an assistant commissioner in the Baltimore City Health Department. Dr. Tayback headed a task force trying to increase enrollment in the federal free school lunch program and asked me, as a student—and this is the greatness of Hopkins—if I would be a working member. It gave me the opportunity to marry the clinical issues and the public health perspective.

**THE REAL WORK.** The school lunch program was a good way to assure appropriate nutrition and maximize the educational experience for disadvantaged children, but the negative impact on cognition had already taken place. The real work had to be directed at pregnancy and the early years of life. To pursue that goal, the school lunch committee led to creating the permanent Maryland Food Committee [now the Maryland Food Bank]. Along with the committee, my colleagues and I tried to think through how to develop a prescriptive approach to early infant feeding and pregnancy. We started to provide iron-fortified formula to newborns at the newborn clinic in Cherry Hill, a poor neighborhood, principally African American. I should say that it wasn’t until the 1980s that WIC began to promote breastfeeding.

It was really a mom-and-pop operation, I was doing almost all the work. We started collecting data on heights, weights and blood characteristics and noted a very high percentage of undergrown children, below the third percentile. Of course, a high percentage of low birth weights. The early data on the benefits of supplementing maternal and infant diets gave us courage to try to expand to a larger population.

**EXPANSION.** We received a grant from the federal Community Services Administration to launch a statewide voucher program enabling Maryland mothers to purchase formula and nutritious food. My research confirmed that providing fortified formula to infants in low-income families reduced their risk of iron deficiency and undernutrition.

I wanted to demonstrate that the problems we were dealing with at Hopkins weren’t specific to Baltimore City, that malnutrition existed anywhere poverty existed. When we submitted the grant, we coined “IFIF” as the acronym for Iron-Fortified Infant Formula Program. Our internal conversation was, “If we get the money, if we can convince the health officers,” so everything was if-if, and it seemed like an appropriate acronym.

**RESISTANCE.** We had considerable resistance from many of the rural counties, where health officers had been disappointed by previous federal programs that came and went. The food vouchers were unfamiliar and untested, and no one knew if the merchants would accept them. Many of the people who most needed the program lived on the Eastern Shore [the poorest, most rural section of Maryland], where resistance from health officers was strongest. Fortunately, as a Hopkins pediatric resident I had traveled throughout the state and down to the Eastern Shore. The health officers finally accepted the IFIF program when I agreed to continue to cover their pediatric clinics once a month.

**GOING NATIONAL.** CSA liked the IFIF program very much, and they began to spread the word on a national level, that Maryland and Baltimore and Paige and the Maryland Food Committee were the go-to people for nutrition intervention in the community, and that, obviously, they had funded us. It suddenly became bidirectional: Our appeal and our funding unleashed interest on the part of the feds, such as the Food and Nutrition Service in the USDA. WIC has emerged as an important national program. The School and I can justly revel in its success—we didn’t build it alone, but we were important architects for the program.

**LONG-TERM IMPACT.** WIC has been very successful in lowering the incidence of low birthweight and pre-term birth, which in turn effectively reduces infant mortality and developmental disabilities. Studies by the CDC found that WIC preschoolers show improved weight gain and overall health, as well as a sharp reduction in anemia. At the same time, WIC has been extraordinarily cost-effective. Even reducing one or two nights in the neonatal intensive care unit or an extra day of a woman’s hospital stay will more than compensate for the cost of WIC benefits.
“Folate is good stuff,” says Xiaobin Wang, MD, ScD, MPH. Just how good, however, has been a matter of some debate—until now.

When mothers consume it through fortified foods and folic acid supplements, prenatal folate prevents neural tube defects such as anencephaly and spina bifida. Folate and other B vitamins, such as B6 and B12, also regulate blood levels of homocysteine, an amino acid that promotes atherosclerosis and increases the risk of heart attack and stroke when produced in excess. But for many years, clinical studies failed to show that reducing elevated homocysteine levels through folic acid supplementation improved patient outcomes.

Wang and her colleagues have produced a series of papers (including one published in The Lancet) demonstrating that those disappointing results arose from studies conducted in the U.S. and Canada, where mandatory fortification of grains and cereals with folic acid ensures that most people already get enough of the stuff. By contrast, studies conducted in China—a country where there is no national fortification program, genetic mutations tied to elevated homocysteine levels are common, and rates of hypertension and stroke are high—paint a different picture. There, folic acid supplements have indeed been shown to slow the progress of atherosclerosis and reduce the risk of cardiovascular disease. For Wang, the takeaway is simple: Folate is a useful tool, but “it’s only good when people need it.”

Most recently, Wang, who is director of the Center on the Early Life Origins of Disease and the Zanvyl Krieger Professor in Child Health, found that optimal folate status at preconception is not only important in itself but may also counteract the adverse effect of DDT on early pregnancy loss in a Chinese preconception cohort. She also discovered high rates of elevated homocysteine levels in Chinese children and adolescents.

Wang believes these results argue for B vitamin supplementation across the lifespan to improve pregnancy outcomes and head off adult diseases in populations that lack fortification. Ultimately, Wang hopes that her work will encourage national fortification programs abroad.

“Additional research is needed to determine optimal dosage and combination of B-vitamin intake that is tailored to individual life stage and health needs and avoids potential adverse health effects of excessive B-vitamin intake,” Wang says.

—Alexander Gelfand

It’s well known that a woman’s diet can affect her baby. But ongoing research by Daniela Drummond-Barbosa, PhD, suggests that diet might determine whether she can produce one in the first place.

For the past decade, Drummond-Barbosa, an associate professor of Biochemistry and Molecular Biology, has explored how diet regulates ovarian cells in Drosophila melanogaster, the common fruit fly. By manipulating Drosophila’s genes, Drummond-Barbosa and her colleagues have identified several nutrient-sensitive pathways that influence the ovarian stem cells that make egg production possible. (Adult humans appear to lack ovarian stem cells, but our embryonic germ cells play a similar role in utero, eventually developing into eggs.) They’ve also demonstrated that the same pathways affect the ovarian microenvironment. That microenvironment, or “niche,” sustains the stem cells, as well as their daughter cells (specific cell types they produce through division, which go on to form eggs). For example, Drummond-Barbosa discovered that insulin levels—increased by carbohydrate intake—influence the rate at which ovarian stem cells proliferate, while diet-related changes to the ovarian niche affect the numbers that are maintained.
But in a complex living organism, many different organs and tissues will respond to the nutrients they encounter, and any of those responses could conceivably affect the ovaries and their contents. As a result, Drummond-Barbosa recently decided to explore how diet-driven signals from fat cells, which play an important role in regulating appetite, metabolism and insulin sensitivity throughout the body, might influence ovarian stem cells and their environment. In a series of as-yet-unpublished experiments, Drummond-Barbosa and postdoctoral fellow Alissa Armstrong, PhD, found that the presence of diet-related substances such as insulin and amino acids causes fat cells to release biochemical signals that trigger “really specific effects” in ovarian stem cells, their niches and their daughter cells.

If further research reveals that the relationships between fat cells and ovarian stem cells in Drosophila also apply to human embryonic germ cells, Drummond-Barbosa’s work could shed new light on how diet affects the early stages of ovarian cell development in people—and, hence, their ability to produce offspring. Additionally, clarifying how fat cells and stem cells interact could help explain the link between obesity and various diseases, including cancer.

—Alexander Gelfand

Cuts to the federal Supplemental Nutritional Assistance Program (SNAP) could backfire by actually increasing federal health spending, according to a recent analysis by a team of scholars including Keshia Pollack, PhD ’06, MPH, an associate professor in Health Policy and Management.

When millions of Americans found themselves newly unemployed after the Great Recession, many turned to SNAP (the federal Food Stamp program). Its budget more than doubled between 2007 and 2011—drawing attention from congressional budget-cutters. On February 4, the Senate passed the long-delayed Farm Bill cutting SNAP’s budget by $8 billion over 10 years. At press time, President Obama was expected to sign the bill into law.

Those proposed cuts could prove to be a serious mistake, even from a fiscal perspective, according to Pollack (above, at the Maryland Food Bank). If SNAP’s budget falls too far, she says, we can expect increases in spending on Medicaid and other health programs. As low-income Americans lose secure access to nutritious food, Pollack says, they will be more likely to need expensive health treatments for diet-related diseases such as diabetes. Families may also be more likely to forgo preventive health care as their food budgets tighten.

“We see $15 billion in potential diabetes-related costs, which would really offset many of the savings that they’re considering in Congress,” Pollack says. Her analysis was conducted with colleagues at the Health Impact Project, a Washington-based nonprofit collaboration between the Robert Wood Johnson Foundation and the Pew Charitable Trusts.

John T. Cook, PhD, an associate professor of pediatrics at Boston University who was not involved in Pollack’s study, says: “Our studies have consistently shown that children in SNAP households are significantly more likely to have their health reported as ‘good’ or ‘excellent’ than children in otherwise-similar families that don’t receive SNAP benefits.

“And that, in turn, means that they’re less likely to need hospitalization or ambulatory-care services,” he says.

Pollack emphasizes that her team’s report does not make recommendations about whether SNAP benefits should be cut.

“We simply want policymakers to be aware of the potential population-health effects and distribution of those effects within a population,” she says, “and to start thinking about ways to mitigate the adverse effects and optimize the beneficial ones.”

—David Glenn
FURTHER

WHAT WE SEEK
HEALTHY CITY FOOD,
BETTER FAMINE WARNINGS,
FREE RANGE TALK,
MEATLESS MONDAYS,
REASONS FOR OBESITY
Americans spend 10 percent of their incomes on food—the lowest of any country.

The U.S. fast food industry spent $4.6 billion in 2012 on advertising.

Total calories in fast food ads viewed by teens went down by at least 11 percent from 2009 to 2012.

“You are what you eat eats.”
—Michael Pollan

By 2050, climate change and erratic weather could push another 24 million children into hunger.

If women farmers had the same access to resources as men, the world’s hungry could be reduced by up to 150 million.

After she received a micro loan for her vegetable stand in Lahore, Pakistan, Bilques Dost Mohammad was able to buy produce from a wholesale market and avoid daily loans from a middleman. With the profits, she plans to send her youngest son to school. (Photo: Shehzad Noorani)

WHAT WE SEEK
Healthy city food,
better famine warnings,
free range talk,
meatless Mondays,
reasons for obesity

SOURCES: Yale Rudd Center for Food Policy & Obesity, Consumer Affairs, UNFAO
Salt, fat and sugar.

As a young boy in Atlanta, the unhealthy but tasty combination amounted to a major food group in my diet.

Fatback, deep-fried pork rinds and fried chicken were menu staples at home. Eating out was usually a trip to the six-dollar, all-you-can-eat buffet, where second and third helpings ensured that our plates were never empty.

It was hard to avoid the Southern fried food culture, but family dynamic also figures in my food narrative. My mother was a single parent, raising two boys, working and going to school for a master’s in social work. She didn’t have much time for home cooking. With no full-service grocery close by, fast food and pizza were cheap and easy options.

Over time, the fat- and sugar-laden diet was a recipe for disaster. I grew into a fat kid and an easy target for schoolyard jokes. (“Better not mess with him; he’ll sit on you!”) Our inner-city apartment complex was far from parks and playgrounds, so we didn’t get much running-around time. And my mother, worried about our safety, told us to stay inside until she returned home from work or school.

Bring on the television and potato chips.

When I was 10, everything changed. We moved to Ann Arbor so my mother could pursue further graduate work at the University of Michigan. We lived in student housing in a neighborhood where kids threw the Frisbee after school or played basketball at a nearby park. At our public middle school, phys ed was mandatory, the cafeteria had a salad bar, and there was a strong extracurricular sports program.

Soon, the pounds started to come off.

I was exposed to new foods (artichokes!). We learned that baked could taste as good as fried. I played high school football and began to make the connection between healthy eating and improved performance—on the field and off.

After I graduated from Columbia University and took a job as a social worker in the South Bronx, I began to think about food on a deeper level.

The endless eating options I had enjoyed as a college student—vegan and vegetarian, farmers markets, ethnic restaurants of all kinds—narrowed considerably. The bodegas and corner stores limited residents to the familiar high-fat and processed foods of my childhood.

The experience sparked my interest in public health, specifically in the areas of obesity risk and improving urban food environments. So I returned to school to learn about food disparity as a social justice issue. I earned my MPH at Hunter College, and now my PhD dissertation examines the role that father involvement plays in determining a child’s risk for obesity, focusing on Black and Hispanic non-resident fathers. The issue has particular resonance for me, as the father of a 4-year-old girl.

Having been overweight as a child, I’m committed to making sure that Emma grows up with healthy, fresh food on the table. I don’t keep soda, candy or cookies in the house. For snacks, there’s fruit—and the occasional granola bar.

Emma also knows that I’m serious about staying fit. My football days are over. Now bodybuilding is my sport of choice, and I’ve actually won a couple of competitions. I launched a website—Dads of Steel—as a resource for fathers, with workouts, healthy recipes and parenting tips.

I put a lot of effort and passion into living a healthy life—and it works. However, it’s not a regimen that we can expect most people to adopt. With more than two-thirds of U.S. adults overweight or obese and 18 percent of children classified as obese, this epidemic needs bold initiatives from public health officials, educators and researchers.

I hope to play a role in the research or policy arena to tackle chronic obesity with the same urgency that informed anti-tobacco and clean air campaigns.

Every child deserves more than a steady diet of Happy Meals.

Desmond Flagg is a PhD student in Health Policy and Management and a C. Sylvia and Eddie C. Brown Community Health Scholar.
Theodora and Eugene Morris (married for 45 years) discuss the bell peppers with Food Depot produce manager Dominic Wilson.
FOOD IN THE DESERT

In a city where the deep-fryer is king, what does it take to sell yogurt, salad and wraps?

Story by Michael Yockel
Photography by Christopher Myers
DURING THE LUNCH-HOUR PEAK AT SHAREEF’S GRILL IN WEST BALTIMORE, A TIGHTLY PACKED LINE STRETCHES ALL THE WAY FROM THE PLEXIGLAS-ENCLOSED COUNTER STRAIGHT OUT THE FRONT DOOR.

Hungry customers chat in the 15-by-20-foot shop as they wait for the usual carryout fare of wings and fries, steak sandwich and Pepsi, as well as the not-so-usual: a hot veggie wrap, a turkey wrap, corn chowder, 100-percent juices and other healthy items. Also atypical for an urban carryout are signs on the walls that declare, “We only use peanut oil when frying foods,” and “Shareef Sorbet: all natural, no high fructose corn syrup, pounds of fruit in every batch,” and “One of Baltimore’s Healthy Carryouts.”

But then Shareef’s, located in the economically depressed Harlem Park neighborhood, defies convention. The beneficiary of an initiative called Baltimore Healthy Carryouts led by the Bloomberg School’s Center for Human Nutrition, Shareef’s encourages its clientele to make better food choices. The project is just one way in which researchers, policymakers and others are making strides toward understanding “food deserts” and their toll on low-income urban populations.

Characterized by areas where the distance to a supermarket is more than one-quarter mile and where more than 40 percent of households do not have access to a vehicle, food deserts commonly plague large American cities like Baltimore, where one in five people lives in one.

With supermarkets out of easy reach, Baltimoreans living in food deserts often rely on corner stores and carryouts for their meals. According to 2012 data compiled by the School’s Center for a Livable Future (CLF), the city teems with 440 such corner stores and 709 carryouts, while boasting just 47 supermarkets.

“If you went outside this building [in East Baltimore] and spun around in a circle and walked in whatever direction you wanted, you would probably have to walk a mile or more before you hit a supermarket—probably two miles,” notes Joel Gittelsohn, PhD, MS, with both the Center for Human Nutrition and the Global Center for Childhood Obesity. “But if you walk a block or two, you’re going to hit a corner store or a carryout or both.”

The stakes are significant: The high-sugar, high-fat, low-fiber diet commonly consumed in poor communities is linked to elevated rates of obesity, which in turn raises the risk for diabetes, heart disease and some kinds of cancer.

Gittelsohn has spent the past 10 years exploring the relationship among low-income minority populations, food access and health via the Baltimore Healthy Stores initiative. He’s identified barriers to healthy eating in the city and fashioned strategies to increase access to a nutritionally adequate diet, improve food security and reduce the risk of diet-related chronic diseases.

“It’s a supply-and-demand issue,” he explains. “We work with local food suppliers to increase the supply of healthy foods, and we work with local consumers to increase the demand for those foods, because you can’t have one sustainably without the other.”

Typically, corner stores and carryouts offer few, if any, options like whole wheat bread, fruits and vegetables, and low-fat milk. Instead, they sell a cornucopia of high-fat, high-sodium and high-sugar foods.

“Most of the people in these communities say that they would love to eat healthier foods,” Gittelsohn notes, “but they cost too much or they’re of poor quality or they are just not available.” Residents have a “relatively good concept” of what healthy foods—and unhealthy ones—mean. Fruits and veggies: good. Sugary sodas: bad. “It’s not so much of a knowledge-gap issue,” he says.

Following research and feasibility studies, Gittelsohn’s Healthy Stores has launched three programs to increase access to healthy foods: B’more Healthy: Retail Rewards; B’more Healthy: Communities for Kids; and Baltimore Healthy Carryouts.

Conducted in 2011, Healthy Carryouts worked with eight West Baltimore shops located in food deserts: four, including Shareef’s Grill, emphasized healthy items; four others were left untouched, says former program coordinator Seung Hee Lee, PhD ’13. The “healthy” carryouts redesigned menus and signage; promoted bottled water, juices, salads and yogurt; and offered new combo meals like a grilled chicken sandwich, baked chips and bottled water that were sold at a discount.

“In Baltimore City carryouts, the deep-fryer is king,” Gittelsohn notes. “Many of these places do not even have a grill or a way to cook food in a low-fat way.” To alleviate that problem, the program provided one of the shops with a George Foreman grill.

Sales of healthy foods at the intervention shops went up dramatically—even after just the menus and signage were changed, says Lee, now an Epidemic Intelligence Service officer with the CDC. The final numbers showed a 100 percent sales increase for healthy options and an overall increase in gross receipts; meanwhile, the control carryouts experienced an overall decrease in gross sales during the same time period.

Additionally, pre-intervention versus post-intervention customer surveys indicated a behavioral change. “We noticed that those who recognized the Baltimore Healthy Carryouts intervention materials were more likely to buy healthier items—and a greater variety of healthier items,” Lee points out.

Count Tina Jackson among them. The Shareef’s Grill customer took notice of the green-leaf-flagged hot jumbo lump crab wrap filled with broccoli before placing her order. “I’m trying to be more conscious about eating heart-healthy foods,” she explains. “I like when food is healthy but still tastes good.” Then she jokes, “Make me at least feel like I’m not eating healthy.”

For his part, Gittelsohn expresses optimism in what the Healthy Carryouts study demonstrated: Not only did healthy food sales improve in the intervention.
Bringing healthy food to the city means working the angles of supply and demand.
carryouts, people also bought fewer unhealthy items. “Sometimes you worry about these interventions in that you could just get people to eat more healthy foods, but they will keep eating doughnuts and high-sugar cereals at the same time,” he says.

For now, the four healthy carryouts “are on their own,” he adds. “However, many more carryouts will be part of the B’more Healthy: Communities for Kids trial, which starts in spring 2014.”

AN A-HA! MOMENT IN CITY MARKETS
Baltimore Healthy Carryouts may have started a ripple effect. In 2012, the city government’s Baltimore Food Policy Initiative (BFPI) adopted the program’s basic model and introduced it to carryouts operating in two of the six city-owned public markets. First established in the mid-18th century, the markets sold fresh produce, meats and dairy products for more than 200 years, but over the past several decades they transitioned into offering mostly prepared meals.

“Some of the markets are more like food courts,” says Holly Freishtat, the city’s food policy director and head of BFPI—an amalgam of city departments that seeks to increase access to healthy food.

While serving an internship with BFPI in 2011 and 2012, Seung Hee Lee worked with its then healthy food coordinator, Rachel Yong, MSPH ’13, to analyze a CLF food assessment survey of the markets. They found that four lie in food deserts, and 70 percent of vendors in all six markets operate as traditional carryouts—in effect, implicating the city itself in Baltimore’s paucity of healthy food.

“That was an a-ha! moment,” admits Freishtat.

Subsequently, BFPI worked with 30 vendors in the Lexington and Northeast markets, both located in food deserts, to implement Gittelsohn’s multifaceted Healthy Carryouts strategy, dubbing its initiative Get Fresh Baltimore. That meant designing new green-leaf-highlighted menus to emphasize the existing healthy choices, introducing new options and creating nutritious combo meals.

“The markets’ management now prioritizes and understands the dire need to have more healthy food venues,” says Freishtat.

In formulating food-access policy, BFPI has also successfully tapped into CLF’s food-mapping project (mdfoodsystemmap.org), which graphically depicts Maryland’s food system, including farms, processors, distributors and retail food outlets. Its Baltimore City map effectively portrays the city’s urgent need for solutions. “[The map is] very good at targeting where need exists, how many people live in a food desert and what a food desert looks like,” she says.

Using CLF’s map, BFPI worked with the USDA to revamp its own food desert map and how a food desert is defined. That resulted in increased federal Healthy Food financing that is used to develop and equip grocery stores, small retailers, corner stores and farmers markets selling healthy food in underserved areas.

THE SUPERMARKET AS LAB
Not long after his wholesale/retail-food company bought a Southwest Baltimore grocery store in 2008, CEO Benjy Green roamed its aisles, discreetly noting his customers’ purchases.

“They were filling their carts primarily with unhealthy stuff,” he recalls, “and I couldn’t stand seeing what people were buying. I really felt like I needed to give back [to the community]. I thought, ‘What can I do?’”

The community can use the help. Food Depot serves a racially mixed, economically challenged neighborhood vexed by a high incidence of obesity, diabetes and hypertension. The neighborhood’s average life expectancy of 65 is one the lowest in the city.

Wanting to understand his customers’ shopping habits and help change their behavior, he contacted the CLF in 2010, suggesting collaboration: “I said, ‘There’s a need here. Use us as a lab.’”

CLF accepted Green’s challenge. “It was a researcher’s dream,” says Anne Palmer, MAIA, program director of CLF’s Food
They were filling their carts primarily with unhealthy stuff. And I couldn’t stand seeing what people were buying. I thought, ‘What can I do?’"

—Benjy Green, Food Depot

Communities and Public Health Program (FCPHP), which launched a two-year campaign in 2011 called Eat Right Live Well (ERLW). The campaign sought to answer a simple question: Can changing a supermarket’s environment induce its shoppers to become more healthful consumers?

First, investigators quizzed Food Depot customers to explore how their limited financial resources influenced their purchases. More than 70 percent receive federal Supplemental Nutrition Assistance Program [SNAP] benefits, the formal name for food stamps. They also asked shoppers how the store’s layout affected their decisions to buy nutritious items and solicited suggestions on how to promote more healthful purchases.

Just as Gittelsohn contends, the results indicated that low-income residents know healthy from unhealthy. “They have thought about it significantly,” Palmer observes, “and they’re making very rational choices of what’s available to them.”

That includes looking elsewhere for healthy food. “People cannot purchase what is not accessible,” explains Joyce Smith, who works with Palmer as a community liaison coordinator in Southwest Baltimore. “[When feasible] they travel to other communities—some beyond city limits—where better supermarkets are located.”

In cooperation with Green, the FCPHP team moved into intervention mode in 2012. They reduced healthful foods’ prices and gave in-store tests, moved healthy choices to eye level, displayed signage encouraging the purchase of low-fat, low-sodium and low-sugar options, set up end-of-cap aisles and register racks featuring healthy grab-n-go items and suggested recipes to customers. The team also worked with store employees on how to better promote healthier food choices and collaborated with a staff dietitian hired by Green.

By the time the intervention concluded, Food Depot had been transformed. Green replaced its warehouse-like sensibility with a warmer, more inviting atmosphere, hired more staff, improved the variety of produce (adding yucca, boniato, chayote squash and tomatillos), began buying locally when possible and started making low-fat prepared foods.

“It’s unique in terms of a supermarket in a low-income neighborhood,” says Palmer, “both visually and display-wise.”

On a recent December morning, Theodora Morris was perusing the augmented produce section, with her husband, Eugene, following attentively. She was shopping for the two of them, their three children and one grandson. “I like to shop healthfully,” notes Morris, placing two bags of mini carrots in her cart. “The vegetables here are good, and they have better prices.”

Barbara Countee, at the store to buy salmon, is also price conscious. “Healthy choices can be very expensive,” she says. Still, she prefers fresh vegetables—“cabbage, lettuce, greens, broccoli”—to frozen ones, and she avoids the canned variety entirely.

Meanwhile, over in the store’s dairy section, Teshea Jackson—shopping for herself, her daughter, her fiancé and his daughter—hauls a gallon of 1 percent milk out of a chilled case. In an effort to consume less fat, “I made the change from [whole milk] about a year ago,” she relates. But like Morris and Countee, she considers price extremely important; she cuts costs by choosing canned fruit over fresh.

It’s too soon to say if the two-year program made a difference. Pam Surkan, PhD, ScD, the project’s principal investigator and an assistant professor in International Health, is still analyzing the data.

From a business point of view, it’s “an uphill battle,” says Green. “People make their own choices; we can’t tell them how to act. And we can’t simply stop selling the stuff that may not be very good for them—we’re in business,” he says. “So we have the good and the bad stuff and everything in between.”

WHY IT’S HARD TO EAT HEALTHY

The battle against food deserts may never end, but City food policy director Freishtat thinks they can be eliminated in some areas and at least reduced in others.

For her, the most imposing obstacle to that goal resides in Washington, not Baltimore: decreasing funds for SNAP benefits. In January 2014, the House of Representatives passed a Farm Bill cutting the federal food stamp budget by $8 billion over 10 years. (Initially House leaders had sought to cut $40 billion from the SNAP budget, which had doubled in size during the national recession.) On February 4, the Senate passed the bill. At press time, President Obama was expected to sign the bill into law.

“We cannot forget that SNAP is an economic driver in our city—$422 million annually is spent on SNAP in the city and surrounding areas,” says Freishtat. “Retailers are impacted by any fluctuations to the SNAP budget, as are the individual residents.”

Depending on how the SNAP reductions affect people and retailers, more food deserts could appear in Baltimore and other cities.

Anticipating additional cuts in SNAP funds, Food Depot’s Green expects to see shopping patterns change at his store as customers choose cheaper, unhealthful items over more expensive, healthy ones. He cites processed white bread instead of whole wheat as an example.

Palmer believes that knowledge still holds the key to reducing food deserts.

“We want to provide qualitative research to the public and academia that gives a better understanding of how hard it is for people to eat healthfully,” she says. “So often we want to say, ‘Oh, those poor people living in those neighborhoods,’ or we victimize them—we do them a disservice, as if they don’t understand or haven’t thought about choosing and eating healthful foods.

“We need to turn that on its head and say, ‘Why do we make it so hard for people to eat healthfully?’ We need to convey how difficult it is to do what we’re asking people to do, and really respect that they understand their circumstances way better than we ever could. They are partners in this.”

FURTHER
When the worst drought in 50 years struck in 2010 and threatened its people with famine, Somalia, the world’s most failed state, was in no position to handle the crisis on its own. The country hasn’t had a functioning central government since 1991, and much of its territory is under capricious warlord rule, including by the Islamist militant group, the Al-Qaeda affiliate Al-Shabaab.

Effectively a ward of the international humanitarian community, the desperately underdeveloped country has received periodic emergency food aid in the past, but Al-Shabaab has made Somalia the most dangerous country in the world for aid workers—two-thirds of those killed in 2008 worldwide died in Somalia. The World Food Programme pulled out.

Chronic hunger conditions deteriorated. As a tell-tale torrent of desperately hungry people moved to refugee camps in neighboring countries, there were more than the usual complicating circumstances. “There was a kind of perfect storm of very bad conditions—climactic, political and security and many other things—at just the very point when we should have been focused on this, other things were happening, the Arab Spring and other big news events,” explains Courtland Robinson, PhD ’04, associate professor in International Health and deputy director of the Center for Refugee and Disaster Response.

The result was that the global relief community failed to act promptly, leading to a largely avoidable tragedy. Robinson and a London-based colleague have studied the consequences of that failure, and the results are a stunning indictment: an estimated
258,000 lives were lost, a figure that at least equals the toll from the last famine Somalia suffered more than 20 years ago. "An estimated 4.6 percent of the total population and 10 percent of children under 5 died in southern and central Somalia," noted the May 2013 report.

"The numbers that we found were beyond what anybody had predicted," says Robinson. Previous estimates were orders of magnitude smaller, in the tens of thousands. But this study found that the famine, at its most savage peak, was claiming 20,000 "excess deaths" each month—above and beyond an already high baseline mortality rate.

"That the needless hemorrhage of human lives took place again in the Horn of Africa in 2011, in spite of all our knowledge and all our experience, is an outrage," said Jan Egeland, UN emergency relief coordinator 2003–2006, echoing the sentiments of many.

Robinson, who has researched other famines, including in North Korea (where official denial of famine is still intact), primarily worked out the demographic denominators for the study—that is, the total population of Somalis (non-displaced, internally displaced and refugees in other countries) exposed to famine mortality risk. This complemented the work of the study’s main author, Francesco Checchi, at the time in the London School of Hygiene and Tropical Medicine (now at the Save the Children, UK), who processed data from hundreds of surveys to calculate baseline and excess mortality rates for the different populations of displaced and non-displaced Somali populations. The study, released in May (which made headlines in Europe but barely a blip in the U.S.), has helped fuel anger and frustration among humanitarian professionals trying to understand how they failed—once again.

After decades working in this region, the international relief community is in a position to do far better. A key part of its extensive infrastructure are two early warning systems, set up almost 30 years ago, by USAID and the UN’s Food and Agriculture Organisation (FAO). The monitoring systems offer detailed on-the-ground assessments (down to current market prices of red sorghum) to help spot probable conditions three to six months ahead.

The increasingly sophisticated monitoring networks (Famine Early Warning Network and FAO’s Food Security and Nutrition Analysis Unit for Somalia) worked as intended. Beginning in August 2010, their technical experts started issuing warnings that grave conditions were worsening. Some relief efforts got under way but were hampered by local conflicts and uncertainty about the severity of food insecurity, according to Robinson. After a famine was officially declared in July 2011, the international community’s ensuing operations were impressively effective and helped to save many. By the time, the famine was declared over in April 2012 a quarter-million Somalis had perished.

Exactly why that happened continues to haunt those who take seriously the wealthy world’s obligation to help their fellow humans to avoid the age-old curse of starvation, and the myriad diseases that opportunistically ride on top of such blows. Some criticize the process of determining a famine that is occurring as too technical—not sufficiently open to strong, earlier anecdotal evidence— and flawed by relying on some lagging indicators, such as mortality, that take months to show up in the data. “I think we need a different metric because mortality doesn’t always happen early, and it’s hard to measure quickly enough,” says Robinson.

Others insist the process—which relies on the Integrated Food Security Phase Classification (IPC) scale—is still the best now available means of achieving an internationally accepted determination of famine, which should then galvanize unreserved global action.

Chris Hillbruner, one of the key technical experts involved in determining

"There was a kind of perfect storm of very bad conditions—at just the very point when we should have been focused on this."

—Courtland Robinson

when famine level has been reached, insists a declaration could not have been made earlier in this instance. But he quickly adds: “A response to an emergency like this should not require a declaration famine. If you wait until a famine declaration to respond, you will always be late—food insecurity deteriorates over time and you have got to respond earlier on.”

Just why this happened is not clear and was probably due to a complex convergence of factors. The global economy was still in recession. The Arab Spring and the Japanese earthquake/tsunami were grabbing headlines. “Somalia fatigue” and concern about running afoul of U.S. anti-terrorism statutes likely played a role as well.

But there is also a nagging sense that, as Robinson says, “we took our eye off the ball.” That has practitioners on the front line calling for reforms that will further depoliticize the process and secure more upfront donor aid commitments that can be tapped without waiting for key capitals to deliberate each time there is a crisis.

Luca Alinovi, a leading Somalia expert, has suggested (along with FAO colleagues) that major donors and UN agencies should agree to “Ulysses Pacts” that would irrevocably bind major donors to future assistance to help vulnerable populations. Key aid personnel, he adds, should be accountable for achieving measurable results with a “specific measure of recourse” for failures, including being dismissed from their posts.

It seems unclear—perhaps unlikely—that the big power players are going to sign up for this. “I am not that optimistic that we will never again have a famine as severe as this, with the kind of mortality that we believe occurred, that we’ll fix this for the next time—there are just too many factors that will conspire against this, again possibly, sadly, even in Somalia,” says Robinson.

Still, he hopes the study might help promote a better understanding of what happened in Somalia and forge a new international resolve of “never again!”

By Ken Stier
Illustration by Harvey Chan
Can the poor afford good quality, healthy food?

Robert Lawrence: It depends on what you mean by affordable. I’m reminded of the car mechanic: you either pay now or you pay later. The externalized cost to health and to the environment of the current American diet really makes it unaffordable to all of us. Low-income people get a special hit, however, because they end up buying more processed food because of the low retail cost but with the high content of cheap inputs—fats, sugars, salt.

Anne Palmer: Price is obviously a factor. If it’s going to be affordable and healthy, it’s going to be mostly raw products that you’re working with and not prepared foods. You need skills, kitchen equipment and knowledge about how to prepare it.

Has the foodie movement helped drive awareness of food quality and sustainability?

Roni Neff: Absolutely, it’s made a huge difference. There’s now an ever-expanding market for the kinds of sustainably produced foods that we’d like to see more of. And the more market there is, the more production there is.

Keeve Nachman: I think the nutrition and food systems communities are after the same set of goals. I think nutrition is just one way that the food system influences health. It benefits both of us to pursue a common ground where the recommendations that are made on the nutrition front could also guide people in making decisions on the other aspects of the food system.

Lawrence: The foodies are exploring; they’re trying new things. And then other people eventually adopt those innovations. [But] unintended negative consequences are always a real problem. So think of quinoa. Quinoa was really introduced to consumers by a few people who discovered its nutritional benefit, the taste. Some of the low-income people in the Andes, however, are actually no longer able to afford quinoa because, as a cash crop, its export value is much greater.

Several researchers told me there’s a real chasm between nutrition and agriculture.

Keeve Nachman: I think the nutrition and food systems communities are after the same set of goals. I think nutrition is just one way that the food system influences health. It benefits both of us to pursue a common ground where the recommendations that are made on the nutrition front could also guide people in making decisions on the other aspects of the food system.

Is it possible to have healthy, fresh food that’s fast and easy as well?

Palmer: I don’t feel like we’ve really answered that question. If we’re being honest: Do I go home and cook a meal every night? Heck no, I don’t have time. So what do I do? We throw things together, we try and make it work. You try and make things as healthy as possible.
Bob, what's been CLF's greatest success—and its biggest failure?

Lawrence: The great success has been that discussion of the food system, and its role as an important part of the public health agenda, has been advanced tremendously by faculty, staff and students, through our innovation grants program, our fellowship program, the courses that we offer, and our collaboration with the Meatless Monday campaign. The biggest failure, I would say, is that despite some extraordinarily valuable contributions to the knowledge base, the policy domain for the U.S. food system remains highly resistant to evidence-based interventions.

What will it take to actually change the food system in the U.S.?

Lawrence: The problem with our food system is that it’s a slow-rolling catastrophe. There are these episodic major epidemics of foodborne disease. So there’s a general uneasiness in the American public about the safety of our food. But the connection between [that] and the fact that in a generation and a half, we have totally transformed the way in which we produce food—especially food animals with all the attendant public health consequences and environmental consequences—I don’t think the average person has made that connection yet. It’s literally out of sight, out of mind.

So where are we headed?

Neff: It has been a slow-moving catastrophe, but there’s every indication that we could hit some real serious bumps. In the meantime, there have been a lot of small, incremental efforts and policy changes. Many of those could lay the framework for what we need in the face of a really serious catastrophe. But we need to invest now in ramping them up.

If you could change one thing about the American diet, what would that be?

Neff: I would address the fact that in the U.S., we waste 30 to 40 percent of all food that’s produced throughout the food system. That’s not just at the consumer level. That’s throughout, from production through consumption.

Evidence about nutrition and environmental impact is converging. That provides further pressure for a healthier and more sustainable food system.

Roni Neff, PhD ’06, MS

Palmer: I’m naively optimistic but I do feel like the entrenched business interests have thwarted a lot of substantial change for so long that it’s really going to be tough. And that makes it sometimes feel a little bit really long-term, you know, when are we going to reach that critical tipping point where we see some transformational change?

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Caffeinated Waffles and the Law

People have been drinking coffee and tea for a caffeinated boost for centuries, but in the last few years the stimulant has crept into everything from “Wired” breakfast waffles to “Perky” beef jerky to a new line of Cracker Jacks called “Cracker Jack’d.”

It’s a trend that caught the attention of Stephen Teret, JD, MPH ’79, founder of the Johns Hopkins Clinic for Public Health Law and Policy and a professor of Health Policy and Management.

“I wasn’t focused on the health effects of the caffeine per se, but if you start feeling really good from the waffles because of the caffeine, maybe you’re going to eat more of them than you normally would,” says Teret, who compares the practice to cigarette manufacturers adding nicotine to cigarettes to addict consumers. “It’s the sugar for some of these products or the salt or the fat that will ultimately give you health problems, not the caffeine, but, like nicotine, the caffeine is what is habituating you. … I thought that there’s something the FDA ought to be doing about it.”

In other words, the issue was ripe for study by Teret’s health law and policy clinic, which he began in 2012 as a way for students to gain hands-on experience solving public health problems. In the clinic’s first year, Teret’s students examined the issue of elevated sodium levels in food served at senior living facilities.

They also made a video presentation to Maryland Secretary of Health and Mental Hygiene Joshua Sharfstein, who later called for public comment on proposed regulations based on the students’ work. This year’s students presented the issue of caffeinated food products to Michael Taylor, FDA deputy commissioner for food policy, explaining why the agency should be paying attention to it. “It was just a fantastic opportunity for students because they have the ability to actually make change by talking to someone who is in the position to affect the regulatory structure of food in the United States,” says Teret. “And that’s exactly what the clinic was designed to do.”

This spring his clinic plans to address the issue of states experimenting with drugs to be used as lethal injections when executing death-row prisoners. —Joe Sugarman

Make Your Mondays Meatless

The Center for a Livable Future (CLF) this past fall celebrated 10 years of supporting the Meatless Monday campaign to encourage Americans to eat meat-free one day a week. In 2003, advertising executive turned public health advocate Sid Lerner teamed up with CLF to give the campaign a strong technical assistance and scientific advisory resource. Since then, Meatless Monday has spread to 30 countries around the world.

In recognition of Lerner’s vision and leadership to create a healthier America, the School awarded him the Dean’s Medal, its highest honor, at a scientific symposium on the Meatless Monday anniversary in October 2013. “Sid took this idea introduced during both world wars and turned it into an innovative public health campaign, encouraging people to go without meat one day per week to improve not just their personal health, but also the health of the environment,” says Allison Righter, MSPH ’12, RD, a program officer at CLF. “It’s grown tremendously despite no paid advertising budget.”

Meatless Monday participation has increased dramatically, Righter says. Celebrities like Oprah Winfrey and Gwyneth Paltrow have joined the campaign, as have universities, food bloggers and high-end New York restaurants. Thanks to these
efforts, nearly half of all Americans are now aware of Meatless Monday, according to a 2012 national survey, and many are changing their behaviors as a result.

Changing your behavior just one day per week might not sound significant, but small changes may kick start larger behavioral shifts—both personally and culturally. CLF scientists backed up this concept with literature reviews that documented the efficacy of periodic prompts in changing behavior and Monday’s cultural significance and usefulness in health promotion.

Building on the success of Meatless Monday, The Monday Campaigns organization has expanded into other “Healthy Monday” ideas, such as quitting smoking, encouraging kids to cook and hitting the gym. Scientists from the Department of Health, Behavior and Society published a study in October 2013 in JAMA showing that people are most likely to consider quitting smoking on a Monday.

Among its more intriguing aspects, the study will also measure DNA methylation—a biochemical process by which genes are turned on and off in cells—to assess how community environments potentially alter gene expression and influence obesity.

“Mondays are a chance to start fresh, which encourages people to make positive changes for their health,” Righter says.

—Carrie Arnold

A Wider Search for Obesity

Over the last two decades, the soaring prevalence of childhood obesity has alarmed and perplexed the public health community. Yet, there has been a precious little understanding of the complex interplay of environmental factors that influence obesity.

Now, a team of Bloomberg School researchers has begun a massive, first-of-its-kind study to explore the community dynamics of childhood obesity. The multi-component study, led by Thomas A. Glass, PhD, MA, and Brian S. Schwartz, MD, MS, who are part of the Johns Hopkins Global Center on Childhood Obesity, will look at numerous community factors that contribute to childhood obesity, including land use and food environments, as well as physical activity settings and social contexts.

“This will provide an unprecedented and richly detailed view of childhood obesity,” says Glass, an Epidemiology professor.

“This study is about big data and big epidemiology,” says Schwartz, a professor of Environmental Health Sciences. “We will have longitudinal data on both risk factors affecting obesity and height and weight measurements throughout childhood, something few if any prior studies have used.”

Health data will be drawn from the electronic health records of a large health care provider; the study includes more than 164,000 children in some 1,300 communities in almost 40 counties in central and northeastern Pennsylvania. Longitudinal aspects will evaluate how body mass index trajectories and community contexts such as population density, socioeconomic status and distance to food sources have changed since 2001.

Among its more intriguing aspects, the study will also measure DNA methylation—a biochemical process by which genes are turned on and off in cells—to assess how community environments potentially alter gene expression and influence obesity.

“This will be among the first studies of community factors, childhood obesity and DNA methylation, which is thought to play a role in stress, appetite control and inflammation systems,” Schwartz says. “This may tell us how a variety of community factors like neighborhood design, food proximity and walkability literally ‘get under the skin’ to influence health.”

He adds: “We’re still early in the study, but we already know how several individual health factors—family socioeconomic status, child diagnoses, child medications and community deprivation—are influencing body mass index growth in early, middle and late childhood.”

—Andrew Myers
Are GMOs a good idea?

People want to know: Are genetically modified organisms (GMOs) causing diseases? Are they bad for my health? The science isn’t really settled on those questions. It’s not clear if there are direct negative health effects from consuming GMOs.

But to really evaluate GMOs from a public health perspective, we need to look beyond food consumption. Food production affects the environment, populations in surrounding communities and people working throughout the food system.

The two most widely used GMO crops in the U.S. are corn and soy designed to withstand a specific herbicide. Monsanto sells both the GMO seeds and the herbicide, known as Roundup. Over the years, Roundup-treated weeds have become tolerant to the herbicide, leading to increasing doses and runoff, resulting in growing risks to public health and the environment.

The latest chapter of the GMO story is the development of GM salmon for human consumption. GM animals produced for direct human consumption is something we’ve never seen, and FDA officials evaluating its safety are relying on data from the company seeking approval.

Overall, the use of GMOs to date has been a negative for the food system and for public health because of increased use of chemicals and other issues. It’s conceivable that genetically modified food could be used in a positive manner, but many factors need to be considered in addition to dietary intake risks.

Jillian Fry, PhD ’12, MPH, is project director for Public Health and Sustainable Aquaculture at the Center for a Livable Future.

Is food a human right?

All citizens of the world have a right to food.

Under UN guidelines, the right to adequate food is everything from nutritional quality to sufficient calories, so food adequacy is this broad concept of good, healthy, safe and culturally appropriate food.

Globally about 2.5 billion people lack food security. Almost a billion are malnourished. Policy changes are needed to support small farmers in low-income countries with better seeds and fertilizer, better use of water, access to markets and protection from subsidized commodities from high-income countries.

When you look at the statistics in the U.S., 15 percent of the population lives in poverty. Even with SNAP (the Supplemental Nutrition Assistance Program), many people run out of benefits halfway through the month and turn to cheap, high-calorie, processed food because it’s available in low-income neighborhoods.

That is a failure of the federal government to fulfill the right to nutritious, affordable food. And it’s a factor in the 600,000 premature deaths in the U.S. that are the result of a poor diet.

If we could ensure food security tomorrow to the 18 million people in the U.S. who don’t have access to enough food—or the right kinds of food—the number of premature deaths would plummet.

As public health people, through our training and research and knowledge, we have the duty to work more effectively for better food policies and for greater access to healthy foods.

Robert S. Lawrence, MD, is director of the Center for a Livable Future.
Are we reaching the end of cheap food?

It’s difficult to predict the future. But I really do think we cannot continue long-term with the availability of cheap food—and in saying this, I should note that for many, it already seems anything but cheap.

We’re not paying the full cost of the food, which includes the overuse of natural resources, the contaminants we’re putting out there and the fact that food system workers often don’t earn a living wage. Someday those costs will show up in our food prices.

With a global population that’s expected to hit 9 billion by 2050, the UN predicts we’d have to expand food production by 70 percent. But environmental threats are going to make it challenging even to maintain current levels. It’s hard to imagine that technological fixes are going to solve these problems.

I don’t say it’s impossible, but I think it will require some big changes. We could feed a lot more people by reducing meat consumption because it’s so inefficient to produce. And cutting into food waste is critical: Thirty to forty percent of all the food that’s produced is wasted—in fields, during storage and transport, and by retail, restaurants and consumers.

We eventually will have to move into more sustainable types of food production and distribution systems. It’s happening now, but not even close to the scale that’s needed.

Roni Neff, PhD ’06, MS, is director of Food System Sustainability and Public Health Program at the Center for a Livable Future.

Why are there so many food allergies now?

It’s likely that many things have changed in the environment, in our diets and in child-rearing practices that have led to an increase in food allergies in the past 20 years.

One of the most popular theories is the hygiene hypothesis. If the developing immune system is not exposed to enough levels and types of germs and bacteria, its focus may shift, leading to allergies or autoimmune diseases. Worldwide, there’s a lot of evidence to support this, as food allergies are much more common in developed countries. But the hygiene theory does not seem to be the most important factor in developed countries. Higher rates of food allergies in inner-city populations contradict the hypothesis.

In terms of nutrient-related allergy causes, two theories have some evidence to support them: vitamin D deficiency and excess folate. Compared to two decades ago, there’s a much higher rate of vitamin D deficiency—especially in northern climates. This may be diet-related, but it’s also because most of us spend more time indoors.

And about 20 years ago, women who were pregnant began taking supplements with high levels of folic acid to prevent birth defects. So there’s been a major change in developing infants’ exposure to folic acid.

I think we’re going to learn that there are quite a few more contributors to food allergies. Some are under investigation; some we haven’t thought of yet.

Robert A. Wood, MD, is chief of Allergy and Immunology, Johns Hopkins Children’s Center; and professor of International Health.
fluctuations in nutrition, they will also conduct surveys each September (after the monsoons) and each January in three representative “sentinel” communities—one in the mountains, one in the plains and one in the hills (in Sitapur, in fact).

For Sitapur and other hill communities, preliminary results are in: 36 percent of children under 5 are moderately or severely stunted. That’s slightly better than the national average of 41 percent.

Analyzing the data further will allow the PoSHAN researchers to look for associations between good nutrition and the many factors that affect it. For instance, perhaps the surveys will show that families have fewer stunted children if they build toilets or have cleaner sources of drinking water. Perhaps it will show that one program promoting hygiene and sanitation was associated with improved nutrition, while another was not.

“We get at least a snapshot of these kinds of patterns,” says West, “and returning next spring to the same homes will give us a longer-term view. This will help us find ways to guide programs toward greater impact, to favor the good influences while always trying to lower costs.”

Nepal’s Ministry of Health would value that kind of recommendation, says Raj Kumar Pokharel, MPH, chief of the child nutrition section. “Experts come and give ideas, for example, small fish farming or a sweet potato hybrid,” says Pokharel. “Some say, ‘Oh, golden rice is a very good source of vitamin A and micronutrients.’ We don’t know what to adopt. … The agricultural sector wants to increase productivity and variety. But it’s dietary diversity within the household that we want to cultivate.”

That applies to both the poor and the (relatively) rich: Not only were 81 percent of Nepal’s poorest children stunted in 2011, but so were 32 percent of the richest. Pokharel blames poor nutrition partly on fast foods like the instant noodles whose bright packages occupy the front racks in urban food shops and village markets alike. He likens noodle manufacturers to American tobacco companies because they are pushing harmful products, “deteriorating the health status of our children.”

Pokharel looks forward to finding out what the PoSHAN household surveys show about what people actually eat, day to day. The government will use that information to advocate for crops that will support or improve diets in the various ecological zones, and to fine-tune programs that educate people about what to grow and what to eat. Declines in stunting will signal success.

There’s no time to waste, says Pokharel. Nepal did manage to reduce stunting by 8 percentage points between 2006 and 2011. But at that rate, it will take a generation to bring it below 5 percent.

“Stunting reduces IQ levels and the capacity of the brain,” says Pokharel. “If you can calculate it in terms of daily losses, in terms of how much we are losing every day, every minute, every month and every year, we cannot wait.”

(Continued from page 29)