FOOD & ENVIRONMENT REPORTING NETWORK

Warning Signs: How Pesticides Harm the Young Brain

By Susan Freinkel on March 13, 2014

The path-breaking CHAMACOS study has detected developmental problems in children born to mothers who toiled in California's treated fields—but will anything be done?

66

2

21

279

Driving along highway 101 through California's Salinas Valley, it's hard to miss the fact that you are traveling through one of the most bountiful farm belts in the country. No matter the time of year, it seems, green fields unfurl toward the mountains that flank the valley, and crews of workers are stooped in the act of picking. Some unique alchemy of air, soil and climate exists here to create a place where dozens of crops flourish, from artichokes to zucchini. Growers plant red and green lettuces side by side in rows so they can be picked and packaged directly as ready-mixed salads. Eighty percent of the country's leafy greens come from the valley, thus its longtime nickname: "America's Salad Bowl."

For all the natural blessings, that bounty also depends on pesticides—more than 8 million pounds of them in 2011. Farmland is expensive here, which puts the farmers under constant pressure to keep increasing their yields. So they rely on an ever-evolving chemical arsenal to fight weeds, insects and diseases in order to grow the blemish-free produce that consumers want to buy. Pesticides are so deeply ingrained in the way agriculture is practiced here that people scarcely notice the noisy helicopters spraying the crops, or the warning signs—complete with skulls—posted in the fields after they're treated.

Maria M., a farmworker for 23 years, has three children, two with serious health problems.

Maria (she asked that her last name not be used) has been a farmworker in the valley for twenty-three years, since her parents moved the family from central Mexico in search of jobs. Her husband is also a farmworker. Now 38, Maria has worked in the fields picking produce, among other jobs. Even when she's not working, she's never far from the fields. They edge the roads she drives. There's a vineyard a stone's throw from her front door. Maria always knew she was in contact with pesticides; sometimes the smell burned her nose or left her with a headache. But she didn't pay it much mind. Many farmworkers figure that *poco veneno no mata*—a little poison won't kill you.

Then she started having children.

Baby Carla was prone to bouts where her chest got tight and she'd wheeze and gasp for air. The doctor diagnosed asthma. Carla's attacks got so bad that some months she missed as many as twenty days of school, Maria told me through an interpreter.

Juan Carlos, born two years after Carla, developed asthma too, though his attacks were never as severe. Maria had other worries about him. He was a wriggly baby and then a mischievous toddler who couldn't sit still. When Maria brought him toys, he'd destroy them in minutes. When she tried to put him in childcare, the center called her later that day and asked her to pick him up: Juan Carlos didn't like to play with the other children. Sometimes when Maria spoke with him, he didn't seem to understand; it seemed to her as if "he was on a different planet… as if he wasn't present." When he was 3, a doctor diagnosed Juan Carlos as having Asperger's syndrome and "hyperactivity."

The health problems affecting two of her three children—a son born in early 2013 seems healthy so far—are a mystery to Maria. There's no history of asthma, Asperger's or attention-deficit disorder in either parent's family. Maria is nagged by a disturbing thought: "I sometimes worry about them getting different diseases caused by the chemicals we bring from the fields, and that we were not even aware that we were the ones exposing them."

A growing body of research suggests that her fears are reasonable.

Since 1945, the use of pesticides in the United States has quintupled. More than 1 billion pounds of pesticides—a broad term that includes weed killers, insecticides and fungicides—are now used in the United States each year. Over 1,000 chemicals registered to fight pests and pathogens are formulated into some 20,000 products. Most are for agricultural use, but a

fifth are designed for nonagricultural applications—in homes and gardens, playgrounds, schools, offices and hospitals.

So it's no surprise that studies show many of us—even newborns—harboring detectable levels of pesticides in our bodies. Yet it's hard to know what that really means for our health. Their mere presence in our systems does not, ipso facto, make for a health threat. Scientists have linked heavy chronic exposure to cancer and birth defects. But what about low-dose continuing exposures—for example, the micrograms that a farmworker might carry home each night on the soles of her boots? Or for those of us who don't work on a farm, the traces that drift from a lawn or golf course, or remain in the dust after a landlord sprays, or that cling to a piece of fruit? (Produce is the main source of exposure for most children in the United States.)

One place where the answers are being worked out is in the Salinas Valley, where for fifteen years researchers have been following several hundred children of primarily Latino farmworkers since birth. The scientists are based at the University of California, Berkeley, but the hub of the study is in the town of Salinas, in a small tan portable bungalow tucked into a parking lot between the county hospital and county jail. The bungalow is busy almost every day, as the children and their mothers visit for periodic interviews and assessments. The waiting room has comfy chairs, toys for all ages and a TV tuned to Spanish-language programs, since most of the participants are originally from Mexico. Everyone loves a snack from the quesadilla maker in the back.

Maria was one of the study's earliest enrollees: she has been making regular trips here since before Carla was born in 2000.

The study is known as CHAMACOS, which stands for Center for the Health Assessment of Mothers and Children of Salinas. The researchers chose that bulky acronym because it's Mexican slang for "little kids." "It really means something to our participants," says Kimberly Parra, the field-office coordinator who manages the traffic of staff, researchers and families through the bungalow.

Many appreciate it for more than just the name. Even as the researchers have been trying to unravel the tangled effects of pesticides and other chemicals on children's development, they've been devising practical ways to help the study's participants reduce their risk of exposure—a rare example of community engagement by academic scientists. In a place that's often sharply polarized between those who own the fields and those who work in them,

CHAMACOS researchers have insisted on involving all sides. They've worked with growers and farmworker advocates to explore ways to mitigate exposure and have spun off studies to answer questions and concerns in the local community. It's been "a partnership, not a top-down approach," says Asa Bradman, one of the researchers. Recently, after hearing from local daycare centers that they were worried about the pesticides used in their facilities, Bradman launched a series of small studies to investigate the problem and help the daycare centers and their pest-control companies find child-safe methods.

"It's one of the things I find most impressive about their work," says Dan Shapiro, a professor at California State University, Monterey Bay, and a member of CHAMACOS's community advisory board. "They have a genuine interest in engaging, collaborating and serving the community rather than swooping in as disinterested researchers, collecting data and leaving."

The CHAMACOS team, led by Brenda Eskenazi, a professor of maternal and child health and epidemiology at University of California, Berkeley, has insisted on involving all sides, working with growers and farmworker advocates to mitigate exposure.

That approach is partly a reflection of the study's chief investigator, Brenda Eskenazi, a professor of maternal and child health and epidemiology at UC Berkeley. A self-described "child of the '60s," Eskenazi has a longstanding passion for community-based research. She has a Berkeley openness and warmth, but also an ex–New Yorker's sharp edge. With research in Italy and South Africa as well as Salinas, Eskenazi is exhaustingly on the go. Colleagues are used to her phoning in for conference calls from her car.

Eskenazi trained to be a neuropsychologist, but in 1978, seven years into her PhD, an adviser sent her to Michigan to interview people who were complaining of memory loss after being exposed to polychlorinated biphenyls, a now-banned class of industrial chemicals. She was astonished to learn that chemicals in the environment could affect people's brains as

strongly as pharmaceuticals, and she wanted to keep studying the issues that revelation raised. “It was a turning point in my life,” Eskenazi recalls. “I said, ‘I don’t know what this field is called, but that’s what I’m going to do.’” Never one to do things halfway, she completed a postdoctoral fellowship in toxicology and epidemiology. Likewise, when she started the CHAMACOS study, she took classes to improve her Spanish. Though her father was Cuban, she’d never learned the language well.

In the late 1990s, the National Institute for Environmental Health Sciences announced that it was going to set up centers around the country to research the influence of genetics and environmental chemicals on children’s health. Eskenazi, by then a member of the UC Berkeley faculty, was determined to win one of the grants. Given that California was the foremost agricultural state in the nation as well as a leading user of pesticides, Eskenazi’s decision to focus on the effects of the chemicals used in farming was “a no-brainer.”

“I wanted to do something to answer the health concerns of my state,” she says. Eskenazi and her team picked the Salinas Valley because it was only two hours south of Berkeley, grew crops year-round (which meant people stayed put) and had some of the most intensive pesticide use in California. They decided to focus on the effects on brain development of organophosphate pesticides—then the most commonly used insecticides in the valley. At the time, there was almost nothing on the subject in the scientific literature.

When Eskenazi and Bradman began visiting the valley, they were met with some wariness. Growers feared they had an anti-pesticide agenda, and farmworkers worried they could lose their jobs if they agreed to participate. The researchers connected with local clinics and gave gift cards to families who enrolled. Over a two-year period, from 1999 to 2000, they enrolled a cohort of 601 pregnant women—most born in Mexico, working as or living with farmworkers, and with an income well below the poverty line. As the women gave birth, the researchers began following the children—an initial group of 536—with periodic assessments.

To determine what the children were exposed to in the womb, the researchers took urine and blood samples from the women while pregnant and at delivery. To gauge the presence of pesticides in participants’ homes, the researchers did inspections and took dust samples. And to assess impacts, they questioned the mothers every few years about their children’s behaviors and tracked the kids through periodic tests: physical exams, neurobehavioral assessments, and analyses of their urine, blood, saliva, baby teeth and hair. (Over time,

about half of the children dropped out of the study, so in 2010 and 2011, the researchers recruited another 300 9-year-olds to start following.)

All of that information—including more than 150,000 biological samples stored in banks of freezers at a facility in Richmond, California—constitutes a treasure trove of data that Eskenazi and her colleagues have mined for more than a hundred scientific papers. Over the years, they have broadened their investigations to look at the effects of other chemicals to which the CHAMACOS children have been exposed, including fungicides, fumigants, bisphenol A and flame retardants. (They explored the last one because, until recently, California required the retardants to be present in any upholstered furniture sold in the state.) “We call the exposures we’ve looked at ‘the California mix,’” Eskenazi says.

By now, she has made the 105-mile trip to Salinas hundreds of times. Still, every time she sees that first crew of workers bent over in their backbreaking labor, she feels deeply moved. When she was passing out plates of food at a recent gathering of CHAMACOS families, she began to cry. None of her other research affects her that way. “I go to Salinas, and I cry. I don’t know why,” she says. There’s something about this population that affects her deeply: “What they do. How hard they work. Their values. It’s all very special for me.”

While there are dozens of crops growing in the Salinas Valley, it’s a less diverse mix than it was fifty years ago. Alongside produce, the valley’s farmers used to raise larger amounts of staples like alfalfa, wheat and dried beans and to rotate their crops frequently throughout the year, a practice that prevented some of the pest problems they battle today with chemicals. But as rising land values shaved the profit margins, the growers increasingly concentrated on the most profitable crops, reducing their rotation of crops. “Broccoli is an excellent rotational crop” that controls many soil-borne diseases, notes Richard Smith, a University of California agriculture-extension agent who works in the valley. But broccoli doesn’t make as much money as lettuce. “So what we now have is 125,000 acres of lettuce and only 50,000 acres of broccoli.”

When CHAMACOS was launched, a half-million pounds of organophosphate insecticides were being sprayed every year in the Salinas Valley. (Roughly 90 million pounds were used annually nationwide at the time.) The vast majority of the mothers who joined the study had detectable signs of exposure to those chemicals in their urine. It’s not possible to directly measure organophosphates in urine; instead, the researchers looked for metabolites—the breakdown products of various commonly used agents like chlorpyrifos and malathion. Most

of the women also harbored metabolites of DDT because they'd grown up in Mexico, where the insecticide continued in use long after the United States banned it in 1972. The women were "shocked" to learn that they had these industrial chemicals in their bodies, recalls Max Cuevas, executive director of the Clinica de Salud del Valle de Salinas, where many of the participants were patients. "The next question was: 'Will this do anything to our baby?'"

As it turns out, these chemicals can pass through the placenta, gaining access to the baby's bloodstream and, eventually, its delicate, developing brain. The brain is more vulnerable at that time than almost any other, says pediatrician Philip Landrigan, head of preventive medicine at the Mount Sinai School of Medicine. "Because the brain is going through such complex, rapid development at that time, it's very easily thrown off-kilter." Prenatal exposure to even tiny amounts of organophosphates—in the parts per trillion range—can have significant impacts on the brain, the CHAMACOS study suggests.

From infancy on, the children of the mothers with the highest levels of organophosphates were at the greatest risk for neurodevelopmental problems. That association was present at every stage the researchers checked in on the kids. At 6 months, they were more likely to have poorer reflexes. At 2, they were at higher risk for pervasive developmental disorder, an autism-related condition, like Asperger's, in which children have trouble connecting to others. At 5, they were more likely to be hyperactive and have trouble paying attention. At 7, they scored lower on IQ tests, by an average of seven points—the equivalent of being a half-year behind their peers. Eskenazi can't say whether the associations persist, because she hasn't been funded to keep looking.

The findings are consistent with animal studies. Meanwhile, New York researchers came up with nearly identical findings following a very different group than the one in CHAMACOS: inner-city children exposed to pesticides used to control cockroaches. Their study focused on one organophosphate pesticide: chlorpyrifos, sold under the brand names Lorsban and Dursban. Here, too, the children with the highest prenatal exposures were more likely to have lower IQs. They also had poorer working memory, which affects learning, reading comprehension and the ability to pay attention. The New York study was published in the same journal and on the same day in 2011 as the CHAMACOS IQ study. The combination made for "a really uniquely strong case" about the risks of the chemicals to children's brains, says Kimberly Gray, a program director at the National Institute of Environmental Health Sciences.

“Scientists are usually too cautious to say they have ‘proven’ anything,” wrote Gina Solomon, senior scientist at the Natural Resources Defense Council and now an official at the California EPA. But the studies “come about as close as I can imagine to absolute proof.”

More evidence came in a paper published a year later by the same New York scientists, Virginia Rauh and Robin Whyatt, deputy directors of the Columbia Center for Children’s Environmental Health. They did MRI scans of some of the children in their study and compared the brain images of those with the highest and lowest prenatal exposures. The brains of the most highly exposed kids looked different: there was less volume in regions associated with working memory, cognition and inhibition. All are areas of the brain that play a role in the skills measured on IQ tests. (There were also signs of “desexing”; the boys’ and girls’ brains looked more similar than usual, though it’s not clear what that means.) “There was a relationship between what we saw in IQ and what we were seeing on the MRI,” says Whyatt.

Losing several IQ points isn’t such a big deal for an individual, but at a population level that collective drop in brainpower has enormous social and economic implications. “If one child loses seven IQ points, the teacher may not notice, the parent may not notice. But if 100,000 kids have a loss of seven points, the economy notices,” says Leonardo Trasande, a pediatrician and environmental health specialist at the New York University School of Medicine.

By one expert’s calculation, even a five-point drop in IQ translates into a 50 percent increase in the number of functionally disabled adults (from 6 million to 9.4 million) and a 50 percent decrease in the number of gifted people (from 6 million to 2.6 million). That shift can bring a host of ripple effects, from an increased number of school kids needing special education to fewer workers capable of complex tasks or high-level decision-making. Experts see parallels between the cognitive effects of organophosphate pesticides and lead poisoning, which causes roughly the same IQ drop. When Trasande looked at the economic impacts of lead poisoning, he found that it cost the United States $51 billion annually in lost economic productivity.

The CHAMACOS and New York findings are “very similar to what we learned about lead twenty-five to thirty years ago,” says Landrigan, one of the country’s leading researchers in children’s environmental health. The lead studies found similarly subtle but important brain impacts among kids who weren’t visibly sick from exposure. In addition to lower IQs, they

were at higher risk for attention and behavioral problems as well as dyslexia. They had a harder time in school and were more likely to drop out. “Further follow-up showed that at 17 or 18, they were more likely to be in trouble with the law,” says Landrigan. “The social burden is very extensive, and it ripples across society.”

Studies of organophosphate pesticides and others have also found associations between in utero exposure and birth defects or childhood cancers. Other research, meanwhile, has linked childhood exposure with asthma, ADHD, early puberty and obesity.

The risks are not confined to children growing up in farm communities or inner-city public housing. Although the CHAMACOS mothers harbored higher levels of pesticide metabolites than most Americans, there were still “substantial” overlaps, says Eskenazi. A 2005 biomonitoring study by the Centers for Disease Control and Prevention found that about 25 percent of pregnant women harbored pesticide concentrations higher than the median levels measured in the CHAMACOS mothers. The CHAMACOS children at greatest risk for problems had relatively high prenatal exposures. Still, the overlaps with the general population suggest that “a large percentage of US children could be suffering the effects of exposure due to pesticides,” says David Bellinger, an environmental health expert at the Harvard School of Public Health.

When the CHAMACOS study was launched, a half-million pounds of organophosphate insecticides were being sprayed every year in the Salinas Valley.

That organophosphates are neurotoxic is not news—they were first developed as nerve-gas agents during World War II, and as pest-control agents they were designed to target an insect’s nervous system. The compounds inhibit cholinesterase, an enzyme that helps regulate acetylcholine, a key chemical messenger in the brain. Without the enzyme, acetylcholine builds up, jamming the traffic of signals between neurons. That’s one reason heavy chronic exposure has been associated with neurodegenerative diseases such as

Alzheimer's and Parkinson's. (Recent research suggests another possible pathway for harm: there's evidence that organophosphate pesticides may disrupt the growth and distribution of fetal brain cells—and at lower levels of exposure than it takes to disrupt cholinesterase.)

It's long been known that children are more vulnerable to pesticides than adults. They take a bigger hit because they eat, drink and breathe more for their body weight, play on the floor where chemicals settle and like to put things in their mouths. They're also less able to metabolize chemicals that get into their systems. But CHAMACOS has found that people's susceptibility can vary by age and genetic makeup.

Working with data from the study, Berkeley geneticist Nina Holland discovered that the participants carry numerous variants of a gene, PON1, that produces an enzyme that helps the body detoxify organophosphate pesticides. That variability in the gene means significant difference in its protective powers. Depending on their gene type, some babies may be twenty-five to fifty times more susceptible than others to the pesticides' neurotoxic effects, and sixty-five to 130 times more sensitive than adults. The children who were genetically more susceptible were at higher risk for neurodevelopmental effects.

Holland and others think the finding suggests a problem in the way that the Environmental Protection Agency assesses the risks of pesticides and sets allowable levels of exposures. By law, the agency is required to reduce the acceptable levels of exposure by at least tenfold if there is a lack of data about a pesticide, or evidence that it poses a heightened risk to fetuses, infants or children, and sometimes the agency goes farther. But Holland fears the agency's safety threshold might not be adequate for children with highly susceptible genetic makeups. EPA spokeswoman Cathy Milbourn says the agency has considered the data on PON1 variability from both human and animal studies and has decided that the current threshold is "protective of all ages, including babies." The agency is currently reviewing the safety-margin threshold for certain pesticides, including chlorpyrifos. But a preliminary EPA review in 2011, downgrading estimates of the chemical's risks to children by seven- to tenfold, suggests that it may lower the safety threshold yet more.

Critics say such a move would fly in the face of a 1996 law that called for extra precautions to safeguard children's health, given their special vulnerability to chemicals. "The EPA seems to be going out of its way to ignore the evidence from these epidemiological studies," says Sonya Lunder of the Environmental Working Group.

It’s one of many complaints that health advocates and environmental groups have about the way pesticides are regulated. In many ways, the regulatory system governing pesticides is stricter than the one for industrial chemicals. Still, critics say there are loopholes and flaws that make it too easy for potentially hazardous products to win approval and too hard to remove them from the market. “Our current rules clearly aren’t doing the job—they serve the interests of the pesticide industry much better than the interests of children, rural families or public health,” says Kristen Schafer, policy director of the Pesticide Action Network. “The system is broken.”

Any pesticide sold or manufactured in the United States has to be registered with the EPA. The agency must determine that the pesticide won’t pose an “unreasonable adverse effect” to human health or the environment—a judgment based mainly on data from studies and tests submitted by the manufacturer. The process can take several years, but many of the products now on the market whizzed through it thanks to a fast-track procedure known as “conditional registration,” which allows a pesticide to be sold before undergoing the full panoply of safety tests if it has a similar makeup to a previously registered product. This mechanism was intended to be used sparingly, but according to a 2010 EPA internal report, 65 percent of the 16,000 pesticides then on the market were approved through conditional registration. The agency has since cut back the procedure, using it for only 20 percent of the pesticides approved in 2011 and 2012. But that’s “still too many for comfort,” a report by the National Resources Defense Council concluded.

The agency reviews registrations every fifteen years. If new data have emerged about a product’s risks, the EPA can demand that a manufacturer change the product or pull it from the market, and if the company refuses, the agency can take the matter to court. To date, the EPA has issued findings of adverse effects leading to the cancellation of registration or severe restriction of only thirty-three chemicals.

In Europe, where policy is guided by a precautionary approach that emphasizes preventing harm, regulators have been more willing to bar chemicals even when the science is uncertain. Atrazine, a weed killer that is environmentally persistent and has been linked to birth defects and hormone disruption, was banned in the European Union in 2004. In the United States, it remains one of the most widely used herbicides while the debate over its safety continues—thanks in large part to the efforts of its manufacturer, Syngenta, to discredit the research on its ill effects [see page 22].

“There’s a gap between what the science is finding” and the EPA’s actions, contends Jay Feldman, executive director of Beyond Pesticides. The agency’s process for reviewing new or already approved chemicals doesn’t sufficiently take into account the subtle impacts showing up in CHAMACOS and other studies, such as learning deficits or behavioral problems. Despite a growing literature on the ways some chemicals can disrupt hormones, the EPA only recently began screening for hormone disrupters. (The program to do so took more than a decade to launch.) Most important, says Feldman, EPA regulators focus too much on single chemicals rather than the real-world mix of different chemicals that people are exposed to every day.

“The EPA is not empowered to act quickly when new evidence shows chemicals are more harmful than was understood,” Schafer says. “That’s what we’re seeing with organophosphates. There is such a compelling body of evidence, and the EPA is slogging through this long, slow process of evaluating this new science, while these chemicals are being used every day and every season and little kids are being exposed.”

While the agency banned chlorpyrifos from household use because of mounting evidence concerning its effects on children’s brains, it still permits its use in agriculture. That approval is currently under review. In the meantime, some 10 million pounds are sprayed on US farms every year, and it remains one of the top ten pesticides used near schools in California. What’s more, thirty other organophosphate pesticides—with the same biological mechanisms as chlorpyrifos—are still registered for use.

Valley activists and health providers concerned about pesticide use say CHAMACOS has delivered much-needed scientific information. “It has brought scientific credibility to issues that people in the community have worried about for years,” says Dana Perls, an organizer with Friends of the Earth who worked in the Salinas Valley.

Not surprisingly, the growers tend to be less enchanted with the study. “I think we’d all love it if we could grow crops without chemicals, but there are just some things that can’t be done that way,” says Norm Groot, director of the Monterey County Farm Bureau. He’s a member of the CHAMACOS advisory board but still worries that the study’s findings “will put another nail in the coffin for pesticides and the limited amount of crop protection that we have here in California.”

Groot and others argue that the findings are based on conditions that prevailed more than a decade ago and don’t reflect changes in regulations or pesticide use that have taken place

since then. For instance, use of organophosphates has dropped by about 40 percent in the valley (and 50 percent statewide) since CHAMACOS started. “It’s a dynamic environment,” says Carolyn O’Donnell, a spokeswoman for the California Strawberry Commission.

But while growers have shifted from organophosphates to “softer” chemicals, it’s not clear whether the replacement chemicals are any safer. For instance, one of the chief replacements for organophosphates is a class of neurotoxic chemicals called neonicitinoids, which are now suspected of playing a role in the decline of honeybees. Another common stand-in group are pyrethroids, widely used on farms and in thousands of consumer products, including flea bombs and roach sprays. Their use in California tripled between 1992 and 2006. A recent review by the EPA found that the “cumulative estimated risks” are not of concern, but Eskenazi worries that too little is known about them. (A recent Canadian study reported an association between exposure and children’s behavioral problems.) “There are a slew of pesticides, like fungicides, that we know virtually nothing about and that are very hard to study too,” she says. In many cases, researchers have difficulty finding the biological markers that make them detectable in people’s blood or urine.

“The other thing we don’t know about is the combined effect of exposures,” Eskenazi continues. Throughout the course of a day, people may eat several different types of produce, each of which may bear traces of one or more pesticides. They encounter other types of chemicals as well—from antibacterials in soaps, to plasticizers in foodware, to flame retardants in the furniture. “By day’s end, you’ve got a combination of chemicals and an unknown level of risk,” she says. Eskenazi could spend several lifetimes trying to unravel that knot of potential influences on brain development.

Another common criticism of CHAMACOS and similar studies leveled by the agro-chemical industry is that, as O’Donnell puts it, “They’re not showing cause and effect.” In other words, the studies don’t prove that pesticide A produced health effect B.

Of course, that’s true. Studies like CHAMACOS can only highlight an association or heightened risk. And the connections they point to are valid only at a population level; they can’t account for what happens in an individual’s life. That’s why there’s no way for Maria to know for sure whether pesticides caused her children’s health problems.

The CHAMACOS team is careful about the information they give participants, striving to strike a balance between the desire to share findings with the community and a reluctance to alarm people with information whose meaning is uncertain. “To say you had ten microliters

per liter of PDBEs—what the hell does that mean, and what am I going to do with it?" Eskenazi says. The mothers are told how their individual pesticide levels relate to the rest of the cohort and national measurements. If someone's child scores three standard deviations below the mean on neuro assessments, the team will contact the parents and suggest they see a pediatrician or school psychologist. When I ask if any of the mothers try to connect the dots between the broad findings and their own child's situation, Eskenazi insists that they don't.

For someone who has spotlighted the disturbing risks of pesticides, Eskenazi is surprisingly unwilling to condemn them. "I see the complexities," she says. She takes to heart the growers' insistence that they need to use pesticides. She recognizes that only about 4 percent of the farms in the valley are organic. She knows eating organic produce reduces children's levels of pesticide exposure, but it's also more expensive. She knows that 40 percent of the CHAMACOS families are food-insecure and have no stretch in their budgets. "I'm all for more biologically safe ways of growing food," she says. "But to me, the most important thing is that people have healthy food—and enough of it." That means ample fruits and vegetables, conventionally grown or organic. "I'm a public health person, and in the scheme of things, diet and quality of diet is more important to me."

Indeed, Eskenazi and her colleagues can't help but wonder if the risks of pesticides pale beside another health threat that the CHAMACOS children face: off-the-charts obesity rates. The kids have tended to be heavy since the age of 2. Now that they're 14, more than half are overweight, and 40 percent are clinically obese—higher than the American average. Obesity is common among Latinos, but the overweight rates among these children are significantly higher than the regions of Mexico where most of the families come from, and also higher than the rates for US Latinos. Even more disturbing: a staggering 47 percent of the kids were at risk by age 9 of metabolic syndrome, a constellation of conditions—elevated blood pressure, blood sugars and cholesterol—that can be a precursor to diabetes, heart disease and stroke. "That has huge implications" for the children's long-term health, says Bradman. Early evidence from animal studies suggests pesticides might play a role in promoting obesity. But more likely, say the CHAMACOS researchers, the kids are showing the effects of too much junk food (common when money is tight and hunger presses), not enough physical activity (gang violence in their neighborhoods keeps many indoors), and a cultural attitude in which calling a baby *gordo* is considered a compliment.

Whatever other health challenges threaten this community, pesticides remain a central concern of the CHAMACOS researchers, who are determined to help reduce exposure among the study's participants. Enter José Camacho, a genial former farm laborer now on the CHAMACOS payroll as a full-time educator. He's done trainings for about 30,000 people at schools and in clinics and community centers—anywhere he can talk to farmworkers about the risks of pesticides and ways they can protect themselves and their families. (The EPA requires growers to provide similar basic safety information to farmworkers, but only once every five years. Annual trainings may soon be required under new proposed safety rules for farmworkers.)

CHAMACOS talks contain simple, concrete advice. Wear gloves at work. Wash your hands before eating. Don't take kids to the fields or let them ride in the car home from work. Wash your work clothes separately from the family's laundry. Carefully wash any produce brought home from the fields.

To some extent, such precautions run up against the hard realities of migrant workers' lives. "You know everybody understands, but it's very hard for them," says Jesús López, a former farmworker and longtime activist who is on the CHAMACOS advisory board.

As he makes it a point to emphasize, migrant workers have no control over conditions in the field. Regulators consider it safe to work in a field right next to one that has just been treated with pesticides and is posted with warning signs. So when a laborer is told to pick broccoli three feet from the treated field, she's in no position to refuse. Driving around the fields surrounding Salinas, López points repeatedly to crews picking crops with their bare hands. If the growers don't supply gloves, he says, the workers are loath to go out and buy them. It's another expense for people making poverty wages. Even advice like washing work clothes separately can be hard to follow for those who rely on pay machines at a laundromat. "Do you think they're willing to spend $2 a day to do that?" López asks. CHAMACOS has provided "very good information, but I don't see any change in the industry."

Yet Eskenazi is hopeful that the lessons will sink in. Maria has taken the advice to heart—she and her husband leave their shoes and coveralls in containers outside and wash them separately. When they get home, they make sure to shower before hugging the kids. When Maria learned how contaminants and tainted dust can settle into rugs, she ripped out all the carpets in their home, which she says helped Carla's asthma. She makes sure to close the windows when the vineyards nearby are sprayed and has stopped using pesticides inside.

She puts away food to stop the ants and deals with mice by laying down mousetraps. “I learned everything I know from CHAMACOS,” Maria says.

This story was originally published at *The Nation*.

About Susan Freinkel

Susan Freinkel is a San Francisco based journalist who writes about science and the environment. She is the author of Plastic: A Toxic Love Story and American Chestnut: The Life, Death and Rebirth of a Perfect Tree. Her work has appeared in various national publications including: The New York Times, Discover, Smithsonian and Health. She writes a column called "Material World" for the OnEarth Web site.

View all items by Susan Freinkel →

Comments are closed.

Our Mission

The Food & Environment Reporting Network is the first and only independent, non-profit news organization that produces in-depth and investigative journalism in the critically underreported areas of food, agriculture, and environmental health. Through partnerships with local and national mainstream media outlets, we seek to tell stories that will inspire, inform, and have lasting impact.

Support FERN

Your donations help us with our investigations.

Support

Get the Latest Ag News Every Morning

Sign up for FERN's Ag Insider by Chuck Abbott, your morning brief for food and agriculture policy.

Sign Up

Subscribe to the FERN Newsletter

Get the latest investigative journalism delivered to your inbox.

Email:

Register