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Laura: You're listening to Just Food, a podcast about cultivating justice and health. This series is brought to you by the Berkeley Food Institute, at the University of California, Berkeley. I'm your host Laura Klivans and I'm here with reporter Alissa Escarce.

Alissa: Hey, Laura.

L: In this episode, we're talking about new research into the impact of pesticides on people's health - especially folks who live in farming communities. And this study is being done by a unique group of researchers. Alissa, where are you taking us today?

A: Salinas, California, about two hours south of San Francisco. People call it the "salad bowl" of the U.S. Every road into the city goes through fields – rows and rows of lettuce, and peppers, and broccoli.

In the middle of all those fields sits the Natividad medical center, and at the edge of the complex there's a little brown bungalow. This is the headquarters of a 17 year U.C. Berkeley research project into the health impacts of pesticides. It's called the Center for the Health Assessment of Mothers and Children of Salinas – or CHAMACOS for short.

On a warm day in early June, a group of CHAMACOS researchers are preparing the findings of their latest study. But they aren't university professors with advanced degrees. They're high school students.

[Typing, background chatting while editing slides. Giselle: "Edgar don't do that!" (laughter)]

A: That laugh – that's Giselle Lazaro. She's 16, a rising high school senior. Last summer, Giselle and ten other teenager collaborated with UC Berkeley researchers to collect data about pesticide exposure in their community. That's because growers in California use more than 200 million pounds of pesticides each year. And the Salinas Valley is one of the state's most productive farming regions. So these researchers wanted to find out whether teenagers like them are effected by all those chemicals. Tomorrow they're going to present their findings, in Spanish, to hundreds of people at a community forum.

Giselle: It's - I wouldn't say nerve-wracking, but it's going to be a new experience. Because I've presented in Spanish before, in my Spanish class... But this is going to be in front of a lot of people, and adults.

[Giselle/Brian chatting. Brian: Should we add it in, with the dust? Or have it on its own?]



A: That’s Brian Jimenez. He’s another one of the young researchers, and he’s working on slides with Giselle for tomorrow’s presentation. This is their second summer working for the CHAMACOS study.

Brian is 16, and he’s a clean-cut kid, with a polo shirt and khakis and a big smile when he talks. Like many of these students, his parents are farm workers. He’s been going with them to these forums since he was a kid.

Brian: My mom would go ‘cause of the information, but I would honesty go because of the food. But I would also listen in and be like, “oh, you know, this is cool.”

Tomorrow will be Brian and Giselle’s first time at the front of the room, presenting their research. But Brian isn’t just a researcher for the CHAMACOS studies - he’s also a research subject. He and several of the other students presenting tomorrow, have been studied by UC Berkeley researchers since before they were born.

B: It’s kind of exciting. Just like a year or two ago, I was on the other side. Now I’m on this side.... Now I’m telling them what I know, instead of me learning what they know.

A: The thing that scientists have been trying to figure out by studying young people like Brian is whether farmworker families are harmed by the pesticides while working in the fields.

One of the lead researchers is Kim Harley, a professor at the UC Berkeley School of Public Health. She’s been working on the study since the beginning.

Kim Harley: In 1999 and 2000 we enrolled 600 pregnant women who were living in the farmworker community of the Salinas Valley... and at the time there was almost no data on the health effects of pesticides for that population

A: One of the pregnant women was Brian’s mom, Marina. I go by their apartment on a weekday evening. Marina isn’t home from work when I get there, but Brian’s dad, Julian, invites me to wait in the living room. One of the walls is covered in plaques - leadership awards from the Salinas City Council, mostly for Marina. The door swings open as we’re talking.

[Sound of door swinging open. Marina: Buenas tardes!]

A: Marina walks in. She’s a tall woman, in her mid-50’s, with Brian’s nose and his big smile. Her short dark hair is matted under her baseball cap, and she wears a blue sweatshirt with Snow White’s elves on the front.

M: Ayer y hoy pues sí nos han dado, muy fuerte! (Sighs.)



A: Marina is tired. It's early June, and the sun is starting to shine bright and hot on the fields where she works, weeding organic vegetables. Marina says her current boss doesn't use pesticides, but that's not how it was back when she was pregnant with Brian.

[04:11:10.17] **M:** Me acuerdo que muchas veces que anduvimos trabajando en la lechuga... andaban las avionetas ahí, fumiga y fumiga. El aire venía y olía bien feo. Nadie decía nada, ni el mayordomo, ni el supervisor.

Translation: I remember there were a lot of times when we were working in the lettuce fields... there would be little planes flying around, spraying and spraying. The air would hit us, and it smelled really bad. But nobody said anything. Not the crew leader, or the supervisor.

A: After she found out she was pregnant, Marina started going to prenatal appointments at the local hospital. That's where she was invited to participate in the CHAMACOS study. And Marina says she enjoys getting involved in her community – which explains all those plaques on the wall -- so she thought, "sure, why not?"

During her pregnancy, the researchers took urine samples, and blood samples, and asked her questions about her life.

[04:03:30.18] **M:** Y pues cuando nació mi Brian, llegó toda la familia de CHAMACOS.

Translation: And when Brian was born, the whole CHAMACOS family came to visit.

A: At that time, Marina says she didn't know that being exposed to pesticides could hurt her baby. And that's largely because nobody did. Scientists hadn't investigated the effects of pesticides on pregnant women and their kids. The CHAMACOS study was one of the first to take a look.

Over the next sixteen years, Marina and Brian paid regular visits to the CHAMACOS clinic. Brian took all kinds of tests – of his brain development, his weight, his breathing, the timing of puberty. And as the data came back, Kim Harley and her fellow researchers started to see some results that concerned them.

K: The moms with more pesticide metabolites in their body had children who had more abnormal reflexes at birth. And we thought, "well, that's concerning, but we don't really know what this means. They're just babies" ... But as the children got older, when they were 2 and 3, we started seeing that they were having poorer motor skills, and slower language development by the time they were 5.

By the time the kids were 7, the kids whose moms had the highest levels of pesticide exposure scored an average of 7 points lower on IQ tests than the ones who had lowest levels of



exposure. Kim says that means those kids were about half a year behind the others, in terms of their brain development. And the pesticides had other negative impacts, too, like ADHD, and asthma symptoms. The researchers organized forums to share what they were learning with the participants. Marina went to a lot of those meetings, and as she learned about the results, she started making big changes in how she dealt with pesticides at home.

M: Cuando llegábamos, la ropa aparte. La hechábamos en una bolsa, amarrada. Aparte de la ropa que uno se ponía de diario. Porque, pues ya trae uno los químicos, la tierra y todo eso. Nos explicaban que no se juntara con la ropa de los niños.

Translation: When we got home from work, we started tying up our work clothes in a bag, separate from the clothes we wore at home. Because our work clothes had chemicals on them, on top of the dirt and other stuff. The researchers explained to us that we shouldn't mix them with our kids' clothes.

A: At work in the fields, Marina started speaking up to her supervisors and coworkers, reminding them of the precautions to take. And when those little airplanes started spraying close by, she'd stop working, get in her car, and wait for them to finish.

[back at the office, teens about to start presentation run-through.]

A: Back at the office, Brian is sitting at a table, pen and notepad in hand. Giselle and two of the other young researchers are practicing tomorrow's presentation, and he's taking notes.

G (practicing presentation): Buenas noches todos, gracias por venir...

A: The information they're presenting is part of a sub-study of the bigger CHAMACOS project. They call it the "COSECHA" study, which means "Harvest". And instead of focusing on moms and babies, it's focused on people like them: other teenagers.

G (practicing presentation): Ahora, estas son nuestras metas. Primero, medir los niveles de exposición a los pesticidas en 100 adolescentes que viven aquí en Salinas...

G: So the first of our goals are to measure the levels of pesticide exposure in 100 teen girls who live in the Salinas Valley.

A: Kim Harley worked with the youth researchers on designing the study.

K: One of the things we're concerned about is that some pesticides are carcinogenic... We don't have any idea how being exposed to pesticides during adolescence... might impact their long-term health...



A: Kim has helped lead a few CHAMACOS sub-studies. But she says this one was special.

K: When you have youth from the community doing research with other youth, it just makes the research more relevant, it makes it more appropriate... It helps you know what questions to ask.

Brian and Giselle and the other teens were involved from the beginning. They helped design the study and gathered the data. They went to each of the 100 participants' homes, and collected dust samples, and urine samples. Then they sent everything off to a lab at UC Berkeley... and now they're analyzing the results.

B: And so basically what the preliminary results show us is that any participant that lives within 100 meters of crops has higher exposure, If you don't have a carpet at home, you do have lower exposure. And if you don't open your windows....

A: And do you think – are you going to keep your windows closed because of this?

B: Um, I mean, I still open my windows... We don't want to give these results to people and scare them, and be like, "don't open your windows!" "Take all the carpet out of your houses," and stuff. You know, we just... want to give them what the problem is, but we also want to give them solutions.

A: That's the thing that's a little complicated about this type of study. These students are learning about risks in their community - risks to their own bodies. Kim Harley says this came up the first time she explained the findings of the previous CHAMACOS studies to the groups - when she told them about how pesticides could lead to lower IQ scores, and breathing problems.

K: When I finished talking there was silence, and I was really worried. And I said, "how does this make you guys feel, to learn this?" And they said, "it makes us feel so proud." They said that they didn't realize how much they had been helping society, and so they were so proud to have been part of the study. So that was, first of all a huge relief, and second of all, I was really touched by that.

A: And Brian says, yeah, he is proud that farmers and scientists and policymakers all over the world use the data from old CHAMACOS studies to help them make decisions. And in a couple years, they could be using new data from this latest study.

B: Participating as, like, me actually doing it, that kind of actually makes me feel important,

[Marina's nephews playing at the house]

A: Back at Brian's family's apartment, Marina says she's proud of her son.



M: Pues yo, mi sueño para mis hijos era de que ellos fueran alguien en la vida. Que estudiaran, que tuvieran una carrera.

Translation: My dream for my kids was that they would make something of themselves. That they go to school and have a career.

A: And when I ask Brian if participating in this study has affected his plans for the future, he says, yeah. Brian wants to join the army after high school - but after that he plans to go to college . And participating in the COSECHA study has changed his thinking.

B: I think COSECHA has kind of shaped where I want to study. At first I was like, "maybe I'll stay local."

A: Then he thought,

B: oh, ok, maybe it's not that hard to get into Berkeley. Maybe it's not that hard to get into somewhere else."... So I am aiming higher, now that I joined COSECHA and learned more about the schools and everything.

A: Working with UC Berkeley is a big deal for Brian. He says most of his classmates get summer jobs at Little Ceasars, or McDonalds, or in the fields. Doing a scientific study - that's a pretty special thing. And this study has become more than just a job.

B: For me it's just like coming to a second home. I don't think of it as work, I think of it as, I mean, I have a second family that's rooting for me. I've been coming here since I was born, so it just feels like home.

A: CHAMACOS has often been the bearer of bad news - telling Brian and his family that the work they do, and the community they live in, have put their health at risk. But by building a community around the study, and by inviting participants to help lead new research, CHAMACOS has given farmworkers like Marina and youth like Brian the tools to make Salinas a healthier place....

B: it's concerning, and I do worry about it. I kind of look for an alternative of, you know, what can I do to stop this? Or what can I do to help this? To get rid of this? So, pretty much that's what CHAMACOS has taught me.

L: Thanks for that story, Alissa. So these students are almost done with high school. Does that mean the study is almost done now?



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A: No. Brian and the other teenagers will be working on their sub study for another year or so. They'll be making videos and a radio show and planning advocacy projects with what they learned.

L: And how about the bigger CHAMACOS study?

A: That's not wrapping up either. As of now, Kim and the other researchers are planning to keep following the teenagers until they are 21, maybe longer.

L: You're listening to Just Food, a podcast about cultivating justice and health.

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This episode of Just Food is produced by Lacy Jane Roberts and Alissa Escarce. Theme music is by Roy Baril. I'm Laura Klivans. Thanks for listening!