**Entire Transcription**:

00:01.37

Brittnie Bloom

Kari, thank you so much for being here with us today. We sure miss you here at San Diego State, but I'm thrilled to be sharing this space with you this morning. Welcome to the If I Could Change One Thing podcast.

00:13.24

Kari Sant

Oh, my pleasure to be here. I'm so excited to be chatting with you. So let's have some fun.

00:18.26

Brittnie Bloom

Okay. So ah let's start off with a question about environmental health. We hear in the news about environmental health and how the environments in which we live can impact our daily health.

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Brittnie Bloom

Can you talk us through what this really means in layman's terms? Or in other words, what does it really mean that the environment can impact both our short-term and our long-term health?

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Kari

For sure. I mean, I think how we define environment is really, really key here, right? Some people, when they think environment are thinking, okay, the air we breathe, the water we drink, et cetera, too. But to some extent, environment can also mean the built environment, right? So basically almost everything we interact with that's not a social interaction is defined as environment.

01:02.55

Kari

But, you know, as an environmental health scientist, I did my MPH originally in environmental health and then my PhD in toxicology. I'm really interested in how, you know, certain chemicals that we come across in our environment can impact our health, right? So whether that's drinking water contaminants, whether that's air pollution coming from industrial processes or traffic, et cetera. So, we always hear kind of through the news something like, you know, everything causes cancer is everybody's reply. But in reality, what we need to be thinking about for environmental health is how can we prevent that? Right. If we know that everything can cause an adverse health effect, if there's too much of it, right, then we need to be starting to consider as an environmental health scientist.

01:47.01

Kari Sant

Well, OK, what can we do? What improvements can we make to the environment that can prevent those long term and short term health effects? So we can talk about anything from short-term offense, like, for example, asthma attacks, right?

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Kari

Or long-term things like chronic disease, like cancer, diabetes, et cetera, that'll stick with you through the life course. So environmental health is really an all-encompassing aspect of public health as a whole, just focused on environmental sources that contribute to those diseases.

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Brittnie Bloom

So you've pretty much shared with us that too much of anything can be a bad thing. That's a phrase we hear a lot, but it seems like perhaps that is true when we're thinking about environmental health.

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Brittnie Bloom

Yeah.

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Kari

And I'm a toxicologist, a running joke is, you know, the dose makes the poison for toxicology. So, you know, I always say, you know, water is not inert, right? If you drink too much water, that can also kill you.

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Kari

Don't get me wrong, you'd have to drink a lot of water, everybody. So, you know, don't be as cautious on that one. But, you know, too much of anything can be bad for you. So everything is about moderation and making really good lifestyle choices to do best for your body and for your family.

02:54.05

Brittnie Bloom

Yeah. So on that, when we're thinking about what we can do to prevent and, um you know, do the best for ourselves, for our family, for our communities, what power do you think that we have as individuals and or as communities to sort of take control over the environments that most impact us?

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Kari

Mm-hmm.

03:16.02

Kari

Yeah, this is a really tough question. And I think some of this comes down to it: you can't always modify the environment, but you can modify how you interact with your own environment. So, for example, where your food comes from is some little changes that you can make, right? If you know that you're in a heavily polluted area, maybe getting fish from right off of that polluted area, not a good choice, right? Or, for example, you can consider organic produce in heavily contaminated soils, etc.

03:45.05

Kari

Think about in Southern California when we have a lot of inversion and air pollution, when you open the windows during the day can be a behavioral change that we make. Or do you have an air purifier? Do you have a water filter in your house if you know that you have poor water quality? So I think even though we might feel hopeless sometimes in addressing some of the larger environmental changes, every day we can make lots of small changes that will positively impact our interaction with the environment and our family's health.

04:13.73

Brittnie Bloom

You're making me think of creating a little a checklist of of things that I could be doing, these micro behaviors.

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Kari

Oh, totally. And my husband makes fun of me all the time for this because I'm like that person with like the really nice air purifier watching when my air quality is worse through the day. I know it's kind of a running joke in our family, but I think sometimes just even being informed so that way you can make those choices is 90% of the battle.

04:38.35

Brittnie Bloom

Absolutely. So you have just told all of us that you're a toxicologist and we know that your research centers on how environmental contaminants like water pollutants and dietary exposures affect things like embryonic development and can contribute to chronic diseases like diabetes and obesity.

04:58.02

Brittnie Bloom

Can you share little bit more about what sparked your interest in toxicology and sort of what motivates you to study the impacts of these contaminants on human health?

05:08.34

Kari

Totally. I mean, it's been a number of things. I think when I originally was setting out, I was always interested in environmental science. But I think I was more interested in it from, like, an engineering perspective. And I grew up, you know, in the Midwest in a very industrial area.

05:22.97

Kari

So I think you know when we draw the picture of what pollution looks like and you see the factories and all that, I mean, that's not too far off of you know what we saw here. um So I think what sparked my interest in toxicology originally was just seeing that built environment around me.

05:38.84

Kari

um I grew up you know dating myself. I grew up in the 90s when there was a lot of focus on you know ecological health and ecosystem benefits and conservation. And I was grateful for that. So I got really passionate about it from a young age and really loved, especially just the ecosystem level impacts and how animal health and human health are so deeply intertwined.

05:58.79

Kari

But for toxicology as a whole, you know I would just stay informed. you know You'd hear about this new chemical um that was associated with cancer or something like that growing up. And I think– just wanting to better understand why. So toxicology as a whole takes into account how much of the pollutant you're exposed to, but also then once it gets into the body or even how it gets into the body, like what is it going to do to each of your cells? Is it going to cause effects in your liver? Is it going to cause effects in your brain?

06:30.09

Kari

And really understanding what those molecular consequences can be and lead to long-term change. So I think you know It really came about from seeing it around me. My first internship was in industrial hygiene, which for those that don't know, big companies have industrial hygienists there to make sure that they're enforcing environmental contamination laws and want to protect the local community around them. so My first internship was actually doing public health, even though I don't think I really knew it yet at the time. and

07:04.14

Kari

really seeing the impact that controlling pollution at the source can do was what drew me to the field as a whole.

07:12.90

Brittnie Bloom

It sounds like you were curious from a young age, and that makes for a great scientist. So for listeners out there who are those people who like to ask why and are curious about things, ah maybe science or public health or toxicology could be for you.

07:30.77

Brittnie Bloom

So one of your main areas of focus is endocrine disrupting chemicals or EDCs. That's a little bit of a mouthful, um but these are commonly found in water pollutants.

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Kari

Mm-hmm.

07:42.35

Brittnie Bloom

Can you explain to us what EDCs are and how they disrupt normal endocrine function?

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Kari

Yeah. So EDCs, like chemicals can do a lot of different things in the body. So we consider some chemicals to be EDCs because they, no surprise, disrupt endocrine processes. So what does that mean?

08:03.73

Kari

So the endocrine system is the part of the body where we send out things like hormones and signals that tell other organs and tissues what to do. So when we think about endocrine function, a lot of people think about like estrogen and testosterone, those classic reproductive hormones, right?

08:20.18

Kari

But also things like insulin is an endocrine hormone, right? That's secreted from the organ. So endocrine disrupting chemicals classically are just chemicals that perturb those processes in the body.

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Kari

So, I guess the one thing I like to address with everybody is endocrine isn't a bad word. I think especially with a lot of current events, people see the word endocrine and they associate it with all kinds of things that right now might have a negative connotation. But endocrinology is an important part of your body's steady state, right?

08:50.83

Kari

So anything that could affect the way that a hormone works or where it goes in the body can have really devastating consequences if not addressed more quickly. So a lot of these endocrine disrupting compounds are things that are found in things like plastics, cosmetics, personal care products.

09:08.76

Kari

So we're exposed to them pretty much all the time. Um, I know that that can scare people coming from a toxicologist, and I don't mean it like that. But again, we can make a lot of choices to try to remove those.

09:19.85

Kari

So some common ones that we've heard about recently are there’s a lot of attention, especially around 2010s, about bisphenol A. So if you look at things like drinking water bottles, et cetera, a lot of them now say BPA free.

09:33.32

Kari

and That's because BPA was widely associated with perturbing estrogen function or endocrine disruption. Nowadays, we've seen things like parabens removed from personal care products, et etc. so A lot of these chemicals that maybe we saw that they were removed from things, a lot of companies did a lot of really good PR to tell you that they were removed from there.

09:52.58

Kari

They're actually protecting you from endocrine disruption, which I thought was really noble that a lot of those companies did step in and try to come up with new formulations to remove those products. But, in terms of what it means for especially young people in particular, a lot of these can have lasting consequences.

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Kari

So there's been a number of studies recently, for example, that show high exposure to some of these things, um especially the ones that behave like estrogens, can cause precocious puberty in women, for example.

10:23.22

Kari

So women are hitting puberty at a younger age, and that's associated with higher exposure to these endocrine disrupting chemicals that are especially estrogen-like. So even though that might seem like a small change, ultimately over the life course, that can have a lot of really large repercussions, potentially related to reproductive function, age of menopause, et cetera. So these are all things that might not be as alarmist as, you know, maybe a major dumping event that we're worried about people being poisoned acutely.

10:55.72

Kari

These are chronic things that are going to follow somebody through the life course. So A lot of the focus on endocrine disrupting chemicals are really just focused on, okay, how can we get back to that steady state?

11:06.82

Kari

But then additionally, just to add another point about this, there's also the aspects of then if things are focused on endocrine disruption, especially maybe related to estrogen, testosterone, et cetera, are men and women going to respond similarly to those exposures, right?

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Kari

So for example, if women are more sensitive to an exposure than men are ultimately the types of disease or disorders that you might see coming out of it might be disproportionately affecting men or women.

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Kari

So there's also a health equity effect. So I'm going to give a another example here with a lot of cosmetics and personal care products tend to be more highly used by women. Right. But they also might have higher impacts on the female endocrine system. Right.

11:53.10

Kari

So not only are women more likely to be exposed to these things, but they're more sensitive to the health effects that may be a result as well.

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Brittnie Bloom

Yeah, that's so interesting to bring in the idea of health equity here, especially like you said, with women being more typically exposed to, you know, wearing makeup, using personal care products, sanitary products, things like that.

12:18.66

Brittnie Bloom

What does this mean– Well, I guess to to change the question a little bit, where would where would someone go to try to figure out how to mitigate their exposure to these sort of things?

12:26.18

Kari

Thank you.

12:34.66

Brittnie Bloom

Like if, for example, a woman or a makeup wearing person wants to continue to engage in the beauty space, but they want to minimize their exposure to...

12:47.92

Brittnie Bloom

makeup that potentially has EDCs in them, where would they go? Is there a list available of like safer products or um things that have like a stamp of approval from a toxicologist or someone who studies this?

13:02.84

Kari

What a great question. Yes, in short, there are. And I think, again, this is more the knowledge is power. So not only knowing the list of brands, but also maybe ingredients that you might want to reduce your exposure to is really important, right? And it is something little that we can all have power over.

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Kari

On the back of every product, they have a list of those ingredients, right? So if you see one of these things that you don't want to be exposed to, maybe choose the alternative. So there's a number of really great nonprofits and groups that have assembled kind of lists or brands that are really socially conscious.

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Kari

um especially about endocrine disruptors. So, ah for example, the Endocrine or Environmental Working Group or EWC assembles a list of products and also contaminants that are commonly found in these things.

13:50.08

Kari

That would be a great place to start. And likewise from food and stuff, one of the biggest concerns that people talk about is, for example, things like mercury in fish or a lot of different chemicals tend to accumulate in fish and then we eat them, so we're exposed, right? So again, even having a list of, okay, well, where does this food come from? Was it from a farm? Was it you know fresh caught? like what is Where is this coming from and understanding that? And I know a lot of nonprofits do really great outreach on that. I remember I went to the Shad Aquarium in Chicago last year.

14:22.40

Kari

It was so cute. um One of the volunteers came up to me and handed me the card of like you know what sorts of fish are best to eat if you want to reduce your contamination. I thought this was so cool. Like as a scientist, I was like nerding out with the person a little bit.

14:36.12

Kari

So I think a lot of nonprofits have really gotten in this space to help with the educational piece that maybe was missing before.

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Brittnie Bloom

Yeah, I happen to be married to somebody who studies environmental health. And we often get into these sorts of conversations of like, what sort of fish should should we be eating?

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Brittnie Bloom

You know, this type has this sort of metals in it, or it's a bottom feeder, or I don't know exactly what all of the terms are.

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Kari

Totally.

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Brittnie Bloom

But it's always fun trying to figure out what to eat for dinner. I’m sure you have similar experiences.

15:09.80

Kari

I'm sure my husband would say the same thing about me.

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Brittnie Bloom

Okay, well, um to change the topic a little bit, something that I have found so interesting about your work is that you use zebrafish models to study the developmental origins of diabetes.

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Brittnie Bloom

I don't know about me, but growing up when I thought about like, animal models when I thought about science and research, different kinds of animals come to mind, like mice, for example.

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Brittnie Bloom

So tell us, why zebrafish?

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Brittnie Bloom

What is it about this type of animal or animal model that helps you and other researchers better understand the relationships between toxic exposures and disease development?

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Kari

Well, first, because fish are awesome, but no, the real reason, um and I will start with, I've worked with a number of different animal models for biomedical research. I think at the end of the day, there are pros and cons for each type of model. So, you know, whether that's mice and rats, whether it's rabbits, et cetera, there's always a really big reason to use each one for its intention.

16:15.78

Kari

So I think my love of zebrafish came from, I had just finished my PhD and I'd done my doctoral research with mice and rats, but I saw this new model on the up and up in developmental toxicology called the zebrafish. And the cool thing about zebrafish is believe it or not, they share more than 70% of their genes with humans, right? So in a lot of ways they behave similarly on the molecular level to a human, which is really cool.

16:43.23

Kari

But also, The perks of using fish is they lay their eggs externally. So if I'm studying things like embryonic development, if I'm doing it on a mouse, there's no easy, accessible way to do it. It's not very sustainable, right?

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Kari

I have to wait through the pregnancy and expose another. With a zebrafish, they lay all the eggs externally and fertilize them externally so I can actually watch the embryo forming before my eyes. And I can actually see pathologically what's happening without having to euthanize an animal. So it's a highly sustainable model, which I really appreciate.

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Kari

And they lay hundreds of eggs each day for a reproductive female. They can. So really it's one of those things where it's just a perfect model for really understanding the developmental environment.

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Kari

So I love zebrafish for that, but also They're really, really cool. So a lot of biomedical research uses what's called cell culture. So we'll grow cells in a petri dish, right? Like when you think of a scientist, it's always some scientists squinting into a microscope, looking at a petri dish, right?

17:41.38

Kari

So the cool thing about zebrafish is a lot of these dyes and stains we use as indicators in cell culture can also be used in a zebrafish embryo. So I can still see which processes are happening.

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Kari

But instead of in one cell grown in a Petri dish, I can see it throughout kind of the whole embryo to know where or which organs these changes might be happening in as well.

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Kari

So it's a really great model for biomedical research, but especially for understanding genetics and also developmental biology. It's truly like one of the better advances, in my opinion, of recent decades is being able to use them in a sustainable way for biomedical research.

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Brittnie Bloom

That is so fascinating. I've never thought about the fact that, you know, the little embryos, the eggs are on the outside of the animal and it being sustainable. And how cool that your lab probably sort of looks like a little mini aquarium.

18:35.92

Kari

It does. We have all these cool fish tanks and everybody always loves to come and kind of check it out because we actually don't do any experiments in my lab on the adult fish at all. They just get to swim and eat and live their best lives. and we just work with the eggs. so We have this big aquarium where the fish are just literally just living.

18:53.63

Kari

I call it the party, the party for the fish. ah But it's really cool, even from the embryonic perspective as a toxicologist, you know, yes, I can use these as a human health model from the biomedical perspective, but also, hey, I'm a toxicologist and I'm interested in eco toxicology.

19:08.78

Kari

What better way to study fish than to do it in a fish, right, too? So I love that my model can be a good model for humans, but also for ecological health.

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Brittnie Bloom

Yeah, and I'm sure it makes your lab a very popular one as well.

19:24.08

Kari

I mean, I'd like to think so at least, but yeah, no, and it's fun and they're so cute. They're so, so cute.

19:31.69

Brittnie Bloom

So next, I want to zoom out a little bit and think about our public health landscape as a whole, especially as it relates to environmental justice. You've talked to us a little bit already about some of the inequities that we see or can see when we're talking about, you know, endocrine disrupting chemicals and potential exposures.

19:53.05

Brittnie Bloom

But for our listeners who may be unfamiliar with the term environmental justice, I just want to give a quick definition. It's the idea that people of all cultures, all races, all socioeconomic backgrounds deserve fair protection from environmental and health hazards, as well as equal access to the decision-making processes behind environmental policies and development.

20:16.49

Brittnie Bloom

So you have worked on initiatives that specifically address water quality, specifically in water scarce regions. I'm sure you've done other work that is also related to environmental justice. So please feel free to um expand on any of that. But I'm wondering if you can tell us a little bit about this work and how it sort of fits into the parameters of environmental justice.

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Kari

Yeah, I mean, environmental justice is one of those foundational areas that I think I got into out of passion, right? I mean, I was a toxicologist and really understanding how the environment affects health is important, but then who is going to be the most affected? Why? And what can we do about it? So a lot of my projects to date have looked at contamination from a specific dumping event or in a specific neighborhood or from a specific cause.

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Kari

And looking at the local communities nearby to see who is most likely to be exposed to this and how can we help them achieve either getting more information so that regulatory action is possible, or also then is there some sort of advocacy that can be done.

21:27.57

Kari

So I've personally gotten involved, like you said, into a lot of things that were water contamination. And you know during my time at SDSU, which I absolutely loved, I got involved in two major projects.

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Brittnie Bloom

Thank you.

21:38.56

Kari

So the first one was looking at the Tijuana River and the water coming um across the border from Tijuana into San Ysidro and Imperial Beach. and looking at the coastal contamination there resulting from things like sewage, but also chemical contamination.

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Kari

And I'm lucky to still be working with a lot of the faculty at SDSU, especially those in environmental health on these projects, because it really started, I was there for a class field trip.

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Kari

I took my water quality trip there. I think it was like my third week of teaching or something at SDSU.

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Kari

And I saw the area and I spoke to a couple of people who lived in in the neighborhoods around there and they were just, tired. They were tired of talking about it. And at the time, there was probably a lot less research happening down there than there is now.

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Kari

So I'm really glad that some of that earlier work that we've been doing has helped hopefully gain some momentum towards improving it. And since this time, a number of regulatory agencies, et cetera, have really gotten involved in what can we do to either clean it up, but also to understand what the long lasting health impacts to San Ysidro and Imperial Beach might be.

22:46.34

Kari

So stay tuned on that project, but if you're interested in getting involved, definitely talk to the other faculty in environmental health as well. And then my other project that I'm working on in Southern California that's particularly related to this has been looking at some coastal dumping that was done by a chemical company, gosh, decades ago.

23:05.42

Kari

However, if you look in a lot of fish, whether that's commercial fish like tuna, or even in whales and dolphins off the Southern California coast, a lot of them still have this chemical hanging around in their bodies.

23:18.00

Kari

So the exposure is still happening in the environment, even though the chemical has been banned for 50 plus years now. And that chemical was caused called DDT and it was a pesticide that was used very widely across California, the whole country and most of the world, quite frankly, although it's been banned.

23:35.36

Kari

So we've been working with a number of groups from UC Santa Barbara SDSU, the San Diego zoo, et cetera, to really put together, an assessment of where is this going in the ecosystem and how that might affect human health. So my job as a toxicologist on this is saying, Hey, okay.

23:53.96

Kari

So we know that this chemical is out there, right. But what does it get metabolized into and what do those chemicals do? to the body. And when we started working on that project, we found that almost none of them had any data available.

24:07.34

Kari

They hadn't really been characterized toxicologically, so we didn't know what they'd do. So a large portion of my role in this project as a toxicologist is just figuring out, okay, what do we need to be worried about if you're exposed to one or all of these chemicals that was involved in the dumping?

24:23.34

Kari

But ultimately, again, this comes down to the environmental justice issue of, okay, well, we found this in tuna. We're eating the tuna, right? I love me some tuna.

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Kari

I'm not going to stop eating tuna anytime soon. So really, number one, knowing which chemicals we need to put on a priority list for monitoring, because none of them are monitored.

24:42.93

Kari

Well, very few of them are monitored to date. But also then which species of fish and birds, et cetera, are these accumulating in? And how can we try to figure out where these are in the ecosystem then and how we can prevent it for ecological health in the future.

24:57.68

Kari

So, a lot of the environmental justice work I do is really coming from community driven concern, like all good public health typically is, right? So just because I'm doing it in a lab squinting into a microscope doesn't mean that it's not a community based project that has great partners and is really listening to them as stewards of their environments.

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Brittnie Bloom

Yeah, so I think you're touching on another really cornerstone important phrase in community health, which is the “nothing about us without us” sort of idea when we go into communities and start working on a public health issue that impacts their daily lives.

25:39.92

Brittnie Bloom

And this brings me to an idea that my last guest actually shared with me. And it really is around a language switch about changing vulnerable populations to priority populations as an attempt to remove deficit type language when we're talking about certain populations.

26:02.63

Brittnie Bloom

And so I'm going to try that on here. So if you could tell me, generally, in your work, who are the priority populations in environmental justice work? And how can your work or our work as public health professionals be expanded upon to better protect them, engage with them, and lift them?

26:24.69

Kari

Absolutely. And I think, you know, the beauty of this is each project is a little bit unique, right? So each of the populations that I've been able to work with over the years has its unique characteristics. So there's no one size fits all here.

26:37.17

Kari

I think just due to the nature of my work, a lot of what I study is developmental, right? And a lot of what I do is based on fish. One of the biggest concerns we've worked with over the years has been, well, what do we tell pregnant women to do?

26:49.80

Kari

You're right, priority population.

26:52.36

Kari

I think that's a great way of wording this. I think I'm going to co-opt that from you guys too.

26:56.27

Brittnie Bloom

Love it.

26:56.61

Kari

I love that one. So identifying pregnant women is a priority population in this case. We're encouraging women to eat fish, right? Because it's viewed as healthy for neurodevelopment during pregnancy, right? It helps balance with those omega threes, their diets and cardiovascular health. So overall, we see fish as something that we are recommending to pregnant women. But then if my job here is, oh my gosh, I'm finding all these contaminants in fish.

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Kari

Well, then we're also exposing pregnant women to higher concentrations of that as well. So I think one of, you know, for a lot of my projects, one of the key priority populations would be pregnant women specifically or infants that might be exposed through breast milk, for example, during lactation then.

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Kari

But really it comes down to, for example, the work that we're doing at the border through environmental health has been along the lines of, well, those are primarily, especially in San Ysidro, typically slightly lower income communities, primarily Latino.

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Kari

So the state as a whole has a really great program called CalEnviroScreen, where they've identified specific communities by things like zip code, et cetera, to know who is going to be most vulnerable to the pollution in their backyard.

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Kari

So I do think, you know, we're privileged enough to live in California, where there's at least some some leadership from the state that's identifying these priority populations, whether it be by ZIPCO, but also by things like socioeconomic status, race, ethnicity, et cetera, that might increase exposure, but also disease burden, and as a result to some of these environmental health kind challenges that we face.

28:35.18

Kari

So there's a whole bunch of them and they're really population specific, obviously, but I think to date, I've been working with pregnant women as one of the more highly exposed ones because developing, you know, embryos and fetuses tend to be very sensitive to exposure. So really not only just trying to prevent those exposures in the first place, but also what can we do to help give pregnant women control over their decision-making during the pregnancy as well.

29:01.50

Brittnie Bloom

Yeah, so building on that, what efforts can be made to better protect these priority populations? And specifically, given that this is a public health policy podcast, what roles do you think public health policy play in these processes?

29:19.44

Kari

Yeah, great. What such a great question. And, you know, I, ah laugh, I'm like, I hope I can do it justice through my answer on this, but I think a lot of it from an environmental health standpoint even comes to changing regulatory levels.

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Kari

So a classic example of this is lead in drinking water. So I, as you mentioned earlier, I recently moved back to Michigan where I grew up and most people are very aware of the Flint water crisis, which demonstrated that there was high levels of lead in water.

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Kari

So I think a good example of that is not only enforcing it, so when there are high levels of lead in the water, we take action immediately instead of later on, but also do we need to revisit what levels are considered safe for exposure to some of these contaminants? So, another good example of that are perfluoroalkyl substances or PFAS, which have been all over the news kind of for the last maybe five or 10 years.

30:16.07

Kari

So if you're ever looking into environmental health, they're kind of a hot topic right now. And those are things that are found in things like ah commercial grade firefighting foams. They were previously used to produce nonstick products like Teflon or Scotchgard.

30:30.50

Kari

So all those things that keep your fabrics really, really safe, right? So, those, as an example, didn't have a regulatory safe level until very recently, where we started establishing guidelines for, well, what level is safe in our water?

30:47.05

Kari

And if so, then now we're looking at all these waterways around the country. Do any of those exceed it? And how can we clean those up and who can help us clean that up if there is a specific source of pollution at those sites? So I think for environmental health, a lot of this comes down to regulatory action, but also regulatory limits to really help promote it because it's not just one group that's affected this.

31:11.13

Kari

I mean, there are people disproportionately affected, like you said, with priority populations, but at the end of the day, air is air, right? So even though there's some microclimate things happening in San Diego, bad air pollution in any one area in San Diego is not good for the rest of San Diego either, right? So at the end of the day, it comes down to how can we make these changes and how do we identify what changes need to be made from a policy level? So I think really good data-driven science.

31:39.14

Kari

So one of the things that we've been doing in the lab, again, for some of these lesser known chemicals is identifying, well, what levels are toxic? How much do I need to be exposed to before a bad thing happens? Right? So I think even providing that to regulatory agencies so they can identify where that upper limit should be in either the workplace or in our outdoor living environments is really, really crucial for making progress. and a lot of the gains that we've made over the years in environmental health have been through regulatory participation and cooperation with groups like community groups, academic groups, etc. and honestly industries played a large role in that too because nobody wants to make an unsafe product right so if a company hears that hey they're exceeding a regulatory level that's been established by for example the U.S. EPA.

32:28.82

Kari

It's in their best interest to either mitigate that or work with them to try and establish a safe limit that works for everybody.

32:38.06

Brittnie Bloom

Yeah, I think you're touching on such an important aspect of this work. And one of the reasons I think why folks often have a perception that environmental health is something that, you know, we as individuals don't have a lot of control over, right?

32:50.70

Brittnie Bloom

It's these big organizations, it's these big businesses, it's, you know, XYZ, that what can I do as a single individual

33:01.21

Brittnie Bloom

to protect myself or protect my community or protect my baby or you know whatever whatever that is. And I know we've sort of flirted with this question already, but when we think about these power differentials and we think about our individual locus of control.

33:17.29

Brittnie Bloom

How do you think that we can better engage ourselves and the public overall in sort of understanding the risks that are posed by environmental toxins and what they do have control over in minimizing their exposures?

33:32.63

Kari

You used the perfect word there and that's risk. Right? And I think a large portion of what we need to be doing more effectively in environmental health is communicating that risk.

33:43.44

Kari

Just because you're exposed to something doesn't mean you're going to get sick from it, right? You need to be exposed to a specific amount of it or more that can lead to sickness. So that's what we call risk.

33:54.86

Kari

Something can be hazardous. Again, I told you earlier in this, if you drink too much water, you could also die, right?

34:00.60

Kari

But I wouldn't consider water hazardous because I'm not going to be exposed to enough of it to be able to experience that adverse health effect. But risk science in particular is looking at how much people are generally exposed to and how much that you are required to be exposed to to have an adverse health effect and determine what is the likelihood that people are going to get sick from this exposure.

34:23.90

Kari

So in my personal opinion, I think good risk science and risk communication is key for engaging the general public in all of this. And, I think, most training programs in environmental health do provide a lot of key training on doing this, maybe more so on the science, less on the communication. But for us to be fundamentally better at educating the public about it, we need to be teaching them that because pseudoscience is real, as we've seen over recent years. I think it's been given more and more attention, I think we have to be really intentional about where we are telling people to put the priority for their effort, right?

35:00.66

Kari

Because, like we say, we see signs that things are bad all over the place, but that doesn't mean that people are going to have to prioritize them all. We get fatigued, right? So we need to do a better job communicating the priorities of them based on risk.

35:16.57

Brittnie Bloom

There are these beautiful efforts happening right now. I've seen a lot of my colleagues in the public health and scientific fields working on figuring out how to better communicate science to people you know, your grandma, your uncle, your neighbor down the street.

35:31.56

Brittnie Bloom

So that way it's not so highbrow and it's more accessible. And I'm definitely hopeful that us in, you know, this field in public health and medicine, science, whatever, that we continue to partner with experts in communication to figure out how to better do that because it ultimately will save lives and probably make people feel a little less stressed out when they aren't thinking that everything is going to kill them,

35:57.26

Brittnie Bloom

Everything you know is negative and will have some sort of negative health impact.

36:02.02

Kari

And think every little conversation we have as scientists really helps them too. You were mentioning earlier in the call talking with spouses about you know metals and fish well you know what i do trust now i think my husband knows a lot about metals and fish and makes pretty good choices so i think every little conversation we have can change a life for the positive as long as we're making sure that we're teaching them and then they're sharing it with their friends etc so i i think you're already doing it by having this podcast number one i think you're doing a great job of engaging the public on some of these more challenging issues

36:33.91

Kari

but also just every little thing that we do, as long as you're talking earnestly with people can really make a lasting impact in their individual lives.

36:41.79

Brittnie Bloom

Yeah. So touching on this education piece, as an educator myself, I spend a lot of time thinking about young people and the role that they are going to play in shaping our public health landscape, both for themselves and for future generations.

36:58.05

Brittnie Bloom

What advice would you have for them related to environmental health and their health, both now and in the future?

37:04.02

Kari

What a really, really tough question. I mean, for one, if you are interested in environmental science and environmental health, this is the time to get engaged. I think there's a lot of momentum in the field right now.

37:17.77

Kari

And whether that be from you know people long before me doing regular communication and outreach that got me excited about it as a kid, or you know, us now making sure that perhaps even our students in the classrooms really understand the science, not the kind of glossing over, but really understanding why these things are a concern is super important.

37:38.81

Kari

So I think number one, you got to put in the effort and now is a great time to do so, to make sure that you're really well educated, but also comfortable with these subjects. And it's not easy, it's really challenging, but it's worth it, right? I love my career and I love what I do.

37:56.17

Kari

But for the future, again, even small changes now can have a lasting impact. And if you're making them for, you know, with yourself and your immediate family, but also having regular conversations, it doesn't always have to be a downer at the Thanksgiving table, right? Me talking about turkey and endocrine disruption by any means, but it can be something that's just more conversational of somebody asking me why I make a particular choice.

38:20.22

Kari

So a lot of my friends, for example, will ask me they know I work with water they'll ask me “Hey do I have a water filter and which one do I have you know sort of thing” but because i take the time to explain to them why I got it you know not boring them to death, but you know really kind of just quickly giving an overview I like to think that i'm passing that on so that way they're now being safe for them and their families and they might have that same conversation with somebody else in the future so I think the the best thing we can do and the best advice I can give you for improving future environmental health is just keep talking with people about it.

38:53.17

Kari

We don't want people to feel fatigued, but at the end of the day, giving people the power to make these choices is by far the most valuable thing we can do.

39:03.25

Brittnie Bloom

You're reminding me the importance of a good elevator pitch, right? Whether we're talking about ourselves and what we can bring to the table at a job interview or we're making specific choices for ourselves related to health. Just a quick 20 to 30 second, this is who I am or this is what I study or this is why this choice is important is a really good thing to be able to articulate clearly.

39:27.55

Kari

Absolutely.

39:29.80

Brittnie Bloom

So for people who are listening to this podcast and they're thinking, this sounds super cool, I want to learn more about environmental health, or I want to assess how environmentally healthy my current work environment is or my current home environment is, what resources could you recommend to them?

39:47.83

Kari

Absolutely. So I think the number one way to get involved is obviously if you're in school right now, take an environmental health course. I really think I've learned a lot from that survey that helped me narrow down what sorts of environmental issues I wanted to work on so I could focus on water.

40:02.60

Kari

So that's the easy answer to this question. but for those that are in the community, I think a great place to start are that we have a number of really, really great policy websites. Even if you're interested in, ah for example, i'll I'll go there and a lot of my family worked in industrial facilities like plants, factories before. And I remember when I told them what I was doing for my dissertation research originally, I told them the chemical I was working with. They said, oh, I used to handle that all the time with bare hands, right? in the workplace.

40:32.74

Kari

Well, there are workplace limits on these things, but they're not always that effectively communicated with people. You know, you learn it during training, but if you work at the same facility for 30 years, you might forget. So I think sometimes brushing up on what are the workplace protections for what you're exposed to is a really important place to start in the workplace.

40:51.58

Kari

But in the home, I mean, there's just small little things we can do. So do you have a carbon monoxide monitor in your home, for example? Um, do you have a water filter? You can kind of do almost like a healthy home checkup because you spend the majority of your time in home, right?

41:07.69

Kari

Kids are crawling around on the floors, putting things in their mouths. We're in there cooking every day. So just doing a whole home checkup. And there's a number of obviously private companies that can come and do that for you, but also just reading up online if you're interested in any of those products or having a conversation with a friend who might work in that area is a great place to start again, at making some of these small changes that can be really, really positive for your family.

41:33.56

Brittnie Bloom

And how do folks avoid pseudoscience when doing this healthy home checkup or check-in?

41:40.48

Kari

What a really, really tough and great question. I mean, it's really tough to know what messages are right and what aren't, right? And I think making sure that it's coming from a reputable place. So for example, if you're looking for guidance on, you know, what the exposure limits are in the workplace, there's no better place to start than NIOSH, which is a branch of the CDC that focuses on worker health and occupational health, right?

42:04.33

Kari

So going to their website, you always know you're getting it from a reputable source. And because they're rooted in the law and policy on this area, you know, you're getting the limits, the exact things that are actionable in your workplace too, right?

42:17.51

Kari

Which is great. But in the home, it's really, really tough because there's another and large number of companies and things out there that do these sorts of services, but whether or not they're rooted in the science is always a little bit tricky. so The best thing I can tell everybody is it's not always easy to tell if it's rooted in pseudoscience.

42:35.90

Kari

I like to think that the majority of groups out there working on this are doing it because they have a passion in it and want to help improve health. But really looking for, for example, if somebody is coming in and helping clean your house, what sorts of products are they using? Right? Even being aware of that, I think it's fine to call and ask these companies that even if you feel naive and maybe don't have full familiarity with which chemicals to look out for, et cetera, it can't hurt to call the company and ask them because if they say that they're using green products on their website, what sorts of green products are they using and why did they choose those things?

43:12.54

Kari

I don't think it's annoying to ask those sorts of questions at all. I think it's really prudent. And honestly, if you're a company that really believes in that, they're going to be honored that somebody actually asks them because it does take a lot of effort to make those changes in the workplace.

43:26.27

Kari

So the fact that somebody is asking you about why you made healthy changes for your clients is a really, really honoring question.

43:35.47

Brittnie Bloom

There's that curiosity piece that we're seeing again from you. And I think it's a good reminder for all of us to be curious about our environments.

43:43.33

Brittnie Bloom

So I just have one more question for you to close us out. And it's an important one. I know I've asked you a few pretty difficult ones today, but it's key because it's the inspiration for this podcast.

43:56.13

Brittnie Bloom

And so that is, if you could change one thing related to public health, public health policy around the topics that we've covered today, what would it be?

44:08.81

Kari

I think, you know, the toughest part of this is even though I do a lot of things that are engaged that are rooted in trying to make regulatory changes, right? We don't always do the best job of communicating with the people who actually make the decisions, right?

44:23.24

Kari

So I think the best thing that we can do in environmental health is follow our other colleagues in public health footsteps and start communicating better with those in the decision-making process. Call your local senator, call all of them and have that conversation. But also, when you have a really important finding, don't just put it out there in a paper.

44:42.40

Kari

Don't just bury it and say, oh, I finished my undergraduate thesis. I never want to talk about it again. If it's important, fight for it, right? Make sure you're sharing it with the people who need to see it so that way they can also see why it's important.

44:55.50

Kari

And make sure you carry that passion on your shoulders when you do it. So that way, when you have that conversation, they really understand why you are so passionate about the project number one, but also additionally, why they should see this as a major stewardship for their constituents.

45:12.13

Kari

So really just getting out there and talking with people. I cannot stress that enough and make sure it's not not just friends and family, which I've stressed a lot throughout this call, but also, you know, when you've got something worth fighting for, make sure you're taking it to the people that will help you fight.

45:28.68

Brittnie Bloom

I love that as a final note on our podcast today. Do you have any final words or messaging beyond what you just shared that you'd want our listeners to take away from this conversation?

45:42.20

Kari

I think a lot of my training in, in public health has been focused on, for example, social determinants of disease, et cetera. And environmental health is kind of seen as an offshoot of public health, but environmental health is in everything and the environment is health.

45:55.32

Kari

And I think really making sure that we kind of inject, whether that's you know physical environment, built environment, outdoor natural environment, et cetera, that does have a place in all public health research. So I just hope that we can find more cooperative partnerships going forward to really holistically address the issue of public health.

46:15.87

Brittnie Bloom

Environmental health is health. Absolutely. Well, thank you, Keri, so much for your time today. And I hope the listeners have enjoyed learning about you, about environmental health and toxicology as much as I have.

46:30.02

Brittnie Bloom

I hope you have a beautiful day.

46:30.42

Kari

Thank you. It was a blast.

46:31.83

Brittnie Bloom

Thank you.