

Science_By_The_Slice-Mosquitos-Ep2-Telg_Dinglasan-1_mixdown-...

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SPEAKERS

Ricky Telg, Phillip Stokes

Ricky Telg 00:04

This is Science by the Slice, a podcast from the University of Florida's Institute of Food and Agricultural Sciences Center for Public Issues Education. In this podcast, experts discuss the science of issues affecting our daily lives, reveal the motivations behind the decisions people make, and ultimately provide insight to solutions for our lives.

Phillip Stokes 00:33

Welcome to Science by the Slice, I'm Phillip Stokes, education coordinator with the PIE center and this is part two of our series on mosquitoes, the diseases they can spread and mosquito control. In this episode, you'll hear from two individuals. The first happens to be my director. That's Ricky Telg, professor of agricultural education and communication and director of the PIE center. And he's going to share information on how to talk about mosquitoes, and why it's important that we do talk about mosquitoes. He discusses a whole lot of resources that are available to everyone. So they can learn about mosquitoes and share information about these long legged insects. Well, Dr. Ricky Telg, it's so great to have you on Science by the Slice finally.

Ricky Telg 01:28

Thank you, glad to be on. Nice to have a topic that I know a little bit about for this and looking forward to talking with you.

Phillip Stokes 01:37

Yeah, absolutely. And everyone, of course, probably knows your voice already, because you are the intro to our to each of our episodes. So it's now Good to hear you talk a little bit about the research and the outreach that you have conducted in the PIE center. So in this series, we're talking about mosquitoes, mosquito control. And of course, through the PIE center, we developed a project called prevent and protect mosquito control messages for your community. So if you could just tell us a little

bit about kind of what needs that project was trying to address and why it was initiated in the first place. Sure.

Ricky Telg 02:18

So this particular project grew out of a need. After the Zika outbreak in South Florida a few years ago, people became very concerned about aerial spraying for mosquitoes, which could carry the Zika virus. So public opinion was such that it was impacting regular mosquito control efforts in those areas where people were reaching out to their local elected officials to say we're not all in favor of aerial spraying. So we were approached, the Center for Public Issues and Education and Agriculture Natural Resources, or as we are known as the PIE center, was reached out to from the Florida Department of Health because of some groups that we had worked with previously, and then Florida Department of Agriculture and Consumer Services. And so they reached out to us to create materials and to do some research designed to educate local elected and appointed officials, and specific targeted audiences about mosquito control in a hopefully simplified and understandable format that would increase public understanding of scientific information on this topic without potentially causing members of the public to dismiss scientific education and information. So that was how this began. And it really ran from March 2018 through July 2019. It encompassed two grants from the Florida Department of Health as well as grant from the US Department of Agriculture or USDA. And so with that we developed materials, we did research, not only with the general public, but also with mosquito control operation educators and department of health educators as well to find out a lot of information about people's perceptions about mosquito control efforts, as well as to test the materials that we also developed.

Phillip Stokes 04:09

So, of course, a big part of this project, you know, initiated from public perception. And then, of course, we conducted and you conducted so much social science research around Floridians perceptions of mosquitoes. So what were some of those key findings that that we found out through the project?

Ricky Telg 04:28

So sure, we did a statewide survey. And we also did a series of eight focus groups in areas around the state that looked at what people knew about mosquito control efforts, how they could also contribute to the effort to control mosquitoes, and also their perception. So what I'll share are some of the I guess, consider major findings from the survey as well as from the focus groups. So one of the things we found was that the public agreed that that mosquito control efforts are important for Floridians to be able to enjoy their outdoor environment, so they were in favor of that specifically as it related to controlling mosquito borne diseases. And that it was extremely important to have mosquito control efforts, especially during those outbreaks of mosquito borne illness, that very few people actually actively searched for information about mosquito control. And to me, that's one of the major positive findings for those areas around the state that deal with mosquito control, which here in Florida, every area of the state deals with mosquito control is it's kind of like out of sight out of mind that unless there's a specific reason, in this case, again, what this started was with the Zika outbreaks back several years ago, that most people feel very comfortable with the idea that they don't need to find out more information about mosquito control because the mosquito control efforts around the state are doing a good job deal dealing with mosquitoes. As far as the focus group efforts went, we asked some very specific questions to them. And to those again, all around the state. In the focus groups. It found that a

kind of a combination of personal mosquito control efforts such as using repellents keeping their doors and windows closed and using screens on their doors and windows, emptying or treating standing water, as well as combined with efforts of mosquito control programs were the most effective ways of controlling mosquito, mosquito populations in the state of Florida. Probably one of the biggest concerns that we found in the focus groups was the use of chemicals in short and long term impacts those chemicals may have on humans, animals, environments, and specifically insects and more specifically, bees. Honey bees are what that impact could have been there. So as a result of some of that information, we specifically created information on the impact that chemicals could have on honeybees. And then as far as trusted sources of information where the people were going when they were searching for information on mosquito control efforts, the trusted sources of information included the government, medical professionals and scientists entomologist specifically. So we used all of that information from the survey from the focus groups from our other research on mosquito control experts and department of health educators to then create materials that we are using on our prevent and protect website.

Phillip Stokes 07:37

So tell us a little bit more about those materials. Where can people find them and what might be included when they go around looking for them?

Ricky Telg 07:44

Well, I will just have to say that of all the projects that I've worked with in the PIE center, and I've been the director here for a little over five years now this has probably been the most comprehensive and most wide ranging project that I've been a part of. We had entomologists, we had representatives from Department of Health Department of Agriculture and Consumer Services, faculty from the the UF Department of Agricultural Education and communication. And I'm sure I'm forgetting somebody in some organization. But we have a lot of input here because of all the materials that we were able to create. So the place to go to is preventmosquitoes.org. Again, all one word, prevent mosquitoes. That's what OES, that's how it's spelled preventmosquitoes.org. And on that site, you will see a lot of information. Again, the original plan was to create these messages or toolkits that can be used at the county and district levels to help educate elected officials and those in your communities about mosquito control. So there's a toolkit that has social media, handouts, some short videos for just generic information about mosquito control, as well as another toolkit that's specifically about the emergency related mosquito control. So there's a natural disaster or mosquito borne illness outbreak, that you could pop in that information immediately to your social media efforts. And you're counting on Facebook and Twitter. In addition to the toolkits which are in English and in Spanish. There's also videos that we partnered with a professional company called Untamed Science. And so if you're really looking for some entertaining videos, go to the website there, look at the videos, we'll see all kinds of blood sucking insects, close ups, but part of that was to show the need for mosquito control that if we didn't have mosquito control, it be a very difficult place to live here in the state of Florida. In addition to the videos and other handout materials that we created, including rack cards for counties and for hotels to use, one of the areas that I'm most proud of is the development of lesson plans for elementary schools as well as for middle school and high school, so those of you who are teachers listening to this podcast, go to goodpreventmosquitoes.org. And you'll find curriculum, including worksheets and lesson plans to help teach students about what they could do to combat mosquitoes such as going and

kind of doing a surveillance around your house to see where there are places where you could dump water, see if there's holes in your screens, that type of thing. And all those lesson plans were tested with teachers in the state of Florida, it's really been a great collaborative effort, we've been able to present the results of our research and of our education and outreach efforts to several associations, the Florida Mosquito Control Association, the American Mosquito Control Association, several other organizations around the state and nationally. And what we found is that our effort has been recognized not only here in the state of Florida, but several states are using this particular website to help educate again, elected officials and the public about the need for mosquito control. So again, very proud of all of the efforts that we've been able to put together collaboratively with all the state and agencies in here at the University of Florida.

Phillip Stokes 11:17

Yeah, that's wonderful. And it really sounds like going to that preventmosquitoes.org website. There's something really for almost everyone, I mean, you mentioned teachers, you know, those that are maybe working for mosquito control districts looking for some of those informational materials that they can use are potentially people who work for municipalities. And then of course, just the general public if they want to learn more about the topic as well. So it just seems like it's a pretty, like you said, a comprehensive resource there for people to check out.

Ricky Telg 11:46

Absolutely. And one of the things we have to keep in mind is that those mosquito control districts, , there's one for every area of the state, and some are very well resourced, especially those that are more in the urban areas. And they have their own educators who go around and do this at schools and in public civic organizations. But there are a lot of places in the state that are not quite so well financially resourced, some of the more rural areas. And so one of the benefits to this is that number one, it's a four letter word, it's called free, all the resources here are free. And we also developed this so that a lot of the handout materials are customizable, so people could put their, their logos for their counties in there. And so it would show that, hey, this is for from our county. And again, part of the role reason why we did the social media campaign with both Facebook and Twitter was that these locations, these districts, counties, or whomever, could take those already created social media posts and graphic and pop it into Facebook, especially during those emergency situations where it's difficult to deal with something as an emergency is happening at the same time, they're already pre made, all you'd have to do is really just copy paste it into your Facebook, and you're ready to go. And same thing with the Teacher Resources too. They're there for you to use, free to use moving forward.

Phillip Stokes 13:14

Well, Dr. Ricky Telg, thank you so much for sharing about prevent and protect on Science by the Slice, and thanks for talking today.

Ricky Telg 13:23

Thank you very much for glad to be of help.

Phillip Stokes 13:32

Once again, that was Dr. Ricky Telg discussing resources available at preventmosquitoes.org. And I do want to say this, some of you that are listening are probably educators or communicators to an audience. And you may be thinking of ways to share use these resources in your work. And that's great. And for others, you may be listening because you're curious or just want to be more informed. And that's really great too. And no matter where you fall, I want to point out that video series again that Dr. Telg mentioned, we teamed up with what I would call an adventurer, scientists communicator videography group. That's my title for them anyway, they're called Untamed Science and the videos are really fascinating. I'll include those video links in the description. And now we join in on a conversation between Jacqueline Aenelle, who was in part one of this series, and Rhoel Dinglasan, a professor of infectious diseases and the director of the CDC, South Eastern Regional Center of Excellence in vector borne diseases. Dr. Dinglasan will discuss his work as a vector biologist, as well as research on mosquito transmitted diseases.

Jacqueline Aenelle 14:46

Dr. Dinglasan, thank you for being with us today. And if you wouldn't mind starting off just by sharing a little bit about what you do and what you research.

14:55

Thank you for for this opportunity. My name is Rhoel Dinglasan. I'm a professor of infectious diseases and the director of the CDC, southeastern Center of Excellence in vector borne diseases, which is exactly what we study in the laboratory of vector borne diseases.

Jacqueline Aenelle 15:10

Thank you. Well, you've already led us into our next question, which is, can you talk about what it means to be a vector biologist? And how that might differ from what other people that might study infectious diseases or entomology?

15:25

No, that's] a great question because my mother asked me that as well. So vector biologists are similar to biologists but are more closely related to the field known as medical entomology. We just focus on identification and study of insects or arthropods that affect human health, especially those that act as transmitters or otherwise known as vectors of disease producing organisms such as parasites, bacteria and viruses. Vector biologists, like medical entomologist also focus on arthropods as factors, and just to be very clear vector is an organism that does not cause disease itself in humans or animals. But which spreads infection by transmitting the pathogens from one host, whether it be a human or an animal hosts to another. So our approach in vector biology is more closely aligned with understanding at a very molecular level. The mechanisms influencing the interaction of the pathogen with the human host and the environment and the environment is that it has the animal hosts as well as these arthropod vectors, whether they be mosquitoes or ticks. And this understanding at the molecular level allows us to gain better insight into disease transmission, and hoping that that data itself can inform our public health policy or public health approach. vector control may be one of those but just disease mitigation, so interventions that break transmission of these diseases in human populations, considering that it is a public health paradigm. One or the other terms for vector biologists are public health entomologists.

Again, the biggest difference from entomologists classically defined is basically vector biologists really cannot tell you too much about butterflies.

Jacqueline Aenelle 17:20

I like that comparison or example. So discussing we've discussed these pathogens are diseases that are attached to these vectors and transmitted by them. So what are specific diseases carried by mosquitoes specifically? And how many people are affected by these mosquitoes transmitted diseases every year?

17:39

Yes, so roughly for mosquito borne diseases, half of the world's population is at risk for acquiring mosquito borne disease. That's approximately 4 billion people. Two main diseases that are, are quite frequently transmitted by mosquitoes include malaria disease caused by a parasite. And there are over 219 million cases each year, and up to 400,000 deaths, mostly in children under the age of five, another disease called Dengue fever or dengue hemorrhagic fever, there are about 100 million cases each year and 40,000 deaths.

Jacqueline Aenelle 18:18

Wow, that is crazy. Especially I mean, I come from the western United States where the conversation around mosquitoes is a lot different than the conversations you hear and have here in the southeastern US. Looking at your research, what steps do you take with your research to look into the transmission of these pathogens?

18:39

The southeastern United States definitely has a lot more pathogens that can be transmitted by mosquitoes. And some of these like Dengue. As I mentioned, West Nile virus is another one. And of course, everyone probably remembers in 2016, the Zika virus epidemic here in the southeast, and in Florida, being one of the hotspots for Zika, as well as Texas, and of course, the United States territory, Puerto Rico and the United States Virgin Islands. Those are the real big hotspots as well. So you asked like what is our general approach? So traditionally, when people think about scientists study, arthropods or insects, they think solely about identification, descriptive work, we do this very differently. Again, as I mentioned, vector biologists study all the different components, the pathogen, the human host environment, the vectors themselves. So because it is a system that we study, we use systems biology approaches and what is systems biology approach? Well, it's a data generating approach. Okay, so to understand the transmission biology of malaria or Dengue, through its vectors, we use genomics and transcriptomics. We use mass spectrometry Based proteomics and lipidomics, metabolomics, all these different multi-omics approaches, the amount of data that is generated is crazy. And as such to complement these approaches, we really need computational biology, Bioinformatics, mathematical modeling, so that we can really get better insight, you know, to is to assemble all of these different data types into a model for understanding disease transmission. So that's, that's one of the biggest differences in what we do. It's really highlighting all of the different technologies that have been developed over the past 20 years in harnessing those capabilities to answering these questions.

Jacqueline Aenelle 20:41

That's great. And I think, from what I've been hearing from my discussions about mosquitoes, mosquito control management research, a lot of the research you are doing and other scientists are doing are kind of holistic in nature or systemic in nature. And I appreciate that, I think that's fantastic. You mentioned one of the diseases or concerns is malaria. So are there currently any anti-malarial treatments being used or available?

21:08

Yes, yes, there are definitely. So we do have what we call the last line of defense anti-malarial drugs. These are artemisinin combined therapies that are available in malaria endemic countries. Unfortunately, the parasite has begun to develop resistance to this last line of drugs. So the clock's ticking, we need to move very quickly to understand how this resistance developed in the parasite, how it is spreading throughout Sub Saharan Africa, or in Southeast Asia, and so forth. Because we don't have any drugs yet. There are some promising drugs in the pipeline. And we are we all have our fingers and toes crossed that it will become available soon. There is also a malaria vaccine, believe it or not, but it has very limited efficacy, essentially, it's really not indicated broadly, in malaria endemic countries, there are a few countries in Sub Saharan Africa, where it's being tested, but its current efficacy is around 30%. So you have better luck getting protection by flipping a coin.

Jacqueline Aenelle 22:01

Wow. That's a scary way to look at it.

22:15

Yeah. So but are there Are there new developments? Yes, there. There's a second generation, if you will, for that current vaccine malaria vaccine. I'd mentioned that the results from that clinical study was just published recently. It's very, very promising. It's, it's hitting the greater than 75% protection. So that's much better, right? It has to go through the process of going through additional clinical trials before being approved for use across malaria endemic countries.

Jacqueline Aenelle 22:48

Well, it sounds like one takeaway is that research into vectors, mosquitoes, specifically, their treatments, the diseases they carry, how they're transmitted, managed, it's still ongoing and continually enhancing and taking future steps. So looking at the past year or so, how has COVID-19 affected research on mosquitoes or your research in general?

23:16

The wonderful thing about people who try and control mosquito borne diseases is that we're very dogged. So we couldn't let COVID-19 affect what we do, whether it be basic research or vector control itself, because vector borne diseases and the mosquitoes for as an example, are the ticks that transmit these diseases and pathogens. They don't care about COVID. So vector borne diseases will still happen in the background of COVID-19. And that's exactly what we experienced in Florida. Last year, we had a West Nile virus outbreak, we had a dengue outbreak all in Miami, in the presence of the large surge of COVID-19 cases. So it affects all of us on a personal level. But we all had to try and find a way to keep at it, right? To keep the research going to keep the vector control efforts going. We had to. In

fact, even though we don't work with SARS-COV-2, because our team works with RNA viruses such as dengue, we had the necessary skill set to basically step up and meet the need to study SARS-COV-2. And we did that we did that last year, all the way through to this year. And we're you know, we're excited about actually submitting our manuscript for all the work that we did last year that actually used all of that systems biology. I described to you both transcriptomics and lipidomics. And so we're excited to get that out there. Interestingly, over the past year, as I said, we're very stubborn. Right? We're happy to report that our grant application to take my malaria vaccine which is a transmission blocking vaccine if it prevents transmission by the mosquitoes. So it's supposed to work with the current vaccine that I just mentioned that one that has 75% efficacy for protecting the human host. But 75% that leaves well 25%, at most that essentially can still get malaria and therefore transmit the pathogen in so we're trying to eliminate and eradicate malaria, that vaccine alone won't cut it. So our vaccine is supposed to prevent the back end, that 25% from continuing to transmit the malaria parasite through mosquitoes and, and we have very promising data. And so our grant application is actually to take our vaccine to phase one clinical trials in Gabon. So we're super excited about that.

Jacqueline Aenelle 25:48

I have a two part question for you, looking at the role our listeners can play. First in as we discussed, even these vaccinations are not foolproof, right? So how can listeners help prevent the transmission of these diseases? And secondly, what role can listeners play in helping fund science? Or show the support that you had scientists need to continue this research?

26:13

Now that's great question. So the nice thing about insects and arthropods it lends itself towards citizen science, kids as young as six, if you're not scared of these things, you can start getting introduced and to the world of vector biology, just by looking at where do mosquitoes grow, you know, work in ticks get picked up, when you're in a hike, where do these kissing bugs hang out in your backyard, all of these things are great opportunities for individuals to get introduced to the field. Because to be perfectly honest, we need more vector biologists and the number of individuals trained both classically and with these modern approaches that I've described. It continues to dwindle worldwide, and especially here in the United States. This is an exciting field, I'm very excited, I remain excited about it, not only because of the type of work we do, but because of the potential impact that we can have in public health. Okay, and so and, and if you will love math, this is great. There's always math involved, you've loved biology, especially biology, absolutely. But together, if you could imagine all of these different capabilities that we can do. Now, through different technologies, we can really tackle some of the hardest and most fundamental biological questions that had remained unanswered for hundreds of years, these diseases have plagued mankind, humankind for a long, long time. And, and I think there's an always an opportunity for the next generation to, to really contribute to quelling these diseases, getting rid of them for good. You know, so I talked about citizen science, and part of being a citizen scientist, is to realize that vector control cannot happen without your help cannot happen without the support of the community, talking to your local leaders, talking to your representatives, your Congressman or woman, your senators, reminding them that, you know, it's really important for me to be able to go in the backyard, you know, and, and enjoy my time with family and our pets and what have you, and in vector biology, vector control all vector surveillance that that needs to be funded. So, you know, speaking,

really, from everyone's own personal level, you know, how can we enjoy life and feel protected? We need to keep going, doing what we \ have been doing. And we need their support.

Jacqueline Aenelle 28:43

Any other last thoughts that you want to leave listeners with, or places they could go find more information if they want to know more about the part they can play?

28:54

Definitely look up the CDC Centers of Excellence in Vector Borne Diseases. There's a webpage on the CDC website that actually describes all the five Centers of Excellence for vector borne diseases spread throughout the United States and Northeast, the Southeast, which is ours, the Southwest, and the western side, all the way into the, the territories in the indo Pacific. So definitely look into that. And there, there are always opportunities to be engaged. We have these, I guess, zoom meetings, for lack of a better term, we're in the public can join in and just listen to what our students doing. You know, what kind of research is being done by different centers across the United States, from both the student, doctoral, masters, undergraduate, all the way up to the professor's what do they do and how do we work together with the CDC? How do we work together with local vector control the departments of health or departments of public health for our individual states? And it's just nice to see how all of us kind of network together and people can realize that they're actually also part of it. You know, they don't need to be part of a university or anything, but they are part of our, our community effort to rid ourselves of vector borne diseases.

Jacqueline Aenelle 30:21

There are many educational resources available on mosquitoes and several ways that you yourself can help manage and control the effects of mosquitoes and mosquito transmitted diseases. For more information and resources, please visit the podcast show notes on the PIE Center website or visit preventmosquitoes.org. That's www.preventmosquitoes.org. That concludes part two of our series on mosquitoes. I want to thank Dr. Rhoel Dinglasan and Dr. Ricky Telg for being guests on Science by the Slice and sharing their experiences and expertise. Before you go, don't forget to subscribe to the podcast because you won't want to miss our next podcast series on heat related illnesses. I want to thank everyone involved in the production of this podcast. Phillip Stokes, Michaela Kandzer, Rachel Rabon, Ricky Telg, Sydney Honeycutt, Valentina Castono, Ashley McLeod-Morin and Alena Poulin. I'm Jacqueline Aenelle. And this is Science by the Slice.