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SPEAKERS

Glenn Morris, Ricky Telg, Phillip Stokes

R **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.

P **Phillip Stokes** 00:29

Hello, and welcome to Science by the Slice. This is your host Phillip Stokes Education Coordinator at the PIE Center. This is our second episode of a three part series on COVID-19 where we're breaking down the pandemic to help us understand how we got to this point. Before I go any further, I want to emphasize that this episode was recorded on December 11 2020. As we all know, the pandemic is changing very rapidly. So as you're listening today, keep in mind that our guest is providing information based on everything that was known up until that point. And my guest is Dr. Glenn Morris. He is a physician epidemiologist, and has focused on infectious diseases his entire career, which led to him becoming the director of the Emerging Pathogens Institute at the University of Florida. More on this institute in just a moment, but first, I mentioned that Dr. Morris has focused on infectious diseases his entire career, but it's a bit more personal than just that. You see, Dr. Morris grew up in Bangkok, Thailand, the son of missionary parents, his father, a PhD theologian, taught Hebrew and Greek. His mother worked with refugee populations. And

Dr. Morris witnessed firsthand epidemics of cholera, dengue and other diseases that so often impact the tropics. These outbreaks were a risk to himself, his family friends, and this experience growing up was a major driver for his career today. In fact, after completing his residency in 1979, he joined the Centers for Disease Control and Prevention as an Epidemic Intelligence Officer, where he dealt with cholera outbreaks at refugee camps in Thailand, something so closely linked to his upbringing. Fast forward to today, Dr. Morris and others at the University of Florida are trying to understand the emergence of pathogens just like the SARS-CoV-2 virus. Dr. Morris is also involved in the health and safety of agricultural workers in the southeast, as he is the director of the Southeastern Coastal Center for Agricultural Health and Safety, one of 11 CDC NIOSH Centers in the US. So in this episode, we also discuss how COVID-19 has impacted agricultural workers in Florida. Now, before I pick up my conversation with Dr. Morris, I should say that the Emerging Pathogens Institute was very quick to research COVID-19. The institute had its own assay to test for COVID-19 very early on weeks before tests were widely available. Researchers isolated the virus from the first case diagnosed at UF Health here in Gainesville, and starts working on studies that could lead to vaccines, treatment options, and just general information to help us understand more about the SARS-CoV-2 virus. So I'll pick up my conversation with Dr. Morris as he's discussing the different strains of Coronaviruses around today and their prevalence.

G Glenn Morris 03:37

The virus responsible for COVID which is the SARS-CoV-2 virus is is a Coronavirus. It's in the in the Coronavirus group. Coronaviruses are extremely common. They tend to like bats. And frequently they are isolated from bats. We've actually isolated Coronaviruses from bats here in the UF campus. We've got some bat houses and those bats carry Coronaviruses. Those are, let me emphasize that's it's not COVID it's not any viruses that are going to cause any harm to humans. But Coronaviruses are present in bats. They are carried by all sorts of mammals. So, you know, the sense that this was something totally unexpected or unusual, needs to be a little tempered with the recognition that Coronaviruses are common. They like mammals. They are frequently transmitted among mammals, and they can cause serious illness in mammals and that's been recognized for a long time. So when we come back to Coronavirus, as in humans, we are aware of at least four different strains of Coronavirus, what we call the human endemic Coronaviruses, which circulate widely in human populations. These generally cause symptoms like the common cold. So when you get a cold, there's a reasonable likelihood that you are infected with a Coronavirus, one of these human endemic Coronaviruses, but then there are three Coronaviruses, which we have come to recognize can cause really nasty disease in people. One is called SARS, which appeared in the early around 2000. And then there was MERS Middle Eastern Respiratory Syndrome, which still is present in

the Middle East. And then there is COVID. SARS, when it first appeared, was very serious with a high fatality rate. And was of significant concern. But basically, the public health authorities jumped on it extremely rapidly. And it's gone away. We haven't seen any more SARS after the the initial outbreak. Why did COVID have all the right stuff? I can't totally tell you that. That's one of the very interesting questions that as a scientist and researcher, people, you know, I, and a whole lot of other people all over the world are going to be looking at for quite some time. So it's a combination of having just the right combination of genes, to be able to cause serious disease in humans, combined with the right combination of genes so that it is able to be easily transmitted among humans. Again, the thing about both SARS and MERS was that we were able to control spread of both of those viruses fairly quickly and we did not see the explosive transmission that we are seeing with COVID. So, you know, I don't want to say it's all luck. But I mean, microorganisms are constantly evolving. And again, that's what we do in the Emerging Pathogens Institute, we watch micro organisms evolve, and try to understand what evolutionary pathways might take them in a direction where they could cause devastating human disease. And in this particular instance, you know, this is what we found was, again, we have a microorganism that happened to undergo the right, evolutionary changes, that it was suddenly able to become a monster as it were, and to be able to cause global pandemic disease.

P Phillip Stokes 08:04

So that's really interesting, because it sounds like there are certain factors that you know, like you said, it's, it's at the molecular level that we don't necessarily, we can't control but then you also mentioned the fact that with SARS, and MERS, public health officials kind of got on top of things early and restricted the spread. So now let's bring it back to COVID-19. And let's talk about spread in the Americas and in Florida, because of course, that's where we both are here in Gainesville, Florida. Tell us a little bit about the case count in Florida and sort of what the drivers of that were what and maybe some of the things that were not done as well as they could have been to restrict the spread.

G Glenn Morris 08:50

Well, again today is December 11th. You know, I always put the date in because the numbers are changing so rapidly. This is right below this is not a good day, or at least last Tuesday was not a good day. We had 11,234 new cases in the state of Florida with a positivity rate eight point about a little over 8% of the COVID tests that were done were positive. Those are definitely not good numbers. And unfortunately what we are seeing in Florida is a a steady rise in the case numbers. Now on the on the good side of things, if there is a good side we are not nearly as bad off as other states. I mean right at the

moment again as of today. We are averaging across a seven day moving average 43 new cases per 100,000 population. The National number is 63 new cases per 100,000. population. So we are below what's going on in terms of the nation as a whole. And actually, we ranked 42nd nationally, in terms of our level of acquisition of new infections. I will say, however, that 43 cases per 100,000 population is a god awful number. It's just that everybody else's numbers are god awful as well and are worse than ours. Why right at this moment? Well, there's sort of two questions. Why are our numbers increasing? And why are they not increasing as rapidly as we're seeing in other states, they are increasing because we have not been able to implement basic control strategies for limiting transmission. And again, the thing about science is that, you know, we're constantly learning and refining where we are. And at this point, we've got a reasonable idea of how we can slow this virus down. And again, to repeat things that have been said, so many times that nobody listens anymore. wearing a mask does slow it down. We know that it's transmitted by aerosols, as well as by large droplets. So do physical distancing. But the aerosols are important. And aerosols are little tiny particles, that include viruses that can drift and float in the air for extended periods of time, multiple hours, forming what we call a toxic cloud. Now you can't see them. But if you're in a closed, tight room, and a toxic cloud forms, and you start breathing, that toxic cloud in, you can get infected. That's how we have instances where one individual can infect hundreds of others, what we call a super spreader event. Essentially, all it takes is one guy in a bar, you know, talking loudly, or singing loudly with no mask, excreting the virus and little tiny aerosol particles, which form a toxic cloud, and then everybody else in the bar gets infected. So that gets back to the idea of stay out of closed tight spaces. So we, we know some of the things we need to do. But we then get down into issues with political will. And again, this, unfortunately, has gotten into politics. And so rather that it being a discussion of the science, it becomes a discussion of the politics. And people, depending on their political leanings will decide that well, no, I don't believe any of this stuff. And so I'm not going to wear a mask. And I'm going to go to the bars, and I'm going to go to the restaurants, pack them in close. And so, we are seeing increases, and I will say from a scientific standpoint, I and others are not surprised that we are seeing increases, because we are not putting in place interventions, mitigations, to try to slow spread. Having said that, we are not seeing the same rapid transmission that we are seeing in other states. And I think there's at least within the scientific community there, there is a general consensus that it again, relates to getting lots of people together in small closed spaces. And when it gets cold, particularly in the northeast, or in the Dakotas, or really anywhere in the northern part of the country. People don't stay outside with the windows open. Everybody gets into into closed tighter spaces. And again, that's been happening to a degree in Florida, but probably not to the same degree that we're seeing in the northern states. You know, there is still the Florida lifestyle. If you're in the southern part of Florida. You know, you're not, you're going to be in an in and out of doors type situation. There may be fewer opportunities for the really tight

closed spaces. We don't have strong data on that, but at least given what we know about transmission, you know, it would appear that at least here in Florida yes, transmission is definitely continuing to occur at levels which are much higher than I would like to see. But we may not be quite as bad off as people in the north in part because we don't have the cold driving us inside to, to further increase the risk of transmission is going to occur.

P Phillip Stokes 15:11

Now I do want to transition a little bit to the agricultural industry, I want to talk a little bit more about the prevalence of COVID-19 in agriculture. These are agricultural workers, a lot of which in the state of Florida, of course, are migrant workers. These are essential workers, these are maybe some of the most essential workers. And so they have been, you know, during the growing seasons, they've been out, you know, picking fruits and vegetables, where what has been the prevalence of COVID-19 in the agricultural industry in Florida and in the southeast.

G Glenn Morris 15:43

Excellent question. And unfortunately, I can't answer it. Because this gets back to issues with testing. There have been, as you're probably aware of significant issues with having available adequate testing within the the nation and within the state of Florida. And we are doing better on our testing. But without testing, we don't know how many cases are out there. And what we have found is that even though the state has made really clear efforts to make testing available, including sort of drive through testing centers walkup testing centers, the agricultural worker community has not really wanted to get tested. We actually have been in situations where we have offered testing to, you know, groups of agricultural working workers, and they have indicated, you know, I don't want to be tested, because if they get tested, then and they're positive, then they have the potential for being out of work for up to two weeks. And for many of these workers, they are paid on a daily or, you know, product basis, and being out of work for up to two weeks, can be absolutely devastating. And so consequently, I don't think we've got a good feel, for the total extent of COVID, there are certain outbreaks which have occurred, which have suggested that it is a significant problem. And just to name one, which, in which we were involved in the investigation in which was reported in the Gainesville Sun, we were, there was a group of over 100 H-2A workers that developed symptoms. And anyway, they we tested them, it ended up that 91% were were positive for COVID. Again, these are guys working out in the fields, harvesting. So being out in the fields is probably not the risk factor. But the problem is they're H-2A workers, and consequently, their employer contractor is responsible for their transportation and their housing. And in this case, they were being transported in a couple of old school buses that were packed with people. And

they were staying in motel rooms, sometimes six to eight to 10 people per room. And so, you know, transmission within those settings, is not only, you know, reasonable but expected. When you've got 10, people sharing or a bedroom, and one person is sick, then everybody else in the bedroom is going to be sick right away. And same when everybody's crowded onto an old school bus. You're going to get very rapid transmission. And at least in this group of H-2A workers, what we saw was evidence that there was indeed, rapid transmission, what we call super spreader events, where, again 91% were positive for COVID. So what this has done is make us really focus on the importance of trying to provide adequate housing and providing appropriate transportation for these individuals providing masking. You know, for the transportation, the problem is in housing. You really can't wear a mask while you're sleeping. And so, you know, what this does is raise a series of questions about how we can best protect our labor population, our agricultural population. And again, H-2A workers constitute approximately 10% of the agricultural workforce in the United States.

P Phillip Stokes 20:03

You said something at the beginning, you said when testing even when testing was available, the workers didn't necessarily want to be tested. And so I want to transition from that to vaccines. Because maybe you know, where I'm going, if a vaccine is available, will they necessarily want to get a vaccine? So before we get into that question, because I want to just kind of hear from you sort of where we are on vaccine development, because I think education on vaccines is probably pretty crucial.

G Glenn Morris 20:37

At a global level, there are a large number of vaccines, which are currently in various stages of testing. And, and I don't have the number in front of me, but it is, you know, in the 40s, to 50s, to 60s, different vaccines being produced by a number of different countries. Unfortunately, the United States elected to go in its own direction, it created the warp speed group, and withdrew from WHO. And so the rest of the world is working collaboratively on vaccine production with the exception of the United States, which has decided to go it alone. Now, again, I ultimately, hopefully there will be sharing back and forth. And this gets into another whole series of issues which, you know, we probably don't have time to get into in terms of our approach to international global health, and the way we approach a pandemic, but nonetheless, the fact remains in this country, we you know, our warp speed group, basically identified six vaccines that were felt to have, you know, high potential for success, and has been providing support for development of those vaccines, or at least four or five of those vaccines, the sixth one, which was developed by Pfizer, Pfizer elected not to accept government aid. The vaccines fall into three basic

groups in terms of mechanisms. One mechanism is what we call the mRNA approach. That is the approach that was used for the Pfizer vaccine, which is now moving into, you know, it's starting to be administered. First, people got the shots a couple of days ago in England or in Great Britain. And then there is a second mRNA vaccine being put out by Maderna, which should fairly shortly be also coming into, you know, broad population based use. There are two vaccines that take advantage of what we call, you know, an adenovirus vector, where the critical parts of the SARS-CoV-2 virus to which one wants to elicit immunity are, are carried by a by another virus. That in fact that gets in you know, that it gets into people and then causes that particular those particular areas to be proteins to be expressed. And then finally, there are two vaccines that are, if you what might be called more classic approaches, which specific proteins of the virus have been identified and are being administered just the individual proteins together with what we call an adjuvant, which elicits further immunologic responses. And as I said, that's the way vaccines traditionally have been made. And we have two candidates in in that realm. At this point, neither of those candidates have moved into human trials. For the adenovirus one has moved into him into human trials and we have data there. The efficacy does not look quite as good as what we are seeing with the the mRNA vaccines. So at least for now, all the action is with the mRNA vaccines. And again, it It appears to be a good vaccine. There are issues, there are logistics issues with it, and that it has to be kept at least the Pfizer vaccine, very, very, very cold until shortly before it's administered. And so, you know, we are started shifting away from the vaccine discovery business and more into the vaccine logistics business. What I anticipate is that over the next, you know, three to six months, there will be a series of vaccines that come online. And the Pfizer vaccine is going to be very expensive and very difficult to handle logistically. I, you know, it's very difficult to predict the future. But my bet is that probably some of these other vaccines, including one or more of the myriad of vaccines being produced by other countries, may well emerge as the the most frequently used simply because of price considerations and logistic considerations. So, again, we are shifting from the vaccine development phase into the logistic and you know, defining which vaccines can be most effectively distributed to the largest number of people.

P **Phillip Stokes** 25:50

So one question I do want to ask so of the the vaccines we were talking about that are, will be available or potentially available in the United States, it sounds like none of them are the live attenuated viruses right the live weakened viruses. Is that correct?

G **Glenn Morris** 26:08

Well, the Adenovirus vaccines are a you know, potentially a live attenuated. Um, but that's

the adenovirus but no we have no virus. That is the live attenuated SARS-CoV-2.

P **Phillip Stokes** 26:26
Right. And I say that because, you know, there would be no risk of someone becoming infected with Coronavirus by getting the vaccine. Is that correct? Right?

G **Glenn Morris** 26:40
That's correct. All of these vaccines that are being considered in the United States involve only parts of the SARS-CoV-2 virus, specifically, all of them tend to focus on one single part of it. And if you've seen, you know, all the pictures of Coronaviruses that have been around, it's what we call the spike protein, you know, those little spikes that Come off, you know, the, the internal ball of the virus, and that spike protein is what seems to elicit the major immune response. And so consequently, what is the thing that all of these vaccines are focused on is that spike protein, that by itself again, clearly, absolutely, you know, is not an intact virus and cannot cause disease. So getting the vaccine will not in any way raise the risk that one can get COVID.

P **Phillip Stokes** 27:38
What kind of protection do you foresee that giving people that do get the vaccine? And how does that change maybe their behaviors or their life after they get the vaccine?

G **Glenn Morris** 27:48
Well, again, the the data suggests that, to start getting population wide immunity, where we begin to see significant drops in the occurrence of illness, we're going to need to immunize and again, these calculations take into into account, you know, the number of people who've already gotten the illness. Plus,

P **Phillip Stokes** 28:14
if you don't mind, and I'm sorry to cut you off, but you're you mentioned people who have already gotten the illness. So do those people also need to be vaccinated as well? What kind of protection do they have? Because there might be a fair number of people listening saying, Hey, I already I was already infected with COVID-19. Or I already had that disease. Do I need to get the vaccine? So sorry, that?

G Glenn Morris 28:40

And that's an excellent question. What I was gonna say is what we need to probably get into immunized anywhere from about 40% to 70% of the US population, to really get a handle on things, slow this down and cut it back to a level where we are not seeing the horrendous outbreaks that are occurring today. If people have already been infected, um, you know, it's it will not hurt to take the vaccine. Is it absolutely necessary? Well, they probably have a degree of protection from the, from the immunity to the illness. We don't know how long that protection lasts. Getting a dose of vaccine would boosts that level of immunity. And I think we'll probably reach the day where getting a Coronavirus vaccine is something that one does routinely. And again, we're still not sure how long protection is going to last. But, you know, if I were to bet, based on our understanding of the immune response to the to the human endemic coronaviruses that just cause the common cold. And keep in mind you get a cold every year. So if you're infected one year, you're not in necessarily protected the next year. We we may well need to be immunizing everybody annually, similar to what we see with influenza. So, you know, when you go to your doctor's office, he or she may well say, Okay, time for your flu shot and your Coronavirus shot. But again, that's it's hard to say for sure. We're way too early in the process to predict. But nonetheless, I think we are moving into a situation. I mean, this is not going to be like measles, or some of the other childhood vaccines, where you get the vaccine once or maybe once or twice, and then you're protected the rest of your life. The odds are, we're going to be all of us becoming very familiar with Coronavirus vaccines, really for the rest of our lives.

P Phillip Stokes 30:52

So is that because there could be different strains of this virus? Or is it just the the waning of immunity over time? Or is it both?

G Glenn Morris 31:04

Um, it's probably more the waning over time. We, when we look at actually some of the some very nice work done by Dr. Derek Cummings, here at UF has looked at persistence of immunity to the human endemic coronaviruses. And again, it appears that the immunity just simply wanes over time, and doesn't last more than a year or two. Now, we have no idea what's going to go on with SARS-CoV-2. We do know that when we look at the presence of antibodies in patients who have been infected with SARS-CoV-2, we find that we do start seeing a drop off in the presence of antibodies starting at three months going on through six months. The problem is the disease hasn't been around long enough for us to know what's going to happen at nine months, 12 months, two years, three years, five years. But we are seeing definite evidence of a drop off in antibody in available antibodies

in patients who have been infected. The question then is will we see the same drop off after vaccination, we have no idea. And so at this point, it's simply too early in time to predict exactly what's happening.

P **Phillip Stokes** 32:39

So going back to the agricultural industry, and you know, the need for everyone, you know, to get the vaccine to you know, have some immunity, some herd immunity, what is it what's important for those agricultural leaders in the state of Florida and in the southeast and elsewhere to know about the vaccine and, and the importance of, of people getting it, and what they should know about, you know, their workers getting it as well.

G **Glenn Morris** 33:09

Well, I think the starting point is the point you've already you just made is that to maintain herd immunity, to keep the virus from spreading within our population, there needs to be a high level of vaccination. And so, you know, just like with measles, for example, when we saw people stop getting their kids immunized for measles, all of a sudden we started seeing measles outbreaks. The same thing will happen with Coronavirus. Not only do we have to reach a certain level of vaccination we have to maintain a certain level of vaccination. And if we have certain populations such as agricultural workers who are not immunized, then there is the possibility that they could serve as a basis for transmitting the virus and be a source of continual outbreaks within other portions of the population. And so, consequently, it is very important that we get a reasonable level of vaccination within all components of our population. And again, I think one of the things that is of concern is that for some of the agricultural population, agricultural worker group, there are anxieties about the vaccine many and for many English is not is not their their first language. There often is a lack of strong scientific background. And there is frequently a distrust of, of science and of doctors and of their labor contractors and so under those circumstances, I think that and in fact, one of the things that we've been working with with Extension Service here at UF is to begin to develop programs that can provide appropriate education and reassurance that taking the vaccine is safe. It's important, both to protect the individual who gets vaccinated, but also to protect society as a whole. So, you know, somebody could say, well, I'm gonna take the chance, you know, I may not get bad symptoms. So I'm just not going to get vaccinated because you don't trust the vaccine, probably not a good idea. Because while you may be willing to take the risk for yourself individually, if we don't get a high enough percentage of people vaccinated, we will continue to see ongoing outbreaks. And so we've really need to maintain that overall level of vaccination. So it's both to protect the individual, but also to protect the

community. And and I think, to get across these ideas, and to provide reassurance that this is a safe and effective means of accomplishing those goals, is going to require ongoing education. Both, you know, in the rural areas of the state, as well as within specific worker populations.

P Phillip Stokes 36:31

Yeah, that's exactly kind of where I was going in what I was thinking just how important credible and accurate education and information I should say, getting that information out to to the entire population, but of course, specifically those that might not have the level of access to information that that others do. So I think it just, it's one of those social variables, even a political variable that impacts infectious diseases and pandemics, just keeping, you know, the role of education, and the role that leaders and communities can have, and in helping out those in their community. And so, and I want to, go ahead

G Glenn Morris 37:22

I would, I would strongly emphasize the importance of this. And in fact, I would say at this point in time, if I had to prioritize my concerns, and you know, where I think we need to be putting effort. I think a key element is in beginning to set the stage for vaccines coming in. And you know, you're not going to be able to walk into a community and say, Hey, we're vaccinating day after tomorrow, let's do it. It's going to take weeks, if not months of education, you know, culturally appropriate education, and ongoing efforts working with, you know, community leaders, thought leaders within various populations, to be able to get people ready for vaccine, and move them to a point where they are generally accepting not only of this vaccine, but vaccines in general, but specifically this vaccine. And I, as I said, we started working with extension, I mean, we are probably months away from the point where we would actually be at a point where there was vaccine to start distributing into agricultural worker populations. But if we don't start now, setting the stage providing the education in a culturally appropriate way, then we will fail when we hit the point where we want to start vaccination.

P Phillip Stokes 39:00

So I have one last question. But before we get there, you mentioned earlier, it's December 11, 2020. When do you think, based on your best predictive ability, when do you think the vaccine will be readily available to distribute?

G Glenn Morris 39:17

Oh. Lord. As I think I mentioned earlier, a key element right now. I mean, we've shifted from a vaccine development to a vaccine logistics era. And I think many of us who are involved with this are starting to become very concerned about the logistic situation. And in fact, President elect Biden was commenting along these same lines was that as you know, the folks began to look at the plans in place. It is not clear that we as a nation, or we as a state are completely ready to move into a program where we are really legitimately going to try to vaccinate 40 to 70% of our population. The logistics are daunting. And, you know, I think we're going to run into a situation where the vaccine availability is going to help run the logistics to distribute that vaccine, the vaccine availability at the factory door is going to outweigh the logistic ability to get that vaccine equitably distributed to people in Florida and to other parts of the country. I mean, you know, people are saying, well, it's going to be spring. Biden is talking about, you know, within 100 days of his inauguration, it should be widespread. I hope he's right. I've just seen issues, however, with mass vaccination campaigns in other countries. And it's been an awful long time since here in the United States, we had a mass vaccination campaign, you have to go back to the polio days. And so we're, we are less experienced with this than a lot of other countries. And particularly with vaccines, such as the Pfizer vaccine, which is extremely difficult to deal with logistically because of its requirements for being kept at minus 80 degrees. I think, you know, we are probably going to be late spring into the summer. I hope I'm wrong. I'm hope. I hope it's a lot sooner. But it's I'm betting late spring, early summer before there is widespread vaccine availability.

P Phillip Stokes 41:48

You know that's a really interesting point you just made and I hadn't thought of it that the US hasn't had a vaccine campaign. I believe that's a term you used, or distribution efforts in a long time. polio, you know, polio, when I think of polio, it I think of, you know, history books. You know, as a reminder, what what year was, was that when polio was vaccine was coming out,

G Glenn Morris 42:16

oh, my I'd have to look it up. But it was a long time ago. It was in the early 50s. Okay, the mid 50s.

P Phillip Stokes 42:23

But you know, you think of other maybe what you would call, like a developing nation have have had other vaccine distribution efforts. I guess one of the more recent ones was Ebola, I guess, right. And in parts of western Africa. But yeah, you're right, we haven't had

that. So it's gonna be a little bit of unchartered territory, or just kind of, I don't know, it'll be new, new ish for us. So the last question I just wanted to kind of wrap up with is kind of getting that big picture view, kind of relating back to, you know, your, your role of what you do and what other researchers at EPI the emerging pathogens Institute do of, you know, looking at some of these complex infectious diseases that affect our entire globe. Outlook going forward for future pandemics or just other infectious diseases.

G Glenn Morris 43:21

I mean, again, I think what you hear people say periodically is and, and, you know, this is getting us ready for the next one. And everybody kind of chuckles and, yeah, sure, but the reality is, this is getting us ready for the next one in the sense that, I think, with the what has been a some really science major scientific marvels in terms of our ability to rapidly develop vaccines. Once we get the vaccines distributed, I think we will have again, I think Coronavirus will develop into an endemic disease. We will continue it will continue to be a risk, but I think we will be able to control it with vaccination long term. But, you know, Coronavirus made the headlines, but China has had several outbreaks of other viruses, particularly flu viruses, where there was transmission of avian flu strains into human populations with high mortality rates. In each case, it was possible to get things under control. And the virus appeared to lack some critical genetic elements which allowed it to be rapidly transmitted. And then there are things like Ebola. I mean, again, this is what I spend my life doing is monitoring these little blips that occur and most of these little blips just go away. But as the Coronavirus, as COVID has shown us every now and then something comes along that has just the right combination of genes and manages to sneak out from under initial control efforts. And, again, what we have learned from Coronavirus is that rapid, extensive global transmission is quite possible, and that our societies are not well positioned to prevent rapid spread of respiratory viruses. And so, do I think there's going to be another pandemic again soon? No, hopefully not. Let's get this one under control. But there are viruses out there that worry me. And I think that we have to, again, not only say, we want to get this under control, but recognize that we need to be ready for the next one. And again, what has been interesting is that countries in the Far East, South Korea, Taiwan, even Australia, New Zealand, have been and China have been very effective in controlling COVID. And one reason everybody points out is that they all got scared with SARS, when they saw SARS, it made them put in place appropriate public health interventions. So that when SARS-CoV-2, two came along, they were ready, and they jumped on it. And consequently, the impact of SARS-CoV-2 to on these countries, has been minimized. In contrast, we were not ready. And the thing took off light lightning, as it did in most of Europe. So, one would hope that this would serve as a warning and that just as SARS may have gotten places in Asia to be ready for SARS-CoV-2. Perhaps SARS-CoV-2 will generate sufficient support to develop the type of public health infrastructure in this

country that will allow us to withstand the next onslaught.

P **Phillip Stokes** 47:46

I want to thank Dr. Glenn Morris for being a guest on Science by the Slice. Be sure to listen to our final episode in our COVID-19 series. I'll be joined by Dr. Lauri Baker and Dr. Shelli Rampold both from the PIE Center. In this episode, we'll take a turn towards the social sciences and learn more about what US citizens think about the pandemic. I'm pretty excited to have them share this research because this is one of the things we do at the PIE Center, gauge the public's beliefs and understandings about issues. I want to thank my co-workers at the PIE Center for working on this podcast with me: Ricky Telg, Michaela Kandzer, Sydney Honeycutt, Ashley McLeod-Morin, Alena Poulin, and Valentina Castano. I'm Phillip Stokes, be sure to subscribe to the podcast and we hope you'll join us next time on Science by the Slice.