Weitzman Institute
2022 VIRTUAL
Symposium

Keynote Presentation #1:
The Fight for Health Justice: Old and New Challenges in the Syndemic of Racism, Climate Change and COVID-19

Reimagining Primary Care through a Health Justice Lens **May 4, 2022**

SPEAKER:

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LEARNING OBJECTIVES:

- **Apply a syndemics framework to understand the converging pandemics of COVID-19, climate change, and structural racism.**
- **Describe environmental justice using examples of environmental health disparities in the DMV region and across the U.S.**
- **Examine the importance of partnerships with community-based organizations to study and address environmental justice and health issues.**
- **Give examples of approaches for how to successfully translate research to action.**

Dr. Sacoby Wilson is currently a professor with the Maryland Institute for Applied Environmental Health in the University of Maryland College Park School of Public Health. He also directs the Center for Community Engagement, Environmental Justice, and Health (CEEJH) Initiative. Dr. Wilson has over 20 years of experience as an environmental health scientist in the areas of exposure science, environmental justice, environmental health disparities, and community engagement research. He works primarily in partnership with community-based organizations to study and address environmental justice and health issues and translate research to action.

Racism is a Public Health Issue

Sacoby Wilson: This symposium is a powerful opportunity to bring the two snakes to the caduceus staff together, the public health and the medical snakes. We need both sides of the staff working together and I am happy to talk about the public health side. **We are in a syndemic.** I want to start by saying we are dealing with multiple pandemics, but when we think about the issues around healthcare, prevention, and social determinants, you must address the root causes.

One of the root issues is racism. Racism is a pandemic. Think about the stolen bodies of Africans in this country, the stolen lands of our indigenous brothers and sisters; I'm on the land of the Piscataway people in Maryland right now. You must talk about racism and how it impacts health by decreasing cortisol and C-reactive protein levels and causing inflammation. Look at the work of David Williams and Arline Geronimus' Weathering Factor. The everyday stressors of racism, for example, driving while Black, couponing while Black, doing your homework while Black, eating ice cream while Black, in your dorm asleep while Black, taking subways home while Black, playing video games in the house while Black, having a permit to carry while Black. You know the examples and **people are losing their lives**. For example, the police state and the over-policing of folks because of their skin color, the school-to-prison pipeline, and the incidence of gun violence, which is a pandemic itself. Seeing little children of color getting handcuffed because they had a temper tantrum. The stop and frisk and sentencing issues, and the recent news about Roe vs. Wade. Black women are three to four times more likely to die in childbirth than White women. What does this mean for Black women? Will this death rate increase? Why do we have this death rate anyway? Regardless of income, why are Black women dying so much in childbirth?

Figure 1. Recognizing racism as a public health crisis is a first step in addressing racial equity and justice.
Source: Faith Eselé | Unsplash.

Structured Inequalities and COVID-19 (Hollis and *New York Times*)

3x: The likelihood that Black and Latinx people in the United States will be infected by COVID-19 compared with their White counterparts.

2x: The likelihood that Black and Latinx people are likely to die from COVID-19, compared with White people.

5x: The infection rate for Latinx people between the ages of 40 and 59 compared with White people in the same age group.

>25%: The percentage of Latinx people who died from COVID-19 who were less than 60 years old. Only 6% of White people who died were in that same age group.

Note: This data accounted for about 55% of the nation's population

Figure 2. Data summarizing racial disparities of COVID-19. Source: Hollis (2020) and *New York Times*

Think about the issues and the data shown in **Figure 2**. It is clear how people of color have been impacted by COVID-19, but why? If the Navajo Nation has no access to running water, how will they practice good hygiene? Think about the history of public health, John Snow, epidemiology and environmental health. The environmental health field started as a sanitation movement. Water issues exist everywhere, including the United States. People do not have access to sewer and water infrastructure in this country. Without safe water to wash their hands, how will they reduce the viral load on their hands? Think about the housing issues, and I am referencing social determinants of health and housing including mold, mildew, allergens, roaches, mice, and volatile organic compounds (VOCs). Poor ventilation systems and overcrowded housing increases your risk of exposure to SARS-COV-2. This gets to another kind of a pandemic and for that I will quote Reverend Lawson. When he eulogized John Lewis, he talked about the plantation apartheid and the plantation economy in the United States. The fact that nine out of ten essential workers were people of color. I'm at work and I'm at home. I'm not essential but folks who look like me, essential workers, they had to go out and work in transportation, meatpacking, healthcare, restaurants, with some of them not surviving. Those essential workers nine out of 10 are folks of color. There is a correlation between air quality and COVID. Part of the reason why you see so many impacts, this in reference to the mortality of COVID, is because a lot of communities of color live in areas with poor air quality. You have the **pandemic of racism, the pandemic of the plunging economy, the pandemic of coronavirus, and the pandemic of climate change** with those contributing the least to climate change being impacted the most.

Vulnerability to Environmental and Climate Related Hazards Determined by Race and Class

Figure 3. Houston overpass before and after Hurricane Harvey. Source: The Guardian

Last year in 2021, Hurricane Ida hit New Orleans 16 years to the day after Hurricane Katrina. We know New Orleans is a heavily segregated community with a lot of people living in poverty. Do you ever wonder why when Katrina hit, people didn't leave? Because you had a lot of people of low wealth that didn't have a car. It was also near the end of the month and people hadn't been paid. Also, if you are low wealth, you don't have savings. People with access to greater infrastructure in response are more resilient. Katrina demonstrated how **the intersection of race and class plays a role in who's vulnerable to climate-related perturbations**, whether it is climate change, hurricanes, tornadoes, forest fires, or heat waves. Think about Hurricane Harvey in Houston. Houston is the fourth largest city in the country and has no real zoning, it's like the wild, wild, west of development with a lot of impervious surfaces. Hurricane Harvey dumped 30 trillion gallons of rain when it hit Houston. That's a lot of water, when it hits impervious surfaces, and where is that water going to go? Houston is also home to North America's largest petrochemical corridor, the Houston Ship Channel. When a hurricane hits this, what happens? It gets flooded. You are already dealing with poor air quality and its negative impacts, VOCs and then you see what happens in this photo (**Figure 3**), pre and post. During Katrina people were wading through a toxic soup to escape. People also waded in a toxic soup to get out of Houston while VOCs and carbon compounds impacted the air quality and human health.

Redlining is a Driver of Segregation, Segregation is a Driver of Environmental Injustice

The social determinants of health are one of the reasons why things look the way they do in this country. Unjust housing, unjust transportation, unjust food, unjust health care, and unjust environmental conditions are connected to segregation and redlining. This is not an accident. For redlining, let me give you a little story. Fifty to sixty years ago, neighborhoods with more people of color

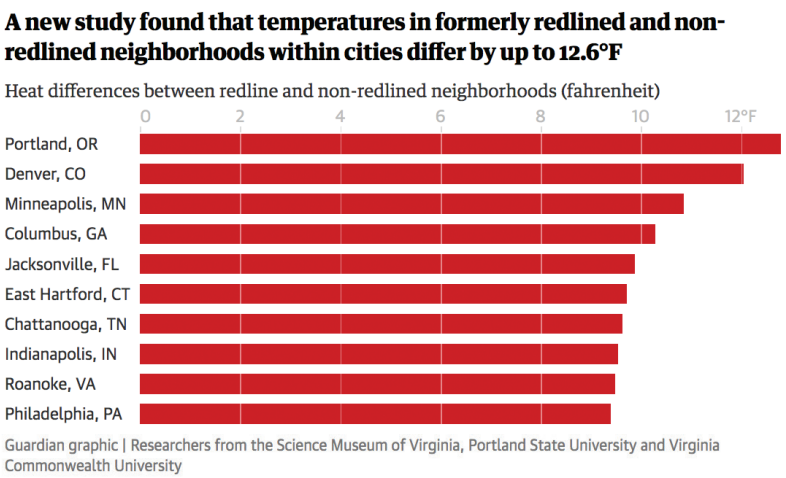


Figure 4. Redlining and Urban Heat Islands. Source: The Guardian

did not receive loans and were colored red, resulting in disinvestment and causing schools, infrastructure, and grocery stores to leave. White neighborhoods on the other hand were colored green and given loans and investments. **Redlining is a driver of segregation, and segregation is a driver of environmental injustice.** When you think about climate change and heat issues, redlined communities are warmer than non-redlined communities because they have more impervious surfaces, concrete, and asphalt. The National Interstate and Highway Defense Act of 1956 built highways through Black and Brown communities on purpose. Many books and films of that time depict this such as Julie Sze's book *Noxious New York* which is about zoning. It's all connected. When you build highways and byways through people's communities—you fragment, destroy, and break the cultural fabric. This brings in more impervious surfaces and gets rid of trees. It's all connected.

Environmental Justice is a Social Movement

Environmental justice is a social movement and the child of the civil rights movement. It's about where we live, where we work, where we pray, where we play, and where we learn. I always ask my students, what is the first word you think of when you think about the environment? What is the first image that pops in your head when we think about the word "environment"?—I think about a polar bear with a Coca Cola. That is not your environment. **Your environment is outside your house. Your environment is where you live, where you work, where you play, and where you pray.** We know that is your environment, but we know it's not your local environment. Environmental justice is about thinking about the local and the proximal. Every day, pocketbook, making the environment real to folks. I will say that my green group friends and the green group organizations like Sierra Club and others have done a poor job and miseducated folks by using the language of Carter G. Woodson from the *Miseducation of the Negro*. They miseducated folks of what comprises the environment. The environment is just not the biome far away. It is the biodiversity in your neighborhood. **You are part of that biodiversity.**

Figure 5. Martin Luther King Jr. and sanitation workers in Memphis, 1968. Source: Various.

The grandfather of the environmental justice movement is Dr. Martin Luther King Jr. He was assassinated 54 years ago while in Memphis with the sanitation workers on strike. Men were being mistreated, working in unsafe conditions, and walking around in waste all the time. Look at the picture (**Figure 5**) and see the sign; **I am a man, recognize my humanity**. What I am saying is that **communities dealing with environmental justice issues have been dehumanized**. They become commodified and de-commodified at the same time. They get dumped on and are used as sacrifice zones. They are dealing with toxic trauma of living near hazards like incinerators, landfills, and petrochemical operations. Some of you may heard about Cancer Alley, the 80-mile corridor where Sharon Lavigne and Rise St. James fought against petrochemical operations in Louisiana. I just showed you Houston Ship Channel. Go to California, Navajo country, and other parts of indigenous lands where brothers and sisters in reservations are dealing with mining issues. Go to New York and Chicago. There are so many environmental justice issues where people are being burdened and overburdened by landfills, incinerators, and chemical plants.

Getting Communities to Where They Should Have Always Been

When you think about the definitions of environmental justice, the first definition in **Figure 6** is from the Environmental Protection Agency (EPA); I call it the Kumbaya definition. But we know that is not happening. If you read the book, *The Color of Law*, it says that everyone was protected, we wouldn't have had a Flint water crisis. All they had to do was comply with the lead and copper rule of the Safe Drinking Water Act (SDWA). Part of the problem is our **environmental laws and regulations do not take into account racism**. There is historic racism and contemporary racism. They protect the average population, but the folks I'm talking about are in the tails of exposure, tails of burden, tails of impact. They are both susceptible and vulnerable. I don't like the definition. It's an all lives matter definition. We are not saying black lives matter only, **we just want the definition to emphasize that their lives had not mattered**. I like the second definition better from Dr. Bunyan Bryant, Professor Emeritus, at the University of Michigan. People can realize their full potential without experiencing the *isms*. Fill in all kind of isms; decent paying jobs, good quality schools, recreation, decent housing,

Environmental Justice (EJ) is the fair treatment and meaningful involvement of all people regardless of race, ethnicity, culture, income, or education level with respect to the development, implementation and enforcement of environmental laws, regulations, and policies.

Environmental Justice is served when people can realize their highest potential, without experiencing the 'isms.' EJ is supported by decent paying and safe jobs, quality schools and recreation, decent housing and adequate health care, democratic decision-making and personal empowerment; and communities free of violence, drugs and poverty. These are communities where both cultural and biological diversity are respected and highly revered and where distributive justice prevails.

Figure 6. Environmental Justice Definitions from EPA and Dr. Bunyan Bryant. Source: EPA and Dr. Bunyan Bryant.

and adequate health care. These are all social determinants of health. Environmental justice is a framework associated with the social determinants of health framework, it is a holistic framework.

It is also about justice so let's talk about justice. Recognitional justice. You may have heard of the 17 principles of environmental justice. Principles five and seven talk about communities speaking with their own voice. Those most impacted should be leading in decision making. Procedural justice, I just mentioned the lead and copper rule, is about making sure you implement the law equally, and **we know the law has not been implemented equally across racial/ethnic groups**. Restorative justice is when we can we restore communities to what they used to be. The problem is because of racism, if I was a community that was impacted by a hurricane, you can't get me back to where I used to be because of racism. I'm not where I should have been in the first place. When we talk about "Build Back Better", that's build back better or build back better betterer, not a word but you get my point. **We don't want to get them back to where they were, we want to get them where they should have been.** What they envision themselves to be at. The study "Toxic Wastes and Race" was the first of its kind study on environmental justice that emphasizes that **race is the single most predictor of distribution of environmental hazards**. How will the White House Environmental Justice Advisory Council's new Climate and Economic Justice Screening Tool address environmental justice and race if you are not including race? Not logical. One of the first books written on this issue was *Dumping in Dixie* by Dr. Robert Bullard. He is known as the father of environmental justice. While Dr. King is the grandfather, W.E.B. du Bois is the great grandfather, and Dr. Bullard is known as the father.

Access to High-Quality Health Promoting Infrastructure is Environmental Justice

Environmental justice invokes the three-legged stool. Communities are overburdened by hazards, have a high concentration of psychosocial stressors and lack access to infrastructure. I will go old-school and ask you about Aaron Antonovsky and Salutogenesis. How do you promote health, well-being, and wellness across all dimensions of environment? I mean the built, natural, social, economic, political, and of course, the spiritual environment. Communities don't have access to good infrastructure such as healthcare. You may have it, but is it good quality healthcare? Access to nature is important when we talk about mental health, and a lot of communities don't have access to trees. Trees are good for air pollution, heat mitigation, and stormwater management. Trees are good for playability, mental health, and food. The point is food. Land is power, land is health, land is wealth, land is culture. Food and land are important things we need to have access to. Black people have three times less access to nature compared to their White counterparts. Low wealth people have three times less access to nature compared to their wealthy counterparts. **The disconnection and the lack of access to nature is part of the problem.** That is an infrastructure issue. All our communities need natural infrastructure and green infrastructure. This is an environmental justice issue.

Framework is a Three-Legged Stool

- **Leg 1:** Differential burden and exposure to environmental hazards and LULUs (chemical plants, TRI facilities, incinerators, brownfields, heavily-trafficked roadways, industrial zoning, goods movement activities, landfills, depots, etc.)
- **Leg 2:** High concentration of psychosocial stressors (crime, violence, poverty, isms, social disorder)
- **Leg 3:** Lack of access to high quality health-promoting infrastructure (supermarkets, banks, schools, basic amenities, housing, parks/green space, economic opportunity structures)

Figure 7. Dr. Sacoby Wilson's Environmental Justice Definition. Source: Dr. Sacoby Wilson.

Environmental Injustice Causes Health Disparities

Burden disparities can lead to exposure disparities, to risk disparities, and to health disparities. Some of these exposures, like particulate matter, PCBs, PAHs, mercury from fish, blood lead levels. Lead is a failure in many ways in public health. We know what lead can do as a neurocognitive toxicant. How are you going to put America first, if you do not put your kids first. The fact that you have kids being exposed to lead in this country to this date is a problem. It's a travesty. It's egregious. We have put a cap on hundreds of thousands of kids over time. These kids exposed to lead could have been the future Michael Jordan, Obama or any person successful you look up to. The cap on their potential is because they've been exposed to lead. Also, exposures to these pollutants can lead to health disparities. These **built environment factors drive environmental injustice** but also could connect environmental health disparities. **Environmental injustice can lead to environmental health disparities.** Race plays a role in this with some groups having a pollution advantage, and some groups having a pollution disadvantage. You cannot address environmental injustice without addressing racism. **Racism is a social**

determinant of health. Racism is a pandemic. Racism is a root cause. It undergirds structural racism and systemic racism.

This is a syndemic. In reference to particulate matter (PM). Communities that have lived in areas with a lot of air pollution have been exposed to PM or particulate matter as a combustion byproduct. PM is like dust in the air, you breathe it in, and it attacks your lungs. It causes asthma attacks, heart disease, elevates blood pressure, causes strokes, contributes to Alzheimer and diabetes, increases birth defects, low birth weight, causes cancer, leads to premature mortality, and decreases life expectancy. This is just one pollutant. Think about the communities living with environmental justice issues, they're exposed to multiple chemical, physical, biological, and psycho-social stressors. Things like mercury or lead, particulate matter, chemical, biological agents like SARS-COV-2, mold, mildew, allergens, bacteria like E. Coli if you live in a hot area, physical exposures like heat and noise, and psychosocial stress.

THIS IS A SYNDEMIC!

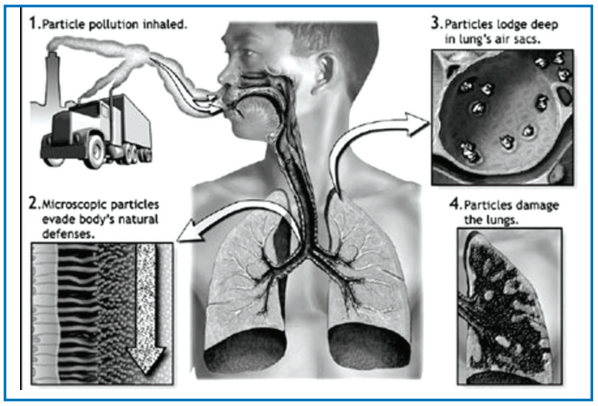


Figure 8. Health effects of inhaled particles.
Source: American Lung Association

Addressing Health Disparities Means Addressing Segregation

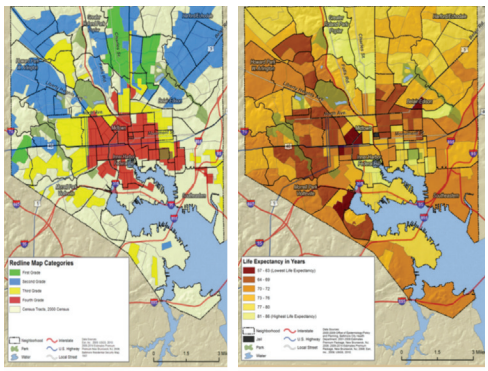
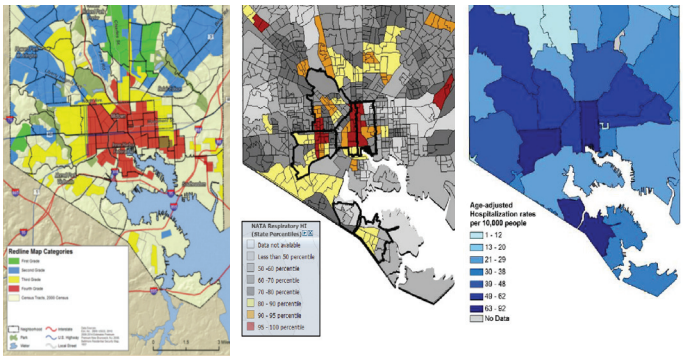


Figure 9. Redlining and health in Baltimore.
Source: Office of Epidemiology, Policy & Planning Baltimore City and Dr. Sacoby Wilson.

One example is the Black butterfly in Baltimore. The Black butterfly wings in Baltimore are hyper-segregated communities where we have a lot of Black folks and in the middle you have more of the White populations. It is hyper-segregated in the wings, and this is connected to redlining. In the areas that have more history of redlining, including the red and the yellow. You see a spatial relationship between being redlined and life expectancy (**Figure 9**).

Asthma, air pollution, and environmental justice are areas on the map with the redlining. **Figure 10** (below) shows both the respiratory risk of both toxic air pollution and asthma hospitalizations. There is a pattern here. **There is a spatial association between redlined communities, respiratory risk, and asthma hospitalizations.**

At CEEJH, we did some work looking at redlining and the first map in **Figure 11** shows lead law violations, and you see again that the butterfly wings are hyper segregated. There are a lot of lead violations and when you look at the map below you see more data on where these lead cases are. This is important for it shows a relation between redlining and segregation but also with lead. In a lot of cases where you have a lot of lead, homes were built either before 1960 or 1970. How are we going to address these issues that I showed you around life expectancy in Baltimore, asthma, lead, and not address segregation? **We have to address the history of redlining and zoning.** Baltimore was the first municipality in the country to have racism-based zoning. It was turned back by the Supreme Court, but it set the social patterning and the built environment pattern that is present in Baltimore today.



Note: Bold boundaries on Respiratory Risk map highlight zip codes with the five highest asthma-related hospitalization rates in 2011.

In 2010, the EIP found that Baltimore City's rate of asthma-related hospitalizations (40.22 per 10,000 residents) was almost 3X higher than the U.S. average (14.1 per 10,000 residents) and about 2X higher than the state of Maryland (18.14 per 10,000 residents). The asthma disparity follows sociodemographic lines in regards to asthma hospitalization and emergency room visits in areas of high poverty and low-income households.

Figure 10. Connection between redline communities, respiratory risk, and asthma hospitalizations. Source: Various, Environmental Integrity

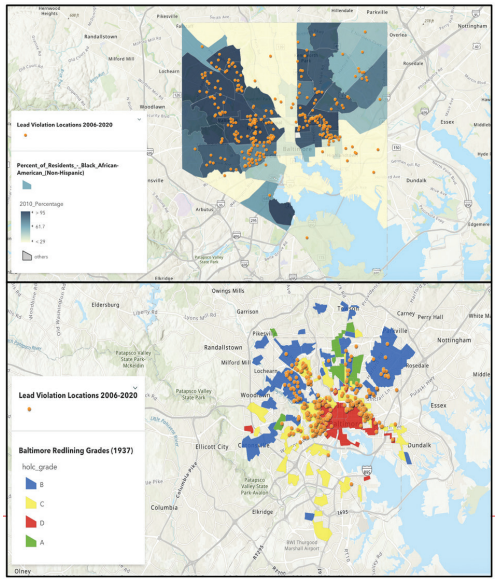
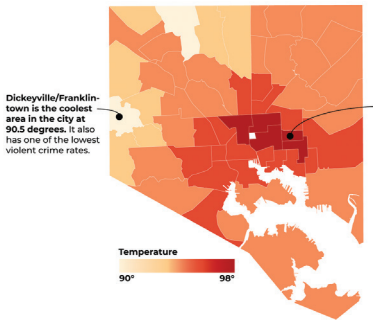


Figure 11. Top map shows the environmental racism of lead poisoning, as most lead violations (orange dots) in Baltimore are found in census tracts home to majority Black residents. The other map shows the connection between lead poisoning and redlining grades, as most lead violations are in the yellow and red areas that were deemed least favorable for providing mortgage loans.
Source: CEEJH and Housing and Lead Story Map program from Maryland Department of Health.

Project Code Red: Heat and Segregation

Code Red is a collaboration between students from Howard School of Journalism at the University of Maryland College Park and residents in Baltimore. **Figure 12** shows there is a 16-degree difference in temperature across the east and west part of Baltimore and across other parts of Baltimore; like the wings compared to the body. Hyper-segregated Black areas compared to White areas. Looking at the picture you see the power of one tree in providing shade and protecting a home from dangerous heat levels. These differences are not just across different neighborhoods, but in the same neighborhood, on the same street, on the same side of street in the same set row of houses. You can see a difference with the house with a tree and the house without a tree. What you see in Baltimore are impervious surfaces, urban heat island, and the albedo effect. The albedo effect means that with sunlight you have heat, the concrete and asphalt absorb it and release it so it's warmer at night and stays warmer longer. Climate forcing gases and the pollution gets trapped. Then you have no trees and people have no air conditioning. In the state of Maryland, the city that has more heat-related morbidity and mortality events is Baltimore. **That is called planning…not an accident.**

Drastic temperature differences can be observed in city infrastructure, most often attributed to SES. Those who can afford the shadier homes experience significant comfort and security as opposed to those experiencing dangerous heat levels. President and CEO of American Forests says "'The single greatest threat from climate change to people in cities is extreme heat.'"



With poor air quality and damaged infrastructure, the effects of climate change are exacerbated for at-risk communities, putting them even closer to harm's way. Data has shown that those living in hotter parts of the city are "more likely to be poor, to live shorter lives, and to experience higher rates of violent crime and unemployment".

Figure 12. Project Code Red displaying heat and inequalities. Source: Code Red

The Value of Community Knowledge and Lived Experiences

As I said in my introduction, I do a lot of community research. When you work in partnership with communities, you can go from outreach to consultation to involvement to participatory research. Outreach is one directional. In consultation, communities get more involved. If you look from left to right (**Figure 13**) trust, communication, and community involvement increases. I do a lot of work using the Community-Based Participatory Research (CBPR) framework and helping with community-driven research. When you think about CBPR we're talking about the community being engaged in all stages of the research process. It's important for the community to be engaged because **community members are the contextual experts** and that is data. It's interesting when we talk about science. There are a lot of barriers to accessing science and how we frame whose science and knowledge counts. It's important for us to value contextual experts. One of the terms I like to use is Bayesian, as in Bayesian space, where you have general knowledge and specific knowledge. I have general knowledge. I don't live in an environmental justice community. The person that lives in an environmental justice community has specific knowledge. We need both knowledge bases to get the right solutions. **We need to uplift and value community knowledge and lived experiences more.** That is actual data and science. When we think about partnerships, think about the ingredients that make partnerships great, what we all have. You must have trust, respect, good communication, openness, transparency, and a process to deal with conflict. These ingredients that go into making relationships form the foundations of the partnerships. Then you move from the processes to the outcomes. Did you clean the air? Did you improve access to water quality? Did you improve access to food? Did you improve the basic amenities like sewer infrastructure? Did you reduce exposures to hazards? Did you reduce/eliminate disparities? People want to see outcomes. Processes are great, but as the quintessential grandma/grandpa might say, poverty impacts, I could have told you that…so what…what are you doing about it? We have to make sure we are not just doing science for science sake. I like to say in the words of Jesse Jackson, "we must stop problematizing so much and *solutionizing* more". **We need more solution science and meaningful outcomes.**

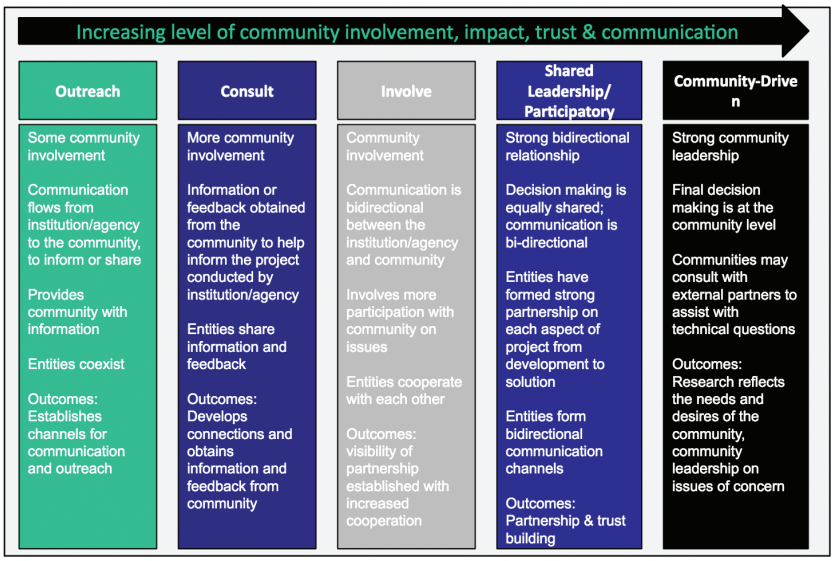


Figure 13. Increasing level of community involvement, impact, trust, and communication. Source: Dr. Sacoby Wilson.

We Need Science that Transforms and Creates Solutions

We want to make sure we transform communities when we do this kind of work. We have to transform the institutions, by changing the culture of the institutions who have actually supported this type of (colonial, extractive) science and the institutions that have funded academic institutions and health centers. We must move away from the reductionist approach and the biomedical. I'm not a biomedical scientist. The salutogenic framework should be brought in more to the science that we do.

How can you leave the community better? Then the political transformation, that justice part, meaning restorative, procedural, recognitional, and social justice are very important. In a lot of the science, we end up doing, especially in academia, we over-emphasize knowledge production. It's important for us to produce knowledge, but **we must go from more inaction to action**. An article from a couple of months ago discussed how all we are doing is studying problems all the time and all kinds of extractive science. I call it pain-pimping science. **We have so much science being done studying people's problems. Where is the return in investment for the folks?** Look at my signature for those who know me. **People's money should be used for the people's research to get to people's solutions. We need a taxpayer science framework.** How different would science be it if it was more action oriented and more applied-solution focused? We must move away from just doing knowledge production. Our lens and **our lived experiences inform science**, we have to be upfront and transparent about that. Rigorous science is important but you don't have to have a PhD to be a scientist. That is part of the problem too because what it does is say, if you are not a credentialed scientist, you are not doing real science. That's not fair and that's a diversity, inclusion, and justice issue in science. There are a lot of community folks doing great science. The idea is to make sure the **science is having an impact**. We have to make sure we are doing the science of engagement and of application. In my opinion, if you are not doing all five dimensions of science, you are doing incomplete science. We have a lot of folks right now in academia who are getting funded doing fishing expedition science. I love innovation, but I love actual impact, and that is what communities want. They want to see change and impact. They want **their money used for change and solutions**. They want their money used to deal with the health disparities and to achieve health equity. They want to see transformation.

How do you do this work with communities? You must talk about their issues, and impacts, the opportunities, benefits, and partnerships. I call it the two hands of engagement. What is your "why"? Be transparent about your "why" and communities should be transparent about the "why". What leads to real partnerships on any issues you work on? Think of five things. I prioritize: food, faith, family, health, and jobs. You may come up with a research question important to the community, but **how is it connected to what's important to them**? That's how you do work, build partnerships and make sure they are long term, and sustainable. That they have impact, are transformative for that's what makes it authentic. That is what communities want to hear. How will it improve my life? The life of my kid with asthma or the ones with lead exposure? The lives of the folks who are dealing with diabetes because they do not have access to grocery stores due to the food deserts, due to food apartheid—the reason why we have these food inequities.

Empowering Citizens Via Science Can Build Community Capacity to Address Environmental Health Issues

I'm on the board of Citizen Science Association. Citizen science is a controversial term, but it is about democratization of science. Some people don't like the term because it's not as inclusive and there are people that want to push for community science which I think is on the same science tree, but a different branch. I do more community science, but I also do citizen science. **This is the way to get science into the hands of the people, science and tools.** If people understood everyone can be a scientist. That we all are already scientists and that we are applied scientists for we use science right now. We watch science, wear science, eat science, drive science, and breathe science, though some of it is bad science. We're all applied scientists, but if we gave access to science to everyone, we would build more trust in science. Think about Henrietta Lacks and the Tuskegee experiment. Think about the medical abuses, and why people don't trust medical science. The father of gynecology, you know what he did. The first heart transplant in Virginia was done illegally on a Black man. You know these things and that is why folks distrust science. But if you get everyone to become a scientist you build trust and increase science literacy. You increase literacy in public health and environmental health literacy. You increase critical literacy. Then, people have the agency to then act on these issues in a collective manner. **Citizen science is a way to Inpower citizens.** I use the term INpower, not empower. My center is about doing Inpowerment science. The idea is to use science to inpower folks. Help them connect to the power they already have and not giving them power. One of my colleagues told me, "You can't give me power as a community member, who are you? You can help me connect to the power I already have, help me get access to the science and the tools so I can connect to the power of collective efficacy." That is why I use the term, "Inpower" not empower.

Mebane North Carolina: Post Slavery Neighborhoods and Water Infrastructure

The West End Revitalization Association (WERA) work in Mebane, North Carolina looked at issues of environmental justice and health disparities. Here are post-slavery Black neighborhoods that didn't have sewer or water infrastructure. This is a big issue in the U.S. with 20% of populations still living in rural areas. If you look at the Deep South, a lot of those communities that are census-designated places (CDPs) are unincorporated, and when you are unincorporated, its contamination without representation. Contamination without representation may mean no infrastructure and no running water. They may be the place where they dump the landfill, or they build a corridor, or a highway over the church or the cemetery. They don't care about your living or about your dead either. This happens time

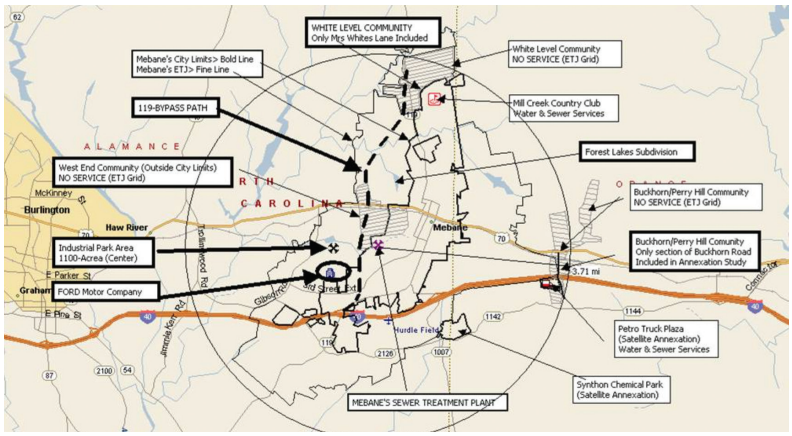


Figure 14. Location of WERA communities in relation to proposed 119 bypass, annexed locations, industrial locations, and sewage treatment plan in Mebane, NC. Shaded gray lines designate the location of different WERA communities in Mebane's Extraterritorial Jurisdiction (ETJ) , which means households in these communities have no sewer and no water services. Source: West End Revitalization Association (WERA).

and time again in parts of the South where communities have highways built right through them and are not connected to sewer or water lines. These are the typical kinds of features that you see in communities that are overburdened. The WERA Community Owned & Managed Research (COMR) Model is the gold standard of community-driven research. WERA created this community-driven research framework which focuses on equity in funding and parity in management. The goal is science for compliance, not just doing science for science's sake, but getting to real solutions and action. WERA was the first community group that submitted an administrative complaint in the country about the lack of basic amenities to the U.S. Department of Justice for violation of the Civil Rights Act of 1964 and the Environmental Justice Executive Order 12898 due to local and state government agencies having created conditions that adversely and disproportionately impacted Mebane's low-income and African American homeowners. They were not connected to sewer lines even though one of the WERA communities hosted a sewage treatment plant. **They hosted a sewage treatment plant but were not connected to the sewage line—that is environmental racism.** They were able to do their own research, collect water samples, and found high levels of biological contaminants above maximum contaminant levels like E. coli. They were able to use this data to block the highway temporarily. They moved it so it wouldn't destroy a couple of Black neighborhoods. We were able to get some residents first time installation of sewer water infrastructure, and get their roads paved for the first time. These are basic amenities, and this is an important issue in this country.

Our Work: Liberating People from Environmental Slavery

The Case of Curtis Bay

At the Center for Community Engagement, Environmental Justice, and Health (CEEJH), we do Inpowerment and liberation science. A lot of environment injustices are due to environmental racism. At CEEJH we address environmental racism and environmental slavery. **We are trying to liberate people from environmental slavery, from toxic trauma, and from sacrifice zones.** One of the communities we work in is Curtis Bay in Baltimore. The idea is that you have this community where ships come and bring goods to port. Vehicles take the good off the ships and put them on rail or big trucks. Then, take those goods to the warehouses. There are seaports, river ports, and airports. The big warehouses with the football field sized warehouses are dry ports. You have a big port environmental justice issue in Baltimore. They have a lot of major polluters. They have a coal fired power plant called the Wheelabrator Incinerator that releases a lot of air pollution. The median household income in the Baybrook area compared to the rest of Baltimore is similar, but lower when compared to the U.S. and to the rest of the state of Maryland indicates income disparities.

There are also health disparities in mortality when it comes to heart disease, lung cancer, and chronic lower respiratory disease especially when mortality rates in Baybrook are compared to other parts of Baltimore, and the state of Maryland. This is an environmental justice community with all these hazards. **Burden disparities leads to exposure disparities, which leads to risk disparities, which leads to health disparities.** Under the Emergency Planning Committee Right to Know Act (EPCRA), the Toxic Release Inventory mandates companies report their pollution emissions. This is self-reporting therefore, it's accurate to a certain degree. According to EPCRA, Curtis Bay (21226) was the most toxic zip code for a while in the country. The data (**Figure 15**) is old, but it's still one of the most toxic zip codes in the country because of all the pollutants produced by the facilities shown in **Figure 16**. If you live in this community, you are exposed to this pollution every day.

Year	Toxic Air Emissions		
	Rank	Percentile	Pounds
2005	7	99.93%	13,736,694
2006	9	99.91%	11,939,943
2007	1	99.99%	20,670,026
2008	1	99.99%	21,650,020
2009	2	99.98%	13,798,694
2010	75	98.96%	2,205,260
2011	73	99.00%	2,084,433

Rank is out of 8,949 zip codes in the U.S. (not counting territories)

Figure 15. Toxic air emissions reported to the Toxics Release Inventory in 21226 relative to other zip codes in the U.S. Source: Environmental Integrity

NO.	FACILITY NAME
1	BP PRODUCTS NORTH AMERICA INC CURTIS BAY TERMINAL
2	CITGO PETROLUEM CORP
3	CONSTELLATION - BRANDON SHORES STATION
4	CONSTELLATION - WAGNER STATION
5	CURTIS BAY ENERGY
6	ERACHEM COMILOG INCORPORATED
7	HESS CORP BALTIMORE TERMINAL
8	MOTIVA ENTERPRISES
9	QUARANTINE ROAD LANDFILL
10	SUNOCO PARTNERS MARKETING & TERMINALS LP BALTIMORE TERMINAL
11	US COAST GUARD YARD
12	US GYPSUM CO
13	W.R. GRACE - DAVISON CHEMICAL

Figure 16. Active facilities in Curtis Bay with major air permits. Source: Environmental Integrity

Figure 17. Destiny Watford (above, left) and Curtis Bay High School students, community activists and union members protesting construction of incinerator in their community. Source: CEEJH and Townson University

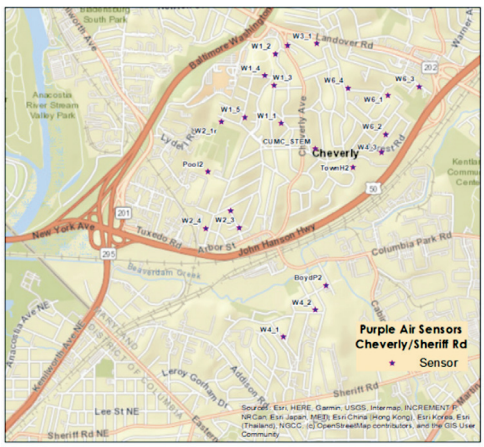
Our center did engagement with the community to talk about these issues by providing a health impact assessment. This is Destiny Watford (**Figure 17**), she was a high school student when the city and state approved the building of an incinerator near her high school. This is an environmental justice issue. The high school students at Benjamin Franklin, led by Destiny, organized a fight against this incinerator known as Energy Answers. They worked with partners like me, the Maryland Environmental Health Network, and Johns Hopkins to collect data and research to push back. This is an example of community science, citizen science, and activism coming together. Destiny won the Goldman Award for November 2016; it is the Nobel Peace Prize for environmental activism. They were able to stop the incinerator's construction. Currently, they've been pushing for a fair development movement. Instead of building the incinerator, they asked the site be used to build a solar farm. Instead of bringing pollution, and factories to these communities who have economic needs, they need to bring better options. It's **not only you get dumped on by the hazards, but you also get dumped on by bad options** to actually address the problem which creates more problems. Once they get one, you get two, you get three. Once you get three you get four, once you get four you get five. Your economic power equals your political power. But it's connected to race as well. **Environmental racism and environmental classism are what we're trying to fight against.** They have been fighting this in Baltimore and are still fighting against it. They won one battle, but they are still trying to win the war.

Figure 18 shows an example of a recent environmental issue in this community. Curtis Bay has a coal pile site that exploded in December 2021. In the bottom left corner of the photo there is a huge, tall mountain of coal. Wind blows it and it particularizes. We are talking about particulate matter. It's 10 microns, that is big enough you can sneeze out. It can fall out of the air onto your car, and it can contribute to smog, but it's the little stuff you breathe in. Curtis Bay has a huge coal pile that is not covered, and when the wind blows, people are breathing in this coal dust all of the time. Coal miners breathe in coal when they are mining for coal but people living near coal piles in Curtis Bay are also breathing in coal.

Figure 18. CSX coal pile explosion in Baltimore. Source: *Baltimore Sun*

The Cheverly Air Quality Monitoring Project

I do a lot of hyper local air quality monitoring. One of the reasons why we have COVID-19 disparities in communities of color is because of pollution. Think about it this way—you've been exposed to air pollution, particulate matter, volatile organic compounds, all the combustion byproducts, and gas emissions, but things like particulate matter are the ones most important for public health. Your lung, respiratory, and cardiac pulmonary capacity have been decreased, therefore, you are an easy target for COVID-19. This is one example of why you have disparities related to air pollution impacting various health outcomes including asthma, heart disease, and COVID-19. CEEJH works to build these hyper local air quality monitoring and get the data into hands of the people. One example is in Cheverly, Maryland. We are also doing this in several communities like Savannah, Georgia, in Charleston, and in Uniontown, Alabama. We are working with Kim Gaddy and folks in South Ward in Newark, New Jersey. With our work in Cheverly, we've been building a monitoring network using low-cost real time sensors to monitor PM levels in the areas of Cheverly, which is a very diverse neighborhood with highway pollution and some local facilities like warehousing.



Government monitors may not adequately capture local conditions.

We have partnered with the **Town of Cheverly** and **MDE** to develop a dense hyperlocal network of N = 23 PurpleAir PA-II | Fine Particulate Matter (PM2.5) Sensors.

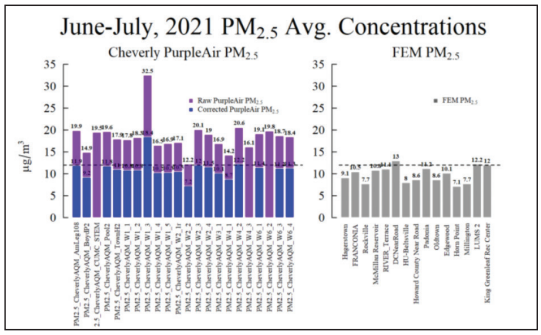
Student Involvement:

- Attending biweekly calls with the Cheverly Green Infrastructure Committee
- Helping with site visits logistics
- Performing data downloads, preliminary analyses, and other tasks as requested by the CAB

Figure 19. Location of PurpleAir sensors in Cheverly. Source: Maryland Department of Environment.

Recent MDE report for June-July 2021:

No significant differences in corrected $PM_{2.5}$ for Cheverly that exceed EPA standards. Residents still reported odor, smog, noise post-business hours, and irritation.



Next Steps:

- Generate a new report with longer time duration to assess seasonal differences, more data measurements
- Citizen science approach
  - — Future applications will include the use of Flow mobile monitoring and driving by stationary pollution sources with EVs

The PlumeLab Flow Sensor

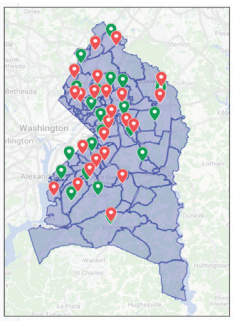
Figure 20. Cheverly Air Quality Monitoring Project.
Source: Maryland Department of Environment & Plume Lab.

This is the kind of data we get into the hands of people with **Figure 20** displaying examples from last year. One of our partners with this project is the Maryland Department of Environment (MDE). They have used some of our data for enhanced inspections in the area. The emissions were not above the national ambient air quality standards, but we did find a lot of idling. A lot of the trucks associated with local industries were idling. What happens is if you are burning diesel? Let me tell you about diesel. They are burning diesel which leads to combustion byproducts like black carbon. Short term exposure to diesel exhaust in kids can impact their coordination, concentration, and focus. It is very important for school buses, and we should all be advocating for all these to be electrified. Kids should not be riding buses that burn diesel. But getting back to this point, if you have any big trucks burning diesel, their emissions impact the air quality. These pollutants will have the same impact on human health that particulate matter does. We're trying to work with the industry to do some electrification. It has been great to have MDE as a partner to use the data and work with the community to get to action. Future work in the community includes having people wear personal sensors. Plume Lab has a sensor called Flow that can measure nitrogen dioxide and VOCs. VOCs is the new car smell. Whenever you get a new car, hold your breath. You shouldn't be breathing that in because those are volatile compounds like benzene, ethylene, toluene, xylene, among others.

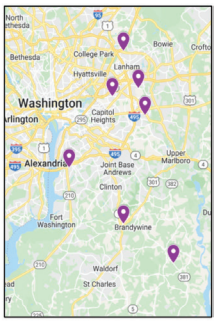
Prince George and St. Mary's County: Expanding Purple Air Network

We are expanding our work beyond Cheverly to build a network across Prince George's County's local schools. We have also done work with St. Mary's County health department to help them build their air quality monitoring initiative called BreatheWell. They have a network of 77 purple air sensors across the county to collect data on air quality and also are doing some mobile monitoring. This started because they were worried about kids with asthma who could have an asthma attack while home during the pandemic and with limited access to healthcare. **This is an important way to understand what people have been exposed to and then use the data as part of decision support tools to make some interventions and policy changes.**

Prince George's County Initiative



Map of potential schools in the county to host sensors



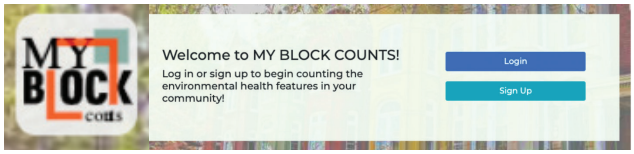
Map of current schools in the county hosting sensors

- Expand the existing Purple Air network in Maryland to high schools in Prince George's County
- Collect **real-time data** on **particulate matter** (PM) levels
- Throughout the project, community members, teachers, and students will be **trained** on air emissions **data collection**, **analysis**, and interpretation to build capacity for advocacy
- **Developing educational activities** exploring sources of air pollution, how to monitor air quality, and impact on health for middle and high school classrooms
- **Students** have contributed to the **development of outreach materials**, **guides** for host monitors at the schools, and participated in **site visits** to schools to install the Purple Air monitors

Figure 21. Prince George's County Initiative. Source: CEEJH.

Tools for Environmental Justice

Getting back to Inpowerment science and how we can get tools to the hands of the people. We are building an app called **My Block Counts**. It should be released next month but we have a backdoor version that you can use in the meantime. The idea is for folks to be able measure their own environmental quality. This relates to the term, Salutogenesis, taking a count of salutogenic features and pathogenic features, including local social, economic, built, and ecologic features. The categories include stores, industry, physical disorders, etc. You can use the app to count and map the features. This information can be used as part of local decision support tools.



https://myblockcounts.herokuapp.com/

A tool that allows community members of all ages, abilities, and skills to conduct a detailed scan of their neighborhoods and to identify and document different conditions in the natural and built environment.

Uses Community-based Participatory Research a "collaborative, community-based approach to research that equitably involves community members and organizations in all aspects of the research process" to support the review and assessment of a neighborhood.

Figure 22. Community Block Assessment Tool/App. Source: CEEJH.

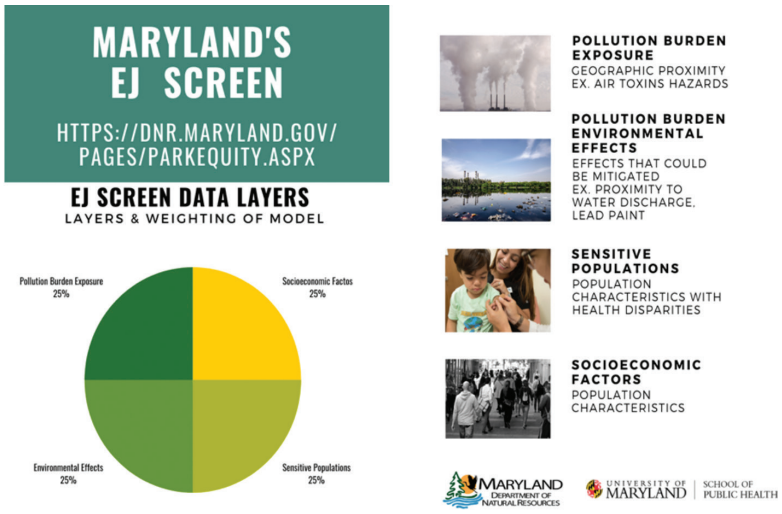


Figure 23. Maryland's Environmental Justice Screen App and factors and exposures used to create score. Source: Maryland's EJ Screen

We are also using geographic information systems (GIS) to develop a lot of environmental justice mapping and screening tools. There are many mapping tools that have been developed. For instance, California has a tool called CalEnviroScreen and the EPA has EJScreen. New York, Colorado, Illinois, Minnesota, Michigan, New Jersey, and Virginia have screening tools, too. These screening tools exist mostly on the coasts, with some in the Midwest and none in the deep South. There are teams working to developing screening tools for states in the South. The idea is that you can map out where environmental justice is by identifying, prioritizing, and micro-targeting communities for interventions. It could be infrastructure dollars or public health interventions. A mapping tool we developed is Maryland's EJ Screen tool (**Figure 23**). It gives you a score and you get an EJ (environmental justice) score at the (census) tract level. We are updating the tool so we can get an EJ score at the block group level, the block level, the legislative district level, and at the school district level. We are also updating the tool by bringing in real-time air quality data, satellite data, and segregation data. We are also adding new domains to the tool including a climate change domain and changing the sensitive populations domain to a health domain. It's going to be great. It should be out later in the summer as well. We have a corporate partner called ACLIMA, and they are doing mobile-based monitoring and groundbreaking cumulative impacts mapping. I want to give a shout out to them because they are also trying to get these innovative tools into the hands of the people that are seeking action. Thank you.

Question and Answer

QUESTION 1: Our first question comes from a colleague from South Africa. This participant noted an interesting take on racism and health. All attempts to close the gap of ensuring effective response to social determinants of health are deterred by grief, inefficiencies, corruption, and no political will. ***Wondering how as health leaders, we can advocate in a way that we can see impact?***

Sacoby Wilson: That's a powerful question. Even with the progress we've made in the United States, we have some apathy as well with the current political divide in our country. Working in a coalition and social movements is very important. We have to bridge across all social movements because it's the same system of oppression that a lot of people are dealing with, whether it be issues around reproductive rights in the U.S. and other parts of the world. For example, we have the reproductive justice movement, and the LGBTQ+ movement. We must connect the movements together because it's the same system of oppression we're fighting against. **We must bridge across the social movements and work through coalitions.**

QUESTION 2: ***Are there any research collaboratives on environmental justice you would recommend for health centers to join, to help with their efforts?***

That's a great question. In the U.S. context there are several centers working on environmental health disparities and environmental justice located at Harvard, John Hopkins, University of New Mexico, and the University of Southern California (USC). A natural opportunity would be the National Institute of Minority Health and Health Disparities through the National Institutes of Health. They funded some of the centers that I mentioned. You have my center, CEEJH, one of the oldest environmental justice programs with Dr. Mohai in Michigan. Dr. Beverly Wright has the Deep South Center for Environmental Justice and Dr. Robert Bullard has the Center for Environmental and Climate Justice at Texas Southern. Some of the new foundations are stepping up and funding environmental justice work. Some examples are the Bezos Earth Fund, Kresge Foundation, Robert Wood Johnson Foundation, and the Packard Foundation. Funded projects including collaborations through some of these foundations is an opportunity to find partners to engage with.

QUESTION 3: ***Can you please comment on the potential of implementation science to help us move beyond simply calculating disparity?***

I really think implementation science is important, and sometimes it's driven by having the right resources. And so, let me just say this, in a way that that makes sense. Our research enterprise is part of a research industrial complex, I'll just frame it that way. I think we have to advocate, push and have lobbying. Lobbying for more funding for implementation science, more funding for application science. I think NIH has been one of the leaders in that regard, because of the funding they provide, we need to lobby NIH for more consistent implementation science funding. We also need to push on Congress, particularly President Biden has these racial equity executive orders. I think it's an opportunity to kind of leverage that and say we didn't see racial equity, how we are addressing health equity, and we see implementation science as a way forward. I will also say when it comes to the schools of public health, we must value implementation science in our tenure and promotion process. When it comes to schools of public health we have to value communication research more, CBPR, and health promotion because that to me is part of implementation science. We must value environmental literacy and critical literacy approaches when it comes to implementation science.

QUESTION 4: I'm a nurse practitioner and educator, I teach in the university setting. We're not teaching nurse practitioner students this content and how to be prepared for their practice when they graduate. ***Could Dr. Wilson suggest a textbook or readings, that I can assign to my nurse practitioner students to read, so we have these conversations and assist nurse practitioners to be better prepared for how to practice?***

Great question. I was part of the conversation over the last couple years to bring population health to medical sciences. That's been a big thing, and I always joke, where have you been? We've been doing this for 20-25 years in public health. Great to have you on board now. We've also discussed bringing more environmental health and climate change into medical training. I don't have a specific textbook but one book that may be relevant is the *Routledge Handbook of Environmental Justice*. This will be a good place to start if you want to get a lot of environmental justice content. There's also a lot of books by environmental justice scholars. Dr. Bullard has about 25 books, he says it's all one book but different chapters of the same book. I think that's probably the best way. I would also say there is a group of folks with the schools of public health who were trying to engage medical school curriculum developers to see more cross pollination and cross collaboration. We must understand, bring context of the patient population into your care is important. We have to do more than making sure folks in nursing, and doctors receive training in and graduate with public health degrees. I would say the School of Nursing in Baltimore has an Environmental Health Nursing program. Adapting elements from our environmental health programs to other fields such as nursing is a good way to connect the dots.

QUESTION 5: Thank you for your presentation, it's embarrassing how agencies which have the mission to protect the environment and health have failed so many communities. ***My question is one of concern, how much of all this damage is reversible?***

Well, I think that's a tough question, I think there are some ways. I was recently quoted in an article about New Jersey Department of Environmental Protection suing companies who contaminated groundwater supplies in communities of color in New Jersey. It will take around 30-40 years for those groundwater supplies to recover. That's not irreversible, but think about the people, particularly people who are using the groundwater which is polluted. We must have clean water, and you have a lot of parts of the country where our natural resources have been irreversibly damaged or close to it. There's a lot of work that needs to be done.

On the climate change front, I know many of you've heard about the doom and gloom around climate change, and we have increased temperatures and sea level rising, etc. Those things are happening, but I don't think doom and gloom will work for the communities I work in because they are already in survival mode. People are dying right now, as we talk about environmental pollution, they are being poisoned. We need to come up with a different framework. Understanding what the impacts are but having a frame where we want to focus on solutions and creating opportunity where we can. As the Pope would say, "the earth is our common home". What can we do to work together to save our common home and save our brothers and sisters who are living in areas that are dealing with you know these impacts that we're talking about.

QUESTION 6: ***For health centers or Federally Qualified Health Centers (FQHCs) in the United States, what should be their role in addressing environmental justice, what are the kinds of questions they should be asking given that environmental justice affects the health disparities that they're observing?***

I would say that Federally Qualified Health Centers and health centers in general are an important part of the infrastructure. I did a study several years ago published in *Environmental Health* where we discussed the double disparity, how some communities are overburdened by hazards and don't have access to healthcare infrastructure. We have to make sure the healthcare infrastructure exists in the places we have identified with environmental justice issues. One of the groups I work with, Center for Families, works with 20,000 Latinx families in the D.C. area including Prince George's County. We have to make sure FQHCs are working with those type of groups because a lot of communities they are working with are hard to reach populations. These may be linguistically isolated,

with English proficiency issues, and we must make sure the centers know their populations, who is coming to their center, know where they live, so they can integrate these tools into the services that they provide. Think about a needs assessment. How can you use My Block Counts in a needs assessment? How can you use the mapping tool and photovoice as part of your needs assessment? Really analyze the environmental, built and social contexts of the patient population. If you can do a better job understanding these contexts, then work with partners to get the resources and interventions into these communities and populations. I think it is an opportunity for the health centers. Also working more with your local partners, whether it be research partners, the health department, academic partners, coalitions and advocacy groups that are engaged with these populations. I think FQHCs have an important role to play and just making sure again, as you work with these partnerships, you are pushing on the politicians to make sure to get the dollars that are needed, for example, the infrastructure dollars. There's a lot of stuff around environmental justice that can be addressed in the new infrastructure bill. How are you engaged to make sure those dollars are coming down or if there are dollars related to racial equity, health equity whether it be for Medicaid, Medicare, SNAP, CHIP; that you all are saying, "Hey, our communities are impacted by environmental justice issues, we want to make sure we activate these dollars, these buckets of dollars." **Making sure we're getting those economic, social, health, and environmental benefits that our patient populations, and the folks we serve, deserve.**

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For More Information

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