CLIMATE CHANGE, PART II: THE PUBLIC HEALTH EFFECTS

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BEFORE THE

SUBCOMMITTEE ON ENVIRONMENT

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COMMITTEE ON OVERSIGHT AND REFORM

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C O N T E N T S

INDEX OF DOCUMENTS

The documents entered into the public record during this hearing are listed below, and are available at: https://docs.house.gov.

CLIMATE CHANGE, PART II: THE PUBLIC HEALTH EFFECTS

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENVIRONMENT,
Committee on Oversight and Reform,
WASHINGTON, D.C.

The subcommittee met, pursuant to notice, at 2:17 p.m., in room 2154, Rayburn House Office Building, Hon. Harley Rouda (chairman of the subcommittee) presiding.

Present: Representatives Rouda, Hill, Tlaib, Krishnamoorthi, Gomez, Ocasio-Cortez, Comer, Gibbs, and Higgins.

Mr. ROUDA. The subcommittee will come to order. Without objection, the chair is authorized to declare a recess of the committee at any time. This subcommittee is convened, the second in a series of hearings on climate change to consider the public health effects.

I now recognize myself for five minutes to give an opening statement.

Good afternoon. This hearing, as I mentioned, is the second of a series of hearings on climate change that the Committee on Oversight and Reform Subcommittee on Environmental plans to hold during the 116th Congress.

In this subcommittee's previous hearing, our esteemed witnesses helped us examine the history of a consensus surrounding climate change based on overwhelming scientific evidence, previous industry knowledge and action, and the need to transcend partisan politics to address this most important issue.

That hearing focused on the past. Today we will concentrate on the current impacts that global warming is already having on the health of everyday Americans.

According to the National Aeronautics and Space Administration and the National Oceanic and Atmospheric Administration, 18 of the 19 warmest years on record have occurred since 2001, with predictions that 2019 will join this list.

Cities throughout the United States are suffering from increased ground level ozone caused by increasing temperatures and continued high levels of particle pollution, which have been linked to activities such as the burning of fossil fuels and wildfires.

Last week, the American Lung Association released its 20th annual State of the Air report. According to this year's report, more than 141 million Americans—or, put in other words, four out of 10 of us—live in counties with unhealthy levels of ozone and/or particle pollution. This is an over 7 million person jump since last year's report.

Excessive heat drives the formation of the dangerous smog and soot referenced in the report and exacerbates the conditions like asthma, lung cancer, cardiovascular diseases, and, in some cases, leads to death.

Among the report's list of U.S. cities where breathing air is most dangerous to human health, my home state of California dominates the list. In the wake of recent wildfires, my fellow Californians have faced air pollution levels that exceed those in cities in China and India.

And it is not just about California. In the last 11 years, nearly 80 million acres have been consumed by wildfire. This is an area greater than the state of North Carolina. States including Montana, Kansas, Oklahoma, Washington, Arizona, Colorado, Nevada, New Mexico, South Carolina, and Utah have all faced extremely destructive wildfires in recent years.

I'm concerned that if we do not act now our children and grandchildren will be forced to grapple with toxic air quality far worse than what we are exposed to now.

Global warming also significantly alters the geographic range of disease-carrying insects and pests, therefore exposing an increasing number of people globally and within the United States to vector-borne diseases, including Zika virus, malaria, Lyme disease, and others.

It's also extremely important to note that the burden of these impacts is not evenly shared. According to the University of California study from 2009, climate change does not affect everyone equally. People of color and the poor are most at risk. Low income urban neighborhoods, communities of color, and the elderly are particularly vulnerable to increased frequency of high temperatures and heat waves. Buildings in urban areas absorb and poorly dissipate the heat, adequate air conditioning is expensive, and access to transportation to facilitate movement to cooler areas is lacking.

Other vulnerable populations, such as children, seniors, and women, are also already facing and will continue to face the negative brunt of continued inaction.

Instead of acting in the public interest to address these serious health effects, the Trump administration's proposed rollbacks seek to weaken and gut protections for clean air and clean water and places landmark environmental legislation enacted to reduce air pollution in the crosshairs.

It is estimated that the Trump administration's attack on the Obama Administration's Clean Power Plan, legally justified under the Clean Air Act, would result in up to 1,630 additional premature deaths and 140,000 missed school days by children by 2030.

These aren't my numbers. These are the Trump administration's own estimates that they released alongside their rollback proposal of this plan.

Additionally, the current administration's reopening of the national Clean Car Standards, a determination that lacks reasoned analysis and fails to offer reasoned explanation, has already been met with legal challenges from a coalition of 18 state attorneys general from states including California, New York, Illinois, Iowa, Virginia, and Maryland.

In fact, these rollbacks have even been opposed by the auto industry. American companies like General Motors and Ford Motors are saying the Trump administration is wrong on this.

These rollbacks are not in the public's best interest. Instead these actions help create a world that is increasingly less safe for all Americans.

This is not a hypothetical conversation. This is not a false narrative. Climate change has direct and indirect effects on human health, and these health effects are already being felt across the United States. These effects are real now and require action.

Today, we are joined by Dr. Aaron Bernstein, Dr. Bernard Goldstein, Dr. Karen DeSalvo, and Dr. Cheryl Holder, who have all spent time in their respective roles studying the impacts of climate change on public health, the various effects that are already being felt in communities across our country, and they can speak to the role that the Federal Government should play in responding to this serious set of challenges.

We also have Dr. Caleb Rossiter with us today whose thoughts the subcommittees looks forward to hearing.

I appreciate the attention each individual on this panel has given to this critical issue that impacts all our lives.

Thank you very much.

And I now invite my colleague, the subcommittee's ranking member, Mr. Comer, to give a five-minute opening statement.

Mr. COMER. Thank you, Chairman Rouda, for holding this hearing.

Thank you also to our panel of witnesses for taking time out of your busy lives to join us for this important discussion about public health. I know that we all agree about the importance of promoting sound health policies for the benefit of our constituents. I look forward to hearing from all of you all.

The Fifth Assessment Report from the U.N.'s International Panel on Climate Change projects with varying degrees of confidence several climate-related health impacts over the course of the 21st century. The extent of these impacts will depend on how much warming eventually occurs, which remains uncertain. But it seems clear that any health impacts will affect poorer populations in developing countries with low income the most.

At the same time, the U.N.'s IPCC states that, quote, "The most effective vulnerability reduction measures for health in the near term are programs that implement and improve basic public health measures, such as provision of clean water and sanitation, secure essential healthcare, including vaccination and child health services, increased capacity for disaster preparedness and response, and alleviate poverty," unquote.

The conversation we are having today is an important one, Mr. Chairman, because it appears that many of the solutions proposed to address climate change, like the Green New Deal, would have a detrimental impact on the ability of poorer nations to develop the types of programs that the U.N. says are most effective to address public health.

I fear that a premature move away from fossil fuels, particularly for poorer areas and nations, means that they will continue to have little access to the type of cheap, reliable energy that enables eco-

nomic growth and allows for the provision of clean water and sanitation, widespread vaccination, and preventative child health services.

As I have said before, coal mining is a way of life in many parts of America, including my district. Kentucky coal remains an important component of the Commonwealth's economy and America's energy portfolio. Kentucky was the fourth highest coal producer in the U.S. in 2016, mining 43 million tons of coal.

In that same year, coal mines directly employed more than 6,600 Kentuckians, most of whom reside in my district, and mining directly contributed billions of dollars to Kentucky's economy. Both the first and second largest coal counties in Kentucky, Union and Ohio Counties, are in my congressional district.

Economic well-being is a leading indicator of health, the likelihood of disease, and premature death. And so I'm incredibly concerned about any proposal that would impact or eliminate this economic engine from my district and the Commonwealth of Kentucky.

My concerns are not limited to my constituents or the United States, however. Inexpensive, accessible energy has led to technological, medical, and other advances that have driven the American economy and increased U.S. life expectancy.

Of course, we still have work to do to make sure that those public health advancements are shared by all of society, including our most vulnerable citizens, such as the elderly and the poor. But I'm also concerned for populations in developing Nations, those where the majority of people still do not have electricity in their homes.

I am eager to hear from our witnesses how we determine the right balance.

On the one hand, there is a push to promote policies to address climate change that put obstacles in the way of access to cheap, reliable energy.

On the other hand, we want to promote policies that expand basic lifesaving health services, like clean water and sanitation, to the poorest populations in the world.

Those policies are most easily and quickly achieved with access to inexpensive fossil fuel energy that, by all accounts, will remain significant sources of worldwide energy for many years to come.

As I said, Mr. Chairman, these are important questions, and I thank you again for holding this hearing and for our witnesses being here today.

Thank you, and I yield back.

Mr. ROUDA. Thank you.

Now I want to welcome our witnesses. Karen DeSalvo, M.D., professor of medicine and population health at the Dell Medical School of the University of Texas at Austin. Bernard D. Goldstein, M.D., professor emeritus, environmental and occupational health, Graduate School of Public Health of the University of Pittsburgh. Aaron Bernstein, M.D., co-director of the Center for Climate, Health and the Global Environment at the T.H. Chan School of Public Health, Harvard University. Cheryl L. Holder, M.D., associate professor and co-chair of Florida Clinicians for Climate Action, Herbert Wertheim College of Medicine, Florida International University. And Caleb Rossiter, Ph.D., executive director of the CO2 Coalition.

Please stand and raise your right hands, and I'll begin swearing you in.

Do you swear or affirm that the testimony you are about to give is the truth, the whole truth, and nothing but the truth, so help you God?

Thank you. Please be seated.

Let the record show that the witnesses answered in the affirmative.

The microphones are sensitive, so please speak directly into them after you've turned the power on in front of you. And without objection, your written statement will be made a part of the record.

With that, Dr. DeSalvo, you now are recognized to give an oral presentation of your testimony.

STATEMENT OF KAREN DESALVO, M.D., PROFESSOR OF MEDICINE AND POPULATION HEALTH, DELL MEDICAL SCHOOL, THE UNIVERSITY OF TEXAS AT AUSTIN

Dr. DESALVO. Thank you, and good afternoon, Chairman Rouda and Ranking Member Comer and distinguished members of the subcommittee. Thank you for the opportunity to testify on the important topic of protecting the public's health.

My message to the committee focuses on three areas to build more resiliency in the face of extreme weather and climate change. These efforts will strengthen our community's ability to withstand, adapt, and recover.

First, we should strengthen our public health infrastructure to support a shift from responding to crisis to building capacity. Second, we should set higher expectations for the healthcare system to support their patients and be better stewards of resources. And third, encourage partnership between public health and healthcare, especially in models that leverage data and technology.

My recommendations are borne mostly from my experiences as a doctor and a public health official in New Orleans, a place that is no stranger to extreme weather events. I want to share a story today not from my time in Hurricane Katrina, but rather a more recent one, one that could happen almost any day, any place in America from an extreme weather event.

It happened after Hurricane Isaac made landfall in 2012. And though New Orleans had not flooded, we did have a widespread power outage. Once the major systems like hospital had power restored, we turned our attention to restoration for the rest of the community. And we had heard that there were seniors across the city struggling in the summer heat and wanted to provide help to those most in need, particularly those who could be electricity dependent, like those on oxygen.

In the absence of good data to drive our efforts, I had to resort to going door to door to door, mostly in highrises that were subsidized housing, to assess the need to inform prioritizing power restoration based upon who we saw. It was a heartbreaking view that I got as I went in those many apartments of social isolation, physical isolation, food insecurity, many challenges, particularly for the seniors that we visited.

This inefficient process spurred us to want to have a more proactive solution. So we worked with HHS to leverage Medicare

data to more efficiently identify community members who are electricity dependent in an effort called emPOWER. It's now scaled nationwide by HHS to help public health in disaster response, like the one I described, but also to support resiliency.

It's now nearly 14 years since Hurricane Katrina passed, and in those years the Nation has really made remarkable advances in our ability to respond to and recover from extreme weather events of all kinds. The performance of the public health and healthcare systems to extreme weather events like Hurricane Harvey or the California wildfires highlight our improvements but remind us that there are important areas where we can and should do more, especially for the most vulnerable in our community.

First, the public health infrastructure needs strengthening to meet the rising health challenges of our Nation. In addition to addressing epidemics like those from opioids, public health also has an obligation to protect the public from health challenges arising from climate change. For example, they will need to continuously assess projected health burden from extreme weather events.

To do their job, the public health infrastructure needs flexible, sustainable, and enhanced funding. The annual outlay for public health infrastructure is anticipated to be $32 a person annually. Based on our current national investment from Federal and local dollars, there remains a $13 per person gap in annual spending to provide adequate public health infrastructure to assure that all people in America have the public health protection they should expect.

Second, healthcare systems have a responsibility to their patients in the face of climate-related disasters, and moving toward population-level care management and payment models will help with that accountability, especially if these models address all needs, including mental health.

Healthcare also has a responsibility to become more climate adaptive and reduce the healthcare sector's carbon footprint in keeping with recommendations from Healthcare Without Harm and those from the National Institute for Environmental Health Sciences. Though the private sector has been taking action, the committee could ask CMS to strengthen the expectation of building an adaptive and resilient healthcare infrastructure by making it a requirement in the CMS emergency preparedness rule.

And third, strong partnerships between public health and healthcare are essential, particularly those that strive to be more efficient and effective by leveraging 21st century tools like data and technology in the way that we did in the work of emPOWER.

A great example of this is AIR Louisville, a collaboration that used geotracker devices to follow the use of asthma inhalers by frequency and by place. The information guided the care plan for the healthcare system for those patients, but also enabled public health to do targeted efforts to increase tree coverage, to identify alternate truck routes for reducing emissions, and to ultimately lead to improved health outcomes and lower cost for citizens.

The CDC Climate and Health Program could be used if it were resourced better to develop more models like emPOWER that could be scaled across the country and implemented on the front lines to support resiliency or like Louisville AIR.

Thank you again for raising the profile of the need to better protect Americans from the public health impacts of climate change and extreme weather events. I look forward to your questions.

Mr. ROUDA. Thank you, Dr. DeSalvo.

Dr. Goldstein.

STATEMENT OF BERNARD D. GOLDSTEIN, M.D., PROFESSOR EMERITUS, ENVIRONMENTAL AND OCCUPATIONAL HEALTH, GRADUATE SCHOOL OF PUBLIC HEALTH, UNIVERSITY OF PITTSBURGH

Dr. GOLDSTEIN. Chairman Rouda, Ranking Member Comer, distinguished members of the committee, thank you for choosing the highly important but often neglected issue of the public health implications of global climate change.

We cannot expect the public to endorse significant action based upon parts per million of carbon dioxide. A major answer to the public's appropriate "so what?" question is health impact.

In the framework of public health, primary prevention is defined as totally avoiding the problem. Secondary prevention is early detection and change in habits to avoid the consequences. And tertiary prevention is lessening of the already occurring medical problem.

It would take a textbook to describe all of the adverse public health implications of global climate change. Let me start with a simple undramatic effect that shows how climate change and public health are intertwined.

Forty-eight million Americans are affected by food poisoning yearly; 3,000 die. Food poisoning is more common in summer, because bacteria growth is dependent upon temperature. The higher it is, the worse it will be.

Heat itself directly causes illness and death. Air pollution will increase. Ozone causes summertime asthma attacks in children. Coal causes particulate pollution responsible for cardiorespiratory disease and premature mortality. Another source of particle is related to global climate change as far as fires, as you said, sir.

Intensifying weather disasters include the force and reach of hurricane winds and floods. The predicted dry conditions with intermittent and heavy rains will result in wildfires, droughts, floods, stress on water resources resorts, and major impacts on agriculture.

Surprises will occur. Unexpected contamination of our corn crop with aflatoxin, which a cause of liver cancer in topical countries, occurred in 2012 under weather conditions that mimic what can be expected of climate change. The cost was estimated to be upwards of a billion dollars.

Particularly at risk are disadvantaged populations. I have worked on improving federally Qualified Health Centers that have treated such populations located in our areas of our southern states affected by hurricanes and by the Deepwater Horizon oil spill. These clinics will require more support.

What can Congress do? Bipartisan support for primary prevention approaches has occurred in the past. The Montreal Protocol to replace CFCs was passed unanimously by the U.S. Senate.

Many who erroneously claim that humans are not primarily responsible for global climate change seem to now agree that global climate change is occurring. Or whenever its cause, it is thoughtless not to be preventive in dealing with its consequences, particularly as there is nothing we can do about alleged causation by sun spots or a wobbly Earth.

A bipartisan approach occurred in the last Congress on what is perhaps the greatest threat to public health, that of war, and particularly in our nuclear era. An attempt to remove funding for the global climate change program from the Defense Authorization Act was defeated because over 40 Republicans joined with Democrats to retain this program. Our military gets it.

There's also bipartisan support for the rebuilding of American infrastructure. Congress needs to consider global climate change in this bill.

Strong bipartisan support exists for STEM education. We need more Americans who understand science who will recognize that having the five hottest years on record in a row is more meaningful than the quibbles raised by climate deniers.

Importantly, global climate change is worthy of both a comprehensive approach that includes nuclear power and recognizes the forcing role of population growth. It also should have a situation in which basically every congressional act is looked at through the lens of global climate change if it's pertinent.

For primary prevention, we need to accelerate the reduction of greenhouse gasses, we need to do it as soon as possible, and we need to recognize that, with only five percent of the world's population, the United States cannot do it alone.

With all due respect, to respond to Ranking Member Comer's important point about balance, the Paris Agreement was about balance.

I end with a lesson from an old fable. We all know about the three little pigs sent out to the world after being warned about a big bad wolf. We also know what happened to the two pigs who dallied, one building a house of straw, another a house of twigs. The survivor was the pig who took the warning seriously and whose foresight and hard work protected the pig's home.

Well, that's a form of secondary prevention. But we also need primary prevention. Before its huffing and puffing blows our house down, we have to kill that wolf.

Thank you.

Mr. ROUDA. Thank you, Doctor.

Dr. Bernstein.

STATEMENT OF AARON BERNSTEIN, M.D., CO-DIRECTOR OF THE CENTER FOR CLIMATE, HEALTH AND THE GLOBAL ENVIRONMENT, T.H. CHAN SCHOOL OF PUBLIC HEALTH, HARVARD UNIVERSITY

Dr. BERNSTEIN. Chairman Rouda, Ranking Member Comer, members of the subcommittee, I'm delighted to be here this afternoon to speak with you about climate change and health. I should mention at the outset that I'm a practicing pediatrician at Boston Children's, and my primary responsibility is the care of children.

As a doctor, I have cared for children with asthma whose lungs have been so damaged by contaminated air that they were scarcely able to breathe. I have sat with parents whose children had Lyme disease as they worried about whether their child's half-paralyzed face will ever get better. I have cared for children who no longer had a will to live, having survived floods that at once washed away their homes and their peace of mind. And I have held in my own arms infants whose brains were deformed by Zika virus whose prospects of living a healthy life vanished before they were even born.

What ties all these experiences together, I am sorry to say to those communities in this country who depend upon fossil fuels, that it is our reliance on fossil fuels, which, when it is extracted from the earth and burned, damage our children's health through climate change and through the air and water pollution they produce.

You as Members of Congress have a choice. You can choose to continue to support policies such as the $20.5 billion of taxpayer money given by Congress to the fossil fuel industry each year that enable our current heavy and disabling reliance on fossil fuels and allow more children to struggle to breathe, more children to contract disabling and fear-stoking infections, and more children to live in a world that is increasingly unpredictable and unstable. Or you can choose to lead, as so many cities, states, and countries have begun to do, and create a healthier, more just, and sustainable path.

I will share facts in my testimony that demonstrate how replacing fossil energy with cleaner sources has immediate and local health benefits which can lessen health epidemics that are foreclosing on our children's health and futures right now.

We are already approaching an expenditure of nearly a trillion dollars on the three disease categories I will mention today: asthma, obesity, and mental health disorders.

Let me begin by talking about asthma. One in 10 children in the United States carries a diagnosis of asthma. Asthma afflicts substantially more children who are poor or African American. One in five children who are newly diagnosed in the United States with asthma received that diagnosis because they breathed air that has been polluted by fossil fuels.

Burning gasoline and other fossil fuels, as you've heard from Dr. Goldstein, produces the building blocks of ozone air pollution or smog. For an athlete, breathing ozone is the difference between victory and defeat. For a child with asthma, it can be the difference between life and death.

Climate change has already made asthma more burdensome as higher temperatures spur ozone formation. Dealing with asthma costs the U.S. economy more than $80 billion each year.

Next, let's turn to obesity. One in five school-aged children in the United States are obese. Childhood obesity undermines health across the life span, making diabetes, bone diseases, heart disease, mental health disorders, and asthma, among others, all more likely.

The obesity epidemic in the United States is so extreme that this generation, this current generation of children that we all know,

may be the first in our Nation's history to live shorter lives than their parents.

And the expense of obesity to the U.S. economy and healthcare sector is staggering. At a cost of $190 billion a year, obesity alone saps one percent of GDP.

The good news is that when we choose to address climate change, we will also combat obesity. First, some of the same fossil fuel air pollutants that trigger asthma also influence obesity risk. Second, providing safe and accessible means for people to walk, bike, and use mass transit will help turn the tide on obesity. And third, eating diets rich in plant-based foods and with less red meat can prevent obesity and the diseases that accompany it.

And last, let us consider what is at stake for our children's minds. One in six children age 2 to 10 have a mental, behavioral, or developmental disorder such as autism or ADHD. One in five adolescents will be diagnosed with a serious mental illness. Since 2009, the number of adolescents and young adults with depression and suicidality has increased by more than 50 percent.

We can protect the developing brains of children and lessen the stresses of adolescence through our actions on climate. Particle matter, mercury, nitrogen dioxide, and poly aromatic hydrocarbons, all released when fossil fuels are burned, contribute to these conditions.

Some $200 billion per year is lost to our economy dealing with mental health disorders in youth in this country, among them neurodevelopment disorders. More than $150 billion are spent on dealing with ADHD itself.

We can do something about this. Planting trees and other vegetation can reduce urban heat, buffer air pollutants that contribute to neurodevelopmental and mental health disorders, and evidence increasingly shows directly prevent mental illness itself.

Some believe that climate action is too expensive. Considering the evidence that you've just heard regarding just a handful of diagnoses, as well as many studies that evaluated near term and localized health benefits of climate action for individual states and for our Nation, you now understand such arguments couldn't be further from the truth.

When the health value of climate actions are taken into account, time and again the benefits far outweigh the cost of transition.

This holds true, and perhaps especially so, in communities that were built on the fossil fuel industry. So I cannot underscore enough that any plan to decarbonize must plan for the welfare of the families and children in these communities where poverty is already too common and opportunity too scarce. We must not leave anyone behind.

In the end, as we come to realize the toll that climate change and the use of fossil fuel exacts on the health of our children today and how climate action can make them healthier today, and as we realize that we must choose to act on climate change to protect their world so that they and their children can continue to enjoy it as we have, as we realize that we cannot afford the health cost of inaction, our children are counting on you to do what's right. It's their lives and their futures that are at stake.

Thank you.

Mr. ROUDA. Thank you, Dr. Bernstein.
Dr. Holder.

STATEMENT OF CHERYL L. HOLDER, M.D., ASSOCIATE PROFESSOR AND CO-CHAIR OF FLORIDA CLINICIANS FOR CLIMATE ACTION, HERBERT WERTHEIM COLLEGE OF MEDICINE, FLORIDA INTERNATIONAL UNIVERSITY

Dr. HOLDER. Representative Rouda and other esteemed Members of Congress, I'm grateful for your invitation to testify this afternoon.

In the spring of 1980, I submitted my senior thesis to graduate from Princeton University, and I wrote about the importance of psychological factors in identifying the root causes of hypertension. In my research, I found that external circumstances, like poor living conditions, lack of control over life choices, exacerbated hypertension. One of the major takeaways from the research was that we cannot deny the impact of outside world on a person's health.

On another spring day today, a beautiful day, 39 years later, I sit before you all to explain why this remains the same. I arrived in Miami-Dade County in 1987, a National Health Service Corps Scholar, to serve the city's underserved population. I cared for its citizens as a physician primarily in all the publicly funded health centers across the county, from Opa-locka in the north, Liberty City in the center, to Homestead in the South.

Most of my patients were low income, underserved, Black or Hispanic. And as we know, for many reasons poor people are, better or worse, we could say they're the proverbial canary in the coal mine. In the early 1980's, we saw the increases in HIV, and by the end of the decade we were in the midst of a national emergency.

The pattern is repeated with substance abuse, obesity, early mortality for middle-aged men, and other health issues. We saw all this before in our poorer communities.

Today, I'm an associate professor, Department of Humanity, Health and Society at the Florida International University, Herbert Wertheim College of Medicine, a fellow of the American College of Physicians, and in 30 years of practice I still mainly treat people without insurance. And even now, again, we are seeing the same mistakes that caused millions to die before.

Twenty of the warmest years in recorded history have occurred in the last century, with the most recent five years being the hottest.

I want to share a story with you that I hope will make real what life is like for a family with small children trying to survive in multiple consecutive 100-degree days in homes with two rooms, one window, and no air conditioner.

My university, we do a home visit program we call Green Family Foundation NeighborhoodHELP, and with medical students and nursing students we went into this home in Little Haiti. It was June 2016. It was hot. When I opened the car door, I felt like the lifting of the lid on a grill when you were grilling some food and it was just left too long.

My students were so excited to meet the family, and she met us at the door wearing a lovely white tee-shirt, her hair pulled back. She was so proud to invite us in her very tidy, slate blue home.

We stepped in the front door, and instead of a couch, there's a double bed with a toddler sleeping quietly. She directed us to some chairs that were set out at the foot of the end of the bed but not quite in the kitchen. And this is where we would do our visit.

As we settled in, we found ourselves sort of breathing a little bit uncomfortable because the humidity and the hot air was a little bit hard to inhale. But the discomfort was short lived because we wanted to face and talk with her and her family. But we felt the sweat in our shirts, we felt the sweat dropping, the ink had dropped on the page because we were just sweating.

Despite our efforts, without AC, we could not hide our discomfort. She humbly got up and moved the fan from the baby and pointed toward us and offered us water. We said absolutely, no. We took the water, but leave the fan on the baby. We understood what was happening.

But luckily, another child brought us a fan from the bedroom, and we got some relief. We said nothing of the heat, and we continued to visit and wrapped up in about 30 minutes. We thanked her for hosting us, grateful to be leaving, but sad because we understand that they could not.

Heat affects mood, increases risk of dehydration, heart attacks. And you've heard my colleagues talk about all the different illnesses, and we all know it. People who lack air conditioning or spend time outdoors, like farm, construction workers, student athletes, are more exposed and at greater risk.

I have a 70-year-old woman who came to me with COPD because she could hardly breathe at night, and she was using her air conditioning and couldn't afford to pay the bill. And the allergy season had prolonged, and she couldn't buy her asthma medicines regularly, and she needed help. So she asked me to sign a form so she could get a break from her electric bill.

We've heard the statistics on asthma. Florida has over 2 million, and one in nine African American kids have asthma. My typical patients, African American, impacted proportionally from this.

The emotional toll is tremendous. My mom, who I treat who has Zika, is worried every day about the baby she delivered. And every time I see her, I remind that the baby is going to be fine, and we were going to make this, and she's going to be okay.

In 2016, I stayed silent. But now we are working together. George Mason University and the National Medical Association have evaluated physicians, and 88 percent of the doctors, the Black physicians, noted that we were seeing the impact of climate in our patients.

Last year, the Florida State Medical Association and George Mason came together to start the Florida Coalition for Climate Action. We want to increase the health literacy of our physicians. We want to help prepare our patients to adapt to the changing environment. We want this message to be taken across the elementary schools, the colleges, the medical schools, increase that curriculum and increase that knowledge.

Our patients want more. Our patients want what the richer patients have. They have clean air and good standard of living. How can we guarantee the same for our poor people? Why do they have to sacrifice for better lives by having worse health?

I'm grateful to you for me to bring these stories from the front lines of our Nation's capital. I hope you'll make the right choice this time to take action to make our communities, our cities, and our country healthful places to live, to raise our families for many generations to come.

Thank you.

Mr. ROUDA. Thank you, Dr. Holder.

Dr. Rossiter.

STATEMENT OF CALEB S. ROSSITER, PH.D., EXECUTIVE DIRECTOR, CO2 COALITION

Mr. ROSSITER. I have a slide show.

Thank you, Chairman Rouda and Ranking Member Comer. As a former congressional staffer, I'm honored to testify today.

I'm a climate statistician and the executive director of the CO2 Coalition of 46 climate scientists and energy economists. I ask that our recent white paper on this topic, "Climate Change and Health," and my full testimony be taken for the record.

Mr. ROUDA. So moved.

Mr. ROSSITER. We save the people of the planet from people who think they're saving the planet from an always predicted but never realized climate catastrophe. A 1999 U.N. report predicted, and I quote, "Entire nations could be wiped off the face of the Earth in 12 years." Sound familiar?

So far, CO2 emissions have had a positive and modest impact on Americans' health. Crop productivity is up by 15 to 30 percent because CO2 is a plant food. Weather mortality is down because CO2 is a warming gas and many more people die from cold snaps than increased heat. And the fracking revolution has saved many lives by making home heating cheaper.

But it's in Africa that fossil-fueled electricity is truly a matter of life and death. Only 25 percent of African homes has electricity. That explains much of why life expectancy in Africa is 20 years lower than the rest of the world.

If we could have the next slide.

As a statistics professor, I taught my students to beware of two Latin enemies of the truth: ad hominem, which is arguing about someone's credentials and paycheck rather than their data and analysis; and post hoc ergo propter hoc, which is claiming that correlation between two variables is causation.

Consider this Preston curve of life expectancy in a country as a function of its wealth or GDP per capita. Now, life is not bivariate. Many variables affect an outcome. But, of course, we human beings can only digest images in two dimensions.

So we often use graphs like these which imply a strong causal relationship but only when we're confident that removing the effect of other important variables would not change it.

This is one of those cases, this is one of the strongest findings in public health and social science: Being wealthy saves lives. You see that if Africa can move from all those dots at the sub-$1,000 per capita level just up to the $2,000 per capita level, millions of lives will be saved.

Reliable energy, reliable electricity, in turn, plays a huge role in getting wealthy and being healthy. Reliable energy means that Africans don't have to cook in heat with wood and animal dung dramatically, reducing lung and heart disease. It means that water can be purified for safe drinking, dramatically reducing the largest cause of infant mortality.

Next slide, please.

This is a typical rural African dwelling.

Next slide, please.

Inside it, people cook in heat with fuels that rob them of years of their lives.

Next slide, please.

This is the million-strong Cape Flats in South Africa. Under apartheid, this was dark. This is the great achievement of free South Africa, universal electricity and, as a result, clean water for all.

A grid of fossil-fueled electricity would not only eliminate deadly indoor air pollution, it would also end deadly outdoor pollution from the dieselization of Africa. Factories, hotels, offices, and wealthy homes fire up their generators when the daily brownouts and blackouts hit. Mr. Chairman, you wouldn't want to be within a mile of a diesel generator in Lagos, yet no square mile is without one.

But, of course, for all the benefits to wealth and health, what if fossil fuels and their carbon dioxide emissions really have led to climate catastrophe.

Now, science is the testing of hypotheses with data. The data are what country singer Porter Wagoner used to call the cold hard facts of life. Using only the IPCC's words and data, Professors Roger Pielke and Judith Curry prepared these coming slides showing the extreme weather and rate of sea level rise have not registered any statistically significant change during the recent period of warming that was partially induced by CO2.

Here are the cold hard facts of life from the IPCC. Rate of sea level rise, it says on there, no increase from when natural warming was the driver in the first half of the 20th century. Drought, no increase from that time.

Next slide, please.

Floods, no increase.

Next slide, please.

No trends in cyclones or hurricanes in North America.

So climate catastrophe may happen, and we need to maintain vigilant scientific inquiry, but it hasn't happened yet.

Last slide, please.

The IPCC, as the ranking member has said, says with, quote, "very high confidence" that the best ways to save lives are provide clean water, sanitation, vaccinate children, prepare for extreme weather, and help people get out of poverty.

We agree with the IPCC. We are part of that scientific consensus. But those solutions today are not possible without cheap, reliable energy.

At the moment, only fossil fuels can grow the food, drive the cars, dig the minerals, build the products, boost the economy, and provide preventive and care health for the sick, and that's good.

Thank you, Mr. Chairman.

Mr. ROUDA. Thank you.

I now recognize myself for five minutes of questions. And I'd like to start out with, again, thanking all the witnesses for coming today.

The goal of this hearing was to—we've got multiple phases. The first phase was the what we knew about climate change, when we knew it, and why we didn't do much about it, which we had that hearing a couple weeks ago.

The hearings we're having now in this phase, the present situation, is to address the human toll and the economic toll of climate change in the present. And many of you provided obvious statistics showing that there's a clear relevance into what we're seeing climate change's impact on the human toll.

And I'd like to start out with Dr. DeSalvo, because in California, in 2006, my home state had a 14-day heat wave where we saw about 36 million people directly affected, 16,000 emergency room visits, 152,000 outpatient visits, $5.4 billion in damage, and that was over 10 years ago.

So as we see this increase in wildfires, as we see increased abnormal storm patterns across the globe, do you see the impact of the cost, the embedded cost in healthcare continuing to increase?

Dr. DESALVO. I think, first of all, you raise a really important point, which is that the impacts of extreme weather events fall in many corners, not just on those that are trying to respond on the front line to the individuals, but there are actual costs associated with it in the healthcare system.

And the folks that are largely impacted by things like heat or wildfires are those who already have a lot of chronic conditions or are predisposed to needing medical care or are older seniors and have more challenges, and so the cost drivers there are likely to be higher anyway. So somebody with—a senior with heart failure and emphysema that needs to go to the emergency room because of the air quality from a wildfire is going to have additional added cost.

I think that anecdotally that's certainly been my experience as a doctor and in public health, that when there are events people who are sicker end up in the hospital. That's just sort of logical.

I think what we're going to need to learn in a more quantitative fashion as a country is what is the cost of the changing—of extreme weather events, of climate change, and how will that be impacting the healthcare budget that we have as a country, especially since a lot of it will fall on the public budget, Medicare and Medicaid.

And I think one thing the committee could do is work to get a shared set of facts that we would all understand and know about what the annual cost is of people presenting into the healthcare system because of events like wildfires.

Mr. ROUDA. And if you don't assume the incredibly small percentage of scientists out there who don't believe climate change is actually being caused by humankind and that if we focus just on the healthcare, Dr. Bernstein, just the fact if we had cleaner air, cleaner water due to using renewables versus fossil fuel, there is a clear impact, correct, in the cost of healthcare?

Dr. BERNSTEIN. Yes. I mean, we spend, as I alluded to in my testimony, hundreds of billions of dollars related to natural disasters.

I would like to set the record straight about Mr. Rossiter's testimony. As a physician, I have to look at all the facts and what Mr. Rossiter told you were some of the facts.

In his testimony, he did not mention heat waves. There's a very clear signal, which is robustly supported by IPCC with very high confidence, our own national climate assessment that heat waves are more common already because of climate change.

He also did not tell you that the best available science, which is recently published in the Proceedings of the National Academy of Sciences this past month, that research at Stanford shows that warming to date over the last 50 years, which is mostly because of emissions from the United States, has resulted in an economic loss to GDP of 24 to 27 percent of the world's poorest countries.

It's also true that 400,000 children in Africa die every year because of air pollution from burning both indoor fuels and outdoor fuels.

And I could go on, but I just want to be clear that what you heard does not reflect the full truth as regards to what science understands.

I might also add, with hurricanes, Hurricane Harvey, the best available science shows that climate change, the warming that has occurred already, increased the rainfall on Texas by 20 percent. And I could go on.

But there's absolutely clear evidence that climate change is influencing these disasters. I agree with him that it is not clear with droughts. Wildfires, I should add, there's compelling evidence that wildfire risk in places like California and the West has gone up by as much as 50 percent because of warming to date.

So the science on these issues is out there, folks. You have to look for it and recognize that not everyone may be giving all the facts.

Mr. ROUDA. Thank you.

Dr. HOLDER. Could I comment also?

Mr. ROUDA. Yes, please.

Dr. HOLDER. On the increase in the CO2, and he talks about increasing production, it does impact the trees, and that's where I see it. Because the allergy season is longer, the trees are flowering more. We're having more vibrant flowering of all trees, which then creates more asthma and more allergies. And then that causes a tremendous increase in cost, because that triggers all your allergic reactions and your asthma.

So directly the cost. And you can look at who gets asthma more in one country, in this country: Black folks who live more in polluted environments resulting from the fossil fuels. So the cost is already being borne by populations significantly.

But CO2 increase is increasing our flowering and worsening our allergies.

Mr. ROUDA. Thank you.

The chair now recognizes the ranking member, Mr. Comer, for five minutes.

Mr. COMER. Yes. Thank you, Mr. Chairman.

Dr. Rossiter, what are the best steps we could take right now to improve public health in poorer nations? Wouldn't you say that clean water and sanitation as well as increased capacity for dis-

aster preparedness and response are essential elements to be addressed when seeking to improve a nation's public health?

Mr. ROSSITER. I would say there are two major ways to increase life expectancy in Africa dramatically. That's the same as saying there's two major ways to reduce infant mortality dramatically. The chart that I showed you is life expectancy. If you saw a chart for infant mortality, it would just be reversed, meaning poor countries have very high infant mortality.

A typical African country is losing 80 children out of 1,000 before the first two years of life. The United States, we lose maybe 8 to 10. And then Sweden, it might be five, and you don't get much lower than that.

So I would say there are two major ways. One obviously is economic, and one is government action.

On the economic front, what's happened to China in the last 30 years clearly shows that the real driver of life expectancy is economic growth. China has engaged in a massive experiment using fossil fuels to boost its economy. They've moved to become a developed country from an underdeveloped country, and the life expectancy, on average, according to the World Bank, has gone from 55, like Africa is today, to 75.

So that's simply wealth, for two reasons. It gives you money to take care of your own family, to make your house air conditioned, to make your house safe to go take your children to the doctor. But it also gives your government more money to do things like infrastructure that can clean the water. So that's the second major thing I would say.

But the public sector, as we know, has a huge role to play in the United States. Malaria was eliminated in large part because of public health investments in the early 20th century trying to go for the sources of the mosquitos.

You have to have government action as well as private action. But, again, government action takes money. And governments need to have the funds from economic growth, the tax base.

In a sense, you know, South Africa, where I've been a professor and have worked much of my—much of my professional interest has been on South Africa, they made a deal at the end of apartheid, which is the whites got to keep the economy and the majority got to keep the government.

So the economy continued to grow and the tax revenues were provided to the government, and that's why you see nearly universal electricity and clean water, which is very rare in Africa, and it has tremendous impact on infant mortality.

So both economic growth and sound government health investment is how you get your dramatic reductions.

Mr. COMER. I want to ask you a question about coal, because a lot of the people that are leading the movement here with various different climate change proposals are very anti-coal. They always cite coal as a dead or dying industry.

In my district, we just opened a new coal mine this week. So on my Facebook site, the news article about it, really, now, this new coal company, the biggest payroll, best average wage in this rural county. I mean, it's a viable industry that's attacked daily by many on the other side of this issue.

My question to you is, can you explain the role that coal would play in helping more Americans escape poverty and maintain a higher state of health and well-being?

Mr. ROSSITER. Well, you're going to think I'm advertising for the natural gas industry, but let's have this discussion.

Obviously, inexpensive energy saves lives. You had testimony a few weeks ago from the gentleman from the Heritage Foundation, I think Mr. Loris, in this subcommittee about a U.S. Government study finding that simply from fracking, the price of natural gas for home heating came down so much that they estimate 11,000 lives saved a year in the United States since 2010.

Obviously, coal is implicated. If coal is almost as cheap as that, then people are able to heat their homes because of electricity from coal. It's a major plus. The cost of energy in America causes people to reduce on cold.

Now, when we talk about heat waves and cold snaps, remember, about 20 to one is the margin in our study—in our review of studies—why cold is more dangerous to public health than heat, because the effects of cold cause many respiratory illnesses, heart illnesses, that then extend for many weeks after the cold snap. Whereas with the heat waves, yes, they're dangerous if people don't have air conditioning and water. And as was mentioned earlier, we've gotten much better at responding both in Europe and the United States to heat waves.

So you want to keep people from getting cold in the winter and feeling like they can't afford to turn on the heat. That's a big killer.

Mr. COMER. Thank you. I yield back.

Mr. ROUDA. The chair recognizes Ms. Hill.

Ms. HILL. Thank you so much.

I have a few questions.

The first is that, you know, I want to point out that we've talked a lot about the vulnerable populations that are impacted, but I'm particularly concerned about the elderly.

Dr. Holder, can you talk about your experience in treating elderly patients? You state that during the hottest days the elderly suffer the most. Can you provide some details?

Dr. HOLDER. What happens, the physiology, it's very difficult to regulate temperature, the extremity. And the pediatrician will know children and elderly do not regulate their body temperatures as easily.

So our old population may not sense the temperature change. They may not respond properly by drinking and do not have the response to thirst, so they won't drink as much as they should. And they then will stay indoors, because they often do not have the mobility and the support to go outside and get cooling or go to a safe place. So they're much more vulnerable.

In inner cities, big cities, and in south Florida, we see that problem with our elderly, just dehydration, heat exhaustion, and in the worst situations, we often end up with heat strokes and admissions and death.

But in my population, why I try to tell that we don't want to wait for the end and the catastrophe and the heat strokes. We want to have awareness earlier. Like when my patient came in with her bill asking simply just to get a waiver of her electric bill, because

she couldn't pay the bills, that was a beginning sign that she was having problems handling the response to the heat that she needed to do. And why should she be the one to have to go all the way to death, the emergency room and eventual death, in response to this. We know it's happening.

Ms. HILL. Thank you.

Dr. DeSalvo, in districts like mine fast-growing brush fires are a reality we face far too often. In fact, just last year I was forced to evacuate my home in Agua Dulce in Los Angeles County as houses and acres of ranchland burned nearby. So I'm familiar with the dangerous air quality that results from these fires.

I'm also concerned about that impact on the elderly. And I'm wondering if you could briefly describe the health risks of the elderly population during a wildfire season.

Dr. DESALVO. Yes, I think some of the really concerning outcomes of those wildfires included some seniors that were just unable to evacuate because they had mobility issues. They didn't have transportation. They had hearing impairments. They didn't know about the event coming. There's a whole list of reasons why they're at higher risk.

And there was increased mortality not only in those wildfires of seniors, but also in storms like Hurricane Harvey, Hurricane Katrina. We see that as a really recurring theme because they have physical and social challenges that prevent them from being connected and being able to access resources.

But I'd love to just highlight this one really important point, which is, absolutely in the crisis of disaster they are at higher risk. They are also at risk every day. And there are just even minor things that we should be doing to really support resiliency. We do want to be there for them in disaster, but I would love to see us lean forward more to build their capacity and make sure they're connected to resources and people so that they can be stronger if an event does occur.

Ms. HILL. Great.

And many—this is to several of you—many older adults depend on Medicare for their medical needs once they're eligible. Based on the testimony we've heard today, it sounds like there could be additional need for medical care for the elderly as temperatures get warmer.

Dr. DeSalvo, Goldstein, and Holder, would you agree?

Dr. HOLDER. Absolutely. Unfortunately, we don't want to spend the dollars that way, but we do have to be prepared.

Ms. HILL. And would you also—I guess, yes, Dr. DeSalvo and Dr. Goldstein?

Dr. GOLDSTEIN. I agree.

Dr. DESALVO. Yes. I think for the physiologic reasons that you heard, they're just more prone to having medical problems when there's heat or cold.

Ms. HILL. Do you agree that it's imperative for more research to be done to determine the exact cost that taxpayers would need to pay if we do not act to mitigate the effects of climate change?

I guess raise your hands if you agree. Perfect.

Dr. DESALVO. Yes. I mean, having a shared set of facts would be wonderful, and then we would know the scale or challenge that

we're dealing with, and we'd know if we're appropriately applying those resources.

Ms. HILL. Great.

And just really quickly. Dr. Rossiter, can you confirm that you have board members Roger Cohen, Craig Idso, and William O'Keefe on your board?

Mr. ROSSITER. No, I can't. Read me the names again.

Ms. HILL. Roger Cohen, Craig Idso, William O'Keefe.

Mr. ROSSITER. On my board? No.

Ms. HILL. They're not on your board?

Mr. ROSSITER. No, ma'am.

Ms. HILL. Okay. Well, previously they were on your board. And one was the former ExxonMobil manager of strategic plans, the former director at Peabody Energy, and a former lobbyist for ExxonMobil and former CEO of American Petroleum Institute.

Mr. ROSSITER. I think that's probably accurate.

Ms. HILL. Okay. So just clarifying that the fossil fuel industry is directly funding your nonprofit.

Mr. ROSSITER. That is false and an ad hominem attack and has nothing to do with the data at issue here.

But, no, there is absolutely no funding for our organization and never has been from any fossil fuel industry. And do you know why? They have stopped giving money for science research about six years ago because of the sort of public relations cost of doing so. So they cannot do that now. They're beyond petroleum.

Ms. HILL. But the members of the board, members of the board have direct ties to the industry?

Mr. ROSSITER. No. But it would be fine if they did. I mean, I have 46 climate scientists, energy economists, who have a variety of backgrounds.

Mr. ROUDA. Thank you.

Mr. ROUDA. Representative Hill, thank you.

The chair now recognizes Representative Gibbs from my home state, Ohio.

Mr. GIBBS. Thank you. Thank you, Mr. Chairman.

I think it is sad, this attack on the fossil fuel industry that brings us the lowest cost of energy, plenty of supply. And we see in this country a decrease in our carbon emissions in the last 10 to 15 years mainly because of natural gas. And we see an increase in China and India and other places around the world.

Dr. Bernstein, I was taken aback a little bit when you were talking about asthma in our children. I was thinking, going back prior to all this climate change talk, prior to 1970, our pollutants, I think they still are our main pollutants, particulate matter, sulphur dioxide, nitrogen dioxide, carbon monoxide, and lead and ozone.

Can you kind of reflect a little bit what you thought the asthma rates were—I guess per capita—based prior to 1970? Because you really, in your testimony, you really blamed a lot of the asthma on CO2 emissions.

Dr. BERNSTEIN. Let me be clear that the best science shows that one in five children today in the United States are getting diagnosed because of exposure to emissions from fossil fuel. The data we have on asthma rates from the 1970's are not reliable because different standards were used to diagnose asthma.

The diagnosis of asthma is not like a diagnosis of cancer. It requires subjective assessments of children and often can be conflated with other diseases. In fact, there is a discontinuity in our own national government data from—I don't remember exactly where the cutoff is—but the diagnostic criteria were reassessed and a new definition was made.

The important point I think here is children have asthma in this country, 1 in 10 children; substantially more in Black children and poor children. And we know without question that when they breathe exhaust from cars or gas that's burned or fumes from coal, even though I'm the first to say that our Nation's air quality in general is doing much better than it's done, they are going to suffer more and it's disproportionate. Children who live closer to roads have higher rates of asthma for sure and other——

Mr. GIBBS. But you would concur, I think, all the innovation and all the technology change we have been making has been helpful. I mean, the scrubbers, the catalytic converters, and all the things we have done to help protect the environment have been helpful. Will you concur to that or not?

Dr. BERNSTEIN. I'm sorry, helpful for?

Mr. GIBBS. American innovation has been helpful, our technology has been helpful to drive down, even though we still have got 1 out of 10 children maybe with asthma.

Dr. BERNSTEIN. That's twice as many as did when I was born.

Mr. GIBBS. Well, you just said me you couldn't tell me what it was.

Dr. BERNSTEIN. I wasn't born that long ago.

Mr. GIBBS. Okay. I'll have to think about that one. I mean, I said prior to 1970.

Dr. BERNSTEIN. Mr. Gibbs, I—Congressman, I completely agree with you that greenhouse gases are going down, and they are going down in large part because of the gases coming out of Ohio.

At the same time in Ohio, you have the sixth-worst infant mortality rate in country. You are the sixth-most obese state among children 10 to 17. Five percent of pre-term births in the state of Ohio are from particulate solution from coal-fired power plants. That's one of the highest attributable fractions of pre-term births from fossil fuels in the country.

If Ohio takes action to further reduce emissions, you will benefit the most. But the poorest people in Ohio will benefit.

Mr. GIBBS. Okay. Thank you.

Dr. Rossiter, you talked about change and improvements, everybody has electricity versus trying to generate their own, trying to burn their own fossil fuel, wood or whatever.

There's been talk about climate change having a direct impact in the frequency and scale of natural disasters. Do you believe that climate change is affecting the nature and size of the natural disasters? And maybe you can talk more in decades than just a small period of time.

Mr. ROSSITER. Yes. If you could put up for me, please, slide 13.

Now, this is the temperature record by our government for the last 120 years or so. The black line is CO2 concentration, and this is why the IPCC says only that when you get to the red area, where temperature's gone up in the last 50 years, that they are

comfortable and confident that at least half of that half-degree warming comes from CO2.

Prior to that, the whole bluish area, the big one there, the big growth of half a degree in the first half of the 20th century is not due to CO2. There was insufficient CO2 to have the warming effect. Physicists agree on that. So we're talking about between a quarter and a half of the 1 degree came from carbon dioxide.

The health effects of that obviously have to be shared in the same way. Global temperature was coming up hard from the 19th century because of the end of the Little Ice Age before there was the carbon dioxide effect. And so these things we're saying about number of hot days and heat waves, a lot of this would be the same and was the same in the 1920's before we got to today, 100 years ago, because the Earth was warming naturally. So it is always hard to take out the other effect.

But in answer to your question, when you count by decade, that was the data that I was showing. If you look at slide 22—I can finish up quickly with this, Mr. Chairman—slide 22.

This is by—no, that's not right, 22. It's got a picture of global landfalls updated. Keep going, maybe we'll get there, 22. Yep, there we go.

This is by decade. Ignore it. Ignore it.

I happen to have a chart here of 1990 to 2016 showing no great range. But the way—the data that I put up earlier in red, the IPCC report, they count the hurricanes from the 1900's by decade, because it is a chaotic event. You have to count how many there are. Pretty easy to count. And that's the one that showed no trends. This shows just those trends in the last 25 years. But most data should be done by decade if it's extreme weather.

And, of course, when it gets hotter, more hot days, which we have anyway, you have less cold days where there is tremendous public health effect. So if you're going to count the deaths due to heat waves, you need to count the reduced deaths due to the fact we don't have as many very cold days.

Mr. GIBBS. Thank you, Dr. Rossiter.

I yield back.

Mr. ROUDA. Thank you.

As this time, I'd like to recognize Representative Ocasio-Cortez.

Ms. OCASIO-CORTEZ. Thank you very much, Mr. Chair.

Where to begin? I think, first and foremost, it's important, as was alluded by already Dr. Bernstein, as we are here we're sworn to tell the truth, the whole truth, and nothing but the truth. So let's just clarify a few things. I don't want to spend all five minutes fact-checking an actual witness.

China is the world's leading country in electricity production from renewable energy sources. China produces over double the generation of renewable energy than the United States. When we want to say things like inexpensive energy is important, it's also important to clarify the facts, like renewable energy and production of renewable energy is less expensive than continued operation of certain forms of fossil fuel, including coal.

And let's get it back to the actual subject of this hearing, which is the impact of climate change on human health. We are not debating whether climate change is real and we are not debating any

of those attendant effects. We are debating and discussing here today the impacts on public health and human health.

So, Drs. Bernstein, Goldstein, DeSalvo, and Holder, do you all agree that climate change is currently negatively impacting the health of Americans?

Dr. HOLDER. Yes.

Ms. OCASIO-CORTEZ. Yes.

Dr. Goldstein, according to your written testimony, the last five years have been the hottest days on record for air and ocean temperatures. How does such extreme heat affect the lives of everyday Americans?

Dr. GOLDSTEIN. I think the effect is not only on everyday Americans—for lots of reasons. I mentioned everything from food poisoning to areas of things that we don't even consider, such as I worked in your district as a kid growing up, driving a truck in the Bronx before there was air conditioning. You just couldn't get much work done on hot days.

If we talk about Africa, and we are talking about the increased heat in a place that's already hot, it's just the ability to do work, the enervation that's caused by heat, is something that we have to take into account in any of these approaches.

Ms. OCASIO-CORTEZ. You bring up an excellent point. I spent a brief amount of time living in West Africa and there I had actually contracted malaria. And I remember even really reflecting on the economic effect of such diseases, which can be widespread.

I've been seeing some reports here, I actually have a report here from a scientist in my district who has been studying the pathogenic impacts of climate change. The potential spread of diseases and bacterial diseases. Have any of you all heard about this potential effect from warming air and sea temperatures?

Dr. DeSalvo?

Dr. DESALVO. I think that's certainly one of the concerns, is that some infectious diseases, like those that are carried by some kinds of mosquitoes or ticks, as there are changes in temperature, they are more able to live in new environments. And so that would be new infections that would arise that might be unexpected in those environments. It might be some things as different as Zika or West Nile and some things like Lyme that maybe others are more familiar with.

Ms. OCASIO-CORTEZ. So there are areas in the country—let's say, Dr. Holder—there are areas in the country that previously may see diseases that they've never seen before, whether they're spread by insects or whether they're spread by gastrointestinal bacteria infections.

Dr. HOLDER. Absolutely. We see the Aedes Aegypti mosquito, which carries the Zika, Chikungunya, and Dengue. That range would be more subtropic. You are now seeing the range of temperature that those live and pass disease can go all the way up to the Carolinas.

Aedes aegypti is really particularly dangerous because it just doesn't bite at dusk and dawn. It bites all day. It lives inside. It lives everywhere. So that's the one that we know pass on the Zika that came into Florida last year.

So the range has changed. Lyme disease has gone all the way up to Maine. We are seeing West Nile virus. Vector-borne diseases will be pretty detrimental to the U.S.

Ms. OCASIO-CORTEZ. And, Dr. Bernstein, you mentioned the impacts on mental health as well. And you would say that, in the aftermath of some of these major natural disasters, the survivors, and particularly young people, tend to see mental health costs?

Dr. BERNSTEIN. Yes, there have been many studies looking at child survivors of disasters, wildfires, floods, et cetera, that have documented persistent symptoms, particularly of post-traumatic stress, so flashbacks and anxiety.

Ms. OCASIO-CORTEZ. Thank you. Mr. Chair, I'd like to submit to the congressional Record two documents, one from PBS on the legacy of Hurricane Maria and students in Puerto Rico who are now exhibiting post-traumatic stress disorder symptoms; as well as testimony from Dr. James Servino on some of the pathogenic risk factors with climate change with respect to New York 14.

Mr. ROUDA. Without objection, so moved.

Mr. ROUDA. And thank you.

The chair now recognizes Representative Gomez. I'm sorry. Oh, you just showed up. Well, I'm sorry. Representative Higgins snuck in behind my back. Come on. It's your five minutes time, please. Thank you.

Mr. HIGGINS. Because I was a police officer prior to being a Congressman, I learned how to sneak up on people real well.

Mr. Chairman, I don't know if this happened in my absence, but I'd like to grant Dr. Rossiter time to respond. During your questioning, good sir, he was personally referred to by two of our panelists, I believe respectfully so, but with some rather pointed statements.

Dr. Rossiter, did you take notes during that time?

Mr. ROSSITER. I surely did.

Mr. HIGGINS. Would you like to respond to those statements at this time, if you have not been granted that time?

Mr. ROSSITER. I would appreciate it.

Mr. HIGGINS. Please, go ahead, Doctor.

Mr. ROUDA. You can use your five minutes as you see fit. So if you'd like to proceed.

Mr. ROSSITER. Yes, sir. I appreciate it, not because I felt that they were unfair accusations. I'm very happy to be on this panel. I want to respond because I think they're incorrect.

Our organization had two of its doctors—Jan Breslow of Rockefeller University, Wes Allen of Australia—produced this white paper, which was submitted to the record recently, which was sort of a monumental study of all the health effects of recent warming, whatever its source.

And what's interesting is that their research found that—well, you saw floods already on a decadal basis, no more floods or rate of sea level rise or hurricanes than there were in the early 20th century.

But when it comes to Zika and Lyme disease, we dealt with those in some detail here. It appears that CO2 and warming are minor, minor problems in the spread of Zika and Lyme disease. Lyme had

to do with reforestation. Zika had to do with international air travel. Warmth is a factor among many, many other factors.

But when it came to asthma, there's not a word in this report by these scientists about asthma, because they felt it wasn't even worth responding to.

Asthma, of course, with good epidemiological studies, as I'm sure Dr. Bernstein is referring to, it needs to look at the reasons people report, the reasons people treat, how they're measured. As you mentioned, it was measured different in the 1970's. It's such a complex area with so many factors that seem to be completely unrelated to carbon dioxide.

Carbon dioxide at today's levels is about 400 parts per million, which is four percent of one percent. If you're on a submarine, you're probably going to get about 5,000 parts per million as you go out for your six-month tour. Plants grow a lot better at about 500 or 600 parts per million, as we're about to find out. We've already gone up 15 to 30 percent during the fossil fuel area of plant productivity just due to that.

So in each of these areas that are mentioned the IPCC does not come to the conclusions that the other panelists who mentioned it have. That's why I didn't include them in my report. I'm happy to send back to the committee what we think about wildfires, which are, as discussed here, clearly influenced by so many factors about load and your safety measures and winds, which may not be related at all to temperature.

It's extremely difficult to isolate a cause, but I think wildfires is one. It's a terrible public health problem. The smoke, we know, in California is a terrible problem. But linking it to there being more carbon dioxide in the atmosphere or a quarter of degree more temperature I just don't think has been proved by the data yet.

Mr. HIGGINS. Let me ask in my remaining time—Doctor, thank you for your response. I wanted to give you an opportunity to address the statements from earlier.

Do you concur, do your studies concur, are there any studies that disagree that the primary driving factor for public health is economic prosperity?

Mr. ROSSITER. I think that that Preston curve I showed you earlier is one of the more widely accepted.

Mr. HIGGINS. It is rather commonsense.

Dr. HOLDER. Which shows that as you get wealthy——

Mr. HIGGINS. It's a direct correlation. And the availability of affordable energy is, of course, a cornerstone for economic development.

So all of us here, we're here voluntarily. Ladies and gentlemen, we appreciate you coming. We admire your passion and your beliefs.

But I believe that as Americans observe these hearings, they are getting home from work, and all of you arrived here by some method of fossil fuel. You all wear clothing developed from petroleum products. You all have, no doubt as doctors of great accomplishment, you have 401(k) portfolios with corporations that rely upon fossil fuels and carbon footprints to some extent.

So that I think it's important, Mr. Chairman—and thank you for having this hearing—that we have honest conversations about an

all-of-the-above energy policy for our country and that Congress supports, of course, expansion of clean energy, but the inclusion of fossil fuels must be part of that factor for economic prosperity.

Thank you, Mr. Chairman.

Mr. ROUDA. Thank you, Representative Higgins.

At this time, the chair would like to recognize Representative Gomez.

Mr. GOMEZ. Thank you, Mr. Chairman.

Dr. Rossiter, a simple question. Do you believe in climate change or not? Yes or no? And it's an easy yes-or-no question.

Mr. ROSSITER. Very difficult. You have to define climate change for me.

Mr. GOMEZ. Okay. Well, we're not going to start. That answers it all. Thank you for being here.

One of the things that I want to kind of really emphasize, is the GAO, the Federal Government, everybody has said that climate change is happening. You can go and read the reports if you need to read those reports. But I think for the American people to say that you are asking what the definition is, then that gives us a hint where you're coming from.

Growing up in Riverside California, the Inland Empire, Riverside, I saw a time during the 1980's when we have so many days of what we call red flag days. We couldn't go outside to play because of the pollution in the air.

California spent a lot of time to clean up our air. Then we also started—and a lot of those restrictions on emissions when it comes to tailpipe emissions from industry really did have an impact on our air quality throughout California.

We started combating climate change to make sure that we would have a role in combating climate change, and we started reducing greenhouse gas emissions. Those had an additional co-benefit of reducing pollution and pollutants, right? They kind of go hand in hand. People get them often confused regarding reducing greenhouse gas emissions and the co-benefits that go along with it, right?

But one of the things that I've noticed is that the people that are most impacted are people that are children and seniors, immigrants, poor and low-income families, rural communities, people of color, indigenous people, right? These are the people that are most impacted.

And then oftentimes when we do pass—and these are the folks that are facing poor air and water quality. They have issues, health issues, like asthma, heatstroke, bacterial infections, heart and lung disease. You know if we can combat it, it has a positive impact.

I was in the California State Legislature. One of the big issues I had is that the money from the Greenhouse Gas Reduction Fund wasn't going to the people that were most impacted, right? The poor. And having a lack of air conditioning and not having heat, which I did not have growing up, does make a difference on people's health. Also not having health insurance also has an impact on people's health.

So climate change policies, I believe, do—anything we do has to prioritize the working class, the underserved, the underpaid, the

struggling, those struggling against racial inequality, and those with preexisting conditions.

Dr. Bernstein, you have spent your career taking care of children. What are some of the impacts you are seeing on the children in low-income communities and communities of color?

Dr. BERNSTEIN. Specifically related to climate change, air pollution?

Mr. GOMEZ. Both.

Dr. BERNSTEIN. I see a number of them. We see heat exposures leading to problems for particularly kids with chronic diseases like asthma, diabetes. That causes their diseases to sort of get worse either with breathing or metabolic problems.

The air pollution issues I alluded to in my testimony are quite apparent, as you talked about your childhood, when it's hot out in particular we see ozone action days, particularly problematic for children who are obese, who also tend to have asthma, especially trying to get children outside to exercise. In the summer we are telling them to stay inside because it is too dangerous to be outside.

We see effects on infectious diseases. I alluded to Lyme disease. It should be clear and important to know that particularly—I'm sorry Representative Higgins and Representative Gibbs are no longer here, but their constituents are actually substantially at risk for the diseases that are being moved northward.

And it is not just Lyme. These ticks carry other diseases, Babesiosis, Anaplasmosis. Other ticks carry other diseases that are growing substantially.

Mr. GOMEZ. I wish we can—five minutes is not a lot of time to kind of debate some of these issues, but I've seen it with my own eyes in California. And we have been leading the country when it comes to combating climate change and taking those dollars and reinvesting.

You know, I get it, you can actually reduce—if we focus on providing healthcare to people, you are going to have a bigger impact than just reducing climate change, right? But then the other side doesn't want to even provide healthcare to other people.

So some of the arguments from the other side just infuriate me. And one of the things we're going to continue doing is really talking up climate change. And I understand the reduction of greenhouse gas emissions to reduce, you know, combat climate change is essential. But the co-benefits that go along with it, including cleaner air and cleaner water, making sure people have better health outcomes, they're all tied together. And we're going to continue focusing in on that.

Mr. Chairman, thank you for having this hearing. I really appreciate it. And I yield back.

Mr. ROUDA. Thank you, Representative Gomez.

At this time, the chair recognizes Representative Tlaib for five minutes.

Ms. TLAIB. Thank you, Chairman.

I want to thank all of you so much for your testimony in this critically important discussion about human impact on people's public health, especially women and children, when we do nothing about climate change.

Through the chair, I'm going to respectively disagree with Dr. Rossiter and just tell you, I lived in a community and I still am raising my two boys where it is very hard to see the direct impact.

However, I thought that smell was normal, I thought that CO2 was normal, that it wasn't impacting people's lives the way now I see a third of the classroom when I read to them raising their hand when I say, "How many of you have asthma?"

I do this intentionally because I want to stay grounded in understanding and believing in them because of the trauma of not being believed when you say you're being poisoned by C02 and other kinds of pollutions out there.

I have the most polluted ZIP Codes in the state of Michigan. One of five children have asthma, Dr. Rossiter. And I can tell you, we have the only oil refinery in the state of Michigan. We have some of the largest-polluting corporate polluters in the state in my district, in the 13th congressional District.

Dr. Bernstein, you discussed in your written testimony about—I think you called it fumes across the fence line. I found that African American children in southeastern Michigan suffer over 2,400 asthma attacks annually caused by oil and gas pollution in the air and miss over 1,700 days of school.

This is something I talk to school administrators about, the fact that they have high rates of absences, when you hear about corporate polluters getting violations passed that weekend because they've outputted more than their air permit required.

And it really is something that I think for those at home, for my 13th congressional District residents, I just want them to know I believe them, and there are doctors and scientists out there that believe them, that CO2 output is killing people. Asthma attacks kill people at three times higher rate among adults. In 48216, in the ZIP Code 48216, has hospitalization among adults three times.

These are real public health impacts. And so I'm going to, through the chair, respectively disagree with the information provided by Dr. Rossiter. And I don't have a question for you at all.

However, Dr. Goldstein and Dr. DeSalvo and Dr. Holder and Dr. Bernstein, I want to know the direct impact on women, especially women of color, when this administration has not pulled its weight to protect kids. What can parents and communities do at the grassroots level to keep children safe?

Dr. DESALVO. I'll be happy to start because I appreciate very much the verb you just used, which is "do," which is something I hope the committee will look hard at and find ways that there can be bipartisan common ground for actions that we could take together that would protect people today.

And so some examples would be requiring more partnership between public health and healthcare on the front lines and using data in the way that I described in my testimony.

We know a lot about communities, children, people of color, but we're not always accessing that information to be targeted and strategic in protecting people from any kind of an impact and also supporting them after they've had some negative impact.

So publicly available tools like emPOWER, that started in the Obama Administration, continue to this day, are a way that local

communities can identify people at risk, get them the help they need, not during disaster, but to help build resiliency.

And so I hope that we'll be able to find ways to work together in the near-term to support people who really need our help.

Dr. HOLDER. In Florida, we've developed a whole—there's a whole list, if you go online, of all the community resources that we've been—the action groups that have come together to fight this. Because we're at the front line in Florida. We're feeling the sea level rise. We're seeing our beach erode. We had Zika. We have extreme——

Ms. TLAIB. Dr. Holder, when you say front line, I love that, because I always say, you want to see what doing nothing on climate change, you want to see what doing nothing looks like? Come to the 13th congressional District and I'll show you block by block of people with cancer and asthma, respiratory issues.

Again, doing nothing does result in death, and people really are hurt by the fact that government is doing nothing to protect them.

Dr. HOLDER. Absolutely. We also, with the Florida Clinicians, that's one of the goals. But on the ground we have local communities, poor communities that are developing resource centers in the hearts of the poorer communities, that before a storm the poor folks can go and get water, they can get food. Because if you've never prepared for a storm, if you don't have money, you can't get water, you can't get food, and you can't go to a shelter without your own food and water. So they're creating these sites in the community and giving mental health services at those sites.

So we're mobilizing efforts to help the poor community as far as bias. But we want—we need—the government to come in and support and recognize that whatever the cause of fossil fuels and everything else, the poor, the most vulnerable are suffering now.

And should we sacrifice that population so everybody else can have? I don't know. To us, that's not the answer. For us, it's how do we mobilize our forces to help the current situation now and the vulnerable now.

Dr. GOLDSTEIN. There are data out there suggesting, which makes sense, that there is more domestic violence against women the hotter it is. We can understand why that would happen.

There is data on ozone. We did some of it in New Jersey. If you go to emergency rooms during the summer and you look at ozone levels and look at asthma admissions, you find that you can explain a significant percentage of the ozone—the ozone cases seen in emergency rooms in northern New Jersey are based upon what the ozone levels were. The hotter it is, the more ozone you're going to have.

So these can be looked at. The ozone one you can do something about as a family.

You asked about the front line things. Well, ozone builds up during the day. And the old question of should you jog in the smog is more important to children. They should be playing in the morning before the 11 o'clock ozone level starts building up. If you are a jogger, you should jog in the morning rather than after work.

These are things that we have to—we should not have to do these things, we should not have these ozone levels, we should not

have these other issues that are being caused by things that we have nothing to do—nothing to control.

Mr. ROUDA. Thank you.

Dr. HOLDER. Could I add? One thing we know in primary care, women bring the kids, women come to doctors. So if you want to know what the impact is on families, we already know.

So some of the data, it's nice to have, but if you've gone to the doctors, women are there. So the impact of climate and health and storm preparation, everything for the family often disproportionately falls on the women.

And at night, I have to say, my postmenopausal and menopausal women are complaining to me, says you have to get that temperature down to 73 degrees to sleep well. When you can't afford it and it's hotter at night you don't sleep well.

So women are paying the cost for sleep, we're paying the cost for taking care of the families, we're paying the cost for preparing, we're paying a huge cost right now.

Mr. ROUDA. Thank you, Doctor.

I'd like to submit two documents into the record. The first one is the testimony of Dr. Daniel L. Costa, U.S. Environmental Protection Agency, retired; and the statement for the record from Ellen Atkin from Colorado. Without objection, these are so moved into the record.

Mr. ROUDA. I'd also like to thank the witnesses for testifying today.

Without objection, all members will have five legislative days within which to submit additional written questions for the witnesses to the chair, which will be forwarded to the witnesses for your response. And I ask that you please respond as promptly as you are able.

In closing, I'd like to point out that the purpose of these hearings is not to debate the economic advantages that fossil fuels have provided us and other parts of world over the last couple hundred years. That goes without saying. The point is, is that the current consumption of fossil fuels and the impact it has on climate change is real and that our ability to move to renewables faster and more effectively has a positive impact on all of us.

One of the main areas talked about was asthma. As a father of four growing up in Ohio and our children in Ohio, two of my four children have been identified as having asthma due to environmental issues in Ohio.

Moving to California, we have been fortunate that we no longer have to experience what it's like to have your child wake you up in the middle of the night, wheezing, trying to breathe, with their lips turned purple as they try and figure out how to breathe.

But we were lucky. There are many, many children who suffer continually around our country and around the world who did not have the opportunity to get quality medical treatment or to move to a place where they can meet the needs of their children.

I often talk about climate change. We can debate about how severe it will be or how fast it will come, but we can't debate any longer that it is coming.

And I often cite the Department of Defense, who recognizes climate change as a primary national security threat. I tend not to

think of the Department of Defense as a bunch of liberals claiming that the sky is falling. These are individuals who look pragmatically at the true national security threats facing our country and we should listen to what they are telling us. And what they are telling us is climate change is real, it is now, and it needs our immediate attention.

And finally, before we adjourn, I personally try to look at the decisionmaking that we make as elected leaders as to what side of history do we want to be on. And I hope that all of us, whether it is you in your community or us here serving our country in the House of Representatives, that we make our decisions based on what side of history do we want to be on for our kids, our grandkids, and future generations.

And with that, we are adjourned. Thank you.

[Whereupon, at 3:51 p.m., the subcommittee was adjourned.]