

Interest Group 7: Toward A More Equitable World for Women & Children Reducing Health Care Disparities

Beth Y. Karlan: Good afternoon, everyone. I'm Beth Karlan, and thank you for taking some time on your Sunday, no matter what time zone you're in, to join us here at the National Academies 2021 meeting. This is Interest Group 7, Maternal and Child Health and Human Development interest group. I first wanted to just welcome everyone on behalf of myself and our program committee, my vice chair, Barbara Stahl, as well as David Savitz, Kulea Duncy, Howard Bockner, and Michelle Williams.

After pulling our membership earlier in the fall, it was really the program committee's unanimous decision to focus today's discussion at this time on reducing health disparities as part of a greater strategy to achieve a more equitable world for women and children. I think it's been on everyone's mind, and we thought we'd use this session to discuss that further. Definitely a tall order, but we hope today's discussion will lead to even an action plan or White Paper that could serve as a blueprint to bring about long overdue and much needed changes in the future.

We're fortunate that Michelle Williams graciously agreed to moderate today's session. We have a lot to cover so without any further ado, I'll just hand it over to Michelle to introduce our keynote speakers and moderate today's important discussion.

Michelle A. Williams: Thank you, thank you so much, Beth. Good afternoon, good morning, everyone. As Beth said, it's really a pleasure to be a member of the program committee that is bringing forward this session. What we will do is have each of our keynote speakers, our esteemed colleagues, provide a 20-minute or so keynote session from our four distinguished panelists.

Very briefly, our speakers are Dr Wanda Barfield, who is the director of the CDC Division for Reproductive Health, and she will share with us a perspective on the current state of disparities in maternal mortality, prematurity, and low birth weight and key maternal and child health indicators and outcomes. Following Dr Barfield's presentation we will hear from Dr Pat Levitt, who is director of the Saban Institute, the Simms/Man Chair of the Keck School of Medicine at USC; he will share thoughts on toxic stress and social origins of risk for mental and physical illness in children and family. Following Dr Levitt's presentation, we will hear from Dr Otis Brawley, the Bloomberg Distinguished Professor at Johns Hopkins University; and he will share an update on the current state of disparities in prevention, diagnosis, and access to care as well as outcomes for cancer among women and children. And following that presentation, we will hear from Professor Howard Koh, who is the Harvey Fineberg Professor at the Harvard Chan School of Public Health, and he will provide a public health perspective on strategies and specific programs that contribute to the goal of eliminating health disparities in women and children.

We will then follow these presentations with what I am certain will be a robust panel discussion open to all members of the National Academy of Medicine's membership and also open to the public. I will moderate the Q&A session, and we hope that each of you members of the NAM will put your questions in the chat. If you would like to not have your questions read but to actually offer your questions directly yourself, please just end your question in cap with "UNMUTE," and we'll be sure to unmute you so that you can deliver your questions to the panelists directly yourself.

We will also be joined by members of the public, and while they will not be able to directly engage their questions, enter their questions into the chat function, please feel free to email your questions and we will try to engage with the panelists and provide responses offline.

With that, I would like to introduce again our first of our keynote speakers, Dr Wanda Barfield. I'll turn the virtual podium over to you, and you can share your slides.

Wanda D. Barfield, CDC: Thank you.

I'm just sharing my slides; are you able to see the slide? Perfect.

Hello, everyone, I'm Dr Wanda Barfield and I direct CDC's Division of Reproductive Health. I'm really honored to be here with you, and I want to thank all of you for this opportunity to speak with you on this beautiful Sunday.

I'm just going into the next slide, I want to... First of all, let us know that, you know, we're all here because we're really dedicated to the same mission, to make sure that we improve the health in women and children. We know that nobody should die from giving life, and that every person should have the opportunity to thrive. So what can we do?

In order to really acknowledge care and outcomes for mothers and infants, it's important that we acknowledge health disparities. The health of the mother and baby are heavily influenced by the factors that surround them, including things like policies, laws, housing, transportation, access to food, education, lifestyle, and genetics. But we need to address disparities at each level, to consider these influences, in order to provide the best care for women and children.

How do we do this? Let's just take a closer look at challenges that arose from the opioid epidemic. Drug overdoses have dramatically increased over the last 2 decades with deaths increasing more than four times between 1999 and 2019. Rates were especially concerning for pregnant and postpartum women since opioid use during pregnancy can affect women and lead to negative health effects for infants, such as neonatal opioid withdrawal syndrome, preterm birth, poor fetal growth, and stillbirth. Neonatal opioid withdrawal syndrome has become a major consequence of the opioid epidemic, with the incidence increasing dramatically over the last decade.

While the opioid epidemic affects White women more than Black women, there is a disparity in access to interventions. We know that the use of medication searches methadone or buprenorphine for the treatment of opioid use disorder has been associated with improvements in the outcomes of mothers and infants. However, only half of all pregnant women with OUD receive these medications.

A study that was conducted last year found that Black and Hispanic women with OUD were significantly less likely to receive any medication or treatment and were less likely to consistently receive medication for treatment during pregnancy, compared with White women with OUD. The authors hypothesized that factors associated with avoiding the use of medication to treat OUD included a woman's desire to minimize medication exposures to the fetus and avoid the risk of neonatal withdrawal, shame, and stigma because of their drug use, and also the fear of being reported to Child Protective Services.

Now, let's take a look at what quality improvement initiatives can do to tackle disparities like this. To actively address the gap in MAT between Black and White patients, the Illinois Perinatal Quality Collaborative worked to help hospitals put systems into place to make it easier for hospitals to ensure that every patient receives the resources and support to receive MAT and optimal care. They provided extra support to safety net hospitals and tackled their progress toward key initiative aims, including MAT, to ensure that they receive the Illinois PQC resources and support that they needed to achieve the MAT goal.

At baseline, you can see from this slide, Black patients with opioid use disorder were less likely to be on MAT; however, across the initiative, improvements in MAT rates were seen for all patients, with the greatest improvement in Black patients. We need to raise the bar for quality improvement initiatives. Yes, it's important to establish standards of care that improve health outcomes across the board, but with blanket quality improvement initiatives, the disparities are still there; so we need to accelerate and improve the quality of care for people in these gaps, and we need to understand what the drivers of disparities are and target initiatives to those core issues.

CDC will be releasing a notice of funding opportunity, or NOFO, to continue the support of initiatives like this. The upcoming NOFO is to Enhance Perinatal Quality Collaborative's capacity to make measurable, equitable improvements in quality care for perinatal populations statewide. Component A will support PQCs to increase the capacity of rapidly conducting population-level QI initiatives in a state and also focus on ensuring equitable distribution of benefits from QI initiatives. Component B will support the Coordinating Center for the National Network of Perinatal Quality Collaboratives to facilitate the provision of technical assistance and capacity building.

The foundation for equity and quality improvement is equity in data collection. At CDC we're working to integrate equity and diversity at every level of the data collection process and translate that data into equitable quality improvement. I'll share more on how this works in our national maternal mortality prevention initiatives.

At CDC we're working to improve data collection so that we have a better understanding of what causes maternal deaths, which helps to inform more effective interventions. Maternal mortality review committees, or MMRCs, get the most detailed and complete data on maternal deaths, including information about social determinants of health. They do this by bringing together representatives from public health, obstetrics and gynecology, maternal fetal medicine, nursing, midwifery, forensic pathology, social work, mental health, and behavioral health—and members of the community.

There's a conscious effort to ensure that there is diversity on committees. CDC is providing the training to committees to ensure that everyone at the table has an equal voice. These diverse multidisciplinary committees reviewing death certificates in any linked birth or fetal death certificates, medical records, social service records, mental health records, autopsies, and in some cases, informant interviews. The conclusions are not just about the infection or the medical condition; it's really about where are the missed opportunities and understanding the social determinants of health that influence a person's life and death. This level of review helps us to understand both the medical and nonmedical contributors to death, which can inform the development and prioritization of recommendations to help reduce future death.

Here are some of the leading causes of pregnancy-related deaths according to the data from the maternal mortality review committees. Leading causes of death include cardiovascular and heart conditions, hemorrhage, infections, and embolism. MMRCs get more detailed information than vital statistics alone so we can better understand the causes of pregnancy-related deaths. Because of the detailed data from multiple sources, we can see that mental health conditions are a leading cause of pregnancy-related death. Also, without reviewing deaths out to 1 year, most cardiomyopathy deaths would be missed; these deaths are the leading cause of death in the late postpartum period.

It's also important to note that leading causes of maternal death vary by race and ethnicity. Here's the MMRC data on causes of pregnancy-related deaths by race. You can see here that the leading cause of death for Black and White women are different; in fact, the leading causes for every race and ethnicity are different. In order to really address the needs of populations that experience disparities, we need to look at detailed data like this and prioritize interventions accordingly; so we need to consider these differences in equitable efforts to reduce maternal mortality.

Let's look at some more specific examples of how this kind of detailed data collection and analysis allows us to better target interventions. Epidemiologists looked at some MMRIA data, which stands For Maternal Mortality Review Information Application, and there was quantitative data that demonstrated the importance of supporting review program capacity to analyze qualitative data.

Looking at qualitative MMRIA data for substance use death, several important things were captured. Qualitative analysis of these data show programs demonstrate where missed opportunities for screening and getting individuals into treatment for substance use disorder contributes to death. For example, some individuals in the analysis had missed an incomplete prenatal care, narrowing the window for screening. It was also more common to see substance use screens in emergency room records than in MMRIA data, which are not often shared with primary, prenatal, labor and delivery, or postpartum care providers.

Qualitative analysis has also helped to understand the contributors of maternal overdose deaths. For example, the loss of a child arose as a key stressor in overdose death review findings. So I just shared this information to emphasize the importance of investing in routine qualitative data review for review programs. This context can tell an important story of the ways that we can work toward preventing maternal death.

Further CDC investments in maternal mortality review committee process includes informant interview resources, and medical records capture perceptions of patients from the health care provider perspective. What's missing is patient and family perceptions of providers and systems. We've convened five jurisdictions to help us develop an MMRC informant interview guide that provide our tools, that provides tools to help capture the woman's perspective through the next-of-kin interviews. There are currently a handful of states that are implementing these interviews. One state MMRC chair said that now that she has them, she cannot imagine reviewing cases without them.

As I mentioned earlier, the CDC has encouraged MMRCs to ensure that there is diversity on committees, and that everyone has a voice. More recently, review committees have also begun to document the impacts of discrimination and racism. There is growing recognition that discrimination, including interpersonal and structural racism, contributes to adverse maternal health outcomes. As we've heard

from MMRCs, bias and discrimination have played an important role as contributing factors leading to death.

A workgroup of MMRC leaders and subject matter experts came together to understand and capture bias as a potential factor in maternal mortality review. The work accumulated into the addition of discrimination, interpersonal racism, and structural racism as the data fields available in MMRIA.

Now, as part of a partnership with the Office of Minority Health, we are working with ACOG call to help MMRCs with tools to identify discrimination and racism in medical records that can ultimately be expanded, for use in medical settings. We're working with the National Birth Equity collaborative scholars on an early analysis of any documentation of discrimination or racism in MMRIA, and we're also building on the Black Mamas Matter Alliance work to examine how MMRCs connect with community partners and to ask perinatal quality collaboratives, or PQCs, how they do this and ask PQCs if they see themselves in the MMRC recommendations.

Let's talk a bit about gaps and opportunities. While we're learning more every year, there is still so much more that we can do to understand, and there's still more work ahead to achieve our goal of optimum and equitable health for all. As far as maternal and infant health goes, we're still just scratching the surface. We are just starting to understand that social determinants of health play an important role in the experience and outcomes for moms and babies. Racism and policies influenced by racism are structural determinants that influence the social determinants. Often what we see in policy and practice is a reflection of that.

We all need to understand that race is not a biological risk factor; race is a social construct, and it's often used inappropriately as a variable in explaining disparities in epidemiological analysis. We also need to continue building infrastructure to count and understand maternal infant mortality. We need to try to identify those unmeasured variables—racism at the structural, institutional, and interpersonal level. This includes analyzing structural barriers that fuel disparities. These are the variables that need to be addressed to best serve different populations at different levels and within different contexts to meet patients where they are and address the factors that influence their health. We also need to utilize other rich resources of data that measure social determinants. By linking data sources, we're able to then more fully understand health outcomes.

We also need to use implementation science and quality improvement to identify how improving access to the social determinants can help improve outcomes. We need to do research on what it takes to create more equitable opportunities. We need to avoid analysis that just end in the differences and highlight those areas where there is promise.

We also need to think about emerging issues and how to approach them. For example, are we going to be prepared for the next pandemic? How do we promote gender equality in reproductive health? And in all of this, we need to identify and address our own biases; we need to be intentional about change and equity in the science that we conduct, in the groups that we fund, in the questions that we ask, and the way that we interpret our results. We still have a lot to do in in terms of making progress.

Finally, I just want to emphasize the idea that we need to aim for equity, not equality, while understanding our reality. As public health professionals, we have to acknowledge that racism exists everywhere and take conscious and intentional action against it.

We need to apply an equity lens for every action that we take. This means practicing intentional diversity and equity. When you increase diversity, you gain perspective and can implement more effective interventions. We need to think about the gaps; what affects disparities that we aren't addressing? For example, we know that women will need care more continuously throughout the life course. We're still working towards a 1-year coverage for postpartum, and that's still not enough. What does it do to their long-term health, or will they fall into yet another hole? This way we can provide optimal, equitable, and quality care to those who need it the most.

We need to act on many levels to really begin disbanding disparities. It's all our responsibilities, and it begins with each one of us.

I'd like to end by thanking all of you for coming out to this event and actively engaging in learning and change. Thank you all for being here.

Michelle A. Williams: Thank you so much, Wanda, for starting this off with such a provocative state of the conditions and challenges, gaps and opportunities in the maternal and child health space. I think you've given us some very important case studies to think about as we continue on.

I'd like to now ask Pat Levitt to take us to the next session, which is toxic stress and social origins of health risks for children and family. Pat, over to you.

Pat Levitt: Thanks very much.

I just want to say first, I'm honored to have been asked to speak with this group, amazing colleagues, and I also see familiar faces at this meeting who I've known for quite a number of years, so it's great to see them all.

My charges to speak to the influence of toxic stress and its contribution to health disparities. I just want to emphasize that Dr Barfield's comments—people asked me what the single most important thing to do that would improve health equity and health outcomes—I'm a developmental biologist so I believe development is where it all starts, but it starts prenatally—and if they were to wave a magic wand, that's where it would be.

My focus is going to be on work that's been done examining the factors that generate a toxic stress response in children after birth. I first want to start with the definition of stress response taxonomy. This was developed back in the early 2000s as part of the National Scientific Council on the Developing Child. I'm on that Council with Jack Shonkoff, who's head of the Harvard Center on the Developing Child—and Harvard's well represented here, I guess; so is the University of Chicago, I want to say, which I'm an alumnus of.

We defined three components to the stress response. One is positive: We all know brief increases in heart rate, mild elevation in stress hormones due to a stressor, but the stress response system responds appropriately and then gets reset. Tolerable, serious, and temporary stress responses—loss of a loved one, a move, maybe some acute unpredictability in a child's life—but it's buffered by supportive relationships. If you take anything away from what I'm going to discuss, it's really the importance of

relationships and the predictability of relationships, which is an important positive buffer against toxic stress. Toxic stress is not the stressor. I want to stress that it's not the stressor; it's being misused. If you do a Google search to find the number of references to toxic stress now it's close to half a million or more, maybe it's more. Toxic stress is the prolonged activation of stress response systems in the absence of protective relationships. That's where the pathophysiology, the adaptation, and what ends up being a maladaptation, occurs.

Neglect is the most prevalent source of what we call early adversity or what's defined in some circles as child maltreatment. This is old data; this is still the same where the absence of relationships, the absence of what we define as “serve and return,” is the driver of toxic stress.

What are the origins of the neglect? In most instances, it's not purposeful; it's actually disrupted caregiver mental health, access to basic resources, disruption, or failure to access quality childcare, support programs in the community that are lacking, and predictability of the day-to-day routines that occur in a family. When families are dealing with this, when individuals are dealing with these uncertainties, one of the fallouts or outcomes of that is the inability to spend sufficient time to be able to engage in the serve-and-return relationships that are so important.

This paper just came out in *JAMA Pediatrics*; I wanted to highlight it. It's a meta-analysis showing the association of childhood adversity with morbidity and mortality in US adults. This is the conclusions. Four of the most costly diagnoses for which child adversity increases risk is costing this country over \$700 billion in annual health care costs a year—that's cardiovascular disease, diabetes, depression, and asthma—we all know that. The prevention of childhood adversity, which can be defined in a number of different ways, and the intervention on pathways early and to identify those who are at high risk for toxic stress that link these experiences, elevate it to zero disease risk, needs to be considered a critical public health priority. I think everyone on this on this remote meeting recognizes that.

The biological underpinnings of toxic stress was formulated in large part by Bruce McEwen. This is Bruce, who unfortunately passed away unexpectedly in December 2019. He was a member of the National Academy of Science and Medicine and really helped us understand the core concepts from a biological perspective and the relationship between brain and periphery in this concept that he popularized, called allostasis and allostatic load.

He simply conceptualized... Homeostasis, as we all know, is a physiological property that can be measured within a range. It's not constant at one value, but it actually can oscillate. It has a pretty narrow risk response range, and it changes, of course, depending upon the influence of circadian changes that occur on a daily basis and changes as well.

Allostasis is the broad response range for maintaining homeostasis due to some challenge to the physiological system. While some of the measures stay within the normal homeostatic range, there is slippage and atypical measures can be identified, whether it's glucose levels, or blood pressure, or whatever is being measured, it's the same concept. Allostatic load, which is the core underlying component or principle that that drives our understanding of toxic stress, is prolonged stressors, chronic stress, shifts the homeostatic range maladaptively, and remains in this range for extended and long periods of time, even throughout a lifetime.

The pathophysiology, the pathophysiological outcomes of maintaining a system in this atypical range may not be evident early on, but over time the stress on the system accumulates, and one sees then the emergence of disease and disorders at a later date. So, what occurs early has an influence on what appears later on.

Development, which we thought about as and argued for several centuries up until recently that it's either genes or environment that are driving these developmental processes. Well, we know that genes can't function without experiences. And this $G \times E$ is also modulated and mediated by time. When the experiences, when environment is driving changes in the use of genes that we inherit from mom or dad. This is a diagram that's Tom Boyce came up with in a recent paper that we all published in *Pediatrics*. I'm not going to go into detail but what the body doesn't do is filter out the disruptive experiences and just focus on the positive experiences; that is, the brain and the body adapt to experiences in ways that may be positive and improve physiological outcomes or adapt in ways to try to survive challenging environments, challenging stimuli in the environments. You can read, you can see what these component parts are.

These are driving physical and mental health outcomes, there's no doubt about it. The reason I started with the paper that just came out of *JAMA Pediatrics* is because it's the social or it's the environmental determinants, some people call it social determinants, including exposure to pollution and toxicants that is disproportionately affecting populations of color in this country and around the world. Which you typically don't think about is the social component, but it's an environmental component that's driving these pathophysiological processes.

If you look at this—this is a relatively old paper, but I think it's important—the predicted allostatic load score based on metabolic the appearance of metabolic syndrome and other measures, I would argue that this extrapolation younger than the age of, below the age of 20, where Black adults and White adults are pretty close to each other, I think it may not be an accurate extrapolation; because we don't really have really strong data on physiological measures that would be indicative of allostatic load. That's part of what I'm going to talk about towards the end of my presentation. But you can see that the gaps are quite substantial in terms of high burden of stress.

We all know these statistics—this is from 2019—that the lack of resources and the time spent having to garner any kind of resources to support family drives allostatic responses, drives chronic stress. You can see the disparities between White and Asian ethnicities and Black American Indian and Hispanic Latina.

I don't need to go through this. Dr Barfield spoke about it. It's very important to understand the origins of such environmental factors that are driving chronic stress. They arise through racism institutionally, culturally, and interpersonally, an area that still is lacking tremendously, from my perspective. And even we have government agencies that are still asking for information in ways that are actually creating more gaps in terms of understanding disparities. We can talk about that during the Q&A.

Environmental stressors affect not only the brain and autonomic nervous system, where a lot of the focus has been in terms of the biological studies. I would say that all of what you see here has evolutionary foundational evidence as well. In animal model research, the same kind of effects of environmental stressors on cardiovascular function on neuroendocrine systems, immune systems, gut and metabolic systems, all of these are affected as well as the brain and autonomic nervous system and occur over a lifetime.

There are three pillars of maladaptation that are clearly reproduced in human subjects studies as well as in animal model studies. What are they?

Behavioral inhibition is a core maladaptive risk response that seen both in animal models studies and in human studies as well—depression, anhedonia, internalization, some externalizing behaviors increase over time, both in childhood and into adulthood as well.

Immune dysregulation: The immune system is a primary target, just like the brain is, of toxic stress response. If you look at the list of diseases that show increased prevalence with childhood adversity, all of them have an immune dysregulation component, including cardiovascular disease, diabetes and obesity, asthma, and mental health disorders such as depression—all of them have immune dysregulation connections.

Finally, epigenetic aging, which appears to be both reproducible in human-subjects popularized studies as well as in animals, there's some, there's quite a bit of heterogeneity in terms of the measures that are used. We're still not at the point where this can be used as a screen, but it appears that epigenetic aging and shifts in the temporal developmental processes that occur appear to be a common response to toxic stress.

I just wanted to reemphasize this point about chronic inflammation, because this has such a great impact on health disparities. We tend to think of these as isolated components, but they're all related to each other because of this chronic inflammatory response that affects not just the periphery but the brain as well. This concept, which is an old concept, not an accurate concept, that the brain is privileged and does not interact with the immune system, of course, is false. It has its own immune-competent cells that are really important for wiring the brain up in the first place is, which is why these immune dysregulations that occur very early can affect brain development as well as body development.

I think I already mentioned these, so I must have had them on both slides. There you go.

Three pillars of building resilience: (1) support of responsive relationships. (2) Strengthening core life skills, including what we call executive functions—mental flexibility, inhibitory control, working memory, cognitive development—why this is an important target to emphasize is because executive functioning, which is mediated in large part by our frontal lobes, which occupy about 30% or 35% of our brain volume, those functions continue to mature into adulthood. So this idea that it's too late to do anything about early adversity is just false because this component, building these core life skills—and it's no different than going to the gym as one of my colleagues would say—there are ways in starting in childhood of strengthening these core skills. (3) And then finally, reduce sources of stress, I hope there are people on this Zoom that have some great ideas about how to do this, because it seems to be increasing not decreasing.

Can we identify infants and toddlers who are high risk for allostatic load and toxic stress? This is a study that was published in *JAMA Pediatrics* in 2018. They did a surveillance of the screening that occurs in pediatric practices—screening or surveillance that occurs. It was a survey of parents. Thirty percent screening is occurring nationally with any kind of an instrument that was screened for a social or language developmentally appropriate milestone between these ages: 30%; 37% if it's verbal surveillance, like the pediatrician ask the parents a question about either of those domains. Factors that

reduce both to make the data even look worse is ethnicity, income, parental education all have a negative impact. So that's my frowny face.

For example, in California we have an initiative to use a modified adverse childhood experiences questionnaire. The questionnaire, this is a paper that was just published in 2021 in *JAMA Pediatrics*, the questionnaire actually is very good at looking at mean group differences, but it has poor accuracy in predicting an individual's risk of later health. The combination of questionnaire with a measure, which we and others are still searching for, is really important; we don't have that measure now.

Einstein, one of my favorite quotes, "If you always do what you always did, you'll always get what you always got." We tend to think about the science of early adversity is science of toxic stress, the science of child development. Our communications in science tend to be about asking for more money for research. I'm not saying that's not important, but we have to be able to speak to policymakers in a clear way. It's foundational for their ability to make policy decisions and maybe this will come up. This is a paper that I wrote with Nat Kendall Taylor, who's the President of Frameworks Institute, which is a nonprofit in New York.

[start video]

"The early childhood brain development story has been a powerful influence on the growth of investments and programs to promote early learning and enhance school readiness, but the brain does not exist by itself. Connecting the brain to the rest of the body is critically important. Early childhood experiences are as much about lifelong physical and mental health as they are about early learning and readiness to succeed in school. All biological systems, all of them are highly interconnected, and all of these systems are primed to adapt to whatever the environment the thrill is. Think about this as a team of highly skilled athletes. Each has a role to play, but they depend on each other; they influence each other's responses. It's how they have operate together that's the key to their success. When we are stressed, every cell of the body is working overtime. The brain is the master control system that detects threat and then manages the response of all of the different systems. It sends signals to the cardiovascular system to increase heart rate and blood pressure. Signals are picked up by metabolic systems to increase the availability of blood sugar to provide more energy stores for the body. The immune system is activated to be on alert for the possibility of a wound or the need to protect against infection. The neuroendocrine system is activated to increase levels of stress hormones in the bloodstream. All of these also provide feedback to the brain. The stress response system was designed to deal with an acute threat per or challenge, but when the stress continues at a very high level then these biological responses actually start to have a wear-and-tear on the body. This is where stress explains chronic disease. The science is really clear. The most costly chronic diseases in our society have their roots in early childhood: cardiovascular disease, diabetes, and depression. Three of many diseases that are associated with greater adversity early in life. Those three diseases together consume more than \$600 billion of health care costs a year. So if we want to think about preventing disease and promoting health, it doesn't begin with exercising or eating better when you're 30 or 40 years old. Health promotion and preventing disease begins prenatally and it extends into the early childhood period. Connecting the brain to the rest of the body has very important implications for early childhood policy. If we look at the basic science-based principles focused on early learning, strengthening relationships, building skills, producing sources of stress, those are the same principles that increase the likelihood for lifelong physical and mental health. And when we think about the major sources of

adversity early in life, we talk about poverty, discrimination, exposure to violence, maltreatment, child abuse, and neglect. Although each of these sources of adversity differ from each other, biologically, the effect on the body is the same. Systemic racism and dangers of implicit bias in everyday discrimination impose a level of stress adversity and families of color raising children that is present all the time. It's never too late to make things better, and we are biologically prepared to adapt to whatever environment, but we need to look upstream at more systemic issues that are the sources of this enormous burden of threat and hardship. We have to connect policies and resource allocations from the education center, the health center, human services center. Pediatric primary care is the one domain where almost all children are seen from birth on and provides critical opportunity for engagement with families, developing relationships, promoting healthy development, and is the ideal frontline opportunity to connect families to needed services as early as possible when it can be most effective. Pediatrics alone is not going to provide all the supports that many families need. The opportunity is to move away from asking how do we connect pediatric primary care to early childhood programs and, in a different way, change our mindset to say how do we build a new early childhood ecosystem in which pediatrics is an integrated part? The brain development story has been a powerful influence. The same principles, the same concepts, are also affecting the early foundations of physical and mental health that will last for a lifetime.”

[End video]

Thanks very much.

Michelle A. Williams: Thank you so much, Pat, really an incredible presentation. We take a lot away from understanding the biological underpinnings of toxic stress, how toxic stress can impact biological systems, and then how those system disruptions can lead to a myriad of chronic conditions that rob Americans years of life that could be lived well if we took a preventive approach. I think it's an important time for us to take here and think about that last point, about the ecosystem that supports optimal development and wellness across the life course.

Now I'd like to pivot to our next keynote presentation by Dr Brawley, who is going to share with us thoughts on disparities in cancer care outcomes in women and children. Over to you.

Otis Brawley: Hello, thank you. Do I have my slides up correctly? Great.

It's actually a privilege to talk to you today and it's really appropriate I talk right after Dr Levitt, my fellow University of Chicago alum, because I'm going to make a plea for prevention and risk reduction to even decrease things. Prevention in childhood can decrease risk of breast cancer for women in their 50s and 60s.

I'm going to define cancer disparities, discuss some of the causes and some of the solutions. My overall theme is, how can we provide adequate high-quality care to include preventive services to populations that so often don't receive it; it is one of the most important questions we can ask in medicine and in cancer medicine.

And in cancer medicine we've got a lot of unnecessary care, which is going on, using up precious resources, interfering with our ability to provide necessary care, and is causing a lot of health disparities.

This is the 29% decline in death rate from cancer that we've seen since the peak year of 1991. You can see from 1900 onward, the rise in age-adjusted death rate from cancer and now a 29% decline. We'll talk about that decline and try to apply it both to children and to women in a second.

I'm going to give a lot of racial data, but it's already been said. It's important that we realize it because I actually believe that part of the institutional racism that we live with is making race into a biological categorization, and this has been rejected by anthropologists. Race changes over time, race is incredibly broad; area of geographic origin, on the other hand, can be useful, but admixture complicates.

That being said, using race as a sociopolitical categorization, these are the death rates from 1990 for Blacks in blue, Whites in orange. Native Americans and Alaskan Natives have a lot of noise, because they represent 1.5% percent of the population. Hispanics, which is an ethnicity and not a race, and Asian Pacific Islanders below. You can see everyone is going down. Native Americans are just barely going down; you really have to be very positive to see that.

Lots of talk about enrollment in clinical trials. National Cancer Institute clinical trial enrollment over the last 3 years by race is incredibly balanced. Indeed, there's a disparity in terms of Whites being enrolled. Frequently there's a concern about biological differences by race. I want to point out, in most cases clinical trials and single-institution studies show equal treatment yields equal outcome, and race should not be a factor in outcomes. Unfortunately, race is a factor in outcome. It's rare that the drug or therapy doesn't work in minorities. It's common that minorities, or the poor I should say, don't get the drug.

I showed you that 29% decline over the last 30 years. It's due to wise early detection—and there is unwise early detection that's wasting resources—improvements in treatment, and prevention, what many of the advocates and survivors prefer we call risk reduction. I think it is a better term, especially tobacco control, and I'm getting ahead of myself in the slides, but in the future, or right now, we need focus on weight control, energy, and balance.

Wise early detection and unwise early detection, all in one slide. About 4,100 American women die from cervical cancer each year. The survey that was done just a few years ago of the medical histories of a large number, over 1,000 women dying of cervical cancer, show that the overwhelming majority had no cervical screening in the 10 years prior to their diagnosis.

Now, at the same time, a large number of women are over-screened. Most organizations now recommend screening every 3 to 5 years, actually there's no organization that recommends it less than every 3 years. There's a lot of women out there who get an annual pap smear, and then there's the group of women who don't get a pap smear at all.

The study of Black versus White outcomes is what we did in the past, increasingly we're moving beyond Black and White and looking more at socioeconomic areas of residence.

When we talk about children aged up to 14 years, these are the most common cancers in order. Many of us are not familiar with pediatric oncology. Approximately 10,400 kids less than 15 years of age are diagnosed each year. Survival does differ by the different types of tumor, by race and ethnicity within tumor. Five-year relative survival rates have increased dramatically since the 1970s, and more than two-

thirds of all children with cancer are now effectively cured. I don't use that four-letter word very often. Of the 10,400 kids less than 15, about 23% go on to clinical trials. Interestingly, 2% to 3% of Americans and adults, adolescents and young adults, go on to NCI clinical trials. There's a paucity on trials, but it's not by race.

For adolescents and young adults, people 15 to 19 years of age, these are the most common cancers. I showed you mortality declines for all people earlier by race, this is the mortality decline in goal for people less than 20 for cancer. Since the year 2000, you can see more than 20% decline in mortality just since 2000. When we break that down by race, you can see all the races and ethnicities are getting closer and closer. Interestingly in 2000, the death rate for Hispanics was higher than the death rates for Blacks or Whites. You can see the death rate for Blacks was actually lower than the death rate for Whites. The only diseases, very few diseases, where you're going to see that category. But they're coming closer and closer together.

Now, with pediatric oncology, we do have the advantage that most pediatric oncology is practiced in university settings where quality of care can usually be a little bit better. However, low socioeconomic status and lack of insurance is associated with a higher stage of diagnosis for virtually all cancers, including children's cancers. For adults, the Affordable Care Act is associated with reduction in disparities in stage, and diagnosis, and outcomes.

For pediatric soft tissue sarcomas or bone and soft tissue sarcoma, you can see a 5-year survival rate. This is a Kaplan-Meier plot; 50% survival, 75% survival. I'm sorry, not 5-year, at 200 months. Here, you can see people with private insurance have a greater chance of being alive at 200 months than people who have low-income public insurance. In pediatrics, I like to look at insurance, because for adults, one of the issues is many people get low-income public insurance when they get diagnosed and they don't have it for prevention or screening. We don't screen, of course, children; there's very little time for prevention.

Here you can see, even at localized disease at diagnosis, the privately insured do better than the publicly insured. This is primarily not because of insurance difference but because people with the public insurance come from poverty, and you have literacy issues, access to care issues, transportation issues, and all of those things.

Here with metastatic disease, private insurance does better at 200 months compared to low-income public insurance. The poor, including poor Whites, more often present with distant disease. The poor are less likely, by the way, to receive adequate care, things such as radiation, which requires intensive follow-up, coming to the doctor 5 days a week for 6 or 8 weeks. We also have evidence that quality of radiation can be an issue. That's becoming more and more of an issue in adult cancer as well, where we find that poor people tend to be treated with lower energy machines in centers that cannot afford the latest in radiation therapy equipment. Aiming of the beam, quality of care, and so forth, they are problems. Cancer disparities are due to differences in access to quality care, as well as utilization of available quality care. The poor, even with insurance, frequently underutilized.

Now let's look at adults with breast cancer. This is breast cancer mortality from 1975 onward. You can see Black and White women did not have a disparity in death rate in the 1970s; the disparity only started as we learned how to screen and treat for this disease. The disparity is at its greatest today. And

then you can see Ronald Reagan told us that we, by executive order, that we had to collect and publish data for the other two races and one ethnicity; that's why these lines started 1990.

There has been a 40% decline in risk of breast cancer death in the United States as a whole, starting in 1990; 40% as a whole for the United States. In purple you can see the states that had a 22%–29% decline, and in dark blue the states with a 44% to 51% decline. The United States as a whole was very homogenous in the 1970s and 1980s, but something happened in the late 1980s such that we have huge state-by-state disparities. Indeed, we're now starting to talk about Mississippi versus Massachusetts disparities more so than Black–White disparities.

There are seven states where the Black–White mortality differences are no longer statistically different. Speaking of race, six because they are very low and then there's West Virginia, which has very high death rates for Blacks and Whites. There are 12 states where White women have a breast cancer mortality higher than the breast cancer mortality of Black women in Massachusetts. Howard Koh is speaking after me, and that's somewhat appropriate because he can claim the good part of this statistic, by the way.

There's a number of studies that show that the decline in mortality is much more because 20% to 27% of women get poor treatment after diagnosis. It's only about 10% of the mortality is due to poor mammography or lack of mammography. Not getting adequate care is a huge, huge driver of death from breast cancer. That's inadequate surgery, chemotherapy, hormonal therapy, inadequate radiation.

Mary Jo Lund was one of my fellows, and she published this in 2008; 7.5% of the Black women in Atlanta in the year 2000 who were diagnosed with a localized, curable breast cancer did not receive surgical removal of the tumor within 1 year of diagnosis; it was 2% of White women. They all have disenfranchisement and poverty in common.

There are a number of military studies, by the way. This show that Black women who have access to military hospitals enjoy a death rate or risk of death that's closer to that of White women than Black women in the United States. An intensive effort at increasing quality screening and treatment in Chicago had significant impact in terms of mortality over a period of about 10 years. A substantial number of women of all races and income did less than optimal breast cancer care, be it screening, diagnostic, surgery, radiation, chemotherapy. There's even evidence that pathologists tend to dissect out less lymph nodes in poor people versus nonpoor people; and that's not that the pathologists are discriminating by socioeconomic status. That's that the pathologists who takes care of poor people usually is working in a hospital, where the pathologist has more cases to deal with per day. Whereas the pathologist that takes care of middle class in short, or upper middle-class people, only has one or two cases per day. One actually does have to start wondering if Medicare is causing some of the disparities by really being a band-aid that just covers some of them up.

Few appreciate, by the way, a lot of talk about breast cancer and triple-negative disease, the disparity and treatment for Black women is among women who don't have triple-negative disease. Triple-negative disease is disease that doesn't express estrogen, progesterone, or Her-2-Neu receptors, and treatment options are much less for people who have triple-negative diseases, about 24% of Black women and 12% of White women have triple-negative disease.

Triple-negative disease, interestingly, is associated with obesity, especially obesity in childhood, it turns out. And dietary differences, high carbohydrate diet—more common in poor people, especially young poor people—as well as reproductive patterns, having a number of children, and not breastfeeding—common amongst poor people. By the way, some of us who went to medical school will remember, and it's still being done, many young ladies as they are discharged from having a child is sent home with a case of formula. We encourage them not to breastfeed, and that increases their risk of triple-negative breast cancer later in life.

Social deprivation studies, by the way, show that this is not just a Black problem, even in Europe, especially in England, they've shown that ER-negative tumors are more common amongst the poor.

This is obesity rates over time. Black women have a huge obesity problem compared to others. Again, energy balance is the second leading cause of cancer in the United States. It starts in childhood, and prevention of cancer is clearly a need.

I'm going to sum up by just saying how can we provide adequate high-quality care is incredibly important; there are cultural differences in acceptance of therapy; disparities in comorbid disease making therapy less appropriate; access is an issue and being able to utilize that care once one has access. And of course, there's racism and SES discrimination as well.

Thank you. It's really a privilege to talk to you today.

Michelle A. Williams: Thank you so much, Dr Brawley.

Now I'd like to turn over the podium to Professor Howard Koh, who is going to be speaking on public policies, strategies to build that that could reduce health disparities in women and children. Howard?

Howard Koh: Michelle, thank you so much, and I want to thank Dempsey who is helping me get the slides on the screen and will be running them for me.

And, before I begin, let me thank you, Michelle, for leading this very important conversation. It's great to be reunited with Wanda again; I had the pleasure of working with her when I was at HHS and she's still doing great work and CDC. Otis and I have a longtime relationship over the years working on cancer disparities and cancer control. It's great to hear from Pat for the first time and hear his fascinating insights on toxic stress and, by the way, Jack Shonkoff is a wonderful colleague for me at Harvard. It's good to see that video at the end. Let me also thank the interest group for sponsoring this, and thank Beth and also particularly, my dear friend, Howard Bockner, who just did such an outstanding job as Editor-in-Chief of *JAMA* before stepping down in July.

I've been asked to talk about this very broad and fascinating topic about political strategies and programs to eliminate health disparities in women and children. This is the broadest presentation but overlaps with the previous three in many ways, as you will see. It also reflects a lot of personal thoughts that I had while serving first as the Commissioner of Public Health in Massachusetts, under multiple governors by the way, and also Assistant Secretary for Health in the Obama Administration. I hope you don't mind if I refer to a lot of personal areas of interest as I go through this presentation. Yes, I am from

Massachusetts, so Otis thank you for that shout out, but most important of all, go Red Sox! Dempsey, first slide, please.

Let's just start with the big picture, and what are we talking about. Just about every day of my professional life, I think about these two opening comments from WHO that were put forward over 70 years ago, that health is “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.” Today we're talking about broad well-being. I think Pat's comments on toxic stress particularly related to that. I'll be making some more comments about well-being and flourishing at the end of this presentation.

And then, “The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being.” That's ingrained in seven languages on the concrete of our school, the Harvard Chan School of Public Health where Michelle is our dean. This goal is something that we're all thinking about right now in the time of COVID.

And then, with respect to health equity, I think the most powerful statement of health equity I've ever heard is from Martin Luther King; I love this quote. “I choose to give my life for those who have been left out of the sunlight of opportunity.” So, in short, many of us enjoy the sunlight of opportunity, but too many others do not. The question is, why not? That's what health disparities and health equity is all about, and these are critical questions in the time of COVID.

Federal strategies to address health equity date back to at least 1985 when under HHS Secretary Heckler, a Secretary's Report on Black and Minority Health was put forward. I had the privilege of starting at HHS in 2009, and shortly afterwards, then Secretary Sebelius asked me to convene an HHS-wide committee to update an action plan to reduce racial and ethnic health disparities. You'll remember the Affordable Care Act was passed into law in 2010; I'll be referring to that repeatedly throughout this presentation. And so we put forward a strategic plan that we're very proud of. The goals and strategies are summarized very briefly below about reducing disparities in health insurance coverage, making sure that our workforce was strong and diverse, addressing these themes in all population health activities, very importantly improving data collection—I was so glad Wanda referred to that repeatedly in her presentation—and then also increase the accountability of HHS programs.

In fact, because of the ACA, six new dedicated Offices of Minority Health were established in AHRQ, CDC, FDA, HRSA, SAMHSA, and CMS. those offices are controlling today, I hope, under this new administration will do even more to address issues of health equity. We had the privilege of summarizing this Report in Health Affairs over on the right, where I had the privilege of writing this up with Sherry Glied and Garth Graham. Next slide.

Another thing to put this all in context that I'm so honored to quickly report about is that, I hope everybody knows about this incredible effort Healthy People, which serves as a roadmap, compass, and report card for the nation. This was started by one of my historic predecessors, Dr Julius Richmond in 1979. It was Dr Richmond's vision that if we are a unified nation, every 10 years we should put together and put forward a report card for the nation about, are we getting healthier or not, and have that report card with goals for the future be based on important, understandable, prevention-oriented, actionable, measurable goals with high-quality data and compare them decade in and decade out. This Healthy People Initiative is something that I have spent a lot of time thinking about; it's been a thrill for me to be part of it, even now since I'm back in academia.

Over on the right is a picture, now over a decade old, with me and my two very beloved and historic predecessors, Dr Richmond, who has since passed away and Dr David Satcher. And then in 2010 when I was the Assistant Secretary for Health, for the ASH, I had the privilege of launching Healthy People 2020. I like to say, we need 20/20 vision for healthy people. Next slide.

Healthy People 2030 has now just been released, and it's very important to consider these goals. Over on the left, you can see that if you go on the Healthy People website, you can set your own custom objective lists through the Web, set targets, work with your institutions and communities to see how your goals and targets align with broad Healthy People 2030 goals. Over on the right are some writings that I've had the privilege of putting forward in various journals on this topic. The most recent one, on the bottom, just came out a couple of weeks ago with my dear colleagues from HHS, Carter Blakey and Emmilene Ochiai. Let me also say that, since this is a National Academy of Medicine presentation, that Mike McGinnis has been, perhaps the godfather of Healthy People, and really wonderful colleague and great leader; so I really want to thank Mike for his vision. Next slide.

All this relates to our topic today of maternal, infant, and child health efforts and eliminating health disparities and achieving health equity. You may be hearing more about this going forward because in just April of this year, the Government Accountability Office, the GAO, has directed HHS to spend even more time about a formal coordinated approach for monitoring maternal health efforts across HHS, including in rural and underserved areas.

So Healthy People 2030 has over 300 objectives, but 23 of them relate directly to maternal, infant, and child health; some selected ones are below, and I won't go through all of them. But on the right, HHS is tracking whether these outcomes are improving, such as increased absence from cigarette smoking among pregnant women staying the same such as reducing the rate of deaths in children and adolescents, or perhaps getting worse like reducing preterm deaths. We can spend a lot of time debating and reviewing why these trends are happening, for better or for worse. Next slide.

Now let's talk more about how we can actually intervene to reduce disparities and promote health equity. On top, you can see that we have various levels of intervention. Over on the right, we can focus on treating disease and injury and work with health systems—such as Johns Hopkins as Otis has mentioned through his talk, great talk on cancer—working particularly with community health centers that serve some 30 million people nationwide in some 1,500 sites. I won't be saying more about that, but I'm a big fan of anybody who is working in community health centers or promoting their heroic efforts, particularly in a time of COVID. We can focus on clinical preventive services, or we can be courageous and start addressing the social determinants of health over on the left. To migrate the light, there's much more data to share with you about addressing social determinants of health, but because of we're all talking about vaccinations in the time of COVID, let's start with that specific topic area first.

When you talk about progress in vaccinations for children, you have to mention the VFC program, which I hope everybody is very familiar with. Sometimes these tremendous advances happen in public health and people forget about how critical they were and are in preventing disease and promoting health. For those of you who have not heard, in the early 1990s Congress was concerned about about measles outbreaks in the late 80s and 90s. About half of the tens of thousands of children who contracted measles had not been immunized. A lot of them were poor and underserved children from poor families, often minority families, and so Congress moved to fund childhood vaccines and take the barrier of costs off the table. Since then some 16 vaccines for children have been made available for free for

those who are Medicaid eligible, uninsured, or underinsured or American Indian or Alaskan Native background.

Since then, our country has poured billions of dollars in VFC, and it's been quite a ride. Currently the budget at CDC is some \$5 billion in mandatory spending, so that's quite a commitment. I've always been interested in tracking how this has gone. Going forward, in 2014 a CDC *MMWR* analysis found very positive news, saying the vaccination coverage across many of these vaccines have increased for all children aged 19 to 35 months. In fact, in that report, which I just reviewed again recently, there's a line saying that from 2007 to 2011, that vaccine disparities for racial ethnic minorities were nonexistent. That is very heartening and reflects progress from the billions of dollars in investment we've made as a nation.

In 2016, there's a very important update from Walsh et al, published in *Health Affairs* on the right, concluding that since the start of the Vaccines for Children program, uptake has increased and most disparities have decreased. Again, good news. But there is a note of caution saying that the disparities narrowed considerably but did not occur, even over time, across vaccines or among groups. And then, a little red flag waving saying that from 2011 to 2013 there was actually a slight widening of income disparities in the uptake of several vaccines and that there may be other factors confounding the VFC program's effect on changing disparities. In preparation for today, I was curious to see if there was another update on how VFC is doing.

I was delighted that the day before yesterday *MMWR* came up with an update. So that's cutting-edge information to present to you. This is vaccine coverage by age 24 months for kids born 2017 to 2018, and a somewhat sobering conclusion here saying that widespread and often substantial disparities in coverage with routinely recommended vaccines indicates a need for improvement to achieve equity in the national VFC program. Then the VFC program covers the cost of all recommended vaccines for eligible children, but parents might not be aware of the program or how to access it. There's still barriers here on the left, which are all familiar to all of us. The caution here is that you can pour billions of dollars in; it'll make a difference, but it may not be enough.

In the same article by Hill et al published 2 days ago, there's a very important map showing state-by-state coverage of uptake of flu vaccine for young kids. As Otis's presentation has shown, there's wide variation by state and the same patterns that we're seeing, that Dr Brawley showed for breast cancer and that we've all seen for COVID vaccination uptake with particularly high uptake rates in places like the Northeast and then much lower uptake in places like the South, for reasons we can all discuss later..

While we're on the topic of vaccinations, let me also add one more quick comment on an area that I'm very, very excited about, and this is particularly of interest to the National Academy of Medicine. If you start over on the right, you all know and we all know that the National Academy of Medicine, IOM, puts out many very important reports for the future of health in our country, but oftentimes they don't translate into action by policy groups or by government. In 2010, leaders of the National Academy of Medicine Strategy for Elimination of Hepatitis B and C came to me and my colleagues at HHS. They said, "Howard, you're the Assistant Secretary for Health. We have a very important strategy that we've put forward, but we don't want this to just sit on a shelf. Can we work with you, and can you in HHS put forward a national strategy for Hepatitis B and C control for the first time ever?" After some thought, we committed to doing that. It was one of the, another incredibly gratifying experiences for me. We released the first report in 2011; on the bottom, you see two more updates up to the present time. And

so we tackle trying to prevent chronic hepatitis, which affects some 4 million people in the US, and what's very troubling is about half of the people who are affected are unaware of their infection status. Particularly for Hepatitis B, making people aware and then making sure that we have an elimination strategy for vaccinations is very important.

On the top left, as you see, there are many screening of vaccination strategies, but the one I'm particularly proud to put forth to you today for consideration is universal vaccine of all infants beginning at birth, or the birth dose. For those of you who have been familiar with this, this is a concept where every newborn in the country gets their first vaccination, in this case for Hepatitis B, within 12 hours of birth. I find this concept fascinating. It's prevention at birth and, as you can see in the middle part of this slide on the left, university vaccination for HepB has increased from some 50% to some 70%, and we need much more progress to get to Healthy People 2020 and 2030 targets of 85% and beyond. Hopefully if we do this and make prevention routine in a hospital setting so that we don't even have to think about it, that could hopefully be one way to eliminate perinatal transmission of Hepatitis B.

Let's move to another very important area of nurse-family partnerships that perhaps straddles the dimensions of clinical preventive services in addressing social determinants of health. This is a fascinating story that is very humbling to review, because if you start at the top, there was understanding from tremendously impressive researchers, particularly David Olds and colleagues, that young, low-income, first-time mothers-to-be need support about how to take care of themselves and take care of their kids, especially if they've never been through this before. There was research and programs to see specially trained nurses could be assigned to young, low-income, first-time mothers-to-be, starting early in the pregnancy, continuing to the child's second birthday, to teach positive health-related behaviors for the mother and child, help support good care of kids. Hopefully this would also have maternal personal development benefits as well.

Fast forward to today, there's now funding for the nurse-family partnerships through private and public sources—not enough and not nearly at the level of VFC, but it is established—then a cost figure here, and lots of investigation about cost-effectiveness.

The science of this is really excellent, not to go into this in great detail, but there are five randomized control trials that Dr Olds and other colleagues were involved in, with subjects followed up for 19 years, if you can believe it. If you look at the details, the background of the subjects were all first-time moms, all of them low-income, many of them unmarried. Some of the studies like in Elmira, New York were predominately White moms, others like in Memphis in 1987 were almost all African American. There have been similar studies done overseas in the UK and the Netherlands as well. Not to go into the great detail of the outcomes, but to summarize at the highest level, the randomized trial showed sizeable and sustained benefits for both mothers, like reduced subsequent births, reduced prenatal smoking, and also for children, reduced child abuse and neglect and improved cognitive and/or active academic outcomes if the mothers have low psychological resources at baseline. I must say, when I heard Pat's presentation about toxic stress and the need for interventions, I must say that the nurse-family partnerships potentially could be one piece of evidence that intervention there was making a difference in addressing those stresses.

And then let's talk about housing and neighborhoods. Wanda mentioned this as a very important social determinant. At our school 2 years ago, we started a new initiative on health and homelessness that I

have the privilege of chairing, so the intersection between housing, neighborhoods, and health are fascinating me and my colleagues and we're trying to bring more academic attention to this.

Perhaps many of you know about this absolutely fascinating and historic study called the Moving to Opportunity Program sponsored by HUD in 1994. If you don't know, this was a study, a randomized trial of vouchers, housing vouchers, with three arms. First was by lottery; people in public housing could receive an experimental housing voucher where they were required to move to a low-poverty neighborhood or they could receive a traditional Section 8 housing voucher, which have been well studied and shown to be effective in terms of policy, but the recipient can move anywhere, not necessarily to a low-poverty neighborhood or continued residents in the public housing, which is the control group. Again, this was a lottery, so a fascinating natural experiment, if you will.

The first report of this from a health point of view came out in *New England Journal* about 10 years ago and showed after 10 years of follow-up, a decreased risk of extreme obesity and diabetes and increased physical activity, improved mental health, and well-being.

What is absolutely fascinating, though, is that the benefits were much broader than those direct health benefits. Again, you see that extreme obesity was reduced; the prevalence of diabetes was reduced. There were improvements of mental health measures, but there were economic effects, too, that were most notable for kids under 13 when the families received the experimental voucher and moved. Over on the right, you can see increased annual income for those whose families moved and the kids were under age 13, but those effects were not demonstrated for those kids who were over age 13 at the time of the move, perhaps because of negative long-term impacts related to the disruption. All these economic outcomes have been done by Raj Chetty, a colleague at Harvard.

Health insurance coverage is a hugely important theme. Again, I had the privilege of living this as the Assistant Secretary for Health when the ACA was signed into law on March 23, 2010, by President Obama. Here's a graph, which I'm very, very proud of for a number of reasons, so I'm going to spend a little extra time showing this because, on one hand it's very simple, but on the other hand, I think it's pretty profound. That is that we all know that health insurance coverage varies by race and ethnicity. On this chart, the light blue are the White rates, the orange are the Black rates, and the grayish line on the bottom are Hispanic. As you have seen from the literature that sometimes Asian American, Native American, Native Hawaiian, Pacific Islander data are available and sometimes they are not. If I can say as a Korean American, this has always troubled me, to be put or regularly be put in the "other" category, if you will.

Let's take a look at this, first of all. From 2009 to 2016, when the follow-up ended here, we saw disparities narrowing, which is great. And then we particularly saw disparities narrowing after 2013 and 2014 when Healthcare.gov was established and Medicaid expansion was formalized. But, as I was looking at this data after coming back to Harvard from HHS, an excellent Harvard public health student, John Park, was doing research, came with me and said, "Dr Koh, there's never been an analysis on whether coverage for Asian Americans, Native Hawaiians, and Pacific Islanders improved because of the ACA." I couldn't believe it; I challenged him to look again, and there never was. So we published this in *JAMA Internal Medicine*; I want to thank John, who is the first author, my colleagues Sarah Humble, Ben Sommers, Graham Colditz, Arnie Epstein. You can see that the gap in insurance coverage between White and Asian Americans narrowed, in fact disappeared, by 2016. That was quite a conclusion, because it's very hard to eliminate disparities of any kind. If I can say, we can't prove that it was because of the ACA,

but it is associated with the implementation of the ACA. I can also say that when these efforts were started for the Asian American, Native Hawaiian, Pacific Islander community, many people said, “Ah, this can't be done. Your group is too heterogeneous. There are too many barriers with respect to translation and language.” But the advocates went out and did this, lots of work with the sisters and navigators, and that gap was closed as of 2016. The big caveat now is, is there follow-up? Can we do more studies to see that that progress has been sustained? We're looking for follow-up studies and data, and I hope that will be coming shortly.

That whole theme of Medicaid expansion and women's health is critical for this conversation, because we know that Medicaid covers a disproportionate share of women in vulnerable populations, often women of color as you see over on the right. Medicaid is the largest payer for pregnancy-related services and publicly funded family planning services. Studies are increasingly showing that if low-income women get access to Medicaid in states where eligibility expanded, it's associated with the increased health care coverage, utilization, better self-related health, decreases and avoidance of care due to cost, decreases in heavy drinking and binge drinking, and other related outcomes.

Following the status of Medicaid expansion is critically important to us as of this time. You all know that this past summer, the Supreme Court refused to strike down Obamacare, and hopefully that will be the last challenge to the ACA after 11 years of struggles in terms of implementation. It's notable, looking at on this map, that two states, Missouri and Oklahoma, passed ballot initiatives to expand Medicaid in 2020 in the middle of COVID of all times. People want this, and it helps improve health and public health outcomes. It would be really very important to expand Medicaid to the remaining dozen states or so if we can so that we can help all people enjoy the sunlight of opportunity.

Just recently we were very proud to see this action from the Community Preventive Services Task Force. You all know that the US Preventive Services Task Force weighs in on clinical preventive services—like they did with aspirin this week, but that's a topic for another time—but the Community Preventive Services Task Force decided to focus on social determinants of health. They formed a Health Equity Committee, and they started looking at population health interventions. They found sufficient or strong evidence for a number of interventions on early childhood education, full day kindergarten programs, school-based health centers, high school completion of schooltime academic programs. But again, the theme of housing as an established social determinant of health is one that we should pay special attention to. We should note that you are hearing through COVID all kinds of concerns about people, perhaps, being at risk for eviction and an eviction moratorium was established first under President Trump then it continued under President Biden but now has lapsed. Can we lean into housing voucher programs, permanent supportive housing, with a theme called Housing First as a way to address this very important social determinant of health theme.

As we are watching Congress debate investments for the country going forward, we should remember that there have been two very massive infusion of benefits for the country, through the CARES Act, on top here, in 2020 that was a \$2 trillion effort with some attention to school emergency relief among many other things, and then the American Rescue Plan was passed in the spring of this year, that was \$1.9 trillion addressing things like housing again, child tax credits, child care, and development. There are many other programs like SNAP and the Indian Housing Block Grant Program that we should pay attention to. I'm hoping that the public health community can follow all this and do analyses and studies to see how this attention to the social determinants can affect the outcomes on maternal and child

health disparities that we all care about. By the way, not to just keep talking about housing, but over on the right, if you're in Boston, just about every day on the front page of our paper is attention to a growing issue at the corner of Massachusetts Avenue and Melnea Cass Boulevard, what's called Mass & Cass, where the homeless population is growing and lots of concerned about safety, and housing, and how businesses are infected, and the livelihood of these very vulnerable people. We have a mayor's race coming up in Boston in a couple weeks, and this has been front and center in their debate. I would say that every big city mayor is wrestling with this now, so we all as public health professionals need to be part of that conversation.

As I end, we did mention that health is not merely the absence of disease or infirmity but complete well-being. At Harvard, I have the great honor of working with Dr Tyler VanderWeele, shown here on the right, and many other colleagues.

Tyler has put forward a so-called Flourishing Index. In fact, one of the challenges of measuring well-being is it's hard to quantify it, but he has a very simple questionnaire that you can go online and take in 10 minutes and measure whether you think your life is flourishing or not. Not just the mental and physical health domain, as you can see, but whether you have happiness, whether you have close social relationships—several of my colleagues on this panel talked about the importance of that—and the one that Tyler and I and Tracy Balboni are really honing in on is meaning and purpose, to what extent do you feel the things you do in your life are worthwhile; I understand my purpose in life. Pat's presentation said that we need to rejoin the brain and the body, and I think that's true. In addition, I would say, we need to rejoin the brain, the body, and soul, because I think that's what's driving a lot of us in what we do day in and day out.

To summarize, what's needed to address health equity? We need commitment; we need research and data; we need partnerships; we need funding like in VFC, that's only part of it, but it'd be great to have more funding through the CARES Act and the Rescue Plan—by the way, the infrastructure conversations going on in DC, it's very important to follow that and see how that's going to impact, particularly, child health outcomes going forward; goals and planning like through Healthy People; and then leadership and vision involving everybody in this workshop today and so many more last night.

If we can do that, we can again help the nation move one step closer to this goal of enjoyment of the highest attainable standard of health for everyone. Thank you very much.

Michelle A. Williams: That's terrific. Thanks so much, Howard.

We're about to now have an opportunity to reflect and share with each other, a Q&A session, where we can reflect and maybe dive a little more deeply with our panelists on questions.

I have questions provided already, the first one from Ted Abel. Ted, I'll ask you to unmute so that you can bring forward your question to Pat.

Ted Abel: Hi everyone. Thanks for today. My name is Teddy Abel; I'm at the University of Iowa. I have a question, but I also have a comment.

It's interesting, I was chatting with Pat Levitt about a center, it's called Intellectual and Developmental Disability Centers, of which there are 15 funded by NICHD. They're makers here that are in centers; nobody is necessarily jumping out at me. It's interesting because we have a group of the directors of those centers that meet monthly with NICHD staff, and it's a group that might be interesting to interface with because they're looking more from the developmental and mental health side of things than maybe cancer or other sides. It's an interesting community, and it's a community that Pat knows well. I grew up in the CHOP IDDRC Community; Pat grew up in the Vanderbilt IDDRC, at least as a faculty member.

My question was about the epigenetic signatures. It's really a striking thing. We heard a talk from a woman at Princeton named Kate Peña, a young assistant professor who's really, really smart, and she studies the impacts of stress in coming out of Eric Nestler's lab. It's been so striking to see that she's literally shown the epigenetic marks that happened because of early life stress are then essentially reactivated when there's additional stress in adulthood.

I just wanted to highlight how important, while it's a very specific thing to talk about epigenetics, it's a marker that I think is very interesting. It's something you can measure in the blood; you can quantify; you can do in a bazillion people; you can do on blood spots from newborns. It doesn't require somebody to come in to have their brain imaged in a magnet. It's a very interesting measure, and I think it's something that they really think about more.

Pat Levitt: I just want to comment on that, Ted.

One of the things that I didn't really talk about is that it's pretty clear that early adversity is creating challenges for the individual to respond to stressors later in life, which actually may be the triggers for the adult-onset diseases in that there are some ideas that one of the risk factors are these changes, these epigenetic marks. The challenge, I think, and this is true just in genetic testing and we could have like days of talking about this, but there are huge disparities in use of genetic tests. There are a number of reasons for that. One of which is that, for example, in the wide range of Hispanic ethnicities that are represented in Latinx Hispanic populations, just data collected from individuals in the general population is so lacking that, even if you developed what you thought would be a genetic test for disorder or disease or a risk factor X, there's nothing to compare it to except for European ancestry data, by and large.

That's a huge problem, because if you don't have something to compare it to, how are you going to know that a variant is actually meaningful or not? We've had these long discussions here in Los Angeles, and there's people who are going to undertake this here on a relatively small scale, but it's a huge disparity and if you've ever heard Joan Fujimura at the University of Wisconsin talk about this issue, she brings up some really important things about why this is just, right now it cannot be broadly applied as a preventive measure. I think we're just not ready for any of this, because the disparities in research data already exist, and there's no clear indicators that there's going to be a large investment.

The other thing I just wanted to say is, if you look at the distribution of dollars that NIH has funded for genetic research, and the thing that I'm most familiar with is mental illness, it so far outweighs research on the role of environment in driving disease; it's not even close. That's a policy issue that needs to be

addressed, in my opinion. I've done genetics before, but I think that the research community hasn't embraced this in a way that's serious enough.

I'll stop there.

Ted Abel: Thanks so much.

Michelle A. Williams: Thank you. Thank you for that question. I wanted to take it to back to a point that, Otis, you made around breast cancer mortality and how we saw gaps emerge between Black and White survivorship for breast cancer when the means for screening and treatment were brought forward that created a disparity. I think there is an alignment here, and a segue for us to take that question from Ted and Pat's response into the cancer screening and prevention space. Might you elaborate?

Otis Brawley: Thank you for that. Whenever there has been an advancement in medicine, there is almost always the creation of a disparity; the group that gets it and the group that does not. Almost every treatment advancement has left us with more disparity than existed beforehand. The only areas where I can think of where the disparities disappeared were vaccination, believe it or not. There's no disparity in smallpox.

When we can prevent a disease and prevent it well, somehow the disparities go away. But I think that's what you're getting at is that—by the way, that scissoring of Black versus White from the 1970s and breast cancer, it exists in colon cancer; it exists in virtually every treatable disease I can think of.

Michelle A. Williams: Thank you.

Wanda, you had a question for Dr Barfield. Would you like to unmute?

Wanda D. Barfield, CDC: Yes, hi. You mean that I had a...

Michelle A. Williams: ...question for Dr Brawley.

Wanda D. Barfield, CDC: Yes, yes, Dr Brawley, and I think his answer may have also been addressed in the chat.

Do you think that the geographic disparities in cancer care are a reflection of structural issues by state? If you can just talk a little bit more about that.

Otis Brawley: Admiral Barfield is what I prefer; I hope you don't mind.

When you look at those disparities, and Dr Koh showed the states that have not expanded the Affordable Care Act. It's interesting. The disparities are worse in states that are also the states that have the lowest COVID vaccination rate. Those are the states where people are most likely to argue about masking; they have the lowest high school graduation rates, the lowest college education prevalences; they also have disparities in a number of other diseases. It's a fascinating... there is a problem in especially those purple states in the South regarding education, regarding social health issues. It's not just, it's not just cancer; it's everything across the board, including they have the lowest high school education prevalences.

Wanda D. Barfield, CDC: I think it's also important to note that sometimes these disparities in terms of the gap may appear to be smaller in some locations because, collectively, White patients may not be doing as well. What we're seeing, particularly in the areas of looking at infant mortality and preterm birth, that some of the widest disparities are actually in the Midwest where there may be a larger, a wider gap. These are really important issues to bring up.

Collectively, I think the message that it gives is that policies at the state level may affect everyone, and that it's really important for us to look at the opportunities to, again, think about these policies that really are important in certain areas of the country.

Otis Brawley: I would agree with you. I would point out Alabama, Mississippi, a number of states that have very high death rates for breast cancer among White women.

Michelle A. Williams: Thank you.

We have a question from Woodrow Myers, and this is directed to you Howard.

Has the ACA had measurable impact on the reduction of infant mortality or maternal mortality, especially for individuals of color?

Howard Koh: I'm going to ask Wanda to help me on that, because I don't have a direct answer. In general, you know, we want to see that the ACA has had impact, not just increased coverage but also public health benefits and population-based benefits.

For those of you who are not following the, one of the best outcomes of the ACA was establishing the Innovation Center at CMS, so called CMMI. I see Howard Bauchner; I know he's supported a lot of that research and publication when he was at *JAMA*. I'm particularly watching that organization right now under this administration to see if they will tackle this.

Wanda, if you can help me on this.

Wanda D. Barfield, CDC: So we do have some opportunities. For example, we're seeing that Paid Family Leave has an opportunity to improve, for example, breastfeeding rates, and there has been work that's been done in California that's shown those increases that have been proved breastfeeding. We're in the process of also publishing a study to look at that as well and seeing that there may be more benefits for African American and Hispanic women. But there are other opportunities; for example, looking at the opportunity to improve care for women in the postpartum period.

As I said in the talk, a year is still probably insufficient but there is the opportunity to address chronic disease issues, particularly the ones that Dr Levitt talked about in terms of cardiovascular disease, mental health, also diabetes, opioid use. There are states that have taken the Maternal Mortality Review Committee data in order to make the justification for coverage in that year postpartum. Hopefully we'll see that occurring across the country.

Michelle A. Williams: Thank you. Kun Lee has a related question that we might want to engage with now.

The ACA has been around for more than 10 years. What do you think should be the next steps? I think this is a great question, as one of the things we're hoping that will come out of this session will be a real momentum that propels us toward an action plan.

The question to you, Howard, but any member of the panel, what can we do? What should the next major steps be to improve equity and insurance coverage for all?

Howard Koh: I can start broadly. It's been fascinating for me as a clinician and also public health professional to see how the worlds of health care and public health have not worked closely together. Now COVID-19 has hit, and we've all seen how important it is to do that.

Again, back to the Innovation Center at CMS and also national conversations about how to deal with health care costs, and move beyond fee for service and get more progress on value-based purchasing, but all that ultimately relates to better outcomes for all people in disparities reduction.

I think, if we can keep that conversation broad—because oftentimes when you talk about ACA you just talk about health insurance coverage alone, and that's where the conversation begins and ends—but as the questions have already implied, it's much more than that. It's making sure the outcomes improve and disparities narrow or even disappear.

Wanda D. Barfield, CDC: I think what Dr Koh said was really important. I think the challenge is really going to be, again, on the implementation arm, that there are these policies that occur. Since there's so much variation, for example for Medicaid, by state, it's really going to be an opportunity to work really closely with states and locally to make sure that these changes really stick.

Otis Brawley: I would also add that, in Maryland, we have people who are now insured, but they can't get a ride to the doctor or ride to the hospital. Transportation has become the great limiter in terms of getting people adequate care. I'd also love for us to try to diversify the hospital and doctor mix. There's a group of doctors who are willing to take Medicaid and a group who are not; I wish we could get rid of that. We still have first-class and coach health care in this country.

Michelle A. Williams: Really good point. I want to add if I may, I'll have the moderators prerogative.

Howard, your example of the Vaccine for Children case study tells us that there are going to be nonfinancial noneconomic barriers. Literacy, improving literacy and increasing awareness is going to be incredibly important, along with things like meeting people where they are in terms of transportation to facilities and the mixture of providers available to treat a diverse, increasingly, diverse population.

Howard Koh: Michelle, thanks so much for mentioning that.

Look at where we are with COVID, where we're drowning with information every day, and the general public's trying to keep up with the evolving science and then how to apply it to our own lives. It can be very, very tough, and people can get pretty frustrated when they see the recommendations changing on masks and other things.

You're absolutely right, Michelle. The health literacy themes are so key. When we're having discussions like this, and an overriding question is, what does this mean to the general public, and how do we communicate that simply so people can take this information and apply it in their own lives to be healthier for the future of their families and their children?

Pat Levitt: Michelle, I can comment on that because my Einstein slide and then the slide I showed about communicating is not just about going to the hill when its budget time and ask that the budget for NIH goes up right, which is what most science organizations do. That's what they do.

There's a huge problem in the ability of physicians, and researchers, and others in health care to communicate what they're doing in a way that resonates with individual citizens. It's not just about—I've learned the hard way—it's not just about shorter sentences; it just isn't.

We work with Frameworks Institute, which is in DC; some of you may know it—Jack's been working with them for a long time. They're a nonprofit, and what I learned from them early on is that what they call the cultural swamp, which is basically belief systems that essentially prevent the second sentence from even being heard by somebody. It crosses cultures; it crosses so many areas in which we can't penetrate because of belief systems that seem at some ways to be impenetrable. So strategies about how to communicate health and well-being, messages about the research that supports that, and the opportunities, I think, is just lacking in our system. There's not an infrastructure to support that training for students when they're going to graduate school. Certainly, you know medical students don't get this training at all, and I think, if you want to make a change, you have to be able to communicate what you

want to change. Right now I would give us, in general... I'll just to speak to the research community: I think we get a D-.

Michelle A. Williams: No, thank you for those reflections.

I'm looking at the time, and we have a number of questions. Jim Roberts, you've had typed a question in the chat, and I want to invite you to unmute.

James Roberts: I wrote the question because I wanted to be sure that I was as precise as I could be. It's an issue around race as a variable that's consider as being involved in health and disease. I think it's naive to assume that putting a label on something, that the label then does something to people in terms of their health. I also think that people who wear that label are subjected to toxic stress that we heard about because of it. How do we deal with this in a politically and humanly positive way?

Otis Brawley: Oh, you are so right, you're so right.

There is a group of Black women breast cancer survivors who is mad as hell that I have published data to show that there are 12 states in the United States where White women have a higher risk of death than Black women in Massachusetts or that there are five states that have essentially the same Black-White death rate. They feel that Black breast cancer is a different disease, and I am saying it is not a different disease. These emotional things actually interfere with finding a solution to the problem.

I do believe that we need to collect data by race and ethnicity for the sociopolitical purpose of showing that people who are certain races and ethnicities are getting less than ideal care; but that's a sociopolitical thing. The problem is, so many people think Black skin means biology is different from White skin. The NIH Revitalization act of 1993 literally says that that's why there are disparities, because the drugs don't work in me the way they work in you.

This is a huge problem; it's an institutionalized problem, and it's a mindset issue.

Michelle A. Williams: Thank you. we're going to move on, unless any of the other panelists wanted to add.

Howard Koh: I can add to that briefly. I had the incredible opportunity to review how race is categorized in the country since 1790. If you ever want a humbling exercise, just look at the charts about how every decade race categories change, and certain changes are made and then undone, and new ones are made and undone.

As an Asian American I've been tracking this carefully, because I often comment that when I started my career Asian Americans were in the "other" category; there was there was no category for us actually.

Then, over time with this genetic testing, millions of people changed their own race identification from Census assessment to Census assessment every decade. This is very fluid; it's very complicated.

It probably has little to do with biology. Just look at that classification scheme from 1790 up to 2020, and it's a very humbling and fascinating experience.

Otis Brawley: Howard, just to give you a couple of examples. Someone who is from India since 1960 has been three different races—in 1960, they were actually Caucasian, by the way. Barack Obama was White in 1970, because the 1970 Census said you should declare yourself to be the race that your mother considers herself to be.

Michelle A. Williams: Thank you, important point.

The last question is going to go to Tina Cheng. Tina, I invite you to unmute.

Tina Cheng: Well, this question may take another hour, but I was just going to mention that families have faced a huge stress in this pandemic. I would postulate that low income and communities of color have faced this stress even more. There is an NASEM report that is going to be commissioned to address the COVID impact on children and families.

I wanted to ask the panel, how do we protect kids, recognizing this huge stress that we're facing? I'm a little worried that, for instance, the VFC program has been wonderful, but now I have more patients coming to the clinic saying that maybe they don't want to get the childhood vaccines anymore, because they're not sure about whether they're safe and they got to do more research. I think that the impact of the COVID pandemic is going to be far reaching.

Wanda D. Barfield, CDC: Yes, Tina, thank you for your comments. I think it is going to be more challenging.

One opportunity, hopefully, that we can do as a start is by vaccinating pregnant women. We know that there's the opportunity to increase antibody coverage for their infants as well as to save women from pregnancy-related complications due to COVID-19. I think the conversations need to also include discussions at the community level, talking with individuals, because we know that there's still issues of trust, particularly for minority population.

Michelle A. Williams: Tina, your question is a really important one, and I couldn't help but connect the dots back to Pat's incredible presentation, where he talked about you know the pillars for resilience and what we have to remember is that this pandemic, so far, 1 in 500 American children have lost a parent or a provider. That's going to be a huge hit on that pillar for resilience for children in this country. I think you're right, through many different dimensions, we'll have to be concerned about the long lasting mental and physical impacts of this pandemic on children.

Pat Levitt: There's a data now, Michelle, that Phil Fisher at the University of Oregon, who some of you know I think, he does mostly intervention research. He developed a survey called RAPID-EC (early childhood). It's been written up in the *New York Times* a few times so you could actually see the real data.

If you identify a disparity pre-pandemic, it's gotten worse. It's not funny; it's just, it's gotten worse. Families that have been financially stressed, lack of access to resources, it's gotten worse. Insecurities for children in the family, gotten worse, etc., etc. Take a look at that data; it's very disconcerting right. I think that—he did the survey, which was a bit out of his—he's a developmental psychologist and said he wanted to know what impact is this having on children, anxiety externalizing, internalized behavior going up as reported in families, etc, etc. It's a serious problem and with no answers yet.

Michelle A. Williams: Thank you. With that, I'd like to turn the podium back to our Chair. Beth, thank you for the privilege of being a moderator for this session, and I turn it over to you.

Beth Y. Karlin: I just will say a few quick words to end this very provocative Sunday afternoon. Michelle, first, thank you so much for your leadership in moderating the session to our speakers, Pat, Wanda, Otis, and Howard.

Thank you for sharing your thoughts that I hope we will be able to have an action plan moving forward. If folks have additional thoughts, please send emails and notes. We really do want to put this together, perhaps get NAM to allow us to write a White Paper about how to not just have this discussion today and have the same comments again in 10 years, but to have some plans that we can put forward that we may be able to then take into an action plan for the US and beyond.

Thank you again. I hope everyone stays well. There is a NAM Awards Committee, awards announcement in 10 minutes if you log back on. I wish you well, and we'll see you in 2022, hopefully in DC. Thank you everybody; have a good afternoon.

Michelle A Williams: Thank you.