Attachment—Additional Questions for the Record

Subcommittee on Health
Hearing on
"The Future of Biomedicine:
Translating Biomedical Research into Personalized Health Care"
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The Honorable Frank Pallone, Jr. (D-NJ)

1. We know that there are many groups that are underrepresented in clinical trials and biomedical research, including racial and ethnic minority groups, sexual and gender minorities, people living with disabilities, people who have low income or low educational attainment, and rural residents. Based on your testimony, you have extensive experience in community engagement efforts and providing traditionally underrepresented groups the opportunity to be heard on issues related to their health.

    a. What are some of the barriers underrepresented populations face in terms of inclusion in biomedical research, and how can we reduce those barriers?

    The major barrier is that inclusion of underrepresented groups is often an after-thought rather than being seen as basic to the foundation for meaningful research.

    Four key steps that Congress can take to make inclusion in biomedical research the standard model are the following.

    - **Mandate standards of inclusion and study design that were** outlined in The NIH Revitalization Act of 1993 PL 103-43.
    - **Pass the Bipartisan Diversifying Investigations Via Equitable Research Studies for Everyone (DIVERSE) Trials Act and Diverse and Equitable Participation in Clinical Trials (DEPICT) Act.** On November 15, 2021, the Energy and Commerce Committee received a letter from a diverse group of 156 health organizations calling for passage of the DIVERSE Trials Act. The Act recognizes the increasingly important role of decentralized trials and the legislative changes needed to support participation of all communities in such trials. Similarly, the DEPICT Act looks to the future of biomedical research and supports the central role that community-based organizations must play in advancing inclusion and good science.
    - **To drive inclusion at the beginning of research design and proposal development, require all federally supported research to report findings at a minimum by gender, age, race, and ethnicity** and to include an inclusion and relevance table. An inclusion table is now required by the New

England Journal of Medicine, the most widely read and prestigious medical journal, for all research submitted for publication.

- **Direct FDA to revisit the Section 907 Report to update recommendations and report on progress.** Particular attention in the update should be paid to the recommendations supporting researchers and providers in developing models that reflect new findings available on diverse communities. This need to rethink models was recently outlined in a New England Journal of Medicine article "Beyond Diversity — Time for New Models of Health," by the Alliance President and CEO, Dr Jane L. Delgado.

b. What are the consequences of inadequate inclusion in biomedical research?

There are three major consequences (1) increased costs to the health care system as the individual will not get what is most effective for them; (2) worse outcomes for those underrepresented in biomedical research; and (3) limiting clinical discoveries. A report by the Alliance's Healthy Americas Institute, "Genes, Culture, and Health," found significant genetic variation among ethnic groups in drug metabolizing enzymes that control the oxidation process of a majority of drugs in common clinical use. However, Hispanics represent only 1.13% of individuals in genome-wide association studies (GWAS) limiting applicability of this research in the clinical setting and the ability of clinicians to fully understand differences in drug outcomes for specific patient groups and prescribe accordingly. When clinical trials do not reflect the diversity of the populations in which treatments will be used, safety and efficacy findings are skewed and the health of populations not included are put at risk. How well a drug works, its chance of causing side effects, and the type of side effects can differ by ethnic group; yet, without diversity in clinical trials clinicians do not have this information. Finally, without diversity in clinical trials we do not learn if a drug or treatment that did not produce results for non-Hispanic white males may have been effective for another population group thus limiting clinically important discoveries and treatments.

c. What more can industry stakeholders do to address the lack of diversity and inclusion in biomedical research?

There are several key steps industry can take to improve participation. Core to all of these are building trust and demonstrating a commitment to the community.

- Take an Equity Pledge committing to only conducting studies that fully meet PL 103-43 and standards of Community Based Participatory Research; including study designs powered to report data at a minimum by gender, age (as clinically relevant), and race and ethnicity.
- Significantly expand the role of and funding for community-based settings for studies; including role of providers serving communities traditionally underrepresented in biomedical research, community health workers and navigators, and trusted community leaders and patients.
- Commit to monthly reporting through FDA-TRACK, and enhanced recruitment strategies in studies where inclusion goals are not being met.

2. This Committee played a role in the creation of the NIH's *All of Us* Research Program, which is intended to help provide the data needed to facilitate further development medical treatments. This program is part of the NIH's Precision Medicine Initiative, which aims to discover how an individual's genetics, environment, and lifestyle impacts health to determine unique approaches to prevent or treat disease. To help achieve this, the *All of Us* Research Program aims to build a diverse biomedical research database of health information for over one million Americans of all demographic backgrounds. Your organization, the National Alliance for Hispanic Health, has partnered with the NIH's *All of Us* Research Program.

    a. According to reports from the *All of Us* program, over 80 percent of participants come from communities that have been historically underrepresented in biomedical research. How many people are currently enrolled in the program?

    According to the latest *All of Us* metrics the program has enrolled over 473,000 participants with 80% from communities historically underrepresented in biomedical research and 50% from racial and ethnic groups. As of March 12, 2022 of participants 20.5% are non-Hispanic Black, African American, or African; 16.9% are Hispanic, Latino or Spanish; 6.6% are more than one race/ethnicity; 3% are Asian American; 2.9% are an Other race or ethnicity.

    b. What does the *All of Us* Research Program do differently than other biomedical research to see this kind of success in diversity and inclusion?

    The answer is perhaps best summed up by the intentionality of inclusion from the beginning. By no means has the program's design and implementation been perfect, but by its design continuously monitors performance for inclusion of underrepresented groups, sets and regularly updates goals and targets for all partners to meet to advance inclusion, has multiple channels to get feedback on performance and how to improve, and fully incorporates and reports back to all participants on progress of the program and how their contribution is advancing science and health.

    The other key element of success is that the program's design and implementation imbedded principles of Community Based Participatory Research (CBPR). The program was designed not only with research institutions but with the full input and participation of organizations and members of communities traditionally underrepresented in biomedical research (UBR). The program is widely dispersed with over 450 sites collecting samples and measures and efforts to ensure rural and other areas are served. There are over 100 partner organizations with organizations representing UBR populations having a governance and implementation role as well as a role in setting research priorities and conducting research. Furthermore, partners are involved in retention efforts and reporting back to communities and participants about new findings and research. Inclusion is built into the DNA of the program and is imbedded in all levels of operations.

c. This is a massive, diverse biomedical data set and we are a few years into the process. How is the data being used now and what will it enable us to do in the future?

The program officially launched for enrollment on May 6, 2018 and only two years later the Researcher Workbench beta launched in May of 2020, more than 1,000 researchers and more than 240 institutions have already registered and are carrying out over 1,100 active research projects ranging from Alzheimer's disease to vaccine hesitancy with numerous projects exploring the role of health care access and social determinants of health and producing findings for various racial and ethnic, gender identity, and socio-economic groups.

The Researcher Workbench now includes:

- Survey data for 329,000+ participants (including lifestyle, access to care, medical history, and data from nearly 100,000 participants on their experiences during the COVID-19 pandemic, and more);
- Physical measurements for 267,600+ participants (including blood pressure, heart rate, BMI, and more);
- EHR data for 214,200+ participants (including demographics, visits, diagnoses, and medications data) harmonized to a common data model; and,
- Fitbit data for 11,600+ participants who linked their personal data to their *All of Us* account.

One of the *All of Us* Research Program's goals is to enroll 10,000 researchers to delve into the available data in the Research Hub. As it does for the participant cohort, the program aims to have a group of researchers who are diverse in many characteristics, including race and ethnicity and where they are in their career. *All of Us* understands that a diverse research community will do more than just drive new types of questions; it will also spark innovation and strengthen research.

The Alliance's supporting organization, the Healthy Americas Foundation, is already turning to the *All of Us* Research Workbench as one of the most robust databases on Hispanic health now available in order to build our understanding of cervical cancer screening among Hispanic women. The Foundation is investing resources raised through our Hispanic Family Equity Fund to support 20 early career scholars with $10,000 grants to conduct a range of research projects in cervical cancer screening. We are also engaged in using the *All of Us* research database to conduct a study on the COVID-19 experience in Hispanic communities. We have already found the *All of Us* database to be one of the most robust research resources for communities underrepresented in research.

We also have already seen that when the nation faces unexpected health challenges, *All of Us* is an important national resource to quickly understand health experiences in public health emergencies. *All of Us* delivered on the quick response need to support COVID-19 research. For example, the program --

- between January and March 2020 tested over 24,000 participant samples to look for antibodies against SARS-CoV-2, the virus that causes COVID-19;
- between May 2020 and February 2021, *All of Us* deployed the COVID-19 Participant Experience (COPE) survey six times to ask questions about mental health, well-being, and everyday life to help researchers understand how COVID-19 impacted experience over time with over 100,000 participants completing the survey one or more times; and,
- since the beginning of the COVID-19 pandemic has leveraged over 200,000 *All of Us* participant EHRs, using privacy and security safeguards including removal of direct identifiers, in order to make COVID-19 EHR data available to researchers.

These efforts not only produced critical and timely information to form an early response to COVID-19, they also have produced an important resource to understand COVID-19 and its impact in population groups that continue to experience a disproportionate impact of the COVID-19 pandemic.

The *All of Us* database is already becoming a critical national resource for exploring treatment approaches, driving research leading to new cures, and strengthening our research and medical enterprise. By engaging the participation of people and communities who had been left out of medical research and making their data available to diverse researchers across a wide range of settings, *All of Us* will accelerate health research and medical breakthroughs, reduce disparities, and enable more individualized approaches to care**.**

3. Community engagement and providing underrepresented communities the opportunity to take control of the decisions being made about their health care is vitally important. Too often, we tell those in the community what is best for them, without soliciting their input. Public engagement looks different across diverse populations. Traditional methods of outreach may not work for underrepresented communities.

    a. How can we best engage with communities that, historically, have not been asked to participate in their health and wellness?

    There is a significant level of agreement in the literature as well as the FDA Section 907 Report mandated by Congress under the 2012 FDA Safety and Innovation Act, the report of the Precision Medicine Initiative (PMI), and the diversity inclusion guide of the *All of Us* Research Program growing out of the PMI on barriers and approaches to increase participation in biomedical research.

    - **Meaningful messengers.** A number of studies have pointed to a range of solutions, including:
        - expand use of community health workers and navigators;
        - diversify the biomedical research workforce to address issues of bias in recruiting participants for biomedical research;
        - expand clinical contacts through technology solutions that incorporate eligibility for local clinical trials into electronic health records to support information and enrollment at the point of clinical contact; and,

    - train and reimburse providers for the additional time to inform their patients and connect them to an enrollment center.
- **Transportation, time, cost, and language and financial access barriers.** Logistics hesitancy is one of the biggest barriers to clinical trial participation for groups underrepresented in biomedical research. One study found that transportation was the most often cited reason for not participating with nearly 70% of potential clinical trial participants living more than two hours away from a study center. Other logistics concerns common in clinical trial literature include access to staff who speak the language preferred by the participant; conflict with work schedules; loss of income due to time required to participate; insurance concerns and cost of co-pays or being uninsured and unable to afford non-covered services; and, availability of childcare or assistance with other family responsibilities such as elder care. Solutions to address logistics and related structural barriers include:
    - linguistically and culturally proficient navigators incorporated in clinical trials, including design and implementation, with budgets to address logistics barriers;
    - utilization of Community Based Participatory Research models that would provide funding for university or research center leads along with a community-based organization as equal co-leads in design, implementation, and analysis and reporting of results; and,
    - passage of the DIVERSE Trials and DEPICT Acts that would update regulations to account for decentralized trial models, participant access to technology to support participation remotely and reduce barriers, and expansion of community-based settings.
- **Study exclusions work against diversity.** No level of well thought out and executed community-based recruitment will be successful if the study design itself broadly excludes the very people sought to participate. Exclusion criteria (e.g. body mass index, white blood cell count, pregnant women, comorbities such as diabetes) was recognized in the FDA 2020 Guidance to Industry as too broad in many studies and a barrier to recruitment of diverse population groups. Key recommendations include:
    - exclusion criteria in study design should include a specific assessment of impact on diverse participant recruitment as part of clinical trial study design submitted to FDA;
    - incorporate an exclusion criteria review at the conclusion of phase 2 studies (which can be very restrictive) to assess if they should be transferred to phase 3 and incorporate a plan for mitigation of any exclusion criteria on recruitment of a diverse group of participants;
    - characterize in early clinical trial development drug metabolism and clearance across population groups (gender, age, race and ethnicity) in order to help avoid later trial exclusions; and,
    - require adaptive clinical trial design as the default design for clinical trials to allow for pre-specified trial design changes to reduce exclusion criteria when data become available.

- **Mistrust, misinformation, and lack of information.** The history of biomedical research in many population groups continues to foster barriers of mistrust. Furthermore, social media has become a force in misinformation, particularly when the biomedical research enterprise has not prioritized delivering information through trusted community-based sources. Key recommendations include:
    - expand current FDA and NIH investments in community-based efforts to provide information on the role of clinical trials in advancing health and new treatments and cures and the importance of participation of all in such efforts;
    - expand technology platforms incorporating eligibility for clinical trials into electronic health records for providers to act on at point of clinical care, and reimburse for referrals to enrollment; and,
    - invest in hiring and training a cadre of community-based navigators equipped to answer questions on clinical trials and provide information to community residents on what trials they may be eligible for rather than recruitment navigators being specific to one study only.

b. What role do community-based organization's play and how can outside stakeholders build meaningful relationships with community members?

   Community-based organizations are critical to building clinical trials that reflect the U.S. population. The *All of Us* Research Program as well as other studies such as the Hispanic Community Health Study/Study of Latinos (HCHS/SOL) have shown that Community Based Participatory Research (CBPR) models result in robust participation of communities that have historically been underrepresented in biomedical research. All federally supported research at NIH and FDA should not only incorporate a CBPR model design, but receive a specific "relevance score" on the strength of their CBPR model design and

c. Why is culturally competent and linguistically appropriate care important? What resources are most helpful to those providers and researchers who lack cultural competency and work in community settings?

   As reported above, mistrust is a key barrier to clinical trial inclusion. While information from trusted community-based providers has been shown to increase likelihood of enrollment, the lack of diversity in investigators conducting those trials is often a barrier. Furthermore, a diverse culturally and linguistically proficient research team has been shown to increase participant recruitment and retention both of which are critical to sustaining a clinical trial to the point of returning results. For providers and researchers who lack cultural competency, it is critical that they incorporate a CBPR model and fund a co-lead from a trusted community-based agency to carry out their program. Support is available from the NIH CBPR Program as well as from a number of NIH Institutes including the National Cancer Institute that has developed the Cultural Competency and

Recruitment Training Program in addition to training for FDA Staff offered by the FDA Office of Minority Health and Health Equity.

4. Communities of color, in particular, stand to gain from *inclusive* biomedical research. It is well known that communities of color were disproportionately at risk for severe COVID-19 infection as well as COVID-19 related death. For this reason, the roll out of COVID-19 vaccine trials that equitably represented communities of color was of high importance and priority. A review of the racial diversity of the COVID-19 vaccine trials by the Kaiser Family Foundation found that both the Pfizer and Moderna vaccine trials achieved greater diversity than other previous trials although Black adults were still underrepresented.

    a. How was diversity prioritized in the COVID-19 vaccine trials?

    COVID-19 vaccine trials achieved diversity because FDA made it unmistakable in early guidance that inclusion was necessary for vaccine approval. In a statement to industry the June 2020 FDA Guidance for Industry, stated "FDA strongly encourages the enrollment of populations most affected by COVID-19, specifically racial and ethnic minorities." The guidance went on to encourage an adaptive trial design to limit exclusions that would be barriers to diverse enrollment as well as inclusion of people with comorbidities in late phase clinical development. The guidance also encouraged trial design that included representation of elderly individuals, pregnant women, and a plan for pediatric assessments of safety and effectiveness. The industry responded by developing study designs that would support an inclusive group of participants and utilized many of the recruitment and retention models detailed in CBPR principles.

    b. What additional strategies should have been employed to increase diversity in the COVID-19 vaccine trials that could be used for future COVID-19 vaccine or treatment trials?

    As stated above, the central factors that resulted in increased diversity in the COVID-19 trials were (1) clear and unambiguous guidance from FDA on inclusion and (2) use by industry of CBPR models including working with trusted community-based providers and organizations in recruitment, including navigators to answer questions and support volunteers in the process.

    Additional steps that were helpful offer lessons for future clinical trials:

    - A central online site and phone navigator number to get information on enrollment in a COVID-19 trial which should lead to a review of the current www.clinicaltrials.gov site to expedite development and release of the beta clinicaltrials.gov to make it more consumer friendly, culturally proficient, and accessible across languages and disabilities.
    - NIH looked to its current clinical trials networks and combined four National Institute of Allergy and Infectious Diseases (NIAID) networks to create the COVID-19 Prevention Trials Network. This approach would work to expand NIH clinical trials recruitment from a specific trial to more broadly support

clinical trial recruitment in the US overall. In addition, the *All of Us* Research Program represents an extraordinary national resource of volunteers committed to advancing science and is a logical resource for building recruitment of diverse communities to volunteer for clinical trials.

c. Lastly, what lessons should we carry for application in future biomedical research from the recruitment and execution of clinical trials for COVID-19 vaccines?

It is a clear lesson that changing the design of clinical trials first and foremost requires strong and clear FDA action to ensure diversity across all industry sponsored studies. It is time to change the FDA Guidance on Collection of Race and Ethnicity Data in Clinical Trials from **a non-binding to a binding guidance**.

The Honorable Anna G. Eshoo (D-CA)

1. Has your organization engaged with AI-related efforts of the federal government? If so, please share any of your comments or recommendations that you believe would be useful for the Subcommittee on Health with respect to enabling biomedical innovation.

While AI was hoped to reduce provider bias and increase quality of care for underserved populations, a number of issues have emerged as algorithms are built on existing bias and exclusions. These include a lack of baseline data by race, ethnicity, gender, age, comorbidity, disability and other populations as well as intersectional data, e.g., Hispanic female). Using a one size fits all approach in predictive algorithms results in the wrong and sometimes harmful treatment. Most health algorithms draw predictions based on prior use data; however, that data is flawed as it hardwires into health decision making the lack of health care access for underserved populations predicting less severe or lower rates of disease presentation and morbidity. AI is a case of putting the cart before the horse. It is more critical than ever that our national research enterprise solve the issue of lack of inclusion through efforts as detailed in the answer to questions above on improving clinical trials as well as access to decentralized trials, increased support for community-basing and use of CBPR standards in research, and FDA authority to mandate post-market studies for treatments approved based on studies that did not meet diversity enrollment targets as called for in the DIVERSE Trials and DEPICT Acts. Other key steps that can be taken to reduce bias in AI include:

- undertake a Federal review and encourage private industry to conduct a bias assessment of all AI tools and increase diversity of AI tool developers;
- implement a bias assessment for any AI tool utilized in the delivery of health care services that receive federal support; and,
- establish an anonymous procedure for federal and private industry staff to alert DHHS Office of Civil Rights of unreported or possible design bias in any AI tool.

2. Please describe any legal, policy, technical, or other protections that protects the privacy of personal information used in research conducted by your institution.

a. Do you believe the lack of a comprehensive privacy law reduces the desire of subjects to participate in biomedical research?

A central feature of asking community residents to participate in research is a discussion of how their information will be used and protected. In the models used by the Alliance, that discussion happens between a potential participant and a trusted community provider such as a clinical health provider or community health worker or navigator. If a comprehensive privacy law existed it would simplify those discussions, create an increased ability to monitor based on a comprehensive privacy policy, and support informed consent.

b. Do you believe federal privacy protections need to improve to protect individuals while also enabling medical research?

Too much of our privacy protections are based on a model of monitoring for and reacting to breaches. Such an approach is expensive to the research enterprise and when breaches happen it lowers confidence and trust in research. An improvement would be to expand and better integrate principles of privacy by design that builds privacy as the default into all design features of networked systems and focuses on the principles of consent, accuracy, access, and compliance. In addition, as we move to larger data systems that can be accessed by a range of researchers, there are lessons for all in the process employed by *All of Us* requiring all researchers and institutions accessing the database (1) to complete a Data Use and Registration Agreement; (2) be approved; and, (3) verify their identity through Login.gov. We also need to be clear on the consequences when someone's privacy is violated.

3. In addition to the proposed actions mentioned in your testimony to advance inclusion of clinical trials and biomedical research, what strategies do you recommend for ensuring the appropriate dissemination of therapies into targeted populations?

The 17 year gap to move research to practice continues to frustrate all involved in the research enterprise. While product labeling and peer-reviewed clinical study reviews play a critical role in communicating to providers, there is a need to inform providers of variations in population groups brought to light by new analyses and findings from genetic science. To enhance current approaches and establish new avenues for moving science from the bench to the bedside, a series of new collaborations would be helpful, including:

- Enhance funding and partnerships between the NIH National Center for Advancing Translational Sciences (NCATS) and the FDA Office of Translational Sciences (OTS) to ensure a pathway to review and inform providers of new findings in clinical trials, FDA post- approval findings, findings from enrichment efforts, and new genetic research with implications for differential clinical outcomes for specific population groups;
- Conduct a review of current drug, biologic, and device approvals to identify available research that may identify population, age, or gender-based differences in clinical

outcomes and assemble a joint NCATS and OTS report to the field to inform providers and enhance quality;
- Give FDA authority to mandate post-market studies for treatments approved based on studies that did not meet diversity enrollment targets; and,
- Establish a continuing education credits program to encourage learning about key clinical outcomes in different population groups.

One of the key challenges that needs to be addressed, as reported in the article "Beyond Diversity — Time for New Models of Health," is that there is often a reluctance to rethink old models in the light of new evidence; models that have often been formed with a lack of data from diverse population groups. The need to challenge these biases makes it critical to have a well-funded and robust translational science program.

4. How should policymakers evaluate changes in target populations over time?

   Unfortunately, longitudinal data is lacking for key disease areas for communities underrepresented in biomedical research. Two key studies that will offer new insight over time, and which deserve support for this longitudinal approach, are the *All of Us* Research Program that seeks to engage with 1 million diverse participants over a 10-year period and the Hispanic Community Health Study/Study of Latinos (HCHS/SOL) that is based on the Framingham model and is following a group of over 16,000 Hispanic participants in five year segments and is now in its second segment.

   It is also critical to mine current data to build the baseline necessary to evaluate changes over time. To this end it is critical to give FDA authority to mandate post-market studies for treatments approved based on studies that did not meet diversity enrollment targets. In addition, to build the baseline Congress should require the DHHS Secretary to establish a taskforce and report on efforts for collecting and analyzing data for populations underrepresented in biomedical research. Based on the findings the work of the task force should be to address gaps, develop solutions for fully addressing the health of the nation, and establish a protocol for evaluating changes over time. It has been 37 years since the Report of Secretary Heckler's Task Force on Black and Minority Health. The time for an update is long overdue.

The Honorable G.K. Butterfield (D-NC)

1. One of the major challenges the biomedical field faces is a lack of racial and ethnic diversity. This problem permeates through every part of the biomedical research industry—from the workforce to what data is collected to clinical trial design and participation.

   a. Mr. Falcón, can you please comment on the importance of ensuring individuals from diverse racial and ethnic backgrounds are included in clinical trials to improve personalized health care?

With better clinical information we save lives, save money, and improve the quality of life. The lack of inclusion in clinical trials means that neither providers nor patients have the information they need to make the best care decision. For too many in our country they are using information from a "one-size-fits-all" approach to make their health decisions rather than information tailored to their background and circumstances. Today personalized health care is for the few and not the majority of Americans. We also know that there are wide variations in pharmacogenetics based on gender, race, and ethnicity so too often providers must prescribe medications based on generalized data rather than being able to prescribe with information on variations of a drug for different genders, race, and ethnicity. Only with inclusion in clinical trials and design of those trials to report data by gender, age, race, and ethnicity will this situation change.

b. An analysis of clinical trials found that just 3.8 percent were funded by the NIH or other government agencies and the rest were funded by industry or other private sources. Beyond guidelines and recommendations, is there an enforcement mechanism by which NIH and FDA can ensure that all clinical trials meet clinically appropriate diversity standards? If not, should there be?

The role of FDA guidance to industry in ensuring COVID-19 vaccine clinical trials had diverse representation is a clear lesson that changing the design of clinical trials first and foremost requires strong and clear FDA action. The following three FDA enforcement mechanisms would transform clinical trials.

- Change the FDA Guidance on Collection of Race and Ethnicity Data in Clinical Trials from **a non-binding to a binding guidance.**
- Give FDA authority to mandate post-market studies for treatments based on studies that did not meet diversity enrollment targets; and,
- Mandate standards of Community Based Participatory Research be required for all drug trial studies submitted to the FDA with a "relevance score" assessing inclusion in study design.

2. As noted, there have been significant accomplishments in biomedical research, precision medicine, accelerated discoveries in cancer immunotherapy and other chronic diseases coupled with state-of-the-art data science all with the goal of improving health. As we make these incredible inroads to advance science and improve health, the gaps in race and ethnic disparities persist, and in many cases continues to widen.

Like in the case of COVID-19, across most diseases Black, Latinx, and other people of color carry the greatest burden of disease and yet remain grossly underrepresented in biomedical research. In fact, the data we currently have is limited based primarily on European cohorts (such as in the Human Genome), and therefore negatively impacts health outcomes in every area including drug development, and personalized and precision medicine.

a. Given the overwhelming lack of diversity in biomedical research that significantly impacts generalizability and outcomes in drug discovery, precision, and personalized medicine, what priorities and policies should be in place to assure rigorous science that includes appropriate diverse representation?

   Ensuring diverse representation will require linking funding decisions to research plans that meet standards of diversity for good science, including:

   - Implement a "relevance score" for scoring all federally supported research proposals assessing standards of inclusion and study design outlined in PL 103-43 and standards of Community Based Participatory Research.
   - Require all federally supported research to report findings at a minimum by gender, age, race, and ethnicity and include an inclusion and relevance table in line. An inclusion table is now required by the New England Journal of Medicine for all research submitted for publication as a means to drive consideration of inclusion at the beginning of research design and proposal development. NEJM's October 7, 2021 editorial "Striving for Diversity in Research Studies" clearly stated, "From this perspective, diversity in research isn't simply a matter of social justice. It's a critical part of learning how to improve the health of every person."

b. What does the "new frontier of biomedical research" look like in the context of equitable access and representation in biomedical research? Describe the process by which addressing the longstanding inequities of lack of diversity in biomedical research can have significant local and global outcomes. How can the government use policy to move the needle toward equity in this context?

   We are rapidly moving to a point where treatments will be tailored to the individual. However, while science is taking us to tailored care, a lack of data means that communities underrepresented in biomedical research will not benefit from this advancement or worse continue to suffer adverse events because data from other populations were applied to them. Most important the health of underserved communities can help us better understand health. A key mechanism for changing this outcome will be to support the development of large and diverse research data sets and longitudinal studies that seek to address tje lack of data for racial and ethnic groups. Two key studies that will offer new insight over time, and which deserve support for this longitudinal approach, are the *All of Us* Research Program that seeks to engage with 1 million diverse participants over a 10-year period and the Hispanic Community Health Study/Study of Latinos (HCHS/SOL) that is based on the Framingham model and is following a group of over 16,000 Hispanic participants in five year segments and is now in its second segment.

c. Describe biomedical research that are highlighting the differences between the use of "race" as a social construct and ancestry?

The key factor here is the need to collect and integrate information on the whole person. We need to move to a system where we integrate public and private data sets and look at multiple factors including health status, genetics, lifestyle factors, economics, and the environment. Our ability to bring together large data sets not only will allow us to aggregate but more importantly disaggregate data to produce information that is more relevant and supports personalized or precision medicine.

d. What are the implications of these distinct concepts in the new frontier" of biomedical research, and particularly in the context of the human genome, drug development, precision medicine, personalized medicine, and closing the gap in health disparities?

The growing ability to bring together a broad range of information in this new frontier of biomedical research means that (1) we need to be willing to build new models that better reflect growing knowledge and deeper understanding of the experiences of communities and individuals and (2) we need new experts who are adept at bringing together diverse streams of information from a variety of disciplines (public health, economics, medical science, environmental science, behavioral science) in a way that served the advancement of precision medicine and closes the gap in health disparities.

e. How does data science, AI, and machine learning perpetuate racism and inequities? What will it take at the national and local level to effectively address these issues while moving this work forward to maximize the use of these tools to advance health equity?

AI was thought to be an advancement that would eliminate the impact of provider bias, in many ways the underlying limited data sets has baked into the algorithms many of the biases that exist in those data sets. While we are building a better national research enterprise, there are key steps that can be taken to reduce bias, including:

- undertake a Federal review and effort to encourage private industry to conduct a bias assessment of all AI tools and increase diversity of AI tool developers;
- implement a bias assessment for any AI tool utilized in the delivery of health care services that receive federal support; and,
- establish an anonymous procedure for federal and private industry staff to alert DHHS Office of Civil Rights of unreported or design bias in any AI tool.

The Honorable Richard Hudson (R-NC)

1. Public engagement, understanding, and meeting the public's needs is key to optimizing the impact of biomedical research in our communities. How can we best communicate and engage with the public as to the outcomes and impact of biomedical research on their day-to-day lives? In this communication and engagement, how do we best minimize misinformation and maximize public trust? If applicable, please explain the strategies and tactics your organization or entity are utilizing to best communicate and engage with the public with regards to your biomedical research work.

   We use several strategies for communicating impact. First, community residents are a part of the design of the work that we do and as such provide input into the design of our strategies and lead many community-based efforts including town halls and health event presentations and, in some cases, become local outreach staff serving as navigators supporting recruitment and retention efforts. Second, we work with trusted community-based organization partners and they tailor efforts to respond to questions they are hearing from those they serve and utilize trusted communication vehicles including community health events, local community Spanish and English media, and social media from both the organization and participants in the research effort. Third, we work with research partners to develop reports of research findings and provide spotlights of the advancements that research program volunteers are making possible. Finally, we also conduct community listening sessions to understand if our programs are meeting community-identified needs.

2. Public-private partnerships are a critical part of ensuring translational biomedical research continues to progress and achieve success. How can we better foster innovative public-private partnerships to maximize such progress and success? If applicable, please explain how your organization or entity is approaching the development and furthering of public-private partnerships.

   Advancing biomedical research requires that information sources include both public and private partners. Research that relies on a set of physical measurements but does not understand the physical and digital environments in which a person lives will miss significant data critical to advancing health and well-being. To foster such partnerships it is critical (1) to develop a better set of privacy standards and protections that can operate across both public and private platforms of information and as one set of standards be better communicated to participants in research, including that information shared will not be used for purposes of immigration enforcement; and (2) operate by standards of inclusion in research as delineated in The NIH Revitalization Act of 1993 (PL 103-43) and standards of Community Based Participatory Research .

3. How can stakeholders – participants, patients, researchers, and providers – best work with state and local public health departments, as well as our communities.

   A key step that is needed is for state and local health departments to develop equity plans that include funding of and integration of community-based organizations serving underserved communities. This collaboration should include assessment of data systems to ensure systems are equipped to report data including by gender, race, and ethnicity; data being reported are responsive to community-based priorities; community leadership is integrated into governance and advisory roles of state and local health departments; and, funding is provided to community-based agencies as partners in services, including supporting the role of community health workers and navigators that again have proved critical in our ongoing response to the COVID-19 public health emergency.