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PERSPECTIVE

Directing Research Toward Health Equity: a Health Equity Research Impact Assessment



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Despite medical research advancements, inequities persist, as research has enhanced the health of some while leaving many communities untouched. Reforms are needed to direct research toward health equity, both during this pandemic and beyond. All research must currently pass scientific and ethical review processes, but neither may adequately examine a project's potential impact on inequities and local communities. Research stakeholders need practical tools to help review and examine any given study's impact on health equity. We articulate a health equity research impact assessment, which draws from existing research impact assessments and health disparities research measures and frameworks. We describe how this tool was developed and how it may be used by research reviewers, researchers, academic institutions, and funding agencies to elevate health equity in medical science.

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In this unprecedented time of cross-institutional research collaborations to address the coronavirus pandemic, we must acknowledge that all communities do not equally benefit from scientific advances.¹ Rather, medical research has advanced the health of some and left others behind, leaving untouched or even worsening some inequities for Black and Brown communities.^{2,3} Calls for anti-racism and equity in research have been made in many fields including public policy, mathematics, business, law, and art.^{4–9} These have been echoed in medical research.^{10–12} To realize this goal, we need intentional practices that integrate health equity into the work of all medical research—from basic science to public health.

Inequities in health and healthcare are unfair differences in outcomes based on characteristics like race, gender, sexual orientation, insurance status, neighborhood, and language, with roots in racism and oppression.^{13,14} Health equity is the “principle underlying a commitment to reduce—and, ultimately,

eliminate—disparities in health and in its determinants, including social determinants. Pursuing health equity means striving for the highest possible standard of health for all people and giving special attention to the needs of those at greatest risk of poor health, based on social conditions.”¹³ As a research theme, health equity cuts across scientific fields, from basic science to epidemiology.¹⁵ As a research goal, health equity is a lens through which one can view all research activities and outcomes.

All research must be scientifically sound and ethical, undergoing separate review processes for each, but practical tools are needed to achieve critical reflexivity about any given study's potential to address inequities in this pandemic and beyond. Health impact assessments are tools that assess public policies' effects on community health, for example, documenting the effects of a new highway project on public exercise spaces and asthma. The Society of Practitioners of Health Impact Assessment developed *Equity Metrics for Health Impact Assessment Practice*, which incorporate principles like community participation and shared decision-making into health impact assessments.¹⁶ While focused on equity, their tool is not designed for use in medical research review processes. Research impact assessments assess the outcomes of proposed or completed medical research on a range of domains to help researchers report the impact of their research to funders and other stakeholders (see¹⁷ for a systematic review). The Research Impact Framework, for example, is designed as a flexible checklist of 27 prompts to help researchers and institutions create qualitative descriptions of a study's impact in four domains: academic (e.g., publications), policy, clinical, and societal.^{18,19} The Research Impact Framework dedicates only one item to health equity. To our knowledge, there is no tool dedicated to assessing medical research's impact on health equity. Our proposed assessment aims to fill an important gap by serving as a tool designed for health researchers to help direct scientific discovery and research peer review toward equity.

DEVELOPMENT OF A HEALTH EQUITY RESEARCH IMPACT ASSESSMENT

In Los Angeles during this pandemic, deadly inequities experienced by Black, Latinx, and other minority communities

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parallel disturbing national trends and are due to longstanding racism and health inequities.^{11,20} Recognizing these and other local inequities, the David Geffen School of Medicine at the University of California, Los Angeles, created our Health Equity Research and Advisory Committee. The committee is chaired by the authors (EC, CH) and includes nine researchers in psychiatry, general internal medicine, gastroenterology, epidemiology, trauma surgery, emergency medicine, and pediatrics. All members are experienced researchers who specialize in health disparities and community-partnered research, especially with local racial/ethnic minority communities. Our committee's initial charge was to promote health equity in the medical school's portfolio of COVID-19 research. Our work has evolved to integrate health equity into all research beyond COVID-19 and develop health equity research review processes.

Our initial motivation in developing this tool was to enrich the peer review process for COVID-19 research funding with

a more systematic assessment of studies' potential health equity impact (Box 1). To develop our tool's domains and content, we reviewed published health equity-related research frameworks.^{15,21–28} Our assessment's domains comprise common research processes—community engagement and research partnerships; recruitment, representativeness, and generalizability; intervention design; interpretation and contextualization; and dissemination of research findings and community benefit—that the National Institute on Minority Health and Health Disparities and World Health Organization have described as critical to the advancement of health disparities research and health equity in medical science.^{15,22} Domains' content is drawn from published community-partnered and health disparities research measures and frameworks (see^{15,21–28}). Whereas those published examples convey their content to guide health disparities research priorities and strategic planning, we found that they were not readily useful for the research review process.

Box 1 Health Equity Research Impact Assessment for Researchers and Research Reviewers

Community Engagement and Research Partnerships^{21–23}

- How will this study engage with diverse, under-resourced, and/or vulnerable communities, especially addressing histories of mistrust and/or research abuses?
- How will the study engage community leaders, community-based organizations, and other stakeholders?
- How will community partners be engaged in the following research activities: needs assessment, study design, development of research questions and hypotheses, recruitment, data collection, data analysis and interpretation, and dissemination of findings in academic, community, policy, media, and other venues?
- For basic and translational science: What are the investigators' plans for translation of their research to address health disparities via transdisciplinary research partnerships or other mechanisms?

Recruitment, Representativeness, and Generalizability^{24–26}

- Who are included in this study? Who are excluded?
- Are there recruitment processes in place to ensure the study sample is representative of the local community (or communities, if multi-site)?
- Note, this may be different than the populations typically served by the research institution
- Consider representation not just by race, ethnicity, and gender, but also by (including, but not limited to) sexual orientation, income, immigration status, health insurance coverage
- Language access: Are non-English speakers included in the study and with adequate supports? Are study materials accessible in multiple languages? How does the study support the recruitment of non-English language speaking participants?

Intervention Design^{15,22,27}

- Will the intervention be conducted in generalizable settings with representative community samples?
- To what extent will the population of focus be engaged in the development or tailoring of the intervention (e.g., needs assessment, collaborative design of intervention) to ensure it is appropriate for that population?
- Taking into account the complexity of health, healthcare, and social inequities, will the intervention act at multiple social-ecological levels (i.e., individual, interpersonal, institutional, community, public policy)? Will the intervention involve multi-disciplinary teams and/or multi-sector systems and services?

Interpretation and Contextualization^{15,22,27}

- Does the study's data collection occur solely at the biological to individual-behavioral levels, which has been shown to increase the potential for misinterpretations of study results due to the absence of contextualizing data? Some research design elements have been shown to decrease potential misinterpretations of study findings, including mixed methods designs, data collection at multiple social-ecological levels, collection of data across the lifespan, and data on sociocultural constructs and physical environments.
- Will this study employ adequate methods to facilitate accurate interpretations of research findings, particularly from the perspective of racial and ethnic minority and other vulnerable communities?
- If the study will collect data only at the biological to individual-behavioral levels, what explicit safeguards will be in place to prevent potential misinterpretation of study results?
- How will the study's results affect the population of focus? Is there the potential for unintended negative consequences for a minority population or under-resourced community?
- How will community stakeholders be engaged in the analysis and interpretation of research findings, to contextualize and help prevent misinterpretations? If such stakeholders are not included, what other relevant safeguards are in place?

Dissemination of Research Findings and Community Benefit^{21,23,25,28}

- What are investigators' plans to disseminate study results to minority populations and under-resourced communities, either directly or through translational research partnerships?
- What are the investigators' plans to translate research findings to recommendations for specific policy reforms and/or engagement with policymakers and relevant healthcare or other systems?
- Will the research create or support clinical or other services that will continue sustainably beyond the proposed period of study to serve minority and other under-resourced communities?

Overall Impact on Health Equity

- If successful, how and to what extent will this research address health, healthcare, and/or social inequities and outcomes for racial and ethnic minority populations and under-resourced communities?
- Is there the potential for this research to inadvertently worsen inequities?

The authors (EC, CH) developed the initial version of this assessment, which was reviewed by all committee members who provided feedback on domains (e.g., split “Community Engagement and Investment” into two domains: “Community Engagement and Research Partnerships” and “Community Benefit”) and the phrasing of content for clarity and completeness. We piloted the use of our tool to review 30 applications for funding allocated to COVID-19 health equity research. Studies were in diverse medical and non-medical fields—ophthalmology, primary care, geriatrics, psychiatry, pediatrics, public health, law, and environmental health sciences. Studies focused on a range of COVID-19-related topics, from public health models for re-opening public schools to multimedia public health education for Spanish-speaking individuals with serious mental illness. This pilot generated multiple rounds of review and revision of the tool by our committee (e.g., revised “Representation” domain as “Recruitment, Representativeness, and Generalizability,” and added the explanatory first bullet point in the domain “Interpretation and Contextualization”), until the tool reached its current form.

EXAMINING AND PROMOTING HEALTH EQUITY IN RESEARCH DESIGN

Frameworks by the National Institute on Minority Health and Health Disparities, World Health Organization, and others highlight methodological considerations to advance health disparities science and promote health equity.^{15,22} Like the Research Impact Framework, our assessment conveys its content as a series of prompts and questions to promote critical reflection and make it readily useful for researchers and reviewers, regardless of their expertise in health equity.^{18,19} We did not aim to create a quantitative instrument that would generate, for example, a health equity score. We also do not suggest that all studies must address every component of each domain.

Community and interdisciplinary research partnerships have been described as critical for shortening the translational research-to-service gap and for addressing the needs of diverse, under-resourced communities.^{21–23} The *Community Engagement and Research Partnerships* domain includes prompts about the engagement of diverse community stakeholders, particularly those who may mistrust medical research due to histories of marginalization and abuses. As some basic and translational studies may not include opportunities for community engagement, this domain includes a prompt to consider how those studies may include plans for interdisciplinary partnerships, for example, with health services or public health researchers, to facilitate research translation and dissemination to address disparities.¹⁴

Underrepresentation of minority populations in medical research is multi-factorial and has a long history that

has engendered understandable mistrust, but many best practices exist to engage diverse populations in research.^{24–26} *Recruitment, Representativeness, and Generalizability* invites deliberation about who is included or excluded from a study, emphasizing non-English language access and representation not just by age, race, and gender, but by other sociodemographics (e.g., sexual orientation, insurance status). This focus on representation should not be understood as reinforcing myths about race as biologically determined, but rather is animated by the goal of making science more accountable to diverse communities.²⁹

Intervention Design considers whether a study’s intervention (if applicable) is generalizable and appropriate to the needs of its population of focus.^{15,22,27} Given the multi-factorial nature of inequities, the domain includes a prompt to consider how a proposed intervention may act at multiple social-ecological levels and involve multiple systems and sectors. Similarly, *Interpretation and Contextualization* considers whether a given study collects data that is sufficient to interpret its proposed findings, drawing from literature about potential misinterpretation of research findings in the absence of contextual data, community input, or other safeguards.^{15,22,27}

Dissemination of Research Findings and Community Benefit acknowledges a common failure for medical research to consider racial and ethnic minority populations and under-resourced communities as the end-users of scientific advancements.^{21,23,25,28} One example in this pandemic is vaccine distribution, which has the potential to reinforce or worsen inequities without diverse stakeholder engagement, community-informed and culturally tailored health education, and the integration of social vulnerability metrics into allocation plans.^{30–33} This domain invites explicit consideration about the immediate and sustained benefit of research for diverse, under-resourced, and other vulnerable communities, either directly or through intentional translational research and policy partnerships. The tool closes with prompts about a study’s *Overall Impact on Health Equity*, urging reflection on the potential for a study to address or possibly worsen inequities.

“IT IS TIME TO BE EXPLICIT”: PRACTICAL APPLICATIONS AND LIMITATIONS

Practical Applications. Our Health Equity Research Impact Assessment can be used as a practical tool by multiple research stakeholders, one that brings health equity into conversations where it may have been notably absent or under-systematized (Box 2). Our Health Equity Research and Advisory Committee used this tool in the review of applications for COVID-19 research funding, as described

Box 2 Practical Applications of the Health Equity Research Impact Assessment for Researchers, Reviewers, Research Institutions, and Funding Organizations

Stakeholder	Practical applications
Researchers	<ul style="list-style-type: none"> • Inform research planning processes, including revision of research objectives, study questions, and design to promote equity • Identify needs and opportunities for interdisciplinary research collaborations to decrease the science-to-practice gap for under-resourced communities • Identify opportunities for community partnerships to inform all research processes, increase generalizability, and ensure dissemination of findings to under-resourced communities
Peer reviewers	<ul style="list-style-type: none"> • Invite continual assessment at every study phase to enhance health equity impact • Prospectively assess studies' potential impact on health equity • Inform feedback for researchers, inviting opportunities to revise studies to enhance their health equity impact
Institutions and funding agencies	<ul style="list-style-type: none"> • Retrospectively or prospectively assess the health equity impact of studies within an institution's or agency's research portfolio • Inform strategic planning processes to prioritize trainings, funding opportunities, team science, and community partnerships to enhance health equity impact • Prioritize health equity goals in all research funding opportunities (requests for applications), drawing on this tool's domains: <ul style="list-style-type: none"> - Institute health equity research review processes for all studies - Require researchers to describe the health equity impact of proposed projects - Integrate health equity goals into the objectives of research funding opportunities - Prioritize studies that incorporate methodologies and partnerships to enhance their health equity impact - Emphasize research dissemination outside of traditional academic venues, especially to local, under-resourced communities

above. Committee members' consistent feedback was that this tool enabled a more intentional and systematic approach to reviewing a studies' impact on health equity compared to ad hoc approaches they had used previously (e.g., assessing a study's overall public health impact).

Sharing the results of our health equity–focused reviews with researchers has given them the opportunity to revise their studies. This has yielded moments of reflection and dialog, as we have encouraged researchers to recruit study populations outside of our healthcare institution, partner with county hospitals and health departments, form interdisciplinary collaborations, and center community voices.

This tool may be used by other stakeholders, as detailed in Box 2. By asking themselves the questions in this tool, researchers have the opportunity to critique their study objectives and identify opportunities for research and community partnerships. Research institutions and funding agencies can use the prompts in this tool to examine individual studies or adapt the prompts to examine their overall research portfolios (e.g., changing “How will the study engage community leaders...” to “How does our portfolio of research engage community leaders...”). In sum, we hope that our assessment invites multiple stakeholders to engage in more systematic reflection on health equity in medical science.

Limitations. While we used established framework development methods to create our tool, we have not conducted a formal validation study. We view this articulation of a health equity research assessment as an important first step. Future studies are needed to further refine this assessment, through cognitive and qualitative interviews with diverse research and community stakeholders, and to assess the effects of this tool's use on research designs, research review processes, and overall

research impact on local and national health equity outcomes. Of note, we designed this qualitative tool, like the Research Impact Assessment, as a flexible series of prompts for research stakeholders. We did not design it as a quantitative psychometric scale, and so tests of psychometric validity (e.g., item response theory) were not used.

Future Directions. We propose that health equity impact reviews be instated alongside existing scientific and ethical review processes. This will require the support of national research organizations and academic institutions. Institutions interested in adopting this framework could start by identifying local experts in health equity and community partnerships in research; tailoring our framework with input from those experts and community leaders; and directing researchers and review committees to conduct prospective and retrospective health equity impact reviews.

We propose this framework as a living, not a static document. We encourage institutions and researchers to adapt this tool over time and by locale, institutional history, and other exigencies. Some institutions have extensive community partnerships in research and can revise this framework to further prioritize and extend that work. Other institutions have broken relationships with neighboring diverse, under-resourced communities, arising from legacies of neglect or research abuses.^{2,3} Those institutions might use this framework to first examine their research portfolio and identify opportunities for re-engagement with community leaders and dissemination of research findings to local under-resourced communities.

This framework should not be used as a litmus test to silence scientific discovery or foundational laboratory research. Additionally, this framework should not be used only for applied research fields like public health and health services research. Health equity goals are relevant to all medical

research. To be sure, any research impact assessment places certain values and expectations on our scientific community. Social medicine has long shown how all scientific endeavors are immersed in explicit and implicit values, social norms, and dominant ideologies. In the absence of a well-articulated health equity framework, other values will naturally prevail in medical science.^{34,35}

We view this tool as an initial step. Many reforms are needed to elevate health equity as a guiding mission for medical research.^{34,36} At the macro level, Black and Latinx individuals are underrepresented in our scientific community, particularly in senior faculty positions and on study sections, and experience inequities in grant funding.³⁶⁻³⁸ We must also address the systematic deprioritization of health disparities, community, and population-level research.^{36,39,40} We propose our framework as one tool for the work ahead, which will require a moment-by-moment examination of the ways our science is designed, conducted, funded, supported, and disseminated.

Paula Braveman writes, “Scientists, like all others, should be guided by ethical and human rights values. The first decade of the 21st century has ended with little if any evidence of progress toward eliminating health disparities...It is time to be explicit that the heart of a commitment to addressing health disparities is a commitment to achieving a more just society.”¹⁴ This pandemic is the time to be explicit. Our scientific status quo should not persist when medicine and other fields are being asked to be more directly socially accountable, more directly contributing to equity and justice. Researchers have the responsibility to bridge divides between scientific innovation and societal impact. Under-resourced communities should not have to crane their necks to glimpse the benefits of research to their health and lives.

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REFERENCES

- Dankwa-Mullan I, Maddox YT. Embarking on a science vision for health disparities research. *Am J Public Health* 2015; 105 Suppl 3: S369-71.
- Nuriddin A, Mooney G, White AIR. Reckoning with histories of medical racism and violence in the USA. *Lancet*. 2020; 396: 949-951.
- Scharff DP, Mathews KJ, Jackson P, Hoffsuemmer J, Martin E, Edwards D. More than Tuskegee: understanding mistrust about research participation. *J Health Care Poor Underserved* 2010; 21: 879-897.
- Thomas VG, Madison A, Rockcliffe F, DeLaine K, Lowe SM. Racism, social programming, and evaluation. *Am J Eval* 2018; 39: 514-526.
- Brown KS, Kijakazi K, Runes C, Turner MA. Confronting structural racism in research and policy analysis. Urban Institute. Available at: http://www.urban.org/sites/default/files/publication/99852/confronting_structural_racism_in_research_and_policy_analysis_0.pdf. Accessed 29 Jan 2021.
- D'Ambrosio B, Frankenstein M, Gutiérrez R et al. Addressing racism: JRME Equity Special Issue Editorial Panel. *J Res Math Educ* 2013; 44: 23-36.
- Melaku TM, Beeman A. Academia isn't a safe haven for conversations about race and racism. *Harvard Business Review*. Available at: <https://hbr.org/2020/06/academia-isnt-a-safe-haven-for-conversations-about-race-and-racism>. Accessed 29 Jan 2021.
- Bowman CG, Roberts D, Rubinowitz LS. Race and Gender in the Law Review. Faculty Scholarship at Penn Law. Available at: https://scholarship.law.upenn.edu/faculty_scholarship/577?utm_source=scholarship.law.upenn.edu%2Ffaculty_scholarship%2F577&utm_medium=PDF&utm_campaign=PDFCoverPages. Accessed 29 Jan 2021.
- Dewhurst M, Hendrick K. Identifying and transforming racism in museum education. *Journal of Museum Education* 2017; 42: 102-107.
- Egede LE, Walker RJ. Structural racism, social risk factors, and COVID-19 — a dangerous convergence for Black Americans. *N Engl J Med*. 2020; 383: e77(1-3).
- Bowleg L. We're not all in this together: on COVID-19, intersectionality, and structural inequality. *Am J Public Health* 2020; 110: 917.
- Buchanan N, Perez M, Prinstein M, Thurston I. Upending racism in psychological science: strategies to change how our science is conducted, reported, reviewed, and disseminated. Available at: <https://doi.org/10.31234/osf.io/6nk4x>. Accessed 5 Jan 2021.
- Braveman P. What are health disparities and health equity? We need to be clear. *Public Health Rep* 2014; 129 Suppl 2: 5-8.
- Braveman PA, Kumanyika S, Fielding J et al. Health disparities and health equity: the issue is justice. *Am J Public Health* 2011; 101 Suppl 1: S149-55.
- Jones NL, Breen N, Das R, Farhat T, Palmer R. Cross-cutting themes to advance the science of minority health and health disparities. *Am J Public Health* 2019; 109: S21-S24.
- Heller J, Givens ML, Yuen TK et al. Advancing efforts to achieve health equity: equity metrics for health impact assessment practice. *Int J Environ Res Public Health* 2014; 11: 11054-11064.
- Cruz Rivera S, Kyte DG, Aiyegbusi OL, Keeley TJ, Calvert MJ. Assessing the impact of healthcare research: a systematic review of methodological frameworks. *PLoS Med* 2017; 14: e1002370.
- Kuruville S, Mays N, Pleasant A, Walt G. Describing the impact of health research: a Research Impact Framework. *BMC Health Serv Res* 2006; 6: 134.
- Kuruville S, Mays N, Walt G. Describing the impact of health services and policy research. *J Health Serv Res Policy* 2007; 12 Suppl 1: S1-23.
- Los Angeles County Department of Public Health. LA County Daily COVID-19 Data. Available at: <http://publichealth.lacounty.gov/media/Coronavirus/data/index.htm>. Accessed 29 Jan 2021.
- Kost RG, Leinberger-Jabari A, Evering TH et al. Helping basic scientists engage with community partners to enrich and accelerate translational research. *Acad Med* 2017; 92: 374-379.
- Östlin P, Schrecker T, Sadana R et al. Priorities for research on equity and health: towards an equity-focused health research agenda. *PLoS Med* 2011; 8: e1001115.
- Arora PG, Krumholz LS, Guerra T, Leff SS. Measuring community-based participatory research partnerships: the initial development of an assessment instrument. *Prog Community Health Partnersh* 2015; 9: 549-560.
- Oh SS, Galanter J, Thakur N et al. Diversity in clinical and biomedical research: a promise yet to be fulfilled. *PLoS Med*. 2015; 12: e1001918.
- Dye BA, Duran DG, Murray DM et al. The importance of evaluating health disparities research. *Am J Public Health* 2019; 109: S34-S40.
- George S, Duran N, Norris K. A systematic review of barriers and facilitators to minority research participation among African Americans, Latinos, Asian Americans, and Pacific Islanders. *Am J Public Health* 2014; 104: e16-31.
- Jeffries N, Zaslavsky AM, Diez Roux AV et al. Methodological approaches to understanding causes of health disparities. *Am J Public Health* 2019; 109: S28-S33.
- Dankwa-Mullan I, Rhee KB, Stoff DM et al. Moving toward paradigm-shifting research in health disparities through translational, transformational, and transdisciplinary approaches. *Am J Public Health* 2010; 100 Suppl 1: S19-24.
- American Society of Human Genetics. ASHG Denounces Attempts to Link Genetics and Racial Supremacy. *Am J Hum Genet*. 2018; 103: 636.

30. Bibbins-Domingo K. This time must be different: disparities during the COVID-19 pandemic. *Ann Intern Med* 2020; 173: M20-2247.
31. Ndugga N, Pham O, Hill L, Artiga S, Mengistu S. Early state vaccination data raise warning flags for racial equity. Kaiser Family Foundation. Policy Watch. Available at: Accessed 29 Jan 2021.
32. Henry Akintobi T, Jacobs T, Sabbs D et al. Community engagement of African Americans in the era of COVID-19: considerations, challenges, implications, and recommendations for public health. *Prev Chronic Dis* 2020; 17: E83.
33. National Academies of Sciences, Engineering, and Medicine. Framework for Equitable Allocation of COVID-19 Vaccine. Available at: <https://pubmed.ncbi.nlm.nih.gov/33026758>. Accessed 29 Jan 2021.
34. Wingfield AH. Systemic racism persists in the sciences. *Science*. 2020; 369: 351.
35. 500 Women Scientists Leadership. Silence is never neutral; neither is science. Available at: <https://blogs.scientificamerican.com/voices/silence-is-never-neutral-neither-is-science/>. Accessed 29 Jan 2020.
36. Carnethon MR, Kershaw KN, Kandula NR. Disparities research, disparities researchers, and health equity. *JAMA*. 2019; 323: 211-212.
37. Garrison H. Underrepresentation by race-ethnicity across stages of U.S. science and engineering education. *CBE Life Sci Educ* 2013; 12: 357-363.
38. Ginther DK, Schaffer WT, Schnell J et al. Race, ethnicity, and NIH research awards. *Science*. 2011; 333: 1015-1019.
39. Hoppe TA, Litovitz A, Willis KA et al. Topic choice contributes to the lower rate of NIH awards to African-American/Black scientists. *Sci Adv*. 2019; 5: eaaw7238.
40. National Institutes of Health. Research topic contributes to persistent gap in NIH research grants to black scientists. Available at: <https://www.nih.gov/news-events/news-releases/research-topic-contributes-persistent-gap-nih-research-grants-black-scientists>. Accessed 29 Jan 2021.

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