



# Racial Disparities Among Lung Transplant Survivors—Shadows and Substance

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Racial disparities in health care can exert a devastating impact on patient health and survival. While some gains have been made in the past decade, Black patients still face significant barriers to appropriate and high-quality health care. This is true even in transplantation, a system of allocating scarce life-saving resources that is governed nationally and operates locally. For instance, Black patients are less likely than White individuals to undergo lung transplants, and when they do, they are more likely to experience worse posttransplant outcomes.<sup>1</sup> Elsewhere in *JAMA Network Open*, Lehr and colleagues<sup>2</sup> assessed the association of neighborhood socioeconomic status (SES) and geographic location with post-lung transplant outcomes across race and ethnicity. Their study found that Black patients had a demonstrable disadvantage in post-lung transplant survival, as did recipients who received lungs from donors residing in the least resourced neighborhoods. They also found that these differences in survival by race persisted despite efforts to account for variation by neighborhood SES. These findings appear to be at variance with the contemporary construct of SES negatively impacting clinically meaningful outcomes in racially minoritized individuals.

Fibrotic lung disease and chronic obstructive pulmonary disease (COPD) are common indications for lung transplantation worldwide and account for more than 60% of individuals requiring lung transplants in North America. Fibrotic lung disease occurs several years earlier in Black patients than in White patients.<sup>3</sup> In addition, Black individuals with COPD have higher mortality rates and a greater prevalence of associated risk factors, such as smoking and exposure to environmental pollutants, compared with White individuals. However, the proportion of Black patients who have received a lung transplant is lower than their proportion in the population with end-stage lung disease. Even after successful transplant, Black patients have lower survival rates compared with their White counterparts. Due to ongoing segregation, racial minority groups tend to cluster in the same geographical location, thus Lehr and colleagues<sup>2</sup> applied a commonly used algorithm, the area deprivation index (ADI), to their statistical analyses to determine whether neighborhood SES mediated the association of race with the observed lower survival among Black individuals. They found that ADI did not mediate the difference in posttransplant survival between Black and non-Hispanic White recipients. A novel finding is that recipients, regardless of race, who had a donor who was Black or lived in a lower SES neighborhood had lower posttransplant survival. The survival disadvantage conferred by having a Black donor was not explained by donor cause of death, blood type, or HLA mismatch.

These findings are intriguing and require closer examination. Race is a social construct that is often associated with other factors linked to health outcomes. Factors besides neighborhood that may impact poor transplant outcomes include structural and interpersonal racism, comorbidities, posttransplant care quality, insurance, and individual SES, which were not analyzed in this study and could have biased the observed results.<sup>4</sup> Important, unanswered questions include: are Black patients more likely to receive posttransplant care at places of lower overall quality? Conversely, while attending the same places as their White counterparts, do they still receive lower quality care? Might Black patients' delays in reaching the waiting list or receiving a transplant account for the observed lower overall survival? Are Black individuals more likely to have extrapulmonary comorbidities that could impact posttransplant survival, such as kidney disease or cardiovascular disease? Or is there a downstream biological effect of racism and other adverse circumstances due to epigenetics or increased inflammatory response that leads to earlier death from graft failure or other complications? In addition, while race is a poor proxy for ancestry, it is possible that, like *APOL1* in

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the kidney, this observed effect is partly due to an ancestry-related gene polymorphism in either the donor or the recipient. It is important to note that even in the case of *APOL1* and kidney disease, the gene polymorphism only explains part of the Black-White difference in disease progression.<sup>5</sup> The impact of racial disparities in health care access is clear when looking at the lung transplant candidate and donor pools. The least resourced ADI was comprised mostly of younger candidates and had the highest proportion of Black patients at listing. This pattern is consistent with that seen in pulmonary fibrosis, the leading indication for lung transplant.<sup>6</sup> These findings highlight the urgent need to further investigate and address the impact of health care disparities on lung transplant outcomes for racial and ethnic minority populations. The work by Lehr and colleagues<sup>2</sup> also suggests that the increased risk of posttransplant death among Black recipients may be associated with their region of residence. Racial differences in recipient mortality were explained, at least in part, by recipient residence in the South. Black transplant candidates and donors were overrepresented in the South, a region that has a legacy of racism, poverty, and poor health outcomes overall. This finding is consistent with a recent National Academies of Sciences, Engineering, and Medicine study that implicates geographic location as a determinant of transplant outcomes.<sup>7</sup>

So how should these findings be incorporated into policy? The answer is unclear. Efforts are ongoing to transition the current lung allocation system into a composite allocation score (CAS) that addresses multiple factors simultaneously while prioritizing candidates for lung transplants.<sup>8</sup> The CAS will use empirical evidence on waiting list death and posttransplant mortality in an attempt to balance equity and utility. Given the results of Lehr and colleagues,<sup>2</sup> it remains to be seen whether the CAS will improve health equity or whether inequities will remain baked into the algorithm. The CAS may reduce regional disparities by allocating organs outside of geographic boundaries; however, incorporating data that Black candidates and those from the South have increased posttransplant mortality may further disadvantage these groups.

As it is, this analysis raises more questions than it answers. Why does the residence of the donor and the recipient influence posttransplant outcomes? Further studies are needed to illuminate our understanding of the role of environmental factors, including air pollution, which could have affected the lungs of both the donor and recipient. Additional work should incorporate individual and health system factors, as these are only indirectly captured in current race and geographic groupings. In addition, examining how continued stress from racism and poverty influence lung health outcomes is an essential line of inquiry. Finally, while understanding how race and poor environments negatively influence health outcomes is important, it is equally vital to ameliorate these structural and health system barriers to health equity. Ultimately, these intriguing findings from Lehr and colleagues,<sup>2</sup> which suggest that neighborhood SES does not account for racial disparities in lung transplant survival, highlight the need for a closer examination of the systemic biases and barriers within the health care system and society that contribute to the unequal post-lung transplant survival of racial and ethnic marginalized communities.

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#### ARTICLE INFORMATION

**Published:** April 19, 2023. doi:10.1001/jamanetworkopen.2023.8285

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**Conflict of Interest Disclosures:** Dr Adegunsoye reported receiving unrelated speaking and advisory board fees from Boehringer Ingelheim and Genentech, consulting fees from Roche Pharmaceuticals and Inogen, and grants

from the Pulmonary Fibrosis Foundation and the American College of Chest Physicians outside the submitted work. Dr Saunders reported receiving personal fees from the Clinical Education Alliance outside the submitted work.

**Funding/Support:** Dr Adegunsoye was supported by career development award K23HL146942 from the National Heart, Lung, and Blood Institute.

**Role of the Funder/Sponsor:** The funder had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

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