

Living in redlined areas associated with lower lung function in those with asthma

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Individuals with asthma who live in redlined neighborhoods have worse lung function than those in locales that excluded Black people and benefited from decades of inequitable wealth accumulation at the expense of Black communities in the United States, according to research presented at the ATS 2021 International Conference.

Alexander Schuyler, MD/Ph.D. candidate, University of Pittsburgh School of Medicine, and Sally Wenzel, MD, director, Asthma & Environmental Lung Health Institute, University of Pittsburgh Medical Center, sought to examine the connection between residence in historically redlined communities and the impact on lung function and asthma outcomes. Redlining is a form of institutional racism and discriminatory mortgage lending practice enacted by the Home Owners' Loan Corporation in the New Deal era that resulted in racialized economic deprivation and segregation. These historically validated and geographically defined mechanisms contribute to current environmental inequities, and, as the authors propose, to worsening asthma outcomes in

Black neighborhoods across the U.S.

"Lung health in Black people is impacted by converging legacies of institutional racism, including racist mortgage loaning practices like redlining, and associated environmental inequities," stated Mr. Schuyler. "Racist housing policies have had a long-term negative impact on diseases like asthma. In addition, the clinical and research convention of applying a race correction to lung function measurements may have accentuated these effects, underestimating the impact of racism and environmental inequities on lung health."

Race-based correction for spirometry was constructed in the 1840s by White supremacist physician and enslaver Samuel Cartwright, who used research to justify Black enslavement and to fabricate arguments that Black people were inferior to White people, including having lower lung function. These adjustments continue today, and are considered accepted medical practice. The authors state that the sickest Black patients with asthma may be undertreated because the results of their breathing tests are "adjusted" and may appear to have better lung function than they actually do.

To examine the impact of institutional racism on asthma outcomes, the researchers looked at the lung health of 326 Pittsburgh residents with asthma localized by zip code to determine if they lived in redlined neighborhoods. Patients were identified by the University of Pittsburgh Asthma and Environmental Lung Health Institute at UPMC's patient registry. Study participants were given spirometry lung function tests and questionnaires.

The researchers determined that residence in redlined neighborhoods was independently associated with lower forced expiratory volume (FEV1—the maximum amount of air a person can forcibly exhale in one second) after theoretical adjustment for several variables used to "normalize" lung function in research and clinical

practice. Supporting these differences, they found that despite no difference in life-threatening asthma episodes, an increased prevalence of co-occurring diseases (co-morbidities) was present in asthmatic adults living in more redlined neighborhoods, independent of race.

"Race is a social construct," said Mr. Schuyler. "We propose that race-based corrections of spirometric values, a multiplicative scaling factor applied to height, age, and sex-adjusted FEV1 and FVC (forced vital capacity—maximum amount exhaled forcefully after breathing in deeply) values on the basis of race, should be abolished. Redlined neighborhoods experience persistently poor air quality, supporting a link with environmental inequality. The use of race-based corrections for spirometric values suggests that observed variations (if any) in lung function across racial groups are related to differential biology when, in fact, disproportionately higher exposure to pollution likely contributed to these differences."

He added, "Clinicians should not use spirometric values alone to make medical decisions, without including the clinical or socioenvironmental context."

The authors explained how spirometric values are adjusted for Black asthma patients: "The equations used to correct spirometric values are generated in reference to a White population. Thus, for this equation White people are artificially assigned a correction factor of 1, while Black people, Asian people, and other racial groups are assigned a correction factor of less than 1. Black people have a correction factor that is typically 85-90% of that used for the White population.

"Applying this correction factor to Black folks compresses the difference between the actual and 'predicted' values in liters to a higher degree than in White people, meaning, in those with severe disease, their lung function appears numerically better than it is. This could lead to clinical decisions to undertreat Black patients. In contrast, there is no recentering of the 'predicted' value in liters in White people. Lower than normal [lung](#) function in White people may promote earlier treatment, as they would have lower percent predicted values

compared to 'otherwise identical' Black people. Everyone will benefit more if asthma care is driven by the best possible percent predicted values for all people, regardless of race."

Since submitting this ATS 2021 research abstract, Mr. Schuyler and Dr. Wenzel expanded their study to include 1,034 adults with asthma residing in Allegheny County, which includes Pittsburgh. "This gives us a much more detailed view and helps provide better context for each patient." They state that this expanded analysis has helped them determine that residence in redlined neighborhoods, in addition to lower FEV1, is associated with uncontrolled and/or severe [asthma](#). Their additional research also found persistently [poor air quality](#) in redlined neighborhoods, linking it strongly with environmental inequity.

Provided by American Thoracic Society

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