

# U.S. military veterans living in discriminatory 'redlined' areas suffered higher rates of cardiovascular disease

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U.S. military veterans who lived in what were once known as "redlined" areas had a higher risk for heart attacks and other cardiovascular issues,

according to a new study by researchers at Case Western Reserve University, University Hospitals and the Cleveland VA Medical Center.

In the 1930s, the federal government-sponsored Homeowners' Loan Corp. (HOLC) established maps of U.S. neighborhoods that identified levels of mortgage risk. This practice led to disinvestments and segregation in "redlined" neighborhoods.

Judicial rulings—and, later, [federal legislation](#)—prohibited such government practices, but research has shown their impact has had lasting effects on educational and economic opportunities—as well as [health outcomes](#). Nevertheless, few studies have targeted the association between redlining and [cardiovascular disease](#).

The study was conducted primarily by Sadeer Al-Kindi, formerly an assistant professor at the Case Western Reserve School of Medicine and co-director of the Center for Integrated and Novel Approaches in Vascular Metabolic Disease at University Hospitals; Salil Deo, an associate professor of surgery at the School of Medicine and cardiac surgeon at the VA Northeast Ohio Healthcare System; and Yakov Elgudin, director of lung transplantation at UH Cleveland Medical Center and an associate professor of surgery at the School of Medicine.

Their findings were published July 11 in *JAMA Network Open*.

"While we know these communities were historically disadvantaged," Deo said, "[limited information](#) is available whether this decades-old practice still influences cardiovascular health today."

The researchers used information from 80,000 U.S. veterans—some living, others deceased—with pre-existing cardiovascular disease who lived in census tracts color-coded by the HOLC and were enrolled in ongoing care at Department of Veterans Affairs Medical Centers

nationwide.

They observed that, over a five-year study period, those who lived in redlined neighborhoods were 14% more likely to suffer from an adverse cardiac event like a stroke or [heart attack](#). And this effect remained even after adjusting for known cardiovascular risk factors and other social determinants of health.

The researchers said their findings "underline the important fact that, despite improvements in [public health](#), access to care—and citizen health in the United States overall—significant gaps exist between communities, and progress has not been uniform across all neighborhoods."

They added that, "while thought-provoking and hypothesis-generating," the data doesn't explain what caused such higher rates of cardiovascular issues in redlined areas.

"Historical residential policies, such as redlining, may have a long-lasting effect on community health," Al-Kindi said. "This study builds on emerging literature linking redlining with a host of present-day health issues."

"Our nationwide study demonstrates that a century-old practice like redlining still affects our nation's health today," Deo said. "Future studies should aim to better define the reasons for the observed relationships between intergenerational inequities and cardiovascular health. These can then be targeted to improve the well-being for all individuals."

**More information:** Salil V. Deo et al, Association Between Historical Neighborhood Redlining and Cardiovascular Outcomes Among US Veterans With Atherosclerotic Cardiovascular Diseases, *JAMA Network*

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