

Redlining linked to higher heart failure risk among Black adults in U.S.

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The risk of heart failure in the present day is higher among Black adults who live in U.S. ZIP codes historically impacted by redlining, according to research published today in *Circulation*. The analysis, published as part

of the journal's "Disparities in Cardiovascular Medicine Special Issue," included more than 2.3 million adults from 2014-2019 who lived in U.S. communities with varying degrees of redlining, which began in the mid-1930s.

In 1933, the Home Owners' Loan Corporation, a [government agency](#) created as part of President Roosevelt's New Deal, began sponsoring low-interest mortgage loans to help people recover from the financial crisis of the Great Depression. In a process called "redlining," the HOLC developed a color-coding system for neighborhoods across the country based on "risk for investment" criteria; it deemed red areas, which were largely Black communities, "too risky" to insure mortgages. The residents who lived in these neighborhoods were denied home loans, which lowered tax revenues in these communities and reduced investment in schools and government programs and services. This created numerous inequities for residents for multiple generations despite the practice being outlawed by the Fair Housing Act of 1968.

[Previous research](#) has found that communities exposed to redlining had higher rates of stroke, as well as increased risk of hypertension, Type 2 diabetes and early mortality due to [heart disease](#). Heart failure is a progressive condition in which the heart is unable to pump enough blood to the body either due to the heart muscle stiffening or from it losing pumping strength. According to the American Heart Association's [2023 Statistical Update](#), [heart failure](#) affects 6.7 million people in the U.S. and disproportionately impacts Black adults.

"Although discriminatory housing policies were effectively outlawed nearly a half-century ago, the relationship between historic redlining practices and people's health today gives us unique insight into how historical policies may still be exerting their effects on the health of many communities," said study co-senior author Shreya Rao, M.D., M.P.H., a cardiologist and assistant professor in the department of

internal medicine at the University of Texas Health Science Center at San Antonio and University Hospital, both in San Antonio, Texas.

The researchers identified nearly 2.4 million adults in the Medicare Beneficiary Summary Files between 2014 and 2019 with linked residential ZIP codes. Study participants were 55.4% female and had a mean age of 71 years; 801,452 of participants self-identified as Black adults, and nearly 1.6 million participants self-identified as non-Hispanic white adults. Individuals of other races were excluded due to the low numbers available within the Medicare data. Participants were excluded from the analysis if they had a history of heart failure or heart attack in the preceding two years, had fewer than two years of Medicare coverage before the study start date or were younger than the age of 40.

The researchers mapped historical redlining maps onto modern day maps of 1,044 ZIP codes in the U.S. and sorted them into four groups ranging from ZIP codes that had the least amount of area impacted by redlining to ZIP codes with the most areas exposed to redlining.

"Ultimately, we were most interested in assessing the difference in risk of heart failure between individuals from communities with the highest level of exposure to redlining and individuals from other communities," said first author Amgad Mentias, M.D., M.S., an interventional cardiology fellow at Cleveland Clinic in Cleveland, Ohio.

The researchers assessed the association between living in higher proportions of redlined ZIP codes and heart failure risk. They conducted separate analyses for Black and white adults and additional variables were considered, such as social determinants of health, which were determined at the ZIP-code level with Social Deprivation Index scores collected in the American Community Survey from 2011-2015. The Social Deprivation Index is a composite measure based on seven demographic characteristics collected in the American Community

Survey, including poverty rate, education level, employment, access to transportation, household characteristics (single-parent households), percentage of households that rent rather than own housing, and percentage of households that are overcrowded. Heart failure was identified as hospitalization with a primary diagnosis of heart failure. Although most adults qualify for Medicare at 65 years old, the cohort also included adults younger than 65 who qualified for Medicaid due to disability.

The analysis found:

- Black adults living in ZIP codes with the highest proportion of redlining had an 8% higher risk of developing heart failure compared to Black adults living in communities with low levels of redlining.
- In contrast, white adults living in ZIP codes with the highest proportion of redlining did not have an increased risk of heart failure.
- About half of the excess risk of heart failure among Black adults living in redlined communities was explained by higher levels of socioeconomic distress (determined by Social Deprivation Index scores) in those redlined communities.
- The risk of heart failure was highest in Black adults living in redlined communities that had high scores on the Social Deprivation Index.

"These findings show us the harm that discriminatory and racist housing policies have had on generations of Black adults and suggest the long-term impact of such policies on cardiovascular health disparities," said senior author Ambarish Pandey, M.D., M.S., a cardiologist and assistant professor in the department of internal medicine at the University of Texas Southwestern Medical Center in Dallas. "A reparative approach may be needed on the part of federal, state and local governments to

intervene and drive investment in redlined communities."

The findings also highlight the pivotal role housing plays as a social determinant of health, Pandey noted. "Aggressive enforcement of anti-discrimination laws in housing, and support for and pathways to homeownership for Black families are needed in order to begin to achieve equity in health," he said.

The study's limitations include that redlining is just one facet of the impact of discrimination in the U.S. Redlining alone does not capture the full contribution of systemic racism on health today, the authors noted.

"Decades of discriminatory housing policies have left a lasting imprint on the cardiovascular health of Black communities. This careful and systematic analysis underscores the higher heart failure risk faced by Black adults residing in historically redlined areas, and provides evidence that social determinants of health, such as poverty, education, and access to healthy food, drive this risk," said the American Heart Association's Chief Clinical Science Officer Mitchell Elkind, M.D., M.S., FAHA, FAAN. "The study serves as a stark reminder of the ongoing impact of structural racism and emphasizes the urgent need for restorative actions and targeted investments to promote health equity."

The Disparities in Cardiovascular Medicine Special Issue of *Circulation* also includes [a separate study](#) examining historical neighborhood [redlining](#) and cardiovascular risk in patients with chronic kidney disease. In this study, researchers at Case Western Reserve University analyzed data for 1,720 participants enrolled in the Chronic Renal Insufficiency Cohort in 2003-2008. The analysis found that people with mild to moderate chronic kidney disease who lived in historically redlined neighborhoods had a two-fold higher risk of developing [heart](#) failure, independent of major risk factors for cardiovascular disease.

More information: Amgad Mentias et al, Historical Redlining, Socioeconomic Distress, and Risk of Heart Failure Among Medicare Beneficiaries, *Circulation* (2023). [DOI: 10.1161/CIRCULATIONAHA.123.064351](https://doi.org/10.1161/CIRCULATIONAHA.123.064351)

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