

Discriminatory redlining practices in the 1930s associated with present-day rates of ED visits due to asthma

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Current rates of emergency department visits due to asthma are around 2.4 times higher in areas that were redlined—deprioritised for mortgage

investment—in the 1930s, than in areas rated as the least risky investments (63.5 versus 26.5 visits per 10,000 residents per year), according to an observational study from eight Californian cities, published in *The Lancet Planetary Health* journal.

Redlining was a practice used by the Home Owners' Loan Corporation (HOLC) to categorise neighbourhoods during the depression era for assessing risk of applicants who applied for refinancing on mortgages they had defaulted on. Set up by the [federal government](#) under the New Deal, they generated maps that categorised urban neighbourhoods into one of four grades of perceived risk. Areas that were predominantly inner-city, with black and immigrant residents were systematically graded as hazardous for investment and outlined in red or 'redlined'. Redlining propelled a lack of investment in those areas perceived as higher risk.

Discussing possible mechanisms for the association, Dr. Neeta Thakur, University of California San Francisco, USA, senior author on the study, says, "Redlining may have shaped [neighbourhood](#) development in ways that compound risk factors for [asthma](#). For example, highways constructed in 1940s and 50s were commonly constructed in poorer neighbourhoods, worsening the air quality. Redlined neighbourhoods had high rates of low socioeconomic status, which are associated with decreased access in health service and increased psychosocial stress, both contributors to asthma incidence, prevalence and severity."

Anthony Nardone, San Francisco and Berkeley, USA, first author on the study concludes "Americans living in redlined neighbourhoods who were denied financing likely missed out on home ownership opportunities, reducing their potential to generate wealth over generations and leading to further segregation of neighbourhoods. This inability to accumulate wealth along with entrenched segregation could ultimately affect asthma risk, particularly for communities of colour, by reducing quality housing

options and ability to buffer stress."

Asthma disproportionately affects communities of colour in the USA, but the underlying factors for this remain poorly understood. Few studies have considered historical policies that might explain the concentration of social and environmental factors in communities of colour. This study is the first study to look at how the government-sponsored discriminatory policy of redlining that might have shaped [neighbourhood development](#) in the USA and is associated with asthma.

The authors used the HOLC security maps available for the following eight cities in California: Fresno, Los Angeles, Oakland, Sacramento, San Diego, San Jose, San Francisco, and Stockton. As part of designating neighbourhoods as risky for HOLC loans, risk assessors in the 1930s categorized neighbourhoods as A, B, C, D, with 'A' considered lowest risk and 'D', the redlined areas, considered highest risk. The authors assessed the relationship between these historical tract grades and rates of emergency department visits due to asthma between 2011 and 2013.

To further evaluate the association between neighbourhood grade and asthma, they assessed the impact of possible confounding variables using a model that adjusted for diesel exhaust particle emissions, PM_{2.5} levels, and the proportion of the population living below two times the [federal poverty level](#).

In the unadjusted model, the risk of emergency department visits due to asthma were 2.4 times higher in neighbourhoods that were previously redlined than those in A-graded neighbourhoods—63.5 versus 26.5 visits per 10,000 residents per year.

Going from A-D rating, there were more people who were non-Hispanic black and Hispanic, more people living in poverty, and the amount of diesel exhaust particle emissions increased.

After accounting for confounding factors, the author's adjusted model suggests that previously redlined neighbourhoods still had higher emergency room visits related to asthma than those not redlined. There was an estimated 39% increased risk of asthma related emergency visits in redlined areas compared to A-graded neighbourhoods.

Co-author on the study, Professor John Balmes, Department of Medicine, Division of Pulmonary and Critical Care Medicine, San Francisco, says "80 years or more after the development of the security maps, we observed persistently higher asthma-related emergency department visits in redlined neighbourhoods compared with higher-graded neighbourhoods. These areas also see higher diesel particle emission levels and rates of poverty. Together these might partly reflect a discriminatory legacy of redlining. Similar research is needed to assess whether our findings apply beyond the eight Californian cities we studied."

He continues, "After accounting for present-day poverty rate and air pollutants, we still see that previously redlined neighbourhoods had higher emergency room visits related to asthma than those not redlined. This suggests a more wide-spread, persisting effect of redlining could be responsible for increased asthma burden."

The authors note some limitations of their study. They highlight that although they used asthma-related emergency department visits to capture the areas most burdened by asthma, health care access, insurance coverage, and baseline asthma prevalence might be different in redlined neighbourhoods, compared to other neighbourhoods. This could mean that the findings might have under-estimated or over-estimated the true association.

More information: Anthony Nardone et al. Associations between historical residential redlining and current age-adjusted rates of

emergency department visits due to asthma across eight cities in California: an ecological study, *The Lancet Planetary Health* (2020).
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