


The Long Red Line: Breast Cancer Incidence at the Intersection of Unjust Structural Policies and Their Contemporary Manifestations

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Structural racism is the varied ways organizations institute racial discrimination through criminal justice, education, employment, income, housing, and health-care systems. Racial health inequities are entrenched in policies and systems that disproportionately affect minority and low-income communities. Despite a growing interest in understanding the implications of structural racism on health disparities, few studies have explored the role of redlining on cancer risk (1) or progression (2–4). Redlining has precipitated the disinvestment of certain neighborhoods, its downstream effects affecting various social determinants of health: household income, education, health care, built environment, and socioeconomic status—and may more readily embody social and economic disadvantage than any of these characteristics alone. Understanding the role of historic redlining on breast cancer risk and progression may yield insights into the onset of aggressive disease—which disproportionately affects Black women. Uncovering the sustained and cumulative exposure to adverse contemporary residential environments offers approaches for targetable policy interventions that can ultimately lead to achieving health justice.

Despite the importance of understanding the relationship between unjust housing policies on health outcomes, research on the contribution of redlining to breast cancer is limited. Beyer and colleagues (2) reported that greater housing discrimination was associated with a larger gap between Black and White breast cancer mortality in the Midwest. Our group has shown that contemporary redlining was associated with increased breast cancer mortality in the Southeast, even after adjusting for stage at diagnosis (3). Krieger and colleagues (1) reported that historic redlining in the Northeast was associated with elevated risk for late-stage breast cancer diagnosis, even among residents living in census tracts with present-day economic privilege. Most recently, a nationwide study found that in a Medicare population, women experienced poorer breast cancer survival as the index of contemporary redlining increased (4). Understanding of the role of redlining in breast cancer risk, specifically by tumor subtypes—which have distinct etiologies and outcomes—remains a critical gap. Similarly, we

lack insight into the intersection between historical and contemporary measures of structural racism on breast cancer risk.

The study undertaken by Wright and colleagues (5) in this issue of the Journal aimed to examine the implications of historical redlining for contemporary inequities in breast cancer incidence, overall and by hormone receptor status, using population-based cancer registry data. Their approach, considering the interaction of historical redlining and area-based measures of present-day neighborhoods, is important for informing breast cancer etiology and future research examining historical discriminatory policies. The authors report that for estrogen receptor (ER) and progesterone receptor (PR)-positive breast cancer, breast cancer incidence was greatest in census tracts “with the most contemporary privilege and mixed HOLC (Home Owners’ Loan Corporation) grade [and] lowest in census tracts with most contemporary deprivation and no HOLC grade,” which highlights the importance of contemporary conditions on present-day breast cancer incidence. Interestingly, there was greater ER-negative or PR-negative breast cancer incidence in areas of contemporary deprivation yet high HOLC grade (suggesting a “downward trajectory” in these neighborhoods), mixed, or no HOLC grade. Low ER-negative or PR-negative breast cancer incidence was observed among women living in the lowest HOLC grades (D: hazardous) irrespective of contemporary privilege. The data on the interaction between the two measures are complex and reiterate the value of ascertaining both historical redlining and present-day area-level metrics, particularly for ER-negative and PR-negative disease.

The above findings also emphasize the importance of considering etiologic heterogeneity in future studies of redlining and breast cancer incidence. First, it is well-established that hormone receptor-negative breast cancers differ with respect to etiology and aggressiveness and are most prevalent in racial minority groups (6). Understanding how government-sanctioned racism and housing discrimination affect the emergence of these aggressive tumor subtypes has important implications for resolving race disparities in breast cancer. Krieger et al. (7) reported that being born in a Jim Crow state was associated

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with increased odds of ER-negative breast cancer among Black but not White women. Moreover, the odds of Black vs White women being diagnosed with ER-negative tumors was higher among women born in Jim Crow vs non-Jim Crow states—emphasizing the importance of considering race in studies of structural racism. Because Wright and colleagues (5) were not able to stratify by race, more robust studies will be needed to completely resolve the legacy of historic redlining on aggressive tumor subtypes (eg, triple-negative breast cancer).

Effectively understanding the impact of historical housing policy on subtype-specific breast cancer incidence will require a life-course approach. Wright and colleagues (5) had available addresses at the time of diagnosis, which may not reflect the etiologically relevant time window for breast cancer development and is likely to affect the study findings if women move between HOLC grades or census tracts. As evidenced within, there were changes in neighborhoods, some historically classified as “hazardous” now classified as having “contemporary privilege”—a potential result of gentrification. Similarly, women are likely to have experienced changes in neighborhood characteristics based on their historic vs present-day residence. Thus, it is crucial to capture residential history, providing important insights into disease progression and future intervention.

Deliberate and systemic efforts to thwart the economic and social advancement of Black persons necessitate a more thorough understanding of the mechanisms linking redlining to adverse health outcomes such as breast cancer. It is established that historic redlining has led to residential racial segregation, which perpetuates economic deprivation, concentrated poverty, subpar education, unhealthy food and built environments, reduced access to health care, the opportunity gap, and crime. The biologic links between historic redlining, neighborhood disadvantage, and carcinogenesis are largely unknown (8). For example, the chronic stress of financial instability or crime may be embodied as dysfunctional inflammatory and endocrine regulatory biomarkers, altered patterns of DNA methylation, or telomere length attenuation (9). Accumulation over time may contribute to tumor initiation and the differential development of prognostically poor vs favorable breast cancer types. Contemplating a molecular pathway for breast cancer incidence stemming from historic redlining may help to better inform etiology and yield a more robust evidence base for its harmful downstream impacts.

These findings by Wright and colleagues (5) underscore the importance of considering the acute and downstream impacts of redlining on breast cancer risk. They demonstrate the value in considering subtypes to unravel the potentially complex effects of redlining on breast cancer risk and highlight the need for inclusion of race. Additional insights on residential history should be pursued vigorously to capture neighborhood conditions based on important time windows relevant to breast carcinogenesis. Future investigations should interrogate the many mechanisms emanating from redlining that may affect breast

cancer development—even biological drivers—to more readily inform debates regarding fair housing, economic development, and health justice. These insights will be important in conceiving appropriate interventions to combat the legacy of redlining at multiple levels.

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