BREAST CANCER, RACE AND PLACE

Kirsten Beyer, PhD, MPH
Institute for Health & Equity, MCW
NATIONAL TRENDS: BREAST CANCER RATES BY RACE & ETHNICITY

Incidence

Mortality

“Breast cancer statistics, 2017, racial disparity in mortality by state”
De Santis et al. (2017) CA: A Cancer Journal for Clinicians
GEOGRAPHIC VARIATION IN THE SIZE OF THE DISPARITY

Breast Cancer Mortality Rate Ratios Comparing Black to White Women, 2011 To 2015

“Breast cancer statistics, 2017, racial disparity in mortality by state”
De Santis et al. (2017) CA: A Cancer Journal for Clinicians
Wisconsin has the 3rd largest gap.
Milwaukee has the 11th largest gap.
WI TRENDS: BREAST CANCER INCIDENCE BY RACE & ETHNICITY

Trend in female breast cancer incidence rates in WI, by race/ethnicity
(aged 20+= excl. 11 counties)

Data Source:
WISH Population Module, WI Department of Health Services, 2003-2015
WI TRENDS: BREAST CANCER MORTALITY BY RACE & ETHNICITY

Trend in female breast cancer mortality rates in WI, by race/ethnicity
(aged 20=+)

Data Source:
State Vital Records Office, WI Department of Health Services, 2003-2014
WISH Population Module, WI Department of Health Services, 2003-2015
2019 Scientific Retreat — Together, Taking on Cancer’s Toughest Challenges
Prostate Cancer Mortality Rate
MCW Cancer Center Catchment Area 2008-2013

The prostate cancer mortality rate is indirectly age standardized and smoothed using adaptive spatial filtering. A grid of points is used to estimate mortality rates continuously across the map, based on the 20 closest prostate cancer mortality cases. Red areas indicate higher rates than expected and blue areas indicate lower rates than expected, given the regional rate. Areas without color exhibit rates close to the regional rate.

Population by Race/Ethnicity by Census Tract, MCW Cancer Center Catchment Area 2009 - 2013

1 Dot = 100 People
- White
- Black
- Hispanic
- Interstate Highway
- City of Milwaukee
- County Boundary

Created by: Yuhong Zhou, Kirsten Bayer
Medical College of Wisconsin (7/2016)
Data Source: 2009-2013 American Community Survey 5-Year Estimates by US Census Bureau
<table>
<thead>
<tr>
<th></th>
<th>Black</th>
<th>White</th>
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<tbody>
<tr>
<td><strong>Employment Rate</strong></td>
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</tr>
<tr>
<td>Black</td>
<td>58%</td>
<td>88%</td>
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<td>White</td>
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<tr>
<td><strong>Poverty rate</strong></td>
<td></td>
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<tr>
<td>Black</td>
<td>39%</td>
<td>8%</td>
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<tr>
<td>White</td>
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<td></td>
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<tr>
<td><strong>Residents living in extreme-poverty neighborhoods</strong></td>
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<tr>
<td>Black</td>
<td>32.9%</td>
<td>1.6%</td>
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<tr>
<td>White</td>
<td></td>
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<tr>
<td><strong>Adult male incarceration rate</strong></td>
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<tr>
<td>Black</td>
<td>11.9%</td>
<td>0.9%</td>
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<tr>
<td>White</td>
<td></td>
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<tr>
<td><strong>Median household income</strong></td>
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<td></td>
</tr>
<tr>
<td>Black</td>
<td>$26,036</td>
<td>$62,100</td>
</tr>
<tr>
<td>White</td>
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<tr>
<td><strong>Average poverty rate of school attended by a student who is...</strong></td>
<td></td>
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</tr>
<tr>
<td>Black</td>
<td>78.1%</td>
<td>24.2%</td>
</tr>
<tr>
<td>White</td>
<td></td>
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</tbody>
</table>

Source: American Civil Liberties Union
RACIAL SEGREGATION AND BREAST CANCER DISPARITIES: MIXED RESULTS

• Schootman et al. found that the percentage of the census tract population Black was – in combination with tumor grade and diagnosis stage – able to explain why Black women were more likely to develop breast cancer metastases than White women (2009).
  – But, Warner and Gomez found that Black women in tracts with a higher Black population experienced lower mortality in California (2010).

• Pruitt et al. found segregation to be associated with poor survival among Hispanic women in Texas (2015).
  – But, Keegan et al. found that US nativity and neighborhood SES, but not residence in a Hispanic enclave, were associated with poor survival in California (2010).

• In aggregate, studies indicate that policy changes targeting segregation and its adverse effects could result in decreased breast cancer survival disparities, but more work is needed to explain mixed results and examine differences among places and population groups.
LIMITATIONS

• Measures of segregation have been largely focused on metropolitan areas, and to a lesser extent on local areas (e.g. neighborhoods);

• Segregation metrics characterize the spatial distribution of people by race and ethnicity, but what needs to be understood is the process by which these patterns arise;

• Little work has compared measures of segregation; doing so could illuminate differences among places and provide insight into how segregation produces health outcomes;

• Few studies have examined pathways linking segregation and health, and very few investigations have worked directly with breast cancer survivors to elicit experiences of navigating segregated landscapes after breast cancer diagnosis.
AND WHAT ABOUT CHOICE?

- Segregation metrics are measures of spatial distributions of people by race.
- Where people live is a product of their constraints, and their choices.
- To what degree is human choice affecting spatial patterns, and thus, segregation measures?
- Is there another measure that is not subject to this limitation?
MORTGAGE DISCRIMINATION

• Home Mortgage Disclosure Act (1975) database
  – Census tract
  – Age, sex, race, ethnicity, and income of applicant
  – Loan purpose, amount

• A continuously defined measure of racial bias in mortgage lending, using adaptive spatial filtering
  – Odds ratio of denial of a mortgage application, controlling for the sex of the applicant and the loan to income ratio
    o Black to White applicant comparison (racial bias)
    o Within the filter vs. the MSA (redlining)
  – Model-based index estimated for each filter and interpolated

FIGURE 3.2 The filters used to calculate the proportion of colorectal cancers diagnosed in the late stage for five grid points on a 3-mile grid in the Cedar Rapids, Iowa, area using adaptive filter density estimation. As demonstrated by the 1:100,000 topographic image, filters in urban areas are smaller, and those in rural areas are larger to pull in enough observations to calculate a stable rate. (Cancer incidence data from the Iowa Cancer Registry; 1:100,000 Digital Raster Graphic from the Iowa Geographic Image Map Server hosted by Iowa State University.)
New spatially continuous indices of redlining and racial bias in mortgage lending: links to survival after breast cancer diagnosis and implications for health disparities research

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A B S T R A C T

Racial health disparities continue to be a serious problem in the United States and have been linked to contextual factors, including racial segregation. In some cases, including breast cancer survival, racial disparities appear to be worsening. Using the Home Mortgage Disclosure Act (HMDA) database, we extend current spatial analysis methodology to derive new, spatially continuous indices of (1) racial bias in mortgage lending and (2) redlining. We then examine spatial patterns of these indices and the association between these new measures and breast cancer survival among Black/African American women in the Milwaukee, Wisconsin metropolitan area. These new measures can be used to examine relationships between mortgage discrimination and patterns of disease throughout the United States.

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Measures Matter: The Local Exposure/Isolation (LEx/Is) Metrics and Relationships between Local-Level Segregation and Breast Cancer Survival

Amin Bemanian¹ and Kirsten M.M. Beyer²

Abstract

Background: The Black-to-White disparity in breast cancer survival is increasing, and racial residential segregation is a potential driver for this trend. However, study findings have been mixed, and no study has comprehensively compared the effectiveness of different local-level segregation metrics in explaining cancer survival.

Methods: We proposed a set of new local segregation metrics named local exposure and isolation (LEx/Is) and compared our new local isolation metric with two related metrics, the location quotient (LQ) and the index of concentration at extremes (ICE), across the 102 largest U.S. metropolitan areas. Then, using case data from the Milwaukee, WI, metropolitan area, we used proportional hazards models to explore associations between segregation and breast cancer survival.

Results: Across the 102 metropolitan areas, the new local isolation metric was less skewed than the LQ or ICE. Across all races, Hispanic isolation was associated with poorer all-cause survival, and Hispanic LQ and Hispanic-White ICE were found to be associated with poorer survival for both breast cancer-specific and all-cause mortality. For Black patients, Black LQ was associated with lower all-cause mortality and Black local isolation was associated with reduced all-cause and breast cancer-specific mortality. ICE was found to suffer from high multicollinearity.

Conclusions: Local segregation is associated with breast cancer survival, but associations varied based on patient race and metric employed.

Impact: We highlight how selection of a segregation measure can alter study findings. These relationships need to be validated in other geographic areas. Cancer Epidemiol Biomarkers Prev; 26(4): 516–24. ©2017 AACR.

See all the articles in this CEBP Focus section, "Geospatial Approaches to Cancer Control and Population Sciences."
Housing Discrimination, Residential Racial Segregation, and Colorectal Cancer Survival in Southeastern Wisconsin

Yuhong Zhou, Amin Bemanian, and Kirsten M.M. Beyer

Abstract

**Background:** Residential racial segregation is still neglected in contemporary examinations of racial health disparities, including studies of cancer. Even fewer studies examine the processes by which segregation occurs, such as through housing discrimination. This study aims to examine relationships among housing discrimination, segregation, and colorectal cancer survival in southeastern Wisconsin.

**Methods:** Cancer incidence data were obtained from the Wisconsin Cancer Reporting System for two southeastern Wisconsin metropolitan areas. Two indices of mortgage discrimination were derived from Home Mortgage Disclosure Act data, and a measure of segregation (the location quotient) was calculated from U.S. census data; all predictors were specified at the ZIP Code Tabulation Area level. Cox proportional hazards regression was used to examine associations between mortgage discrimination, segregation, and colorectal cancer survival in southeastern Wisconsin.

**Results:** For all-cause mortality, racial bias in mortgage lending was significantly associated with a greater hazard rate among blacks [HR = 1.37; 95% confidence interval (CI), 1.06–1.76] and among black women (HR = 1.53; 95% CI, 1.06–2.21), but not black men in sex-specific models. No associations were identified for redlining or the location quotient. Additional work is needed to determine whether these findings can be replicated in other geographical settings.

**Conclusions:** Our findings indicate that black women in particular experience poorer colorectal cancer survival in neighborhoods characterized by racial bias in mortgage lending, a measure of institutional racism. These findings are in line with previous studies of breast cancer survival.

**Impact:** Housing discrimination and institutional racism may be important targets for policy change to reduce health disparities, including cancer disparities. *Cancer Epidemiol Biomarkers Prev.* 26(4): 561–8. ©2017 AACR.

See all the articles in this CEBP Focus section, "Geospatial Approaches to Cancer Control and Population Sciences."
BREAST CANCER, RACE AND PLACE (BCRP): STUDY AIMS

• Construct new and existing metrics of racism and segregation at the local level for the largest US metropolitan areas, and determine (1) how measures co-vary, (2) whether segregation measures predict stressors, social resources and opportunities at the local level, and (3) whether relationships differ by metropolitan area.

• Determine whether measures of segregation are related to breast cancer survival disparities among Black, Hispanic and Non-Hispanic White women, and whether relationships are mediated by local stressors, social resources, or opportunities.

• Explore the ways in which Black, Hispanic and non-Hispanic White breast cancer survivors in a highly segregated metropolitan area (Milwaukee) navigate cancer survivorship in the context of segregation.
MEASURES

- **Racial Bias in Mortgage Lending**: The odds of being denied a mortgage application if you are Black, as compared to if you are White, while controlling for the sex of the applicant and the loan amount to income ratio.

- **Redlining**: The odds of being denied a mortgage application if you apply to live in a specific neighborhood, as compared to an application for a property elsewhere in the MSA, while controlling for the sex of the applicant and the loan amount to income ratio.

- **Ethnic Bias in Mortgage Lending**: The odds of being denied a mortgage application if you are Hispanic, as compared to if you are non-Hispanic White, while controlling for the sex of the applicant and the loan amount to income ratio.
SPATIAL PATTERNS OF MORTGAGE DISCRIMINATIION
New York-Newark-Jersey City, NY-NJ-PA MSA
Box plots illustrate the magnitude of mortgage lending bias by applicant’s race, applicant’s ethnicity, and the census tract of the property across the 100 most populated US metropolitan areas, 2007-2013. Box plots show the median odds of denial of a mortgage application, the 25th and 75th percentiles as well as the ±1.5 times interquartile range of the distribution.
Regional variation in the magnitude of mortgage bias by race, ethnicity and neighborhood across the 100 most populated US metropolitan areas, 2007-2013. Box plots show the median odds of denial of a mortgage application, the 25th and 75th percentiles, and the ±1.5 times interquartile range of the distribution by census region.
Racial Bias in Mortgage Lending by HOLC Grade and City

<table>
<thead>
<tr>
<th>City</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
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<tbody>
<tr>
<td>Cleveland</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Milwaukee</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Pittsburgh</td>
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Odds of Mortgage Denial for Black vs. White
NEXT STEPS

• Link mortgage discrimination measures with individual tumor registry and Medicare claims data (SEER-Medicare)

• Examine associations between mortgage discrimination and breast cancer disparities.

• Explore mediating factors that may explain main relationships.
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If you want to go fast, go alone.

If you want to go far, go together.

- African Proverb

THANK YOU

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