



UNDERSTANDING DISPARITIES IN BREAST CANCER IN NORTHEAST OHIO

Population Health Research Institute Seminar

April 22, 2022

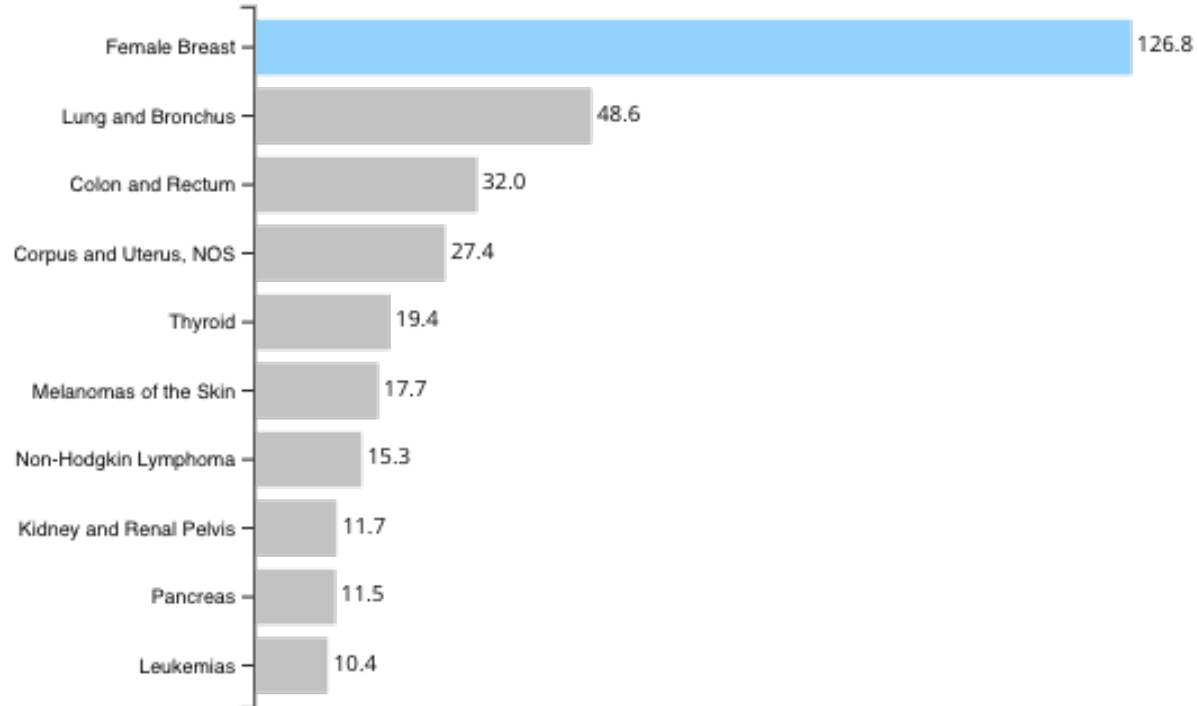
Kirsten Eom, PhD MPH

Postdoctoral Scholar

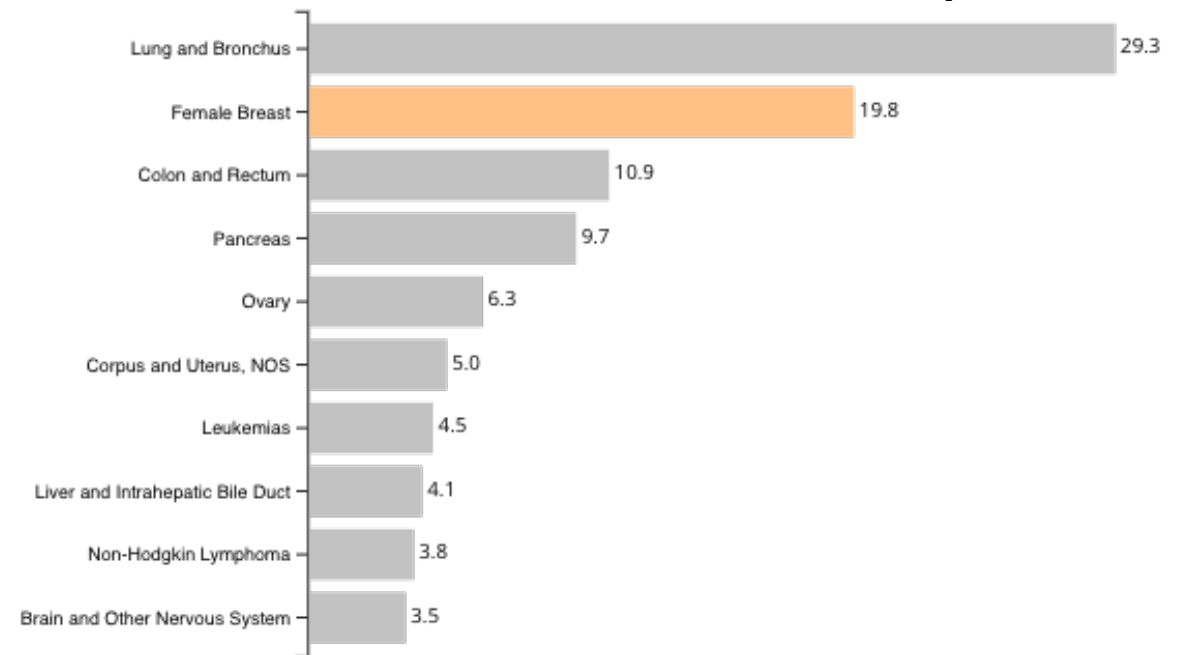
The Population Health Research Institute at the MetroHealth System and the
MetroHealth Cancer Center

The burden of breast cancer is high among women in the U.S.

10 most common cancer types among women in the U.S. in 2018 based on incidence rates



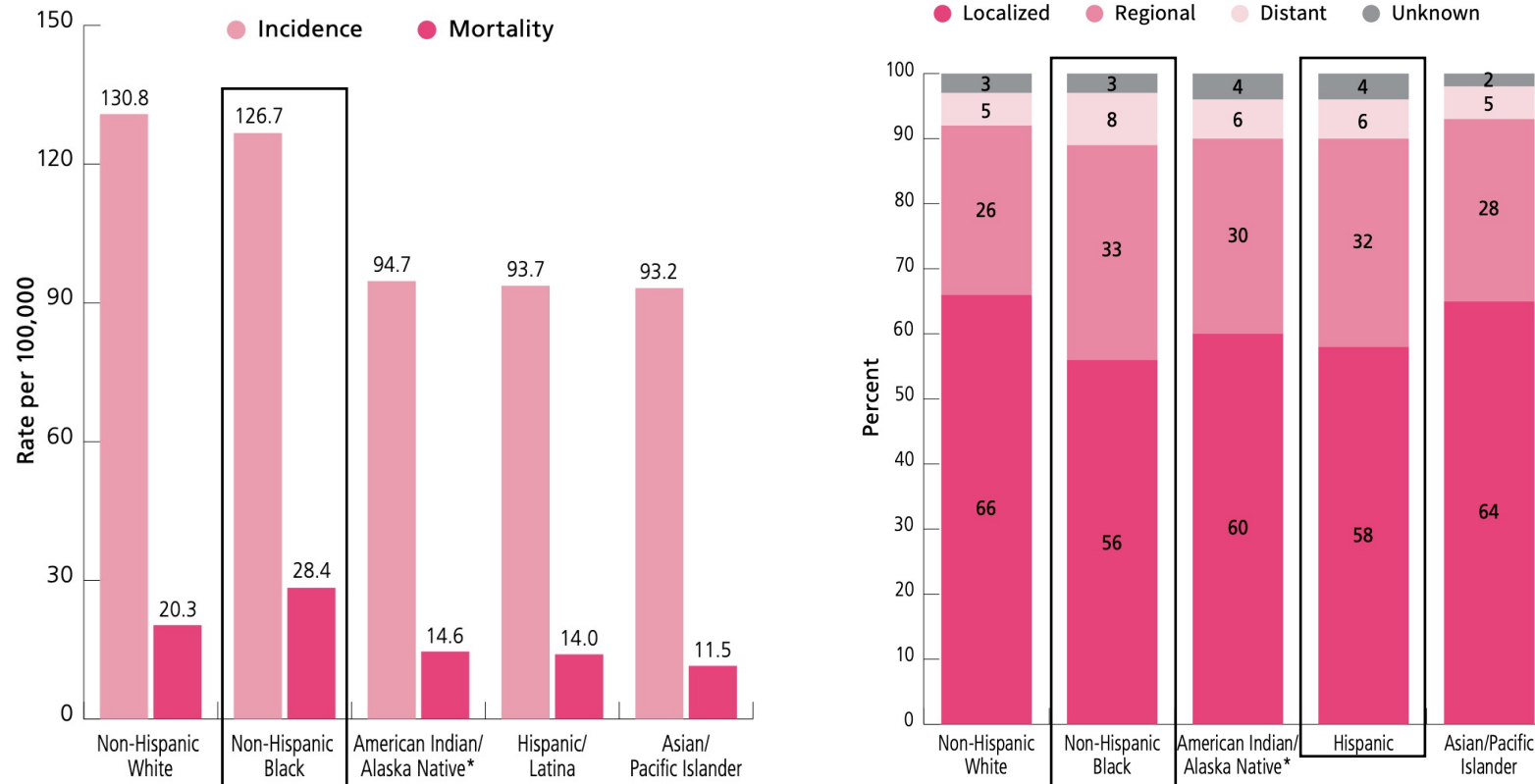
Top 10 leading causes of cancer deaths among women in the U.S. in 2018 based on mortality rates



Rate per 100,000 women

Source - U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on 2020 submission data (1999-2018): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; <https://www.cdc.gov/cancer/dataviz>, released in June 2021.

Disparities in breast cancer screening, incidence, and survival persist by sociodemographic factors.



Breast cancer screening: Mammography (%)	Up to date* (≥ 45 years)	Within the past 2 years (50-74 years)
Overall	63	73
Age (years)		
45-54	53	–
55-64	73	–
50-64	–	72
65-74	75	75
75+	51	–
Race/Ethnicity		
Non-Hispanic White	64	73
Non-Hispanic Black	66	74
Non-Hispanic Asian American	55	71
Non-Hispanic American Indian and Alaska Native	64	66
Hispanic	60	71
Sexual orientation		
Gay/Lesbian	70	79
Straight	63	73
Bisexual	†	†
Education		
Less than high school	52	63
High school diploma or GED	61	69
Some college/associates degree	64	72
College graduate	70	81
Health insurance status (age ≤64 years)		
Uninsured	30	39
Insured	64	75
Immigration		
Born in US	64	73
Born in US territory	68	†
In US fewer than 10 years	43	54
In US 10 or more years	61	74

American Cancer Society. *Breast Cancer Facts & Figures 2019-2020*. Atlanta: American Cancer Society, Inc. 2019. <https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/breast-cancer-facts-and-figures/breast-cancer-facts-and-figures-2019-2020.pdf>

GED = General Educational Development high school equivalency. *According to American Cancer Society recommendations: mammogram within the past year (ages 45-54 years) or past two years (ages ≥55 years). †Estimate not provided due to instability. Note: Estimates are age adjusted to the 2000 US standard population. Mammography prevalence estimates do not distinguish between examinations for screening and diagnosis.



Breast cancer is common among women in the U.S.

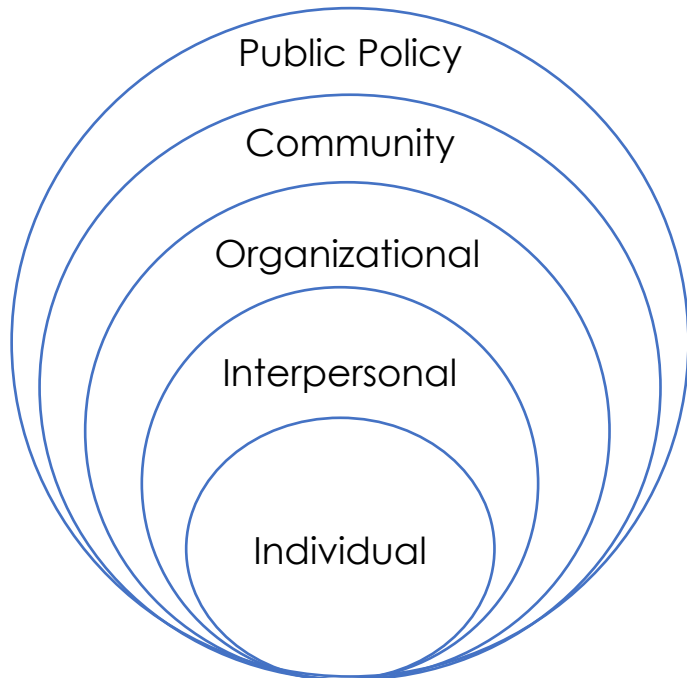
Disparities in screening and diagnosis of breast cancer by sociodemographic factors persist.

Understanding patient's sociodemographic factors and their contextual factors is critical to improve guideline-recommended screening and early detection of breast cancer.

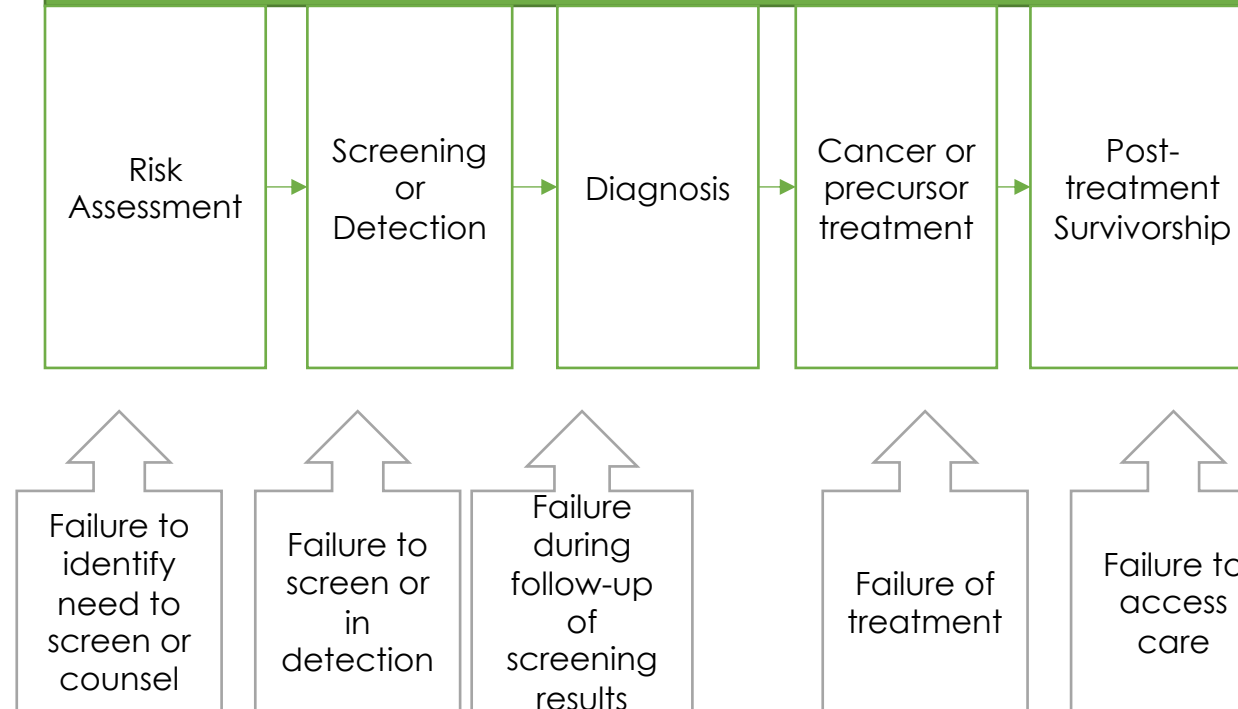
1. The Bringing Education Advocacy and Support Together (BREAST)/Amigas Program: Addressing barriers to breast cancer screening
2. Influences of neighborhood-level characteristics and patient's race on Triple Negative Breast Cancer (TNBC): Understanding multilevel factors for TNBC incidence, diagnosis, and mortality

Conceptual Framework: Improving Breast Cancer Care and Population Health

Contextual and Population Characteristics



Health Behavior (Process of Care)



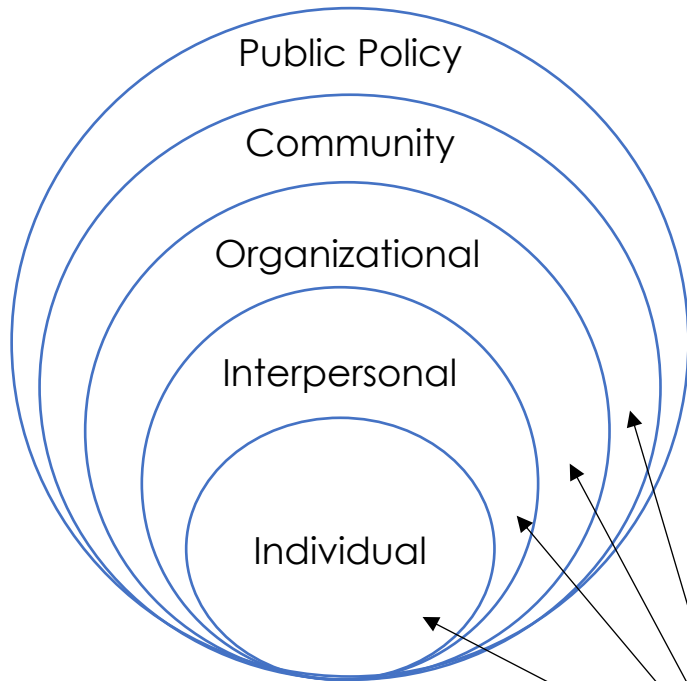
Multilevel Outcomes

- Patient
- Risk Status
 - Health-related quality of life
 - Financial burden
 - Patient experience
- Population
- Cancer incidence
 - Cancer mortality

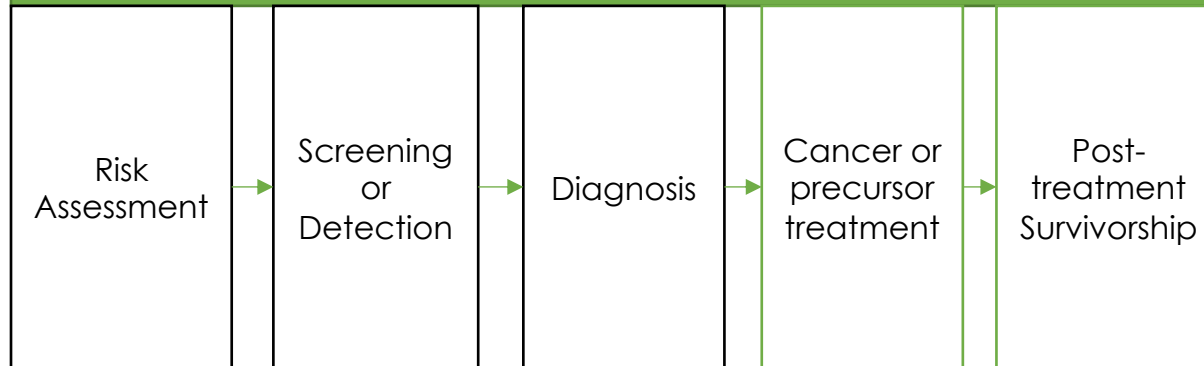
Adopted the Andersen Behavioral Model of Health Services Use, the Social-Ecological Model, and Process of Care across the Cancer Care Continuum

Understanding the BREAST/Amigas Program

Contextual and Population Characteristics

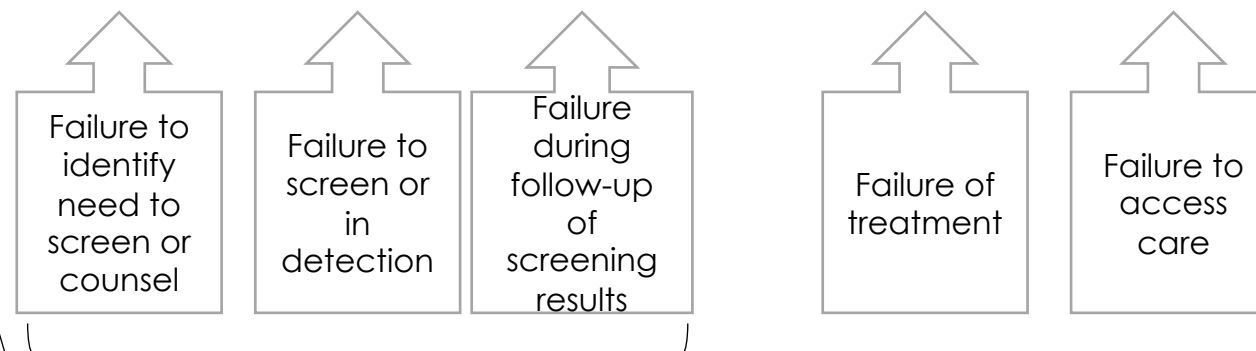


Health Behavior (Process of Care)



Multilevel Outcomes

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The BREAST/Amigas Program

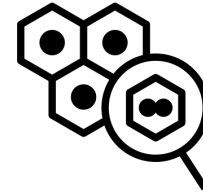
The BREAST/Amigas Program provides comprehensive services related to breast cancer screening.



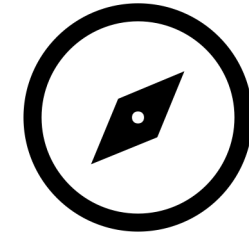
Hospital-based
Community
Outreach
Program



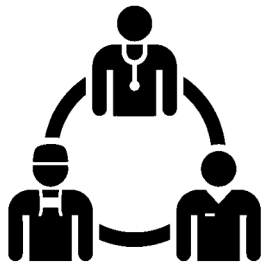
Longstanding Program
Launched in 2005



Free Breast Cancer
Screening Services:
Clinical Breast Exam
and/or
Mammogram



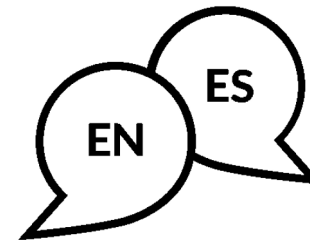
Patient Navigation
(Follow up procedures
for patients with
abnormal results)



Care Coordination
with Primary Care
Physicians, Surgical
and Medical
Oncologists



Referrals for
Financial
Assistance and
Social Services



Bilingual Services
(English and Spanish)



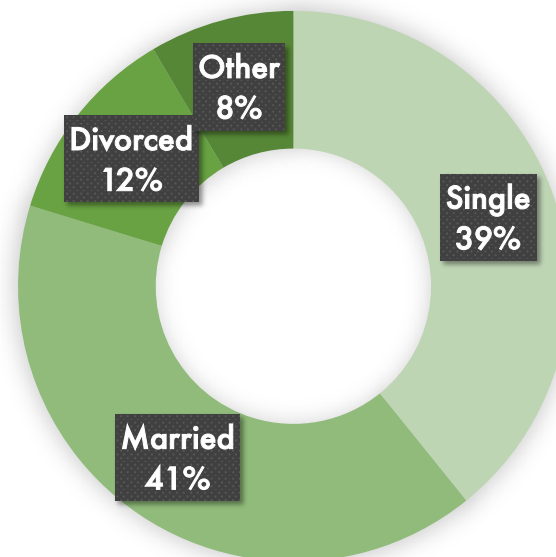
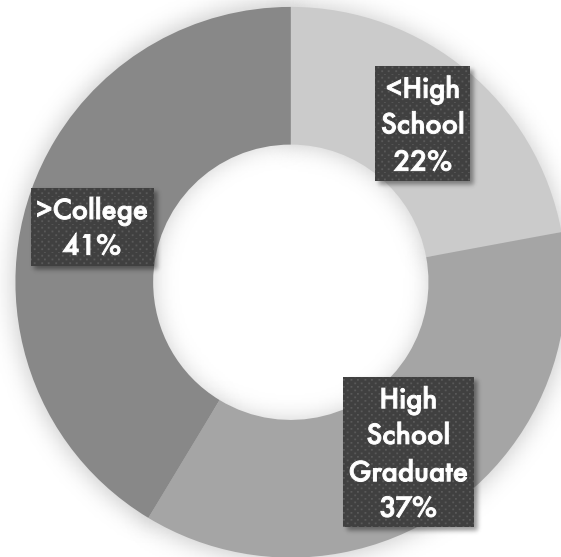
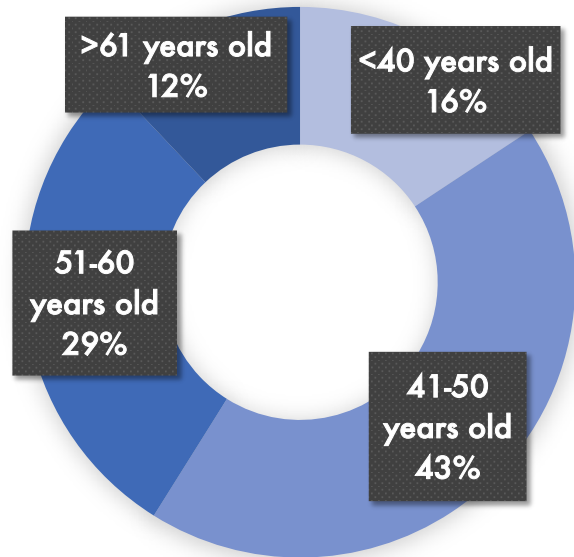
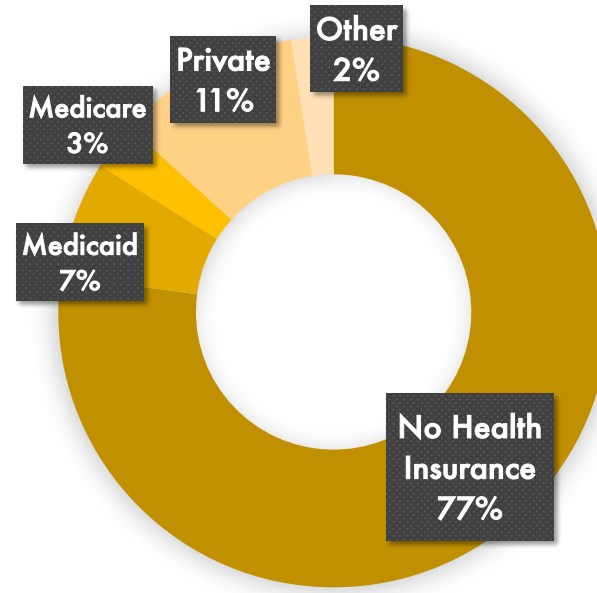
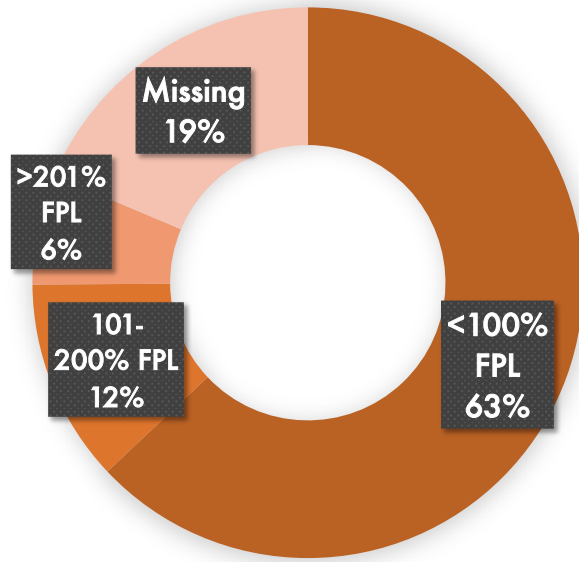
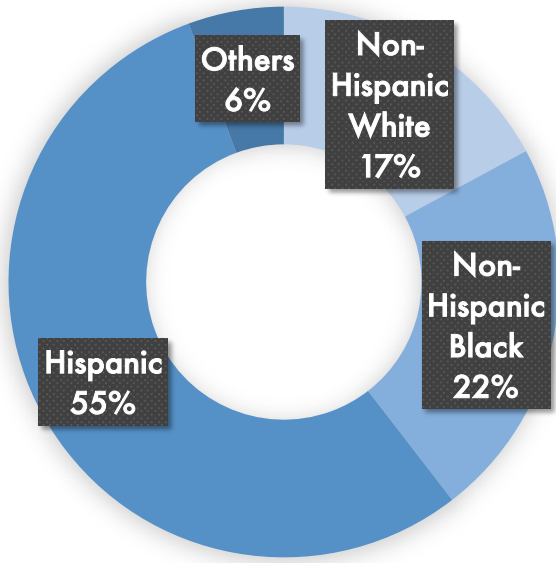
Amigas: Peer
Advocates and
Educators of
Breast Cancer

Data Sources

- Amigas Program Data: Self-reported sociodemographic, personal/family history of breast cancer, and past breast cancer screening services use information at the Amigas events
- MetroHealth Epic: Subsequent mammogram services

Study Population

A study cohort of 713 participants with complete sociodemographic and clinical information out of 1,964 who had attended an Amigas event from 2005 to 2017



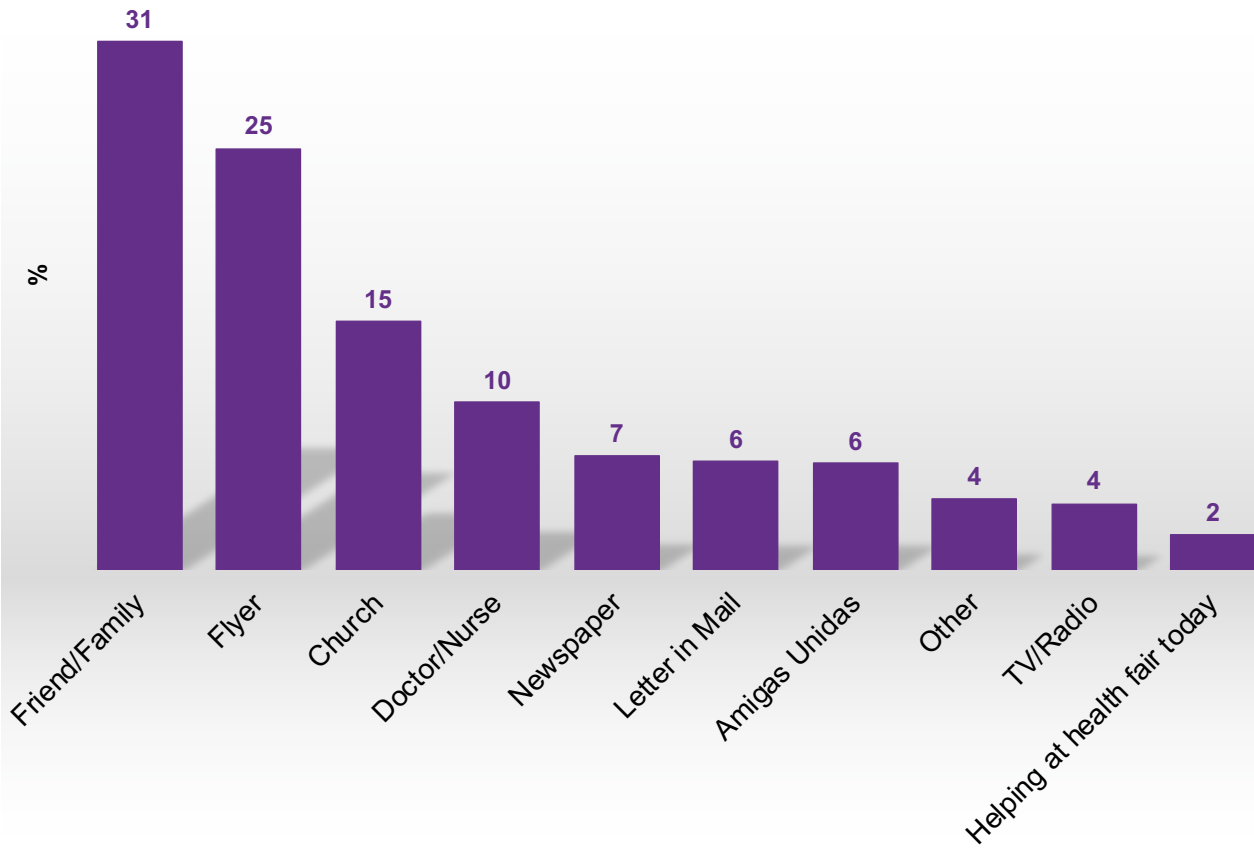
35% No usual source of care

30% Family history of Breast Cancer

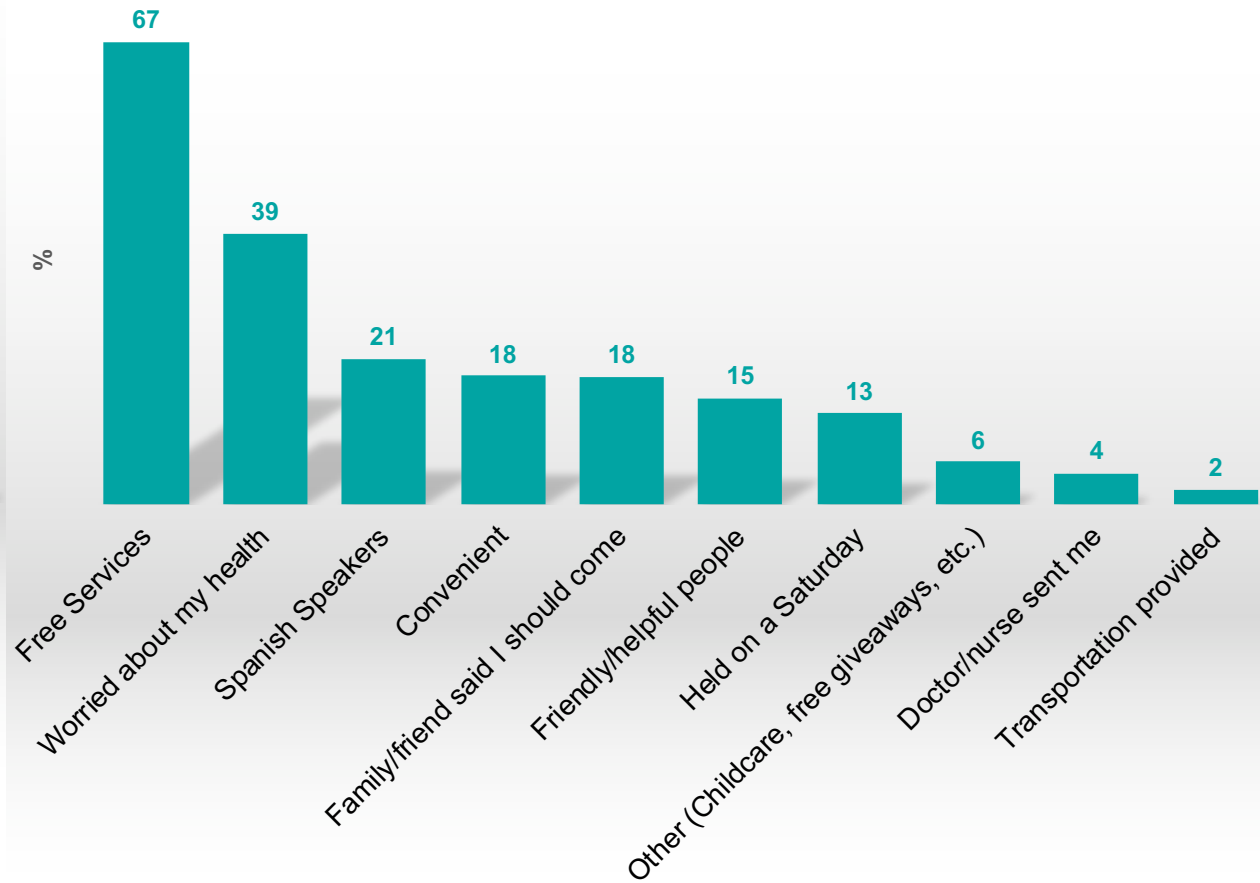
60% First generation immigrants

20% Lived in the US <5 years

Sources of the BREAST/Amigas Health Fairs



Reasons for Attending the BREAST/Amigas Health Fairs



42%

had a subsequent mammogram within 1 year from their initial health fair, on average, from 2005 to 2017.

65%

had a subsequent mammogram within 2 years from their initial health fair, on average, from 2005 to 2017.

The BREAST/Amigas program successfully reached to a population group with a higher burden of breast cancer and became an effective gateway to healthcare: women with low-income, limited access to care, and cultural, social, and language barriers.



Ongoing/Planned Studies of the BREAST/Amigas Program

- Evaluating effectiveness of the BREAST/Amigas program by comparing mammogram services use among the program participants vs. women seen at MetroHealth but did not participate in the BREAST/Amigas program (ongoing)
- Qualitative evaluation of the BREAST/Amigas program
 - Former and current program staff, community partners, and Amigas (ongoing)
 - Program participants (planned)
- Cost-effectiveness analysis of the BREAST/Amigas program (planned)

Acknowledgments

MetroHealth Cancer Center

Camille Garcia, MHA (Program Coordinator)

Patricia Tousel (Patient Navigator)

Natalie Joseph, MD

Benjamin Li, MD

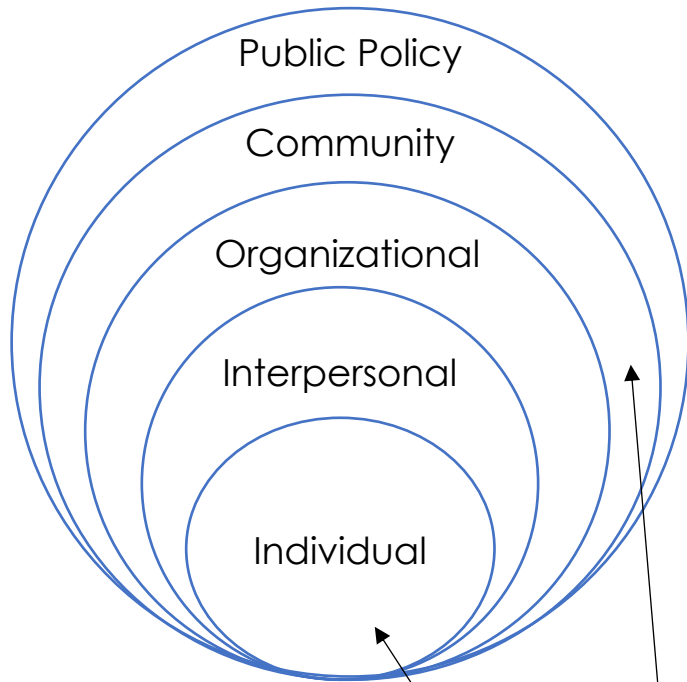
PHRI

Adam Perzynski, PhD

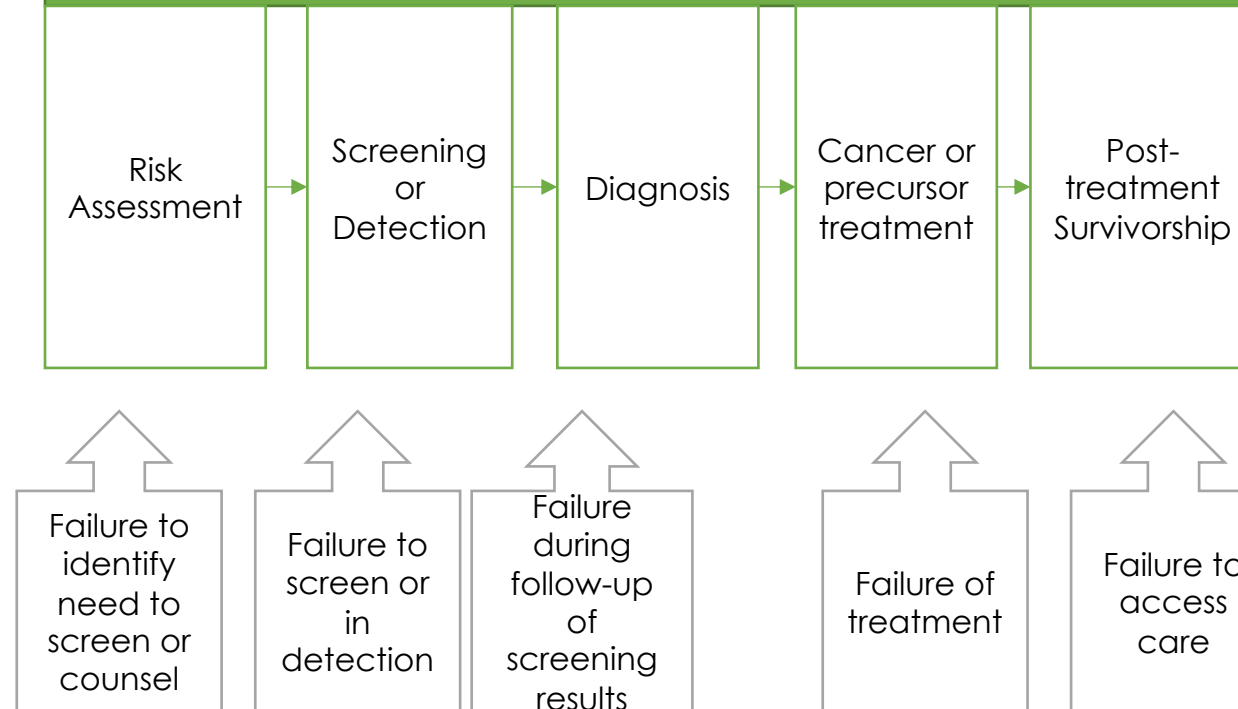
Yasir Tarabichi, MD

Understanding neighborhood characteristics and race on TNBC incidence and mortality

Contextual and Population Characteristics



Health Behavior (Process of Care)



Multilevel Outcomes

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Understanding Influences of Neighborhood-level Characteristics and Race on Triple Negative Breast Cancer

Acknowledgments

Khalid Sossey-Alaoui, PhD

Adam Perzynski, PhD

Natalie Joseph, MD

Kristen Berg, PhD

Yasir Tarabichi, MD

Kristen Runner, RN

**Funded by the National Cancer Institute
for the study “Triple Negative Breast Cancer in African American Women” (PI: Sossey-Alaoui)**

Triple Negative Breast Cancer (TNBC)

- TNBC is an aggressive subtype of breast cancer with a poorer prognosis.
 - Characterized by negative expression of estrogen or progesterone receptors (ER or PR) and no amplification of HER2
 - Accounts for 10-15% of all breast cancers
 - More common in women younger than age 40 or have a *BRCA1* mutation
 - Poorer response to standard-of-care chemotherapies
 - 5-year survival 8% to 16% lower than hormone receptor-positive disease
- TNBC incidence is more than double in non-Hispanic Black compared to non-Hispanic White.

There is limited understanding in mechanisms of multiple factors associated with TNBC incidence and mortality.

- Studies of multiple health conditions and care processes have found that neighborhood socioeconomic position is a key driver of health disparities.
- However, we have limited understanding in how these neighborhood socioeconomic characteristics interact with other patients' factors, i.e., race/ethnicity, and impact cancer incidence, progression, and mortality.
- To that end, **this study investigates roles of patients' neighborhood-level characteristics and race on incidence and mortality among patients diagnosed with TNBC.**
 - *To our knowledge, no other studies have studied the impacts of neighborhood-level characteristics and race together on TNBC incidence and mortality.*

Study Population

A cohort of 2,284 female patients ever diagnosed with breast cancer at MHS from 2007 to 2020 using the MHS tumor registry. Among which, about 8% were diagnosed with TNBC (n=193).

	Overall	Non-TNBC	TNBC
N	2284	2089	193
Mean Age at diagnosis (SD)*	60.37 (12.18)	60.54 (12.12)	58.58 (12.73)
Race/Ethnicity***			
Non-Hispanic White	52.2	53.5	38.3
Non-Hispanic Black	36.9	35.4	52.9
Hispanic	7.3	7.2	8.3
Other	3.6	3.8	0.5
Married	35.4	35.5	34.7
Health Insurance			
None	10.4	10.3	11.9
Medicaid	26.6	26.4	29.5
Medicare	36.7	36.8	35.8
Managed Care	8.7	8.8	8.3
Private	16.6	17.0	13.0
Others (i.e., Tricare or VA)	0.9	0.9	1.6
Family History of Breast Cancer	30.0	29.8	32.6
Cause of Death due to Breast Cancer	5.0	4.4	11.9

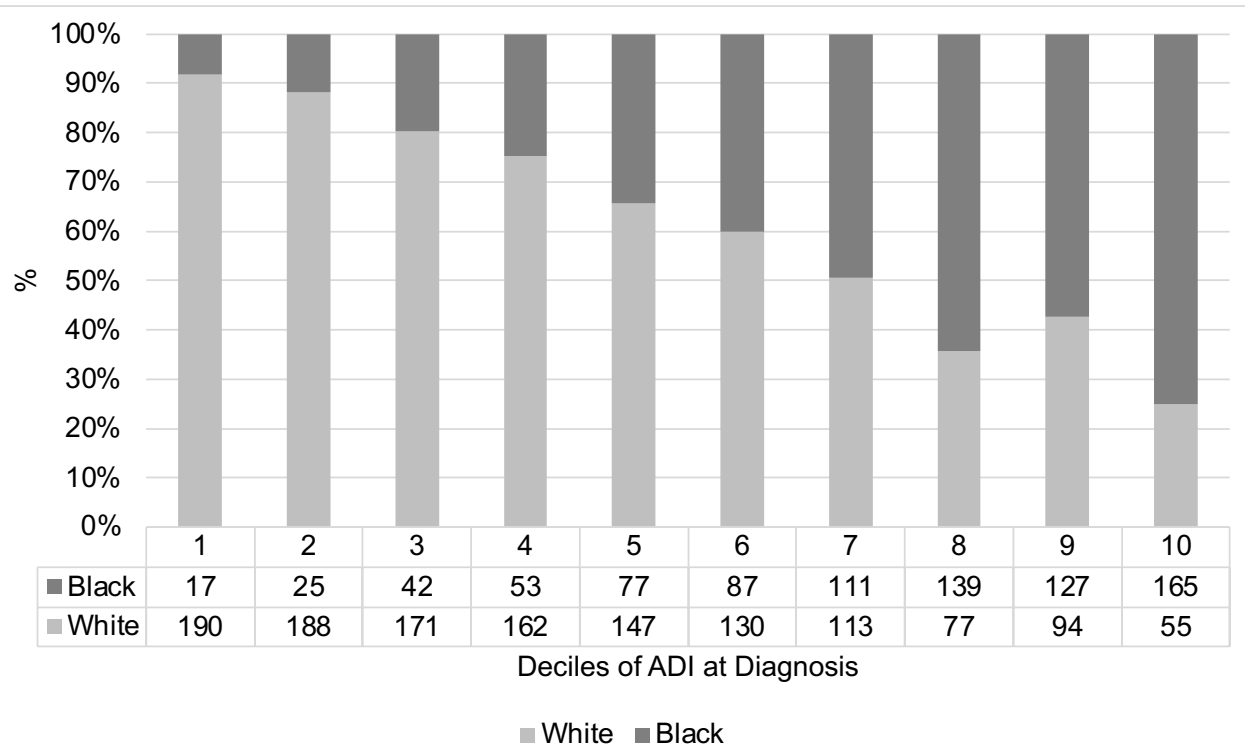
Tumor registry of the MetroHealth System (MHS)

- Demographic characteristics (age at diagnosis, race and ethnicity, marital status, and residential address at diagnosis)
- Health insurance information at diagnosis
- Histopathology of the cancer (tumor type, tumor stage, grade of differentiation, and receptor status)
- Date of death or last follow-up and cause of death

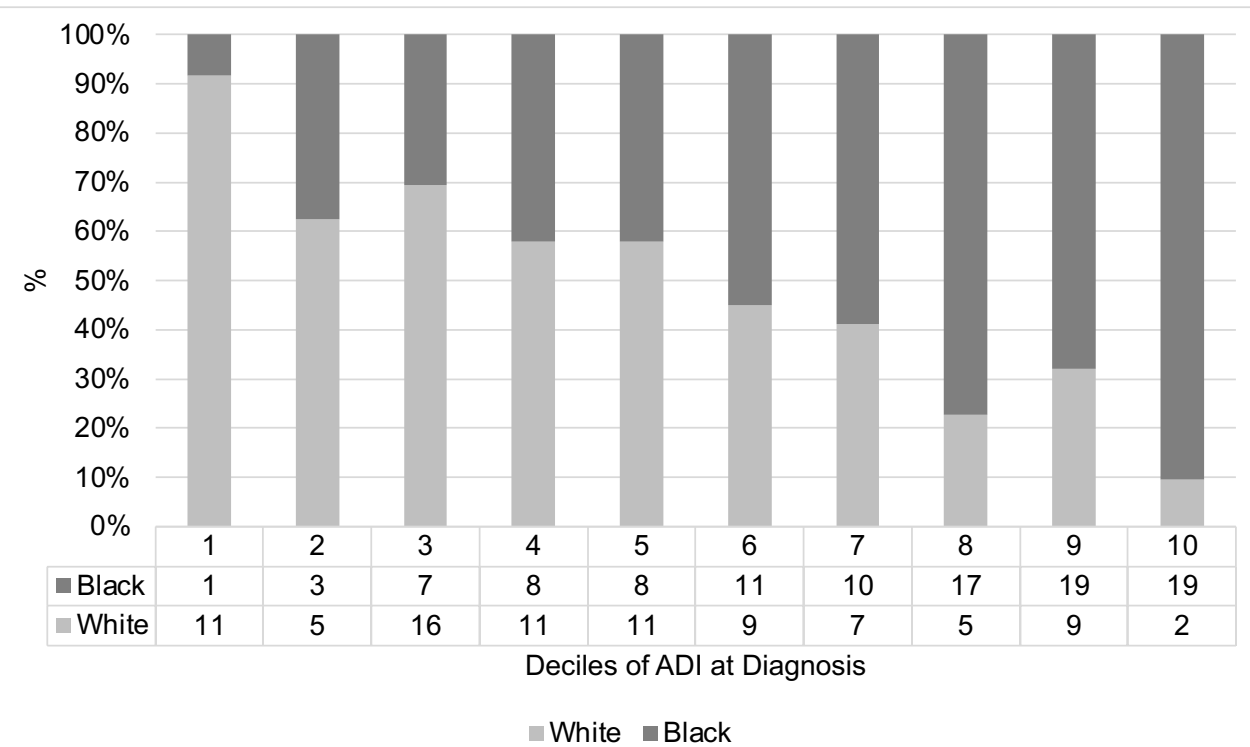
Area Deprivation Index (ADI)

- Constructed based on neighborhood financial strength, economic hardship and inequality, and educational attainment based on the American Community Survey (ACS) data
 - Used the *sociome* R-package to match patients' geocoded addresses at the time of diagnosis
- Previously demonstrated to be associated with lung cancer incidence.
- Operationalized as deciles to account for its distribution
- **The larger the ADI at diagnosis decile, the more disadvantaged the neighborhood is**
 - ADI at diagnosis Decile 10: most disadvantaged
 - ADI at diagnosis Decile 1: least disadvantaged

Breast Cancer Patients by race and ADI at diagnosis deciles



Patients diagnosed with TNBC by race and ADI at diagnosis deciles



Correlation between race and breast cancer and TNBC by ADI at diagnosis is observed: The burden of breast cancer as well as TNBC appears to be highest among black patients in the most socioeconomically disadvantaged neighborhoods.

Bootstrapped logistic regression for comparative TNBC prevalence

ADI at diagnosis and race, individually, are significant factors for TNBC diagnosis.

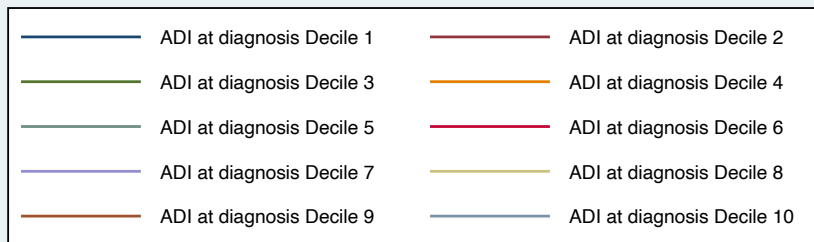
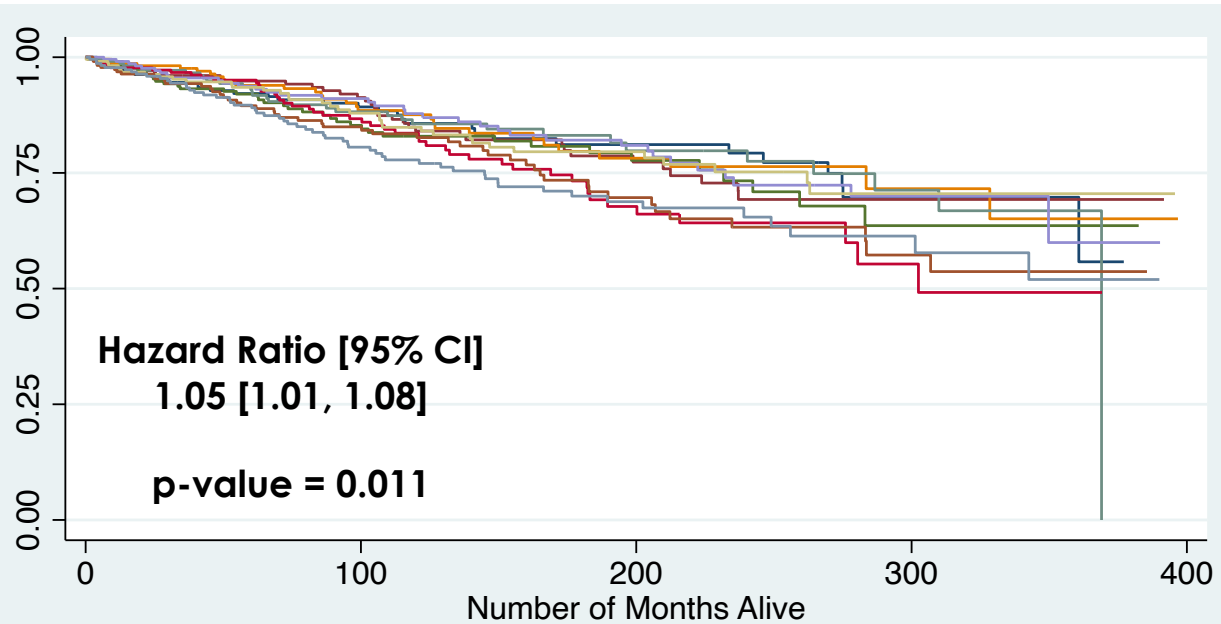
- With a unit increase in ADI at diagnosis decile, the odds of patients diagnosed with TNBC increase by 1.08 times.
- The odds of black patients diagnosed with TNBC are 1.94 times those of white patients.

After adjusting for patients' sociodemographic factors, race remains a significant factor for TNBC diagnosis (Models 1 and 2).

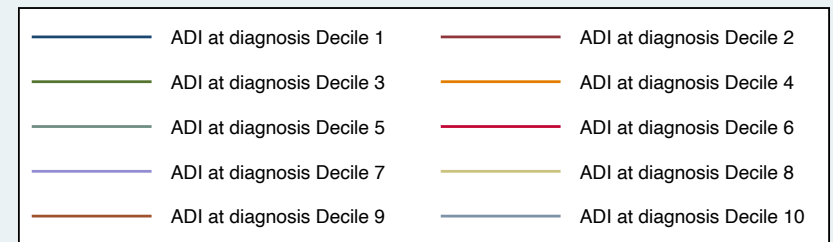
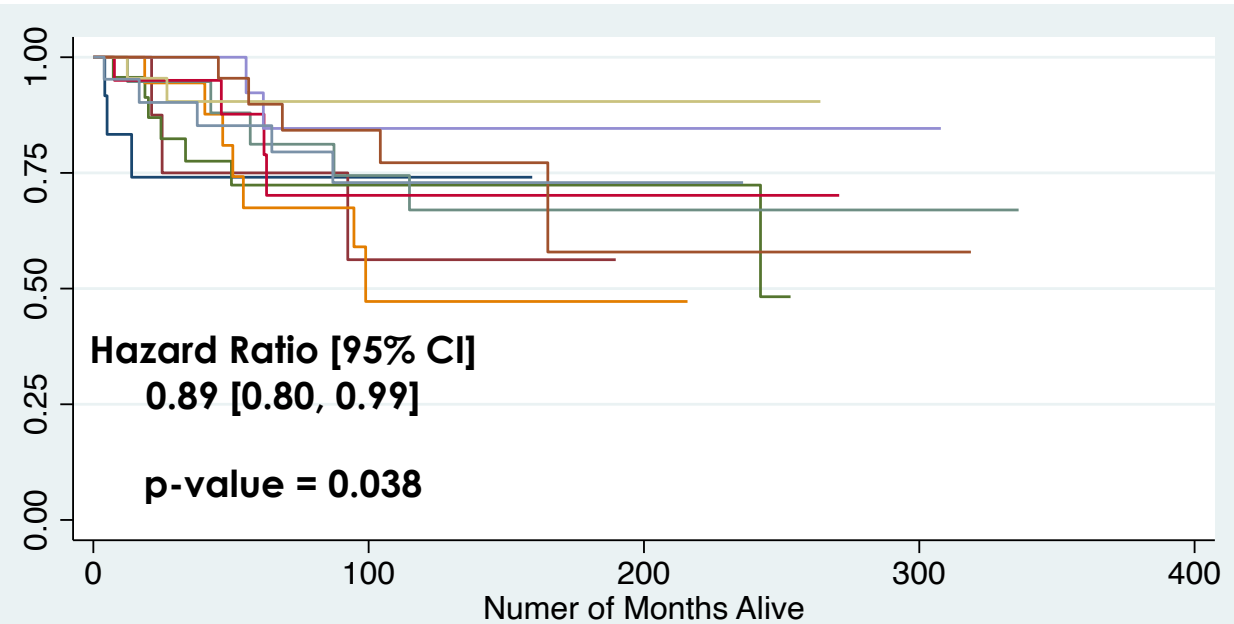
		Bivariate Model	Model 1	Model 2
ADI at diagnosis (deciles)		1.08** [1.03, 1.14]	1.02 [0.96, 1.08]	1.02 [0.94, 1.08]
Race				
	White	REF	REF	REF
	Black	1.94*** [1.44, 2.61]	1.91*** [1.36, 2.69]	2.23*** [1.52, 3.28]
Age at diagnosis				
	≤50 years old			REF
	51-64 years old			0.77 [0.51, 1.17]
	≥65 years old			0.56 [0.30, 1.04]
Marital Status				
	Not Married			REF
	Married			1.42 [0.98, 2.06]
Health Insurance				
	Private			REF
	Medicaid			1.20 [0.68, 2.13]
	Medicare			1.57 [0.80, 3.09]
	Uninsured			1.12 [0.55, 2.28]
	Others			1.78 [0.95, 3.34]

NOTE All models report bootstrapped estimates. **Model 1** estimates ADI at diagnosis in deciles and race. **Model 2** estimates ADI at diagnosis and race, adjusting for age at diagnosis, marital status, and health insurance type. *p-value<0.05 **p-value<0.01 ***p-value<0.001

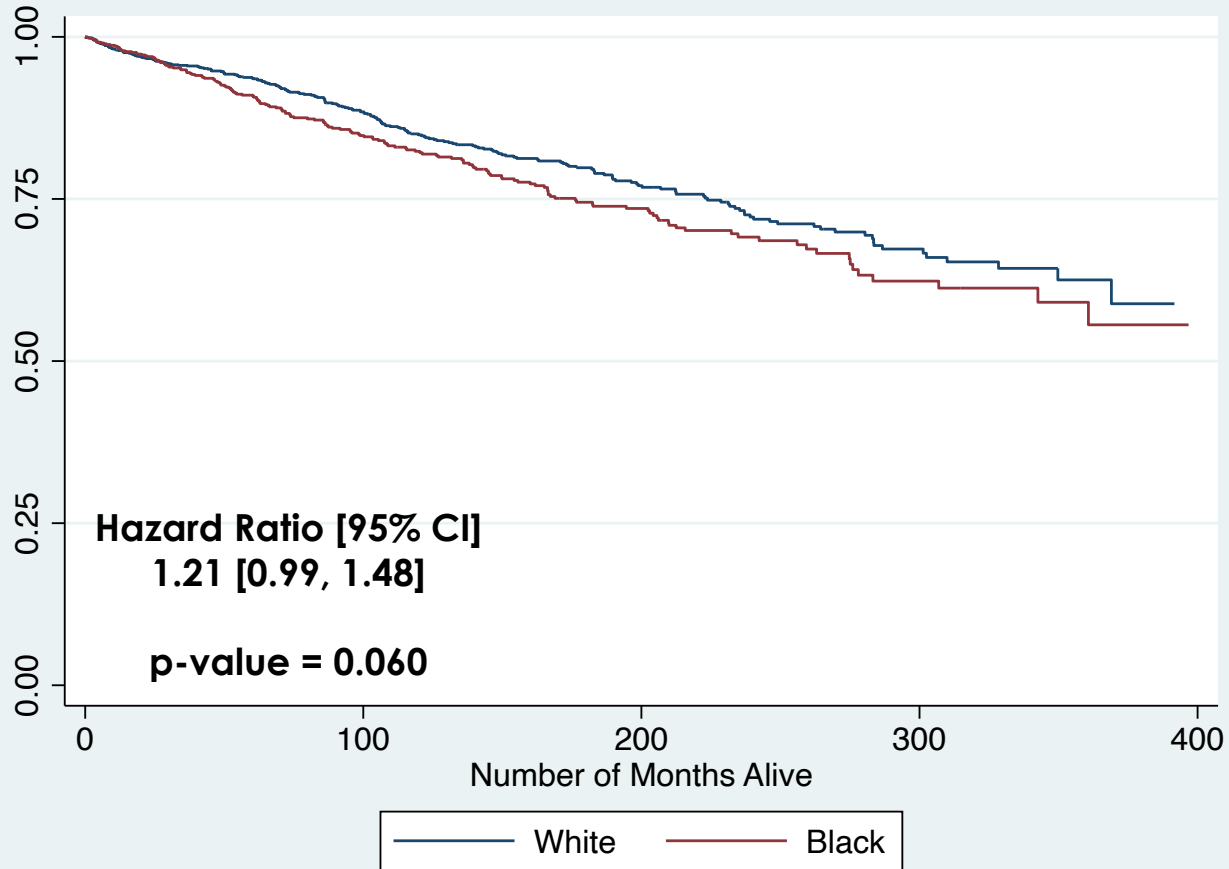
Survival Curve by ADI at diagnosis deciles among all breast cancer patients



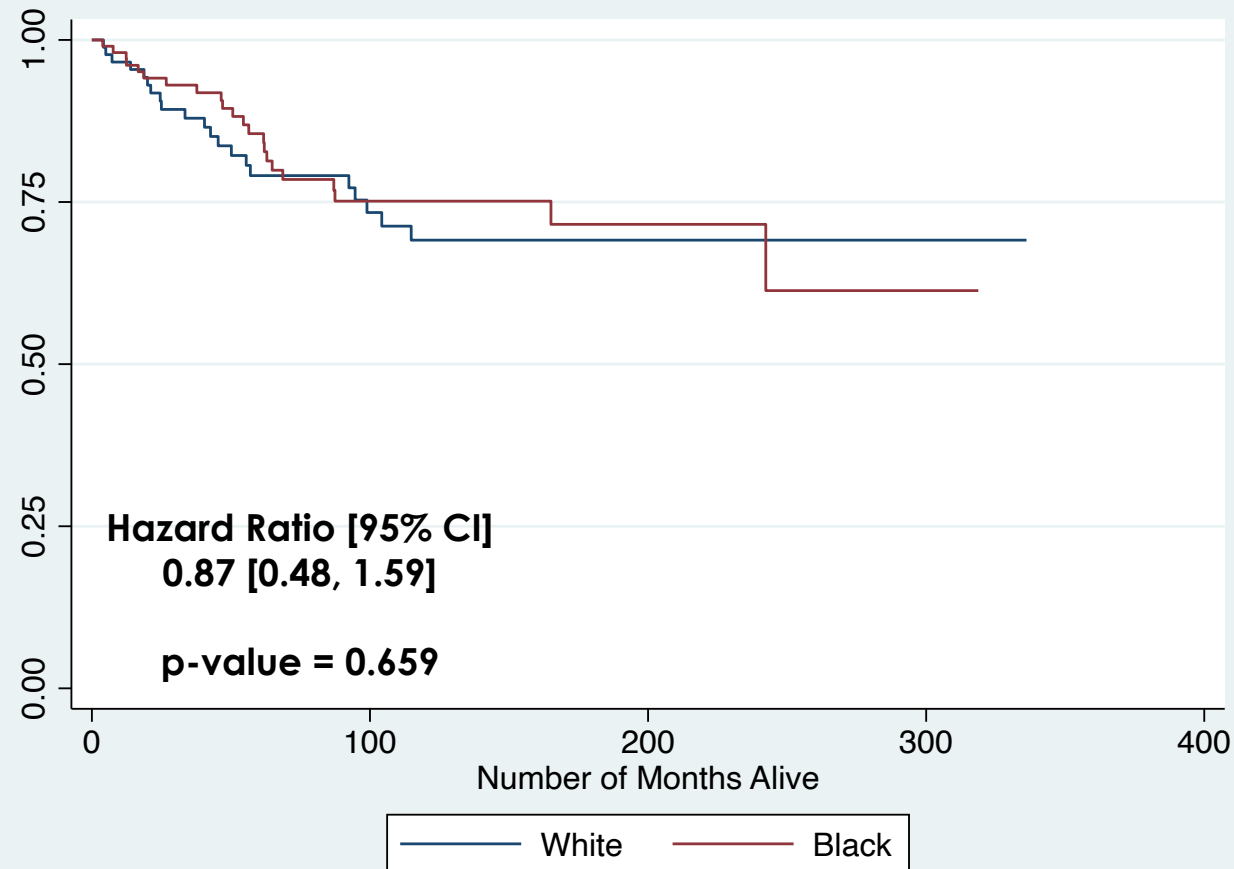
Survival Curve by ADI at diagnosis deciles among TNBC patients



Survival Curve by race
among all breast cancer patients

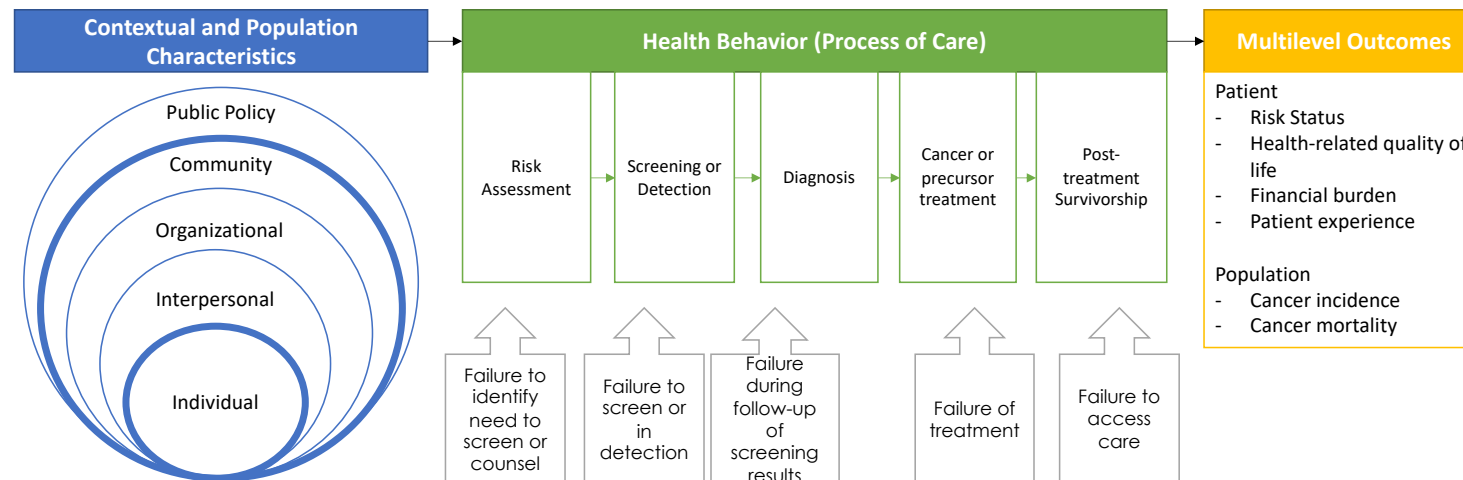


Survival Curve by race
among TNBC patients



Summary

- Both neighborhood socioeconomic position and race are powerfully associated with having TNBC as opposed to other forms of breast cancer.
- These findings suggest that a complex interplay of social conditions and biological disease characteristics contribute to racial disparities in breast cancer outcomes.



Thank you!

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