Targeting Disparities: Impact of Mammographic Screening and Social Drivers on Advanced-Stage Triple Negative Breast Cancer in Vulnerable Populations Across US Counties

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Introduction

- Triple-negative breast cancer (TNBC) is an aggressive subtype with disproportionate mortality among underserved populations.
- Mammographic screening reduces breast cancer mortality, but disparities in access and utilization persist, particularly in African American (AA) communities and socioeconomically vulnerable areas.
- This study aims to quantify the relationship between mammography uptake, demographic factors, and social determinants of health (SDOH) with advanced-stage TNBC (AS-TNBC) across diverse U.S. populations.

Methods and Materials

- A cross-sectional analysis of 593 counties across multiple states.
- Data from the CDC PLACES database (2020 release, representing 2018 data), the American Community Survey (ACS 2014-2018), and county-level SDOH indicators.
- Communities were aggregated using the Max-P Regions method to balance TNBC case counts and socioeconomic indices (adjusted for area deprivation index, ADI).
- Descriptive statistics were used to summarize key characteristics across regions.
- Multivariable Poisson and negative binomial regression models were used to evaluate associations between AS-TNBC diagnoses, mammographic screening uptake, demographic (% AA, % Hispanic, % <45 years), and social vulnerabilities including limited English proficiency, rurality and insurance status.

Results

Table 1. Distribution of sociodemographic and healthcare access indicators and area disadvantage across U.S. counties.

Characteristics	Median % [IQR] N=593 counties
AS-TNBC diagnosis	38.80 [34.90, 43.60]
1-year routine doctor visit adults ≥18 yo	74.30 [71.80, 77.80]
Mammography use women 50–74 yo	72.40 [69.60, 74.80]
Hispanic residents	7.40 [3.30, 19.30]
AA residents	5.00 [1.70, 14.40]
Limited English proficiency	1.30 [1.00, 1.90]
Uninsured adults 18-64 yo	14.50 [11.80, 22.50]
ADI Top Quartile (%)	148 (25.0)
Non-Metro (%)	210 (35.9)

Table 2. Comparison of sociodemographic and healthcare access indicators between high and low AS-TNBC incidence counties.

Characteristics	High % AS-TNBC N=294 Mean% (SD)	Low % AS-TNBC N=299 Mean% (SD)	P-value
1-year routine doctor visit adults ≥18 yo	74.32 (4.00)	74.42 (3.86)	0.761
Mammography use women 50–74 yo	71.48 (4.11)	72.62 (3.93)	**0.001**
Hispanic residents	15.71 (19.05)	13.81 (15.88)	0.187
AA residents	13.96 (15.83)	7.93 (10.33)	**<0.001**
Age 18 to 44	33.08 (4.05)	33.18 (4.40)	0.769
Limited English proficiency	1.66 (0.84)	1.46 (0.85)	**0.005**
Uninsured adults 18-64 yo	18.73 (7.26)	15.66 (7.06)	**<0.001**
ADI Top Quartile (%)	99 (33.7)	49 (16.4)	**<0.001**
Metro (%)	172 (58.5)	203 (69.8)	**0.006**
Non-Metro (%)	122 (41.5)	88 (30.2)	**0.006**

Figure 1. Geographic distribution of AS-TNBC Diagnosis by County (Quartiles).



Figure 2. Geographic distribution of AS-BC Diagnosis by County (Quartiles).

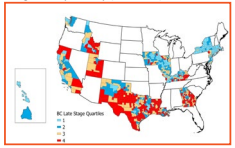


Table 3. Multivariable Poisson regression model of county-level predictors of AS-TNBC incidence.

Characteristics	% Δ	Incidence Risk Ratio [CI]	P-value
Mammography use women 50–74 yo	-5.2	0.948 [0.9121; 0.9854]	**0.0068**
Age18 to 44	-0.48	0.9952 [0.9648; 1.0265]	0.7611
Hispanic residents	+0.16	1.0016 [1.0007; 1.0025]	**3.00E-04**
AA residents	+3.74	1.0374 [1.0261; 1.0488]	**<0.001**
1-year routine doctor visit adults ≥18 yo	-3.41	0.9659 [0.929; 1.0041]	0.0798
English less than very well	-3.91	0.9609 [0.7898; 1.1672]	0.6886
Uninsured adults 18-64 yo	+1.08	1.0108 [0.9872; 1.035]	0.3733
ADI top quartile	+1.04	1.0104 [0.9767; 1.0451]	0.5491
No vehicle	+0.8	1.008 [0.9984; 1.0176]	0.1004
Non-Metro	+4.7	1.047 [1.0078; 1.0876]	**0.0182**

% Δ is percent difference per 10% increase or decrease in variables

Table 4. Negative Binomial model of county level predictors adjusted for total BC cases.

Characteristics	% Δ	Incidence Risk Ratio [CI]	P-value
Mammography use women 50–74 yo	-9.11	0.9089 [0.8848; 0.9336]	**<0.001**
Age 18-44	+2.86	1.0286 [1.009; 1.0485]	**0.0037**
Hispanic residents	+0.06	1.0006 [0.9999; 1.0012]	0.0846
AA residents	+3.68	1.0368 [1.0287; 1.0449]	**<0.001**
1-year routine doctor visit adults ≥18 yo	-1.64	0.9836 [0.9553; 1.0127]	0.2675
Limited English proficiency	+9.97	1.0997 [0.9856; 1.2267]	0.0882
Uninsured adults 18-64 yo	+3.68	1.0368 [1.0206; 1.0532]	**<0.001**
ADI top quartile	+3.99	1.0399 [1.0181; 1.0621]	**3.00E-04**
No vehicle	-0.56	0.9944 [0.9833; 1.0058]	0.336
Non-Metro	+1.51	1.0151 [0.9959; 1.0346]	0.123

Conclusions

- Mammographic screening disparities and adverse social determinants significantly influence the prevalence of advanced-stage TNBC.
- High-risk populations, particularly AA communities, rural areas, and regions with elevated socioeconomic vulnerabilities, face disproportionate impacts.
- These findings highlight the urgent need for targeted interventions aimed at enhancing access to culturally sensitive and linguistically appropriate screening and healthcare services to mitigate disparities and improve breast cancer outcomes.

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References

1. Bianchini G, Balko JM, Mayer IA, Sanders ME, Gianni L. Triple-negative breast cancer: challenges and opportunities of a heterogeneous disease. Nature reviews Clinical oncology. 2016;13(11):674-690.
2. Myers ER, Moorman P, Gierisch JM, et al. Benefits and Harms of Breast Cancer Screening: A Systematic Review. JAMA. 2015;314(15):1615-1634. doi:10.1001/jama.2015.13183
3. Blackmon DJ, Mao CM. Racial and ethnic disparities in breast cancer mortality: are we doing enough to address the root causes? Journal of Clinical Oncology. 2006;24(14):2170-2178.
4. Chen Y, Sussick L, Davis M, et al. Evaluation of triple-negative breast cancer early detection via mammography screening and outcomes in African American and White American patients. JAMA surgery. 2020;155(5):440-442.
5. Bayard S, Fasano G, Chen Y, et al. Screening mammography mitigates breast cancer disparities through early detection of triple-negative breast cancer. Clinical imaging. 2021;80:430-437.
6. Warnecke RB, Oh A, Breen N, et al. Approaching health disparities from a population perspective: the National Institutes of Health Centers for Population Health and Health Disparities. American journal of public health. 2008;98(9):1608-1615.

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