Bridging the Gap: Understanding Socioeconomic and Geographic Inequities in Access to Specialized Cancer Care

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BACKGROUND

Centralized cancer care at high-volume centers is associated with better outcomes due to greater resources and clinical expertise. In response, many health systems are shifting complex surgeries to regional referral centers. However, this shift may unintentionally widen disparities in access and outcomes, especially for underserved populations. Understanding who is left behind in this transition is critical to ensuring equitable delivery of high-quality cancer care.

RESEARCH OBJECTIVES

Investigate disparities in access to regional referral centers for major cancer surgeries. Examine effects of:

- Racial and ethnic minority status
- Socioeconomic deprivation (measured by the Area Deprivation Index [ADI])
- Rural vs. urban residence

STUDY DESIGN & METHOD

Data Source: Data were drawn from the Pennsylvania Cancer Registry (2013–2019), linked with Pennsylvania Health Care Cost Containment Council database (PHC4) and supplemented by external sources including the AHA, and AHRF.

Study Population: Included adults (≥18 years) with first diagnoses of bladder, brain, breast, colorectal, esophageal, liver, lung, pancreatic, or prostate cancer

Outcome: The primary outcome was whether patients received treatment at a regional referral center (NCI-designated or CoC-accredited academic cancer center).

Covariates: Models included age, sex, race/ethnicity, Area Deprivation Index (ADI), rural-urban residence (RUCA), comorbidities, insurance type, differential travel distance (difference between nearest hospital and nearest referral center), SEER Summary Stage, surgery year, surgeon procedure volume, procedure complexity (for breast and lung), and county-level physician supply.

Statistical Analysis:
Multivariable logistic regression models were stratified by cancer type to assess factors associated with referral center care. Results are presented as odds ratios (ORs) with 95% confidence intervals (CIs).

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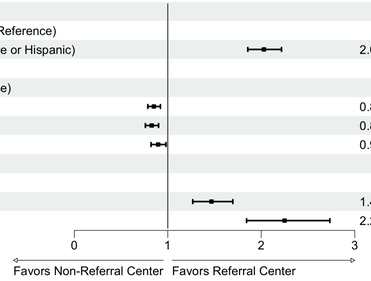
PRINCIPAL FINDINGS

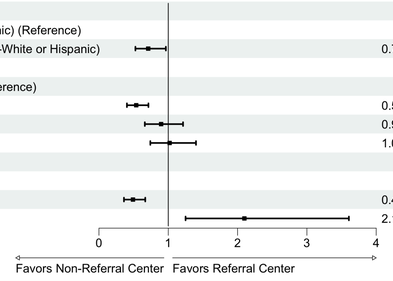
Multivariable Logistic Regression for Receipt of Care at Regional Referral Center
Colorectal Cancer

Variable	OR (95% CI)
Race and Ethnicity	
Non-minority (White, not Hispanic) (Reference)	
Racial and Ethnic minority (non-White or Hispanic)	2.03 (1.86-2.22)
Area Deprivation Index (ADI)	
Quartile 1 (least deprived) (Reference)	
Quartile 2	0.85 (0.79-0.92)
Quartile 3	0.83 (0.76-0.90)
Quartile 4 (most deprived)	0.90 (0.82-0.98)
Residence (RUCA)	
Urban (Reference)	
Large town	1.47 (1.27-1.70)
Rural	2.25 (1.84-2.73)



Multivariable Logistic Regression for Receipt of Care at Regional Referral Center
Pancreatic Cancer

Variable	OR (95% CI)
Race and Ethnicity	
Non-minority (White, not Hispanic) (Reference)	
Racial and Ethnic minority (non-White or Hispanic)	0.71 (0.53-0.97)
Area Deprivation Index (ADI)	
Quartile 1 (least deprived) (Reference)	
Quartile 2	0.54 (0.40-0.71)
Quartile 3	0.90 (0.66-1.21)
Quartile 4 (most deprived)	1.02 (0.74-1.40)
Residence (RUCA)	
Urban (Reference)	
Large town	0.49 (0.36-0.67)
Rural	2.10 (1.25-3.61)



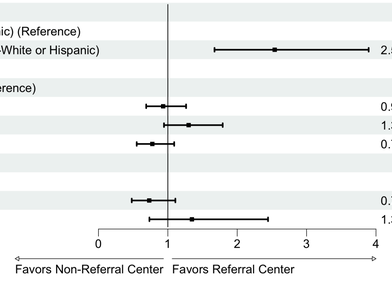
Racial and ethnic minority patients were **more likely to receive care at referral centers** across five cancer types (bladder, breast, colorectal, lung, and prostate).

For socioeconomic status, **no consistent pattern emerged** across cancer types. Only in **prostate cancer** did patients from **more deprived areas** show a clear trend of being **more likely** to receive care at referral centers.

Patients in **rural areas** were consistently **more likely** to receive care at referral centers compared to those in urban areas, while access among patients in **large towns** varied by cancer type.

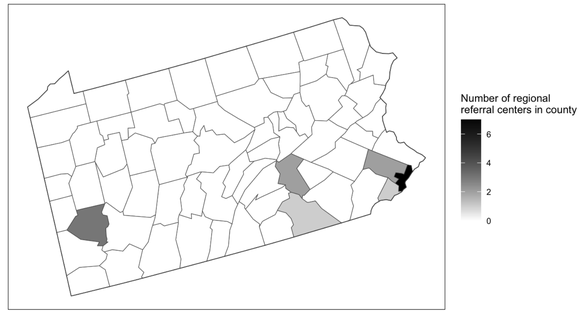
Multivariable Logistic Regression for Receipt of Care at Regional Referral Center
Bladder Cancer

Variable	OR (95% CI)
Race and Ethnicity	
Non-minority (White, not Hispanic) (Reference)	
Racial and Ethnic minority (non-White or Hispanic)	2.54 (1.67-3.89)
Area Deprivation Index (ADI)	
Quartile 1 (least deprived) (Reference)	
Quartile 2	0.93 (0.69-1.26)
Quartile 3	1.30 (0.94-1.79)
Quartile 4 (most deprived)	0.78 (0.55-1.09)
Residence (RUCA)	
Urban (Reference)	
Large town	0.73 (0.48-1.11)
Rural	1.35 (0.73-2.44)



Models also included covariates: age, sex, comorbidities, insurance type, differential travel distance (difference between nearest hospital and nearest referral center), SEER Summary Stage, surgery year, surgeon procedure volume, procedure complexity (for breast and lung), and county-level physician supply.

Counties with Regional Referral Centers in Pennsylvania



Policy Implication

These findings highlight the complexity of access to centralized cancer care. While racial and ethnic minority patients were more likely to receive care at referral centers for several cancers, no clear socioeconomic pattern emerged, and rural patients often had better access than urban ones. These trends may reflect Pennsylvania's unique demographics and care infrastructure, suggesting that state-specific strategies are essential. Broader studies are needed to assess whether similar patterns exist nationally and to guide equity-focused cancer care planning.

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