

Cervical cancer screening gaps in New Jersey university and college census tracts

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Background

- New Jersey has the 12th highest cervical cancer screening rate in the nation (80.0%). However, significant racial and age disparities exist within screening compliance: 21-25-year-olds have a 61.1% screening rate, more than 17% lower than the 26-35 age group and 26% lower than the 46-55 age group.
- Utilizing Rutgers Cancer Institute's **Cancer InFocus™ (CIF)** platform, we observed that many of New Jersey's census tracts with the lowest cervical cancer screening rates contain college campuses. (Figure 1).



Figure 1. College census tracts with low cervical cancer screening rates (clockwise from top left: Rutgers, Stockton, Ramapo, Rowan)

Methods

- Data sources:** We analyzed New Jersey census tracts using 2020 CDC BRFSS cervical cancer screening prevalence. Sociodemographic covariates were obtained from the 2020 American Community Survey (ACS) 5-year estimates via the tidycensus R package.
- Age-expected screening (baseline) prediction.** Female age composition derived from ACS; age bins were mapped to five age groups (21–25, 26–35, 36–45, 46–55, 56–65) and converted to within-tract proportions among females aged 21–65. We calculated an age-expected screening estimate for each tract.
- Multivariable model.** We computed an age-adjusted residual for each tract. We then used an elastic net regression (glmnet via tidymodels) to predict from tract characteristics: female race/ethnicity composition (NH White, Black, Asian, Hispanic), % insured, and median household income. Predictors were standardized and model tuning used 5-fold cross-validation minimizing RMSE.

Results

- The age-expected screening baseline varied as a function of female age composition, larger 21-25-year shares contributed to lower screening rates.
- College-containing tracts had significantly larger gaps than non-college tracts (Welch's t-test: $t(20.17) = -4.72, p = 0.000129$; mean difference [Yes–No] = 0.0315, 95% CI 0.0176–0.0454). A Wilcoxon rank-sum test confirmed significant upward shift in gap distribution among college tracts ($W = 7286, p = 3.15 \times 10^{-7}$).
- 19 of 21 college census tracts observed a lower screening rate than multivariable model predicted rate (Table 1)

Residuals vs Predicted Cervical Cancer Screening Rates (Multivariable) New Jersey Census Tracts (2020)

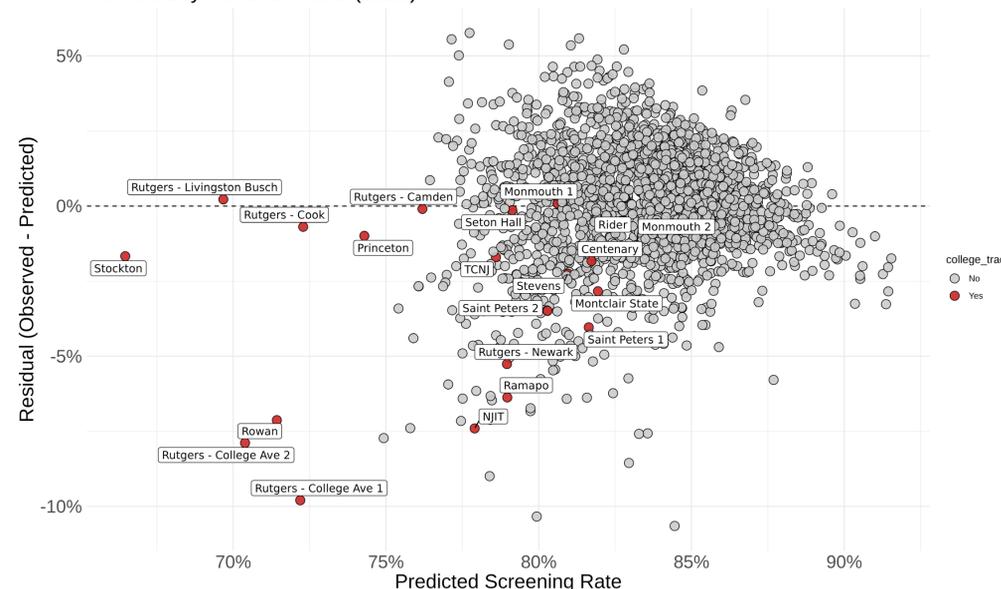


Figure 2. Residual values for census tract predicted screening rates.

College Tract	Observed Screening Rate	Age-Adjusted Model	Multivariable Model	Multivariable Gap
Rutgers - College Ave 1	62.4%	73.3%	72.2%	-9.8%
Rutgers - College Ave 2	62.5%	68.9%	70.4%	-7.9%
NJIT	70.6%	77.1%	77.9%	-7.4%
Rowan	64.3%	69.8%	71.4%	-7.1%
Ramapo	72.6%	76.5%	79.0%	-6.4%
Rutgers - Newark	73.7%	77.9%	79.0%	-5.3%
Saint Peters 1	77.6%	81.6%	81.6%	-4.0%
Saint Peters 2	76.8%	81.1%	80.3%	-3.5%
Montclair State	79.1%	78.3%	81.9%	-2.8%
Stevens	78.7%	76.9%	81.0%	-2.3%
Centenary	79.9%	79.8%	81.7%	-1.8%
Stockton	64.8%	62.9%	66.5%	-1.7%
TCNJ	76.9%	75.2%	78.6%	-1.7%
Princeton	73.3%	69.1%	74.3%	-1.0%
Rutgers - Cook	71.6%	71.8%	72.3%	-0.7%
Rutgers - Camden	76.1%	75.4%	76.2%	-0.1%
Seton Hall	79.0%	76.2%	79.1%	-0.1%
Rutgers - Livingston Busch	69.9%	68.3%	69.7%	0.2%

Table 1. Census tract screening estimates vs. age and multivariable models

Discussion

- There is no clear relationship between screening gaps and university enrollment. Several colleges are included in multiple census tracts – it will be helpful to calculate the % of the census tract population for each university.
- Median household income was the strongest predictor of screening residual. Asian & Hispanic populations were stronger predictors than high Black or White populations.

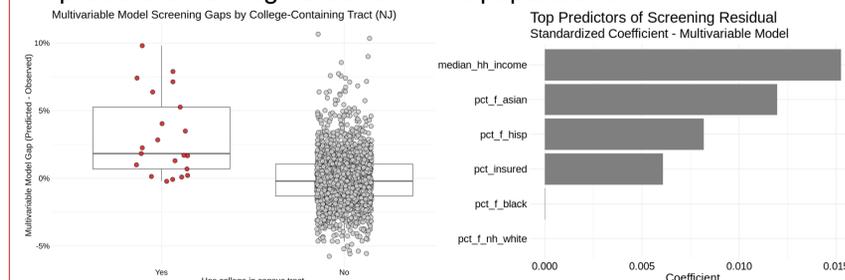


Figure 3. Screening gaps in college vs non-college tracts. Figure 4. Predictors of screening residual in multivariable model

Limitations

- CDC BRFSS cervical cancer screening rates are only updated through 2020. For comparison, breast and colorectal screening rates are reported through 2024.
- Census tract boundaries were updated during the ACS 5-year reporting period. As a result, 2019 demographic tables used for multiple census tracts in analysis.
- Screening is recommended ever 3 years between ages 21-29; low screening may be attributed to

Future Plans

- Improve multivariable model to include other socioeconomic and access barrier data points.
- Expand gap analysis to national level to identify if similar gaps exist in other states or university census tracts.
- Collaborate with university health services and Rutgers Cancer Institute COE team to implement interventions to increase cervical cancer screening rates in targeted census tracts.

Citations

Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2022.

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