College Access for Cancer Prevention in Rural North Carolina

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Context

North Carolina is among states with the highest cancer incidences, at 475.5 diagnoses per 100,000 residents. Further, cancer is the second-leading cause of death in NC, at 151.1 deaths per 100,000 residents in 2023, 40% of which were from lung, breast, or colorectal cancer. The NC Central Cancer Registry acknowledges these as preventable, claiming "the majority of cancers are related to personal lifestyle or environmental factors, such as smoking and diet, and are therefore preventable."

The framing of "personal lifestyle" minimizes critical data. These diagnoses are shaped by social determinants of health (SDOH), which the CDC defines as the non-medical and cumulative factors that influence individual health outcomes. Understanding which SDOH most strongly affect cancer outcomes is critical for designing effective interventions.

To address this, I analyzed 2019-2023 NCDHHS aggregate data for county-level lung, breast, and colorectal cancer incidence and mortality and 2021 NCIOM SDOH snapshot data. College graduation emerged as the only consistently protective factor across all three cancer types, with effect sizes 4-16 times stronger than any other SDOH variable, including PCP access, smoking rates, and poverty.

When examining geographic distributions across NC, this finding holds urgent significance. Thirty-five percent of North Carolinians live in rural counties, where college graduation rates are 43% lower (23.0% vs. 40.4%), and lung cancer incidence and colorectal cancer incidence and mortality are significantly higher ($p=0.015$, $p=0.001$, $p=0.000$) than urban areas. The populations facing the highest cancer burden have the least access to the most powerful prevention factor identified in this analysis.

If college graduation is 4-16 times more protective than any other SDOH variable, and rural populations are systematically excluded from this protection, the policy solution becomes clear: NC must invest in educational access for the populations at highest cancer risk.

Proposal

Cancer treatment is a massive financial undertaking, with the projected national cost for 2030 reaching $246B. Lifetime treatment costs for SDOH-linked cancers are $190,929 (lung), $114,620 (breast), $182,913 (colorectal). These comprise 40% of NC diagnoses, and rural diagnoses with statistical significance. Addressing education as a protective determinant can save both lives and money.

NC College Connect is a program that guarantees admission for public high school seniors with a 2.8+ weighted GPA to 40 NC colleges, and all 58 community colleges. A last-dollar scholarship built on this infrastructure targets the cost barrier directly, and would increase educational attainment in rural communities.

The average cost of tuition and fees at the public universities in this program is $5,832 per year. With a 27.3% low-income population, 467,000 K12 students, and average state Pell Grant of $6,144, a last-dollar scholarship with 70% program participation would cost the state $308,002,565 annually.

Applying standardized LASSO coefficients to projected graduation increase, diagnoses across cancers would drop by 746.5 diagnoses per year, lung (285.7), breast (329.6), and colorectal (131.2). Over 18 years, 9,331 cases would be prevented.

Lung (73.90), breast (196.87), and colorectal (44.14) cancer occur in rural populations at a rate of 314.92 diagnoses per 100,000 residents per year. Rural populations currently face 11,778 annual diagnoses at a treatment cost of $1.67B; this program saves $116.3M annually in treatment alone.

The fiscal case extends further. A conservative $20,000 wage premium per graduate yields $6.54B in new rural wages and $260.9M in state tax revenue at 3.99%. Of the 2,931 annual rural deaths from these cancers, 271 are prevented, representing $2.96B in statistical value of life saved.

At maturity, the program returns $377M annually against $308M, a net gain of $69M, while preventing 747 diagnoses and reducing rural SDOH-linked cancer mortality by 7.36%.

Obstacles

The most immediate objection to this policy is that it funds education, not healthcare. Critics will argue that cancer prevention belongs in hospitals and clinics, and that health funding should focus on these areas. However, the data shows that higher education is 4-16 times more protective than any other modifiable variable, including healthcare access. In fact, healthcare access showed a positive correlation with cancer diagnosis, indicating detection bias, but not mortality reduction. Cross-sector interventions are preventative health policy.

Another obstacle is that even with guaranteed admission through NC College Connect, rural students may not apply to the program. This is resolved by integrating the scholarship into existing infrastructure. CFNC's NC Countdown to College program provides year-long support for students applying to college, including free applications during College Application Week, which is already integrated with NC College Connect. By adding an automated eligibility flag based on student address (data CFNC already collects), rural students are automatically enrolled in the scholarship when they submit applications. They opt out, not in, leveraging systems rural students already use with negligible technical cost.

The protective factor is college graduation, not enrollment, meaning efforts must be taken to ensure student support. UNC system schools already provide this through academic advising, tutoring, career counseling, mental health resources, and peer mentoring. While these services are available to all students, hiring dedicated academic advisors for rural scholars ensures proactive, in-system advocacy for their success. At a median UNC salary of $44,000 per advisor, the program costs $484,000 annually across 11 schools, less than 1% of the program's $69M net gain.

This program is fiscally beneficial, integrates well into existing infrastructure, and uses cross-sectional policy to reduce cancer diagnoses and deaths in rural NC.

References and Supplementary Material

College Access for Cancer Prevention in North Carolina Supplementary Materials
https://github.com/madisonthompson27/nc-county-epigenetics