Informing Cancer Prevention and Control in Maryland Through Geospatial Analysis and Community Advisory Partnerships

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1. Background

The Community Outreach and Engagement (COE) office at the Johns Hopkins Sidney Kimmel Comprehensive Cancer Center (SKCCC) collaborates with community stakeholders to reduce the cancer burden in Maryland. Building sustainable, trustworthy, and effective partnerships involves understanding the unique needs of diverse communities. Given the emerging cancer patterns in the state, this community-centered collaboration is vital. The last five-year report from the National Institutes of Health noted a 3.9 percent annual increase in Stage I breast cancer incidence, alongside a slower 1.9 percent decline in mortality. This trend is primarily due to advances in mammography screening and treatment. However, both incidence and mortality rates vary by community, necessitating tailored intervention approaches.

2. Goals

Our goal is to enhance understanding of the breast cancer burden at the census tract level across Maryland. We intend to identify factors impacting breast cancer outcomes in neighborhoods, such as mammography rates and social vulnerability, to inform targeted interventions. Strengthening partnerships with community stakeholders through Community Advisory Groups in Western Maryland, the Eastern Shore, Baltimore City and County, and Prince George's County is crucial to this effort.

3. Solutions and Methods

Breast cancer data were sourced from the Maryland Department of Health. Tract-level data on preventive services, chronic disease risk behaviors, and social health needs were obtained from the U.S. Centers for Disease Control and Prevention (CDC) PLACES dataset. From 2010 to 2022, cases, stages at diagnosis, and mortality were aggregated for each tract. Using state-level rates, we calculated Standardized Incidence and Mortality Ratios (SIR and SMR) and compared them with the 2022 prevalence of the previously mentioned behavioral factors. Bivariate choropleth maps prioritized tracts with high burdens of outcomes and risk factors, which were shared with CAG leaders to identify neighborhoods in need of targeted programs. This abstract highlights the association between SIR and mammography rates, showcasing how CAG stakeholders leverage geospatial data to inform tailored interventions.

4. Outcomes

Between 2010 and 2022, Maryland reported 61,370 new breast cancer cases, representing a 34.6 percent incidence increase, statistically higher than the expected 32.3 percent. The average incidence rate was 17.8 cases per 10,000 females annually, with a mortality rate of 4.5 deaths per 10,000 females. The bivariate map indicated that Western Maryland and the Eastern Shore had many tracts with high SIR, but mammography rates below the Healthy People objective of 77.1 percent (46.2 percent and 58.1 percent of the tracts, respectively). This data guides Eastern Shore stakeholders in focusing their mobile mammography program on areas with elevated incidence and mortality but low screening prevalence. In regions with high screening and mortality, such as the Central region, where 40.9 percent of its tracts present this scenario, additional factors may influence outcomes, including access to timely treatment, neighborhood deprivation, social vulnerability, and environmental exposures.

5. Lessons Learned and Future Directions

Geospatial analysis provides detailed, community-level insights, enabling stakeholders to develop context-sensitive strategies rather than generic approaches. The mobile mammography program illustrates how data are currently utilized. Further analysis of behavioral factors will guide public health efforts in Maryland, addressing concerns about breast, colorectal, ovarian, lung, and prostate cancers, crucial to COE's mission to improve cancer outcomes in the community.

Figure: Tract-Level Breast Cancer Risk & Mammography Objective

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