Neighborhoods archetypes for understanding disparities in prostate cancer mortality

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ABSTRACT:

Background: Neighborhood factors shape and perpetuate disparities in prostate cancer mortality, but existing approaches have made it challenging to assess the synergistic effects of multiple neighborhood factors on health outcomes. An alternative approach is to define neighborhood archetypes that encompass multiple dimensions within a single classification system and capture meaningful distinctions across neighborhoods. The archetype approach has the potential to identify improved opportunities for intervening and reducing health disparities.

Methods: Leveraging a comprehensive database of small-area level data on neighborhood social and built environments (the California Neighborhoods Data System), which includes socioeconomic status, racial/ethnic composition, immigration/acculturation factors, urban/rural status, population density, street connectivity, walkable destinations, food environment, recreational opportunities, traffic density, and green space), we applied latent class analysis (LCA) to develop neighborhood archetypes for 2000 and 2010 California block groups and census tracts. Geographic variability in all-case and prostate cancer-specific mortality by neighborhood archetypes was assessed using multivariable Cox proportional hazard models with geocoded cancer registry data.

Results: Goodness of fit statistics identified 5-class and 9-class neighborhood archetype models for census tracts that showed significant associations with mortality after prostate cancer. For the 9-class archetype model, compared to those residing in Upper Middle Class suburban neighborhoods, all other neighborhood types, except High Status, had statistically significant higher mortality (for all cause and for prostate cancer-specific mortality), with Hispanic Small Town neighborhoods having the highest morality (HR=1.39, 95% CI=1.35-1.43 for all cause; HR=1.37, 95% CI=1.29-1.45). Heterogeneity was observed for all cause and prostate cancer-specific mortality by race/ethnicity. For all-cause mortality, among NH Whites and AANHPIs, those residing in Inner City neighborhoods had the highest mortality; for NH Blacks and Hispanics, those residing in Hispanic Small Town neighborhoods had the highest mortality. For prostate cancer-specific mortality, among NH Whites and Hispanics, those residing in Hispanic Small Town neighborhoods had the highest mortality; among NH Blacks and AANHPIs, those residing in Rural/Micropolitan neighborhoods had the highest mortality. Variation by nativity (US- or foreign-born) was also observed.

Conclusion: The archetype approach yields insights into how neighborhood characteristics work synergistically to influence prostate cancer mortality. This research contributes a more fundamental understanding of how place affects health and can inform multilevel interventions.