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Validity of geographic-level social determinant of health metrics in pancreatic neuroendocrine tumors

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BACKGROUND

Various social determinant of health (SDOH) metrics and indices are utilized to evaluate access to cancer care and to explain disparities in outcome in pancreatic neuroendocrine tumors (PNETs). Little prior work has compared the validity of various geographic metrics. Therefore we aimed to examine different geographic metrics validity (from smallest to largest: census block group< census tract< zip code< county) utilizing single institutional data in a racially diverse patient population.

METHODS

We reviewed all patients surgically treated for PNETs from 2006 to 2022 at a single NCI-designated comprehensive cancer center. We collected patient demographics including self-reported race (White or Black), billing address, tumor characteristics, and SDOH. We utilized individually reported or American Community Survey census block group or tract level as the gold standard for SDOH metrics. We then compared between- and within-race SDOH differences across different geographic levels, including zip code and county using Wilcoxon Signed Rank tests.

RESULTS

A total of 179 patients were included; 49 (27%) patients self-identified as Black. The mean age at surgery was 59 y (SD 13). Black patients were younger at diagnosis (55y (SD: 14) vs. White patients: 60y (SD: 12) ($p=0.0094$)) and were more likely to be female (69% vs. 45% ($p=0.004$)). At the block group/census tract level, compared to White patients, Black patients lived in neighborhoods with lower educational attainment, lower income, higher rates of uninsurance, higher overall social vulnerability index (SVI), and higher Area Deprivation Index (all $p<0.05$). These differences, however, were masked when examining county- and zip code-level SDOHs.

Compared to census block/tract level data, county- and zip code-level neighborhood data were most inaccurate for White patients. For White patients, zip code level metrics underestimated income and overestimated uninsurance level ($p<0.05$). County level metrics underestimated White patients' neighborhood median household income and high school graduation rate, but overestimated poverty, uninsurance rate, and SVI (all $p<0.05$).

For Black patients, zip code level metrics overestimated poverty level and uninsurance rates ($p<0.05$); the only inaccurate county level metric was SVI ($p<0.001$).

CONCLUSIONS

Black patients with PNETs experience more vulnerable SDOHs, a disparity which may be hidden when analyzing large geographic regional variations. It is imperative to consider the application of census SDOHs and the potential inaccuracies that may mask between-group differences. For the most robust conclusions about racial disparities in cancer research, we encourage investigators to obtain data for individuals or for the smallest geographic region available.

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