

# Evaluating the Intersection of Climate Vulnerability and Cancer Burden in North Carolina



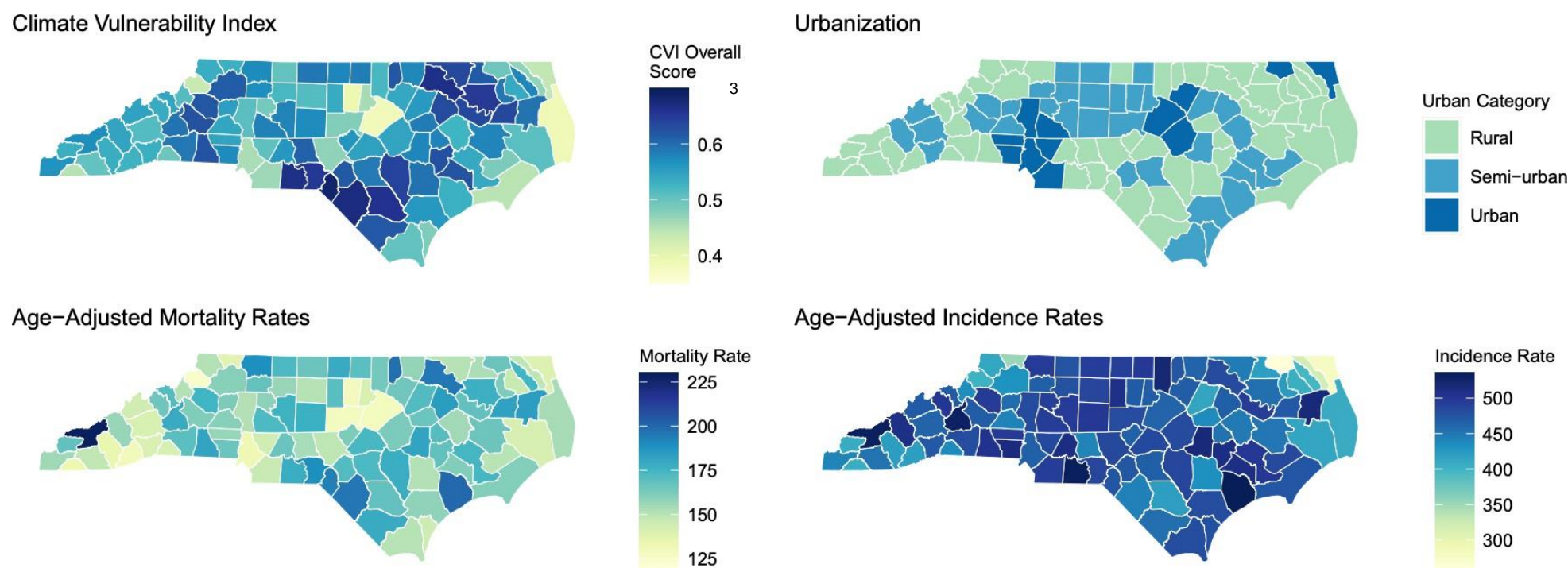
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## BACKGROUND

- Climate-related extreme weather events (e.g., hurricanes) have been associated with interruptions to cancer care, impacting health outcomes across the cancer continuum.
- Publicly available climate and cancer data can identify geographic areas of overlapping burden.

Figure 1. North Carolina Maps of Geographical Trends for Select Community Characteristics



## OBJECTIVE

- Evaluate intersections of cancer burden and climate vulnerability by describing NC county-level cancer incidence and mortality rates with aggregated measures of climate vulnerability.

## METHODS

- County-level baseline vulnerabilities and climate change risk data from the U.S. Climate Vulnerability Index (CVI) and the 2017-2021 county-level cancer incidence and mortality data reported by the North Carolina (NC) Department of Health and Human Services were utilized.
- Counties were ranked by CVI and cancer incidence and mortality rates per 100,000 people. Rates were additionally stratified by CVI quartiles and urban categories.
- Relations between county climate vulnerability and cancer burden were analyzed using Spearman's rank (r) correlation, rate ratios, and 95% confidence intervals.

## CONCLUSION

- Research focused on the impacts of climate change on cancer outcomes has the potential to inform equitable climate preparation, mitigation, and adaptation strategies.
- Mapping cancer mortality rates to the climate hazards relevant to NC can help cancer centers and hospitals better prepare for the impacts of extreme weather events and direct public health resources to the people and places most likely affected.

## RESULTS

- Age-adjusted cancer incidence ranged from 261 to 535 (median = 471, IQR = 442 - 493) and mortality ranged from 125 to 229 (median = 162, IQR = 151 - 173) across NC counties.
- Scotland, Robeson, and Halifax counties had the highest overall CVI scores of 0.68, 0.67, and 0.66, with respective cancer mortality rates of 193, 195, and 196 per 100,000 people.

Table 1: Age-Adjusted Cancer Mortality Rates and Rate Ratios, Stratified by CVI Quartiles and Urban Category

	Total	Q1	Q2	Q3	Q4	Rate Ratio; Q4/Q1
All Cancer	162.4 (158.8, 166.0)	145.6 (140.6, 150.5)	157.5 (151.3, 163.8)	172.3 (166.5, 178.1)	174.29 (168.4, 180.2)	1.20 (1.15, 1.25)
<i>Cancer Type</i>						
Lung	41.8 (40.3, 43.3)	35.1 (32.3, 37.8)	41.4 (38.6, 44.2)	46.0 (43.8, 48.2)	44.8 (42.2, 47.3)	1.28 (1.17, 1.40)
Female Breast	21.3 (20.5, 22.1)	19.2 (18.1, 20.3)	21.2 (19.4, 23.0)	21.1 (19.5, 22.7)	23.3 (21.5, 25.1)	1.21 (1.06, 1.39)
Prostate	20.6 (19.7, 21.5)	19.2 (18.1, 20.3)	19.5 (18.0, 20.9)	20.9 (18.6, 23.3)	22.4 (20.3, 24.4)	1.17 (1.01, 1.35)
Colon/Rectum	14.1 (13.4, 14.8)	11.7 (10.9, 12.4)	13.3 (12.3, 14.2)	14.9 (13.3, 16.4)	16.1 (14.5, 17.8)	1.38 (1.17, 1.64)
<i>Urbanization</i>						
Large Metropolitan	152.7 (143.5, 161.9)	144.2 (132.6, 155.8)	161.3 (151.2, 171.4)	169.5 (126.9, 212.0)	-	-
Medium small metro	161.2 (155.7, 166.7)	147.0 (134.5, 159.4)	159.2 (148.8, 169.6)	171.3 (166.1, 176.5)	170.6 (158.2, 182.9)	1.16 (1.06, 1.27)
Micropolitan/noncore	165.3 (160.0, 170.7)	145.4 (137.9, 152.8)	154.3 (142.7, 165.9)	173.3 (162.7, 183.9)	175.2 (168.0, 182.4)	1.21 (1.13, 1.28)

\*Age-adjusted mortality rates are presented per 100,000 persons with 95% CI

Table 2: Age-Adjusted Incidence Rates and Rate Ratios for Cancer, Stratified by CVI Quartiles and Urban Category

	Total	Q1	Q2	Q3	Q4	Rate Ratio; Q4/Q1
All Cancer	462.5 (453.2, 471.7)	439.2 (412.8, 465.7)	463.7 (446.2, 481.2)	475.7 (461.2, 490.3)	471.1 (458.4, 483.8)	1.07 (1.05, 1.10)
<i>Cancer Type</i>						
Lung	63.3 (61.2, 65.4)	54.0 (49.8, 58.1)	65.0 (61.0, 69.0)	67.4 (63.7, 71.1)	66.7 (63.2, 70.2)	1.24 (1.15, 1.33)
Female Breast	154.4 (149.8, 159.1)	151.7 (138.9, 164.4)	158.1 (149.0, 167.2)	153.6 (146.5, 160.7)	154.3 (145.3, 163.3)	1.02 (0.97, 1.06)
Prostate	114.9 (111.3, 118.5)	110.9 (102.7, 119.2)	111.5 (105.5, 117.6)	113.1 (115.6, 132.9)	124.2 (115.6, 132.9)	1.12 (1.06, 1.18)
Colon/Rectum	35.3 (34.0, 36.5)	31.1 (29.1, 33.2)	33.3 (30.9, 35.7)	37.3 (34.7, 39.9)	39.4 (37.5, 41.3)	1.27 (1.15, 1.39)
<i>Urbanization</i>						
Large Metropolitan	448.2 (395.3, 501.1)	418.2 (327.6, 508.8)	481.9 (455.2, 508.7)	502.6 (461.9, 543.2)	-	-
Medium small metro	480.0 (471.9, 488.1)	478.0 (471.5, 484.5)	480.1 (462.6, 497.6)	480.5 (457.8, 503.3)	482.0 (460.2, 503.8)	1.01 (0.96, 1.06)
Micropolitan/noncore	454.6 (442.5, 466.6)	423.0 (390.3, 455.7)	438.5 (402.2, 474.8)	468.8 (446.2, 491.5)	468.4 (453.0, 483.7)	1.11 (1.07, 1.15)

\*Age-adjusted incidence rates are presented per 100,000 persons with 95% CI

Figure 2. Correlation Matrices for Cancer Mortality and Incidence by CVI and Select Factors

