

## Supplemental Information

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### APPENDIX A: CALCULATING RI

The RI index ranges from 0 to 1. NHB living in a neighborhood environment that is nearly all non-NHB will have a RI value that is close to 0. In contrast, NHB living in a neighborhood environment that is nearly all NHB will have a RI value that is close to 1.

$$RI_{im} = (\sum_{j \in \hat{\partial}_i} w_{ij} T_{jm}) / (\sum_{j \in \hat{\partial}_i} w_{ij} T_j) \quad (1)$$

In Equation 1,  $\hat{\partial}_i$  denotes the set of index unit ( $i$ ) and its neighbors (ie, tracts that are adjacent to the index tract). Given  $M$  mutually exclusive racial subgroups,  $m$  indexes the subgroups of  $M$  (eg, NHB).  $T_i$  denotes the total population in region  $i$  and  $T_{im}$  denotes the population of subgroup  $m$  in region  $i$ .  $W^l$  denotes a  $n \times n$  first order adjacency matrix, in which  $n$  is the number of census tracts in the study area. First order adjacency means that the entries in the matrix,  $w_{ij}$ , are set to 1 if a boundary is shared by region  $i$  and region  $j$ , and 0 otherwise. Entries of the main diagonal ( $w_{ii}$ ) of  $W^l$  are set to 1.5, such that the weight of the index tract,  $i$ , is larger than the weights

assigned to adjacent tracts. Note that if  $w_{ij}$  is large relative to the other  $w_{ij}$ , then  $RI_{im} \approx T_{im}/T_i$ , the local proportion of group  $m$ . For neighbors of any index tract  $i$  with 0 population, the corresponding  $T_{jm}$  and  $T_j$  are 0, so that the value of  $RI_{im}$ , the RI index of unit  $i$  for subgroup  $m$ , would not be affected. We note that, in calculating spatial indices, edge tracts (eg, tracts along a coastline or bordering Canada or Mexico) may have few neighboring tracts, such that index values in these tracts may be unstable.

### APPENDIX B: CALCULATING COMMON BOUNDARY CROSSWALKS FOR 1990 AND 2015

Census blocks are the highest-resolution geography at which race/ethnicity data and other basic demographic data (eg, age, sex) are reported. Census blocks are the “building blocks” for all other geographic boundaries in the census, including block groups and tracts. The National Historical Geographic Information System crosswalks provide interpolation weights that allocate population data from 1990 census blocks to 2010 census blocks. Briefly, the crosswalks from 1990 blocks to 2010 blocks identify intersections between a single 1990 block and 2010 block, along with an interpolation weight (ranging between 0 and 1) approximating the proportion of the 1990 block’s population at the intersection.

To interpolate count data from 1990 to 2010 blocks using the crosswalk, we (1) join the crosswalk to 1990 block data, (2) multiply the 1990 block population counts by the crosswalk’s interpolation weights, producing estimated population counts for all 1990  $\times$  2010 block intersections, (3) sum these intersection counts for each 2010 block. This produces estimated 1990 population counts for different racial/ethnic groups, reported at 2010 census block boundary definitions. Once the 1990 intersection population counts are calculated for 2010 blocks, the population counts are aggregated to the census tract level, using 2010 boundary/geography. The result is estimated 1990 population counts for different racial/ethnic groups, reported at 2010 US census tract boundary definitions.

**APPENDIX C: 1990 AND 2015 RI IN THE CONTIGUOUS US**

<b>SUPPLEMENTAL TABLE 3</b> Counts (Percentages) Revealing Changes in RI Among the NHB Population Across Standard NC Regions						
Region	Non-Hispanic Black Population	RI Increasing Over Time		RI Relatively Stable Over Time	RI Decreasing Over Time	
		RI NHB, $\Delta < -0.25$ , <i>n</i> (%)	RI NHB, $-0.25 \leq \Delta < 0$ , <i>n</i> (%)	RI NHB, $-0.025 \leq \Delta < 0.025$ , <i>n</i> (%)	RI NHB, $0.025 \leq \Delta \leq 0.25$ , <i>n</i> (%)	RI NHB, $\Delta > 0.25$ , <i>n</i> (%)
North Carolina	2 084 249	75 068 (3.6)	810 529 (38.9)	490 280 (23.5)	694 608 (33.3)	13 764 (0.7)
Mountains	46 602	0 (0.0)	1051 (2.3)	34 146 (73.3)	11 237 (24.1)	168 (0.4)
Piedmont	1 281 604	75 068 (5.9)	583 138 (45.5)	239 651 (18.7)	370 859 (28.9)	12 888 (1.0)
Coastal Plain	756 043	0 (0.0)	226 340 (29.9)	216 483 (28.6)	312 512 (41.3)	708 (0.1)

<b>SUPPLEMENTAL TABLE 4</b> Counts (Percentages) of Census Tracts by Degree of Urbanicity <sup>a</sup>						
Region	Number Of Census Tracts	RI Increasing Over Time		RI Relatively Stable Over Time	RI Decreasing Over Time	
		RI NHB, $\Delta < -0.25$ , <i>n</i> (%)	RI NHB, $-0.25 \leq \Delta < 0$ , <i>n</i> (%)	RI NHB, $-0.025 \leq \Delta < 0.025$ , <i>n</i> (%)	RI NHB, $0.025 \leq \Delta \leq 0.25$ , <i>n</i> (%)	RI NHB, $\Delta > 0.25$ , <i>n</i> (%)
North Carolina	2195	36 (1.6)	639 (29.1)	850 (38.7)	654 (29.8)	16 (0.7)
Urban	1648	36 (2.2)	575 (34.9)	568 (34.5)	454 (27.5)	15 (0.9)
Suburban	347	0 (0.0)	56 (16.1)	181 (52.2)	110 (31.7)	0 (0.0)
Rural	195	0 (0.0)	7 (3.6)	100 (51.3)	88 (45.1)	0 (0.0)
Unclassified	5	0 (0.0)	1 (20.0)	1 (20.0)	2 (40.0)	1 (20.0)

<sup>a</sup> Rural Urban Commuting Area (RUCA) classifications are determined on the basis of 2010 Census data.

<b>SUPPLEMENTAL TABLE 5</b> Counts (Percentages) of NHB Population Residing in Tracts by Degree of Urbanicity <sup>a</sup>						
Region	Non-Hispanic Black Population	RI Increasing Over Time		RI Relatively Stable Over Time	RI Decreasing Over Time	
		RI NHB, $\Delta < -0.25$ , <i>n</i> (%)	RI NHB, $-0.25 \leq \Delta < 0$ , <i>n</i> (%)	RI NHB, $-0.025 \leq \Delta < 0.025$ , <i>n</i> (%)	RI NHB, $0.025 \leq \Delta \leq 0.25$ , <i>n</i> (%)	RI NHB, $\Delta > 0.25$ , <i>n</i> (%)
North Carolina	2 084 249	75 068 (3.6)	810 529 (38.9)	490 280 (23.5)	694 608 (33.3)	13 764 (0.7)
Urban	1 615 225	75 068 (4.6)	717 543 (44.4)	321 862 (19.9)	486 988 (30.1)	13 764 (0.9)
Suburban	299 754	0 (0.0)	89 017 (29.7)	117 287 (39.1)	93 450 (31.2)	0 (0.0)
Rural	169 270	0 (0.0)	3969 (2.3)	51 131 (30.2)	114 170 (67.4)	0 (0.0)
Unclassified	0	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

<sup>a</sup> Rural Urban Commuting Area (RUCA) classifications are determined on the basis of 2010 Census data. The population counts reported in this table are based on 2015 American Community Survey data.

<b>SUPPLEMENTAL TABLE 6</b> Count (Percentages) of NHB Population Residing in Tracts With Highest Levels of RI						
Year	Population Count: Non-Hispanic Black	Greater Racial Isolation of Non-Hispanic Blacks				
		RI $\geq$ 0.5, <i>n</i> (%)	RI $\geq$ 0.6, <i>n</i> (%)	RI $\geq$ 0.7, <i>n</i> (%)	RI $\geq$ 0.8, <i>n</i> (%)	RI $\geq$ 0.9, <i>n</i> (%)
1990	1 449 142	373 856 (25.8)	218 090 (15.0)	127 417 (8.8)	62 309 (4.3)	12 326 (0.9)
2015	2 084 249	413 183 (19.8)	168 803 (8.1)	41 515 (2.0)	5414 (0.3)	0 (0.0)

<b>SUPPLEMENTAL TABLE 7</b> Summary Statistics of the Blood Lead Study Population			
	1992–1996, <i>n</i> (%)	2013–2015, <i>n</i> (%)	Pooled Data, <i>n</i> (%)
Total	154 366 (48.1)	166 550 (51.9)	320 916 (100)
Age at testing			
0–3 y	101 875 (38.9)	159 763 (61.1)	261 638 (100)
4–6 y	52 491 (88.6)	6787 (11.4)	59 278 (100)
Race/ethnicity			
NH Black	68 931 (55.3)	55 788 (44.7)	124 719 (100)
NH White	85 435 (43.5)	110 762 (56.5)	196 197 (100)
Child age in y, mean (SD)	2.6 (1.7)	1.3 (0.9)	1.9 (1.4)
Season			
Winter	28 176 (41.9)	39 038 (58.1)	67 214 (100)
Spring	36 771 (46.2)	42 741 (53.8)	79 512 (100)
Summer	47 544 (51.7)	44 333 (48.3)	91 877 (100)
Fall	41 875 (50.9)	40 438 (49.1)	82 313 (100)
Census tract-level characteristics			
RI <sub>NHB</sub> , mean (SD)	0.272 (0.203)	0.232 (0.169)	0.251 (0.187)
Percent with a 4-y college degree, mean (SD)	15.4 (12.7)	24.2 (15.8)	19.9 (15.1)
Percent with public assistance, mean (SD)	8.7 (7.2)	2.2 (2.2)	5.3 (6.1)