**SUPPLEMENTAL TABLES AND FIGURES**

***Impact of differential privacy and census tract data source (decennial census vs. American Community Survey) for monitoring health inequities* (version: 09/21/2020)**

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**Table A.** Counts of Massachusetts population (under age 65) and premature deaths (under age 65), 2008-2012, overall and by race/ethnicity and by gender, with population counts based on three sources of census tract (CT) data for 1478 CTs: 2010 decennial census (DC), 2010 DC with differential privacy (DP), and 2008-2012 5-year American Community Survey (ACS) data.

**Table B.** Data sources and methods for generating the census tract characteristics, for Index of Concentration at the Extremes (ICE) and the poverty level.

**Table C.** Age-standardized average annual premature mortality rates (death before age 65 per 100,000, standardized to the Year 2000 standard million) computed using the 3 different census tract (CT) denominators: 2010 decennial census (DC), 2010 DC with differential privacy (DP), 2008-2012 5-year estimate for American Community Survey (ACS), for the total population and by race/ethnicity and by gender, overall and by quintile for the ICE for racialized economic segregation and by poverty level, Massachusetts, 2008-2012.

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| **Table A. Counts of Massachusetts population (under age 65) and premature deaths (under age 65), 2008-2012, overall and by race/ethnicity and by gender, with population counts based on three sources of census tract (CT) data for 1478 CTs: 2010 decennial census (DC), 2010 DC with differential privacy (DP), and 2008-2012 5-year American Community Survey (ACS) data.** | | | | |
| **Group** | **Population count (age < 65 y; census tract data): N** | | | **Premature deaths (age < 65 yrs): N** |
| **2010 decennial census** | **2010 decennial census with differential privacy** | **2008-2012 5-year American Community Survey average annual estimate** |  |
| Total population | 5,644,905 | 5,644,877 | 5,649,516 | 55,560 |
| **Race/ethnicity:** |  |  |  |  |
| White non-Hispanic | 4,176,344 | 4,176,277 | 4,190,431 | 45,795 |
| Black | 399,579 | 400,523 | 411,538 | 4,505 |
| Hispanic | 600,518 | 598,917 | 602,571 | 3,701 |
| Asian and Pacific Islander | 327,495 | 327,369 | 333,853 | 1,185 |
| American Indian and Alaska Native | 17,477 | 17,328 | 11,673 | 91 |
| **Sex/Gender** |  |  |  |  |
| Women | 2,854,702 | 2,854,801 | 2,855,204 | 21,023 |
| Men | 2,790,203 | 2,790,076 | 2,794,312 | 34,537 |

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| **Table B. Data sources and methods for generating the census tract characteristics, for Index of Concentration at the Extremes (ICE) and the poverty level.** | | | | | | | |
| **Index of Concentration at the Extremes (ICE), using American Community Survey (ACS) census tract data (5 year estimate, 2008-2020; 2010 normalized boundaries)** | The formula for the Index of Concentration at the Extremes (ICE) is as follows:  *ICEi = (Ai – Pi)/Ti*  where *Ai,Pi* and *Ti* correspond, respectively, to the number of persons in the *i*th geographic area who are categorized as belonging to: the most privileged extreme, the most deprived extreme, and the total population whose privilege level was measured. The ICE thus ranges from -1 to 1, delineating areas in which 100% of the population is in the most extreme group for deprivation to 100% in the most extreme group for privilege.  For example, for the ICE for racialized economic segregation, *Ai* = number of white (only) households in the top income quintile for households (20th percentile) in neighborhood *i; Pi* = number of black (only) households in the bottom income quintile for households (80th percentile) in neighborhood *i*; and *Ti* = total households across all income percentiles in neighborhood *i*. The ICE for racialized economic segregation presented here focuses on the US black and white populations because they are the two US racial/ethnic groups that have consistently exhibited the most extreme residential racial segregation. | | | | | | |
| **Component** | **Index of Concentration at the Extremes (ICE) measure: racialized economic segregation** | | | | | |
| **Privileged group** | White high-income households (upper 20th percentile for US household income) | | | | | |
| **Deprived group** | Black low-income households (bottom 80th percentile for US household income) | | | | | |
| **Formula, with census variable categories** | B19001A\_(VD14 + VD15 + VD16 + VD17) - B19001B\_(VD02 + VD03 + VD04 + VD05)/ B19001(VD01) | | | | | |
| **Quintile cutpoints (based on Massachusetts distribution)** | **T1 (lowest)** | **T2** | **T3** | | **T4** | **T5 (highest)** |
| -1.00 to 0.104 | 0.105 to 0.229 | 0.230 to 0.324 | | 0.325 to 0.426 | 0.427 to 1.00 |
| **Population health analyses using the ICE for racialized economic segregation: origins and selected examples**  **1) Study that introduced the ICE for racialized economic segregation and for racial segregation**  Krieger N, Waterman PD, Gryparis A, Coull BA. Black carbon exposure, socioeconomic and racial/ethnic spatial polarization, and the Index of Concentration at the Extremes (ICE). Health Place. 2015 Jul;34:215-28. doi: 10.1016/j.healthplace.2015.05.008. Epub 2015 Jun 18. PMID: 26093080; PMCID: PMC4681506.  **2) Studies providing evidence of the utility of the ICE for racialized economic segregation, in relation to capturing health inequities not captured solely by economic or racial measures of residential segregation or spatial social polarization**  **a) by team who originated use of this measure (chronological order)**   1. Feldman JM, Waterman PD, Coull BA, Krieger N. Spatial social polarisation: using the Index of Concentration at the Extremes jointly for income and race/ethnicity to analyse risk of hypertension. J Epidemiol Community Health. 2015 Dec;69(12):1199-207. doi: 10.1136/jech-2015-205728. Epub 2015 Jul 1. PMID: 26136082; PMCID: PMC4878399. 2. Krieger N, Waterman PD, Spasojevic J, Li W, Maduro G, Van Wye G. Public Health Monitoring of Privilege and Deprivation With the Index of Concentration at the Extremes. Am J Public Health. 2016 Feb;106(2):256-63. doi: 10.2105/AJPH.2015.302955. Epub 2015 Dec 21. PMID: 26691119; PMCID: PMC4815605. 3. Krieger N, Singh N, Waterman PD. Metrics for monitoring cancer inequities: residential segregation, the Index of Concentration at the Extremes (ICE), and breast cancer estrogen receptor status (USA, 1992-2012). Cancer Causes Control. 2016 Sep;27(9):1139-51. doi: 10.1007/s10552-016-0793-7. Epub 2016 Aug 8. PMID: 27503397. 4. Krieger N, Feldman JM, Waterman PD, Chen JT, Coull BA, Hemenway D. Local Residential Segregation Matters: Stronger Association of Census Tract Compared to Conventional City-Level Measures with Fatal and Non-Fatal Assaults (Total and Firearm Related), Using the Index of Concentration at the Extremes (ICE) for Racial, Economic, and Racialized Economic Segregation, Massachusetts (US), 1995-2010. J Urban Health. 2017 Apr;94(2):244-258. doi: 10.1007/s11524-016-0116-z. PMID: 28130678; PMCID: PMC5391325. 5. Krieger N, Waterman PD, Batra N, Murphy JS, Dooley DP, Shah SN. Measures of Local Segregation for Monitoring Health Inequities by Local Health Departments. Am J Public Health. 2017 Jun;107(6):903-906. doi: 10.2105/AJPH.2017.303713. Epub 2017 Apr 20. PMID: 28426303; PMCID: PMC5425857. 6. Huynh M, Spasojevic J, Li W, Maduro G, Van Wye G, Waterman PD, Krieger N. Spatial social polarization and birth outcomes: preterm birth and infant mortality - New York City, 2010-14. Scand J Public Health. 2018 Feb;46(1):157-166. doi: 10.1177/1403494817701566. 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Police-Related Deaths and Neighborhood Economic and Racial/Ethnic Polarization, United States, 2015-2016. Am J Public Health. 2019 Mar;109(3):458-464. doi: 10.2105/AJPH.2018.304851. Epub 2019 Jan 24. PMID: 30676802; PMCID: PMC6366529. 11. Krieger N, Waterman PD, Chen JT. COVID-19 and overall mortality inequities in the surge in death rates by ZIP Code characteristics: Massachusetts, January 1 to May 19, 2020. *Am J Public Health* (in press). 12. Chen JT, Krieger N. Revealing the unequal burden of COVID-19 by income, race/ethnicity, and household crowding: US county vs ZIP code analyses. *J Public Health Management Policy* (in press). 13. Chin T, Kahn R, Li R, Chen JT, Krieger N, Buckee CO, Balsari S, Kiang MV. US-county level variation in intersecting individual, household and community characteristics relevant to COVID-19 and planning an equitable response: a cross-sectional analysis. *BMJ Open* 2020;10:e039886. doi:10.1136/bmjopen-2020-039886. <https://pubmed.ncbi.nlm.nih.gov/31765272/>   **b) by additional research teams (alphabetically, by last name of first author)**   1. Bruzzese JM, Kingston S, Falletta KA, Bruzelius E, Poghosyan L. Individual and Neighborhood Factors Associated with Undiagnosed Asthma in a Large Cohort of Urban Adolescents. J Urban Health. 2019 Apr;96(2):252-261. doi: 10.1007/s11524-018-00340-2. PMID: 30645702; PMCID: PMC6458186. 2. Chambers BD, Arabia SE, Arega HA, Altman MR, Berkowitz R, Feuer SK, Franck LS, Gomez AM, Kober K, Pacheco-Werner T, Paynter RA, Prather AA, Spellen SA, Stanley D, Jelliffe-Pawlowski LL, McLemore MR. Exposures to structural racism and racial discrimination among pregnant and early post-partum Black women living in Oakland, California. 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| **Census tract poverty: percent of persons below the federal poverty line (2010 normalized boundaries)** | **Census source** | **Census poverty variables** | | | | | |
| **Persons below poverty** | | | **Denominator**  **(all persons for whom poverty level ascertained)** | | |
| **2010 decennial census** | P087002 | | | P087001 | | |
| **2008-2012 American Community Survey, 5 year estimate** | B17001\_(VD02) | | | B17001\_(VD01) | | |

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| **TABLE C: Age-standardized average annual premature mortality rates (death before age 65 per 100,000, standardized to the Year 2000 standard million) computed using the 3 different census tract (CT) denominators: 2010 decennial census (DC), 2010 DC with differential privacy (DP), 2008-2012 5-year estimate for American Community Survey (ACS), for the total population and by race/ethnicity and by gender, overall and by quintile for the ICE for racialized economic segregation and by poverty level, Massachusetts, 2008-2012.** | | | |
| **Group: overall and by ICE quintile** | **Premature mortality rate (95% confidence interval), by source of CT denominator data** | | |
| **2010 decennial census** | **2010 decennial census with differential privacy** | **2008-2012 5-year American Community Survey average annual estimate** |
| **Overall** |  |  |  |
| Total population | 166.4 (162.2, 170.6) | 166.4 (162.2, 170.6) | 166.3 (162.1, 170.5) |
| **Race/ethnicitya:** |  |  |  |
| White non-Hispanic | 169.0 (164.2, 173.8) | 168.9 (164.1, 173.7) | 168.6 (163.9, 173.4) |
| Black | 230.5 (210.5, 250.6) | 229.8 (209.8, 249.8) | 226.1 (206.4, 245.8) |
| Hispanic | 153.1 (138.0, 168.3) | 154.4 (139.1, 169.7) | 152.0 (137.0, 167.0) |
| **Sex/Gender** |  |  |  |
| Women | 118.6 (107.6, 129.6) | 118.6 (107.6, 129.6) | 118.6 (107.6, 129.6) |
| Men | 214.2 (199.0, 229.4) | 214.2 (198.9, 229.4) | 214.0 (198.8, 229.3) |
| **By CT ICE quintile for racialized economic segregation, where: lowest value: greatest concentration of low-income Black non-Hispanic households, and highest value: greatest concentration of high-income White non-Hispanic households** | | | |
| Total population  Q1 (lowest)  Q2  Q3  Q4  Q5 (highest) | 260.1 (247.5, 272.6)  197.6 (187.6, 207.9)  158.1 (149.0, 167.1)  135.1 (126.8, 143.4)  103.4 (95.9, 110.8) | 258.7 (246.2, 271.2)  196.7 (186.4, 206.9)  158.2 (149.1, 167.3)  135.5 (127.1, 143.8)  102.9 (95.6, 110.3) | 262.4 (249.7, 275.1)  197.0 (186.7, 207.3)  157.7 (148.7, 166.8)  134.7 (126.4, 143.0)  102.8 (95.4, 110.2) |
| **Race/ethnicitya:** |  |  |  |
| White non-Hispanic  Q1 (lowest)  Q2  Q3  Q4  Q5 (highest) | 322.2 (301.5, 343.0)  213.0 (200.7, 225.3)  165.5 (155.5, 175.5)  139.6 (130.6, 148.5)  106.9 (98.9, 114.9) | 314.6 (294.2, 335.0)  212.6 (200.3, 224.8)  165.9 (155.9, 175.9)  140.3 (131.3, 149.3)  106.6 (98.7, 114.6) | 325.6 (304.6, 346.6)  211.5 (199.3, 223.6)  164.5 (154.6, 174.5)  139.2 (130.3, 148.1)  106.6 (98.7, 114.6) |
| Black  Q1 (lowest)  Q2  Q3  Q4  Q5 (highest) | 258.6 (230.6, 286.6)  212.0 (169.3, 254.7)  176.0 (120.9, 231.1)  177.1 (107.8, 246.5)  173.0 (88.8, 257.2) | 260.4 (232.3, 288.6)  211.0 (168.5, 253.5)  177.1 (121.7, 232.5)  165.8 (100.8, 230.7)  161.3 (82.6, 240.1) | 249.6 (222.6, 276.6)  222.6 (177.7, 267.5)  167.7 (115.1, 220.3)  164.8 (100.4, 229.1)  177.5 (91.5, 263.5) |
| Hispanic  Q1 (lowest)  Q2  Q3  Q4  Q5 (highest) | 179.7 (158.1, 201.3)  139.1 (107.4, 170.8)  118.3 (74.1, 162.5)  90.5 (44.6, 136.5)  64.0 (21.1, 107.0) | 187.3 (164.7, 209.9)  136.6 (105.7, 167.5)  110.7 (70.0, 151.4)  87.3 (42.8, 131.7)  59.0 (19.3, 98.8) | 182.1 (160.3, 204.0)  137.9 (106.4, 169.4)  115.1 (73.0, 157.2)  83.6 (40.8, 126.4)  59.0 (19.4, 98.6) |
| **Sex/Gender** |  |  |  |
| Women  Q1 (lowest)  Q2  Q3  Q4  Q5 (highest) | 182.7 (149.8, 215.6)  140.7 (113.7, 167.7)  113.1 (89.4, 136.7)  97.2 (75.4, 119.0)  73.4 (54.2, 92.6) | 181.5 (148.9, 214.2)  139.9 (112.9, 166.8)  113.3 (89.6, 137.0)  97.7 (75.8, 119.6)  73.0 (54.1, 92.0) | 184.0 (150.8, 217.1)  139.3 (112.6, 166.1)  113.0 (89.3, 136.7)  97.3 (75.5, 119.1)  73.2 (54.1, 92.3) |
| Men  Q1 (lowest)  Q2  Q3  Q4  Q5 (highest) | 339.8 (293.7, 386.0)  251.8 (214.8, 288.7)  201.7 (168.9, 234.5)  175.4 (144.9, 205.9)  134.7 (107.3, 162.1) | 338.2 (292.3, 384.2)  250.9 (214.1, 287.8)  201.6 (168.8, 234.3)  175.5 (145.0, 206.1)  134.2 (107.1, 161.2) | 343.5 (296.8, 390.2)  253.0 (215.8, 290.1)  201.0 (168.3, 233.6)  173.9 (143.7, 204.2)  133.5 (106.5, 160.6) |
| **By CT percent below the poverty line** | | | |
| Total population  0.0 – 4.9%  5.0 – 9.9%  10.0 – 19.9%  20.0 – 100% | 128.1 (121.7, 134.5)  153.5 (146.2, 160.9)  193.9 (183.8, 204.0)  263.0 (248.8, 277.1) | 127.5 (121.2, 133.9)  154.1 (146.7, 161.5)  193.8 (183.7, 204.0)  259.5 (245.5, 273.4) | 127.7 (121.3, 134.0)  152.6 (145.3, 159.9)  193.6 (183.5, 203.7)  267.7 (253.2, 282.2) |
| **Race/ethnicitya:** |  |  |  |
| White non-Hispanic  0.0 – 4.9%  5.0 – 9.9%  10.0 – 19.9%  20.0 – 100% | 132.6 (125.7, 139.5)  160.7 (152.5, 168.9)  207.7 (195.2, 220.1)  319.1 (296.1, 342.0) | 132.2 (125.3, 139.0)  161.1 (152.9, 169.2)  208.5 (196.0, 221.0)  312.2 (289.6, 334.8) | 132.3 (125.4, 139.1)  159.8 (151.7, 167.9)  207.3 (194.9, 219.7)  321.0 (298.0, 344.1) |
| Black  0.0 – 4.9%  5.0 – 9.9%  10.0 – 19.9%  20.0 – 100% | 159.2 (105.5, 212.8)  171.5 (131.1, 211.9)  216.3 (180.8, 251.8)  285.3 (250.5, 320.1) | 154.6 (102.3, 206.9)  168.3 (128.7, 208.0)  216.5 (181.1, 252.0)  286.7 (251.8, 321.6) | 156.2 (103.5, 208.9)  168.4 (128.7, 208.1)  205.9 (172.2, 239.6)  286.9 (251.9, 322.0) |
| Hispanic  0.0 – 4.9%  5.0 – 9.9%  10.0 – 19.9%  20.0 – 100% | 87.6 (51.7, 123.5)  105.5 (72.0, 139.0)  139.9 (111.7, 168.1)  188.7 (164.6, 212.7) | 80.5 (47.7, 113.3)  105.8 (72.1, 139.6)  139.0 (111.2, 166.9)  195.6 (170.5, 220.7) | 80.0 (47.5, 112.5)  100.8 (69.1, 132.6)  139.6 (111.4, 167.8)  193.8 (169.1, 218.6) |
| **Sex/Gender** |  |  |  |
| Women  0.0 – 4.9%  5.0 – 9.9%  10.0 – 19.9%  20.0 – 100% | 92.5 (75.8, 109.2)  106.0 (87.1, 124.8)  140.4 (113.6, 167.2)  186.2 (148.9, 223.5) | 92.5 (75.9, 109.1)  106.0 (87.1, 124.9)  140.1 (113.4, 166.9)  184.0 (147.2, 220.8) | 92.8 (76.1, 109.6)  105.5 (86.7, 124.4)  139.5 (112.9, 166.1)  187.5 (149.8, 225.1) |
| Men  0.0 – 4.9%  5.0 – 9.9%  10.0 – 19.9%  20.0 – 100% | 165.4 (142.0, 188.8)  198.4 (171.6, 225.2)  240.7 (204.7, 276.6)  351.7 (299.2, 404.2) | 164.0 (140.8, 187.2)  199.9 (172.9, 226.8)  240.9 (204.9, 276.9)  346.7 (294.9, 398.5) | 163.6 (140.5, 186.7)  197.0 (170.4, 223.6)  241.7 (205.6, 277.8)  362.4 (308.3, 416.6) |
| a Race/ethnicity data presented only for the three largest racial/ethnic groups, since small numbers precluded meaningful estimation of rates for the non-Hispanic Asian and Pacific Islander and the American Indian and Alaska Native populations. | | | |