QUESTIONS
Longstanding connections: census & public health

(1) Counts: denominators

(2) Place: metrics to characterize areas

(3) Time: temporal trends & discontinuities

(4) Counts for resources & representation: societal determinants of health

The US Census and the People’s Health: Public Health Engagement From Enslavement and “Indians Not Taxed” to Census Tracts and Health Equity (1790–2018)


PATTERNING OF PARISIAN MORTALITY BY WEALTH: VILLERMÉ, 1826

<table>
<thead>
<tr>
<th>Arrondissement</th>
<th>N of residents</th>
<th>% untaxed rents</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Proportion</td>
</tr>
<tr>
<td>2 (wealthiest)</td>
<td>65,623</td>
<td>7</td>
<td>1 in 62</td>
</tr>
<tr>
<td>3</td>
<td>44,932</td>
<td>11</td>
<td>1 in 60</td>
</tr>
<tr>
<td>1</td>
<td>52,421</td>
<td>11</td>
<td>1 in 58</td>
</tr>
<tr>
<td>4</td>
<td>46,624</td>
<td>15</td>
<td>1 in 58</td>
</tr>
<tr>
<td>11</td>
<td>51,766</td>
<td>19</td>
<td>1 in 51</td>
</tr>
<tr>
<td>6</td>
<td>72,682</td>
<td>21</td>
<td>1 in 54</td>
</tr>
<tr>
<td>5</td>
<td>56,871</td>
<td>22</td>
<td>1 in 53</td>
</tr>
<tr>
<td>7</td>
<td>56,245</td>
<td>22</td>
<td>1 in 52</td>
</tr>
<tr>
<td>10</td>
<td>81,133</td>
<td>23</td>
<td>1 in 50</td>
</tr>
<tr>
<td>9</td>
<td>42,932</td>
<td>31</td>
<td>1 in 44</td>
</tr>
<tr>
<td>8</td>
<td>62,758</td>
<td>32</td>
<td>1 in 43</td>
</tr>
<tr>
<td>12 (poorest)</td>
<td>80,079</td>
<td>38</td>
<td>1 in 43</td>
</tr>
</tbody>
</table>

## REMINDER ABOUT RATES

### Rate:
\[
\frac{N \text{ of cases}}{N \text{ of population at risk}} \text{ per specified unit of time}
\]

- Deflate denominator → inflated rate estimate
- Inflate denominator → deflated rate estimate

AND: systematic error in denominator (e.g., for areas, for social groups) → systematic bias in rate estimation

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What might be the impact of differential privacy on accurately measuring local and national distributions (by areas, by social groups) of:

- rising death rates in US middle-age adults?
- HIV/AIDS in US South?
QUESTION #1: COUNTS

Health outcome (premature mortality rate) & single census tract variable (% below poverty)

CENSUS TRACT (CT) AGE-STANDARDIZED PREMATURE MORTALITY RATES (DEATH <75, PER 100,000) BEFORE AND AFTER ADJUSTING FOR CT POVERTY: BOSTON, 1999-2001

LUNG CANCER MORTALITY: MA, 2000-2005

Better Data for Better Health

Health data resources for analysis of the many factors which shape health in communities, and local efforts to achieve better health for all.

Health data are a powerful tool to help communities better understand the health of their neighborhoods and residents.

The health data sources in this collection range from public health and social service agencies to hospitals and insurers, and include multiple types of data at the state, county, city, and neighborhood levels. Across the nation, the growing variety of data sets now being aggregated and shared is providing an increasingly clear picture of health challenges that communities are experiencing, and driving residents, community leaders, policymakers, and advocates to come together to set common goals for improvement.

In connection with programs focused on creating healthier communities, the Robert Wood Johnson Foundation (RWJF) supports multiple efforts to leverage health data to advance efforts to achieve better health. With partners across the public, private and nonprofit sectors, we are working to expand the potential for data to illuminate health gaps in communities, and areas where action is needed. The more communities take advantage of the many forms of health data now available, the better they can target resources to assure everyone has a fair and just opportunity for health.

HEALTH DATA RESOURCES

County Health Rankings

The County Health Rankings show that where we live matters to how long and how well we live. The Rankings rank nearly every county in the nation, based on 35 factors that impact health, such as high school graduation rate, housing, employment, income, and access to healthy foods.

500 Cities

A collaboration of RWJF, the Centers for Disease Control and Prevention, and the CDG Foundation, 500 Cities enables users to easily browse data about health in the nation’s 500 largest cities, based on measures of health related to unhealthy behaviors, health outcomes, and prevention practices.

City Health Dashboard

Developed with RWJF support, the City Health Dashboard allows users to see correlations between community-level factors that shape health in cities, such as housing affordability, unemployment, children in poverty, and access to nutritious foods.

QUESTION #2: PLACE

Using the Index of Concentration at the Extremes at multiple geographical levels to monitor health inequities in an era of growing spatial social polarization: Massachusetts, USA (2010–14)

Nancy Krieger*, Rockli Kim, Justin Feldman and Pamela D Waterman

*Results from multilevel Poisson models for age-standardized mortality rates that adjusted for gender, race/ethnicity, and urbanicity

**Figure 1a: Child mortality incidence rate ratios* by ICE/poverty quintile (Q5: most privileged; referent) for the total population, Massachusetts, 2010-2014.**

**Figure 1b: Child mortality rate ratios by ICE/race/ethnicity quintile (Q5: most privileged; referent) for the total population, Massachusetts, 2010-2014.**

**Figure 1c: Child mortality rate ratios by ICE/race + income quintile (Q5: most privileged; referent) for the total population, Massachusetts, 2010-2014.**

Index of Concentration at the Extremes (per Massey, 2001)

\[ ICE_i = \frac{(A_i - P_i)}{T_i} \]

where, say, for racialized economic segregation,

- \( A_i = \) N of high income white non-Hispanic persons in neighborhood
- \( P_i = \) N of low income black non-Hispanic persons in neighborhood
- \( T_i = \) total N with known income in neighborhood

range: -1 (total deprivation) to 1 (total privilege)

Health outcome (child mortality rate) & area-based metrics for spatial social polarization, involving relations between social groups at each geographic level

Source: Krieger et al, IJE 2018 (funding: American Cancer Society Clinical Research Professorship)
HISTORICAL REDLINING & CANCER STAGE AT DIAGNOSIS: BOSTON, 2011-2015

NOTE: CT HOLC status determined in relation to % of CT population in a given HOLC area, using census block population counts

Source: Krieger et al (under review; funding: American Cancer Society Clinical Research Professorship)
QUESTION #3: TEMPORAL ISSUES

Why history matters for quantitative target setting:


Nancy Krieger, Nakul Singh, Jarvis T. Chen, Brent A. Coull, Jason Beckfield, Mathew V. Kiang, Pamela D. Waterman, and Sofia Gruskin

Discontinuities
1) 1997 OMB change: race + ethnicity
2) NCHS: change in age-standard

QUESTION #4: RESOURCES & REPRESENTATION

Federal programs relevant to health: funding formula use census data

Uses of Census Bureau Data in Federal Funds Distribution

A New Design for the 21st Century

Issued September 2017
Version 1.0
Prepared by Marisa Hotchkiss, Jessica Phelan

N = 132 federal programs, $675 billion (FY 2015); among top 18, (each >$4 billion), 13 with direct health impacts (★)

Table 1: Federal Assistance Distributed Using Census Bureau Data in Fiscal Year 2015

<table>
<thead>
<tr>
<th>CFDA number1</th>
<th>Program Name</th>
<th>Federal Executive Department or Agency2</th>
<th>Fiscal Year 2015 Fund</th>
</tr>
</thead>
<tbody>
<tr>
<td>93.778</td>
<td>Medical Assistance Program</td>
<td>HHS</td>
<td>$311,805,244,413</td>
</tr>
<tr>
<td>10.551</td>
<td>Supplemental Nutrition Assistance Program</td>
<td>USDA</td>
<td>$71,035,786,000</td>
</tr>
<tr>
<td>93.774 (part)</td>
<td>Medicare Part B Physicians Fee Schedule Services</td>
<td>HHS</td>
<td>$70,300,000,000</td>
</tr>
<tr>
<td>20.205</td>
<td>Highway Planning and Construction</td>
<td>DOT</td>
<td>$38,479,013,855</td>
</tr>
<tr>
<td>84.063</td>
<td>Federal Pell Grant Program</td>
<td>ED</td>
<td>$29,916,604,438</td>
</tr>
<tr>
<td>10.555</td>
<td>National School Lunch Program</td>
<td>USDA</td>
<td>$18,915,944,292</td>
</tr>
<tr>
<td>93.558</td>
<td>Temporary Assistance for Needy Families</td>
<td>HHS</td>
<td>$17,225,738,021</td>
</tr>
<tr>
<td>14.871</td>
<td>Section 8 Housing Choice Voucher</td>
<td>HUD</td>
<td>$15,761,488,440</td>
</tr>
<tr>
<td>84.010</td>
<td>Title 1 Grants to Local Educational Agencies</td>
<td>ED</td>
<td>$14,253,154,251</td>
</tr>
<tr>
<td>84.027</td>
<td>Special Education Grants to States</td>
<td>ED</td>
<td>$11,382,883,850</td>
</tr>
<tr>
<td>93.600</td>
<td>Head Start</td>
<td>HHS</td>
<td>$8,538,887,781</td>
</tr>
<tr>
<td>10.557</td>
<td>Special Supplemental Nutrition Program for Women, Infants, and Children</td>
<td>USDA</td>
<td>$6,062,899,861</td>
</tr>
<tr>
<td>20.507</td>
<td>Federal Transit Formula Grants</td>
<td>DOT</td>
<td>$5,452,882,796</td>
</tr>
<tr>
<td>93.658</td>
<td>Foster Care Title IV-E</td>
<td>HHS</td>
<td>$5,409,221,818</td>
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<tr>
<td>93.596</td>
<td>Child Care Mandatory and Matching Funds of the Child Care and Development Fund</td>
<td>HHS</td>
<td>$5,314,103,129</td>
</tr>
<tr>
<td>14.195</td>
<td>Section 8 Housing Assistance Payments Program</td>
<td>HUD</td>
<td>$4,367,081,456</td>
</tr>
<tr>
<td>93.767</td>
<td>State Children’s Health Insurance Program</td>
<td>HHS</td>
<td>$4,212,457,713</td>
</tr>
<tr>
<td>10.553</td>
<td>School Breakfast Program</td>
<td>USDA</td>
<td>$4,057,189,000</td>
</tr>
</tbody>
</table>

Key findings:
1) strong relationships between gerrymandering and (a) proximity to superfund sites, and (b) % white
2) “minority populations are effectively ‘gerrymandered out’ of the white and lower environmental hazards districts”
CORE QUESTIONS FOR PUBLIC HEALTH & HEALTH EQUITY

how will differential privacy affect:

COUNTS: for denominators and rates? for area-based metrics?

RELATIONSHIPS BETWEEN VARIABLES: within and across geographic levels?
-- at the individual level (e.g., “race” x “ethnicity”)?
-- for area-based metrics?
-- for analyses of health inequities? – especially for:
-- “small” populations? (e.g., Indigenous populations; immigrant sub-groups)
-- using census tract level data? block group data? or block data?

MONTORING TRENDS: in population health? in health inequities?

RESOURCES & REDISTRIBUTION: impact on these social determinants of health?

look forward to learning the answers – and sharing what I learn with my colleagues in public health & advocates for health equity