Generating science that advances environmental justice in policy-making

Rachel Morello-Frosch, Ph.D., M.P.H.
School of Public Health &
Department of Environmental Science, Policy and Management
rmf@berkeley.edu
Sustainability and Health Equity Lab:
https://nature.berkeley.edu/morellofroschlab
@rmfrosch
Drivers of Environmental Inequities:
Racial Segregation in US Cities
Multi-group Dissimilarity (Dm) by Metropolitan Area in the United States
US Census, 2010
Historical redlining and air pollution

Population-weighted mean annual intraurban levels for (a) NO$_2$ and (b) PM$_{2.5}$ by HOLC grade and race/ethnicity

Modern air pollution disparities in historically redlined areas

202 redlining maps drawn in the 1930s


HOLC – Homeowner Loan Corporation
Difference in birth weight (g) associated with full pregnancy particulate pollution exposures, stratified by maternal race/ethnicity (1996-2006)

Morello-Frosch et al.  
*Environmental Health* 2010
Leveraging a “natural experiment” to assess short-term health benefits of power plant closures

CALIFORNIA: 8 OIL AND COAL RETIREMENTS (2001-2011)

Hunters Point, San Francisco Retired: 2006
California power plant closures associated with 2% reduction in preterm birth rates - adjusted results


- Corresponds to a change from 7% in pre-retirement period to 5.1% preterm birth in the post-retirement period
- Benefits stronger for African American and Asian mothers
Hyper-localized Measures of Air Pollution and Preeclampsia in Oakland, CA
Goin et al, ES&T, 2021

Distribution of black carbon (BC), nitrogen dioxide (NO2), and ultrafine particles (UFPs) within Downtown and West Oakland, CA
Preeclampsia risk differences (95% CI) per 100 women associated with hypothetical intervention reducing pollutant levels to the 25th percentile versus observed levels by exposure characterization distance

(Goin et al, ES&T, 2021)

- Estimates shown for each pollutant averaged within 120 m and within 30 m of maternal residence at delivery.
- The 25th percentile was 9.0 ppb for NO2, 0.27 μg/m3 for BC, and 26.6 × 103/cm3 for UFPs.
- Adjusted for maternal race/ethnicity, insurance type, age at delivery, age squared, smoking history, parity, season of conception, proportion of census block with educational attainment less than high school, and proportion of census block living below the poverty line.
Preeclampsia risk differences (95% CI) per 100 women associated with hypothetical intervention reducing pollutant levels to 25th percentile versus observed levels – stratified by race/ethnicity

(Goin et al, ES&T, 2021)
Implications for addressing cumulative impacts

Underlying science will take awhile...

Communities can’t wait until scientists sort it all out.

Mapping tools integrate place – level measures of environmental and social “stressogens”

– Highlight communities of potential regulatory concern
– Target holistic strategies that integrate environmental health, sustainability and environmental justice goals
– Data sharing by scientists can contribute and enhance decision – making tools
CalEnviroScreen
Mapping Disadvantaged Communities for CA Climate Investment Funds

CEJST – Climate Equity and Economic Justice Screening Tool
Mapping Disadvantaged Communities for Justice

How to use the map:
Zoom in +, search , or locate yourself and select to see information about any census tract.

Things to know:
The tool uses census tracts . Census tracts are a small unit of geography. They generally have populations of between 1,200 - 8,000 people.

Communities that are disadvantaged live in tracts that experience burdens. These tracts are highlighted on the map.
Thank You!

rmf@berkeley.edu

@rmfrosch

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Children’s Environmental Health Centers
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• NIEHS P01 ES022841

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California Air Resources Board
Cal-EPA Office of Environmental Health Hazard Assessment