CUMULATIVE IMPACTS: VULNERABILITY, RISK, AND HEALTH

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ENVIRONMENTAL JUSTICE: SCIENCE AND HISTORY

General Accounting Office

Siting Of Hazardous Waste Landfills And Their Correlation With Racial And Economic Status Of Surrounding Communities

This report provides information on the racial and economic characteristics of communities surrounding four hazardous waste landfills in three southeastern States. It also describes Federal criteria for siting landfills and provides data on public participation and how the Environmental Protection Agency's (EPA's) proposed hazardous waste facility permit changes will affect it.

TOXIC WASTES AND RACE
In The United States

A National Report on the Racial and Socio-Economic Characteristics of Communities with Hazardous Waste Sites

1983 1987
The Drinking Water Disparities Framework: On the Origins and Persistence of Inequities in Exposure

Caroline L. Balazs, PhD, and Isha Ray, PhD

With this article, we develop the Drinking Water Disparities Framework to explain environmental injustice in the context of drinking water in the United States. The framework builds on the social epidemiology and environmental justice literatures, and is populated with 6 years of field data (2005–2010) from California’s San Joaquin Valley. We trace the mechanisms through which natural, built, and sociopolitical factors work through state, county, community, and household actors to constrain access to safe water and to financial resources for communities. These constraints and regulatory failures produce social disparities in exposure to drinking water contaminants. Water system and household coping capacities lead, at best, to partial protection against exposure. This composite burden explains the origins and persistence of social disparities in exposure to drinking water contaminants. (Am J Public Health. 2014;104:603-611. doi:10.2105/AJPH.2013.301664)

An Index for Assessing Demographic Inequalities in Cumulative Environmental Hazards with Application to Los Angeles, California

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Environmental justice and health practices: understanding how health inequities arise at the local level

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Environmental justice and regional inequality in Southern California: Implications for Future Research

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Exposures to environmental hazards are unequal
Biological and social vulnerabilities modify environmental hazards
Tipping Points

- Factors that enhance health and resilience:
  - Parks, green spaces
  - Safe communities
  - Access to healthy foods
  - Access to health care
  - Financial resources
  - Social support
  - Power and agency

Reducing GHGs Can Produce Major Health Co-benefits

Some examples:

- Reductions in multiple air pollutants
- Reduced noise
- Increased physical activity
- More green spaces
- Reduced traffic congestion
- Fewer odors

Some of these are hard to quantify
Toxic Stress

Responses to Chronic Stress:

• **Short-term:** Stress hormones (cortisol, epinephrine, etc.)

• **Longer term:** Inflammation, high blood pressure, heart rate, blood sugar, cholesterol

• **Ultimately:** Cardiovascular disease, neurodegenerative disease, cancer, etc.

Source: https://www.nhlbi.nih.gov/health-topics/atherosclerosis
Measuring Toxic Stress?
Example: Telomere Shortening

- Age
- Genetics
- Socioeconomic status
- Stress
- Exercise
- Smoking
- Diet
- Anti-oxidants
- Occupational exposures
- Environmental exposures (especially air pollution)

Associated with early onset of coronary heart disease, heart failure, diabetes, cancer, and osteoporosis.
Example: Epigenetics

Changes caused by modification of gene expression rather than alteration of the genes themselves.

Jirtle and Dolinoy.
Cumulative Impacts can be multi-generational

Conclusions

Health outcomes have multiple causes – Environmental, social, biological

Climate mitigation will affect multiple health-related factors

Quantifying the health benefits is challenging

Existing approaches to cumulative impacts all have limitations

Newer approaches are emerging

Need to make decisions now and be nimble as new tools emerge