

## Lecture 19: Environmental Justice in Regulation 1

---

Prof. Austin  
Environmental Economics  
Econ 475

# Outline

This week we will focus on two big questions:

1. Why is there inequality of pollution exposure for minority and low-income populations?
  - Contextual background, analytic considerations, common explanations
2. When might environmental policies be regressive, i.e., worsen environmental or wealth inequality for minority and low-income populations?
  - Framework for EJ analysis of regulations, prospective analyses, retrospective studies

## Part 1: Environmental Justice Background

# History of the EJ Movement

Very long history of environmental injustice and organized opposition. Inflection point with protests against the siting of a PCB landfill in Warren County.

Contractor hired by Ward Transformer company illegally sprayed 13,000 gallons of PCB waste on 210 miles of roads at 51 sites in 14 North Carolina counties in 1978.



Figure: Protesters attempting to block delivery of PCB waste to the Warren County, NC landfill in 1982 ([Source](#)).

# History of the EJ Movement

After considering 90 potential landfill sites, NC narrowed down to two locations:

- Public landfill in Chatham County (26% Black, 7% below FPL).
  - Already a landfill. Clay-lined.
- Privately-owned land on recently foreclosed property in Warren County (60% Black, 25% below FPL).
  - No city council or mayor
  - Shallow groundwater and permeable soils



Figure: Protesters attempting to block delivery of PCB waste to the Warren County, NC landfill in 1982 ([Source](#)).



# History of the EJ Movement

NC chose the Warren site. Multiple lawsuits, including by the NAACP, did not prevent the landfill creation moving forward.

In 1982, as trucks began to fill the Warren landfill with PCB wastes, local groups protested. 500 people were arrested, including Walter Fauntroy of the US House of Representatives and a leader of the United Church of Christ.

Landfill went ahead as planned.



Figure: Protesters attempting to block delivery of PCB waste to the Warren County, NC landfill in 1982 ([Source](#)).

# History of the EJ Movement

Two landmark studies followed:

- [Siting of Hazardous Waste Landfills and their Correlation with Racial and Economic Status of Surrounding Communities](#) by the General Accounting Office (1983)
- [Toxic Wastes and Race](#) by the Commission for Racial Justice of the United Church of Christ (1987).

## Demographic Characteristics of Communities with Uncontrolled Toxic Waste Sites

- Three out of every five Black and Hispanic Americans lived in communities with uncontrolled toxic waste sites.
- More than 15 million Blacks lived in communities with one or more uncontrolled toxic waste sites.
- More than 8 million Hispanics lived in communities with one or more uncontrolled toxic waste sites.

# A Broad Coalition

In 1991, the UCC's Commission for Racial Justice held the First National People of Color Environmental Leadership Summit.

- The 17 Principles of Environmental Justice.



*People of Color Summit delegates hold rally on the steps of the U.S. Capitol building, Washington, DC, 1991 (Photo by R.D. Bullard)*

## Principles of Environmental Justice

These 17 principles were adopted on October 27, 1991, at the First National People of Color Environmental Leadership Summit held in Washington, DC. This historic summit was sponsored by the United Church of Christ's Commission for Racial Justice and was attended by around 1,100 persons. The principles played a foundational role in defining environmental justice for a growing movement.

### PREAMBLE

**WE, THE PEOPLE OF COLOR**, gathered together at this multinational People of Color Environmental Leadership Summit, to begin to build a national and international movement of all peoples of color to fight the destruction and taking of our lands and communities, do hereby re-establish our spiritual interdependence to the sacredness of our Mother Earth; to respect and celebrate each of our cultures, languages and beliefs about the natural world and our roles in healing ourselves; to ensure environmental justice; to promote economic alternatives which would contribute to the development of environmentally safe livelihoods; and, to secure our political, economic and cultural liberation that has been denied for over 500 years of colonization and oppression, resulting in the poisoning of our communities and land and the genocide of our peoples, do affirm and adopt these Principles of Environmental Justice:

1. **Environmental Justice** affirms the sacredness of Mother Earth, ecological unity and the interdependence of all species, and the right to be free from ecological destruction.
2. **Environmental Justice** demands that public policy be based on mutual respect and justice for all peoples, free from any form of discrimination or bias.



# The Movement Gains Support

[Executive Order 12898](#) signed in 1994.

- Directs all federal agencies to identify and address disproportionately high and adverse effects of their policies on **minority** and **low-income** populations.



Bill Clinton signing EO 12898 ([source](#)).



## Office of Environmental Justice Definition

The **fair treatment** and **meaningful involvement** of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Fair treatment means no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies.

-- [U.S. Environmental Protection Agency](#)



# Office of Environmental Justice Definition

## Procedural Justice

The **fair treatment** and **meaningful involvement** of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

## Distributive Justice

Fair treatment means no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies.

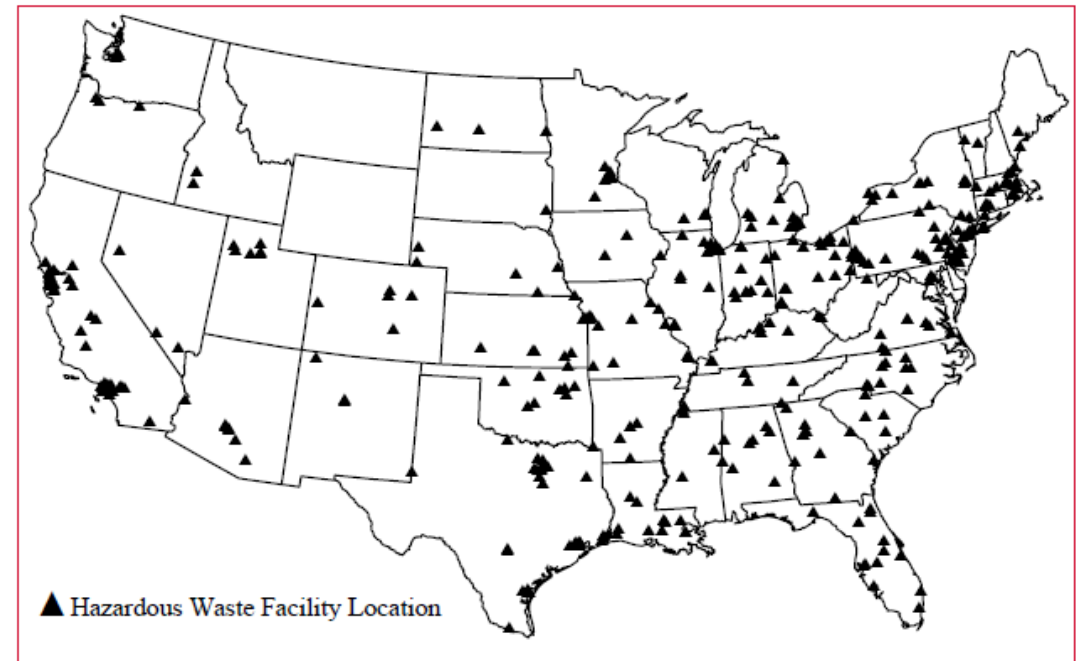
-- [U.S. Environmental Protection Agency](#)

# Toxic Wastes and Race at Twenty 1987—2007

**A Report Prepared for the  
United Church of Christ  
Justice & Witness Ministries**

Many studies established correlation between differential potential exposure and presence of low-income and minority populations.

Follow-up to Toxic Wastes and Race showed EJ concerns still prevalent.



[Link to the full report.](#)

**Table 3.1 – Racial and Socioeconomic Characteristics of People Living Near Hazardous Waste Facilities**

	Within 1 km.	Between 1 km. and 3 km.	Between 3 km. and 5 km.	Beyond 5 km.
<b>Population</b>				
Total Population (1000s)	845	7,828	14,101	225,936
Population Density (persons per square kilometer)	690	840	810	24
<b>Race/Ethnicity</b>				
Percent People of Color	47.7%	46.1%	35.7%	22.2%
Percent African American	20.6%	20.4%	20.6%	11.2%
Percent Hispanic	23.1%	20.4%	18.1%	7.8%
Percent Asian/Pacific Islander	4.4%	5.4%	5.3%	2.7%
Percent Native American	0.6%	0.6%	0.5%	0.8%
<b>Socioeconomic Characteristics</b>				
Poverty Rate	20.1%	18.3%	16.9%	12.7%
Mean Household Income	\$31,192	\$33,318	\$36,920	\$38,745
Mean Housing Value	\$93,985	\$102,594	\$111,915	\$111,956

[Link to the full report.](#)



**Table 4.1 – Racial and Socioeconomic Disparities between Host Neighborhoods and Non-Host Areas for the Nation's 413 Commercial Hazardous Waste Facilities (1990 and 2000 Census)**

	2000				1990			
	Host	Non-Host	Diff.	Ratio	Host	Non-Host	Diff.	Ratio
<b>Population</b>								
Total Pop. (1000s)	9,222	272,200	-262,979	0.03	8,673	240,037	-231,364	0.04
Population Density	870	29.7	840	29.0	820	25.1	790	27.3
<b>Race/Ethnicity</b>								
% People of Color	55.9%	30.0%	25.9%	1.86	46.2%	23.4%	22.8%	1.97
% African American	20.0%	11.9%	8.0%	1.67	20.4%	11.7%	8.7%	1.74
% Hispanic or Latino	27.0%	12.0%	15.0%	2.25	20.7%	8.4%	12.3%	2.47
% Asian/Pac. Is.	6.7%	3.6%	3.0%	1.83	5.3%	2.8%	2.5%	1.88
% Native American	0.7%	0.9%	-0.2%	0.77	0.6%	0.8%	-0.3%	0.68
<b>Socioeconomics</b>								
Poverty Rate	18.3%	12.2%	6.1%	1.50	18.5%	12.9%	5.6%	1.43
Mean Household Income	\$48,234	\$56,912	-\$8,678	0.85	\$33,115	\$38,639	-\$5,524	0.86

# EJ Internationally

Differential exposure to nuisance pollution has been established as a stylized fact across many pollutant types, EJ groups of concern, and localities.

EJ concerns have been studied in many other contexts including India ([Kopas et al., 2020](#)), Italy ([Germani et al., 2014](#)), and New Zealand ([Pearce et al., 2006](#)).

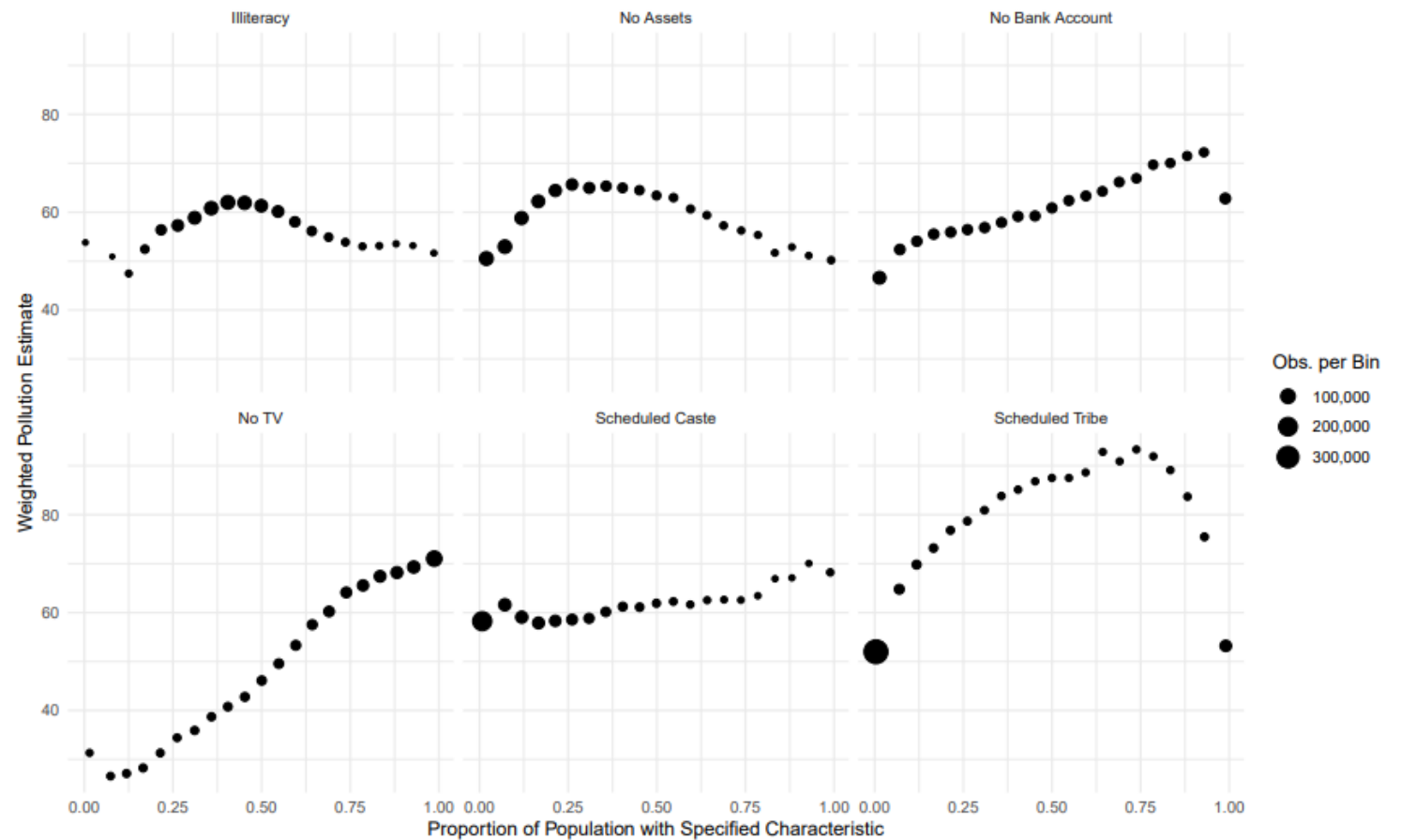


Figure 4: **Pollution Outcomes by Socioeconomic Characteristics.** Plot shows average pollution measures within groups binned by proportion of the population with the characteristic indicated by the panel label.

## Part 2: Analytic Considerations

# Common Pitfalls in Assessing EJ Concerns

Studies may miss or mis-characterize EJ concerns because of their analytic methods:

- Controlling (or not controlling) for other variables and multicollinearity
- Transboundary pollution and measurement error
- Defining the comparison group
- Unit-hazard coincidence vs. distance measures
- Defining the unit of analysis and the **ecological fallacy**

# Mohai and Saha (2006)

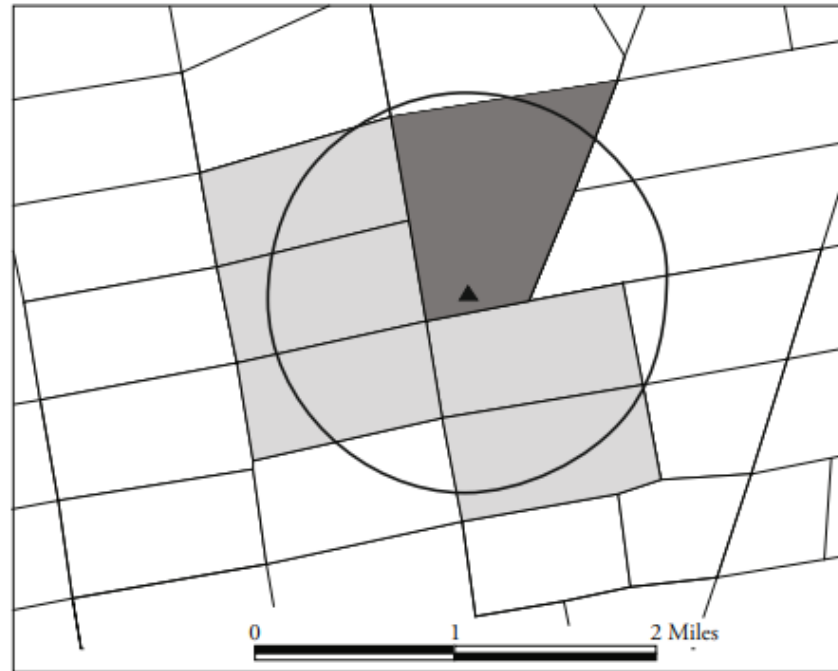
## **Unit-hazard coincidence**

considers the demographics of one pre-determined boundary.

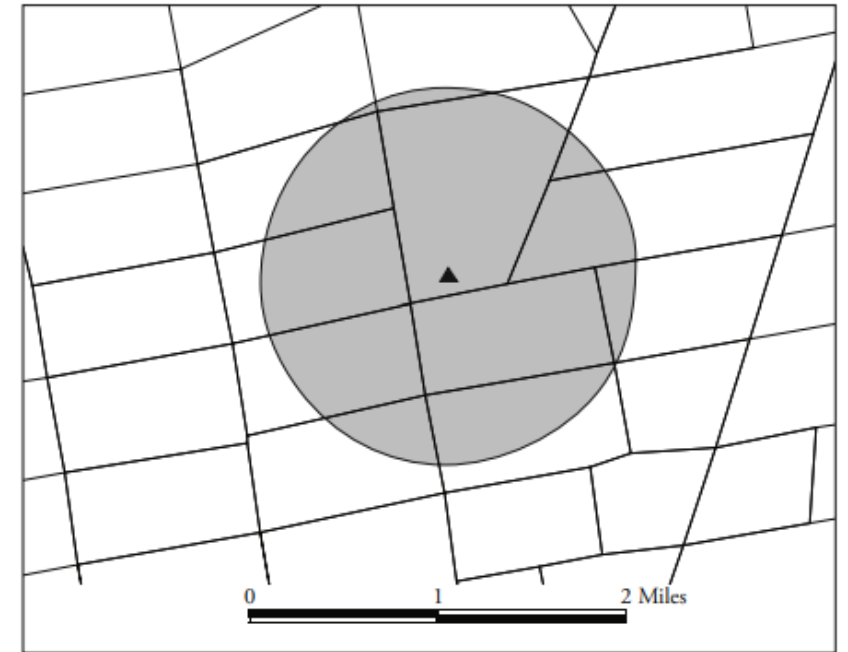
## **Distance-based measures**

consider demographics within a specified distance, often by areal apportionment.

**a. 50% areal containment using a one-mile radius**



**b. Areal apportionment using a one-mile radius**





## Mohai and Saha (2006)

Race and income are more likely to be correlated with pollution when using distance-based measures rather than unit-hazard coincidence.

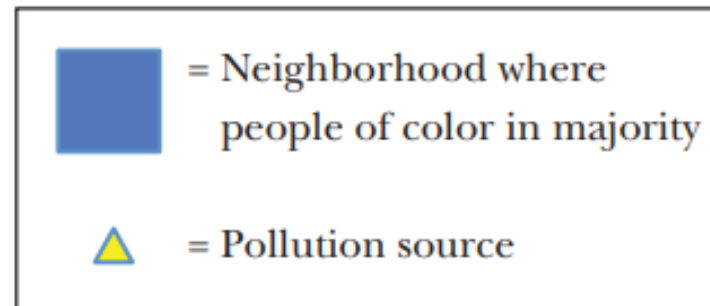
**Table 3. Logistic Regression Results Comparing Unit-Hazard Coincidence and 50% Areal Containment Methods**

Variable	Unit-Hazard Coincidence		50% Areal Containment (1-Mile Radius)		50% Areal Containment (3-Mile Radius)	
	Coefficient (1)	Significance (2)	Coefficient (3)	Significance (4)	Coefficient (5)	Significance (6)
% African American	-.003	.986	.698	.000	1.522	.000
% Hispanic	.431	.066	1.482	.000	1.960	.000
Mean household income (\$1,000s)	.012	.000	-.025	.000	-.015	.000
Mean property value (\$1,000s)	-.002	.058	.005	.000	.004	.000
% With a college degree	.338	.673	-1.704	.012	-.409	.046
% Employed in executive, managerial, and professional occupations	-3.215	.002	-.872	.282	.010	.970
% Employed in precision production or labor occupations	2.323	.000	1.787	.000	.073	.684
Constant	-5.052	.000	-4.197	.000	-2.220	.000
-2 Log-Likelihood	6,010.2		8,077.3		40,995.556	
Model chi-square	153.743	.000	548.233	.000	2786.536	.000
Sample size	59,050		59,050		59,050	

# Ecological Fallacy

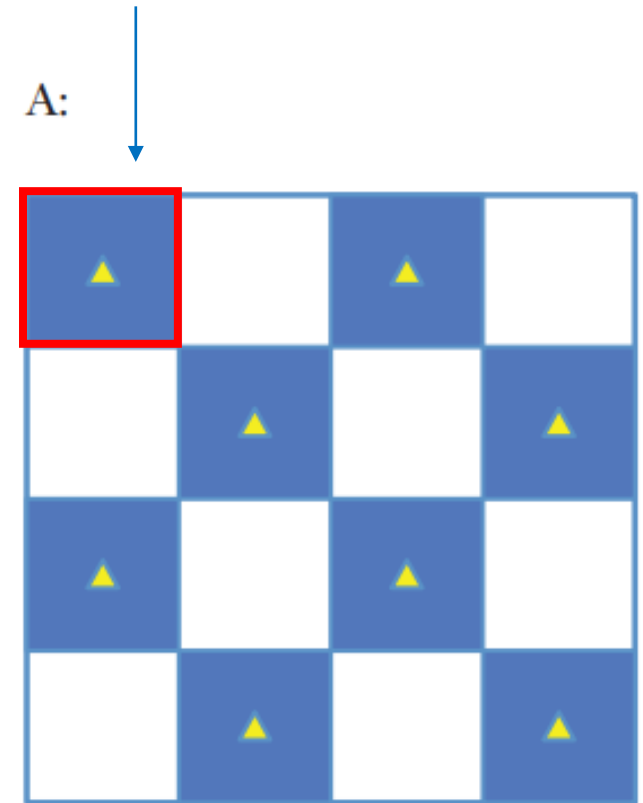
**Ecological fallacy:** Incorrectly drawing conclusions about individual exposures from group exposures.

In figure A, Pollution sources are perfectly correlated with neighborhoods where people of color are the majority.



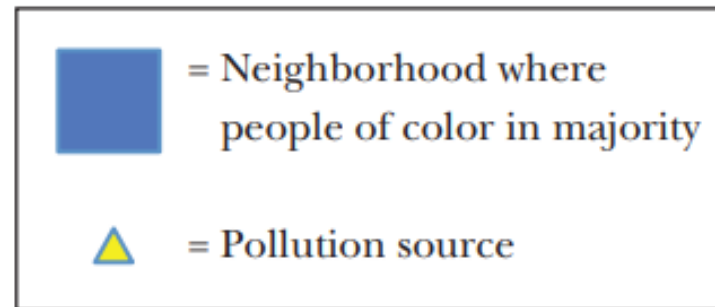
Unit of analysis

A:



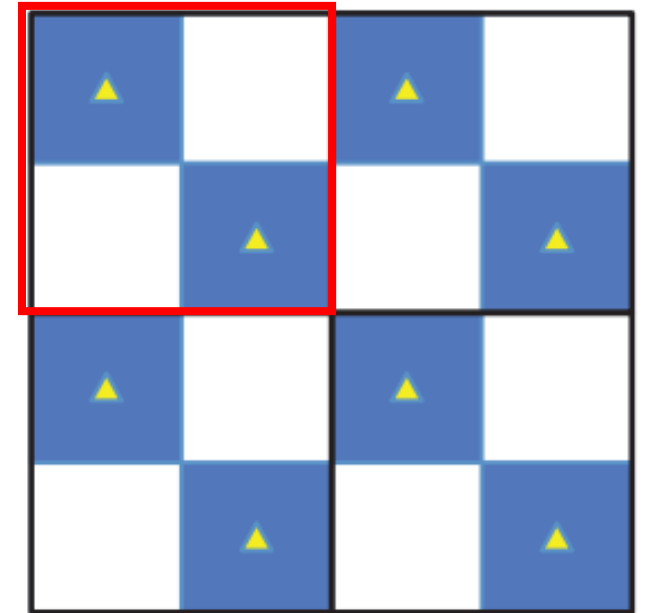
# Ecological Fallacy

Using a larger group for analysis in figure B, there is no correlation between pollution sources and minority neighborhoods.



Unit of analysis

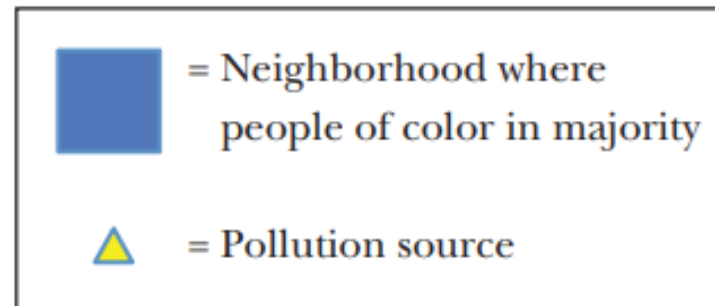
B:



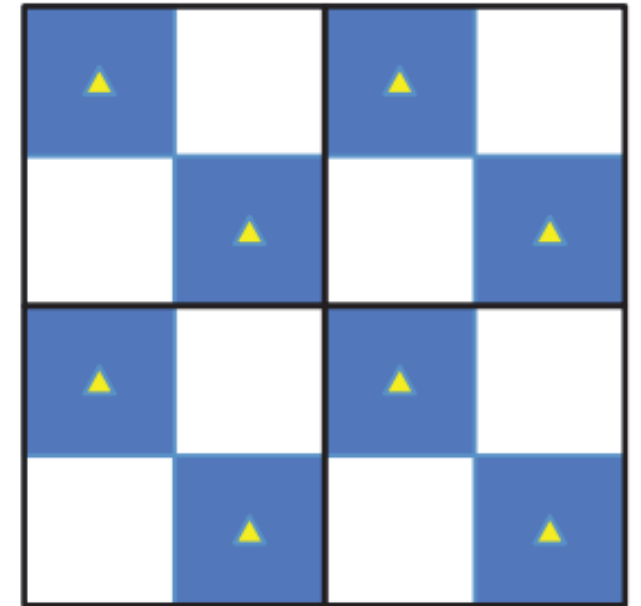
# Ecological Fallacy

Aggregation can mask inequality of pollution exposure with greater residential segregation.

[Baden, Noonan, and Turaga \(2007\)](#) show using smaller level of analysis increases correlation between NPL sites and demographics.



B:



## Part 3: Sources of Environmental Inequality



# Possible Explanations

Many non-exclusive sources of environmental justice concerns:

1. Disproportionate siting by firms
2. Coming to or fleeing pollution by households
3. Market coordination of firms and households
4. Discriminatory policies and/or enforcement
5. Intergenerational transmission

# 1. Disproportionate Siting

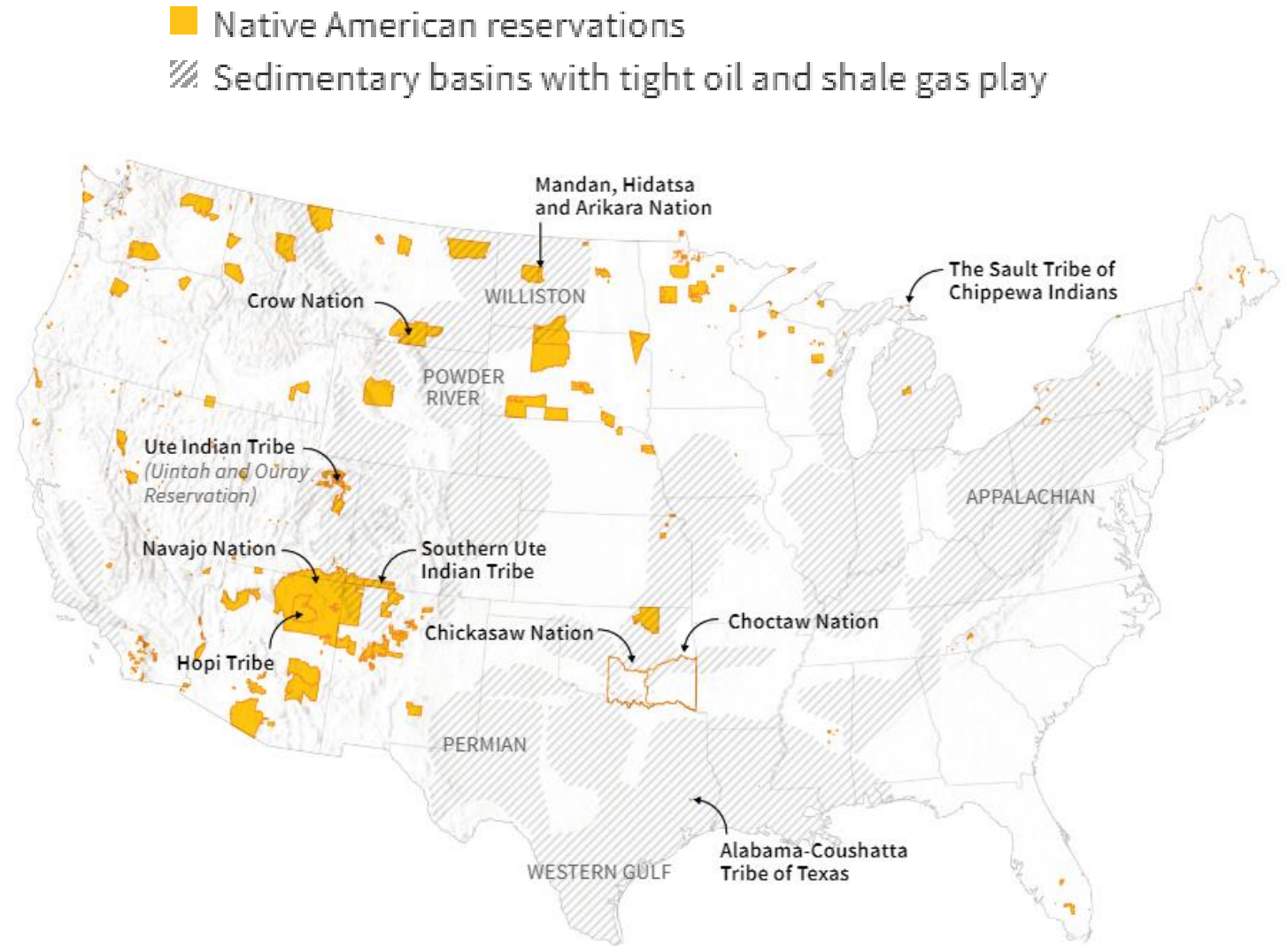
Some possible explanations for differential siting behavior of polluting firms in neighborhoods of lower income and/or with more people of color.

- Internal Colonialism
- Discriminatory siting behavior
- Firms select locations based on local economic conditions such as inexpensive land, low-wage labor, or transportation networks.
- Government permitting decisions may steer firms to certain regions

# Internal Colonialism

Tribal reservations are 2% of US land but have:

- 30% of coal west of the Mississippi
- 50% of all uranium
- 20% of oil and shale natural gas



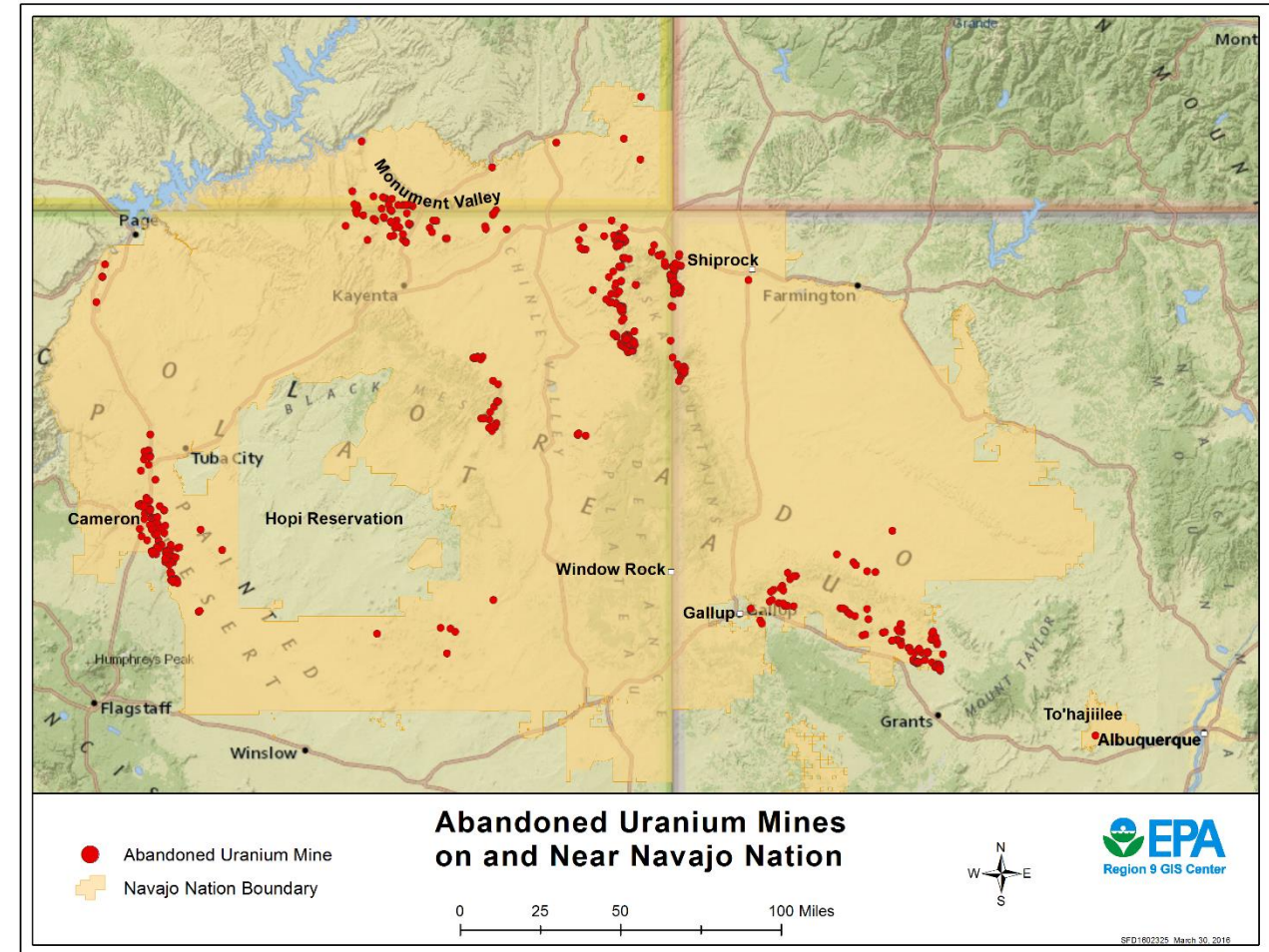
Source: [Reuters \(2017\)](#).

# Internal Colonialism

Ongoing concerns, but legacy pollution from extraction is still relevant.

Uranium extraction on Navajo nation alone left over 1000 abandoned uranium mines.

Spent nuclear fuel and weapons testing near Skull Valley Goshute reservation.



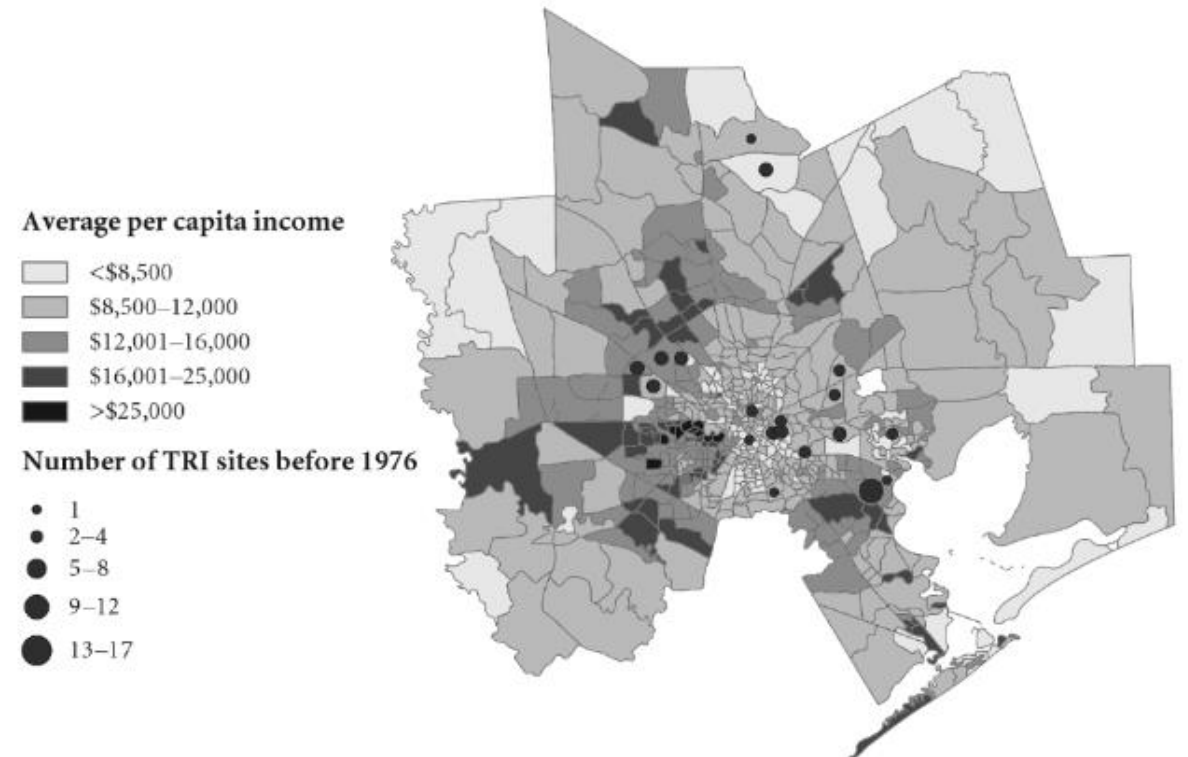
Source: [EPA \(2016\)](#).

# Wolverton (2009)

## Research Questions:

- Are correlations between firm location decisions and demographics robust to using demographics at the time of siting?
- How do local economic conditions affect firm siting decisions?

**Methods:** Predict location of TRI sites in Houston and Dallas census tracts given demographic characteristics near the facility at the time the facility was sited.



Source: [The Political Economy of Environmental Justice \(2012\)](#)



# Wolverton (2009)

**Table 1: Logit Regressions Using All TRI Plants and 1990 Socioeconomic Characteristics**

Variable	Goldman and Fitton	Davidson and Anderton	Kriesel et al
	Coefficient Estimates		
CONSTANT	5.78 ***	-2.63 ***	-6.14 **
NONWHT (percent nonwhite residents)	0.49 **	0.59 **	0.44 *
FOREIGN (percent foreign residents)	1.44 **	1.29 **	1.09 *
POVERTY (percent persons living in poverty)	-2.19 ***	0.25	0.45
LNINCOME (log of median household income)	-0.73 ***		
URBAN (percent persons living in urbanized area)	-0.35 **		
HIGHSCH (percent with high school degrees)		1.67 **	1.60 **
LNVALUE (log of average housing value – owner occupied)		-0.05 **	-0.05 **

## Findings:

1) TRI site location is strongly correlated with *current* demographics.

## Wolverton (2009)

### Findings:

2) TRI site location not significantly correlated with % non-white *at the time of siting*.

Still negatively correlated with income.

Table 3: Conditional Logit Estimation – 50 choices

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Davidson and Anderton	Kriesel et. al	Been and Gupta	Without Input Costs	With Input Costs	With Input Costs
NONWHT	-0.03 (0.28)	0.09 (0.28)	-0.12 (0.28)	-0.28 (0.29)	0.52 (0.33)	0.44 (0.28)
FOREIGN	0.25 (0.80)	-0.46 (0.85)	0.08 (0.83)	-0.16 (1.02)	0.46 (0.97)	1.20 (1.02)
INCOME			-0.23 *** (0.06)	-0.21 *** (0.05)	-0.16 *** (0.06)	-0.21 *** (0.06)
POVERTY	-0.56 (0.69)	-1.83 *** (0.71)	-0.50 (0.71)	- 0.95 (0.67)	-2.21 *** (0.83)	
NOPHONE						1.10 (0.85)
HIGHSCH	1.90 *** (0.67)	1.43 ** (0.68)	1.98 *** (0.63)	2.27 *** (0.67)	0.61 (0.76)	1.74 ** (0.84)

## Wolverton (2009)

### Findings:

3) TRI site location strongly predicted by local economic characteristics such as wages, distance to railroad, manufacturing share of the local workforce, and pre-existing TRI sites.

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Davidson and Anderton	Kriesel et. al	Been and Gupta	Without Input Costs	With Input Costs	With Input Costs
WAGE		-0.92 *** (0.24)			-1.08 *** (0.32)	-0.93 *** (0.31)
PLANT SIZE					0.36 *** (0.08)	0.36 *** (0.08)
OLDSITE					0.27 *** (0.03)	0.26 *** (0.03)
URBAN					-1.00 *** (0.14)	-0.77 *** (0.15)
MANUF	5.27 *** (0.53)	6.03 *** (0.60)	5.95 *** (0.54)		4.11 *** (0.70)	3.89 *** (0.76)
RAIL					-0.14 ** (0.04)	-0.18 *** (0.04)
Pseudo R <sup>2</sup>	0.05	0.05	0.06	0.03	0.18	0.19
Log L	-1,350.05	-1,342.11	-1,339.59	-1,377.86	-1,171.45	-1,155.62

## 2. Coming to or Fleeing the Nuisance

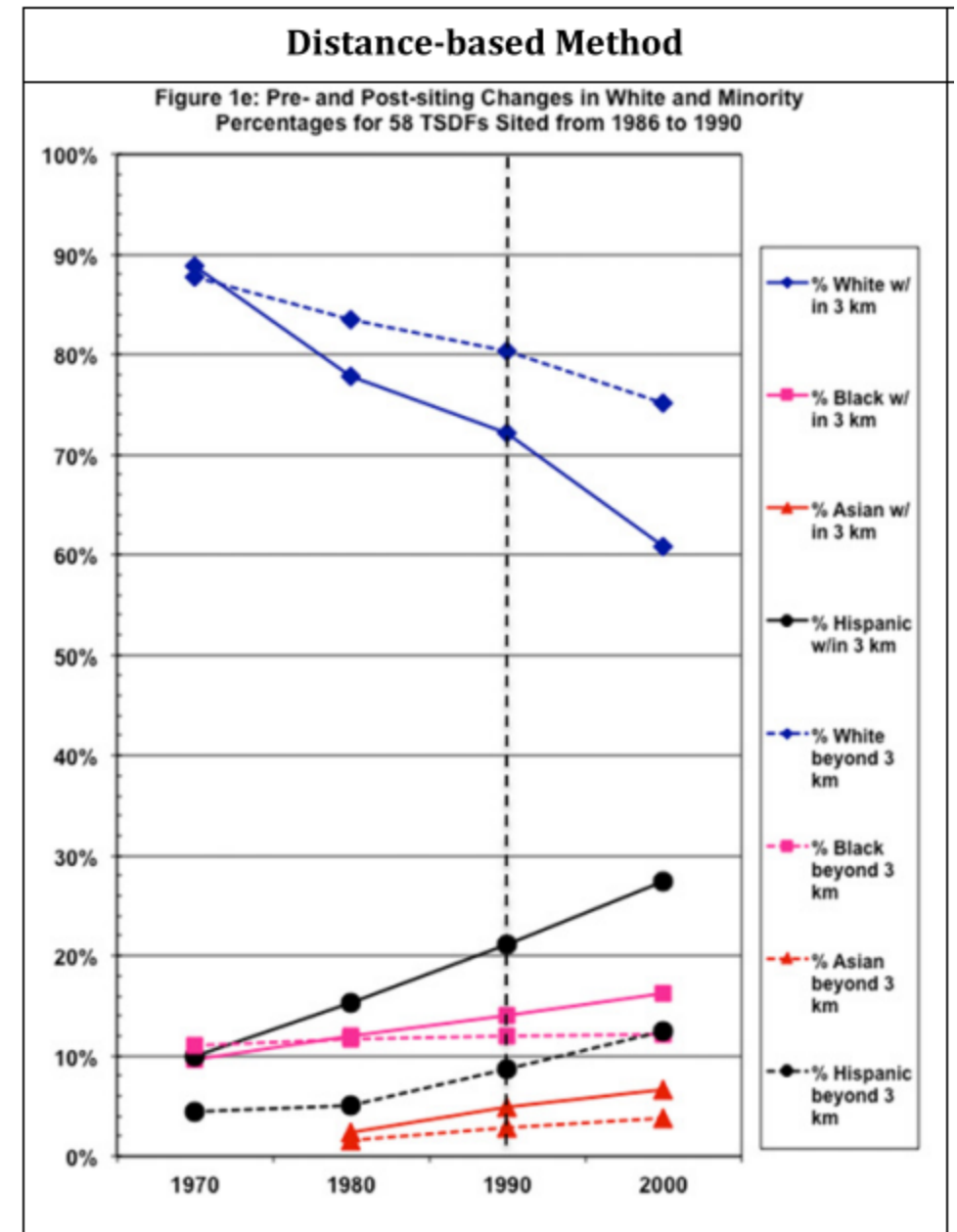
**Tiebout sorting:** Households move based on their willingness and ability to pay for local amenities including environmental quality.

- Households “vote with their feet” for neighborhood characteristics.
- Stratification of amenity provision across income levels.
  - Areas with more amenities are more expensive, hence pricing lower income individuals out of the community.
  - Areas with worse pollution are cheaper, hence attracting lower-income renters.

# Evidence for Tiebout Sorting

Some evidence that new siting of polluting firms  $\downarrow$ %white and  $\uparrow$ %minority:

- [Mohai and Saha \(2015\)](#) look at demographics before and after siting of hazardous waste treatment, storage, and disposal facilities.



# More Evidence for Tiebout Sorting

Effects to changes in local pollution:

- [Banzhaf and Walsh \(2007\)](#): changes in the emissions of toxic air pollutants in California associated with emigration of high-income households and immigration of low-income households.
- [Gamper-Rabindran and Timmins \(2011\)](#) offer further evidence on the effect of Superfund site cleanups.

# Gamper-Rabindran and Timmins (2011)

Using restricted-use census data that allows summarizing characteristics of households before and after cleanup.

- More owner occupied.
- Higher income and college educated.
- Greater housing density.

TABLE 1—THE EFFECT OF CHANGES IN EXPOSURE TO HAZARDOUS WASTE SITES PROPOSED, LISTED, AND DELETED FROM THE NPL ON CHANGES IN NEIGHBORHOOD COMPOSITION BETWEEN 1990 AND 2000

	Mean [SD]	Counts of sites within 3 km		
		Proposed	Listed	Deleted
<i>Panel A. Housing supply and population</i>				
Population density (1,000 people per km <sup>2</sup> )	2.911 [4.181]	0.265** (0.116)	0.437*** (0.083)	0.533*** (0.092)
Housing unit density (1,000 units per km <sup>2</sup> )	1.182 [2.15]	0.070 (0.047)	0.143*** (0.037)	0.199*** (0.044)
<i>Panel B. House prices</i>				
Median house price (\$10,000)	7.034 [4.816]	−0.847*** (0.175)	0.825*** (0.130)	1.690*** (0.148)
<i>Panel C. Income and educational attainment</i>				
Mean HH income (\$1,000)	37.9 [1.6]	−0.426 (0.774)	5.842*** (0.685)	10.02*** (0.759)
Share HH below poverty line	0.127 [0.117]	−0.001 (0.006)	−0.018*** (0.005)	−0.028*** (0.006)
Share HH with public assistance	0.078 [0.072]	−0.007*** (0.002)	−0.019*** (0.002)	−0.037*** (0.002)
Share college educated	0.185 [0.131]	−0.005 (0.004)	0.039*** (0.004)	0.057*** (0.004)
Share high school dropout	0.253 [0.128]	−0.023*** (0.005)	−0.041*** (0.005)	−0.071*** (0.005)
<i>Panel D. Demographics</i>				
Share black	0.118 [0.226]	0.022*** (0.002)	0.013*** (0.002)	0.030*** (0.002)
Share Hispanic	0.054 [0.105]	0.063*** (0.004)	0.106*** (0.003)	0.173*** (0.004)
Share female headed HH	0.237 [0.160]	0.012*** (0.003)	0.017*** (0.003)	0.030*** (0.003)
<i>Panel E. Housing unit characteristics</i>				
Share occupied units	0.922 [0.067]	0.004** (0.002)	0.011*** (0.002)	0.012*** (0.002)
Share owner occupied units	0.661 [0.214]	−0.011*** (0.003)	0.016*** (0.002)	0.024*** (0.003)
Share mobile homes	0.064 [0.114]	−0.005*** (0.001)	−0.009*** (0.001)	−0.015*** (0.001)



# Environmental Gentrification

[Gamper-Rabindran and Timmins \(2011\)](#) suggest that that environmental quality changes may lead to more than coming to the nuisance or emigrating to cleaner areas.

Environmental improvements → environmental gentrification.

- Rising property values, renovation, conversion from rental to owner-occupied, population turnover, provision of other services.
- Residents are priced out.

# Environmental Gentrification

[Qiang, Timmins, and Wang \(2021\)](#) study  
LA using the Family and Neighborhood  
Survey.

**Probit model:** how do housing value  
increases in LA >10% from 2000-2006  
increase the likelihood of out-migration  
by renters?

Move	(1) Housing Price
Gentrification	-0.337** (0.161)
Gentrification×Renter	0.500*** (0.190)
Renter	0.340*** (0.083)
Hispanic	0.009 (0.102)
Black	0.356*** (0.130)
Asian	-0.130 (0.161)
Kids	0.277*** (0.099)
Age	-0.016*** (0.013)
Education	0.014 (0.009)
Income	-0.016 (0.013)
constant	0.294 (0.256)

# Environmental Gentrification

[Qiang, Timmins, and Wang \(2021\)](#) also show where displaced renters move.

Table 10: SUR Results for Amenity Choices among Movers

Dependent Variable	Increase in Housing Price	Increase in Pollution	Increase in School Quality	Increase in Crime Rate
Gentrification	28.246 (19.408)	-16.219 (16.471)	2.905 (1.905)	-1.384 (1.628)
Gentrification × Renter	-33.845* (20.275)	17.316 (17.207)	-4.228** (1.991)	3.156* (1.700)

# Tibout Sorting

Housing sorting behavior:

- Evidence for coming to the nuisance and fleeing the nuisance.
- Cleanup has been linked to environmental gentrification.

Welfare implications for EJ communities?

- Less pollution is a welfare improvement, but could be negated if low-income households are priced out and move to more polluted regions.
- Contextual factors complicate efficiency considerations of sorting.  
Hysteresis, steering, housing discrimination, etc.

### 3. Coasean Bargaining

1. Communities may be willing to accept some pollution exposure in exchange for benefits of local employment, investments in the community, gifts, etc.
2. Communities may also prevent facilities from polluting through protest, legal actions, local government decisions, etc.

Implication: It is efficient to site firms in poorer communities because lower willingness to accept payment for pollution exposure.

➤ Giving rights over pollution to communities → environmental justice?

# Two Sides of Coasean Bargaining

Giving rights over pollution to communities → environmental justice?

- Prohibiting polluting firms from siting in minority or low-income communities denies the benefits of economic development. This precludes meaningful involvement (*procedural justice*, EJ Principles 5 and 7).
  - Procedural justice ≠ distributive justice
- Jobs and economic development do not always flow to lower-income individuals within the community, property rights over pollution may not belong to less-advantaged individuals within a community, and language barriers or institutional factors may prevent meaningful involvement in the process.

# Limitations of Coasean Bargaining

What else is missing? The broader limitations of Coasean bargaining in achieving efficiency.

- How do you assign “pollution property rights” to a “community”?
- Information about true costs of the facility in long-term health damages, liability from a hazardous site, risks of contamination or accidents
  - E.g., unknown health costs, attribution problems, firm enticement can be manipulative or misleading
- Difficult to coordinate across affected groups
  - E.g., one group supports jobs, the other supports environmental protection
- Bargaining power: Firms may target areas with a weaker bargaining position
  - E.g., The Cerrell Report in California



# Evidence from Fracking Lease Negotiations

[Timmins and Vessing \(2022\)](#) ask how private lease negotiations for hydraulic fracturing wells vary with measures of wealth, race, ethnicity, and language.

Failure to negotiate protections in leases leads to increased risk of drilling violations. Suggests a “breakdown of efficient Coasian bargaining.”

**Table 12**

Coase seemingly unrelated regressions with U.S. Census tract FE & BISG predi

(a) Part I	Royalty	Term Length	Environ.
Pred. Black (%)	−0.002*** (0.000)	−0.046 (0.173)	−0.018*** (0.007)
Pred. Asian (%)	−0.000 (0.000)	0.129 (0.144)	0.004 (0.007)
Pred. Hispanic (%)	−0.001* (0.000)	0.630*** (0.140)	−0.006 (0.006)
Pred. Hispanic x % Spanish Speaking	−0.006*** (0.002)	0.943 (0.664)	−0.137*** (0.022)

## 4. Discriminatory Policies and Enforcement

Previously covered some examples in class:

- Longer time to return to compliance in SDWA violations.
- Steering behaviors and discrimination in the housing market.

More examples:

- Zoning practices
- Housing covenants
- Expulsive urban renewal

# Discriminatory Zoning

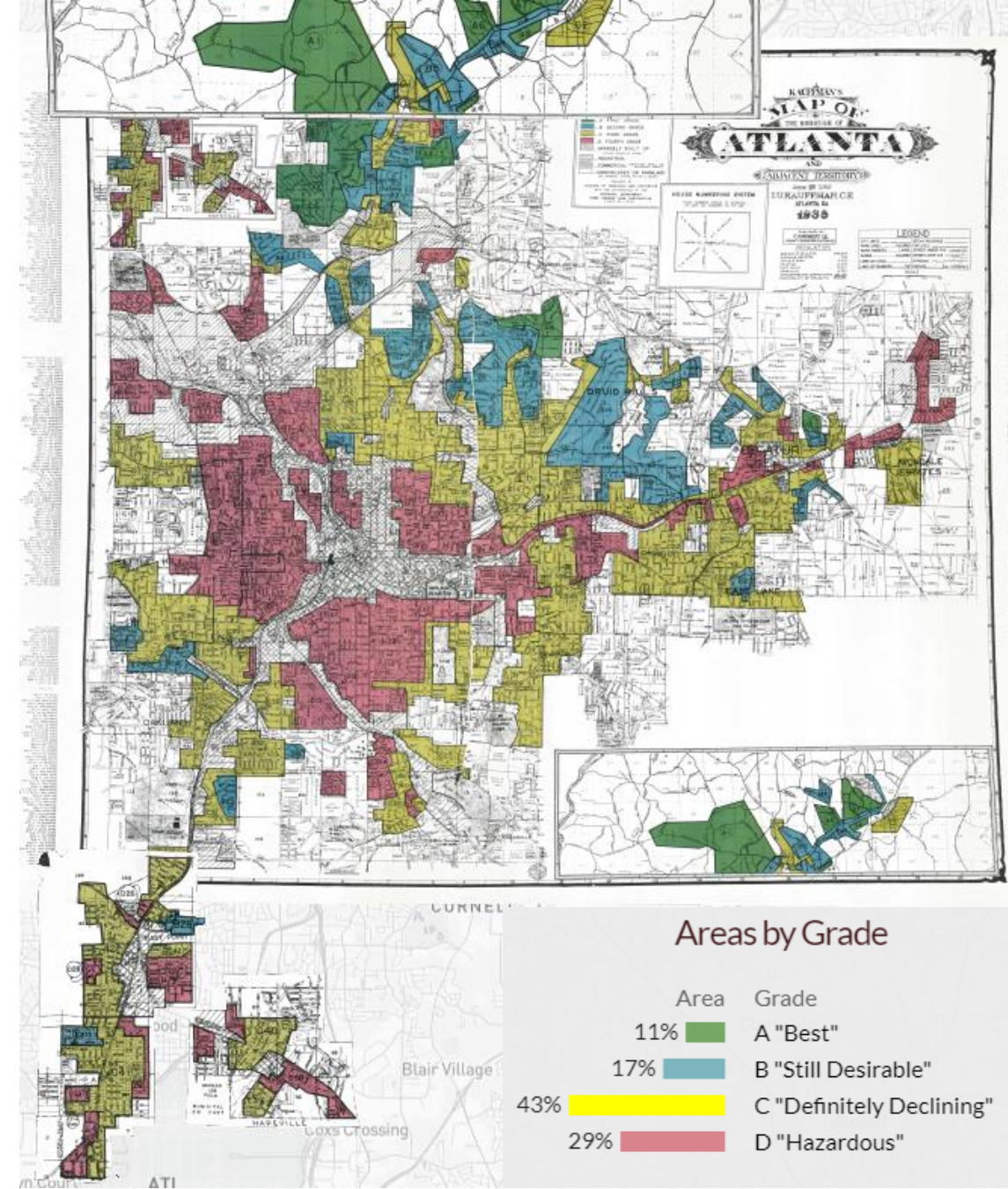
Zoning practices are rules on the use of land. They establish parking lot requirements, building heights, housing types, etc.

- Zoning rules define where polluting facilities can legally operate.
- In the US, zoning laws were also used to create and enforce housing segregation.
- Redlining practices, encouraged by the Federal Housing Administration, were underwriting criteria for mortgages. Criteria were explicitly based on race and environmental hazards.

# Redlining in Atlanta

Redlined areas often correspond to segregated zones with greater minority share and more pollution.

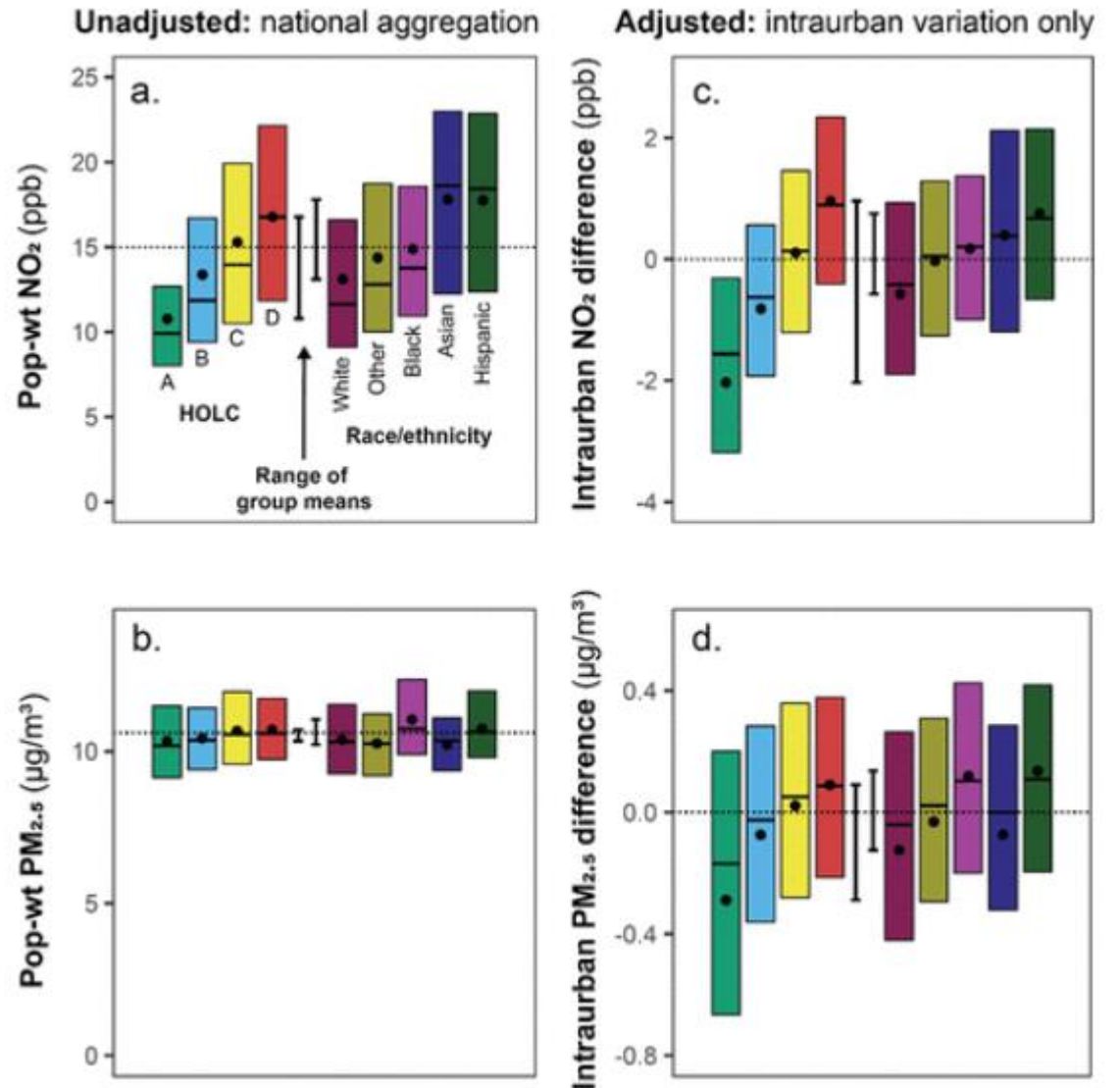
- Minority neighborhoods pay a premium for access to credit or don't receive it at all.
- Less investment led to food deserts, lack of healthcare access, and disinvestment.
- Contributed to the race wealth gap.
- See "[Mapping Inequality...](#)" for other cities.



# Effects of Redlining Today

Redlining created persistent gaps in air pollution exposure that are still evident today.

- Figure displays exposure differentials in 202 redlined cities with population of 45 million.



Source: [Lane, Morello-Frosch, Marshall, Apte \(2022\)](#).



# Housing Covenants

Housing covenants were house- or neighborhood-level agreements not to sell homes to specific minority groups.

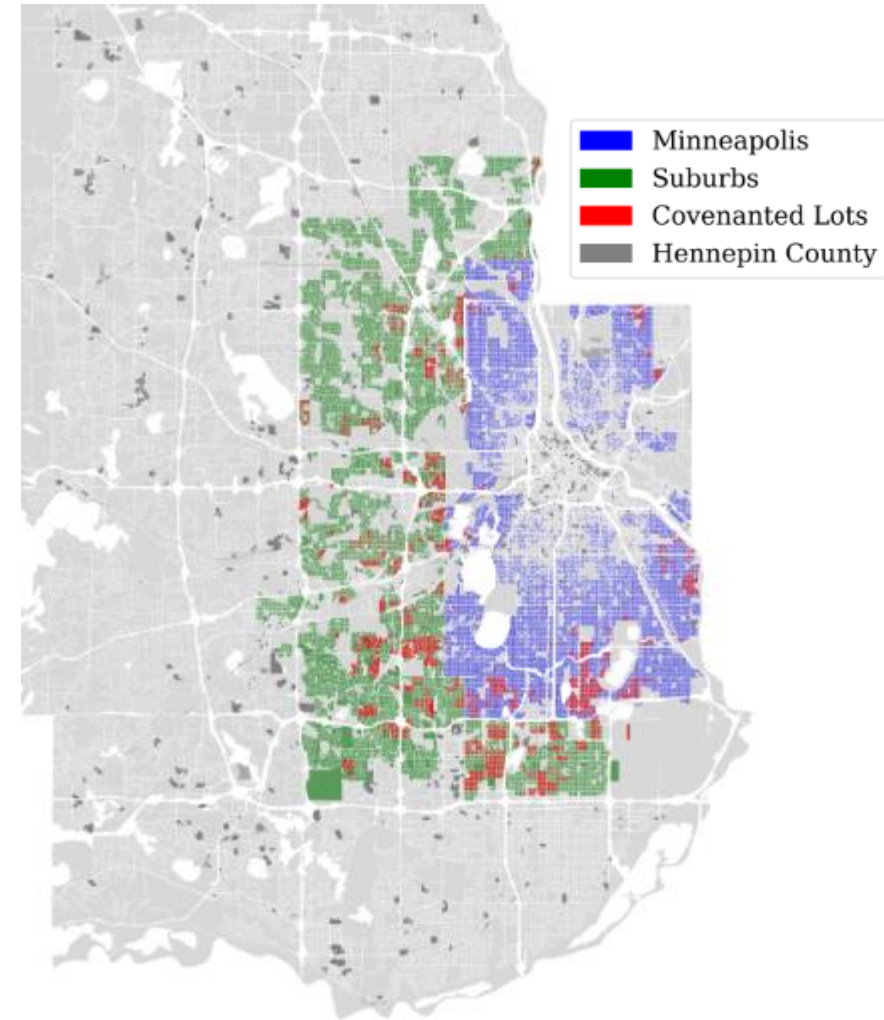
- Limited potential for people of color to flee the nuisance to newer homes constructed away from industrial zones.
- Lorraine Hansberry and George Bush's experiences with racial housing covenants.



# Long-term Impact

Using 120,000 properties in Minnesota, [Sood et al. \(2021\)](#) find that:

- Covenanted houses in 1948 have 3.4% higher *present* values.
- Census blocks with 1% increase in covenanted homes in a census block reduces current % Black by 14% and Black homeownership by 19%.





# Expulsive Urban Renewal

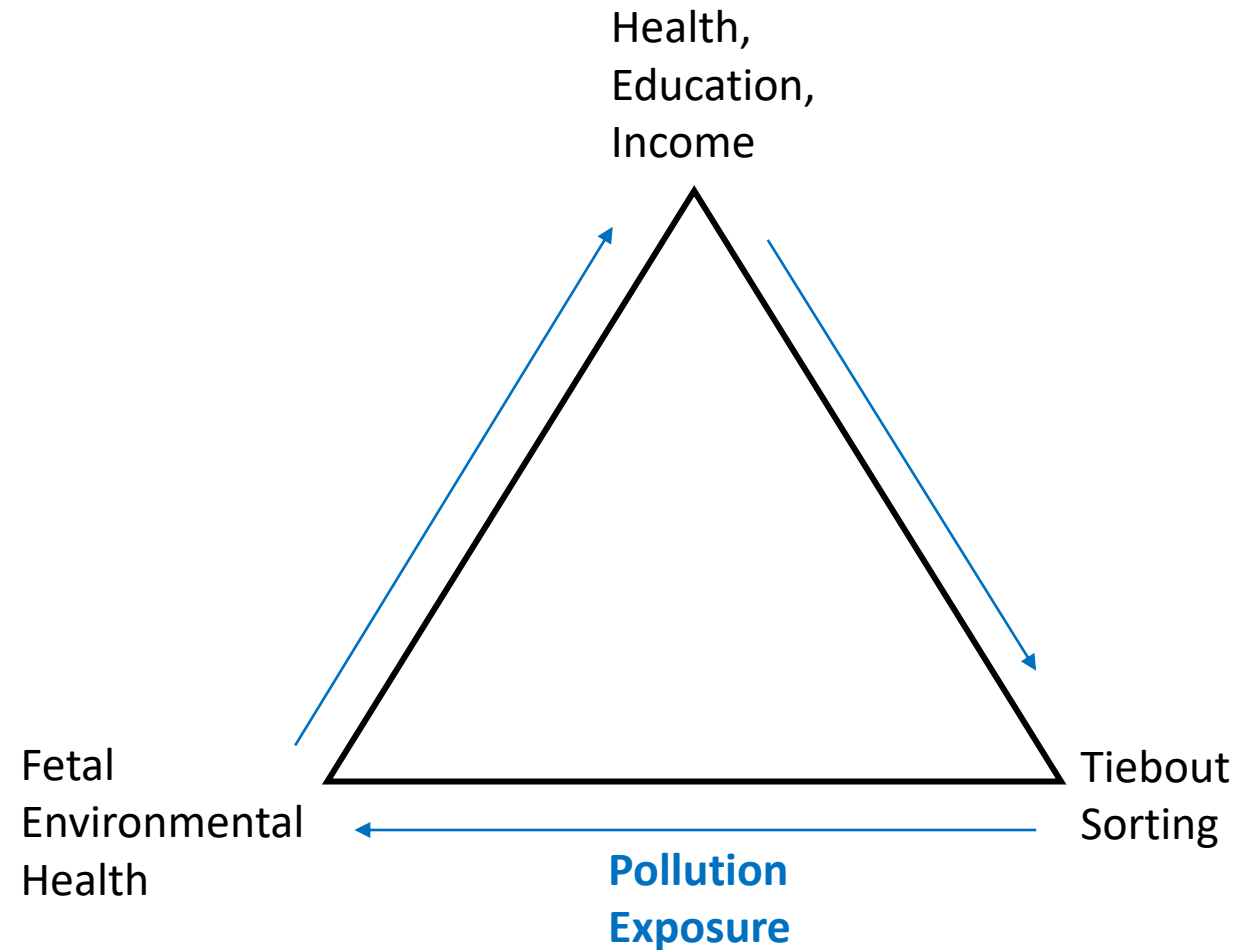
Eminent domain takes private property for public use in exchange for just compensation.

- Eminent domain, urban renewal, and urban planning differentially target properties inhabited by people of color.
- Of 2,500 cases of eminent domain in 992 cities from 1949 to 1973, one million people were displaced and two thirds were Black ([Fullilove, 2015](#)).
- In combination with zoning, redlining, housing covenants, and hysteresis, limits options for escaping pollution.

## 5. Intergenerational Transmission

The **fetal origins hypothesis** suggests that pollution exposure in utero has lifelong effects on physical health, educational attainment, and income.

- [Almond and Currie, “Killing me Softly: The Fetal Origins Hypothesis” \(2011\)](#) overview.
- [Follow-up in 2018](#) with more evidence.



# Concluding Remarks

From an economics and EJ perspective, important to disentangle causes to determine policy implications, but often current causes are not easily separable from past causes.

Even with good causal inference, equity/efficiency trade-offs often remain:

- Differential sorting might imply economic efficiency if equal access and no discrimination
  - Environmental gentrification, red-lining, housing covenants, steering, and hysteresis
- Differential siting might imply economic efficiency if meaningful community involvement and fair negotiations
  - Internal colonialism, firm enticement and manipulation, bargaining power, and coordination problem

# Next class

On Wednesday we will cover how EPA conducts EJ analyses and walk through some examples. Then we will discuss your readings.

Readings for Wednesday:

- [Hernandez-Cortes and Meng \(2020\)](#)
- *(optional)* [Chapter 14 of ELG Steam Electric BCA](#)