



Analyzing Environmental Justice in EPA Air Quality Policies

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Disclaimer

Views expressed here are those of the presenter alone and do not necessarily reflect the views and policies of the U.S. EPA

Background

EPA defines environmental justice (EJ) as “*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.*”

EPA further defines the term fair treatment to mean that no group of people should bear “***disproportionately high and adverse human health or environmental effects.***” †

† Executive Order 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations

Introduction

As addressing environmental injustice is a priority, EJ analytic concerns* are carefully considered in the development of each rulemaking on a case-by-case basis.

EJ analytics are designed around three guiding questions**:

1. Are there potential EJ concerns associated with environmental stressors affected by the regulatory action for population groups of concern **in the baseline?**
2. Are there potential EJ concerns associated with environmental stressors affected by the regulatory action for population groups of concern **for the regulatory option(s) under consideration?**
3. For the regulatory option(s) under consideration, **are potential EJ concerns...exacerbated or mitigated compared to the baseline?**

*This talk focuses on quantitative assessments of EJ impacts, not outreach and/or engagement efforts

** [EPA Technical Guidance for Assessing EJ in Regulatory Analysis](#)

EJ Analytic Approaches



Demographic Proximity Analyses

- Compares proportionality of potential EJ populations living nearby affected facilities.
- Requires facility location information.



Exposure/Health Impact Analyses

- Compares PM_{2.5} and ozone exposure/health impacts.
- Requires air quality modeling.
- Health impacts requires additional scientific support and input data.



Hazardous Air Pollutant Risk Assessments

- Compares proportionality of risk levels in potential EJ populations.
- Requires detailed location, emissions data.

Outline

- Three examples of EJ analytics in recent significant air quality rulemaking packages (performed by an array of EPA analysts)
 - One of the earliest quantitative EJ analyses (Oil & Gas)
 - Criteria air pollutant EJ analysis (PM NAAQS)
 - Hazardous air pollutant/air toxic EJ analysis (HON)
- Research directions

Example 1: Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review (Oil & Gas)

Rule Overview: Reduce methane and other harmful air pollution emissions, such as ozone from volatile organic compounds (VOCs), from both new and existing sources in the oil and natural gas industry.

EJ Analytics Responding to Q1:

- Quantitative baseline EJ analyses
 - Risk from oil and natural gas air toxic emissions
 - Ozone exposures from oil and natural gas VOC emissions
 - Oil and natural gas workers and communities
 - Potential household energy market impacts
- Qualitative discussion of EJ climate impacts

Example 1: Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review (Oil & Gas)

Cancer Risk and Demographic Population Estimates for 2017 NEI Nonpoint Emissions

	Risks \geq 100-in-1 million		
Number of Cells	36		
Total Population	38,885 (936 census blocks)		
		Nationwide	
	Population	%	%
Minority	13,268	34.1	39.9
African American	140	0.4	12.2
Native American	77	0.2	0.7
Other and Multiracial	1,443	3.7	8.2
Hispanic or Latino	11,608	29.9	18.8 *
Age 0-17	10,679	27.5	22.6 *
Age \geq 65	4,272	11	15.7
Below the Poverty Level	2,000	5.1	13.4
Over 25 Without a High School Diploma	2,788	7.2	12.1
Linguistically Isolated	808	2.1	5.4

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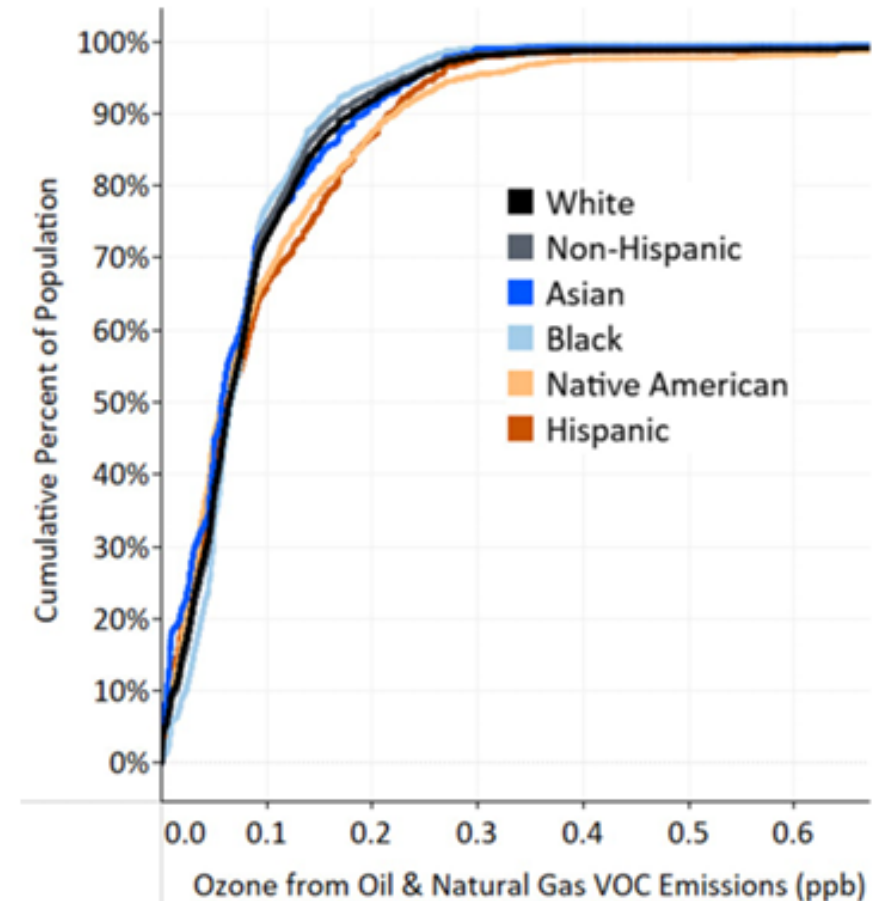


Figure 4-3 Distributions of Ozone from Oil and Natural Gas VOC Emissions Concentrations by Race/Ethnicity

Example 2: Reconsideration of the National Ambient Air Quality Standards for Particulate Matter (PM NAAQS)

Rule Overview: Propose to revise the level of the primary (health-based) annual PM_{2.5} standard from 12.0 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) to a level within the range of 9.0 to 10.0 $\mu\text{g}/\text{m}^3$ and to retain the primary 24-hour PM_{2.5} standard at the level of 35 $\mu\text{g}/\text{m}^3$.

EJ Analysis Responding to Q1, Q2, Q3:

- National and regional average and distributional exposure burden and impacts of pre- and post-policy 2032 scenarios
- National and regional average and distributional mortality burden and impacts of pre- and post-policy 2032 scenarios
- Case study of average impacts only in areas changing due to the rulemaking

Example 2: Reconsideration of the National Ambient Air Quality Standards for Particulate Matter (PM NAAQS)

Q1

Population Groups	Populations (Ages)	Baseline 12/35
Reference	All (0-99)	7.2
Race	White (0-99)	7.1
	American Indian (0-99)	6.7
	Asian (0-99)	7.7
	Black (0-99)	7.4
Ethnicity	Non-Hispanic (0-99)	7.0
	Hispanic (0-99)	7.9
Poverty Status	Above the poverty line (0-99)	7.2
	Below poverty line (0-99)	7.2
Educational Attainment	More educated (HS or more) (25-99)	7.1
	Less educated (no HS) (25-99)	7.3
Age	Children (0-17)	7.2
	Adults (18-64)	7.2
	Older Adults (64-99)	7.0
Sex	Females (0-99)	7.2
	Males (0-99)	7.2

Figure 6-1 Heat Map of National Average Annual PM_{2.5} Concentrations (µg/m³) by Demographic for Current and Alternative PM NAAQS Levels (10/35, 10/30, 9/35, and 8/35) After Application of Controls

Example 2: Reconsideration of the National Ambient Air Quality Standards for Particulate Matter (PM NAAQS)

Population Groups	Populations (Ages)	Q1	Q2			
		Baseline 12/35	10/35	10/30	9/35	8/35
Reference	All (0-99)	7.2	7.1	7.1	7.0	6.9
Race	White (0-99)	7.1	7.0	7.0	7.0	6.8
	American Indian (0-99)	6.7	6.6	6.6	6.6	6.5
	Asian (0-99)	7.7	7.6	7.5	7.4	7.2
	Black (0-99)	7.4	7.4	7.4	7.3	7.1
Ethnicity	Non-Hispanic (0-99)	7.0	6.9	6.9	6.9	6.7
	Hispanic (0-99)	7.9	7.7	7.7	7.6	7.5
Poverty Status	Above the poverty line (0-99)	7.2	7.1	7.1	7.0	6.9
	Below poverty line (0-99)	7.2	7.2	7.2	7.1	7.0
Educational Attainment	More educated (HS or more) (25-99)	7.1	7.1	7.0	7.0	6.8
	Less educated (no HS) (25-99)	7.3	7.3	7.3	7.2	7.0
Age	Children (0-17)	7.2	7.2	7.2	7.1	6.9
	Adults (18-64)	7.2	7.2	7.2	7.1	6.9
	Older Adults (64-99)	7.0	6.9	6.9	6.9	6.7
Sex	Females (0-99)	7.2	7.1	7.1	7.1	6.9
	Males (0-99)	7.2	7.1	7.1	7.0	6.9

Figure 6-1 Heat Map of National Average Annual PM_{2.5} Concentrations (µg/m³) by Demographic for Current and Alternative PM NAAQS Levels (10/35, 10/30, 9/35, and 8/35) After Application of Controls

Example 2: Reconsideration of the National Ambient Air Quality Standards for Particulate Matter (PM NAAQS)

Population Groups	Populations (Ages)	Q1				
		Baseline 12/35	10/35	10/30	9/35	8/35
Reference	All (0-99)	7.2	7.1	7.1	7.0	6.9
Race	White (0-99)	7.1	7.0	7.0	7.0	6.8
	American Indian (0-99)	6.7	6.6	6.6	6.6	6.5
	Asian (0-99)	7.7	7.6	7.5	7.4	7.2
	Black (0-99)	7.4	7.4	7.4	7.3	7.1
Ethnicity	Non-Hispanic (0-99)	7.0	6.9	6.9	6.9	6.7
	Hispanic (0-99)	7.9	7.7	7.7	7.6	7.5
Poverty Status	Above the poverty line (0-99)	7.2	7.1	7.1	7.0	6.9
	Below poverty line (0-99)	7.2	7.2	7.2	7.1	7.0
Educational Attainment	More educated (HS or more) (25-99)	7.1	7.1	7.0	7.0	6.8
	Less educated (no HS) (25-99)	7.3	7.3	7.3	7.2	7.0
Age	Children (0-17)	7.2	7.2	7.2	7.1	6.9
	Adults (18-64)	7.2	7.2	7.2	7.1	6.9
	Older Adults (64-99)	7.0	6.9	6.9	6.9	6.7
Sex	Females (0-99)	7.2	7.1	7.1	7.1	6.9
	Males (0-99)	7.2	7.1	7.1	7.0	6.9

Figure 6-1 Heat Map of National Average Annual PM_{2.5} Concentrations (µg/m³) by Demographic for Current and Alternative PM NAAQS Levels (10/35, 10/30, 9/35, and 8/35) After Application of Controls

Population Groups	Populations (Ages)	Q3			
		Base-10/35	Base-10/30	Base-9/35	Base-8/35
Reference	All (0-99)	0.7	0.8	1.7	3.8
Race	White (0-99)	0.7	0.8	1.6	3.5
	American Indian (0-99)	0.7	0.9	1.5	3.2
	Asian (0-99)	1.5	1.6	3.0	5.5
	Black (0-99)	0.5	0.5	1.7	3.9
Ethnicity	Non-Hispanic (0-99)	0.5	0.6	1.4	3.4
	Hispanic (0-99)	1.5	1.6	2.7	4.8
Poverty Status	Above the poverty line (0-99)	0.7	0.8	1.7	3.7
	Below poverty line (0-99)	0.8	0.9	1.8	3.8
Educational Attainment	More educated (HS or more) (25-99)	0.7	0.8	1.7	3.7
	Less educated (no HS) (25-99)	1.1	1.2	2.2	4.1
Age	Children (0-17)	0.7	0.8	1.8	3.8
	Adults (18-64)	0.8	0.9	1.8	3.8
	Older Adults (64-99)	0.7	0.8	1.6	3.4
Sex	Females (0-99)	0.8	0.8	1.8	3.8
	Males (0-99)	0.7	0.8	1.7	3.7

Figure 6-9 Heat Map of National Percent Reductions in Average Annual PM_{2.5} Concentrations (µg/m³) for Demographic Groups When Moving from Current to Alternative PM NAAQS Levels After Application of Controls

Example 3: New Source Performance Standards for the Synthetic Organic Chemical Manufacturing Industry and National Emission Standards for Hazardous Air Pollutants for the Synthetic Organic Chemical Manufacturing Industry and Group I & II Polymers and Resins Industry (HON)

Rule Overview: Requires a number of hazardous air pollutants (HAP) and volatile organic compounds (VOC) emissions from chemical plants nationwide be monitored and limited, including ethylene oxide, chloroprene, and benzene.

EJ Analysis Responding to Q1, Q2, Q3:

- Demographic proximity analysis
- Baseline and post-control risk analysis, from the source category and facility-wide

Example 3: HON

	FRAME OF REFERENCE	PROXIMITY
Demographic Group	Nationwide Average for Reference	Baseline Proximity Analysis for Pop. Living within 10 km
Total Population	328M	9.3M
Number of Facilities	-	195
Race and Ethnicity by Percent [number of people]		
White	60 percent [197M]	47 percent [4.4M]
African American	12 percent [40M]	25 percent [2.35M]
Native American	0.7 percent [2M]	0.2 percent [20K]
Hispanic or Latino (includes white and nonwhite)	19 percent [62M]	22 percent [2M]
Other and Multiracial	8 percent [27M]	5 percent [493K]

Example 3: HON

	RISK-BASED	
	Cancer Risk >100-in-1 million within 10 km	
Demographic Group	Baseline	Post- Control
Total Population	87K	0
Number of Facilities	8	0
White	54 percent [47K]	- -
African American	15 percent [13K]	- -
Native American	0.2 percent [202]	- -
Hispanic or Latino (includes white and nonwhite)	25 percent [22K]	- -
Other and Multiracial	6 percent [5.5K]	- -

Potential EJ-Related Areas of Research

Populations

- Additional methods of charactering low income/socioeconomic status (SES) populations

Air Quality (AQ) Modeling

- Higher-resolution AQ modeling, when appropriate

PM_{2.5} and Ozone

- Additional epidemiologic studies stratifying PM_{2.5} and ozone-related health impacts (e.g., race/ethnicity, income, and pre-existing disease)

Climate Change

- Higher-resolution benefits of greenhouse gas (GHG) reductions

Thank you

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