Can the concept of community vulnerability contribute to emission reduction strategies?

Amy D Kyle, MPH PhD

Feb 15, 2022

2022 Scoping Plan Update - Public Health Workshop

February 15, 2022

CATEGORIES

Topics Climate Change

Programs Community Health, AB 32 Climate Change Scoping Plan

Type Presentation

CONTACT

Research Division

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The 2022 Scoping Plan Update will assess progress towards achieving the Senate Bill 32 2030 target and lay out a path to achieve carbon neutrality no later than 2045. This Scoping Plan workshop will discuss California Air Resources Board's (CARB) planned qualitative and quantitative health analysis, in collaboration with the California Department of Public Health (CDPH) and the Office of Environmental Health Hazard Assessment (OEHHA). This effort will build upon and broaden the assessment of public health included in previous scoping plans. The focus will be on benefits associated with a dramatic reduction in greenhouse gases compared to the public health impacts from a continued reliance on fossil fuel combustion.

CARB, in collaboration with, CDPH and the OEHHA will also invite speakers to discuss the public health benefits and challenges in meeting the State's energy, climate, and air quality goals. This workshop will inform the 2022 Scoping Plan Update. Stakeholder input and feedback are encouraged.

For more information see, CARB's AB 32 Climate Change Scoping Plan Meetings and Workshops.

Search | California Air Resou | June 2021 Board Meeting Ag | Public Webinar Presentation | These are the world's first wir | AB 32 Climate Change Scopi

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Topics Climate Change
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In 2006, the Legislature passed the California Global Warming Solutions Act of 2006 [Assembly Bill 32 (AB 32)], which created a comprehensive, multi-year program to reduce greenhouse gas emissions in California.

MORE ABOUT THIS PROGRAM >

2022 Scoping Plan Update - Achieving Carbon Neutrality by 2045

The 2022 Scoping Plan Update will assess progress towards achieving the Senate Bill 32 2030 target and lay out a path to achieve carbon neutrality by mid-century.

PUBLIC WORKSHOPS

2017 Scoping Plan Update

Achieving California's 2030 Greenhouse Gas Target

2013 Scoping Plan Update

Building on the Framework

2008 Scoping Plan

A Framework for Change

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-- Prior to June 26, 2008

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Workshops Schedule

Upcoming Scoping Plan workshops will be listed here. See Carbon Neutrality Meetings & Workshops for workshops on carbon neutrality.

Date & Time	Title	Materials
February 15, 2022 9:30 am to 1:00 pm (Pacific Time)	Public Workshop: 2022 Scoping Plan Update – Public Health Workshop	Workshop Notice Agenda Presentations Comment (opens 2/15/22 at 8:00 am) View Comments Register
September 30, 2021	Updated Materials Public Workshop: 2022 Scoping Plan Update - Scenario Inputs Technical Workshop	Revised Scenario Assumptions (posted December 15, 2021)
December 13, 2021 9:00 am to 3:00 pm (Pacific Time)	Public Workshop: 2022 Scoping Plan Update – Building Decarbonization Workshop	Workshop Notice Agenda Presentations Comment (closed 1/21/22 11:59 pm) View Comments Workshop Recording
December 2, 2021 1:00 p.m. to 4:00 p.m. (Pacific Time)	Public Workshop: 2022 Scoping Plan Update – Natural and Working Lands Scenarios Technical Workshop	Workshop Notice Agenda NWL Draft Scenarios

Key points

1. Where are we in health assessment? What else is planned or needs to be done?
2. Social determinants of health and vulnerability as key constructs to contribute to effective strategies
3. Engaging in community contexts matters
4. Health improvements for vulnerable likely more valuable
   - Could be incentivized across the program
5. Maximizing benefits includes maximizing pollution reduction and reducing vulnerability

Where this fits in Scoping Plan health discussion

- Pathways model → UCI project → estimates of health benefits → monetize for cost benefit assessment
  - Pathways model does not optimize; results depend on inputs
  - Inputs do not optimize for health
  - Details not released, are data fit for stated purposes? What about EJ?
- Health assessment secondary but as yet undefined for plan
  - EJ argument that health goals and equity should be central to actions
  - Will outputs of UCI approach be useful? What else is needed?
- Activities in CDPH, OEHHA, Strategic Growth Council
  - Not drivers of central decision making. Role in scoping plan?

Initial Principles for Integrating Climate Mitigation and Racial Equity & EJ

Actions must protect public health and address opportunity gaps

Residents in heavily burdened communities, often people of color, must be first to benefit from climate action

Moving away from combustion of fossil fuels will bring critical air quality and health benefits

Carbon pricing funds must be reinvested to benefit burdened communities

Continue evaluating how to integrate equity with EJ Advisory Committee

Explore discrete actions in the Plan that bring benefits first to heavily burdened communities

Review and integrate actions in Community Emission Reduction Programs

Identify ways to protect low-income households from high energy costs

AB 32 Scoping Plan Process

CALIFORNIA AIR RESOURCES BOARD

JUNE 2021

health and equity

Example Topics For this Scoping Plan

- How can we maximize air-quality and public health benefits for vulnerable communities in the near term and be on the path to long term GHG goals?
- How do we ensure environmental justice, affordability, and equity in implementation of actions?
- What approaches to CN exist that are technologically feasible, cost-effective, and have minimal impacts to households and jobs? How quickly can sectors transition?
- Given potential limits to electrification, how do we best use RNG and renewable hydrogen, and what are the infrastructure needs to further reduce/replace fossil fuels?
- What are the environmental and economic trade-offs of NWL actions and how do these actions intersect with other sectors (i.e. electricity/fuels, land-use, etc)?
- How do we ensure we reduce petroleum demand as we evaluate how to phase out extraction by 2045 per the Governor's directive?

What we know about the health analysis - from Aug 17

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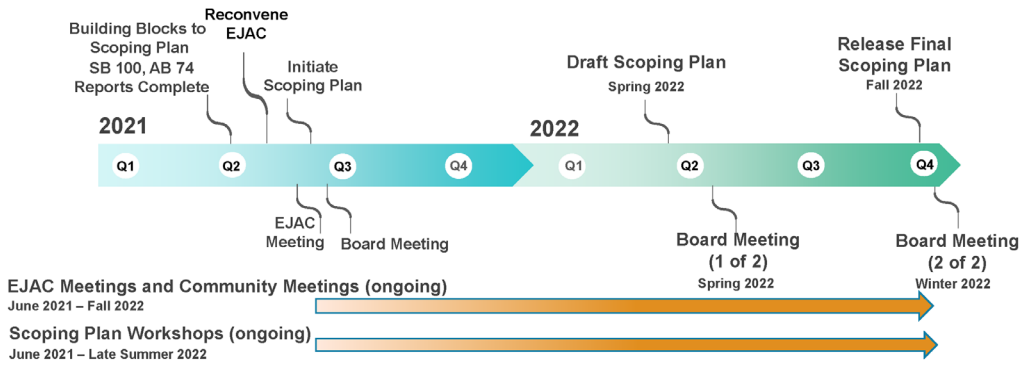
December 2, 2021 1:00 p.m. to 4:00 p.m. (Pacific Time)	Public Workshop: 2022 Scoping Plan Update – Natural and Working Lands Scenarios Technical Workshop	Workshop Notice Agenda NWL Draft Scenarios

September 8, 2021 9:00 a.m. to 1:00 p.m. (Pacific Time)	Public Workshop: 2022 Scoping Plan Update - Short-Lived Climate Pollutants Workshop	Workshop Notice Agenda Presentations View Comments Workshop Recording
August 17, 2021 9:30 a.m. to 1:00 p.m. (Pacific Time)	Public Workshop: 2022 Scoping Plan Update - Scenario Concepts Technical Workshop	Workshop Notice Agenda Presentations View Comments Workshop Recording
August 2, 2021 9:30 a.m. to 3:30 p.m. (Pacific Time)	**Public Workshop: 2022 Scoping Plan Update – Engineered Carbon Removal Technical Workshop** CARB and the California Natural Resources Agency have assembled experts to discuss engineered carbon removal: • Carbon removal potential in California • Carbon removal technologies • Carbon storage and utilization technologies	Workshop Notice Agenda Presentations View Comments Workshop Recording
July 20, 2021 1:00 p.m. to 4:30 p.m.	Public Workshop: 2022 Scoping Plan Update – Natural and Working Lands Technical Workshop	Workshop Notice Presentation View Comments Workshop Recording

2022 Scoping Plan Update – Scenario Concepts Technical Workshop

AUGUST 17, 2021

2022 Scoping Plan Update Schedule



Energy+Environmental Economics

Jessie Knapstein, Managing Consultant

California PATHWAYS: A Tool to Examine Long-Term Greenhouse Gas Reduction Scenarios

California Air Resources Board Scoping Plan

08/17/2021

Scoping Plan 2022

California economy-wide scenarios developed in collaboration with CARB

Energy+Environmental Economics

PATHWAYS model:
California economy-wide energy and greenhouse gas scenarios
(E3 lead & prime contractor for overall team)

This is what the technical inputs were for

Air Quality and Health Impacts

Advanced Power & Energy Program, University of California - Irvine

SMOKE + CMAQ air quality models + **BenMAP model** for health impacts

UCI

Economic Analysis

Rhodium Group

IMPLAN macroeconomic modeling

Social costs

PATHWAYS does:

+ Compare user-defined policy and market adoption scenarios

Included in model:

+ Physical accounting of energy flows within all sectors of the economy
+ Cost accounting, including energy infrastructure and fuel costs
+ GHG accounting

PATHWAYS does not:

+ Optimize for lowest cost solutions

Not included in model:

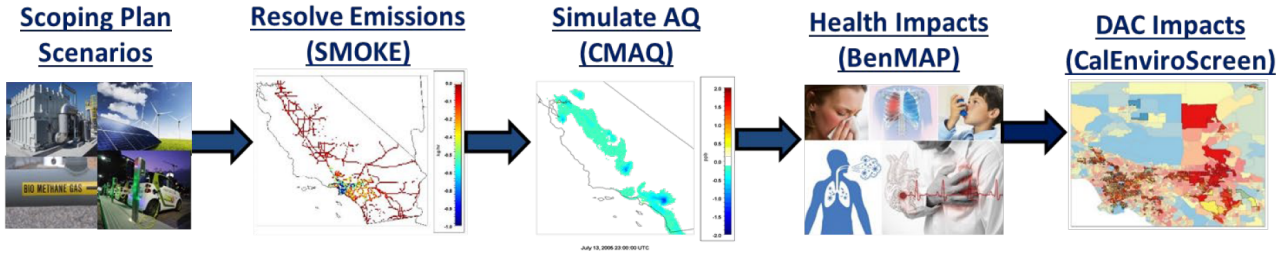
+ Structural/macroeconomic impacts
+ Societal cost impacts (avoided damages)
+ Criteria pollutants
+ Geographic granularity
+ Policy design modeling

Advanced Power & Energy Program
University of California · Irvine

August 17, 2021
Sacramento, CA

Air Quality and Public Health Benefits

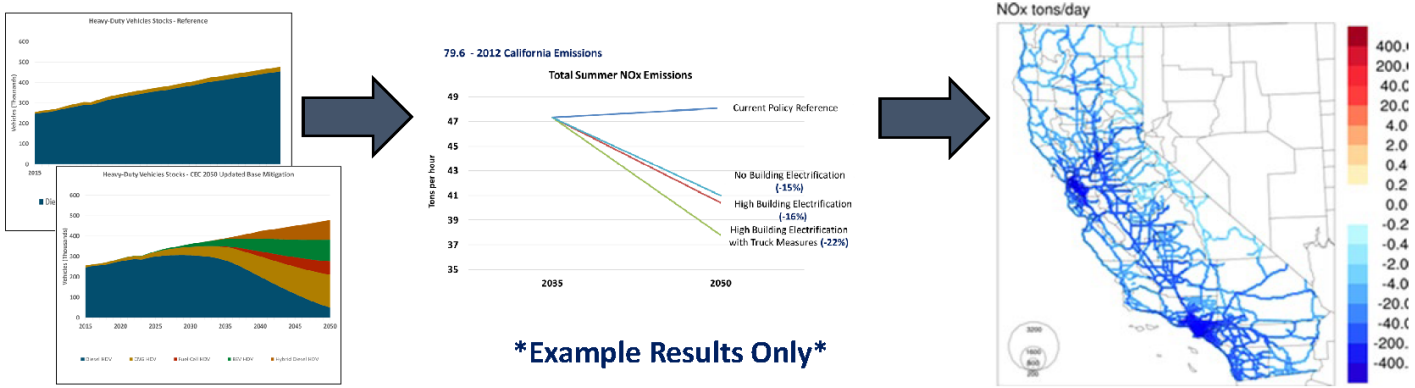
- **Assess the air quality and public health benefits that result from the Scoping Plan Scenario(s) relative to a Reference Scenario**
  - Quantify health savings from improvements in outdoor air pollution
  - Identify scenarios that maximize air quality co-benefits
  - Provide insight into health savings within disadvantaged communities



1. Emissions Modeling

- **Develop an emissions inventory for both the Reference and SP scenario(s) which include all emission sources in California**

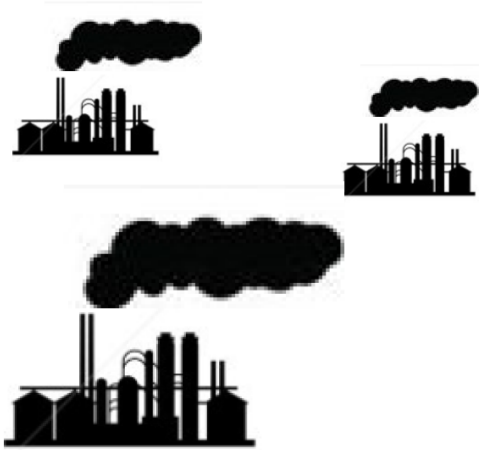
  1. Map changes in end-use sectors from PATHWAYS to CARB emission inventory
     - Utilize energy consumption, fuel, and technology stock data to project total emissions
  2. Spatially and temporally assign emissions to locations of source activity
     - Sparse Matrix Operator Kernel Emissions (SMOKE) model used to input the locations of each emission source (e.g., refineries, roadways, industrial activity, buildings)



1. Emissions Modeling

- **Final emissions will combine information on the location, timing and totals of pollutant emissions with projections from PATHWAYS**
  - CARB emission inventory has highly detailed information for emission sources
  - PATHWAYS output is at the state level and will be used to estimate the future emissions

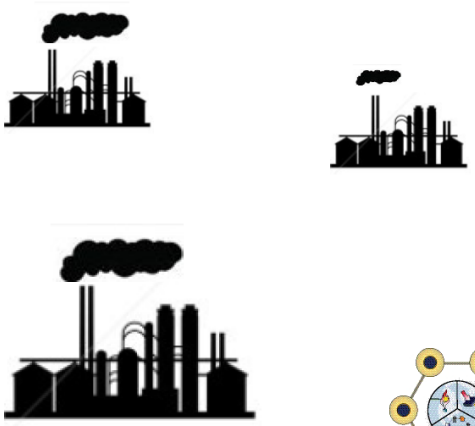
CARB inventory provides the location and current emissions for all refineries



PATHWAYS provides change in refinery energy consumption to a future year at the state level

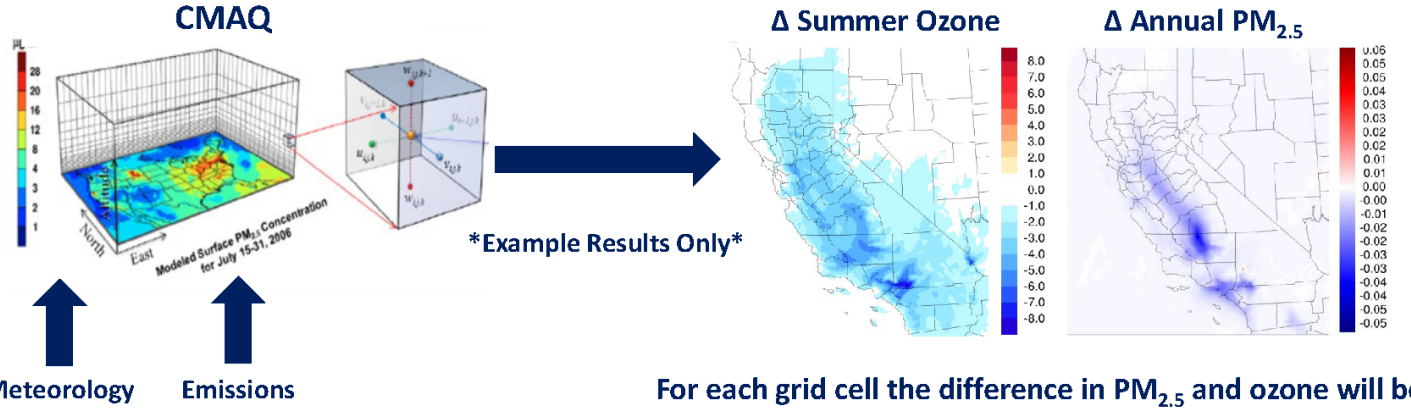
E.g., 80% reduction in refinery emissions statewide

Future year emissions for refineries



2. Air Quality Modeling

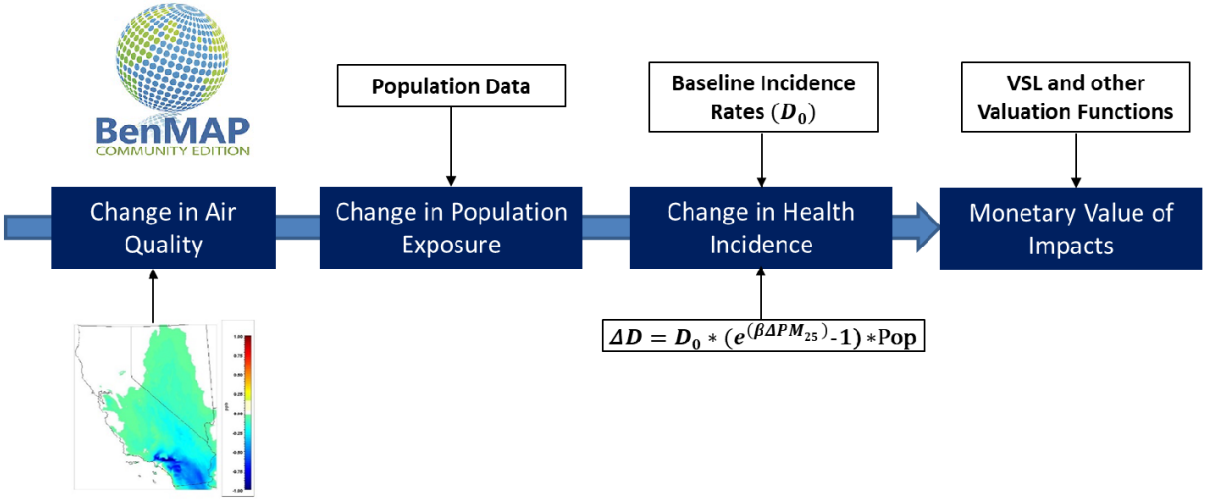
- **An advanced air quality model (CMAQ) will be used to translate changes in emissions into changes in air pollutant concentrations**
  - Wide-spread use for regulatory and research purposes
  - Simulate atmospheric chemistry and transport at 4 km x 4 km (2.5 mile) resolution
    - Allows for a comprehensive understanding of how air quality changes due to the emission reductions in the SP scenario by including both primary and secondary pollutants



For each grid cell the difference in $PM_{2.5}$ and ozone will be calculated and used as input into the health impact assessment

3. Health Impact Assessment

- **Environmental Benefits Mapping and Analysis Program (BenMAP) will be used to translate pollutant changes from CMAQ into health impacts**
  - BenMAP estimates the avoided incidences of health effects from reduced exposure to $PM_{2.5}$ and ozone that occur in California populations from the improved air quality in the SP scenario

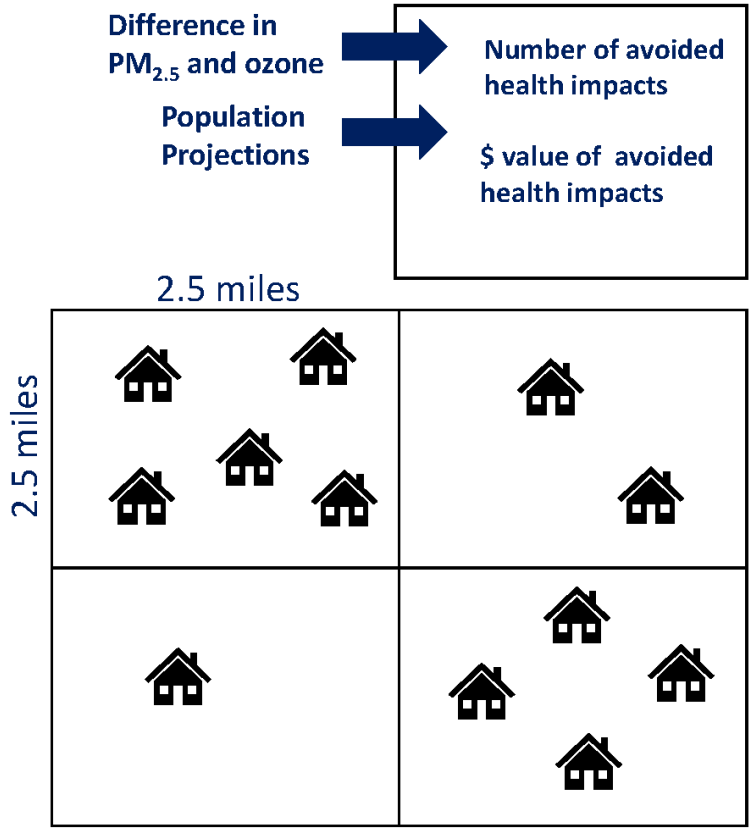


3. Health Impact Assessment

- Health savings are calculated with the same resolution as the air quality and can be reasonably downscaled to the census tract level

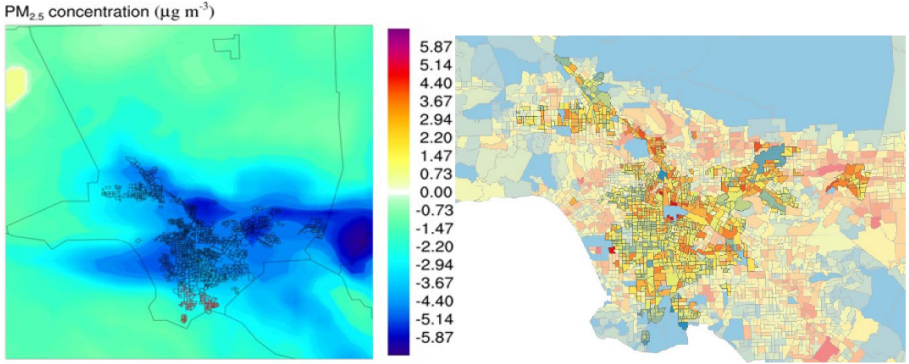
- Does not allow for individual source impacts to be resolved

- Does not allow for community level impacts to be resolved



3. Disadvantaged Community (DAC) Impacts

- **Quantify and assess health benefits in DAC to provide insight into environmental justice implications of the SP scenario**
  - Identification of highly impacted or prioritized DAC using CalEnviroScreen
  - Ratio of public health benefits within DAC
  - Consider other economic metrics, e.g., Lorenz curves

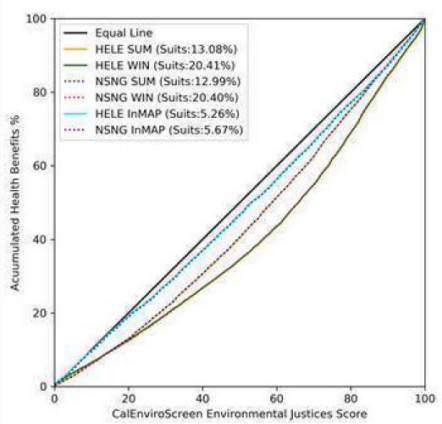


Avoided Incidence of Mortality from $PM_{2.5}$ Exposure

Total CA: 2651

POLA DAC: 587

Brown, Austin L., et al. "Driving California's Transportation Emissions to Zero." (2021).



Distribution of health benefits across DAC

Rhodium Group

Economic Analysis and the Social Cost of Carbon

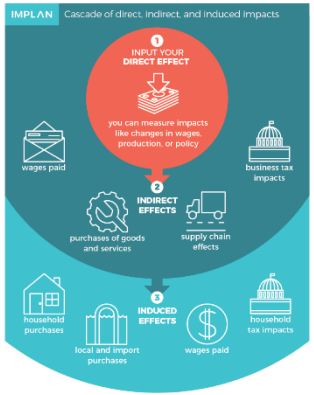
California's 2022 Climate Change Scoping Plan

AUGUST 17, 2022 | SACRAMENTO, CA

Section 1

Job and Economic Analysis

IMPLAN estimates the economic impact to changes in an economy



Source: IMPLAN

Inputs

Costs and savings from PATHWAYS representing changes in spending by businesses and households

Monetized health impact data to estimate the change in health expenditures that result from changes in air pollution

Outputs

Changes in spending and employment across the California economy, California businesses, households

Section 2

The Social Cost of Carbon

Climate Impact Lab and the social cost of carbon

Climate Impact Lab | The University of Chicago | Berkeley | Rutgers | Rhodium Group

- The Climate Impact Lab combines historical economic and climate data and uses big data analytical tools to find ways of how a changing climate impacts society
- The Lab is estimating the relationship between a changing climate and human well-being using the most comprehensive climate and economic data sets ever compiled
- The Lab is monetizing and aggregating impacts to produce the world's first evidence-based estimate of the social cost of carbon – the cost to society and the economy from each ton of carbon dioxide emitted

Quantifying global benefits using the updated social cost of carbon

- Rhodium will quantify the global benefits of the GHG reductions using the Climate Impact Lab's updated social cost of carbon estimates
- The Lab's update will bring the social cost of carbon up to date with the frontier of science & economics
- The Lab's forthcoming social cost of carbon update is following the Biden administration's Executive Order on updating the SCC and recommendations from the National Academies
- Updates include adequately accounting for climate risk, environmental justice, and intergenerational equity

AB 197 for Reference

Each scoping plan update developed pursuant to Section 38561 shall identify for each emissions reduction measure, including each alternative compliance mechanism, market-based compliance mechanism, and potential monetary and nonmonetary incentive the following information:

(a) The range of projected greenhouse gas emissions reductions that result from the measure.

(b) The range of projected air pollution reductions that result from the measure.

(c) The cost-effectiveness, including avoided social costs, of the measure.

…"social costs" means an estimate of the economic damages, including, but not limited to, changes in net agricultural productivity; impacts to public health; climate adaptation impacts, such as property damages from increased flood risk; and changes in energy system costs, per metric ton of greenhouse gas emission per year.

AB 197 for Reference

In adopting measures to help achieve statewide GHG targets and protect the most impacted communities, CARB shall:

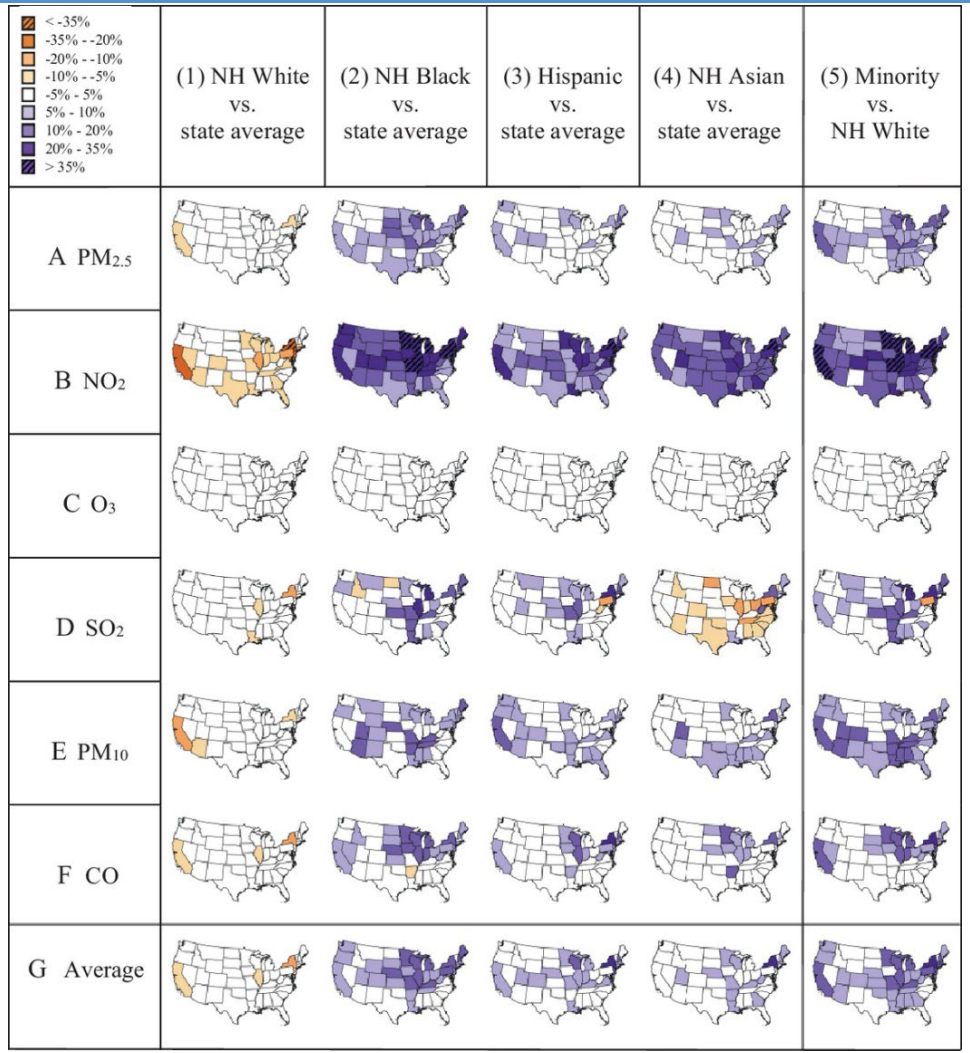
- Consider social costs of GHG emissions
- Prioritize measures that result in direct emission reductions in both stationary and mobile sources
- Also, follow requirements in AB 32:
  - Consider cost-effectiveness, minimize costs and maximize total benefits to California
  - Do not disproportionately impact low-income communities
  - Do not interfere with efforts to achieve air quality standards and reduce toxic air emissions
  - Consider overall societal benefits
  - Minimize leakage
  - Consider significance of contribution of source/category to statewide GHGs

Questions about approach – when to discuss?

- How complete are the results?
  - What pollutants? Diesel, NOx, non diesel toxics?
- Are the data sources fit for purpose?
  - Emissions inventory has known deficiencies
- How statewide Pathways result become local results?
- How are health benefits quantified?
- How well can health benefits be monetized;
- Does this account for equity and vulnerability for action?

Part 2: Can construct of vulnerability help to develop strategies for emission reductions Key concepts

- Disparities in air pollution or environmental factors
- Health disparities
- Vulnerability
- Social determinants of health and Upstream actions
- Health equity and Equity

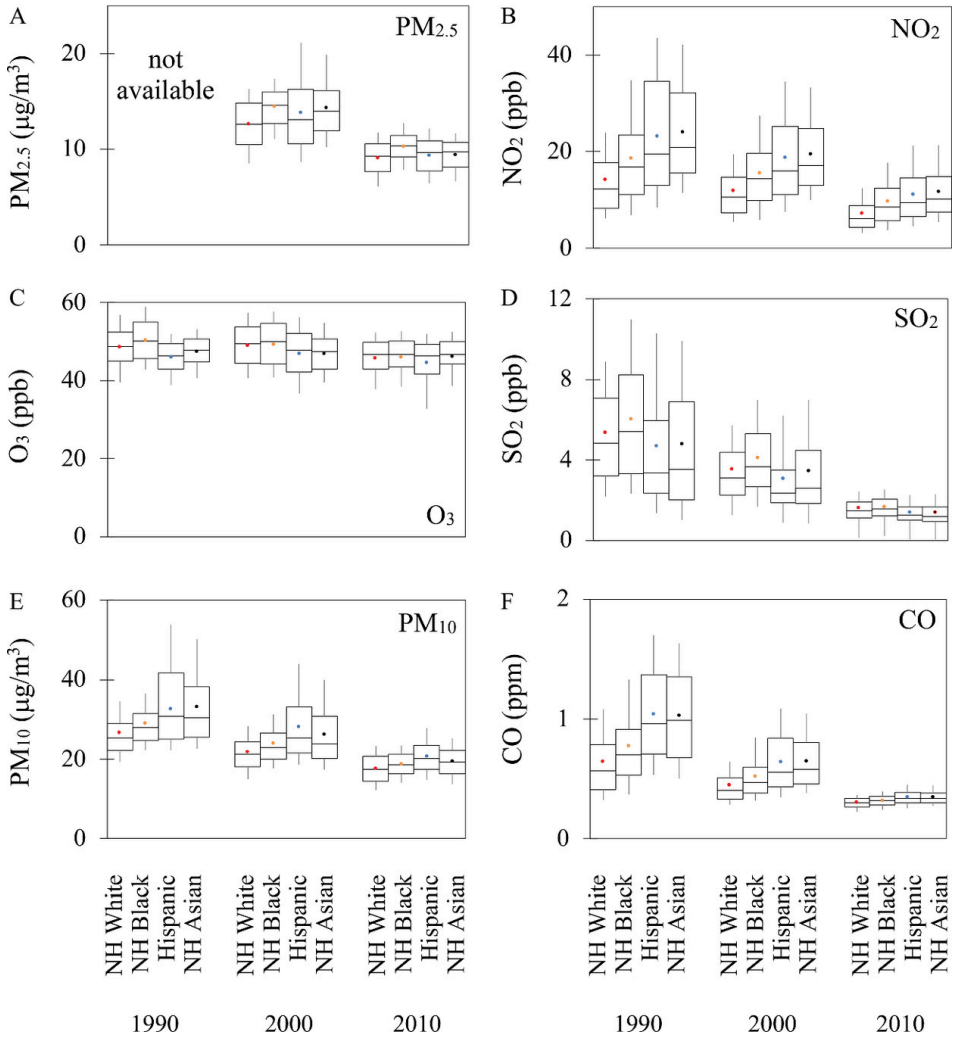


Disparities in air pollution: What's left to say?

Six columns list map legend binned into ranges, including

< 35 %,
- 35 to - 20 %,
- 20 to - 10 %,
- 10 to - 5 %,
- 5 to 5 %,
10 to 20 %,
20 to 35 %,
> 35 percent;

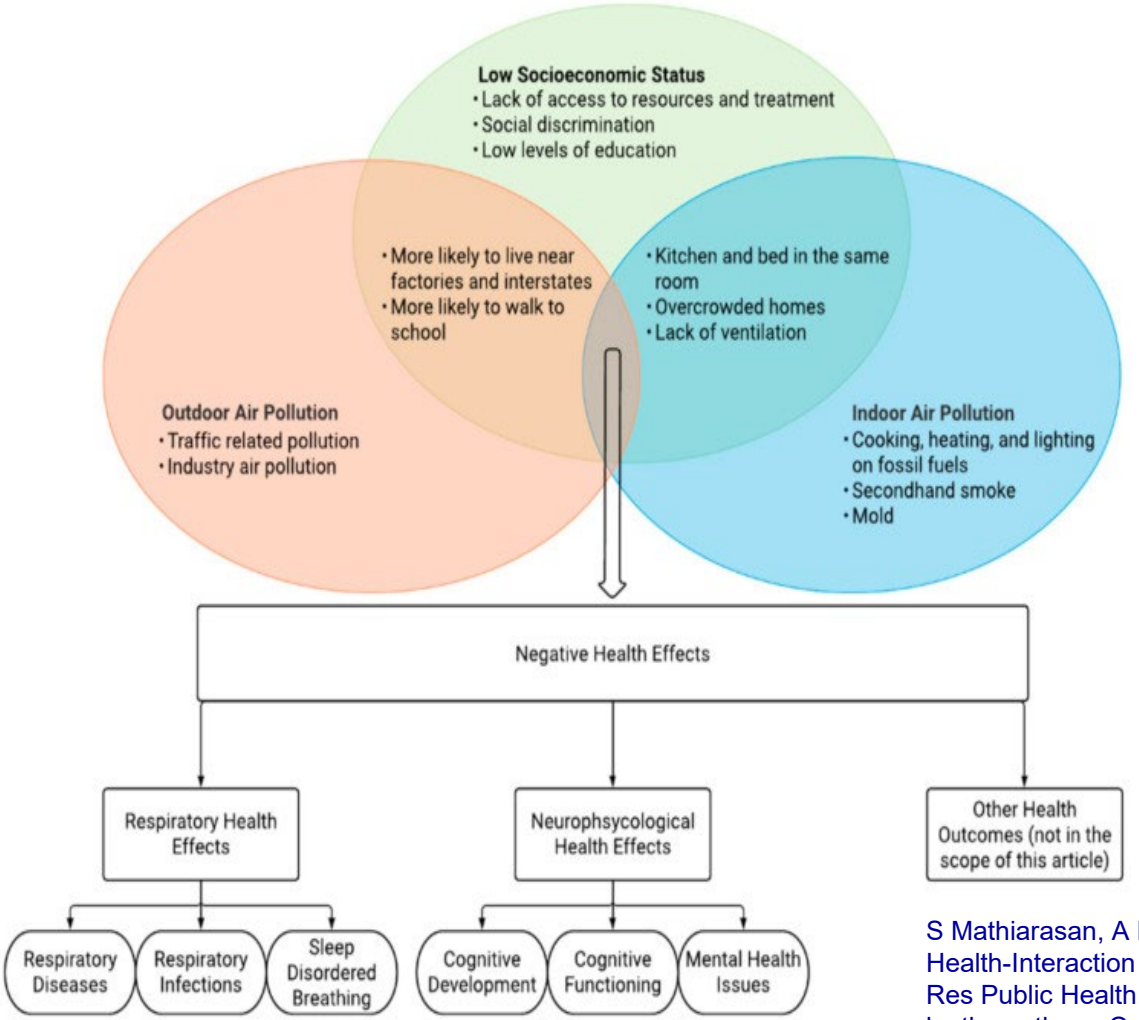
non-Hispanic White versus state average;
non-Hispanic Black versus state average;
Hispanic versus state average;
non-Hispanic Asian versus state average;
Minority versus non-Hispanic White.



Disparities in air pollution: What's left to say?

Distribution of exposure to pollutants in years 1990, 2000, and 2010, stratified by racial/ethnic group, For all panels, the highest/lowest bound represents the 90th/10th percentile value, the box shows the 25th and 75th percentiles, and the horizontal line in the box represents the median. Color circles indicate the national population-weighted mean.

J Liu, LP Clark, MJ Bechle, A Hajat, Sun-Young Kim, Lianne Sheppard, AA Szpiro, Julian D. Marshal. Disparities in Air Pollution Exposure in the United States by Race/Ethnicity and Income, 1990–2010. 2021. Environmental Health Perspectives. 129 (12). December 2021. DOI https://doi.org/10.1289/EHP8584). Open Access Journal.



Environmental injustice

The detrimental intersection of outdoor and indoor air pollution with socioeconomic status and its consequences for children's health.

S Mathiarasan, A Hüls. 2021. Impact of Environmental Injustice on Children's Health-Interaction between Air Pollution and Socioeconomic Status. Int J Environ Res Public Health. 2021 Jan 19;18(2):795. doi: 10.3390/ijerph18020795.

Individual v Community Vulnerability

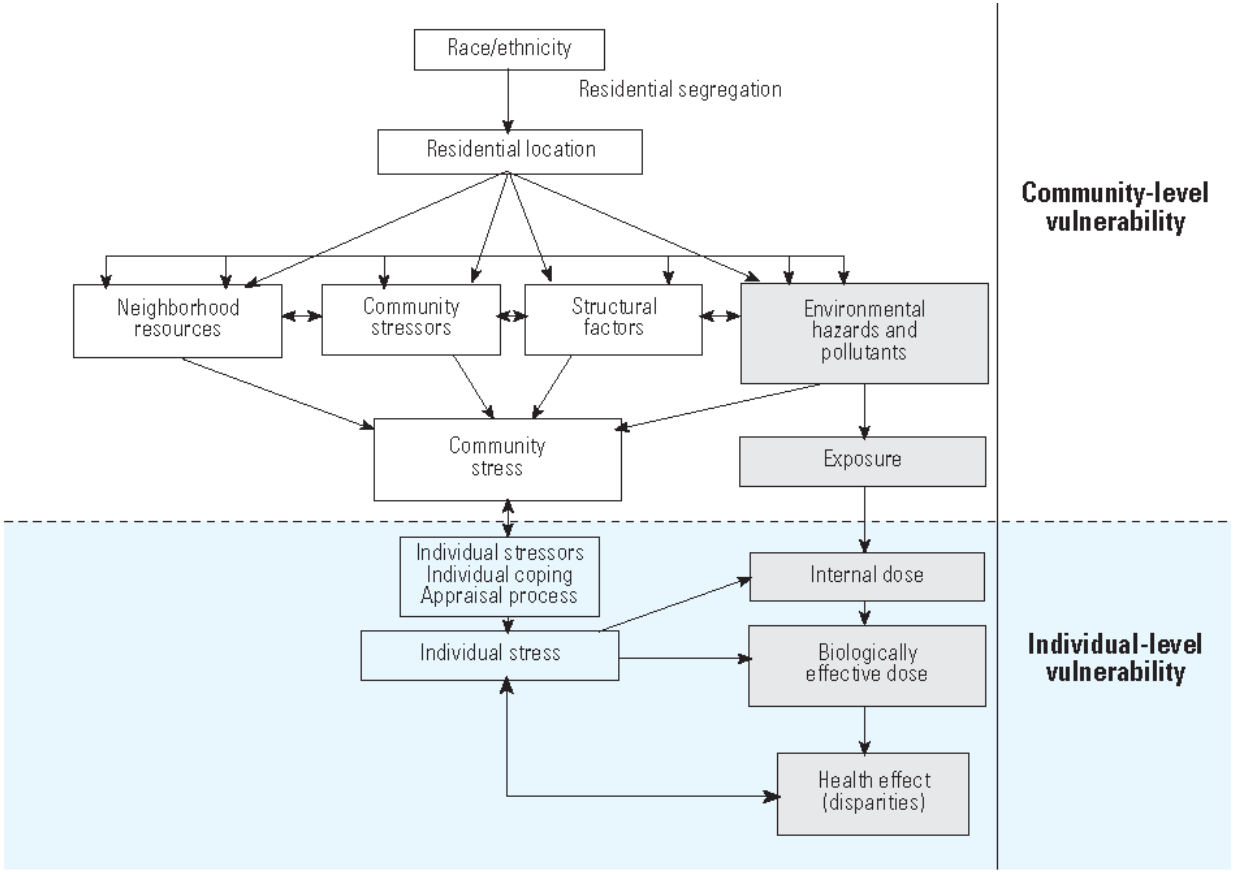
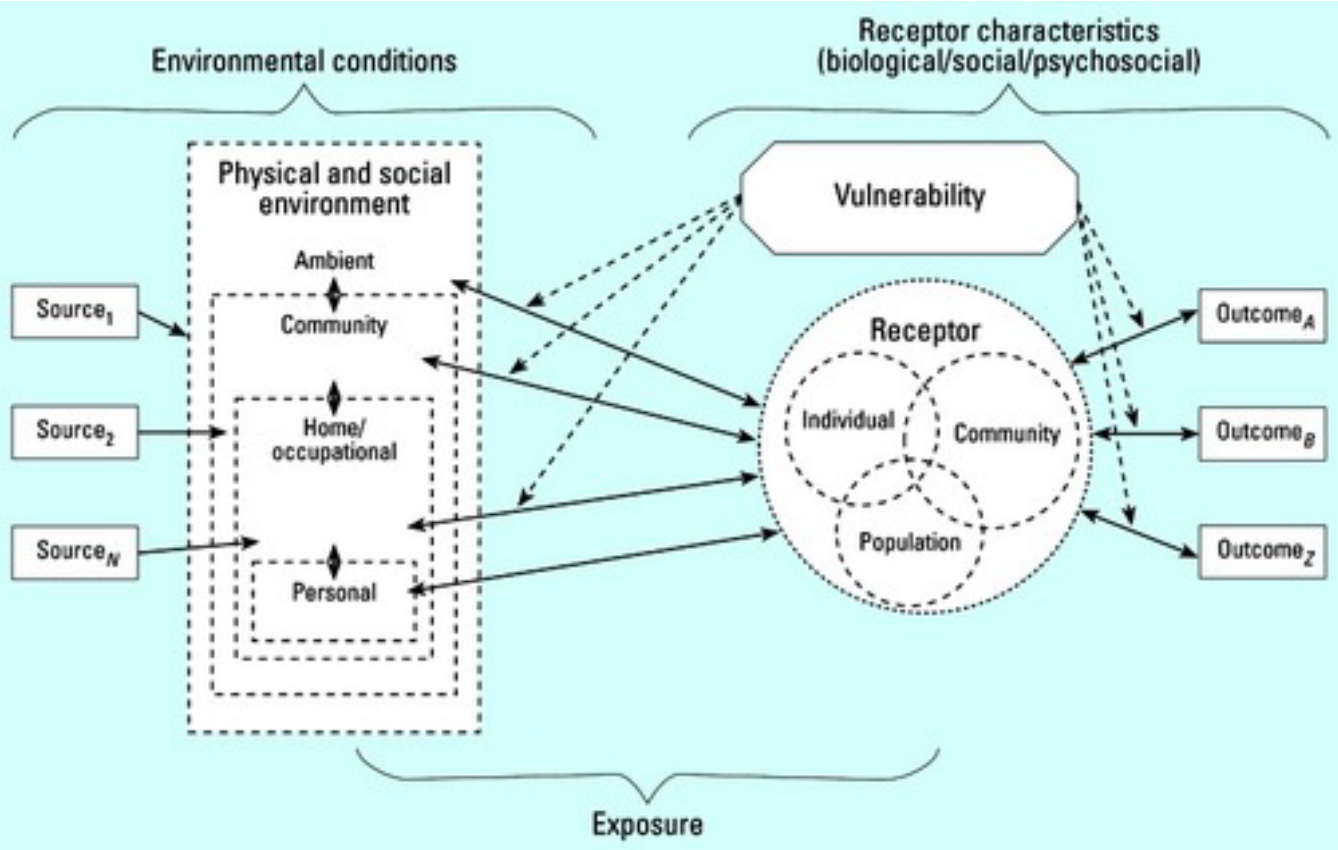


Figure 1. Exposure–disease–stress model for environmental health disparities.

Gilbert C. Gee1 and Devon C. Payne-Sturges. Environmental Health Disparities: A Framework Integrating Psychosocial and Environmental Concepts. 2004. Environmental Health Perspectives. Vol 112(17). Open access journal.

Vulnerability

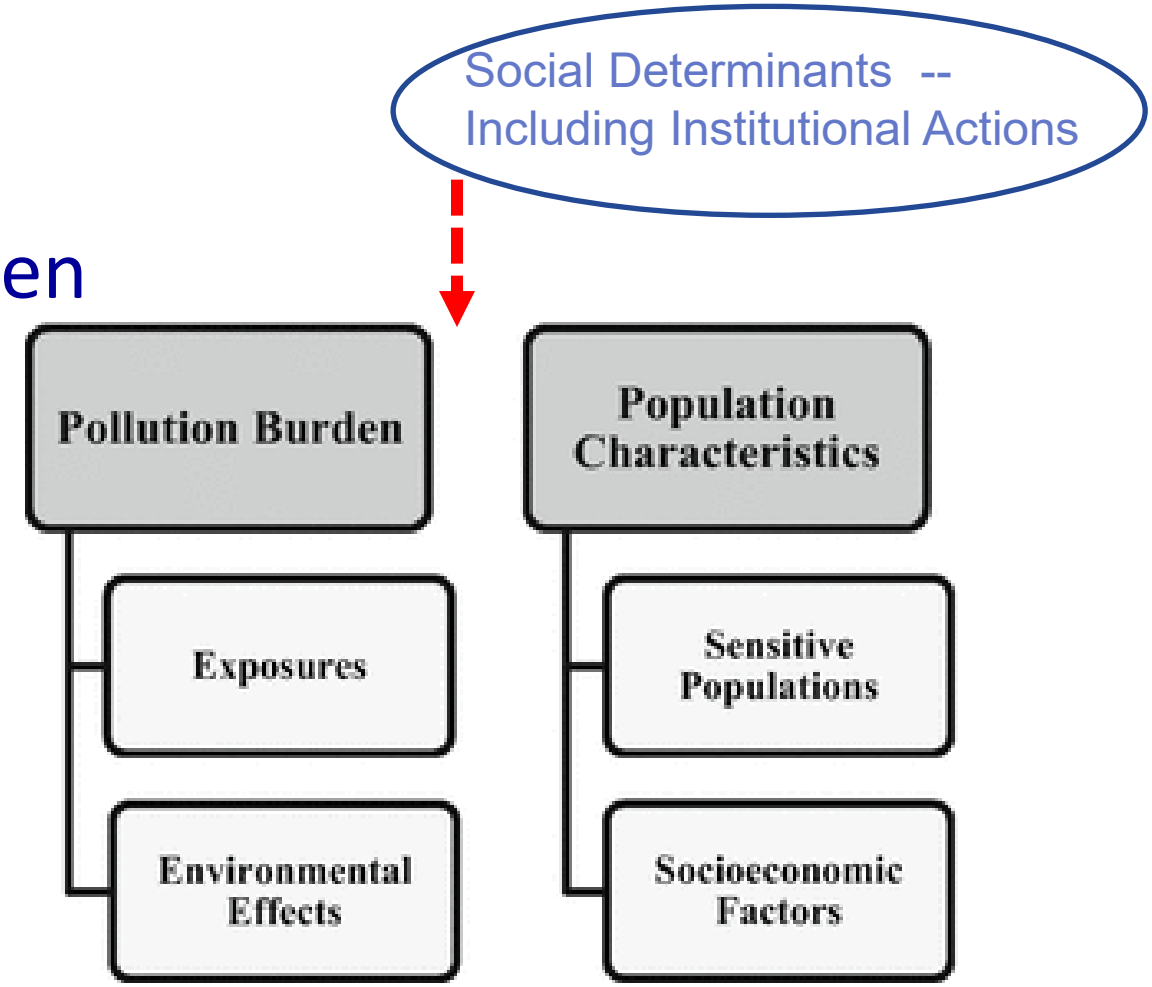
- Here in traditional risk assessment: something missing
- Does not add social determinants

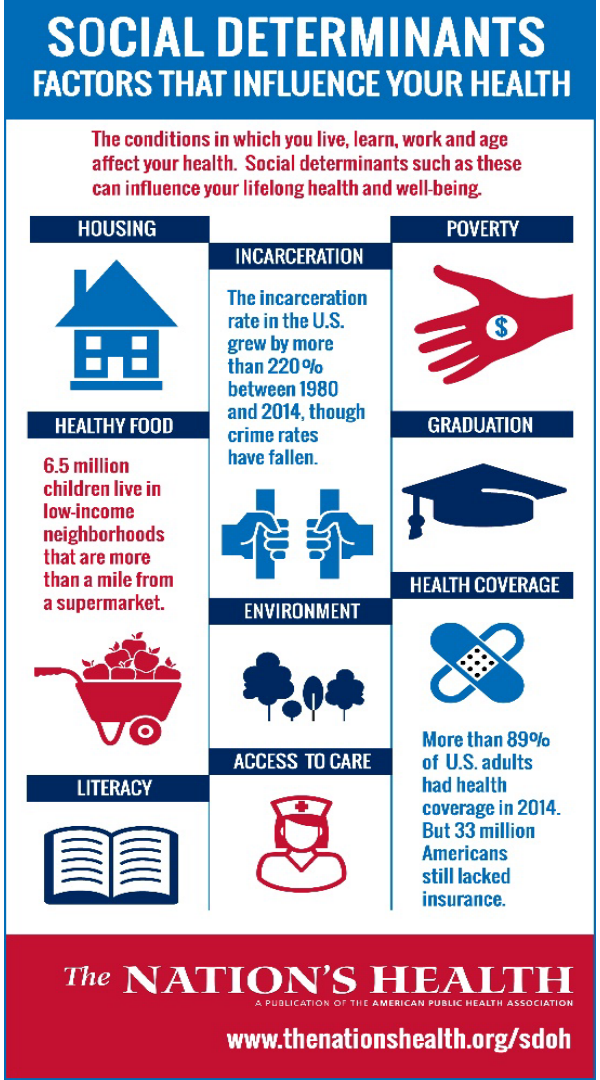


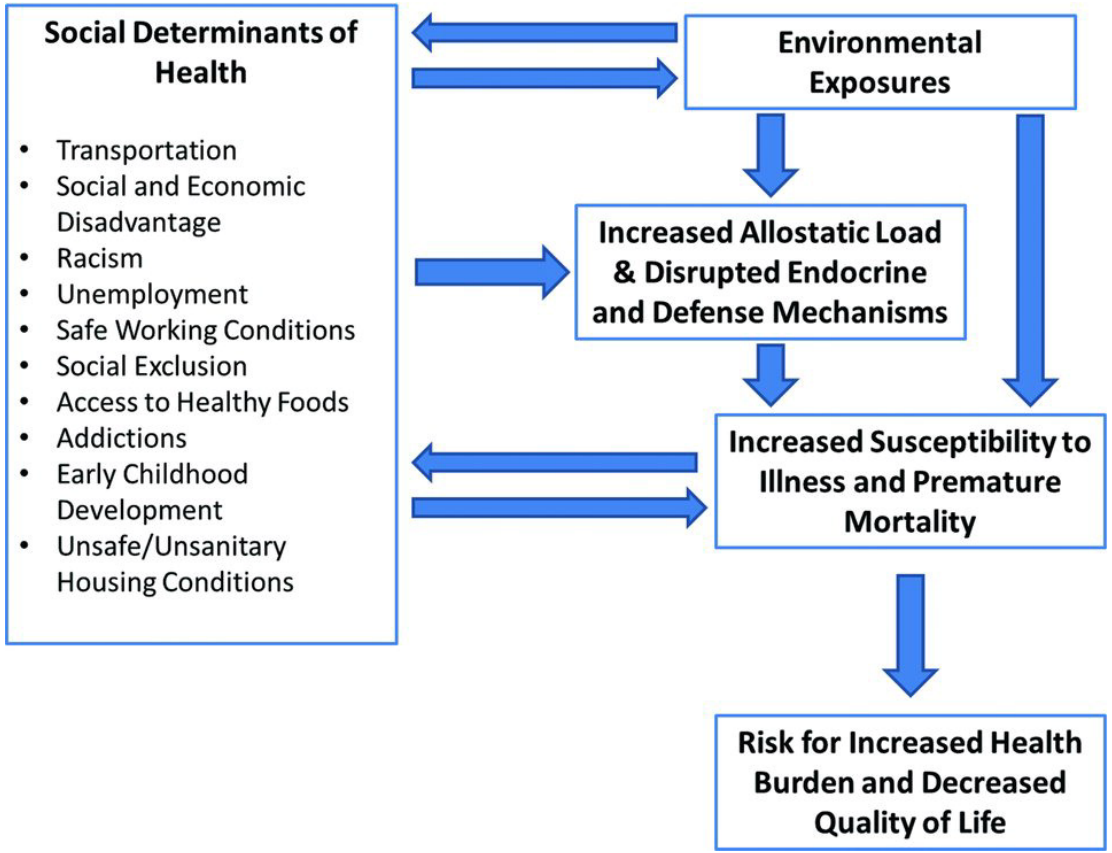
Conceptual model for considering vulnerability in cumulative risk assessment. The risk paradigm is depicted in a left-to-right flow with sources of stress on the left, exposure pathways to receptors in the center, and outcomes on the right. The receptors—individuals and groups—are shown as circles.

PL DeFur, GW Evans, EA Cohen Hubal, AD Kyle, RA Morello-Frosch, DR Williams. *Vulnerability as a function of individual and group resources in cumulative risk assessment.* 2007. **Environmental Health Perspectives**. 115(5):817-24. doi: 10.1289/ehp.9332.

Conceptual model for CalEnviroScreen

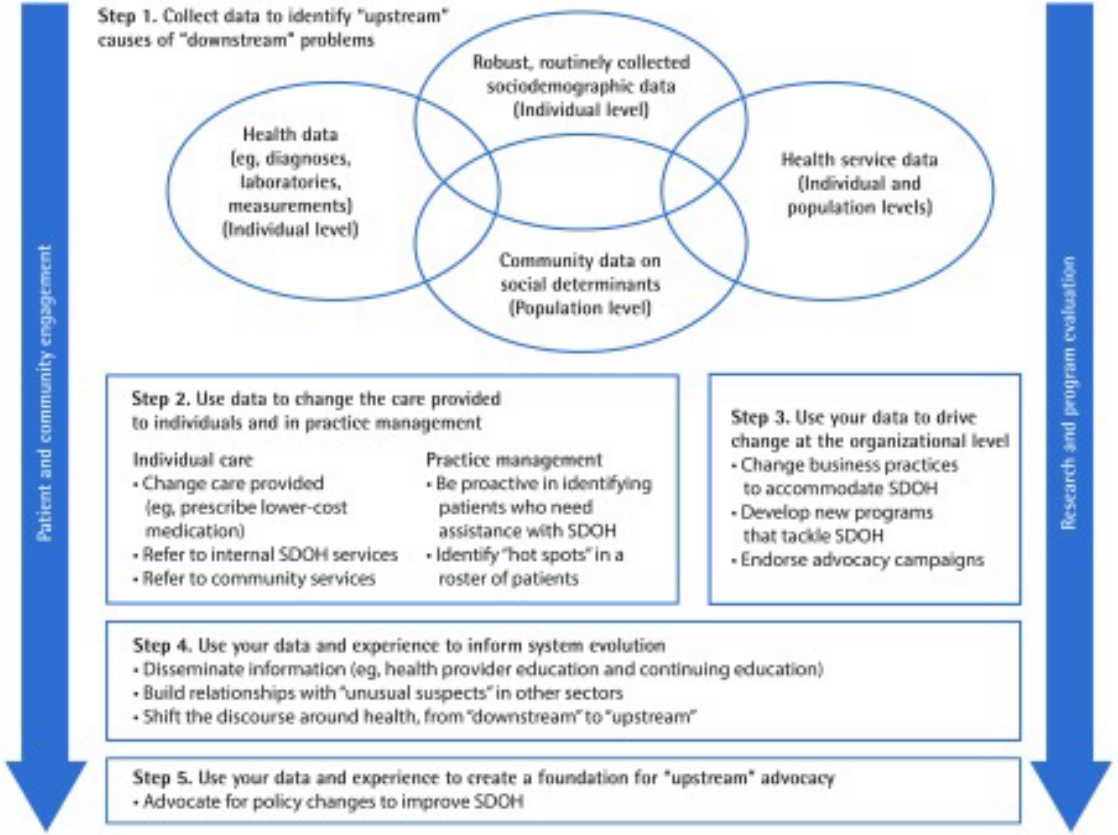



SOCIAL DETERMINANTS
FACTORS THAT INFLUENCE YOUR HEALTH
The conditions in which you live, learn, work and age affect your health. Social determinants such as these can influence your lifelong health and well-being.
HOUSING
POVERTY
INCARCERATION
The incarceration rate in the U.S. grew by more than 220% between 1980 and 2014, though crime rates have fallen.
HEALTHY FOOD
6.5 million children live in low-income neighborhoods that are more than a mile from a supermarket.
GRADUATION
HEALTH COVERAGE
ENVIRONMENT
ACCESS TO CARE
LITERACY
More than 89% of U.S. adults had health coverage in 2014. But 33 million Americans still lacked insurance.
The NATION'S HEALTH
A PUBLICATION OF THE AMERICAN PUBLIC HEALTH ASSOCIATION
www.thenationshealth.org/sdoh


Social Determinants of Health
Transportation
Social and Economic Disadvantage
Racism
Unemployment
Safe Working Conditions
Social Exclusion
Access to Healthy Foods
Addictions
Early Childhood Development
Unsafe/Unsanitary Housing Conditions
Environmental Exposures
Increased Allostatic Load & Disrupted Endocrine and Defense Mechanisms
Increased Susceptibility to Illness and Premature Mortality
Risk for Increased Health Burden and Decreased Quality of Life

Process model to address more “upstream” issues in health care

Figure 1. Framework for SDOH interventions in primary care, from "downstream" data to "upstream" advocacy



SDOH—social determinants of health.

Can Fam Physician. 2017 Nov; 63(11): e476–e482.

Community Contexts

Box 2 | Principles of Authentic Community Engagement

Based on CDC principles and public health accreditation, these are principles - not requirements or a checklist.

FOSTER TRUST

- Immerse yourself in the community.
- Listen deeply.
- Recognize different kinds of groups.
- Understand the historical context of previous attempts of engagement.
- Notice assets.
- See different experiences.

SUPPORT COMMUNITY-LED SOLUTIONS

- Work with communities.
- Agree on the process.
- Understand each partner's individual and community interest.
- Allocate resources.
- Balance power.
- Share power.
- Create positive experiences of contribution.
- Recognize the contributions of the community.

RECOGNIZE THAT IMPROVEMENT REQUIRES SOCIAL CHANGE

- Leave the community stronger.
- Stay in it for the long term.
- Address racism.
- Remember that self-determination is a right.
- Expect tension.
- Address challenges.
- Welcome new accountabilities and opportunities to transform practice.
- Strengthen relationships among participating groups to build power for change.

SOURCE: Adapted from Minnesota Department of Health. 2018. Principles of Authentic Community Engagement. Available at: https://www.health.state.mn.us/communities/practice/resources/phqitoolbox/docs/AuthenticPrinciplesCommEng.pdf (accessed March 20, 2021).

Equity analysis needed

- This is a slide from a presentation on the 2017 scoping plan process

At Climate Talks, a Struggle Over Aid for Poorer Nations

By JOHN M. BRODER

DOHA, Qatar — The United Nations climate conference here has settled into its typical doldrums, with most major questions unresolved as a Friday evening deadline for concluding the talks approaches. One of the thorniest issues is money, which has often bedeviled these affairs.

Since the process for the United Nations Framework Convention on Climate Change began about 20 years ago, countries have been split into two often-warring camps: the small number of wealthy nations that provide money to help deal with the effects of global warming, and the much larger group of poorer states that receive it.

At a climate summit meeting in Copenhagen three years ago, the industrialized countries promised to provide $10 billion a year in funds for adapting to climate change over the following three years and $100 billion a year beginning in 2020. The short-term money has more or less been raised and spent, although some nations have quarreled over whether it was new money or simply repurposed foreign aid. A Green Climate Fund has been established to handle the money after 2020.

EUROPEAN PRESSPHOTO AGENCY

Izabella Teixeira, Brazil's environment minister, at the United Nations climate meeting in Qatar.

Pete Betts, the principal climate negotiator for the European Union, said that Europe would continue to provide climate roughly $10 billion a year in short-term money would be replaced by a gradual increase until 2020. He said he was sympathetic veloping world. Addressing the conference on Wednesday, he said that different countries had different abilities to cope with a

The New York Times

National Edition
Northern California: Sun and clouds. Highs from the 40s northeast and mountains to the 60s across the Central Valley. Clear tonight. Weather map is on Page 25.

2013 The New York Times | SUNDAY, NOVEMBER 17, 2013 | Printed in California | $6.00

JANEK SKARZYNSKI/AGENCE FRANCE-PRESSE — GETTY IMAGES

Top, evacuating after a storm hit the Puntland region of Somalia. Above, participants at a United Nations climate conference in Warsaw paying tribute to typhoon victims in the Philippines.

GROWING CLAMOR ABOUT INEQUITIES OF CLIMATE CRISIS

RESTITUTION DEMANDED

Typhoon Highlights Rift as Poor Nations Fault Rich for Damage

By STEVEN LEE MYERS and NICHOLAS KULISH

WARSAW — Following a devastating typhoon that killed thousands in the Philippines, a routine international climate change conference here turned into an emotional forum, with developing countries demanding compensation from the worst polluting countries for damage they say they are already suffering.

Calling the climate crisis "madness," the Philippines representative vowed to fast for the duration of the talks. Malia Talakai, a negotiator for the Alliance of Small Island States, a group that includes her tiny South Pacific homeland, Nauru, said that without urgent action to stem rising sea levels, "some of our members won't be around."

From the time a scientific consensus emerged that human activity was changing the climate, it has been understood that the nations that contributed least to the problem would be hurt the most. Now, even as the possible consequences of climate change have surged — from the typhoons that have raked the Philippines and India this year to the droughts in Africa, to rising sea levels that threaten to submerge entire island nations — no consensus has emerged over how to rectify what many call "climate injustice."

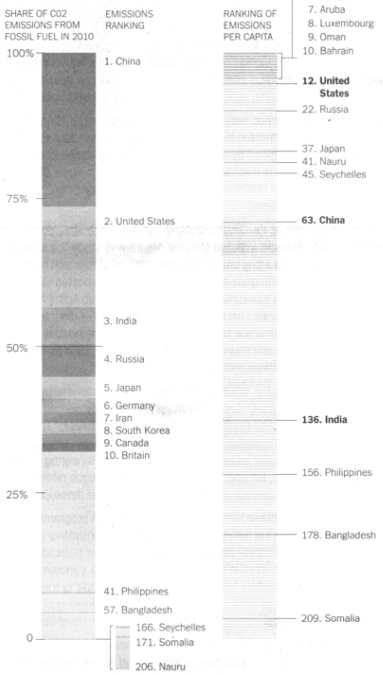
Growing demands to address the issue have become an emotionally charged flash point at negotiations here at the 19th conference of the United Nations Framework Convention on Climate Change, which continues this week.

"We are in a place of land

Continued on Page 12

Share of Emissions

The level of carbon dioxide, the most important heat-trapping gas in the atmosphere, continues to rise globally. The debate over how to address the effects intensified at a United Nations meeting that began last week, with some countries claiming the need for compensation. But determining each country's responsibility is a complicated task.



* The Netherland Antilles was dissolved in 2010 and absorbed into the administrative structure of the Netherlands.

Source: Carbon Dioxide Information Analysis Center

THE NEW YORK TIMES

remained little more than an organizing principle since its creation in 2010, its fund-raising goals unmet.

Others have suggested a sort of insurance program.

The United States and other rich countries have made their opposition to large-scale compensation clear. Todd D. Stern, the State Department's envoy on climate issues, bluntly told a gathering at Chatham House in London last month that large-scale resources from the world's richest nations would not be forthcoming.

"The fiscal reality of the United States and other developed countries is not going to allow it," he said. "This is not just a matter of the recent financial crisis. It is structural, based on the huge obligations we face from aging populations and other pressing needs for infrastructure, education, health care and the like. We must and will strive to keep increasing our climate finance, but it is important that all of us see the world as it is."

Appeals to rectify the injustice of climate change, he added, will backfire. "Lectures about compensation, reparations and the like will produce nothing but antipathy among developed country policy makers and their publics," he said.

Juan Pablo Hoffmaister Patiño, a Bolivian who represents the alliance of developing nations known as the Group of 77 and China, said the issue was not so much about assigning culpability for the looming climate disaster as doing something to help those nations hardest hit.

"Trying to assign the blame is something that even scientifically could take us a very long time, and the challenges and problems are actually happening now," he said in an interview here. "And we need to begin addressing them now rather than identifying who is guilty and to what degree. We can't make this issue hostage to finding the responsible ones or not."

Meanwhile, global emissions continue to rise. A report this month by the United Nations Environment Program warned that immediate action must be taken to reduce emissions enough to limit the rise in average global temperatures to 2 degrees Celsius, or 3.6 degrees Fahrenheit, above preindustrial levels. That is the maximum warming that many scientists believe can occur without causing potentially catastrophic climate change.

The current global turbulence, consistent with what scientists expect to happen as the climate changes, is already taking a toll.

As the hundreds of diplomats and advocates assembled for talks here, Justus Lavi was waiting for rain in Kenya. The wheat, beans and potatoes he planted on his farm in Makueni County sprouted, but the rainy season brought only two days of showers, threatening to ruin his yield.

In northern Somalia, Nimcaan Farah Abdi's 10 acres of corn, tomatoes and other vegetables were ruined as violent storms swept the Horn of Africa. A typhoon last weekend in nearby Puntland killed more than 100 people, a disaster overshadowed by the far more destructive one in the Philippines.

"My farm has been washed away," Mr. Abdi said. It was the second year in a row of unusually heavy storms to have destroyed his livelihood, leaving him uncertain about how he will provide for his six children. "God knows," he added, "but I don't have anything to give now."

Discussion points

- What will get from the top down analyses already commissioned and what else do we need?
- Focusing on vulnerable communities, can we agree that reductions in burdens have greater relative value and incentivize this across the schema?
- Can we consider a way to integrate all of the separate bits now in play into a learning/action model?
- Can we address the role that institutional actions play in creating vulnerability?

AB 32 CA Climate Change Solutions Act 2006

- (f) It is the intent of the Legislature that the State Air Resources Board coordinate with state agencies, as well as **consult with the environmental justice community**, industry sectors, business groups, academic institutions, environmental organizations, and other stakeholders in implementing this division.
- (h) It is the intent of the Legislature that the State Air Resources Board design emissions reduction measures to meet the statewide emissions limits for greenhouse gases established pursuant to this division in a manner that minimizes costs and maximizes benefits for California's economy, improves and modernizes California's energy infrastructure and maintains electric system reliability, **maximizes additional environmental and economic co-benefits for California**, and complements the state's efforts to improve air quality.
- 38561 (d) (d) The state board shall evaluate the total potential costs and total potential economic and noneconomic benefits of the plan for reducing greenhouse gases to California's economy, environment, and public health, using the best available economic models, emission estimation techniques, and other scientific methods.


Thank you.

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