Methods and Data for Cumulative Assessment in Disproportionately-Impacted Communities

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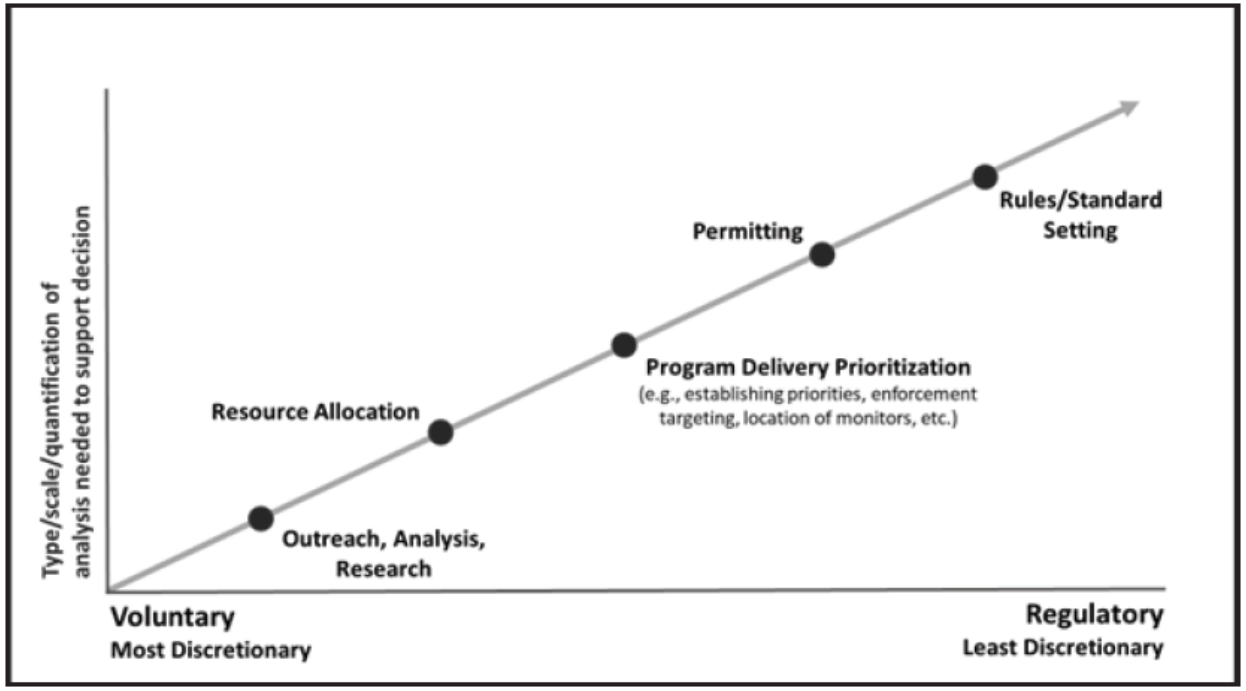
Range of needs and assessments

- Assessment of cumulative impacts or risks can be useful for different types of decisions.

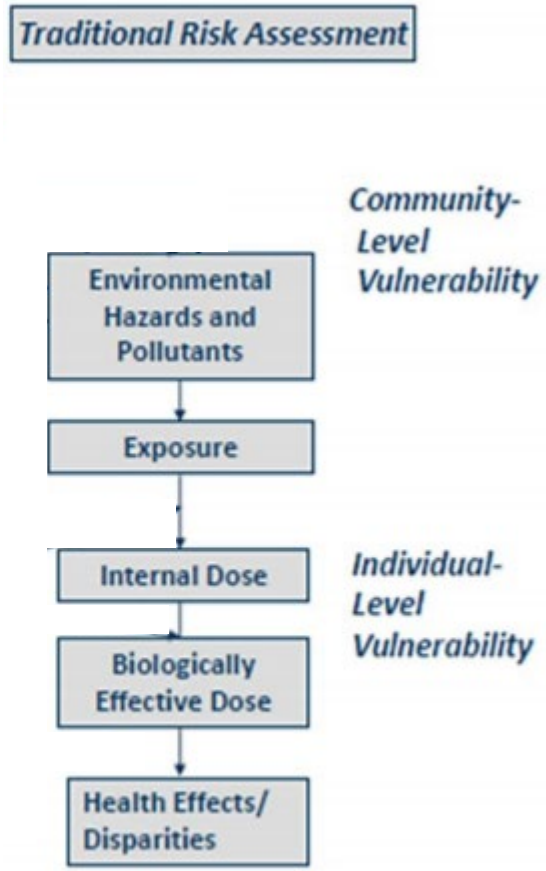
Figure 2. Spectrum of EJ Integration Approaches, Using a "Fit-for-Purpose" Continuum



From Confronting Disproportionate Impacts and Systemic Racism in Environmental Policy. Charles Lee. (51) Environmental Law Reporter. 2021.

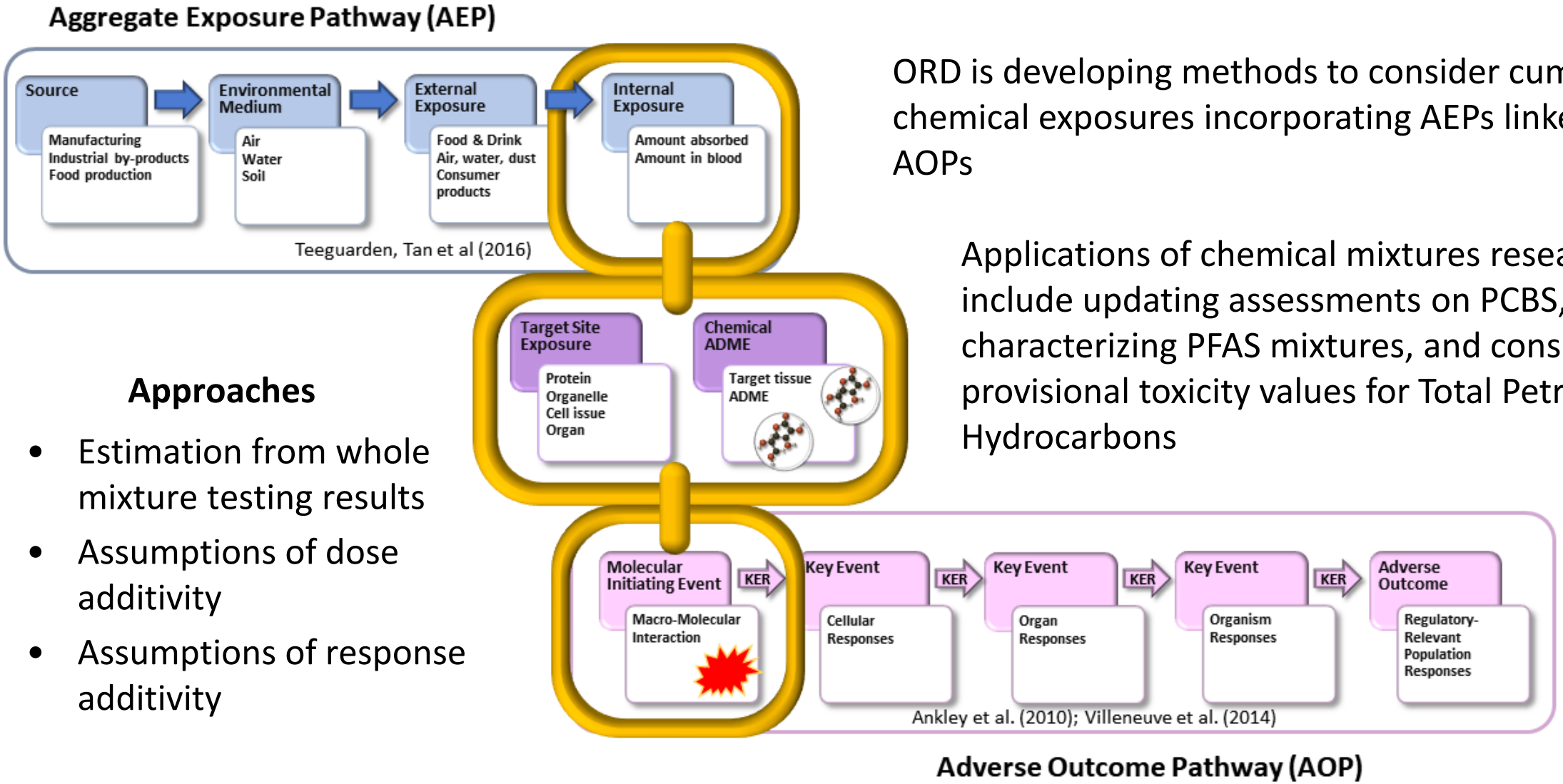
Cumulative Assessment – Chemical and Non-chemical Stressors

EPA and ORD have much experience with source to outcome chemical risk assessment.



From Environmental Justice Research Roadmap EPA 601/R-16/006 (2016)

Cumulative Assessment – Chemical and Non-chemical Stressors



ORD is developing methods to consider cumulative chemical exposures incorporating AEPs linked to AOPs

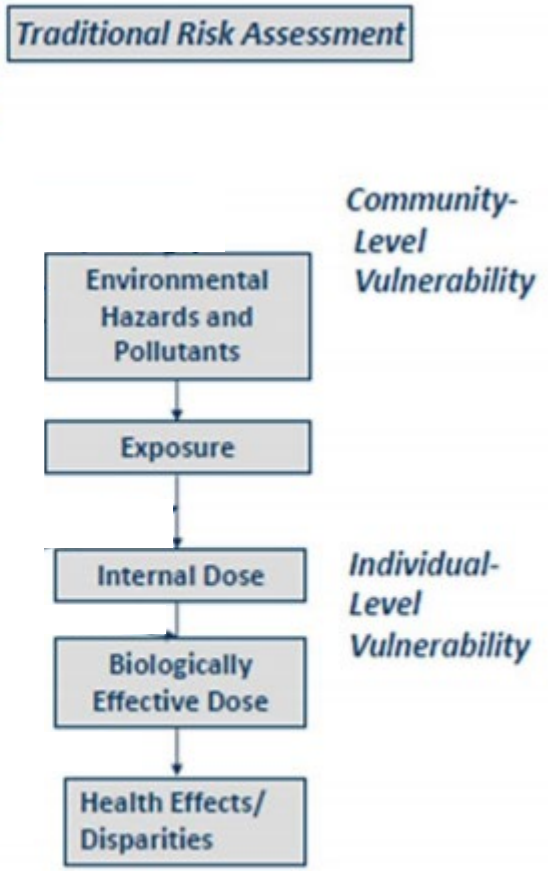
Applications of chemical mixtures research include updating assessments on PCBS, characterizing PFAS mixtures, and considering provisional toxicity values for Total Petroleum Hydrocarbons

Approaches

- Estimation from whole mixture testing results
- Assumptions of dose additivity
- Assumptions of response additivity

Cumulative Assessment – Chemical and Non-chemical Stressors

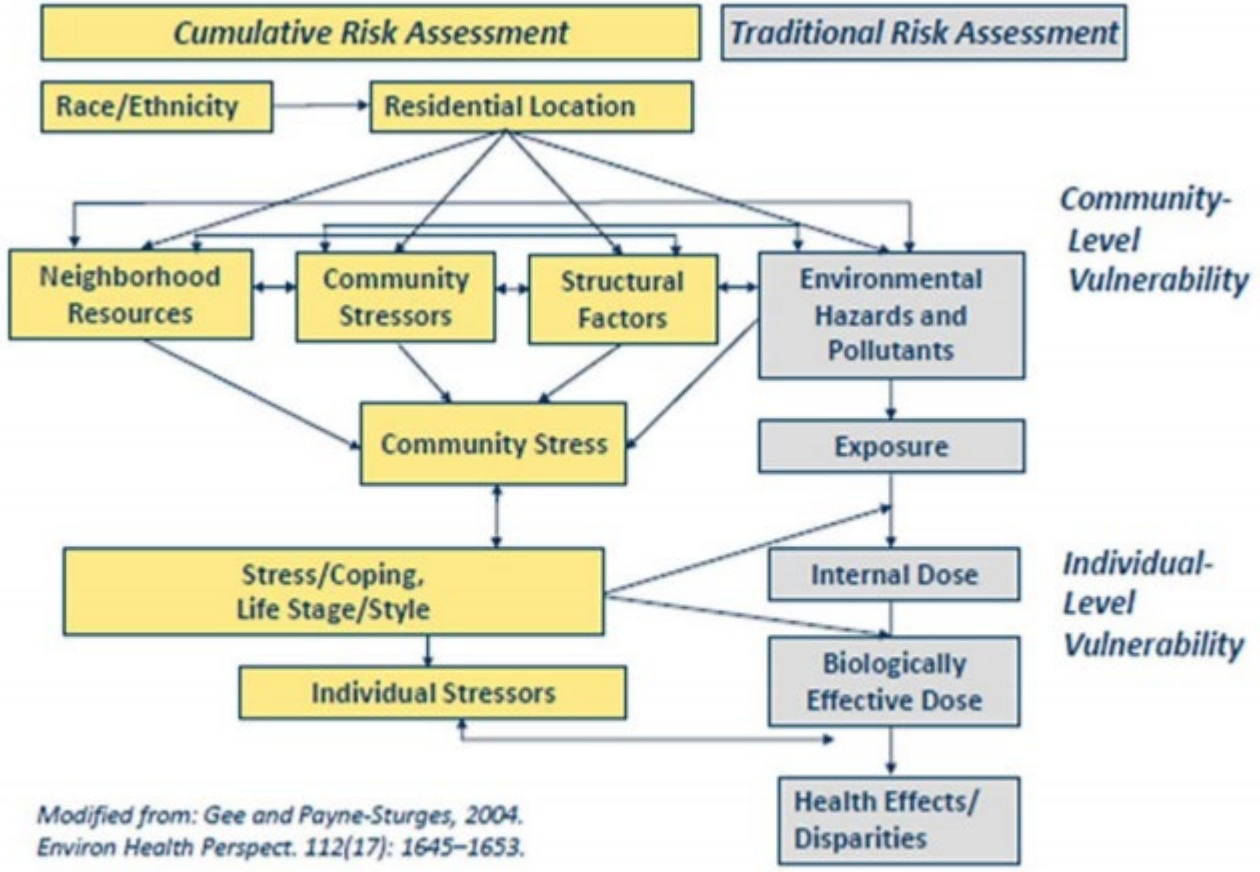
How do we go from this traditional chemical risk assessment paradigm…



From Environmental Justice Research Roadmap EPA 601/R-16/006 (2016)

Cumulative Assessment – Chemical and Non-chemical Stressors

…to this paradigm that incorporates non-chemical factors that undoubtedly play a role in disparate exposures and health outcomes?



From Environmental Justice Research Roadmap EPA 601/R-16/006 (2016)

Chemical and Non-chemical Stressors – The Total Environment / Exposome

Exposome: The cumulative measure of environmental influences and associated biological responses throughout the lifespan, including exposures from the environment, diet, behavior, and endogenous processes (Miller and Jones, 2014)

Outcome-based research:

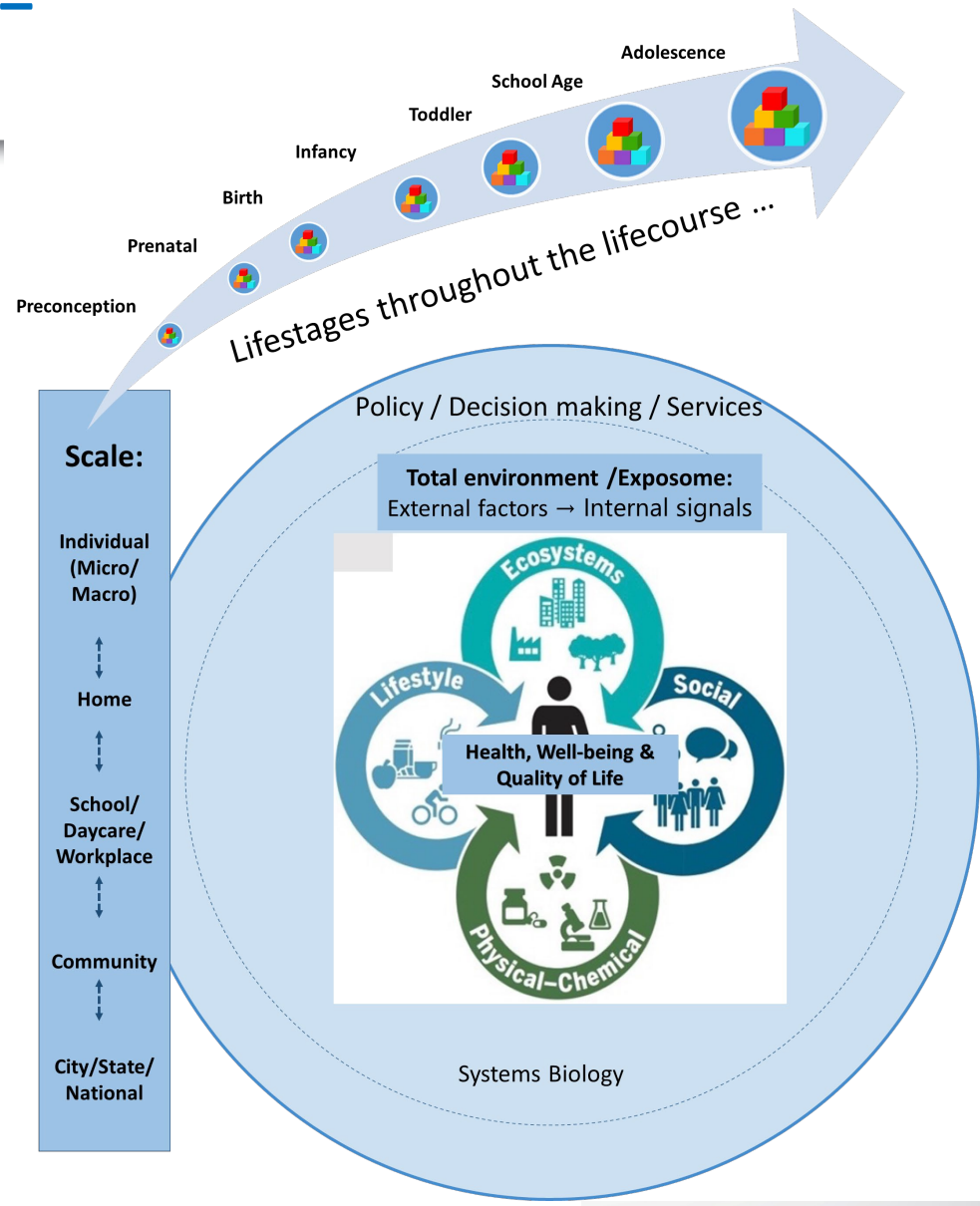
- Chemical and non-chemical stressors affecting children: Systematic review and meta-analysis of: obesity, general cognitive ability, ADHD, childhood externalizing behaviors

Identifying biomarkers of allostatic load:

- Can these serve to operationalize the exposome?
- How to quantify social stress to use together with these biomarkers?
- Utility of constructs such as embodiment (Krieger) and weathering (Geronimus)
- Use of qualitative data?

Additional future research issues:

- Application of exposome to lifestage research
- Application to community-engaged research and public health
- Application to regulatory determinations



Modified from: Vermeulen et al., Science 367, 392–396 (2020) and Tulve, N.S., et al. J Environ Health Sci 2(2): 1-8 (2016)

Application of Cumulative Impact Assessment: New Jersey Statute S232

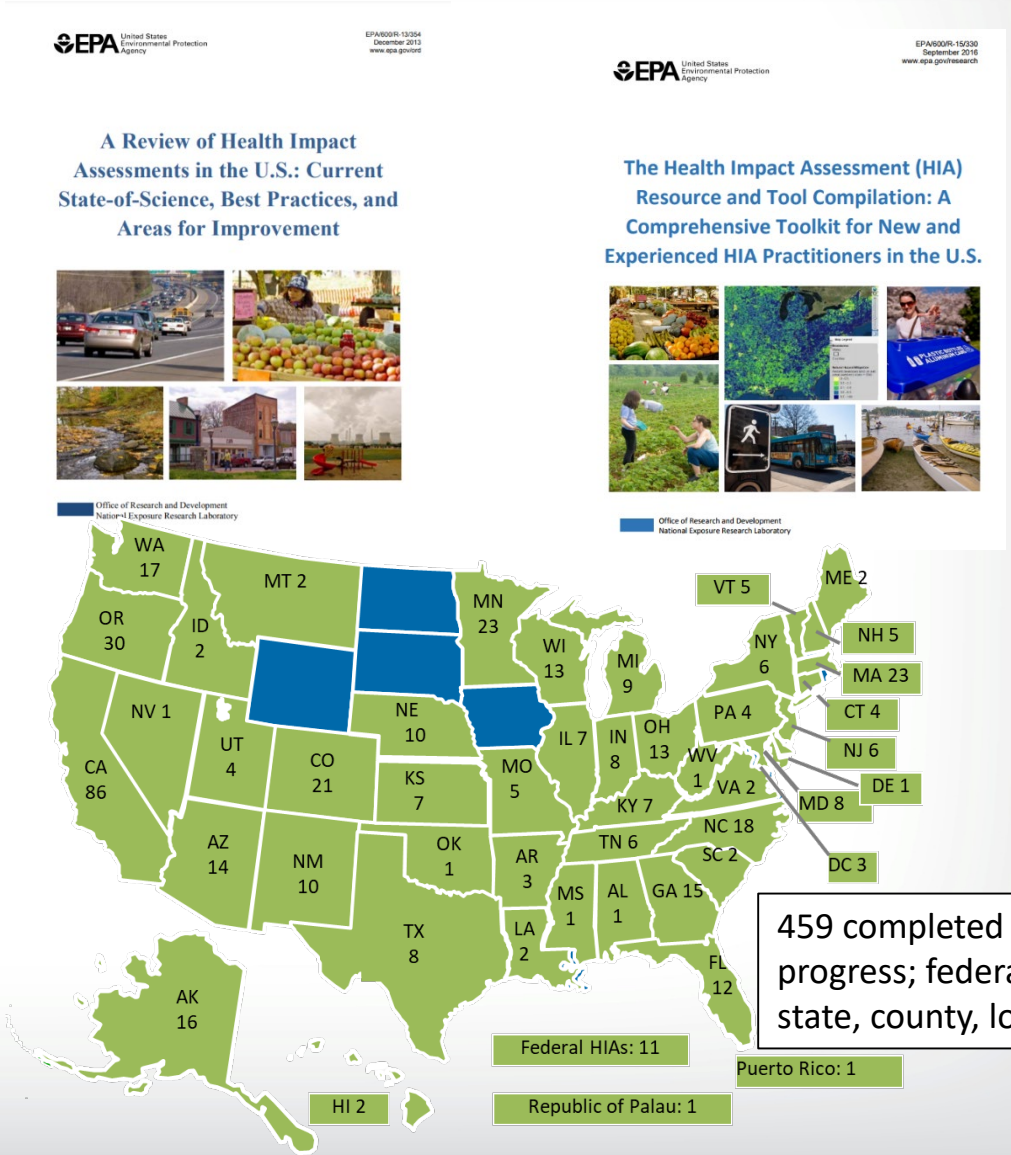
From the State of NJ Environmental Justice website:

- No community should bear a **disproportionate** share of the adverse environmental and public health consequences that accompany the State's economic growth.
    - It is in the public interest for the State, where appropriate, **to limit the future placement and expansion of such facilities in overburdened communities.**
- An applicant must prepare:
    - "…an **environmental justice impact statement** that assesses the **potential environmental and public health stressors** associated with the proposed new or expanded facility, or with the existing major source, as applicable, including any adverse environmental or public health stressors that cannot be avoided if the permit is granted, and the **environmental or public health stressors already borne by the overburdened community** as a result of existing conditions located in or affecting the overburdened community"

HIA at EPA and Nationally

Evaluating HIA as a decision-support tool for promoting sustainable and healthy communities

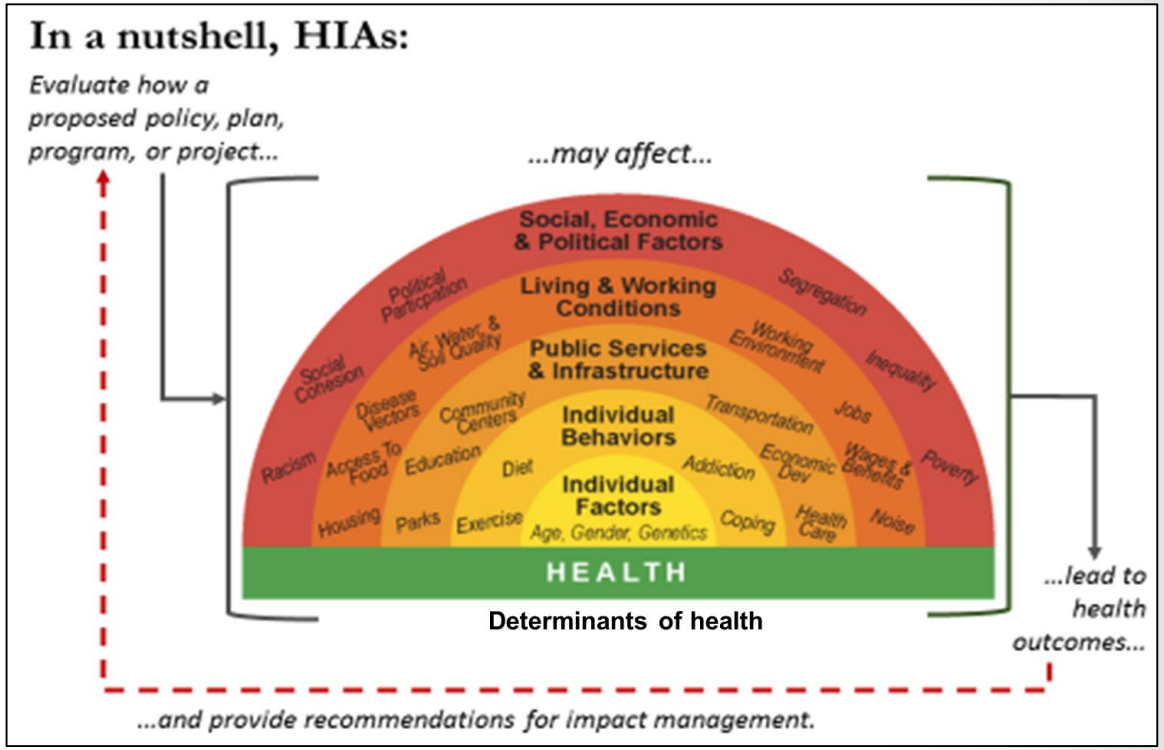
- Gerena Community School HIA (2015; Springfield, MA; R1)
- Proctor Creek Boone Boulevard Green Street Project HIA and Expanded HIA (2015; Atlanta, GA; R4)
  - Proctor Creek Watershed Story Map: The Intersection of Green Infrastructure and Health (2020; Atlanta, GA; R4)
- Former Chesapeake Supply Brownfield Revitalization HIA (2018; Dover, DE; R3 and OBLR)
- Kingsbury Bay-Grassy Point Habitat Restoration: A Health Impact Assessment (TBD; Duluth, MN; R5)
- HIA of Proposed Code Changes for Individual Sewerage Systems (TBD; Suffolk County, NY; R2)
- South Main Corridor Area Neighborhood Revitalization Rapid HIA (TBD; Rockford, IL; OBLR)



https://www.epa.gov/healthresearch/health-impact-assessments

Health Impact Assessment (HIA) and EJ

- Systematically considers the **full range of potential impacts** of the proposal on health determinants, health status, and health equity
- **Involves and engages stakeholders** affected by the proposal, particularly vulnerable populations
- **Characterizes** the proposal's **impacts** on health, health determinants, and health equity
- **Documents** data sources and analytic methods, quality of evidence used, methodological assumptions, and limitations
- **Provides** recommendations on feasible and effective actions to promote the positive health impacts and mitigate the negative health impacts of the decision



Modified from: Human Impact Partners. 2011. A Health Impact Assessment Toolkit: A Handbook to Conducting HIA

Conclusion

- EPA is early in the planning cycle for the next multi-year research plans.
- ORD expects cumulative risk, cumulative impact, and support for EJ communities to be priority issues within new plans.
- At the national regulatory scale, for cumulative risk assessment, better methodologies are needed for public health application of exposures considered broadly.
- At the local scale, assessments of conditions are needed with a combination of social vulnerability indices with environmental conditions and community engagement in environmental decisions that directly affect health and well-being in those communities.
    - EPA has some tools for rapidly screening communities and locations.
    - Health Impact Assessments (HIAs) provide one approach to community-engaged cumulative assessment and structured decision-making.
- EPA is conducting some foundational research on how different sociodemographic and other factors impact risk from chemicals and other pollutants.