

Environmental Justice Index Community Engagement Report

Responses to Feedback from Environmental
Justice Index 2022 Community Engagement

Acknowledgements

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Introduction

The Environmental Justice Index (EJI) Community Engagement Report plays a critical role in CDC/ATSDR's ongoing efforts to promote environmental equity and empower communities. Environmental justice, as defined by [Executive Order 14096](#), is the just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, tribal affiliation, or disability, in agency decision-making and other federal activities that affect human health and the environment so that people:

- (i) are fully protected from disproportionate and adverse human health and environmental effects (including risks) and hazards, including those related to climate change, the cumulative impacts of environmental and other burdens, and the legacy of racism or other structural or systemic barriers; and
- (ii) have equitable access to a healthy, sustainable, and resilient environment in which to live, play, work, learn, grow, worship, and engage in cultural and subsistence practices.

Community engagement drives impactful action, empowering communities and decision-makers alike to take meaningful steps toward positive change. In this report, we explore the vital role of community engagement in refining the EJI. We also emphasize the significance of community feedback in enhancing the tool's effectiveness and fostering a deeper understanding of its methodology and applications.

The Environmental Justice Index (EJI) is the first national, place-based tool designed to measure the cumulative impacts of environmental burden through the lens of human health and health equity. It delivers a single score for each community, so that public health officials can identify and map areas most at risk for health impacts from environmental burden. Social factors, such as poverty, race, and ethnicity, as well as preexisting health conditions, may increase these impacts. The EJI helps individuals, community-based organizations, public health officials, scientists, and researchers educate, inform, and act to protect communities from the health impacts of environmental injustice.

Community feedback is the cornerstone of the EJI, driving continuous improvement and ensuring its relevance and accuracy. By actively engaging with champions of environmental justice and health equity from communities, government organizations, and academia, we can better understand and represent the lived experiences of those facing environmental injustice and its effects on their health and the health of their communities.

Through active involvement in workshops and communication channels, community members have contributed to identifying new potential indicators that are crucial for understanding and addressing justice and equity issues. This feedback has also enabled CDC/ATSDR to enhance EJI resources, including data, web interface, and information materials. These resources have become more accessible, intuitive, and actionable. Together, these efforts propel the EJI's mission forward, creating a more impactful and inclusive platform for driving actions and advancing justice and equity initiatives.

The EJI Community Engagement Report provides detailed responses to specific questions, comments, suggestions, and general inquiries about the EJI and its methodology. In this report, we delve into how community engagement and user feedback have shaped the development and application of the EJI. By highlighting real-world examples and showcasing the impact of community involvement, we demonstrate the transformative power of collaboration in advancing environmental justice and building more resilient and equitable communities.

The Community Engagement Process

The EJI Community Engagement Report represents the culmination of our efforts to gather invaluable insights from the environmental justice community about the perception and usability of the EJI. Our inclusive approach encompassed a structured survey process, active solicitation of written and verbal feedback during Community Engagement workshop sessions, gathering feedback during presentations and events, and the collection of questions and comments via the EJI coordinator inbox (ejc_coordinator@cdc.gov). We carefully designed these methods to capture thoughts from environmental justice champions who are using the EJI to advance justice and equity. Their voices are central to our report and initiatives.

Our process prioritized fostering open dialogue and soliciting feedback through a series of Community Engagement workshops conducted between May and June 2023. The workshops had 1,355 registrations and 674 participants that ranged across 390 unique organizations and 11 countries. These organizations included groups from academia, federal agencies, STLT agencies, community-based organizations, nongovernmental organizations, and more. The workshops provided a platform for participants to actively engage in discussions and activities aimed at deepening their understanding of the EJI and its applications. Following each workshop session, participants were invited to complete surveys designed to capture detailed feedback on various aspects of the EJI, including usability, clarity, and real-world applications. In total, we collected 208 survey responses from these workshops, which provided valuable insight into how the community has received the EJI.

Additionally, we encouraged participants to provide written and verbal feedback during the workshops, which allowed for immediate insights and interaction. We received 147 questions and comments during these workshops, which provided further depth to our understanding of the EJI's impact. This allowed us to capture nuanced perspectives on topics such as appropriate use, comparisons with other tools, updates, and communication strategies related to the EJI. Presentation feedback from event attendees further contributed to our understanding of community needs and preferences. Moreover, the EJI Coordinator inbox continues to serve as a crucial channel for ongoing engagement, offering community members a platform to share their feedback, experiences, and ideas at any time. From the launch of the EJI tool in August 2022 to August 2023, the EJI team received 260 comments to the EJI Coordinator inbox that we responded to in real time and have addressed below.

Comments received through all forms of engagement, virtual workshops, presentations, listening sessions, and the EJI Coordinator inbox, have been paraphrased and grouped into broader categories below. These categories and paraphrased questions, all answered or addressed in this report, represent the breadth of comments and questions we received. Through this, we seek to ensure that all voices were heard and that insights gained through community engagement are integrated into the development and refinement of the EJI. This Community Engagement Report is a testament of our commitment to transparency, accountability, and continuous improvement. We strive to address common questions and comments, enhance the usability and relevance of the EJI, and ultimately advance the cause of environmental justice for all.

General Questions about the EJI

How often will the EJI be updated?

The EJI team received questions about frequency and scope of EJI data updates.

EJI Team Response. The EJI, along with all its modules, is updated every other year to ensure accuracy and relevance. The updates use the latest data from authoritative sources such as the U.S. Census Bureau, the U.S. Environmental Protection Agency (EPA), the U.S. Mine Safety and Health Administration, and the Centers for Disease Control and Prevention.

When significant errors are identified or updates become necessary, the EJI will be subject to off-cycle updates to address these issues promptly. Off-cycle updates will always be noted in these releases.

For further information or inquiries, please reach out to the EJI coordinator at ejc_coordinator@cdc.gov.

Why is data not currently available for Alaska, Hawaii, Puerto Rico, and U.S. Territories?

The EJI team received questions about the availability of data for specific regions such as Hawaii, Alaska, Puerto Rico, and U.S. Island Territories.

EJI Team Response. Currently, data for several critical environmental indicators, including those related to air pollution and water pollution, are not collected for Alaska and Hawaii. This prohibits us from drawing direct comparisons between communities in these states and other communities in the United States. We recognize the significance of not including these states in our index and are actively exploring ways to overcome data gaps and ensure their inclusion in future iterations of the EJI.

While there are some environmental and social indicators available for Puerto Rico, health indicators are not yet accessible or do not meet the criteria needed for complete inclusion in the EJI. Data needed to calculate EJI for other U.S. territories, including Guam, American Samoa, the U.S. Virgin Islands, and the Northern Mariana Islands, are unavailable or not collected at the geographic level needed for inclusion in the EJI. We acknowledge the unique environmental justice challenges faced by the territories and are committed to addressing their specific needs in our index as we are able.

Moving forward, we want to emphasize our commitment to making jurisdiction-specific measures available in the future. We are actively engaging with partners to identify and access relevant data sources, develop methodologies for incorporating territorial data into the index, and ensure that the EJI accurately reflects the environmental justice landscape across all U.S. jurisdictions.

How are disparities communicated through EJ mapping?

The EJ team received questions about communities that consistently face high cumulative impacts over multiple years and how the EJ and accompanying materials address persistent disparities.

EJ Team Response. Environmental justice mapping tools, like the EJ, have emerged as powerful instruments for identifying and addressing disparities in environmental quality and exposure to hazards. To empower affected communities, we need to communicate about persistent disparities. The EJ and accompanying materials carefully consider how to best display and discuss communities that experience cumulative impacts from environmental burdens and how members of those communities can use the EJ to take action to reduce burden in their community. The EJ team is also committed to engaging with communities to address their concerns, to make the EJ a more inclusive tool and to make it as representative as possible of their lived experiences. We welcome community input to ensure that communities are represented accurately.

It is important to note that the EJ is based on a framework established and supported by environmental justice scholars and activists who believe that directing attention and resources to communities facing high cumulative impacts from environmental burdens outweighs unintended adverse effects. Consistently high burdens, as represented by high EJ rankings, may present an opportunity to engage in deeper analysis and address the cumulative impacts affecting that area.

However, it is also important to recognize that high-level tools, such as the EJ, cannot capture all social, environmental, or health issues that a community may face. Nor does the EJ capture all community assets, such as strong social ties, community organizations, or individual resilience. These community assets, which are difficult to measure using nationally available data, are nonetheless critical components of a community's identity. They can drive resilience in a way that are difficult to quantify using a high-level screening tool. We look forward to exploring additional ways to represent community assets in the future, better acknowledging the strength and resilience of communities facing environmental burdens and injustice.

The EJ is best seen as a useful starting place for investigating issues of distributive and procedural justice and their effects on health and well-being. Distributive justice in this context is the fair distribution of environmental costs and benefits; the allocation of material goods, such as resources, income, and wealth; or the distribution of social standing. Procedural justice is the "fair and equitable institutional processes of a State" (see [Environmental justice and the SDGs: from synergies to gaps and contradictions](#) by Menton et al., 2020). Thus, the EJ is not intended to be a tool for labeling "overburdened" or "Environmental Justice" communities. It is a tool for providing data that can help identify disparities in health and environmental burdens. Using the EJ along with local and state-level environmental justice tools may offer a more complete picture of the relative contributions of individual factors to cumulative impacts when making state-level comparisons.

In summary, the EJ is not intended to be the following:

- A definitive tool for labeling "EJ Communities" or characterizing all EJ issues
- A full representation of current or future social, environmental, or health characteristics
- A representation of risk or exposure for a given community or area

For more information about EJ's resources, please visit the [EJ Resources](#) webpage.

EJI Framework, Data, and Methodology

What is the EJI framework and how are scores calculated based on the various indicators?

Questions and comments were raised regarding the construction of the EJI framework and how scores were calculated based on various environmental justice indicators.

EJI Team Response. The EJI framework has three different modules designed to assess and quantify environmental justice disparities across various communities. The **Social Vulnerability Module (SVM)**, **Environmental Burden Module (EBM)**, and the **Health Vulnerability Module (HVM)** focus on specific indicators related to socioeconomic factors, environmental conditions, and health outcomes, respectively. These indicators include pollution burden, access to environmental infrastructure, socioeconomic status, preexisting chronic health conditions, and vulnerability to environmental hazards. By analyzing these indicators, the EJI framework aims to identify areas where environmental injustices affect health and to help guide efforts towards addressing these disparities. The framework provides a structured approach for policymakers, researchers, and communities to understand and address environmental justice concerns effectively.

We received many questions about the decision-making process for identifying and screening potential indicators for inclusion in the various EJI modules. Pages 13-16 of the [EJI 2022 Technical Documentation](#) have detailed information on this process.

How does the EJI measure cumulative impacts and how does it compare to other measures of cumulative impacts?

The EJI team received questions about the framework used by EJI to measure cumulative impacts and how this relates to other measures of cumulative impacts.

EJI Team Response. It is important to note that the EJI uses a very specific interpretation and framework for understanding cumulative impacts that may not align with others' understanding and interpretations. This is partly because there is no single recognized federal definition for cumulative impacts. We recognize cumulative impacts as the total harm to human health that occurs from the combination of environmental burden such as pollution and poor environmental conditions, preexisting health conditions, and social factors such as access to quality healthcare. However, this definition is not universally recognized or understood.

The EJI is focused on measuring cumulative impacts in relation to health and well-being. To do this, the tool borrows a framework for measuring cumulative impacts from the Environmental Justice Screening Method (EJSM). The EJSM, originally developed by environmental justice scholars in California, attempts to measure cumulative impacts at a high level by combining data organized into five categories: (1) hazard proximity and land use, (2) estimated air pollution exposure and health risk, (3) social and health vulnerability, (4) climate change vulnerability, and (5) drinking water quality (see [Playing it safe: assessing cumulative impact and social vulnerability through an environmental justice screening method](#)

[in the South Coast Air Basin, California](#) by Sadd et al., 2011). The EJI adapts this framework slightly by categorizing data into (1) environmental burden, (2) social vulnerability, and (3) health vulnerability.

To combine data with different units, both the EJSM and EJI use percentile ranking. It is an easy and understandable way to transform data into a metric that can be combined with the percentile rank metrics. Both the EJI and EJSM further combine these percentile-ranked “indicators” into broader categories (described above). They then combine those categories to create an overall score representing cumulative impacts.

The EJSM was specifically designed to map and screen cumulative impacts. This provides a high-level measure of cumulative impacts as a supplement or alternative to resource-intensive health risk or health impact assessments (see [Cumulative Environmental Impacts: Science and Policy to Protect Communities](#) by Solomon et al., 2016). The EJSM has been adapted by dozens of states and other entities have adapted the EJSM to create environmental justice mapping and screening methods. California’s [CalEnviroScreen](#) tool and Washington State’s [Environmental Health Disparities Map](#) are two examples. The EJI builds on the foundation laid by EJ advocates, states, and others to apply this framework at a national level.

What are the underlying data sources for the EJI indicators?

The EJI team received questions about the source data underlying EJI indicator measures.

EJI Team Response. All EJI indicators and sources are listed in the chart below. The [EJI 2022 Technical Documentation](#) contains full descriptions of each indicator and lists of sources.

Modules	Domains	Indicators	Data Sources		
	Social Vulnerability	Racial/ Ethnic Minority Status	Minority Status	U.S. Census Bureau American Community Survey (ACS)	
		Socioeconomic Status	Poverty		U.S. Census Bureau American Community Survey (ACS)
			No High School Diploma		
			Unemployment		
			Housing Tenure		
			Housing Burdened Lower-Income Households		
			Lack of Health Insurance		
		Household Characteristics	Lack of Broadband Access		U.S. Census Bureau American Community Survey (ACS)
			Age 65 and Older		
			Age 17 and Younger		
	Civilian with a Disability				
	Housing Type	Speaks English "Less than Well"	U.S. Census Bureau American Community Survey (ACS)		
		Group Quarters			
	Environmental Burden	Air Pollution	Ozone	U.S. EPA Air Quality System (AQS)	
			Particulate Matter 2.5 (PM2.5)		
			Diesel Particulate Matter		
		Potentially Hazardous & Toxic Sites	Air Toxics Cancer Risk	U.S. EPA National Air Toxics Assessment (NATA)	
			National Priority List Sites		
			Toxic Release Inventory Sites		
			Treatment, Storage, and Disposal Sites		
Risk Management Plan Sites					
Built Environment		Coal Mines	U.S. Mine Safety and Health Administration Mine Data Retrieval System (MDRS)		
		Lead Mines			
		Lack of Recreational Parks			
Transportation Infrastructure		Houses Built Pre-1980	U.S. Census Bureau American Community Survey (ACS)		
		Lack of Walkability			
Water Pollution		High-Volume Roads	TomTom MultiNet® Enterprise Dataset		
	Railways				
	Airports				
Health Vulnerability	Pre-existing Chronic Disease Burden	Impaired Surface Water	U.S. EPA Watershed Index Online (WSIO)		
		Asthma*			
		Cancer*			
		High Blood Pressure*			
		Diabetes*			
Poor Mental Health*	U.S. CDC PLACES Estimates				

*Health vulnerability measures are marked with asterisks because they are calculated differently than other indicators. While most indicators can have a range of values, the health vulnerability indicators represent only whether a given census tract experiences a high estimated prevalence of disease or not.

EJI Indicators

Text-Only Version

Social vulnerability module

- Racial/Ethnic Minority Status
 - o Minority Status
- Socioeconomic Status
 - o Poverty
 - o No High School Diploma
 - o Unemployment
 - o Housing Tenure
 - o Housing Burdened Lower-Income Households
 - o Health Insurance
 - o Broadband Access
- Household Characteristics
 - o Age 65 and Older
 - o Age 17 and Younger
 - o Civilian with a Disability
 - o Speaks English “Less than Well”
- Housing Type
 - o Group Quarters
 - o Mobile Homes

Environmental burden module

- Air Pollution
 - o Ozone
 - o PM2.5 (Fine Particulate Matter)
 - o Diesel Particulate Matter
 - o Air Toxics Cancer Risk
- Potentially Hazardous and Toxic Sites
 - o National Priority List Sites

- o Toxic Release Inventory Sites
- o Treatment, Storage, and Disposal Sites
- o Risk Management Plan Sites
- o Coal Mines
- o Lead Mines
- Built Environment
 - o Recreational Parks
 - o Houses Built Pre-1980
 - o Walkability
- Transportation Infrastructure
 - o High-Volume Roads
 - o Railways
 - o Airports
- Water Pollution
 - o Impaired Surface Water

Health vulnerability module

- Pre-existing Chronic Disease Burden
 - o Asthma*
 - o Cancer*
 - o High Blood Pressure*
 - o Diabetes*
 - o Poor Mental Health*

What are percentile rankings? How can they be interpreted?

The EJI team received questions about how percentile ranks for EJI indicators, and composite scores were calculated, as well as how these percentile ranks should be interpreted.

EJI Team Response. A percentile ranking in the EJI represents the proportion of tracts across the nation that are equal to or lower than a specific tract of interest in terms of environmental burden.

For example, if a tract has an EJI ranking of 0.85, this indicates that 85% of tracts in the nation likely experience less severe cumulative impacts from environmental burden. Conversely, it also indicates that

15% of tracts in the nation likely experience more severe cumulative impacts from environmental burden.

This percentile ranking provides valuable context for understanding the relative environmental burdens experienced by different communities across the country. It allows users to gauge where a particular tract stands in relation to others and assess the severity of environmental justice disparities within and between regions.

What are the percentile rank bin and cutoff standards?

The EJI team received questions about how EJI scores are “binned” into different categories of burden and if there is a standard cutoff for differentiating “high” v. “low” levels of cumulative impacts from environmental burdens.

EJI Team Response. EJI scores, which range from 0 to 1, are represented as percentile ranks of cumulative impacts. An EJI score of 0.75 indicate that census tract would likely experience more severe cumulative impacts from environmental burdens than 75% of all other tracts in the nation. EJI scores are intended to be understood as a continuous measure, and modest score differences should be interpreted with caution. The index calculation does not consider potential errors in the underlying data, such as demographic estimates from the U.S. Census Bureau’s American Community Survey (ACS).

Continuous measures can be difficult to understand and interpret, and they might not be appropriate for some scientific analyses. When EJI scores for census tracts are mapped, census tracts are typically binned (or grouped) into quartiles. The data are split into four equal parts. This means that census tracts in the lowest quartile will have EJI scores < 0.25, while census tracts in the highest quartile with have EJI scores > 0.75. These quartiles are then mapped to show which census tracts fall into which quartile.

While quartiles are a great way of categorizing and visualizing EJI data, the thresholds used to define quartiles are not meaningful in and of themselves. There is not necessarily a meaningful difference between a tract with an EJI score of 0.74 and a tract with an EJI score of 0.75. However, it is sometimes necessary to categorize tracts using EJI scores. In these cases, using standardized thresholds such as quartiles (splitting the data into four parts: 0-0.25, 0.25-0.5, etc.), tertiles (splitting the data into three parts: 0-0.33, 0.33-0.66, etc.), or deciles (splitting the data into 10 parts: 0-0.1, 0.1-0.2, etc.) can help make these categories understandable. However, it is important to avoid giving the impression that these categories are inherently meaningful.

Is there uncertainty in the data used to calculate the EJI? How is that uncertainty addressed in the calculation?

The EJI team received questions about the uncertainty associated with source data used in EJI calculations, such as demographic estimates from the U.S. Census Bureau’s American Community Survey (ACS) and how this was accounted for.

EJI Team Response. Many of the indicators used to construct the EJI rely on estimates that involve some level of uncertainty. This includes demographic estimates from the ACS, modeled data on air pollution from the Environmental Protection Agency (EPA), and modeled estimates of chronic disease prevalence from CDC’s PLACES program. While these sources do have a level of uncertainty associated with their data, they are widely considered authoritative, and currently the best data of their kind available nationally. These sources do provide measurements of uncertainty along with their estimates,

as with census-calculated margins of error (MOEs), but this uncertainty is not factored into EJI calculations.

Uncertainty is not factored into EJI calculations, largely because statistical methods used to account for uncertainty in index calculation, such as component weighting, structural equation modeling, or Bayesian approaches, can make the index creation process more complex and challenging for the average user to replicate. Since transparency, reproducibility, and adaptability are key aspects of the EJI, we have chosen simpler and more replicable methods.

We aim for procedural justice with the EJI, meaning that we work to be transparent about the data sources we use, how we incorporate them into the index, and their limitations. We communicate these details throughout the [EJI 2022 Technical Documentation](#). This transparency allows users to explore the underlying data and understand how it is collected, helping them make informed interpretations of the index results. The Technical Documentation includes notes on the caveats and limitations associated with the use of datasets with some level of uncertainty. In the interest of transparency, we plan to provide future validation analyses that demonstrate the effects of uncertainty on EJI rankings for our more technical users.

We acknowledge that every dataset has its limitations, including issues related to data collection methodologies, sampling biases, and temporal or spatial coverage. By explicitly outlining these caveats in our documentation and showing readers where they can go to learn more about the unique caveats associated with each dataset, we aim to empower users to critically evaluate the strengths and weaknesses of the index and interpret the results within the appropriate context.

We are actively working on improving the clarity and accessibility of our index documentation to ensure that users have the necessary information to make informed decisions and interpretations. We will continue to look for the best ways to communicate these limitations, and to look for new data sources or methods that allow us to more precisely measure indicators that contribute to cumulative impacts on health.

What are some of the data gaps that affect the EJI?

The EJI team received questions about which datasets presented challenges during the development of EJI.

EJI Team Response. One of the challenges we encountered in developing the EJI is the lack of detailed environmental data in certain key areas. We acknowledge the absence of data related to specific EJ concerns, including pesticide exposure, concentrated animal feeding operations (CAFOs), and maternal and child health. These gaps limit our ability to provide a complete picture of environmental injustice, and we are actively exploring ways to address these issues. We are collaborating with other agencies and organizations to examine and enhance data collection and explore new technologies and methods.

Regarding the lack of local data on maternal and child health, we understand that this is a critical element in understanding and characterizing cumulative impacts and environmental injustice. Currently, the data collected by CDC and other entities on most maternal and child health outcomes is subject to limitations in use because of data confidentiality and privacy laws. We are exploring new methods and

data sources that will allow us to capture trends in maternal and child health outcomes at a broader geographic scale while safeguarding the health information of the public.

Questions about Mapping and Geographies

What guided the visual design and accessibility of the EJI?

The EJI team received questions about the rationale behind color choices and visual accessibility of the EJI.

EJI Team Response. Accessibility is a significant consideration in the design of the EJI. We are committed to ensuring that our maps are easily comprehensible to all users, regardless of their background or visual abilities. In line with this commitment, we have employed clear and intuitive design principles to enhance accessibility. This includes using legible fonts, appropriate color contrasts, and simple map legends.

One of our primary considerations in designing the EJI was the desire not to stigmatize any community or area. We recognize the potential harm that can arise from using colors associated with risk or hazard, such as red or green, which may inadvertently perpetuate negative stereotypes or perceptions. Therefore, we have consciously avoided using these colors, opting for neutral and nonconfrontational hues that convey information without implying judgment or bias.

Additionally, we understand the importance of employing a distinctive color palette that is both visually appealing and functionally effective. We have carefully selected colors that strike a balance between uniqueness and clarity, so users can easily differentiate data categories, while maintaining a cohesive and aesthetically pleasing visual presentation.

We remain committed to continuously refining and improving the cartography and display choices of the EJI to better serve the needs of our users.

How are changes in census geography and demographic data handled?

The EJI team received questions about how EJI 2022 accounted for significant shifts in census tract boundaries and demographic changes between 2010 and 2020.

EJI Team Response. The EJI 2022 is calculated and displayed using 2010 census tract geographies from the U.S. Census Bureau's TIGER/Line Shapefiles. Census tracts are the smallest subdivisions of land for which data are consistently available. Each census tract is part of a specific county, and each tract is home to an average of 4,000 people.

The EJI uses 2010 census geographies because many of the indicators included in the EJI use data specifically calculated at the 2010 census tract geographic. Future versions of the EJI will be calculated using 2020 census tract geographies.

Census tract maps are updated every 10 years with each census. This update reflects changes in population size and characteristics. Because the U.S. population increased between 2010 and 2020, the total number of census tracts grew from about 72,000 in 2010 to around 84,000 in 2020. This is

important for users of the EJI to note, as anyone seeking to tie data from EJI 2022 to data provided for 2020 census tract geographies will encounter a mismatch.

To see how 2020 census geographies relate to 2010 geographies and how the number of census tracts changed from year-to-year by state, you can view the [U.S. Census Bureau's Relationship Files](#). However, please note that, because of demographic changes and underlying methods used to calculate many indicator values, it is not necessarily appropriate to use the relationship files to crosswalk (or convert) EJI data from 2010 to 2020. However, it will be possible to compare EJI data to other data provided for 2020 census geographies following the release of future EJI versions.

Are there EJI rankings for ZIP codes, counties, or metropolitan areas?

The EJI team received questions about how to interpret and use EJI for spatial scales larger than a census tract, such as a ZIP code, county, or metropolitan area. There were also questions about averaging EJI census tract scores for these larger areas.

EJI Team Response. The EJI is calculated at the census tract level because that is the smallest unit of geography for which national environmental, social, and health data are consistently available. EJ often occurs at the local level, with neighborhood conditions varying drastically across a given county or metropolitan area. We therefore feel that it may be misleading to display a measure of cumulative impacts for a larger geographic area, such as a county or metropolitan area, as neighborhood level variation in environmental, social, and health conditions can be washed out at this scale.

It is also important to note that we do not recommend aggregating EJI scores by county or metropolitan area. While it is mathematically possible to do this by averaging EJI scores for all census tracts in a county, aggregation introduces unmeasurable error and could misrepresent neighborhood-level variation in social, environmental, and health conditions.

In some cases, it is critical to summarize EJI scores for a larger geographic area. We recommend looking at measures such as the percentage of census tracts in an area with EJI scores at a certain threshold. Users can also calculate the percentage of the population living in census tracts with elevated EJI scores. This can provide a useful metric without introducing unmeasurable error or completely masking smaller areas where communities are experiencing high levels of cumulative impacts.

We also understand that many users in the public health field are interested in a measure of EJI that can be combined with health data at the ZIP code level for research into cumulative impacts and associated health outcomes. It is important to note that the U.S. Postal Service creates ZIP codes to coordinate mail handling and delivery. They do not directly correspond to actual geographical areas. The U.S. Census Bureau provides generalized areal representations of ZIP codes called ZIP Code Tabulation Areas (ZCTAs), but these do not perfectly align with actual ZIP code service areas and do not align with most other census-defined geographic units, such as census tracts or counties. Instead of trying to adapt EJI to correspond to data for which ZIP code is the only spatial reference, we recommend exploring data at the census tract level or some smaller unit of geography. Users can also explore statistical options, such as multiple geographic imputation, for transforming data with associated ZIP codes into data with more granular spatial information.

How do urban and rural areas compare?

The EJI team received questions about the differences in uncertainty/error rates in data between urban and rural census tracts, as well as on the general comparability of rural and urban areas.

EJI Team Response. There is a degree of uncertainty associated with nearly all data in the EJI. This is typically because these data are modeled estimates, based on the best available sampling data. Our initial comparisons of uncertainty/error rates between urban and rural census tracts show no statistically significant differences. We intend to publish robust comparisons of uncertainty in future technical documentation to clarify this point.

We do acknowledge that there are other important differences between urban and rural areas in terms of the environmental, social, and health-related burdens that they face. Rural environmental burden may not be directly comparable to urban burden due to differences in population density, the types of unwanted or hazardous land uses that are more prevalent in each type of community, and the size of these areas. In cases where direct comparison may not be appropriate, the method of landcover-based peer group stratification used by the [Environmental Burden Index](#) offers a way to classify and compare census tracts of similar levels of urbanicity.

Using the EJI

How can the EJI be used?

The EJI team received questions about the EJI's capability in assessing societal, environmental, and economic challenges.

EJI Team Response. The EJI aims to assess environmental injustice across various modules to rank the cumulative impacts of environmental burdens on health for every census tract. It can help identify and prioritize areas that may require a particular focus for improving health and health equity, guiding policymakers, and community members towards targeted interventions. The EJI educates and informs communities about their environmental burdens, thereby empowering grassroots action and advocacy. It also analyzes local factors driving cumulative health impacts, offering valuable insights for policy formulation and decision-making processes. Additionally, the EJI facilitates the establishment of meaningful goals and helps measure progress toward environmental justice and health equity. For state and local applications, the EJI can be a resource for states that lack environmental justice mapping tools. The EJI can also serve as a foundational framework for the development of new local environmental justice mapping tools. It provides a framework for measuring cumulative impacts that is relatively simple to understand and replicate.

How can the EJI be used to assess health risk?

The EJI team received questions about using the EJI to assess health risk instead of using Health Risk Assessments (HRAs).

EJI Team Response. The EJI was developed to measure cumulative impacts of environmental risk factors. Exposure pathways are used to create HRAs. Cumulative impacts assessments are an alternative to traditional risk and exposure assessments. They combine numerical and approximate data to

compare the combined effects of social factors, environmental factors, and pre-existing chronic conditions on community health and well-being (see [A Screening Method for Assessing Cumulative Impacts](#) by Alexeeff et. al, 2012). HRAs, like those conducted by the U.S. Environmental Protection Agency (EPA), seek to quantify the likelihood that a population will experience harm from a hazardous event or chemical exposure using detailed data on factors such as chemical exposure levels, dose-response relationships, and contaminant fate and transport. To learn more about HRAs and how they compare to environmental justice tools, explore EPA's approach here: [About Risk Assessment | US EPA](#).

How can local data be integrated into the EJI?

Questions and comments were raised seeking to understand how to use the EJI for deeper or more personalized analysis. Examples of how the tool has been used and integrated at the state and local level have been provided.

EJI Team Response. The EJI is a user-friendly tool for helping public health officials, policy makers, and communities identify and respond to the environmental and social factors that can affect a community's health and well-being. Specialized training is not required to use the EJI or its modules. Each module within the EJI can be used to assess specified indicators of interest at the census tract level. These indicators provide only a screening-level overview of the environmental burdens within a community. Therefore, we recommended using accompanying measures of interest in conjunction with the EJI for more detailed analysis. Users shouldn't aggregate census tract level data from the EJI to larger levels of geography (like to the county or larger levels). Aggregation introduces unmeasurable error and could misrepresent neighborhood-level variation in social, environmental, and health conditions.

To incorporate localized data from the EJI for deeper analysis, users may download the EJI data from our website. Updated technical documentation provides a detailed workflow for incorporating localized data, as well as additional instructions and guidance.

As it stands, the EJI continues to be a valuable tool for deeper analysis at the state and local level by offering a national perspective on environmental justice challenges. It facilitates broad geographic comparisons and highlights the extent of these challenges. The EJI uses nationally consistent data to build upon environmental justice screening and mapping tools that have previously been developed at the local, state, and federal levels. These two examples illustrate how the EJI has been used at the state and local level:

New York Tolling Plan Environmental Assessment:

- The New York Metropolitan Transit Authority (NY MTA) used the EJI to assess the potential impacts of a Central Business District Tolling Alternative on low-income and minority populations in New York and New Jersey through the [New York Tolling Plan Environmental Assessment](#).
- Following a recommendation from the U.S. Department of Health and Human Services (HHS), the EJI was used in combination with other environmental justice mapping tools to help identify communities with existing pollution and chronic disease burdens.
- The NY MTA prioritized these communities for the implementation of health protective measures, aligning with HHS recommendations.

Chesapeake Bay Report Card:

- The University of Maryland Center for Environmental Science (UMCES) incorporated the EJI into its [2023 Chesapeake Bay Eco Health Report Card](#).
- This allowed the UMCES to compare EJI ranks across census tracts within the Chesapeake Bay watershed, which gave insights into disparities among urban, suburban, and rural communities.
- The UMCES emphasizes the importance of addressing environmental justice for the long-term health and sustainability of the Chesapeake Bay watershed.

In both cases, the EJI contributed to an increased understanding of environmental justice issues, which allowed for targeted measures and interventions to address disparities and promote sustainability in specific communities.

While the EJI is helpful method for assessing environmental justice concerns, it is not a substitute for local, state, or federal tools. However, it can complement to these tools by

- Providing national-level comparisons that may bring additional attention to local issues
- Focusing on the cumulative impacts of environmental burdens on health
- Validating the lived experiences of communities impacted by poor environmental conditions and other social determinants of health

The EJI is a tool for evaluating the cumulative impacts from environmental burdens that communities may face. Using the EJI for screening and information gathering can provide valuable insights into the individual and cumulative environmental, social, and health factors affecting a community and how that community compares to other areas in the county. However, it is important to note that the EJI's environmental indicators do not represent in-depth measures of risk or exposure assessments. Instead, they offer a screening-level overview of the environmental burdens affecting a community. We recommend supplementing analyses with more detailed local data whenever feasible and incorporating risk and exposure assessments into assessment methodologies.

For additional guidance, please reference [Using the Environmental Justice Index: A Resource for State, Local, and Tribal Government](#).

How can the EJI data be downloaded?

The EJI team received questions about downloading and accessing materials and data in various formats, as well as aggregating data by state and national geographies.

EJI Team Response. Users can easily access tract-level EJI datasets on the [data download site](#) for national and state geographies. The data is available in GIS-friendly geodatabase files or in a CSV spreadsheet format for personal analysis. The site also has the latest version of the data dictionary for interpretation of included variables.

EJI data is currently not available for download at the county level due to limitations in data availability and aggregation. The data is provided at the tract level for national and state geographies to ensure accuracy and consistency. The EJI presents data for each census tract because they are the smallest subdivisions of land for which data are consistently available. Each census tract lies within a county and

is home to an average of 4,000 people. There are ongoing efforts to continually expand the availability of EJI data as the scope of source data develops.

Additionally, EJI state rankings are not currently available for download, but national data can be downloaded for a specific state or for all states. However, these rankings within both geographic levels of data represent comparisons to all other census tracts in the nation and cannot be parsed for individually ranked analysis.

What resources are available to learn more about the EJI and how to use the EJI mapping tool?

The EJI team received questions about navigation of the EJI website and accessing resources demonstrating effective use of the tool.

EJI Team Response. Live demonstration and overview of the EJI are publicly available. View a webinar and live demonstration here:

[The Environmental Justice Index: Measuring the Cumulative Impacts of Environmental Burden on Health \(youtube.com\)](#)

The EJI website also contains the [Technical Documentation for the Environmental Justice Index \(2022\)](#), which provides complete information on the EJI's development, indicator selection, methods, and purpose.

For further assistance with navigating the website or for troubleshooting, please reach out to the EJI coordinator at ejc_coordinator@cdc.gov.

EJI & Other Indices

How does the EJI compare to other EJ indices?

The EJI team received questions about when to use the EJI over other Environmental Justice tools, including EJScreen, Climate and Economic Justice Screening Tool (CEJST), and CDC/ATSDR's Social Vulnerability Index (SVI).

EJI Team Response. The EJI, EJScreen, CEJST, and SVI draw from similar data sources and employ some overlapping methodologies, but there are significant methodological distinctions. Each tool has its own intended uses, which are described in more detail below.

EJI vs. EJScreen

EJScreen is a tool developed by the EPA that integrates environmental and demographic data to identify areas that may be experiencing environmental injustices ([What is EJScreen? | US EPA](#)). It highlights vulnerable communities facing higher environmental burdens, allowing users to access and compare specific locations against state, EPA region, or national data. EJScreen maps display one indicator at a time for targeted analysis.

Similarly, the EJI helps public health officials and communities identify and map areas that may be at risk of adverse health outcomes. However, the EJI focuses on cumulative impacts, using 36 indicators across social vulnerability, environmental burden, and health vulnerability to calculate a comprehensive cumulative impacts score. This approach provides a holistic understanding of environmental justice issues and the cumulative impact on health outcomes.

EJI vs. Climate and Economic Justice Screening Tool (CEJST)

The Climate and Economic Justice Screening Tool (CEJST) identifies communities that are disproportionately affected by climate change and environmental hazards. The EJI and CEJST serve distinct purposes within the context of environmental justice. EJI was developed as a resource to identify and map areas that may be most at risk for the health impacts of environmental burden. CEJST was created in response to the Biden-Harris administration's attention to environmental justice through the Justice40 Initiative. Its purpose is to help federal agencies guide the benefits of certain Justice40 programs by identifying disadvantaged communities that are overburdened and underserved. CEJST uses a threshold methodology, where each burden is ranked using percentage thresholds or "yes/no" indicators. Based on this methodology, communities are considered disadvantaged if they are in census tracts that meet the thresholds for at least one of the tool's categories of burden ([Climate and Economic Justice Screening Tool | U.S. Climate Resilience Toolkit](#)).

CEJST looks across multiple categories of indicators to identify these communities and provide a snapshot of areas in need of targeted assistance. While EJI focuses on health impacts and cumulative impact scores, CEJST pinpoints areas for specific funded programmatic interventions seeking to deliver 40% of the overall benefits of climate, clean energy, and related investments to disadvantaged communities. Importantly, the [White House's Guidance on Justice40 implementation](#) requires all federal agencies to use CEJST to identify disadvantaged communities.

HHS advises that, under its Justice40 programs, the EJI can be used along with tools like CEJST to identify and prioritize disadvantaged communities for environmental justice purposes. The EJI may help to focus in beyond the question of whether a neighborhood is disadvantaged or not. It also helps users compare the relative cumulative impacts of multiple environmental, social, and health factors in these communities.

EJI vs. Social Vulnerability Index (SVI)

The [CDC/ATSDR SVI](#) assesses the resilience of communities to external stresses on human health, including natural disasters, disease outbreaks, and other emergencies. The EJI and the SVI serve different purposes and incorporate distinct indicators reflecting their respective focuses. The SVI was specifically created in response to a call for federal agencies to provide tools that consider the [Social Determinants of Health \(SDOH\)](#) for the disaster management cycle. Its indicators were selected based on their relationship to disaster preparedness, response, and recovery, with the aim of identifying regions less equipped to handle emergencies or public health crises. In contrast, the EJI was not developed specifically for emergency preparedness and response. Its indicators were chosen based on their relationship to the cumulative impacts of environmental burdens on health, focusing more on long-term injustices.

The SVM includes indicators that are not included in the SVI, including housing tenure and lack of broadband access, which are more relevant to understanding environmental injustice issues. On the

other hand, the SVI includes indicators not included in the EJI SVM, such as single-parent households, multi-unit structures, no vehicle, and crowding, which are specific to disaster management but not as useful for understanding cumulative impacts from an environmental justice perspective.

EJI Social Vulnerability Module (SVM)

What are the characteristics of the SVM?

The EJI team received questions about how the EJI SVM relates to the Social Determinants of Health and the CDC/ATSDR SVI.

EJI Team Response. The SVM measures population characteristics that may influence the ability of a community to respond to environmental hazards or influence environmental decision-making due to discrimination, limited resources, or other societal barriers. Community characteristics that may influence environmental decision making can also be risk factors for various health outcomes. Many of these factors are considered, aligning with SDOH domains such as economic stability, education access and quality, health care access and quality, and social and community context. This framework for understanding social vulnerability is distinct from the framework used for the CDC/ATSDR SVI, which was developed to help officials identify communities that may need support during public health emergencies or disasters. The SVM focuses more on factors that influence long-term risk and resilience to environmental hazards and characteristics that can affect health and wellbeing.

How were SVM indicators selected?

The EJI team received questions about the process for vetting indicators and why specific indicators are not included in the SVM, such as historical redlining and unhoused persons.

EJI Team Response. Information on indicator selection and screening can be found on pages 13-16 of the [EJI 2022 Technical Documentation](#) and on page 10 -11 of this report. We would like to emphasize that indicators considered for inclusion in the SVM were screened by asking, *Do the populations represented in the indicator have less capacity to improve environmental conditions or advocate against unwanted land uses in their communities because of historical or ongoing discrimination or other factors?*

Indicators considered for inclusion in the SVM, but ultimately not included, are listed below along with their reasons for exclusion.

Indicator considered	Reason for exclusion
Income (median per capita)	Income represents a similar kind of economic measure to poverty but is not as widely used in the literature or as well understood. Income as it relates to cost of living varies widely, so this indicator was instead represented by an indicator for housing-burdened, lower-income households.

Income inequality	Income measurements are not directly calculated by the U.S. Census Bureau. This measure is also indirectly captured by other variables in the EJI.
Single-parent households (with children under the age of 18)	Single-parent households was not a measure tied to environmental justice or cumulative impacts in the literature, therefore this indicator did not meet our inclusion criteria.
Multiunit structures (housing structures with 10 or more units)	Multiunit housing was not strongly related to environmental justice or cumulative impacts in the literature and was found to be more relevant to disaster preparedness and response.
Crowding (occupied housing units with more people than rooms)	Crowding was not strongly related to environmental justice or cumulative impacts in the literature and was found to be more relevant to disaster preparedness and response.
No vehicle access	Lack of access to a vehicle was not strongly related to environmental justice or cumulative impacts in the literature and was found to be more relevant to disaster preparedness and response.
Segregation Index	The Segregation Index describes something similar to percent minority or minoritized populations (minority status) and can be defined in many ways (see U.S. Census Bureau definition of measures of residential segregation). Additionally, more literature reports on discrimination and disparities as a function of race/ethnicity itself, rather than as a function of the measures of segregation defined above.
History of redlining	Indicators of the history of redlining do not measure characteristics of a population, but rather characteristics of an area. While redlining and related discriminatory practices by the Homeowners Loan Corporation (HOLC) was an important historical phenomenon with long-lasting effects, redlining was a single practice that was part of a much larger group of practices that systematized racism and discrimination in housing. Redlining largely took place in urban areas and did not affect the entire nation. Measuring redlining alone without measuring other discriminatory practices for which data is not as publicly available or maintained, misses important features of discriminatory housing practice. Furthermore, many historically redlined urban areas have since gentrified or are in the process of gentrification, reducing its effectiveness as a measure of contemporary social vulnerability due to discrimination.
Incarcerated persons	Incarcerated persons are included in the “group quarters” indicator within the SVM but are not identifiable as a separate category within data from the U.S. Census Bureau.

What is the purpose of the minority status indicator?

The EJI team received questions about the purpose of the minority status indicator and caveats related to its use.

EJI Team Response. The minority status indicator in the SVM measures the percent of census tract population that is a racial or ethnic minority (i.e., all persons except white, non-Hispanic). Like all SVM indicators, minority status should not be interpreted to mean that persons from marginalized groups are

inherently more vulnerable to environmental hazards. Instead, its inclusion in the SVM acknowledges that minoritized racial and ethnic groups have been, and continue to be, socially and economically marginalized. Minoritized groups face contemporary discrimination and a legacy of systematized discriminatory policies that have led to disparities in many social determinants of health.

We know that minoritized persons are disproportionately affected by environmental burdens. Unwanted land uses are disproportionately located near minoritized communities. There is evidence of discrimination within the institutional medical system. Studies spanning nearly four decades consistently point to racial and ethnic characteristics of communities as the single most important predictor of hazardous waste site locations in the United States. Racial and ethnic minorities are disproportionately represented in populations surrounding these sites (see [Toxic Wastes and Race at Twenty: 1987-2007](#) by Bullard et al., 2007 and [Toxic Waste and Race in Twenty-First Century America](#) by Mascarenhas et al., 2021). Meanwhile, minoritized persons experiencing negative health effects associated with environmental pollution may experience barriers to accessing health care because of discrimination and other factors. They often experience worse outcomes than white or non-minoritized persons (see [The Lived Experience of Race and Its Health Consequences](#) by Smedley, 2012).

Although race and ethnicity status are key historic and ongoing contributors to social vulnerability and environmental injustice, there may be instances when neither is relevant to a given study or action. It is a notable feature of the EJI that users can remove or add indicators or domains. In cases where law or best practices prevent the consideration of race and ethnicity in decision-making processes, users can remove the minority status indicator.

EJI Environmental Burden Module (EBM)

Detailed information on select EBM indicators

Comments and questions in this section focused on learning more about specific indicators in the 2022 EBM, including (1) impaired surface water, (2) lack of recreational parks, (3) airports, (4) lack of walkability, (5) housing built pre-1980, and (6) railways indicators.

EJI Team Response. The [EJI 2022 Technical Documentation](#) contains more detailed information about each indicator included in the EBM, including the data source, year of data used, references to literature that support the inclusion of the indicator in the EJI, and step-by-step information on how each indicator was calculated.

Here are the indicators that users were particularly interested in learning more about.

Indicator	Indicator Description
Impaired Surface Water Indicator	The impaired surface water indicator in the 2022 EJI uses data from the EPA Watershed Index Online (WSIO), which contains information on the level of degraded water quality for each watershed hydrographic unit (HUC12) in the United States. The EJI team downloaded the data from WSIO and calculated the proportion and percentage of each census tract that intersected with a HUC12 watershed with impaired water quality.

Lack of Recreational Parks	The lack of recreational parks indicator in the 2020 EJI uses the 2020 TomTom MultiNet® Enterprise Dataset, which includes national, state, and local recreational areas and public forests.
Airports	The airports indicator in the 2022 EJI uses the 2020 TomTom MultiNet® Enterprise Dataset, which includes airports with at least one runway, including local, regional, international, and military airports.
Lack of Walkability	The lack of walkability indicator uses data from the 2021 EPA National Walkability Index (NWI). The NWI calculates walkability for block groups throughout the United States and gives them a score from 1 (least walkable) to 20 (most walkable). More information on how the NWI is calculated can be found in the EPA's National Walkability Index Methodology and User Guide . The EJI calculates the percentile rank of the NWI Score for all census tracts and then takes the inverse of the percentile rank scores to calculate the walkability per census tract.
Housing Built Pre-1980	The housing built pre-1980 indicator in the 2022 EJI comes from the U.S. Census Bureau's ACS for 2015-2019. The indicator includes all occupied housing units built before 1980, when the ban on lead-based paint was established and cannot be broken down by housing type. For more information on how the ACS defines housing units and occupied housing units, please see the 2019 ACS Documentation on Living Quarters, beginning on page 7.
Railways	The railway indicator in the 2022 EJI comes from the 2020 TomTom MultiNet® Enterprise Dataset, which only includes information on the location of railways and does not include information on railway quiet zones or the success of their implementation.

Potential New EBM Indicators

Comments and questions in this section focused on suggesting new indicators for inclusion in future releases of the EBM, including indicators on (1) concentrated animal feeding operations (CAFOs), (2) marine port data, (3) public water sources, (4) pipelines, (5) indoor toxic pollutants, (6) heat index, (7) wind chill, (8) noise pollution and quiet zones, and (9) environmental amenities (e.g., access to swimming pools and swimming lessons to prevent drowning deaths during national disasters).

EJI Team Response. The EJI team continues to assess potential new indicators for inclusion. In order for indicators to be included in the EBM, potential new indicators will need to be supported by current EJI literature and pass EJI global and module-specific inclusion criteria. More information on the EJI inclusion/exclusion criteria may be found on page 13 of the [EJI 2022 Technical Documentation](#).

Potential new indicators that were suggested to the EJI team as part of the Community Engagement Workshops are included below, along with the steps that the EJI team is currently taking to assess these indicators for inclusion.

Indicator considered	Next Steps for Potential Inclusion
Concentrated Animal Feeding Operations (CAFOs)	Current national data sources for CAFOs are incomplete and do not pass the EJI’s data inclusion/exclusion criteria. The EJI team will continue to assess potential data sources for inclusion in a future release of the EJI.
Marine Port Data	The EJI team will begin assessing the possibility of including marine port data in the EJI.
Public Water System	The EJI team is currently assessing national public water system data sources for inclusion in a future release of the EJI.
Pipelines	The EJI team will begin assessing the possibility of including the Energy Information Administration pipeline data into a future release of the EJI.
Metal Processing Facilities	The EJI team will begin assessing the potential to include metal processing facilities into a future release of the EJI.
Indoor Toxic Pollutants	The EJI team previously assessed the potential to include indoor toxic pollutants (e.g., lead, volatile organic compounds (VOCs), and indoor air pollution from natural gas use in homes) as indicators in the 2022 EJI and were able to include the indicator of “Houses Built Pre-1980” to represent potential exposure to lead-based paints. The EJI will continue to assess the feasibility of incorporating additional indoor toxic pollutants in future releases of the EJI as new data becomes available.
Heat Index	The EJI team has begun to assess the feasibility of incorporating climate-related indicators, such as historical heat index data, into a future release of the EJI.
Wind Chill	The EJI team has begun to assess the feasibility of incorporating climate-related indicators, such as historical wind chill data, into a future release of the EJI.
Noise Pollution and Quiet Zones	The EJI team has begun to assess incorporating noise pollution data into a future release of the EJI, to better estimate all traffic-related noise pollution from railways, airports, and traffic. The EJI team will begin to assess if railway quiet zone data exist nationally and if it is feasible to include quiet zone data into a future release of the EJI.
Environmental Amenities	The EJI team will begin assessing the feasibility of including environmental amenities, including access to pools and swimming lessons into the EJI.

How were the proximity-based indicators calculated?

The EJI team received questions about the one-mile distance used to calculate the proximity-based indicators. An additional question focused on whether data (such as building footprints and/or parcel data) could be used to assess the number of people being exposed to each pollutant more accurately.

EJI Team Response. The EJI team determined that using a uniform one-mile buffer for all proximity-based indicators would help with the interpretation of EJI indicators and results by a wide audience. One-mile buffers are commonly used in research to illustrate proximity in issues of environmental burden or environmental justice. One-mile buffers may be appropriate for high-level screening tools, such as the EJI. But different buffer sizes (based on exposure type) or more granular data (e.g., building footprints and/or parcel data) may be more appropriate for assessing an individual's level of risk or exposure. More information on the use of one-mile buffers for proximity indicators can be found in the [EJI 2022 Technical Documentation](#), starting on page 8.

Detailed Information and Future Directions for the Hazardous Sites Indicators

There was interest in learning about how the proximity-based hazardous sites indicators were calculated, specifically whether centroids of the facility/census tract were used. Concerns were also raised about the data source's accuracy in identifying local facilities, with requests for more information on the original data sources. Additionally, there was interest in the types of facilities included in the Treatment, Storage, and Disposal Facilities (TSDFs) indicator and whether Large Quantity Generators (LQGs) would be included in future updates.

EJI Team Response. There are six proximity-based indicators included in the Potentially Hazardous and Toxic Sites domain of the EMB: (1) National Priorities List Sites, (2) Toxic Release Inventory Sites, (3) Treatment, Storage, and Disposal Facilities (TSDFs), (4) Risk Management Plan Sites, (5) Coal Mines, and (6) Lead Mines. The first four indicators come from the EPA Facility Registry Service (FRS), and coal and lead mine data come from the U.S. Mine Safety and Health Administration (MSHA) Mine Data Retrieval System (MDRS). Information for how facilities were identified by each data source may be found on the [U.S. EPA FRS](#) and [MSHA MDRS](#) websites.

To calculate each indicator in the Potentially Hazardous and Toxic Sites domain, point data were downloaded for each type of hazardous facility from the U.S. EPA FRS and MSHA MDRS. Data were filtered to the specific type of facility (e.g., National Priorities List sites), and one-mile buffers were added around each facility. The buffered hazardous site data was then intersected with census tract boundary data to determine the proportion of each census tract that was within one mile of a hazardous facility. More information on how each indicator was calculated can be found in the [EJI 2022 Technical Documentation](#).

The 2022 EJI Technical Documentation also contains information on what is included in the TSDFs indicator. Currently, the EJI 2022 only includes sites identified as TSDFs according to the US EPA FRS. The EJI team is working to incorporate LQGs into this indicator for the next release of the EJI.

Detailed Information on the EBM Air Pollution Indicators

There was interest in learning more about the air pollution indicators in the EJI, specifically: (1) which indicators are included (e.g., toxic air contaminants, methane, diesel particulate matter, big car facilities), (2) the timeframe and data sources for those indicators, (3) whether it is possible to view a list of air pollution sites included in the EJI, and (4) if the EJI accounts for the effect of mountainous regions on air pollution.

EJI Team Response. There are currently four indicators included in the Air Pollution domain of the EJI Environmental Burden Module: (1) Ozone, (2) Particulate Matter 2.5 (PM2.5), (3) Diesel Particulate Matter, and (4) Air Toxics Cancer Risk. Each air pollution indicator included in the EJI comes from the EPA and uses the most recent data that was available at the time of publishing the 2022 EJI. This means that the ozone and PM2.5 indicators come from the 2014–2016 [U.S. EPA Air Quality System \(AQS\)](#) and the diesel particulate matter and air

toxics cancer risk indicators come from the 2014 [U.S. EPA National Air Toxics Assessment \(NATA\)](#). The [EJI 2022 Technical Documentation](#) has more information on the air pollution indicators included in the EJI.

The EJI uses both monitored and modeled data from the EPA to calculate these indicators to get a more accurate picture of air quality in the nation. The U.S. EPA AQS and NATA websites (above) have more information about what is included in the original data sources. View the monitor locations for these indicators through the [U.S. EPA AirData Map](#) application.

Why are there data discrepancies with the Coal and Lead Mine Indicators?

The EJI team received questions about the coal and lead mine indicators that may be incorrect for their communities and were interested in learning more about how EJI users could address and highlight such discrepancies for review.

EJI Team Response. Based on feedback received during and after the EJI Community Engagement Workshop sessions held in 2023, the coal and lead mine indicators were corrected and the values for these fields were updated in the 2022 EJI. The [EJI Data Download webpage](#) has more information about these updates. EJI users can continue to address and highlight such data discrepancies during community engagement sessions and by contacting us through the EJI Coordinator inbox at ejc_coordinator@cdc.gov.

EJI Health Vulnerability Module (HVM)

What data are collected and available through CDC's Behavioral Risk Factor Surveillance System (BRFSS)?

The EJI team received questions about how data are collected through BRFSS and what measures are available.

EJI Team Response. BRFSS collects many of the data used to develop the HVM indicators. You can find more information on BRFSS, including survey data and documentation, at [CDC's Behavioral Risk Factor Surveillance System Web Page](#).

How does the EJI determine high estimated prevalence of cancer?

The EJI team received questions about the reason some areas with known elevated cancer rates are not flagged as experiencing high estimated cancer prevalence by this indicator.

EJI Team Response. The High Estimated Prevalence of Cancer Indicator within the HVM represents the crude prevalence of all-cause cancer (excluding skin cancer) among adults ages 18 and older in the United States. The source for this measure is the CDC's PLACES dataset. The PLACES website provides documentation on how these estimates are calculated (see [PLACES: Local Data for Better Health](#)). It is important to note that this crude rate is (1) not age-adjusted, (2) not stratified by race/ethnicity, and (3) combines many different cancer types, which have different risk factors and distributions among populations.

Because cancer is more common in older populations and different types of cancer can be more or less common among people with different racial/ethnic backgrounds, this is not an informative measure for understanding actual patterns of cancer distribution or potential cancer "hotspots." The use of this measure in the EJI is purely for capturing population-level physical susceptibility to environmental pollution. It should not be used or interpreted for other purposes.

For additional information on how to understand and interpret place-based measures of cancer incidence, see [CDC/ATSDR's Guidelines for Examining Unusual Patterns of Cancer and Environmental Concerns](#). These guidelines cover many of the potential considerations and limitations associated with investigations into unusual patterns of cancer.

Why is smoking not included as an HVM indicator?

A suggestion was made to look at smoking, or the prevalence of smoking, as a new indicator to consider for inclusion in the HVM.

EJI Team Response. We acknowledge that smoking and its health impacts are important to consider as aspects of health vulnerability. However, it is less clear if smoking meets all criteria necessary for inclusion in the EJI. Ultimately, the future inclusion of a smoking indicator will be determined after data evaluation data and consultation with communities and subject matter experts.

While smoking was not evaluated for inclusion in EJI 2022, we acknowledge that it bears consideration as a future candidate. Smoking is the leading preventable cause of death in the United States, with approximately 480,000 deaths each year attributed to cigarette smoking and exposure to tobacco smoke (see [The health consequences of smoking—50 years of progress: a report of the Surgeon General](#)). You can find data on the estimated prevalence of smoking by census tract through CDC's PLACES program (see [PLACES: Local Data for Better Health](#)). However, to include smoking as an indicator in the HVM, it must meet the inclusion criteria applied to all HVM indicators, including theoretical and statistical criteria. The [EJI 2022 Technical Documentation](#) has details on how indicators are evaluated for inclusion in the EJI.

Based on the importance of smoking to communities and the availability of relevant data, we will pursue this indicator for future versions of the EJI. We will evaluate smoking based on its theoretical merits and statistical value to the index and present our findings as part of future community engagement efforts. We will make the final decision after receiving feedback from communities and subject matter experts.

Conclusion and Future Directions

The EJI will continually improve and expand its scope to better serve champions of environmental justice and health equity. We always aim to better represent the lived experiences of communities facing environmental injustice. Planned changes include adjustments to indicators based on further developments in source data, which will ensure that our measures accurately reflect evolving justice and equity needs. Page 7 of the [EJI 2022 Technical Documentation](#) provides an in-depth explanation of the methodology and its constraints. We are committed to fostering more collaborative opportunities through additional workshops, inviting broader engagement from the community to drive impactful action. We will include data for Alaska, Hawaii, and Puerto Rico as they become available to ensure that environmental justice considerations are not limited to the contiguous United States. Furthermore, we will focus on updating and enhancing our communication materials, including technical and guidance documentation. This will ensure that users can access accurate and detailed information on data sources, methodology, and interpretation. These ongoing efforts will contribute to the EJI's effectiveness in informing policy, research, and advocacy efforts aimed at achieving environmental justice nationwide.

EJI Resources

1. EJI General Resources Webpage

[EJI Resources | Place and Health | ATSDR \(cdc.gov\)](https://atsdr.cdc.gov/place-health/php/eji/eji-resources.html)

[<https://atsdr.cdc.gov/place-health/php/eji/eji-resources.html>]

2. EJI Data Download

[EJI Data Download | Place and Health | ATSDR \(cdc.gov\)](https://atsdr.cdc.gov/place-health/php/eji/eji-data-download.html)

[<https://atsdr.cdc.gov/place-health/php/eji/eji-data-download.html>]

3. EJI Demo

[The Environmental Justice Index: Measuring the Cumulative Impacts of Environmental Burden on Health \(youtube.com\)](https://www.youtube.com/watch?v=FEGnzu14lko&t=11s)

[<https://www.youtube.com/watch?v=FEGnzu14lko&t=11s>]

4. EJI Technical Documentation

[Technical Documentation for the Environmental Justice Index \(2022\)](https://atsdr.cdc.gov/place-health/media/pdfs/2024/07/EJI-2022-Documentation-508.pdf)

[<https://atsdr.cdc.gov/place-health/media/pdfs/2024/07/EJI-2022-Documentation-508.pdf>]

5. Using the Environmental Justice Index: A Resource for State, Local, and Tribal Government

[Guidance Document | EJI \(cdc.gov\)](https://atsdr.cdc.gov/place-health/php/eji/how-to-use-the-environmental-justice-index-at-the-state-and-local-level.html)

[<https://atsdr.cdc.gov/place-health/php/eji/how-to-use-the-environmental-justice-index-at-the-state-and-local-level.html>]

If you would like to engage with us further, please reach out to us at ejc_coordinator@cdc.gov.

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