

Methods

Indicator

E10: Percentage of children ages 0-17 years living within one mile of Superfund and Corrective Action sites that may not have all human health protective measures in place, 2023.

E11: Distribution by race/ethnicity and family income of children living near selected contaminated lands in 2023, compared with the distribution by race/ethnicity and income of children in the general U.S. population.

Summary

EPA's Office of Land and Emergency Management has compiled data on contaminated lands from the RCRA Corrective Action Program and the Superfund Program. These data include the latitude and longitude, site areas, and the status of human health protective measures as of October 1, 2023. Indicators E10 and E11 present information about children living within one mile of Superfund or RCRA Corrective Action sites that may not have all human health protective measures in place as of October 1, 2023. A computer mapping tool was used to identify all land areas within one mile of the estimated boundary of each of these sites. Data from the American Community Survey 2022 5-Year Data (U.S. Census) were then used to estimate the population of children ages 0 to 17 years living within these areas. Indicator E10 gives the percentages of children living within one mile of these selected sites, by race/ethnicity, and family income. Indicator E11 gives the percentages of each race/ethnicity for children living within one mile of these selected sites and the percentages of each race/ethnicity for all U.S. children, for all incomes and for children below poverty.

Overview of Data Files

The following files are needed to calculate this indicator.

- An Excel file that gives the site information for all RCRA Corrective Action Program and the Superfund Program sites that may not have all human health protective measures in place as of October 1, 2023. These files were obtained from EPA's Office of Land and Emergency Management. A shapefile that contains the boundary of the Superfund sites was updated by and obtained from Shared Enterprise Geodata and Services in 2024. The boundary shapefile was obtained from here: <https://catalog.data.gov/dataset/npl-superfund-site-boundaries-epa4>
- American Community Survey (ACS) 2022 5-Year Data for the entire United States from the US Census at the Block Group level and Census Tract level. For each Census Block Group, we needed the population (0-17). For each Census Tract we needed the populations by age (0-17), poverty level, and race/ethnicity for the following race/ethnicity groups: White, Black, AIAN, Asian, NHOPI, Other, Two or More Races, and Hispanic and White Alone. The populations of the Other and Two or More Races groups were summed to give the populations for the "All Other Races"

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group. The 2022 ACS 5-Year data was obtained from here:

<https://www.census.gov/data/developers/data-sets/acs-5year.html>

- U.S. Census 2020 Block Group mean centers of population (centroids) were obtained from: <https://www.census.gov/geographies/reference-files/time-series/geo/centers-population.html>
- U.S. Census 2020 Tract boundary data was obtained from: <https://www.arcgis.com/home/search.html?restrict=false&sortField=relevance&sortOrder=desc&searchTerm=us+census+tract+boundaries#content>

Calculation of Indicator

1. Source data pull.

Obtain the Block data from the ACS 2022 5-Year Data files from the U.S. Census for the entire United States. Specifically, at the Census Tract level obtain sex by age counts for the White population, Black population, AIAN population, Asian population, NHOPI population, Other population, and Two or More Races populations. Also obtain the Hispanic ethnicity sex by age counts for the population. Obtain the population counts of the same race/ethnicity groups by age from the Census Tract data, for all income levels, and for the populations of each race/ethnicity group by age below the poverty level and for each race/ethnicity group by age at or above the poverty level. At the Block Group level obtain population by sex and age.

2. Aggregate American Community Survey 2022 5-Year Data.

Sum the Block Group populations over the age groups 0–4, 5–9, 10–14, and 15–17, and over the two sexes. For each race/ethnicity group, sum the tract populations over the age groups 0–4, 5–9, 10–14, and 15–17, and over the two sexes. Sum the populations for the Other and Two or More Races groups to create the “Other Races” race/ethnicity group. The Census Tract populations are summed into one field for each race/ethnicity group for the total population of children ages 0 to 17 years, and into another field for the population below poverty of children ages 0 to 17 years for each race/ethnicity group.

3. Spatially select Block Groups that intersect the contaminated lands buffer file.

For each contaminated land site in the RCRA Corrective Action Program and the Superfund Program file of sites that may not yet be protective for people without boundary information, create circles with centers at the given latitude and longitude and areas equal to the given acreage. Increase the radius of each circle or boundary by one mile to create a buffer area extending one mile beyond the modeled-circular boundary or boundary. The original land area polygon (i.e., circle) based on the Excel file, and the resulting one-mile buffer are dissolved into one polygon (i.e., circle). That combined polygon is used to select all Block Group centroids that intersect the contaminated land, including the buffer area. This process creates all combinations of contaminated land areas with Block Groups that intersect them. If two contaminated lands buffers overlap and contain the same Block Group centroid, then the same Block Group would only be counted once.

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4. Create poverty level proportions from the Block Group and join them back to the Block table.

The Block Groups are a smaller Census division that rolls up into the Census Tract level. Many Block Groups may make up one Census Tract, and the ACS does not release race, ethnicity or family income level data at the Block Group level. The percentage of the total number of children 0 to 17 for each race/ethnicity/family income bin in each Census Tract was calculated and then applied to the total number of children 0 to 17 in each Block Group within the Census Tract to estimate the number of children 0 to 17 in each race/ethnicity/family income level bin for each Block Group.

5. Aggregate the data for all Block Groups in the United States.

Sum the populations over all Block Groups in the United States in each race/ethnicity/family income level bins. (\sum Number of children in income group i and race/ethnicity group r)

6. Calculate the percentages of children living within one mile of contaminated lands (Indicator E10).

Divide the number of children living within one mile of contaminated lands by the total number of children in the US (for whom poverty levels were calculated).

Percentage of children in income group i and race/ethnicity group r living within one mile of contaminated lands = $\text{Number of children in income group } i \text{ and race/ethnicity group } r \text{ living within one mile of contaminated lands} / \text{Number of children in income group } i \text{ and race/ethnicity group } r \times 100\%$

7. Calculate the percentages of each race/ethnicity for children living within one mile of contaminated lands and for all children (Indicator E11).

Divide the number of children of each race/ethnicity living within one mile of contaminated lands by the total number of children of all races and ethnicities living within one mile of contaminated lands. Divide the number of children of each race/ethnicity by the total number of children of all races and ethnicities.

Percentage of children in income group i living within one mile of contaminated lands that are in race/ethnicity group r = $\text{Number of children in income group } i \text{ and race/ethnicity group } r \text{ living within one mile of contaminated lands} / \text{Number of children in income group } i \text{ living within one mile of contaminated lands} \times 100\%$

Percentage of children in income group i that are in race/ethnicity group r = $\text{Number of children in income group } i \text{ and race/ethnicity group } r / \text{Number of children in income group } i \times 100\%$

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Questions and Comments

Questions regarding these methods, and suggestions to improve the description of the methods, are welcome. Please use the “Contact Us” link at the bottom of any page in the America’s Children and the Environment website.