June 20, 2025

Map of Overburdened Areas in Bernalillo County:
How the Interactive Map Was Made

On January 16, 2024, the Albuquerque-Bernalillo County Air Quality Control Board passed the "Health, Environment and Equity Impacts" regulation.[1] The regulation requires, among other things, that the City of Albuquerque Environmental Health Department (EHD) develop a map that displays overburdened areas in Bernalillo County. The regulation defines overburdened areas as "twenty percent of census block groups in Bernalillo County that experience the highest cumulative environmental and public health stressors," considering environmental factors (herein also described as indicators), health indicators, and social determinants of health (SDOH) indicators.

In response to these requirements, on January 1, 2025, EHD posted to its website Version 1.0 of a map of overburdened areas in Bernalillo County.[2] That version of the map considered only those indicators identified in the original regulation. Subsequently, EHD posted an updated version of the map that contains two additional indicators. EHD has already sought and considered public input on this mapping project. In the future, EHD must update this map at least every 5 years.

This report documents how EHD generated its map of overburdened areas. The report lists the indicators that were included in the analysis of overburdened areas; and it identifies the data sources that were selected for each indicator. It also describes how EHD evaluated the available data to determine which census block groups countywide should be considered overburdened areas. The latest version of the map of overburdened areas is presented at the end of this report.

Indicators Considered for Overburdened Areas

The "Health, Environment and Equity Impacts" regulation lists several indicators that EHD was required to consider when developing the map of overburdened areas. These indicators are classified into three categories: environmental factors(indicators), health indicators, and SDOH indicators. Table 1 lists the 17 indicators that EHD considered in the current version of the overburdened area map. But as described below, sufficient data was available to develop 16 of these 17 indicators. EHD took two steps to determine what indicators to include when developing the overburdened area map.

First, the regulation identified 16 indicators that were required to be considered in the mapping process. With one exception, these indicators factored into the evaluation. As the one exception, the regulation indicated that EHD shall consider pediatric asthma prevalence when identifying overburdened census block groups. EHD first attempted to obtain the spatially resolved pediatric asthma data from the New Mexico Indicator Based Information System (NM-IBIS). While NM-IBIS tracks pediatric asthma prevalence, the data are only available at the county level—and not at the census tract or census block group level. EHD also attempted to obtain these data from Centers for Disease Control and Prevention (CDC) data sources that were used for the other health indicators, but those CDC data are based on surveys of adults and do not provide insights on pediatric asthma prevalence. EHD ultimately decided that the available data are not at a spatial resolution needed to be useful for the analysis of overburdened areas; that is why the pediatric asthma prevalence indicator was not included in this

[1] See: https://www.cabq.gov/environmentalhealth/documents/20-11-72-health-environment-and-equity-impacts-rulle-heei-english.pdf.

[2] See: https://www.cabq.gov/environmentalhealth/public-health/overburdened-areas-map-version-0.1.

analysis. EHD will revisit this decision in the future if reliable data sources become available that report pediatric asthma prevalence for individual census tracts or census block groups in Bernalillo County.

Second, EHD sought input from the public about which additional indicators should be considered when identifying overburdened areas. Between August and November 2024, EHD held ten public consultation sessions—four virtual and six in-person—to gather input from residents, community groups, and other interested parties. These public consultations were geographically selected to afford all citizens in the county an opportunity to contribute their input. After reviewing these recommendations, EHD opted to include two additional indicators in the analysis of overburdened areas. The two indicators were ambient concentrations of nitrogen dioxide and proximity to Superfund sites. Other recommended indicators were considered but not adopted for varied reasons. For example, one recommendation was to include proximity to wastewater discharge locations. This indicator was not considered because it is a better metric of water quality impacts, while the other environmental indicators shown in Table 1 better relate to air quality impacts. As another example, prevalence of diabetes was considered but ultimately not included because the U.S. Environmental Protection Agency's latest scientific assessment of particulate matter found "inadequate evidence" that having diabetes increased the risk of health effects due to particulate matter exposure.[3]

Therefore, based on regulatory requirements and public input, EHD developed the overburdened area map using the 17 indicators listed in Table 1. In the future, EHD will continue to review input from the public and other parties to decide whether future revisions of the overburdened area map are warranted and whether additional environmental, health, and SDOH indicators should be considered.

Data Sources Used to Evaluate Indicators

EHD next sought to identify data sources to evaluate the 17 indicators to be considered for the overburdened area map. EHD required that the data sources be issued by environmental or public health authorities; that the data sources be peer-reviewed or have been vetted by subject matter experts; and that the data sources be publicly available. EHD also considered specific data sources referenced in the "Health, Environment and Equity Impacts" regulation and identified during public consultation sessions.

The fourth column in Table 1 lists the two data sources that EHD ultimately used when preparing the latest overburdened area map:

- **The U.S. Environmental Protection Agency (EPA) Environmental Justice Screening and Mapping Tool (EJScreen).**[4] EJScreen provides nationally consistent data on environmental and socioeconomic indicators. EHD used EJScreen as the data source for all five environmental indicators, one health indicator (life expectancy), and all four SDOH indicators. All EJScreen data accessed for the overburdened area analysis are available at the census block group level. The final set of data used in the mapping analysis was accessed in December 2024 from EJScreen Version 2.3.

[3] See: Supplement to the 2019 Integrated Science Assessment for Particulate Matter. Published in May 2022. Available for download at: https://assessments.epa.gov/isa/document/&deid=354490.

[4] This resource was previously available at: https://www.epa.gov/ejscreen. However, since this report was initially drafted, EPA has taken down the resource. Multiple other organizations retained copies of EJScreen and have made them publicly available.

- **The CDC PLACES resource.**[5] Like EJScreen, PLACES provides nationally consistent data, except the focus is on health-related indicators. A primary source of data is the American Community Survey, which asks people to identify their diagnosed medical conditions and to provide other health-related information. EHD used PLACES data for five health indicators, all of which have data available at the census tract level. The final set of data used in the mapping analysis was accessed in December 2024 from the "PLACES 2024" version of this resource.

The original data that EHD downloaded from these two resources has been made publicly available.

Data Processing Steps

Several data processing steps were conducted to generate the map showing overburdened areas. It should be noted that the "Health, Environment and Equity Impacts" regulation did not specify how the individual indicator data must be processed. EHD researched algorithms used for this purpose and opted to adopt the algorithm used in the CalEnviroScreen Version 4.0 application. This decision was made because that application has undergone several rounds of peer review and public review; it has been widely used for evaluating cumulative impacts; and it continues to be publicly available.

Data were processed as follows:

- For each indicator, a data point was assigned to each of the 468 census block groups in Bernalillo County. EHD considered a few additional issues when generating the raw data for the 468 census block groups:
    - The PLACES data used in this evaluation is only available at the census tract level. EHD assigned the census tract values to all census block groups within the corresponding tracts.
    - When compiling these data, no adjustments were made based on census block group population density. EHD acknowledges that assigning a single indicator value to an entire census block group has known limitations, which can be more pronounced for census block groups that span large areas and have low population densities; the limitations can also be more pronounced for indicators that exhibit large spatial variations. For example, for some indicators, "pockets" within a large census block group can have considerably larger and smaller values than the average value assigned to the entire census block group. However, other jurisdictions and agencies (e.g., California, EPA) that have launched comparable mapping efforts were faced with this same issue and did not adjust for population density; as a result, EHD chose to not do so either.
    - Three census tracts in Bernalillo County have a population of fewer than 20 residents, according to U.S. Census data. This occurs for tract numbers 9408 (an area west of the City of Albuquerque where the Route 66 Casino Hotel is located), 9803 (an unincorporated area within the City of Albuquerque where the New Mexico State Fairgrounds is located), and 9806 (an area outside the City of Albuquerque where the Petroglyph National Monument is located). Due to the low population counts in these census tracts, the census block groups within the tracts did not have data for the several

[5] See: https://www.cdc.gov/places.

indicators, particularly the health indicators. Surrogate values of zero were assigned to the indicators for the census block groups within these tracts.

- The data points were then translated into rank percentiles. This resulted in the census block group with the lowest value for a given indicator being assigned a 0.0% percentile and the census block group with the highest value being assigned a 100.0% percentile. Census block groups with intermediate values had intermediate percentages assigned. At this stage of the evaluation, all indicators ranged on the same scale (i.e., from 0.0 to 100.0%), which helped ensure that no indicator was artificially weighted more or less heavily than others. The assignment of rank percentiles was done using the Microsoft Excel "PERCENTRANK.INC" function. This function assigns a percentile based on the rank of values in a data set. Using percentile ranks ensures that outlier values are not artificially weighted because the magnitude of the data points do not affect the percentile rank. As a result, no special treatment for data outliers was necessary. At the end of this data processing step, every census block group had 17 values between 0.0% and 100.0% assigned—one percentage rank value for each of the 17 indicators.

- For each census block group, EHD then calculated composite percentages for four subsets of indicators: the "environmental factors – exposure" indicators, the "environmental factors – sources" indicators, the health indicators, and the SDOH indicators. These calculations were arithmetic means of the indicator percentiles for each category. Within the four categories, no indicators were weighted more heavily than others. Table 1 lists the indicators within each category. After this data processing step, every census block group had four data points:

    - An average score for "environmental factors – exposures" indicators
    - An average score for "environmental factors – sources" indicators
    - An average score for health indicators
    - An average score for SDOH indicators

- The next step was to generate an overburdened area map score based on the numerical values of the four data points noted above. This calculation was done in three steps, following the approach that the State of California used in its CalEnviroScreen application[6]:

    - First, the two environmental factors indicators were collapsed onto one value, referred to here as the Pollution Index. This was done using the following equation, which is the same equation used in CalEnviroScreen:

$$Pollution\ Index = \frac{Avg.(EF\ Exposure) + 0.5\ x\ Avg.(EF\ Sources)}{1.5}$$

      In this equation, "EF" refers to environmental factors. In this equation, the average score for environmental factors that characterize exposures was added to one-half the average score for environmental factors (indicators) that characterize sources, and this

[6] For more information on the CalEnviroScreen approach, see: https://oehha.ca.gov/sites/default/files/media/downloads/calenviroscreen/report/calenviroscreen40reportf2021.pdf.

summation was divided by 1.5. CalEnviroScreen assigned half the weight to the score for environmental sources because that does not directly characterize exposures to pollutants. On the other hand, the environmental factors (indicators) for exposure (e.g., ambient concentrations of selected criteria pollutants) are better linked to population exposure to air pollution.

- Second, the scores for health indicators and SDOH indicators were collapsed onto one value, referred to here as the Vulnerable Populations Index. The calculation is an unweighted arithmetic mean:

$$Vulnerable\ Populations\ Index = \frac{Avg.(Health\ Indicators) + Avg.(SDOH\ Indicators)}{2}$$

- Third, the Overburdened Area Map Score—the final value used to generate the map of overburdened areas—was calculated as the product of the two indexes noted above.

$$Overburdened\ Area\ Map\ Score = (Pollution\ Index)\ x\ (Vulnerable\ Populations\ Index)$$

After completing these steps, all 486 census block groups in Bernalillo County had an Overburdened Area Map Score. By this approach, census block groups with disproportionately high environmental and health stressors tended to have higher Overburdened Area Map Scores than census block groups with lower stressors.

Map of Overburdened Areas in Bernalillo County

The last step in the mapping effort was to identify which census block groups in Bernalillo County should be considered overburdened areas, based on the requirements set forth in the "Health, Environment and Equity Impacts" regulation. If one interprets the regulation as overburdened areas being "the twenty percent of census block groups in Bernalillo County that experience the highest cumulative environmental and public health stressors" (and this wording is copied directly from the regulation), then an appropriate approach to identifying overburdened areas is to use the rank percentiles of the OBA scores.

To create the map, EHD calculated rank percentiles of the Overburdened Area Map Scores for the 468 census block groups in Bernalillo County. This was done using the Microsoft Excel "PERCENTRANK.INC" function. After doing this, every census block group had a percentile rank of Overburdened Area Map Scores between 0.0% and 100.0%; and 94 census block groups had values between 80.0% and 100.0%. These 94 census block groups were then displayed on the map of overburdened areas. Figure 1, on the final page of this report, shows the map of overburdened areas in Bernalillo County that reflects the 17 indicators shown in Table 1. The map is also available on the City of Albuquerque/EHD website.[7]

Note that the map only addresses the requirements set forth in the "Health, Environment and Equity Impacts" regulation. That regulation makes no mention of special considerations for census block groups underlying pueblos and Navajo Nation lands. EHD is addressing that topic separately from the analysis presented in this report. Note that the City of Albuquerque acknowledges and affirms tribal sovereignty and self-determination for tribal governments. It is the purpose of §§ 2-6-6-1 et seq., to recognize and formalize the government-to-government relationship between the City of Albuquerque and its adjacent

[7] See: https://www.cabq.gov/environmentalhealth/documents/15_indicator_bg_1.pdf.

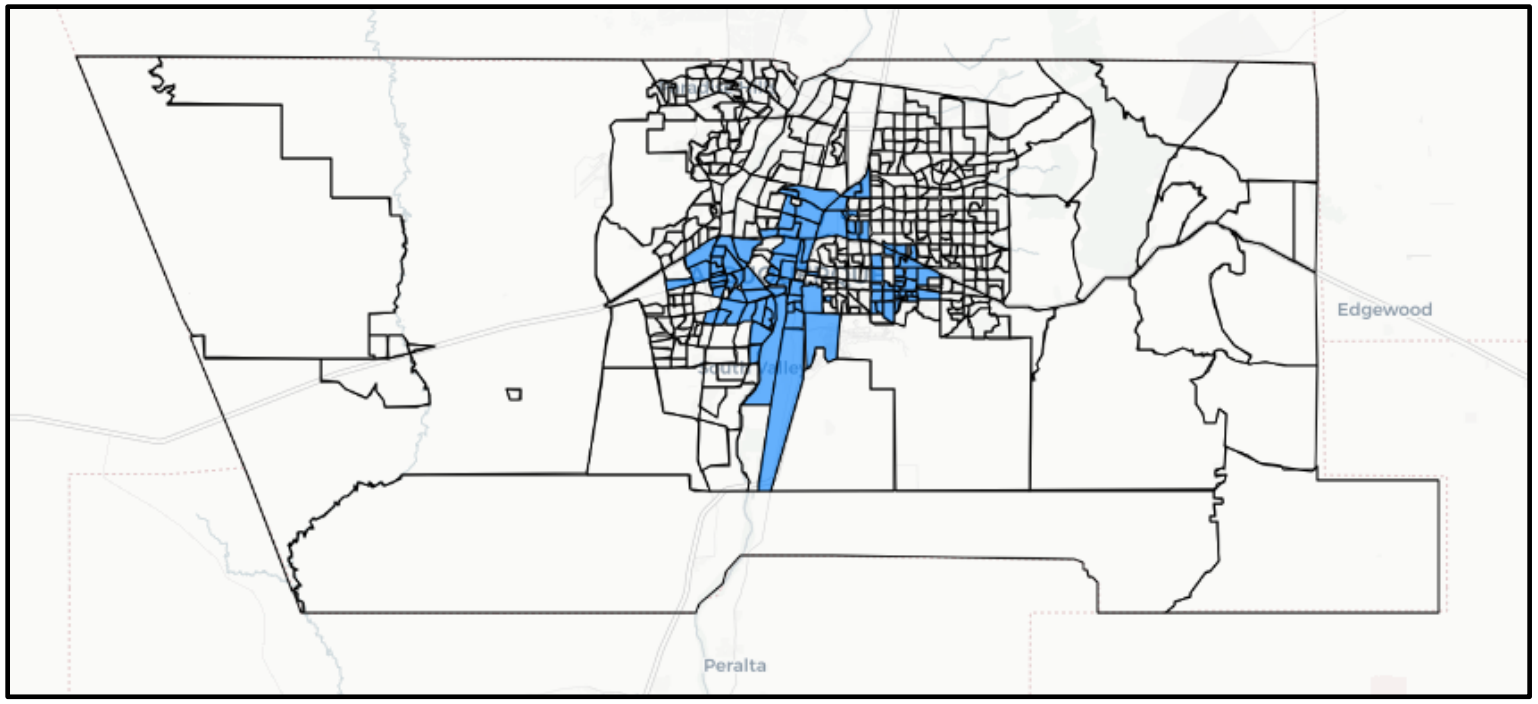
tribal communities and to promote the health, safety, and general welfare of its citizenry through the creation of a Commission on American Indian and Alaska Native Affairs. The Commission serves as the forum for government-to-government relations and as an advocate for American Indian/Alaska Native affairs within the City of Albuquerque and the surrounding area, including, but not limited to, matters of employment, education, economy, health, environment, homelessness, government, and access to services. The City will continue to foster partnerships with regional and tribal governments to address shared environmental challenges (such as developing the overburdened area map) and to protect water, land, and air across jurisdictions.

Table 1. Indicators and Data Sources Included in Developing the Map of Overburdened Areas

Indicator Category	Indicator Name	Indicator Description	Data Source	Spatial Resolution
Environmental factors - exposures	Ambient air concentrations of fine particulate matter ($PM_{2.5}$)	Annual average $PM_{2.5}$ concentration, as determined by monitoring and modeling.	EPA EJScreen, v2.3	Census block group
	Ambient air concentrations of ozone	Average of the ten highest 8-hour ozone concentrations in a year, as determined by monitoring and modeling.		
	Ambient air concentrations of diesel particulate matter	Annual average concentrations of diesel particulate matter, as determined by modeling.		
	Air emissions of air toxics	Annual emissions of air toxics reported to the Toxics Release Inventory, weighted by toxicity.		
	Traffic proximity	Amount of traffic on major roadways within 10 kilometers of a census block group centroid, divided by distance to those roadways.		
	Ambient air concentrations of nitrogen dioxide	Annual average nitrogen dioxide (NO_2) concentrations, as determined by monitoring and modeling.		
Environmental factors - sources	Proximity to Superfund sites	Count of Superfund sites (proposed and final National Priorities List sites and Superfund Alternative Approach sites) within 10 km, each divided by distance in km.		
Health indicators	Asthma prevalence in adults	Percent of adults with diagnosed asthma, calculated from self-reported information in CDC's Behavioral Risk Factor Surveillance System and American Community Survey.	CDC PLACES	Census tract
	Chronic obstructive pulmonary disease (COPD) prevalence in adults	Percent of adults with diagnosed COPD, calculated from self-reported information in CDC's Behavioral Risk Factor Surveillance System and American Community Survey.		
	Cardiovascular disease prevalence in adults	Percent of adults with diagnosed coronary heart disease, calculated from self-reported information in CDC's Behavioral Risk Factor Surveillance System and American Community Survey.		
	Cancer incidence among adults	Age-adjusted incidence of cancers (other than melanoma) per 100,000 adults, calculated from self-reported information in CDC's Behavioral Risk Factor Surveillance System and American Community Survey.		
	Adults with disabilities	Percentage of adults with any disability (e.g., hearing, vision, mobility, cognition, etc.), calculated from self-reported information in CDC's Behavioral Risk Factor Surveillance System and American Community Survey.		
	Life expectancy	Average life expectancy at birth, as reported by the National Center for Health Statistics.	EPA EJScreen, v2.3	Census block group

Indicator Category	Indicator Name	Indicator Description	Data Source	Spatial Resolution
Social determinants of health (SDOH) indicators	Population with less than high school education	Percent of adult (age 25 and older) population who did not receive a high school diploma, based on self-reported educational status in the American Community Survey.	EPA EJScreen, v2.3	Census block group
	Low-income households	Percent of households with total household income less than or equal to twice the national poverty level, based on U.S. Census data.		
	Limited English-speaking household	Percent of households in which no household members (age 14 or older) speak English at least "very well," as self-reported in the American Community Survey.		
	People of color	Percent of individuals who individuals who report being of a race other than white alone or who list their ethnicity as Hispanic or Latino, based on U.S. Census data.		

Figure 1. Map of Overburdened Areas in Bernalillo County



Note: Map is based on evaluation of the 17 indicators shown in Table 1.