

**ONE**  
**ALBUQUE**  
**RQUE**

**environmental  
health**

# Overburdened Areas Map: Version 0.1



Public Consultation Series: Initial Webinar

PRESENTATION: Tybur Casuse-Driovínto, María Gallegos



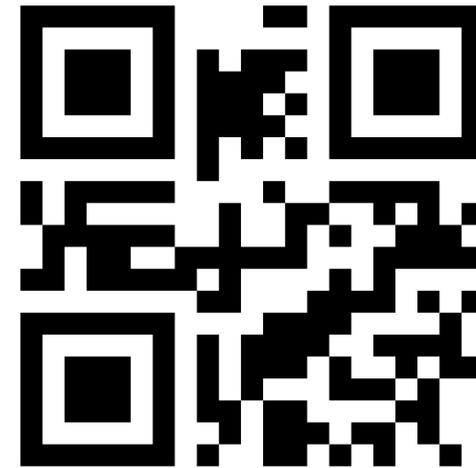
# Invitation and Plain Language

This is the first of six public consultations  
We would like to invite you to attend the interactive in person sessions

## Plain Language Description

- This rule enhances public participation in the air quality permitting process for Bernalillo County in areas which are considered to be overburdened.
- The rule identifies overburdened areas by considering cumulative impacts from socioeconomic, health, and environmental stressors.

Schedule and  
Online Engagement



[www.cabq.gov/HEEI](http://www.cabq.gov/HEEI)



[OBAmap@cabq.gov](mailto:OBAmap@cabq.gov)



# Health, Environment, and Equity Impacts

As described in the HEEI Rule: “Overburdened Area” means the twenty (20) percent of census block groups in Bernalillo County that experience the highest cumulative environmental and public health stressors ... considering at least the following indicators: environmental factors, health indicators, and social determinants of health as defined within this regulation

## Environmental Factors

- Annual Particulate Matter (PM 2.5)
- Ground level Ozone
- Diesel Particulate Matter
- Traffic Proximity
- Toxics Release

## Health Indicators

- Adult Asthma Prevalence
- **Pediatric Asthma Prevalence\***
- COPD Prevalence
- Heart Disease Prevalence
- Persons with Disabilities
- Life Expectancy
- Cancer Prevalence

## Social Determinants of Health

- Non-Highschool Attainment
- Low Income (<200% Poverty level)
- Percent Limited English Proficiency
- Percent non-white residents

# Data Sources

The regulation states data should be “...using the most recent version of the Environmental Protection Agency’s Environmental Justice (EJ) Screen and New Mexico Department of Health’s New Mexico Indicator Based Information System (NMIBIS) as on-line resources...

- EJ Screen 2.3 contains Environmental Factors and Social Determinants of Health as raw data sets in 2020 Block Group granularity
- NMIBIS provides only county granularity
- Behavioral Risk Factor Surveillance Survey (BRFSS)
- Center for Disease Control PLACES contains health indicator data from 2023 in 2010 Tracts Granularity (They are going to update to 2020 Tracts late 2024)

Therefore, we have used the most recent published files from EJ Screen and PLACES

- Non-HS Attainment
- Low income
- % Limited English
- % POC

- PM 2.5
- Ozone
- Diesel Particulate Matter
- Traffic Proximity
- Toxics Release

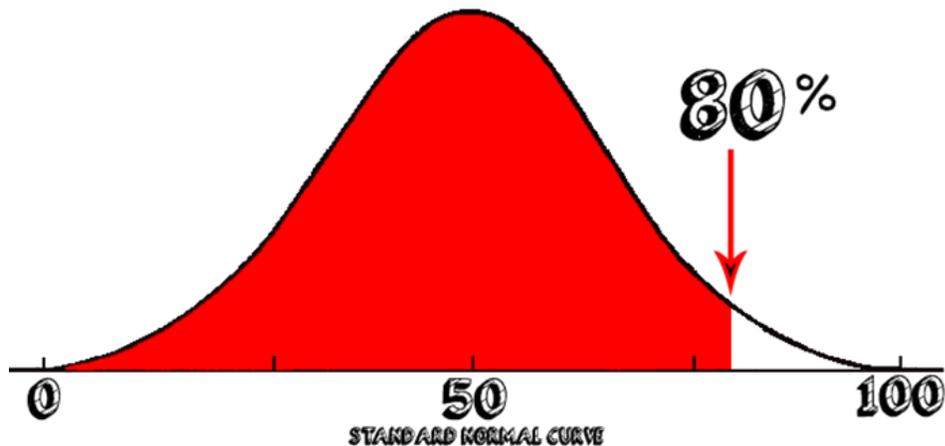
- Adult Asthma
- COPD
- Coronary Heart Disease
- Persons with Disabilities
- Life Expectancy
- Cancer

**EPA EJ Screen**  
Rank Percentiles from  
Raw Data

**CDC PLACES**  
Rank Percentiles from  
Raw Data

# Rank Percentile

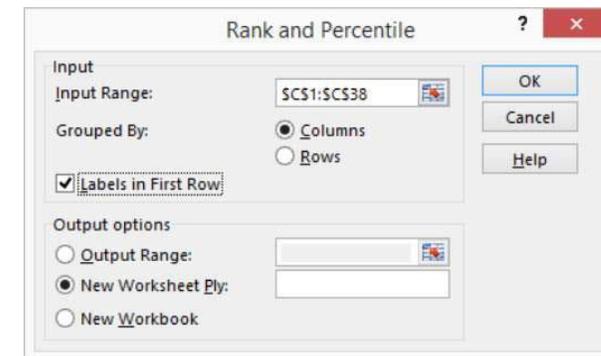
Identify the top 20% most impacted, 80<sup>th</sup> percentile, from raw data for Bernalillo



**Method 1:** Simple code in R studio which allows for processing of many datasets at once and simple processing.



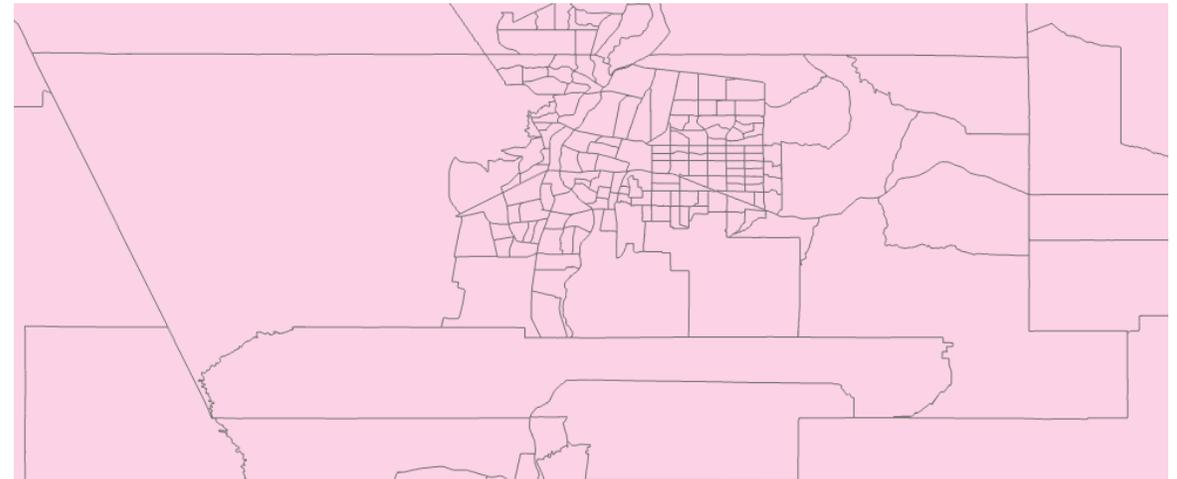
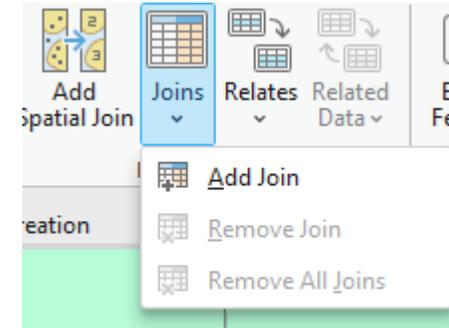
**Method 2:** Excel Rank and Percentile tool paired with the sort a to z tool in Excel can calculate percentiles from prevalence data.



# ArcGIS Joining data

The Shapefiles for the census geographic boundaries can be [downloaded from TIGER/Line](#)

The Join tool can be used to connect data files generated through Excel to census boundaries based on their unique GEOID numbers



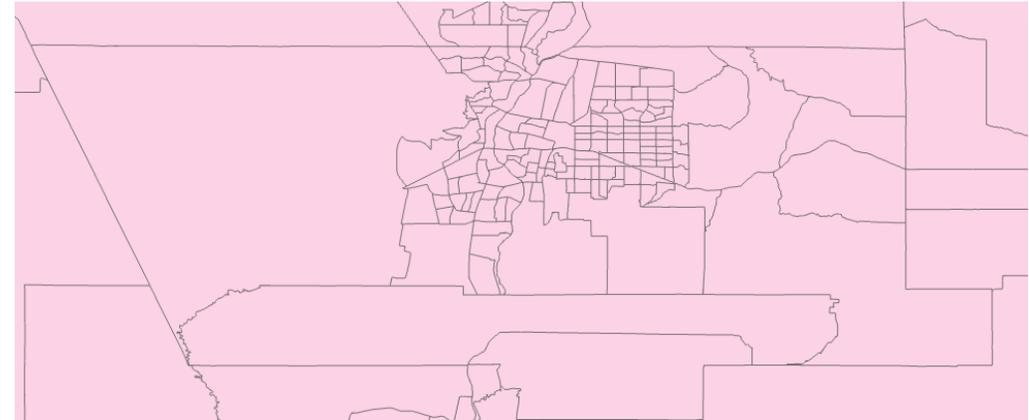
# Geoprocessing

PLACES is provided in 2010 Tracts and needed to be converted to 2020 Block group shapes

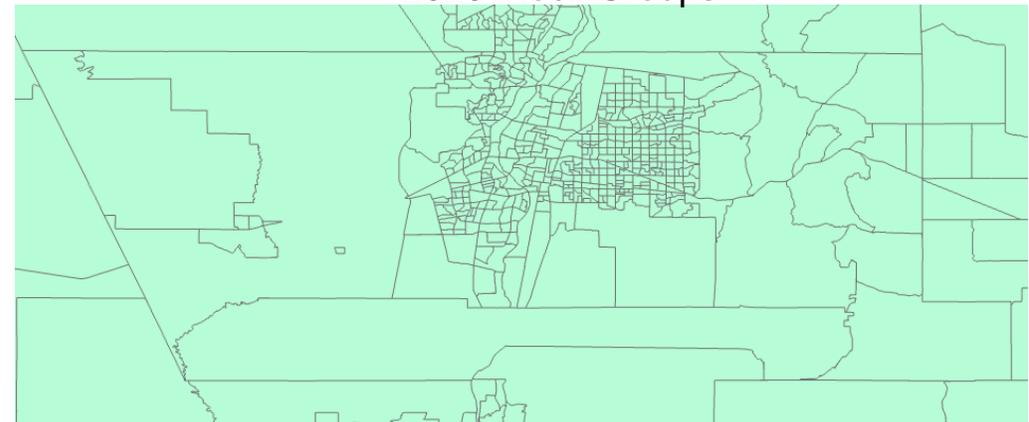
The intersect tool allows for intersection of shapes.

This creates many new small features with the same data as before for a given area.

2010 Tracts



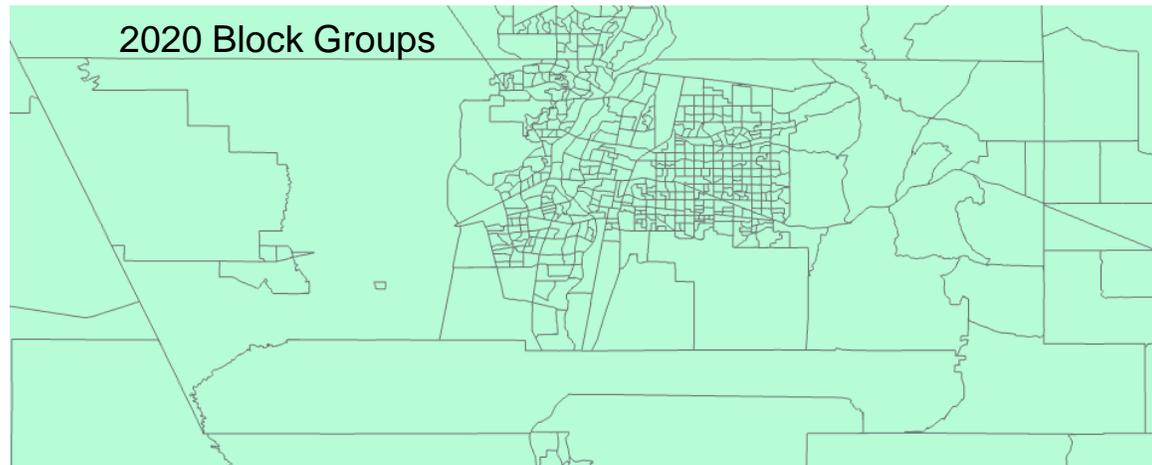
2020 Block Groups



# Geoprocessing

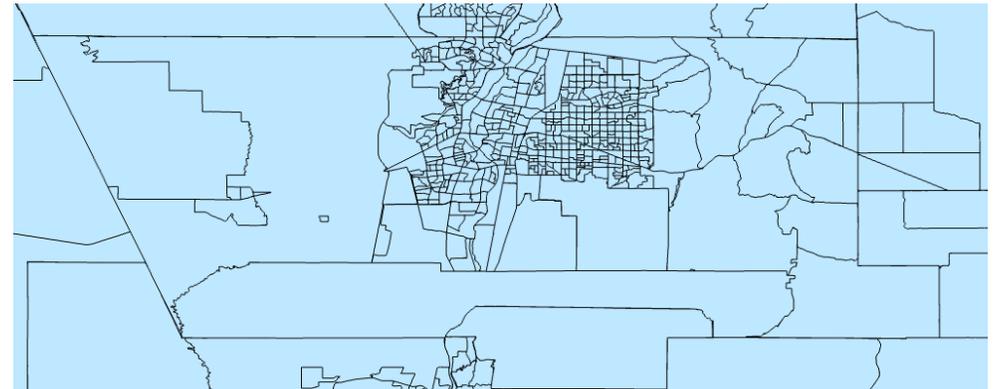


+



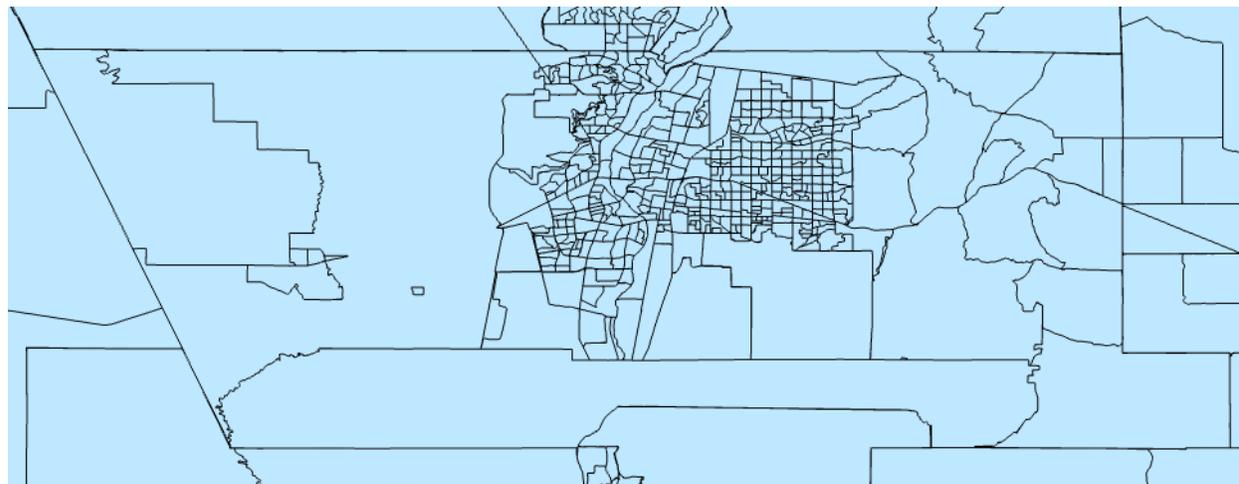
=

2020 Block Groups and 2010 Tract lines  
creating a new set of shapes



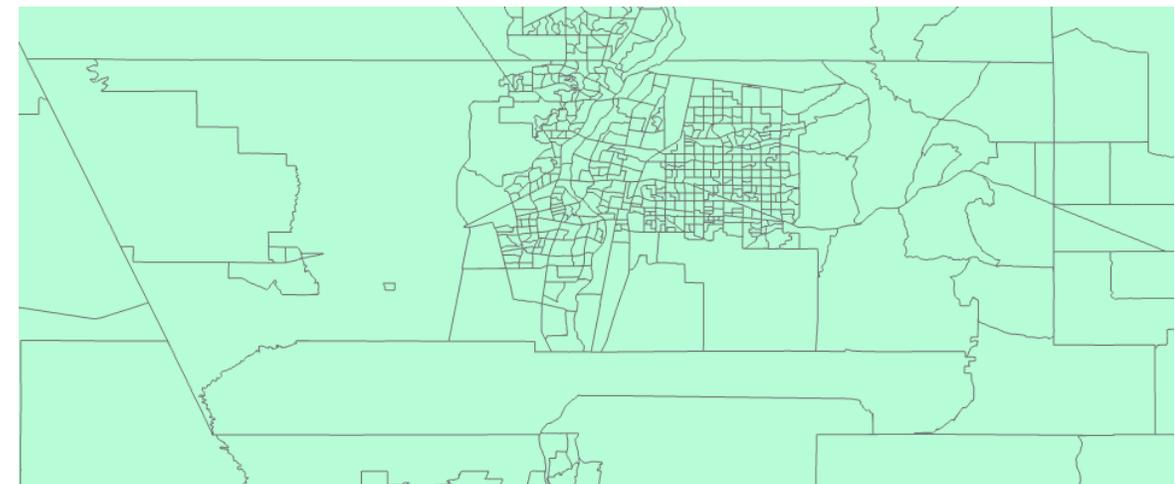
# Geoprocessing

Summarized into desired granularity  
(2020 Block Groups)



2020 Block Groups and 2010 Tract lines  
creating a new set of shapes

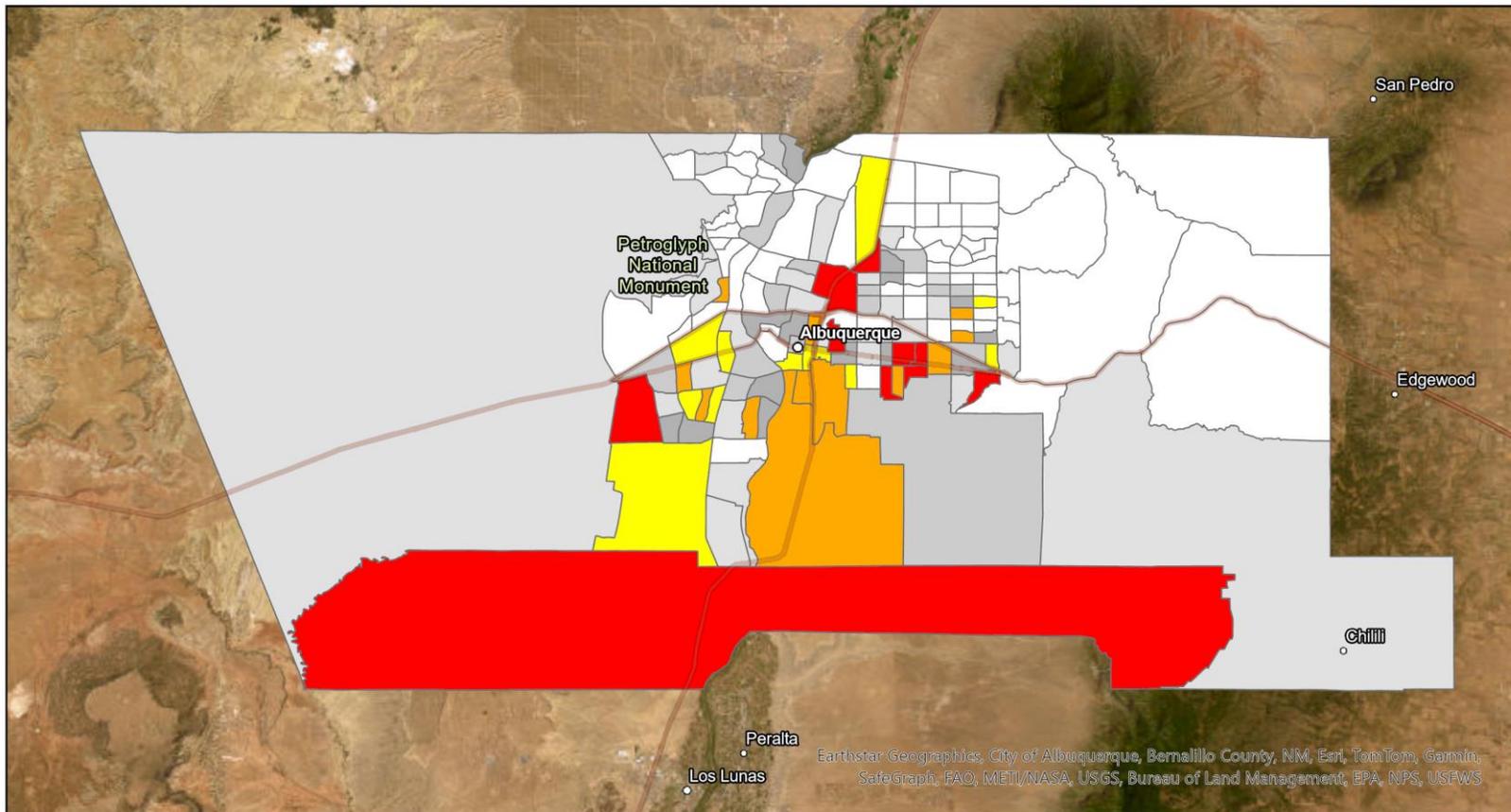
=



2020 Block Groups with weighed  
average of data from 2010 Tracts

# Asthma Prevalence: Before

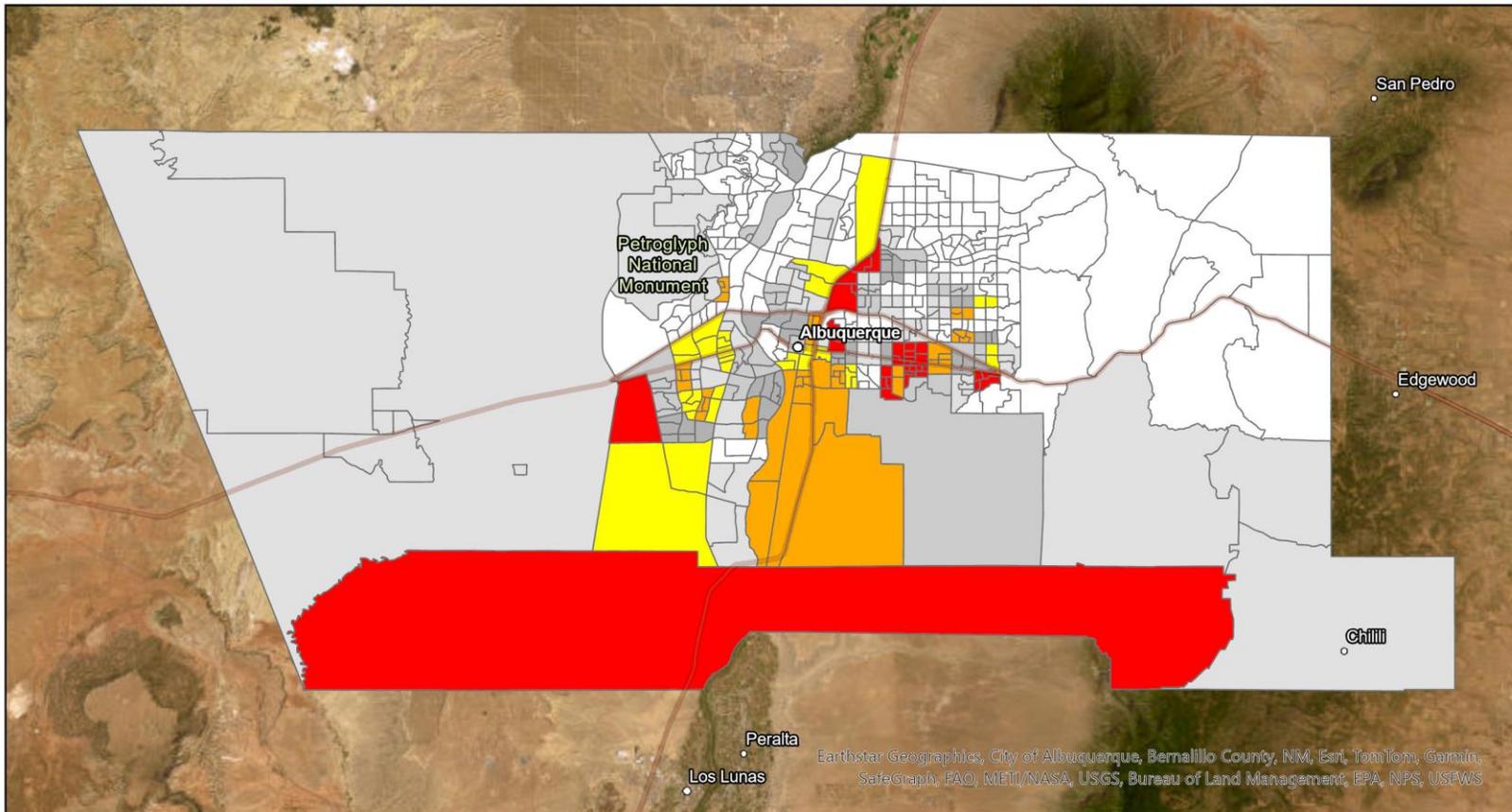
## Asthma Prevalence in 2010 Tracts



Asthma Prevalence: Bernalillo County 2010 Tracts

# Asthma Prevalence: After

## Asthma Prevalence in 2020 Block Groups



Asthma Prevalence: Bernalillo County 2020 Block Groups

# Index Background

- Composite indexes are among the latest and best available methods for identifying overburdened areas
- Used by many other state level tools including California, Pennsylvania, and Connecticut to identify overburdened areas.
- Allows for identifying the top 20% while considering many factors

Standard Composite EJ Index Calculation

<b>Cumulative indices</b>	<b>Environmental Justice Index Score</b> = Pollution Burden x Sensitive Populations			
<b>Composite Category</b>	<b>Pollution Burden</b> $\frac{0.5 \times \text{average}(PPS) + \text{average}(PPE)}{1.5}$		<b>Sensitive Populations</b> $\frac{\text{average}(SF) + \text{average}(HS)}{2}$	
<b>Category</b>	Potential Pollution Sources (PPS)	Potential Pollution Exposure (PPE)	Socioeconomic Factors (SF)	Health Sensitivity (HS)

- Non-HS Attainment
- Low income
- % Limited English
- % POC

- PM 2.5
- Ozone
- Diesel Particulate Matter
- Traffic Proximity
- Toxics Release

- Adult Asthma
- COPD
- Coronary Heart Disease
- Persons with Disabilities
- Life Expectancy
- Cancer

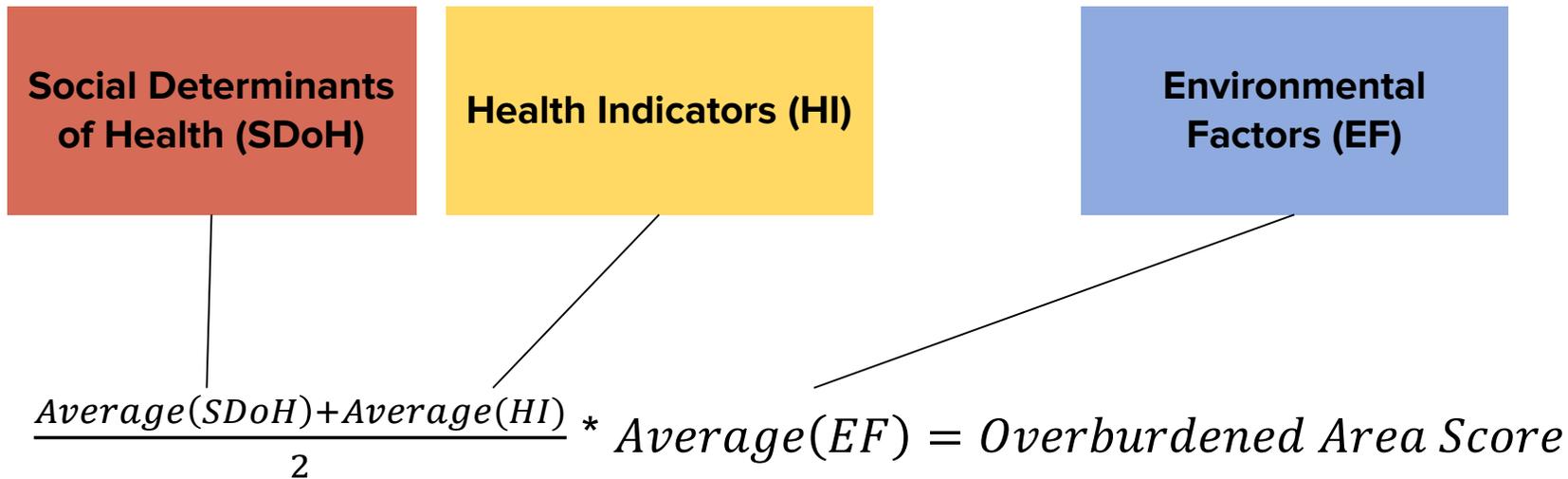
**EPA EJ Screen**  
Rank Percentiles from Raw Data

**CDC PLACES**  
Rank Percentiles from Raw Data

Image from: Defne A (2023) Fact Sheet | Connecticut Environmental Justice Screening Tool. <https://connecticut-environmental-justice.circa.uconn.edu/fact-sheet/>. Accessed 2 Jul 2024

# Overburdened Area Index

- Application of the composite index method to the datasets identified in the registry



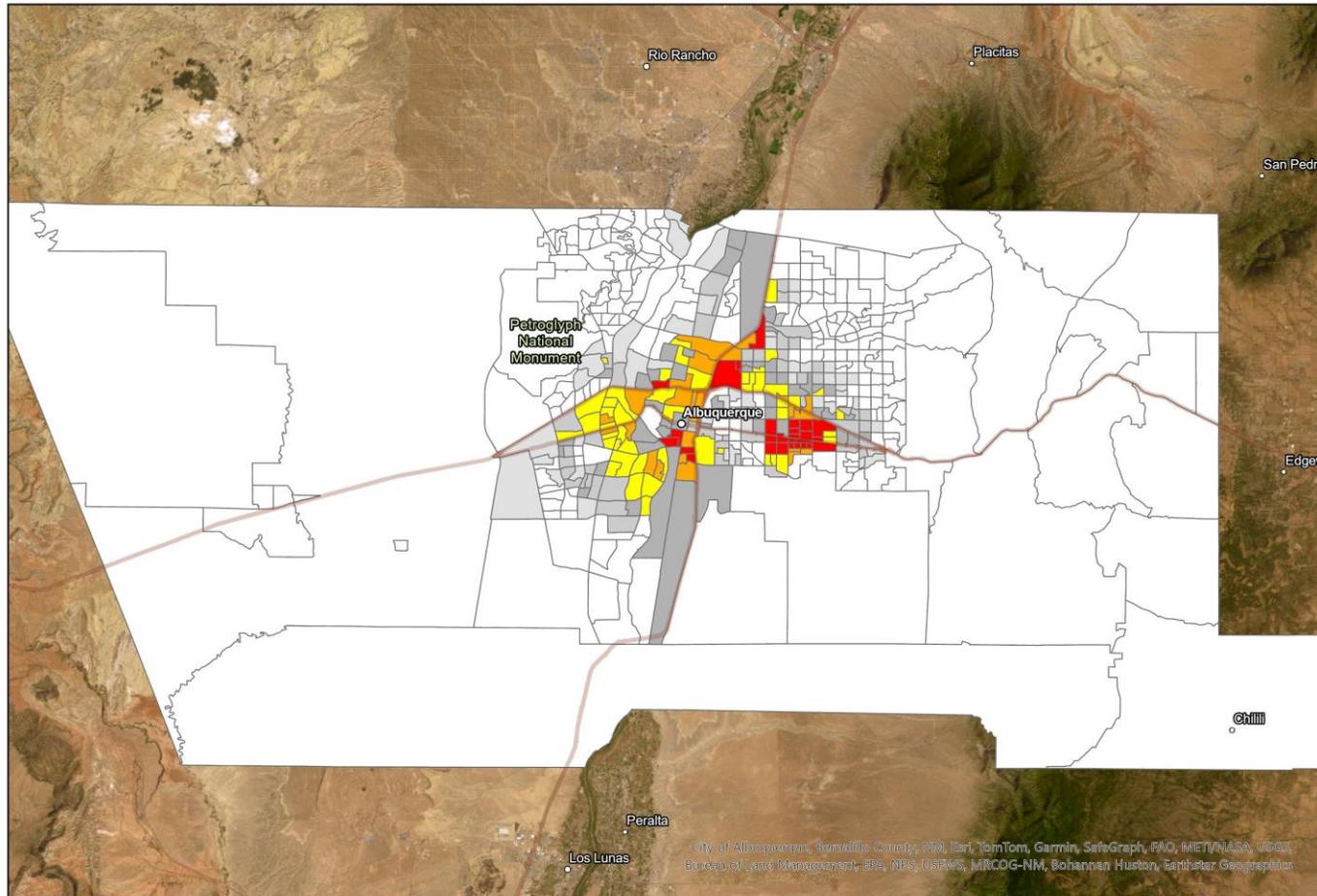
Once an Overburdened Area Index Score is generated the percentile is calculated and presented to identify the top 20% most impacted

- Non-HS Attainment
- Low income
- % Limited English
- % POC

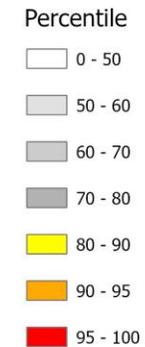
- PM 2.5
- Ozone
- Diesel Particulate Matter
- Traffic Proximity
- Toxics Release

- Adult Asthma
- COPD
- Coronary Heart Disease
- Persons with Disabilities
- Life Expectancy
- Cancer

# Health Environment and Equity Impacts Overburdened Areas Map Version 0.1



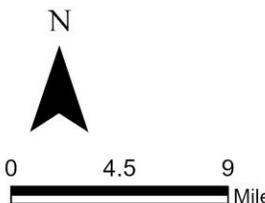
Overburdened Area  
Map Index



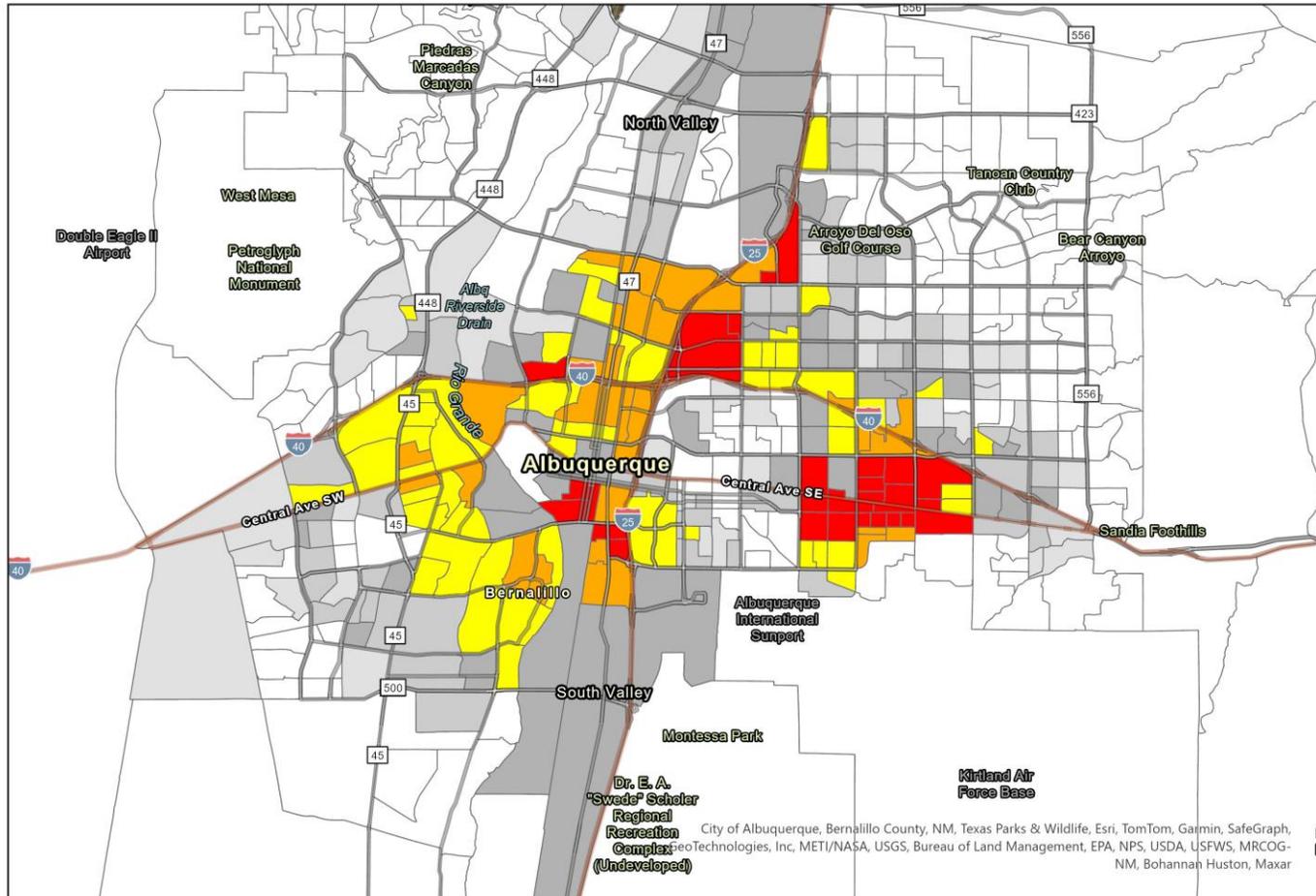
- Non-HS Attainment
- Low income
- % Limited English
- % POC

- PM 2.5
- Ozone
- Diesel Particulate Matter
- Traffic Proximity
- Toxics Release

- Adult Asthma
- COPD
- Coronary Heart Disease
- Persons with Disabilities
- Life Expectancy
- Cancer

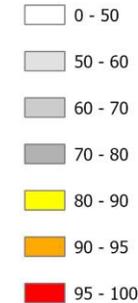


# Health Environment and Equity Impacts Overburdened Areas Map Version 0.1



Overburdened Area  
Map Index

Percentile



- Non-HS Attainment
- Low income
- % Limited English
- % POC

- PM 2.5
- Ozone
- Diesel Particulate Matter
- Traffic Proximity
- Toxics Release

- Adult Asthma
- COPD
- Coronary Heart Disease
- Persons with Disabilities
- Life Expectancy
- Cancer

City of Albuquerque, Bernalillo County, NM, Texas Parks & Wildlife, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NAASA, USGS, Bureau of Land Management, EPA, NPS, USDA, USFWS, MRCOG-NM, Bohannah Huston, Maxar



# Limitations and Considerations

1. These maps are intended to be a guide for further investigation of overburdened areas not to predict health outcomes or identify causation
2. Percentiles are a comparative unit which allows for index calculations and not directly representative of exposure, risk, or prevalence
3. Based on community feedback and resources we will make revisions to the map

Examples of purpose and use statements

- [Connecticut EJ](#)
- [New Jersey EJMAP](#)
- [EJ Screen 2.3](#)



# Conclusions and Next Steps

## Conclusions

- We have shared the technical methods for generating an Overburdened Areas Map
- Visualized the top 20% most impacted block groups in Bernalillo county using the HEEI rule
- Your feedback suggestions and ideas are needed in development of the overburdened areas map

## Next Steps

1. Conduct in-person Public Consultation Sessions in development of the overburdened areas map
2. Publish the map with initial community input in October; 2<sup>nd</sup> round input and revise before January 1<sup>st</sup>, 2025
3. Plan for periodic updates and modification of the maps as well as continued public engagement after initial implementation

# Thank You!

## Schedule and Online Engagement

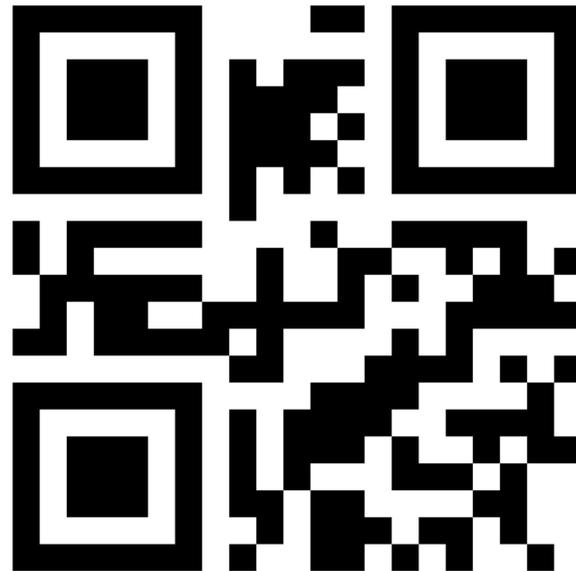
### Ways to Engage

Attend In Person  
Sessions!

Email:

[OBAmap@cabq.gov](mailto:OBAmap@cabq.gov)

[Website Engagement  
Applications](#)



**Tybur Casuse-Driovinto, PhD**  
Environmental Health Specialist II

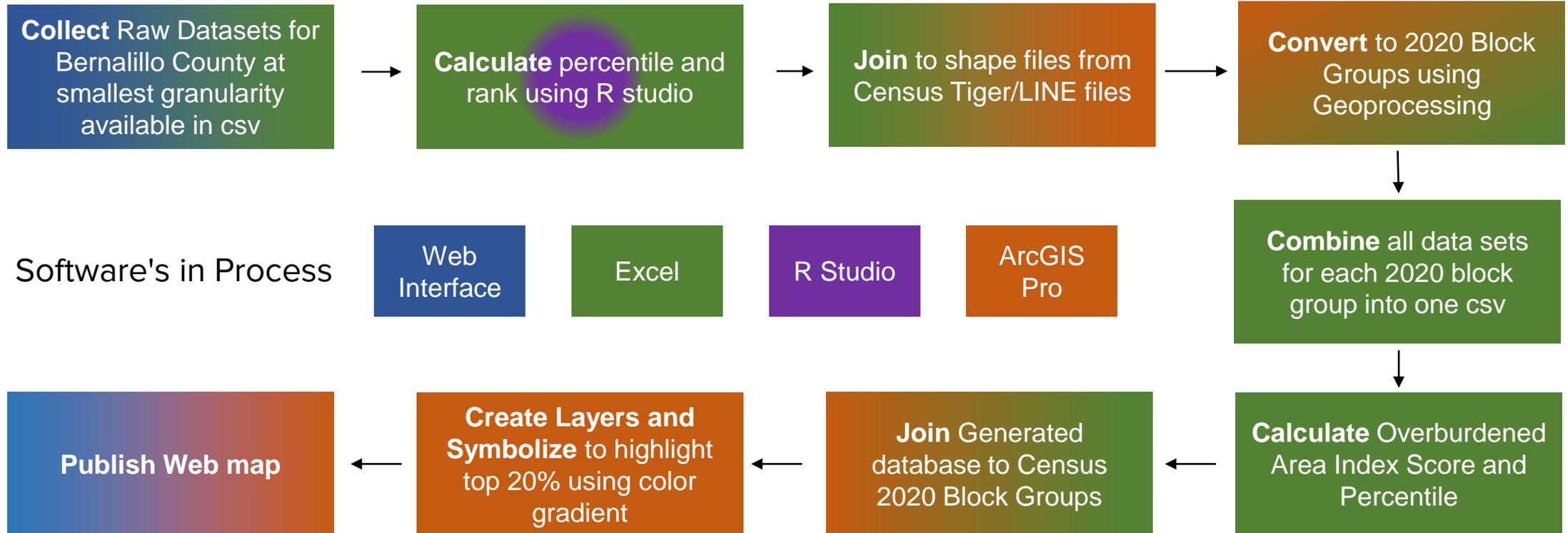


**María Gallegos**  
Public Health Compliance Manager

[www.cabq.gov/HEEI](http://www.cabq.gov/HEEI)

# Overview of Methods

Outline of 9 steps covered today





# Rstudio code

The first step to using this code is using only the tracts or block groups within Bernalillo county.

```
```${r}  
# Load in EJ Screen data which is for Bernalillo County only  
EJScreenBernCo = read.csv("Filepath/EJScreen_BernCo_StatePercentiles.csv")  
```${r}  
# Load in PLACES data which is for Bernalillo County only  
PLACESBernCo = read.csv("Filepath/PLACESBernCoraw.csv")  
````
```

# Rstudio code

```
```${r}
# Calculate percentile ranks for each row and percent value of EJ Screen columns
EJScreenBernCoRanks <- apply(EJScreenBernCo[,7:43], 2, function(col) ecdf(col)(col))
# Rename columns with prefix "CP_" which is short for Calculated Percentile
Rankscolnames(EJScreenBernCoRanks) <- paste0("CP_", colnames(EJScreenBernCoRanks))
# Combine the original data frame with the ranks
EJScreenBernCoRankDatabase <- cbind(EJScreenBernCo,EJScreenBernCoRanks)
# Export the original EJ Screen data with ranks on the end write.csv(EJScreenBernCoRankDatabase,
"Filepath/EJScreenBernCoRankDatabase.csv", row.names = TRUE)
```

```${r}
# Calculate percentile ranks for each row and percent value of EJ Screen columnsPLACESBernCoRanks <-
apply(PLACESBernCo[,7:43], 2, function(col) ecdf(col)(col))
# Rename columns with prefix "CP_" which is short for Calculated Percentile
Rankscolnames(PLACESBernCoRanks) <- paste0("CP_", colnames(PLACESBernCoRanks))
# Combine the original data frame with the ranks
PLACESBernCoRankDatabase <- cbind(PLACESBernCo, PLACESBernCoRanks)
# Export the modified data frame to a CSV filewrite.csv(PLACESBernCoRankDatabase, "Filepath/PLACESBernCoRankDatabase.csv",
row.names = TRUE)
```
```