AP19 Workshop: Measuring alcohol outlet density to inform policymakers

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Thursday, September 15, 2022

As required by the Alcohol Policy 19 Conference, I/we have signed a disclosure statement and note the following conflict(s) of interest:

None

Disclaimer

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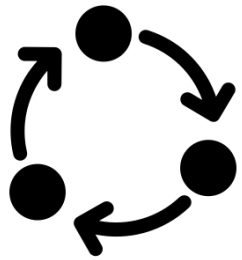
Overview

- **Introduction & Background**– Jessica (2-5 min)
- **Toolkit Themes** – Mike (2 min)
- **State Deep Dives** (5-10m apiece)
  - Minnesota - Kari
  - Colorado - Julia
  - North Carolina - Mike
- **Toolkit Workshop** - All
  - (60-70min: 10-20m per stage, 3-5m intro & panel, 10-15m small groups)
  - Step Intro – Mike
  - Panel Discussion – Jessica facilitates
  - Small Groups – 3/4 (presenters facilitate toolkit questions)
  - Report Out – Mike facilitates
- **Closing & Next Steps** (2-3m) - Jessica



Introduction & Background

Jessica Mesnick

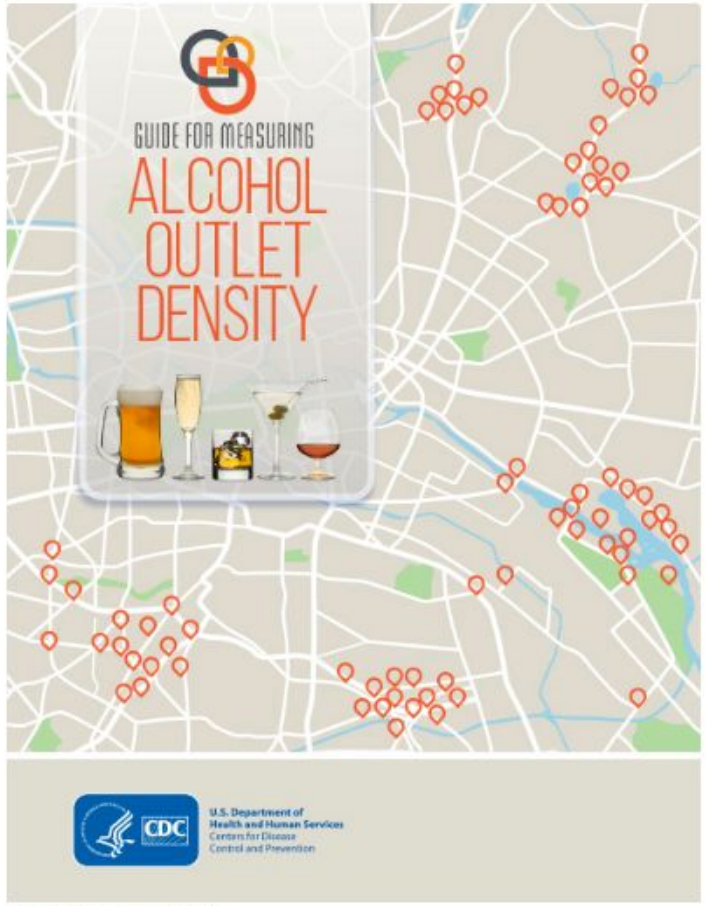
Background

Regulating Alcohol Outlet Density Prevents Excessive Alcohol Use

Preventing Chronic Disease

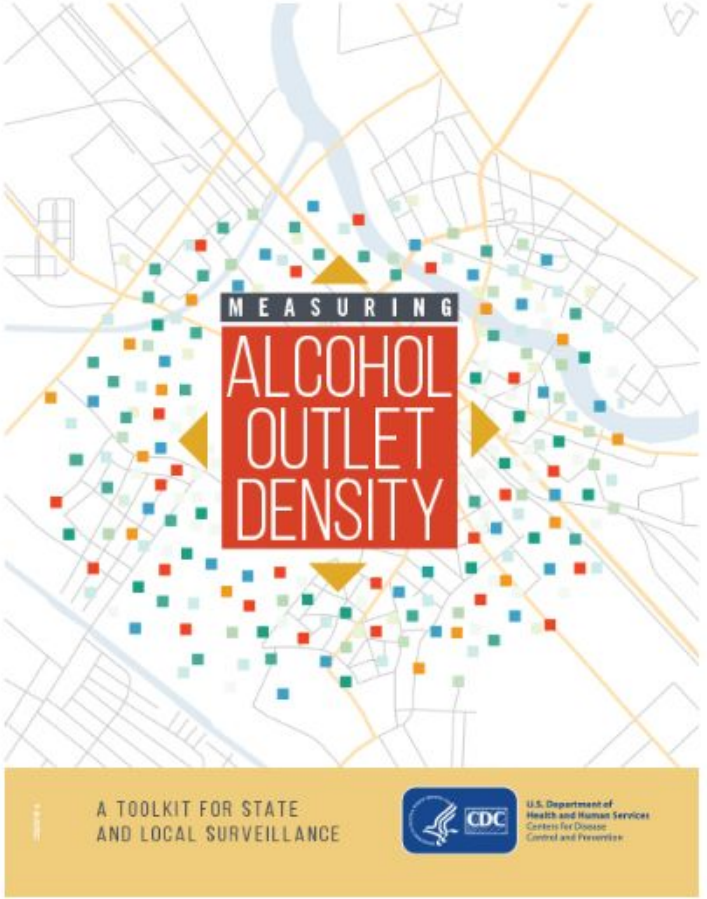
Changes in Density of On-Premises Alcohol Outlets and Impact on Violent Crime, Atlanta, Georgia, 1997–2007

CDC Guide for Measuring Alcohol Outlet Density



[PDF - 13 MB]

CDC Alcohol Outlet Density Surveillance Toolkit



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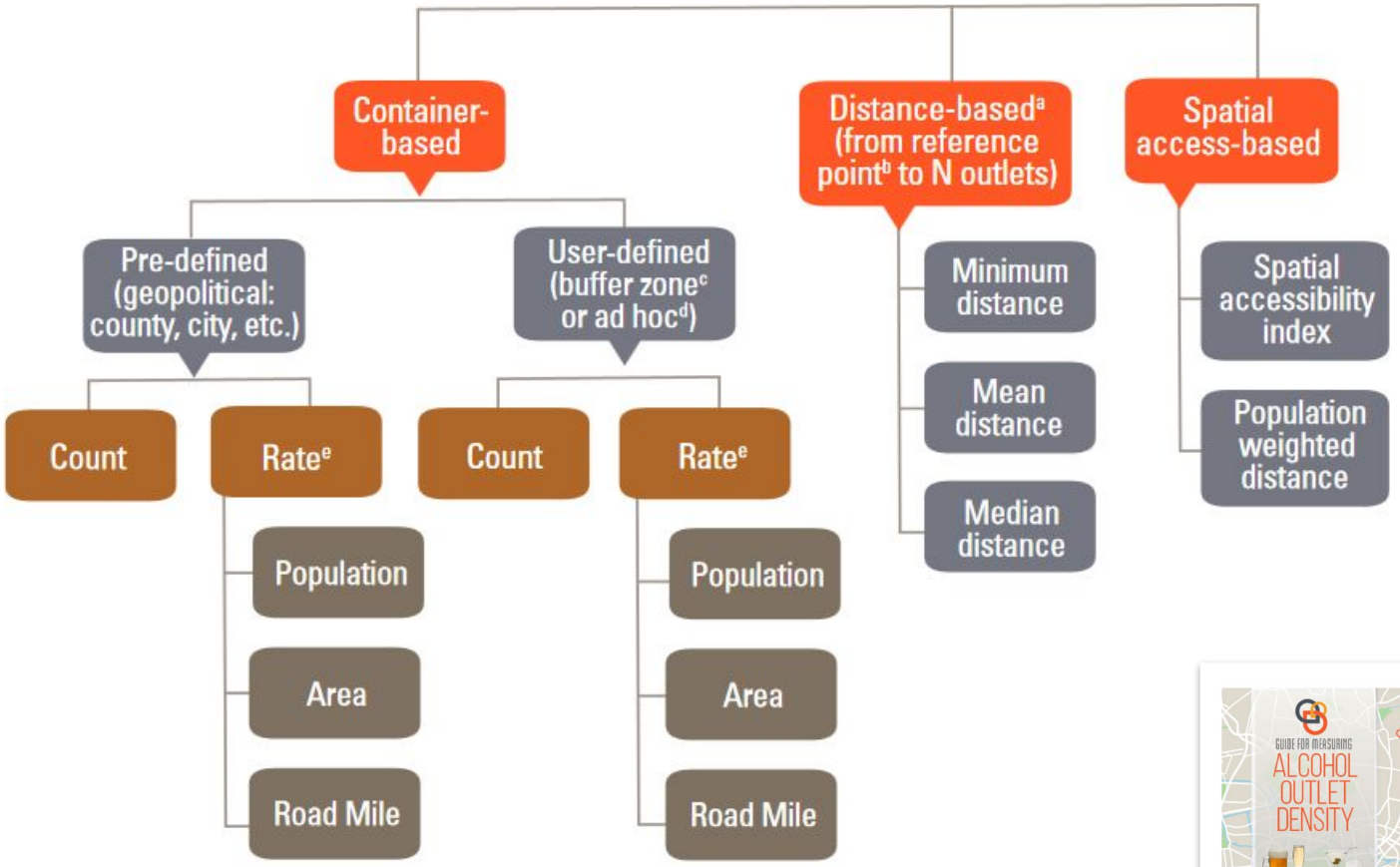
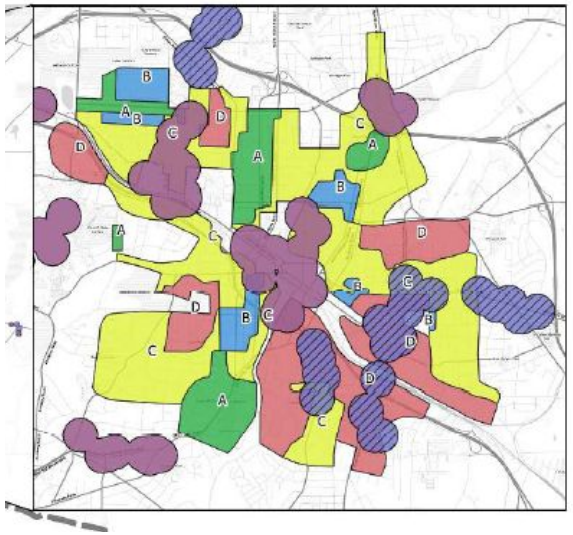
https://www.cdc.gov/alcohol/fact-sheets/outlet-density-measurement.htm

Measuring Outlet Density Toolkit - **Overview**

Mike Dolan Fliss

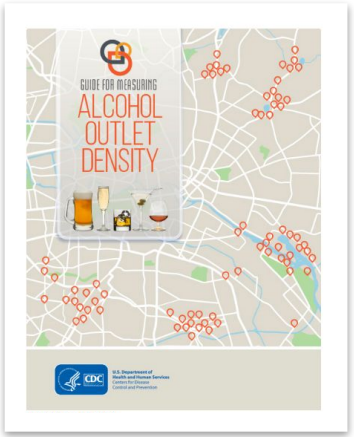
Many ways to measure:
CDC's Methods for Measuring Alcohol Outlet Density (AOD)





...

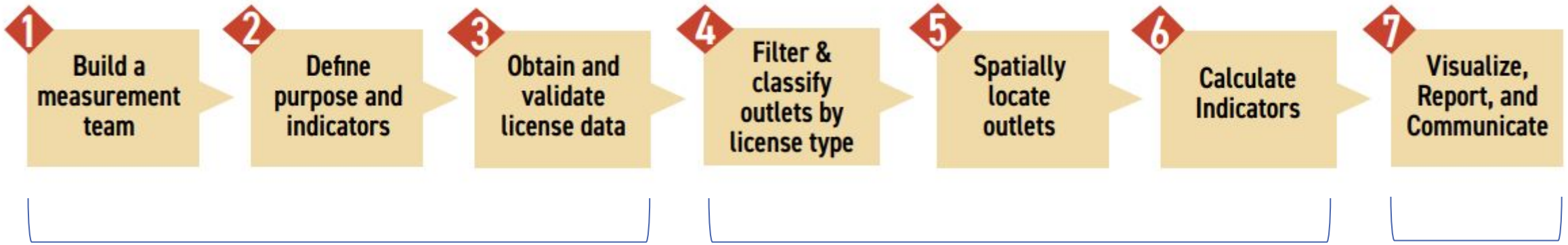
+clusters



- Source: Centers for Disease Control and Prevention. Guide for Measuring Alcohol Outlet Density. Atlanta, GA: Centers for Disease Control and Prevention, US Dept of Health and Human Services; 2017.

Steps – thinking ahead

- Listen for these steps in example state stories!
- What steps are your team working on?
- Organize your own questions (which step?) as we go.



Indicators – thinking ahead

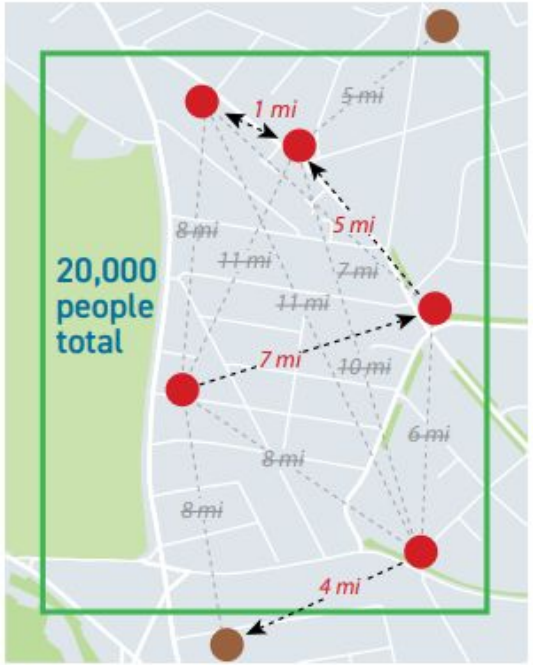
Listen for **Recommended Indicators:**

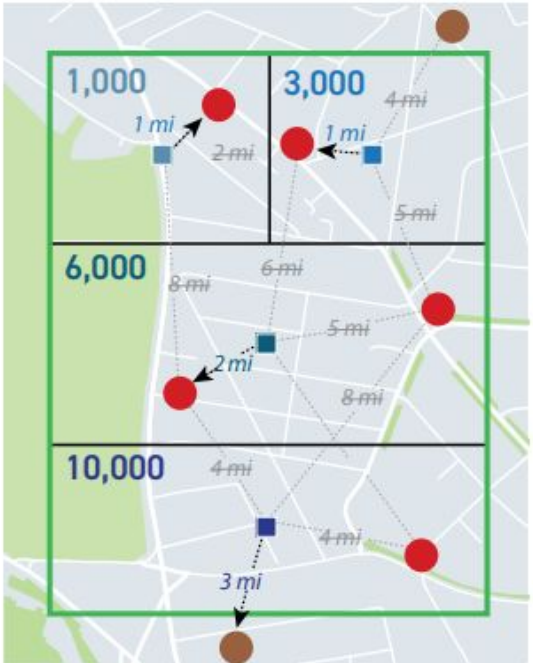
Count-based Indicators
Easier to calculate

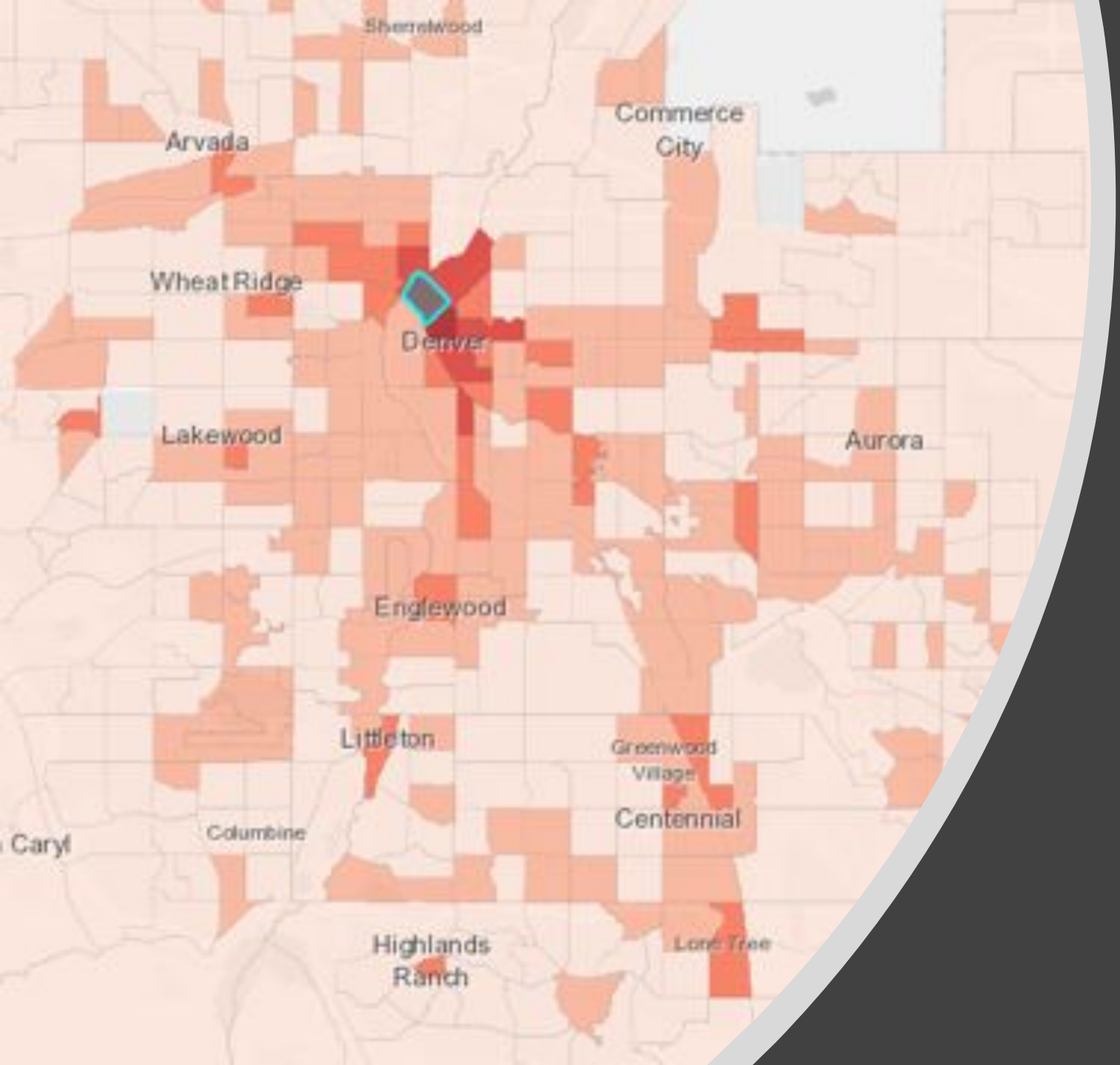
1	Outlets per square mile	*Panel A*	**5 inside region of 10 sq mi** 5/10 sq mi = 0.5 outlets/mi²
2	Outlet per 10,000 persons	*Panel A*	**2.5 outlets per 20,000 people in region** (5/20,000) x 10,000 = 2.5 outlets/10,000 persons

Distance-based Indicators
Harder to calculate

3	Outlet to nearest outlet distance	*Panel A*	**On average, the 5 outlets in region are 3.6 miles to their next nearest outlet** (1 mi + 1mi + 5 mi + 7 mi + 4 mi) / 5 = 3.6 mi
4	Person to nearest outlet distance	*Panel B*	**Average miles to nearest outlet from small population centers** $\frac{(1000 \text{ at } 1 \text{ mi}) + (3{,}000 \text{ at } 1 \text{ mi}) + (6{,}000 \text{ at } 2 \text{ mi}) + (10{,}000 \text{ at } 3 \text{ mi})}{20{,}000 \text{ total people}} = 2.3 \text{ mi}$







Colorado

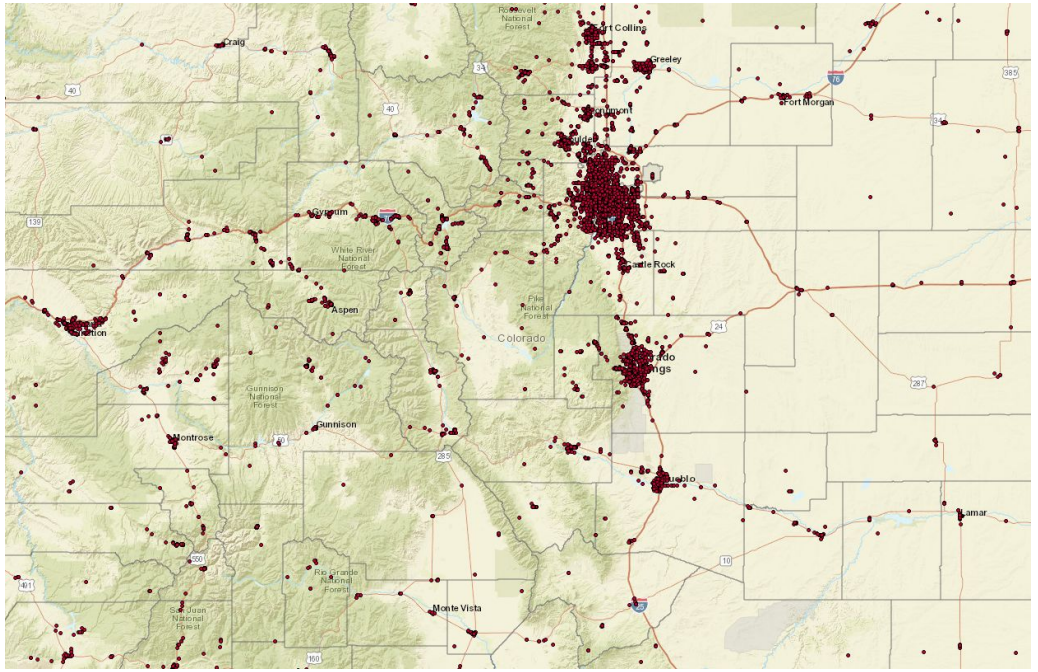
Julia Stullken, MPH

Alcohol Epidemiologist, Colorado Department of Public Health and Environment

Colorado

Background/Logistics of the project

- Ongoing surveillance
- CO alcohol sales are privatized
- Licensee lists from Department of Revenue represent a complete dataset
- Data from DOR-LED, update frequency WIP



Stakeholder Input

State Epi Outcomes Workgroup

Alcohol epi program stakeholders

Ad hoc input from partners within CDPHE

Stakeholder Input

Social math

Include info about alcohol use

Count based indicators

Interactive & static data products

Social justice & equity context

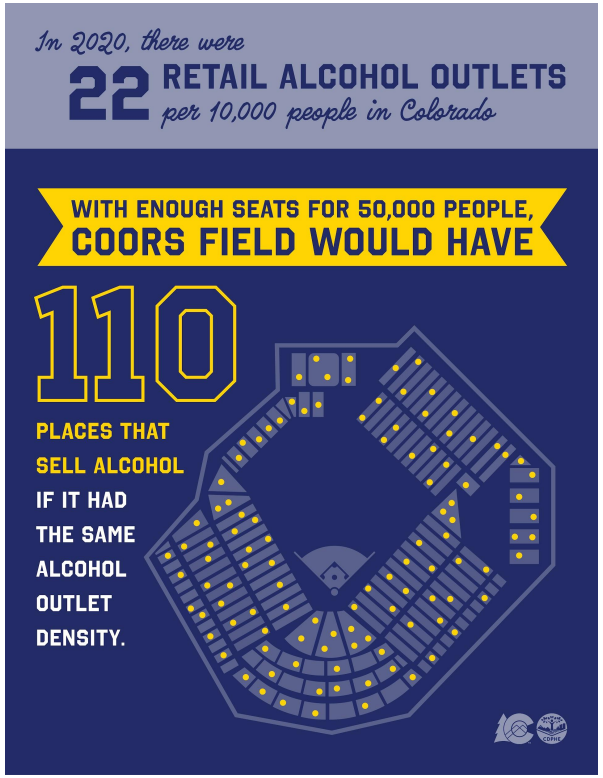
Overlay alcohol related harms

Visualization, Reporting, & Communication

- ESRI StoryMap
  - Choropleth maps
  - Graphics

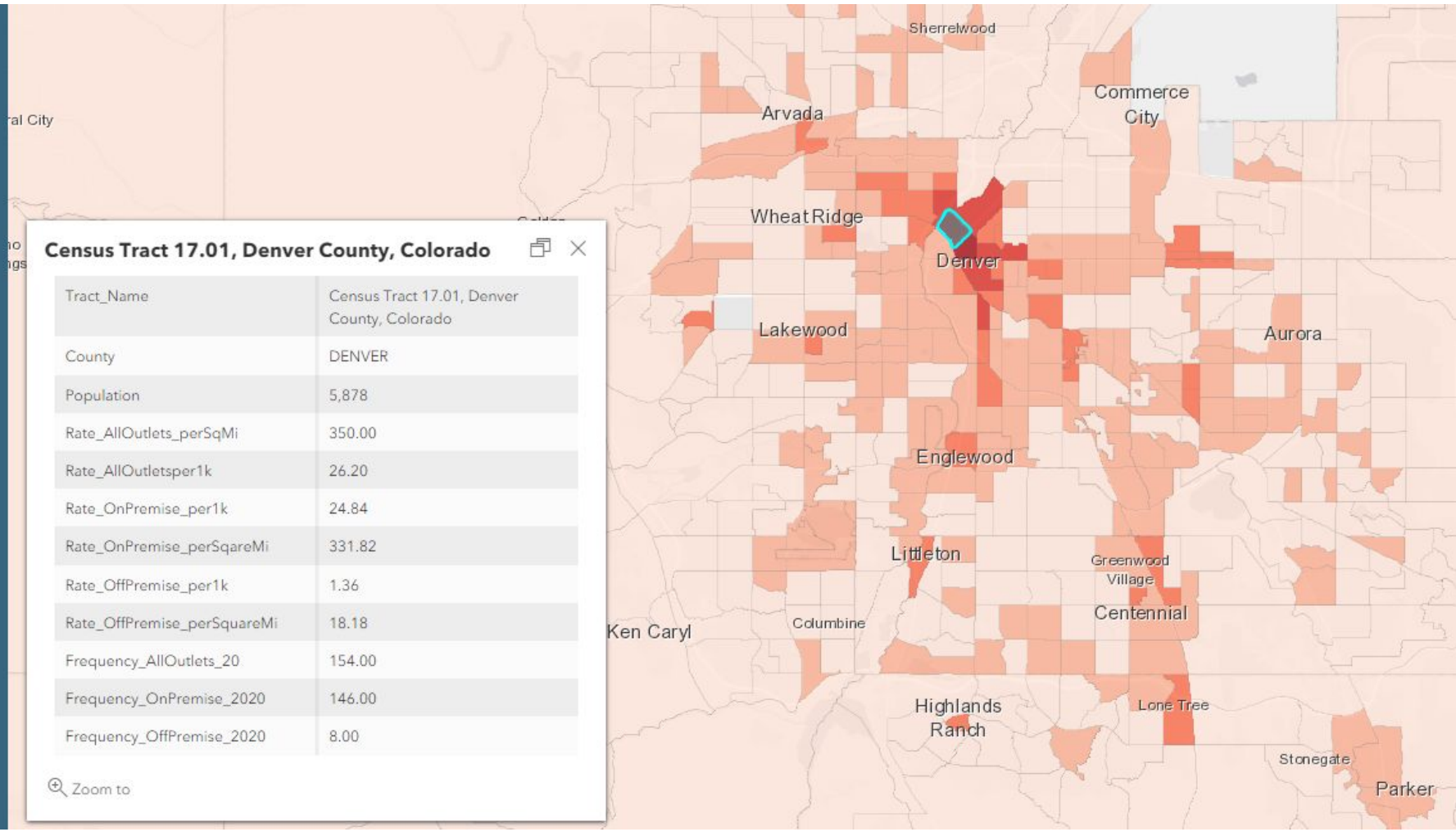
- CDPHE Open Data Portal

- Static infographic branded and released through SEOW



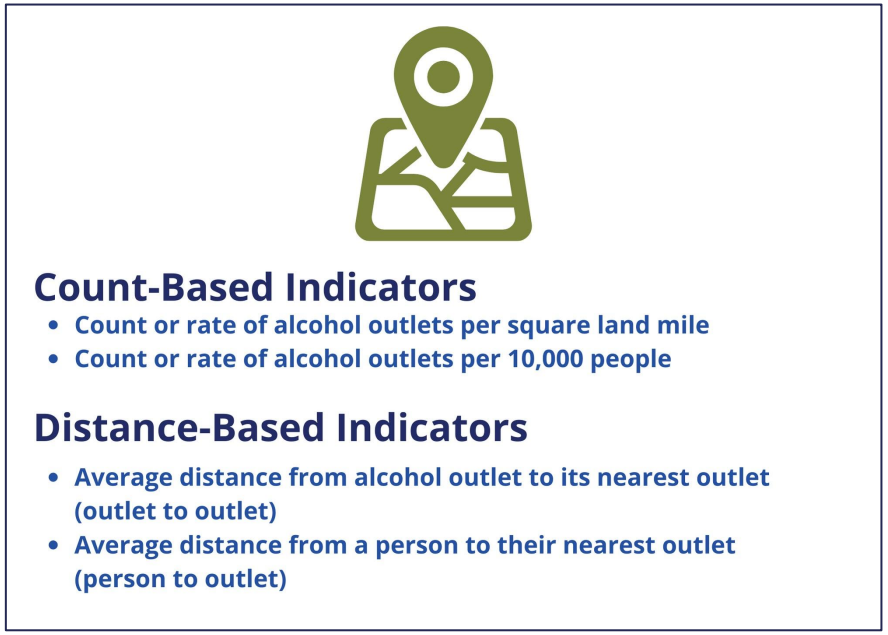
This map illustrates the **rate of alcohol outlets per square mile by census tract**. Darker colored tracts have a higher number of alcohol outlets per square mile than lighter census tracts.

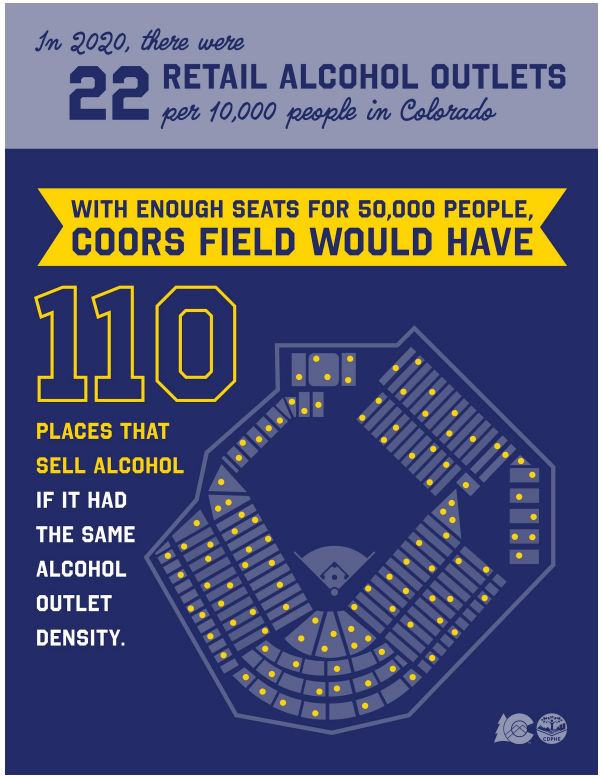
Census tracts in urban areas, such as Denver metro area, have higher outlets per square mile. That means that the nearly 3 million people who live in the Denver metro area likely see alcohol outlets regularly on their way to and from work, school, or recreation.



Tract_Name	Census Tract 17.01, Denver County, Colorado
County	DENVER
Population	5,878
Rate_AllOutlets_perSqMi	350.00
Rate_AllOutletsper1k	26.20
Rate_OnPremise_per1k	24.84
Rate_OnPremise_perSqareMi	331.82
Rate_OffPremise_per1k	1.36
Rate_OffPremise_perSquareMi	18.18
Frequency_AllOutlets_20	154.00
Frequency_OnPremise_2020	146.00
Frequency_OffPremise_2020	8.00

Static Graphics Used in the StoryMap





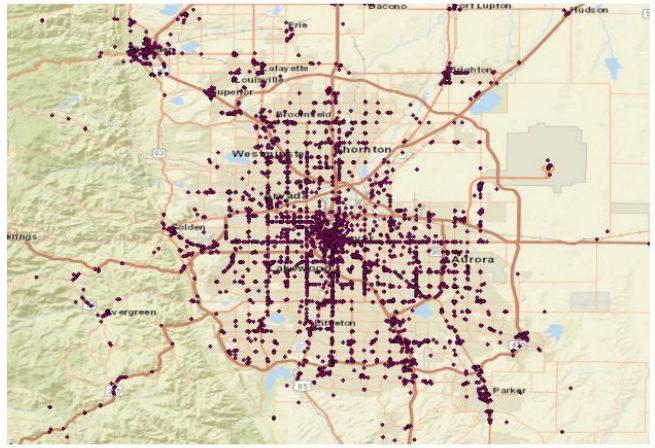
Lessons Learned

- What is ‘safe’ alcohol outlet density?
- Unique geographies
  - Who is exposed to alcohol in these places?
- Changing license types are a headache
- Ongoing and continuous improvement

Lessons Learned

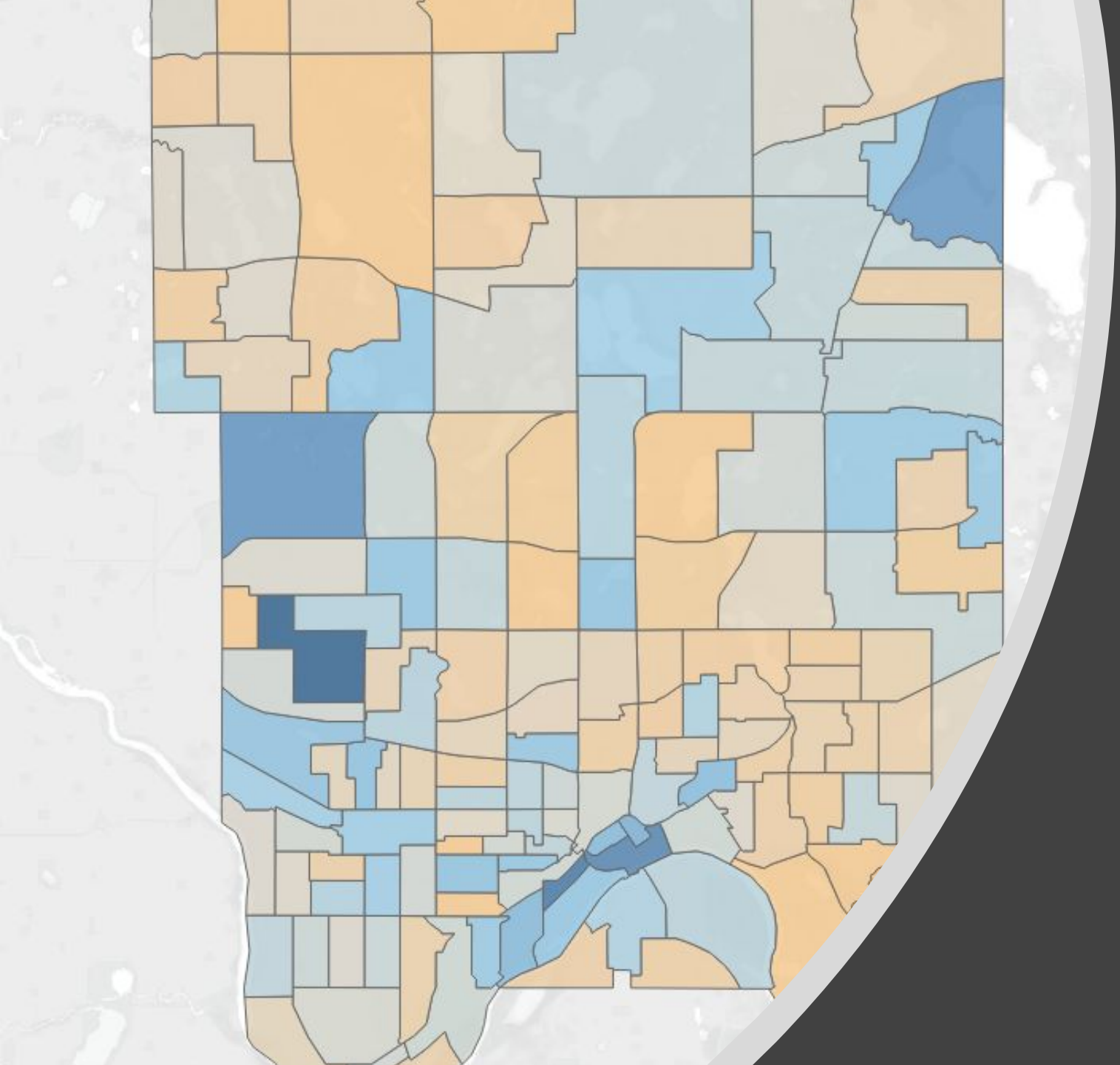
Process manual document

- Contact information/position titles for relevant data stewards
- Any insider information about license types, tricky geographies (e.g. ski resorts), ideas about visualization & interpretation
- Suggested timeline for repeated surveillance



Surveillance of Alcohol Outlet Density in Colorado

Process Manual
First Published November 2021
Last Updated May 2022



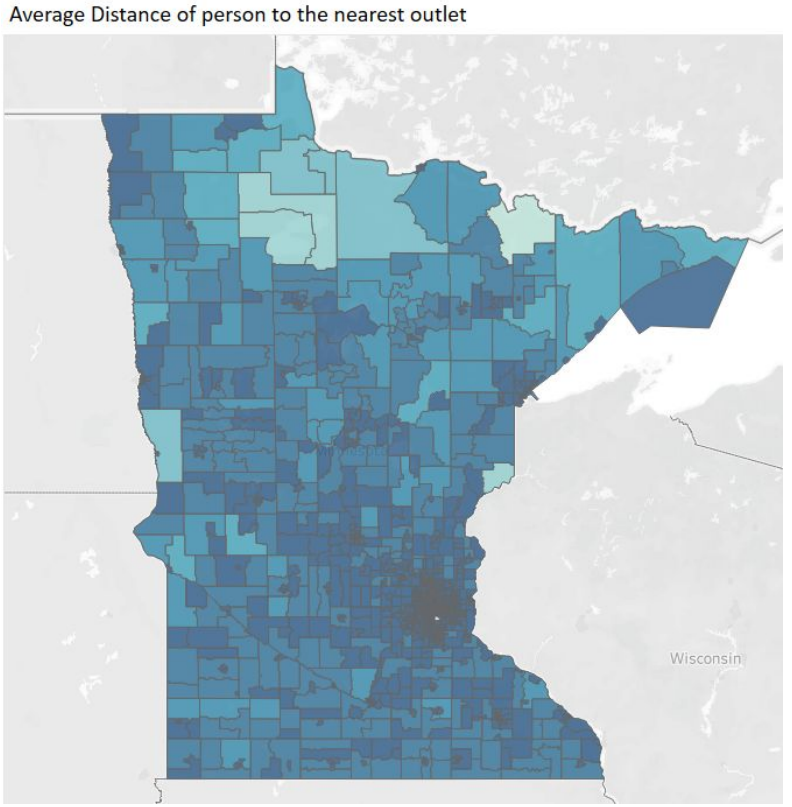
Minnesota

Kari Gloppen, PhD

Senior research scientist, Minnesota Department of Health

Minnesota

- MN alcohol sales are privatized
- Alcohol outlet licensing list from MN Department of Public Safety's Alcohol and Gambling Enforcement Division
- Categorized the 50+ license types into on-sale and off-sale
- Interactive mapping tool for local communities



Partners


DEPARTMENT OF PUBLIC SAFETY
STATE OF MINNESOTA


UNIVERSITY OF MINNESOTA
Driven to Discover℠


SUMN.ORG
SUBSTANCE USE IN MINNESOTA

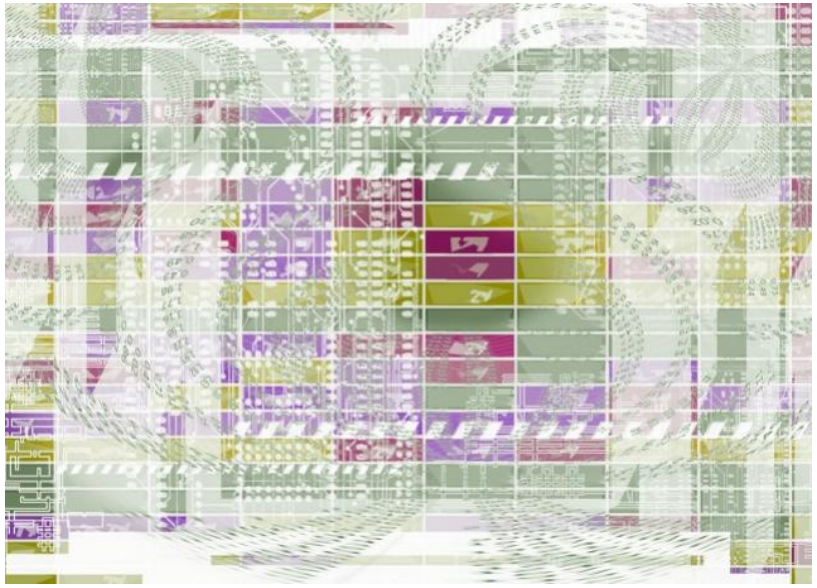

MPA
MINNESOTA
PREVENTION
ALLIANCE


RAMSEY COUNTY
OPUS COALITION
Opioid Prevention & Unified Services

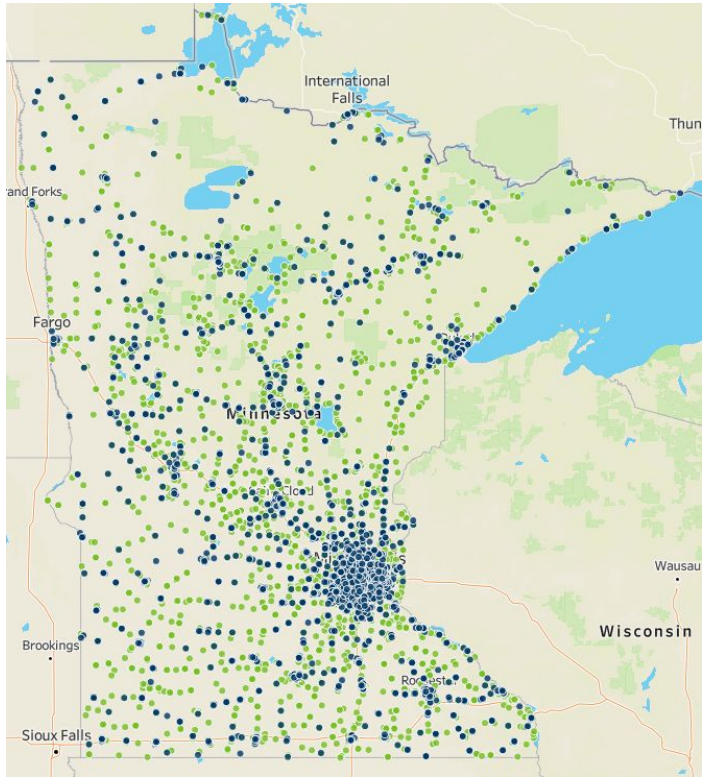

Regional
Prevention
Coordinators
Alcohol Tobacco and Other Drugs

Step 1: Obtain and clean alcohol license data

- The data are messy!
- Addresses are mixed with PO Boxes, misspellings, missing address parts
- 110 types of alcohol licenses, one establishment may have multiple licenses
- Initially categorized license types into on-sale, off-sale, and combination of on/off 2 types, on-sale and off-sale



Step 2: Map outlets, calculate indicators, develop mapping tool



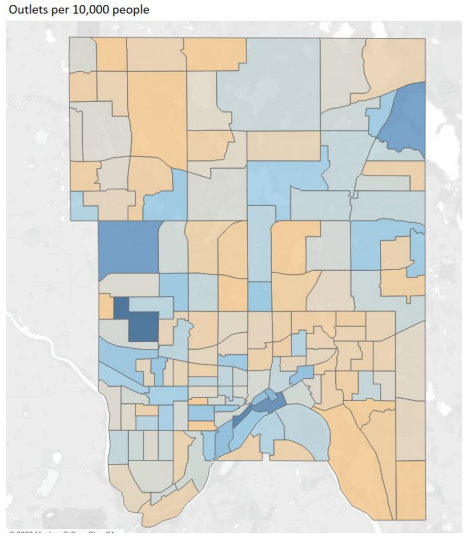
- Imported csv file of alcohol outlets into QGIS
- Calculated 4 indicators
- Geocoded outlet information and indicators imported into Tableau
- Maps can be filtered to county and census tract levels

But what do these indicators look like and mean for different geographical areas?

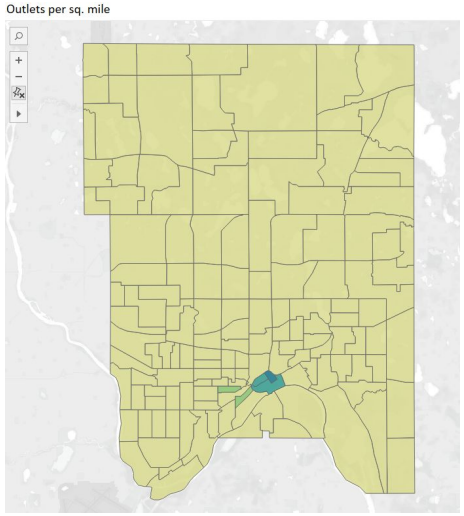
Urban vs. Rural: Indicators can show different stories

Count-based Indicators

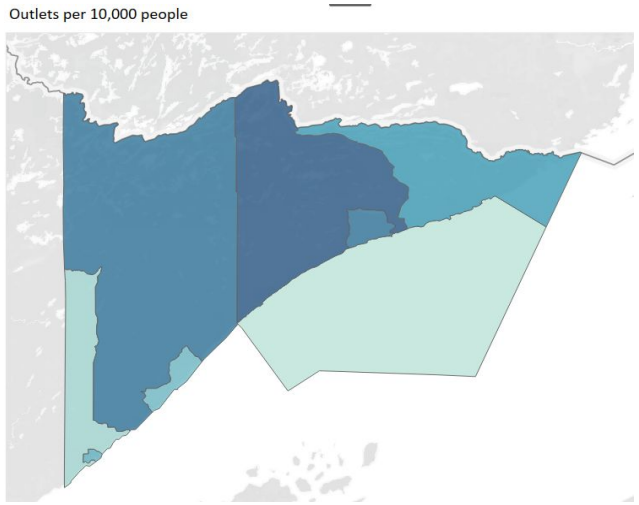
Outlets per 10,000 people

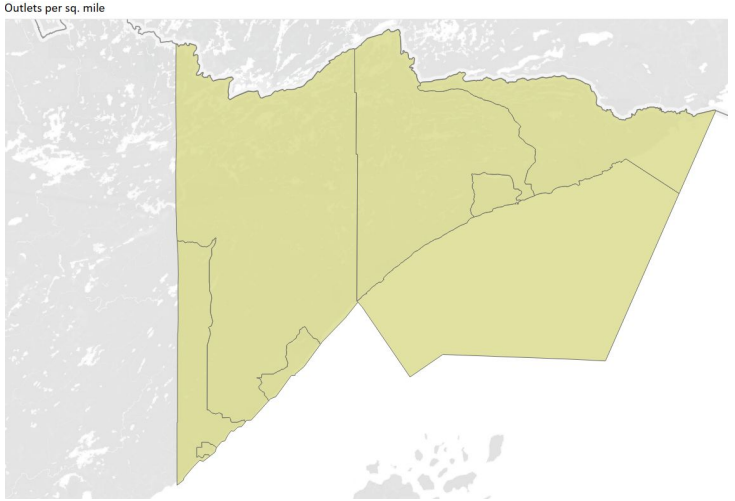


Outlets per sq. mi.



Urban/suburban
(Ramsey county)

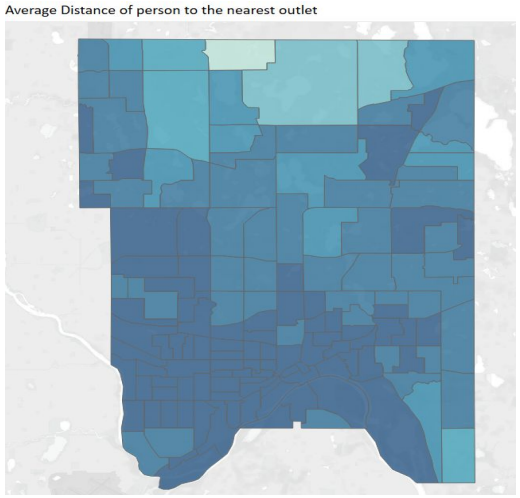




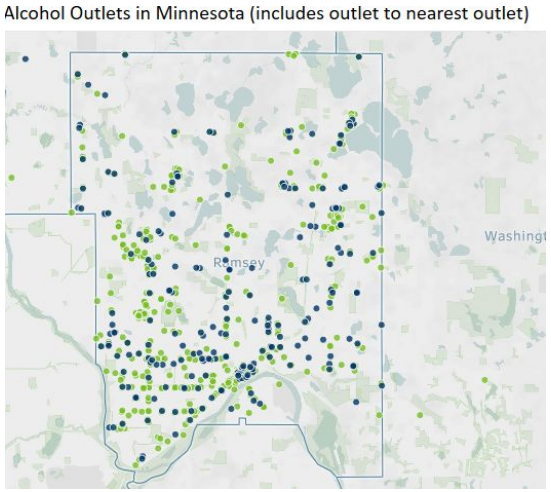
Rural
(Lake and Cook counties)

Urban vs. Rural: Indicators can show different stories
Distance-based Indicators

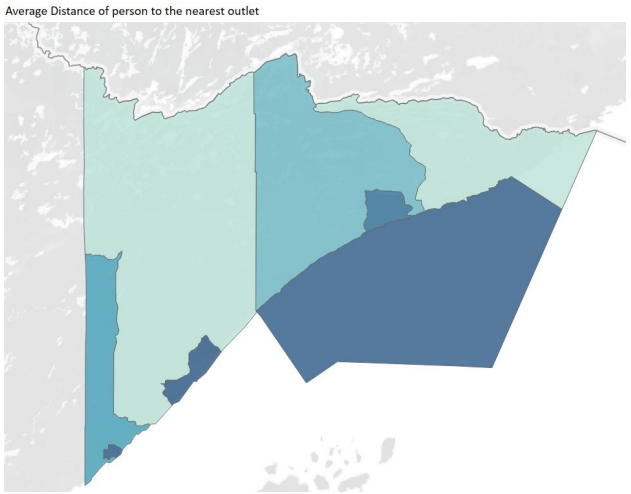
Avr distance person to nearest outlet

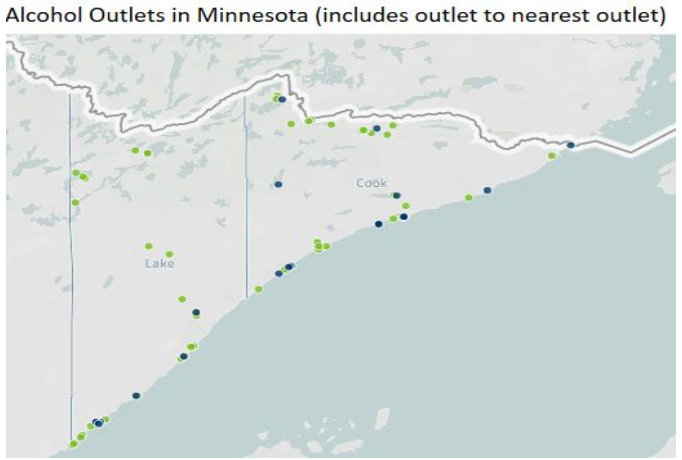


Avr distance outlet to nearest outlet



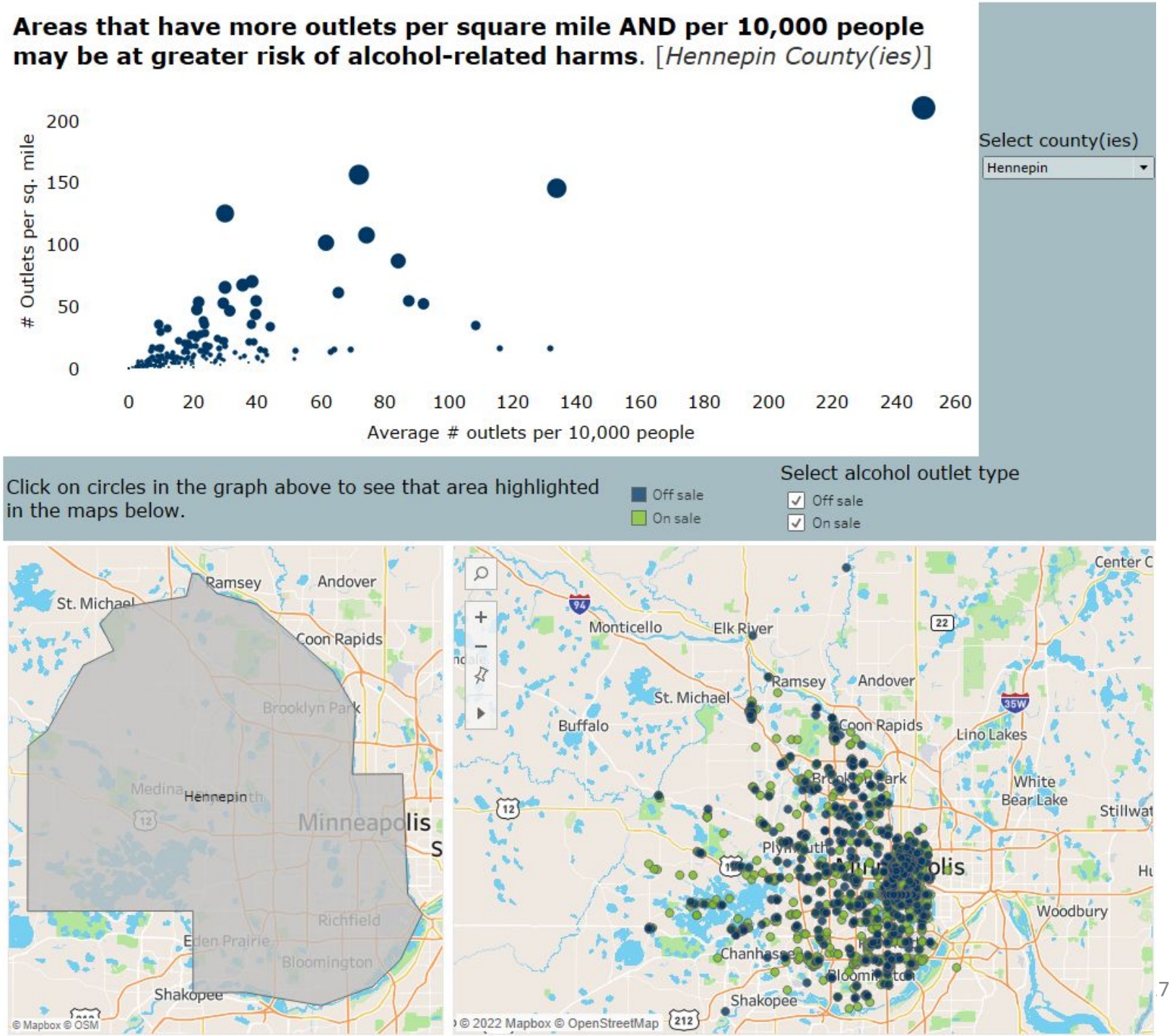
Urban/suburban
(Ramsey county)





Rural
(Lake and Cook counties)

Geographic areas that have high AOD on more than one indicator may be an area to look at more closely

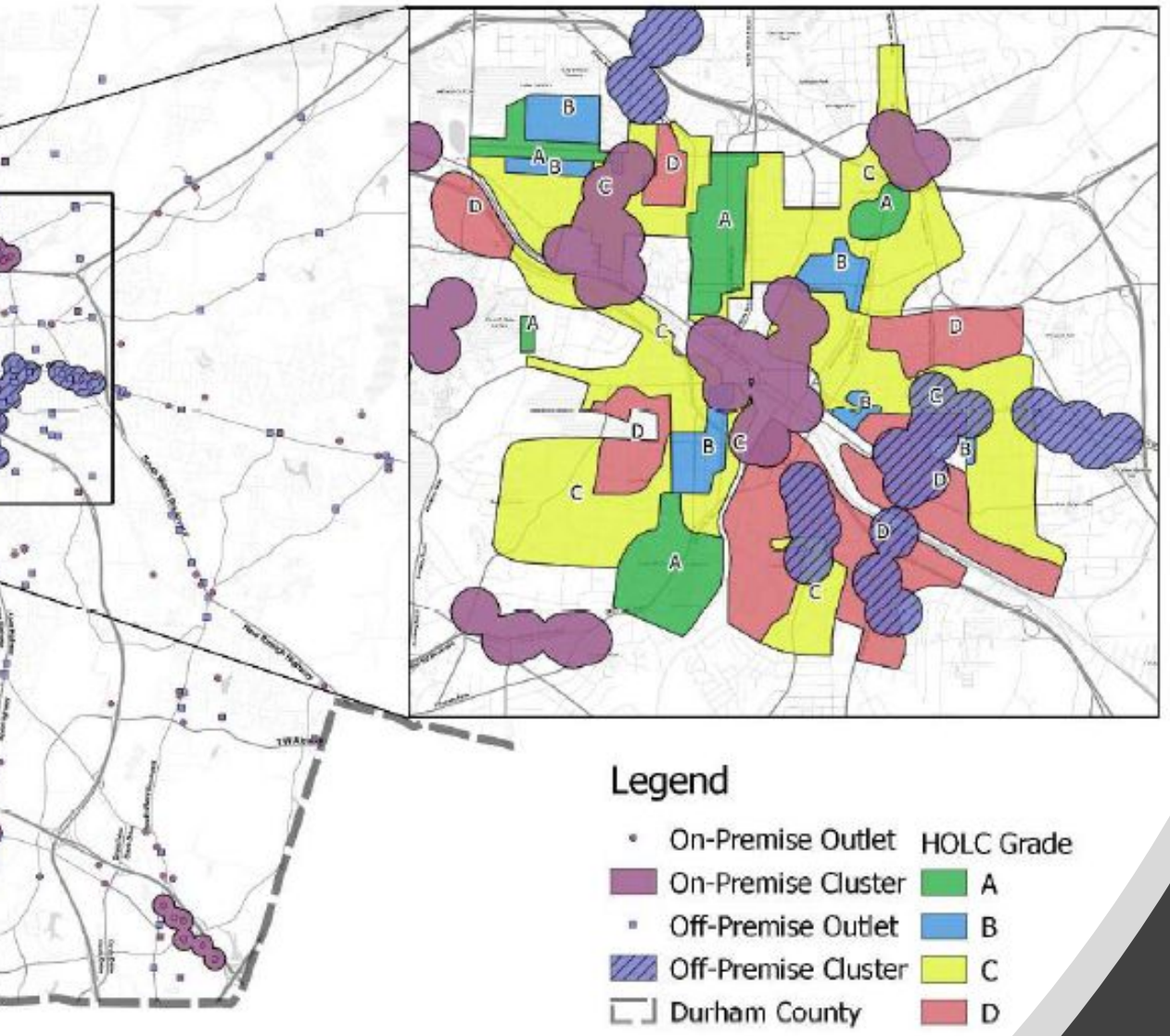


Next step: Pilot process to assess AOD with local communities

- Piloting process with an urban community (Ramsey County, St. Paul) and a more rural community, likely in northern Minnesota
- Plan to create a user guide to help community groups consider their goals for assessing AOD, how to use the mapping tool, choose the best indicator(s) for their community and purposes, etc.

Pilot test questions

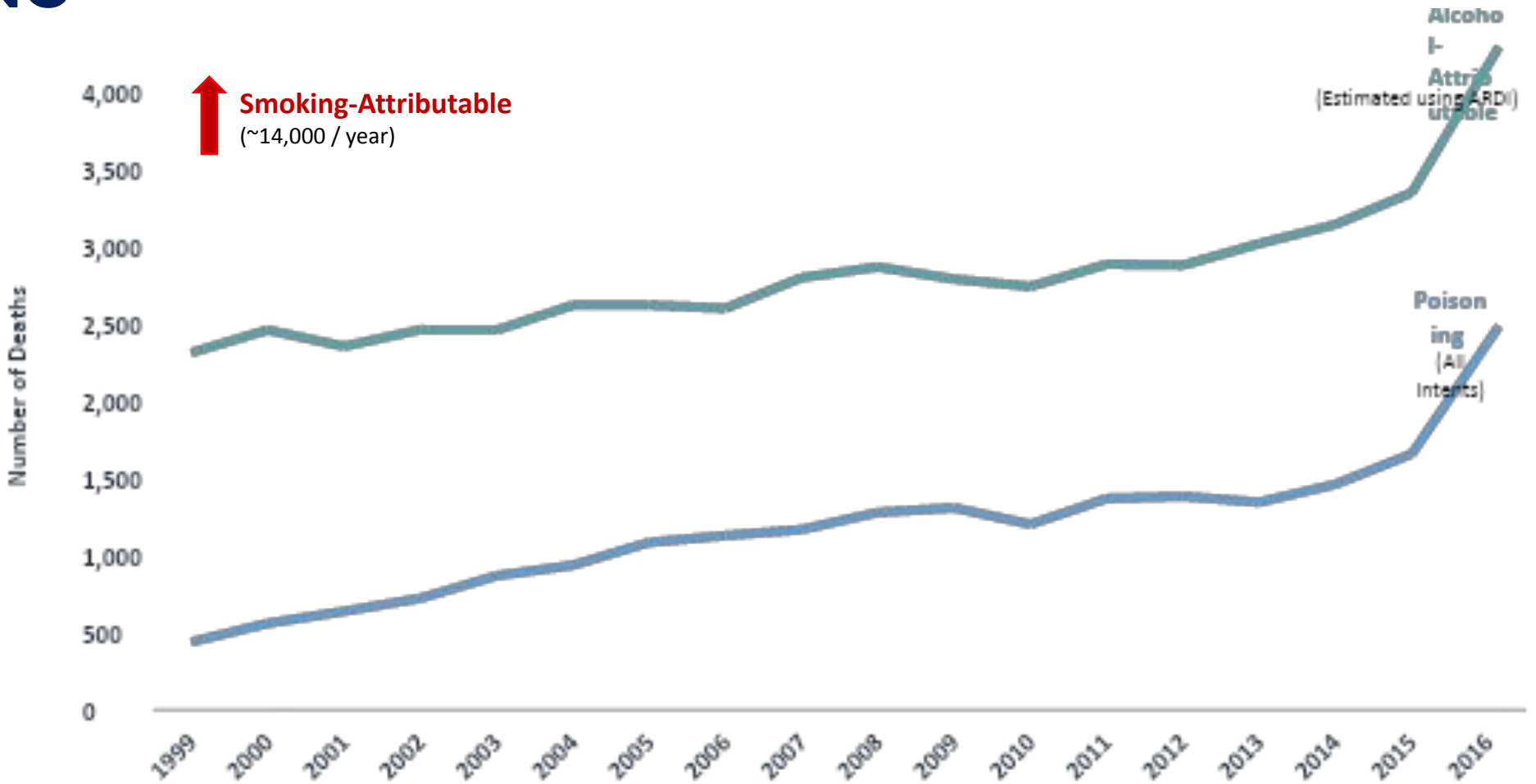
- What kind of goals do community partners have for assessing AOD? Which indicator(s) is appropriate to answer the questions asked?
- What does a feasible process look like to use the AOD mapping tool to assess AOD in different kinds of communities?
- Are there other data that are helpful to include when the community partners are considering AOD in their community? (e.g., # DWI stops, location of sensitive areas such as schools, crime indicators)
- What does varying levels of AOD “mean” in an urban community vs. in a more rural community?



North Carolina

Mike Dolan Fliss

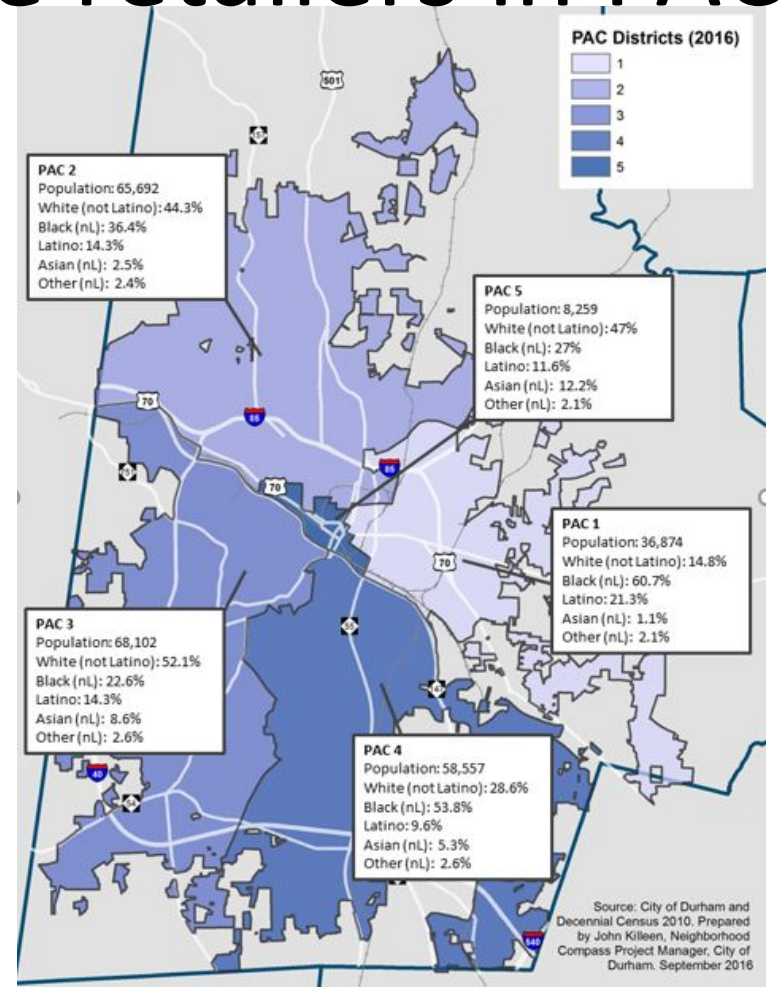
Alcohol-Attributable Deaths Exceed Poisoning Deaths in NC



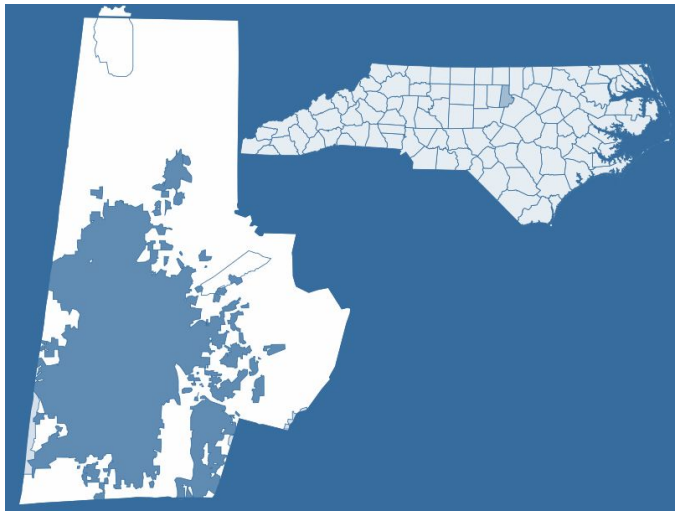
- Source: N.C. State Center for Health Statistics, Vital Statistics-Deaths, 1999-2016,
- and CDC's Alcohol-Related Disease Impact (ARDI).
- Analysis by Injury Epidemiology and Surveillance Unit

North Carolina
Injury & Violence
PREVENTION Branch

Durham:
More retailers in PACs w/ high % BIPOC



	PAC 1	PAC 2	PAC 3	PAC 4	PAC 5
Convenience/Gas	22	38	27	35	7
Convenience/Gas Chain stores	5	21	18	13	5
Grocery	6	15	17	7	2
Grocery Chain stores	3	8	12	5	2



- Source: Boone, Wanda Johnson. “Regulating Outlets That Sell Alcohol in Predominantly African American and Hispanic Neighborhoods.” In *Preventing Alcohol-Related Problems: Evidence and Community-Based Initiatives*, edited by Norman Giesbrecht and Linda M. Bosma, 397–408, n.d.

NC: Gathering Data – from NC ABC

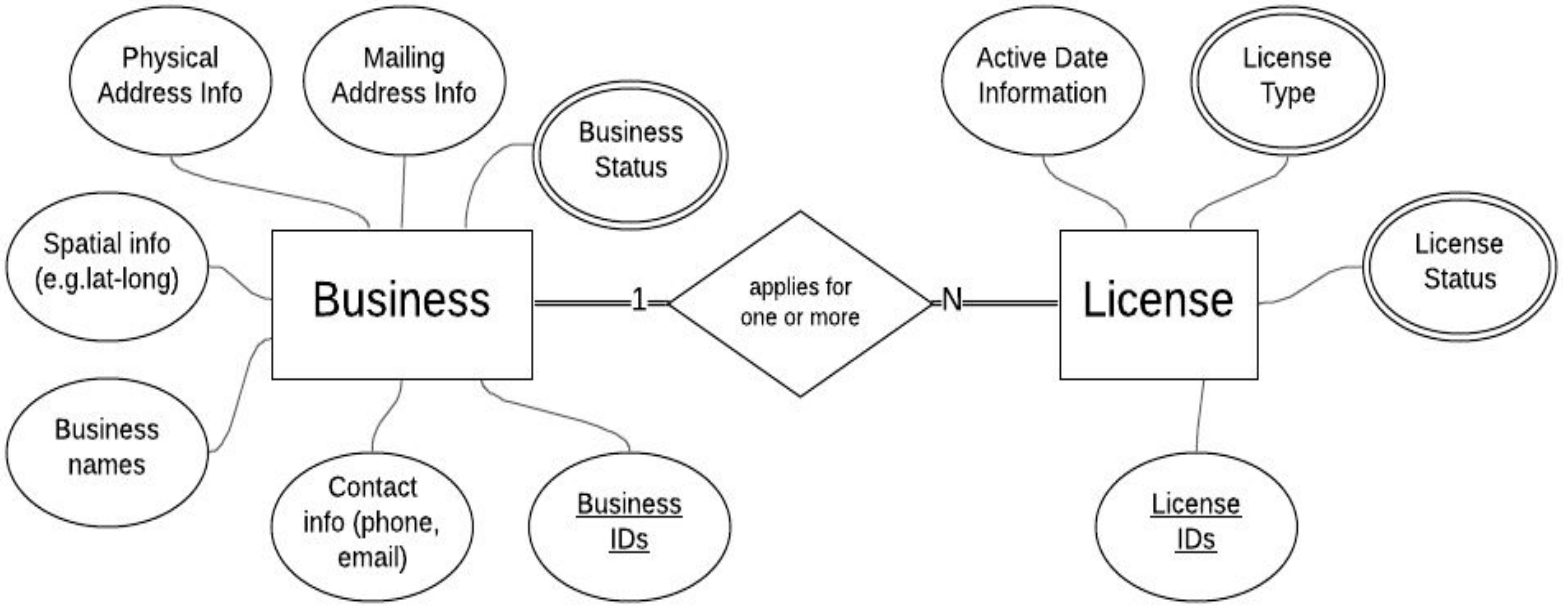
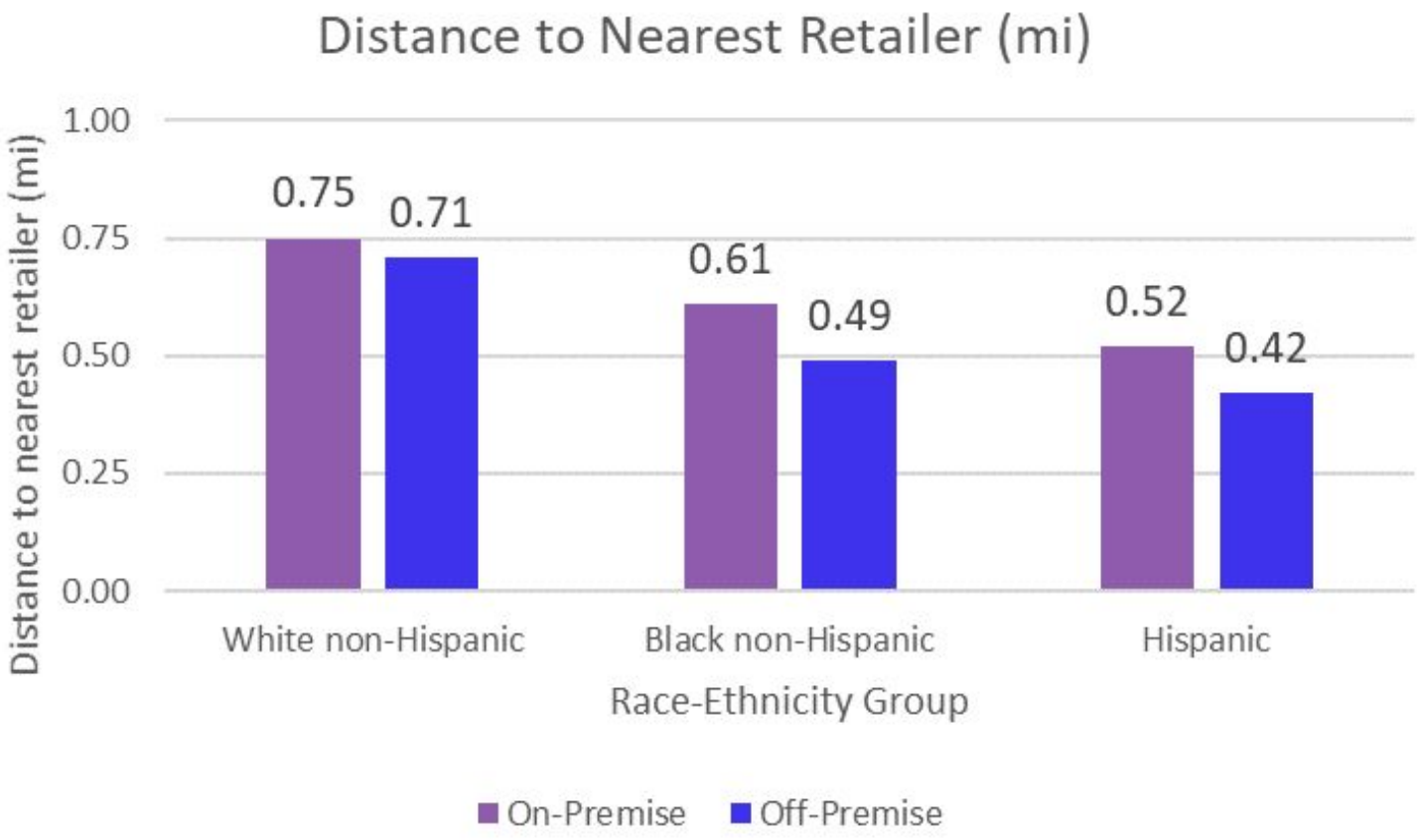


Figure. Example entity relationship schema diagram for alcohol license and outlet database concepts –

Distance to Nearest Retailer in Durham: Disparate by Race-Ethnicity

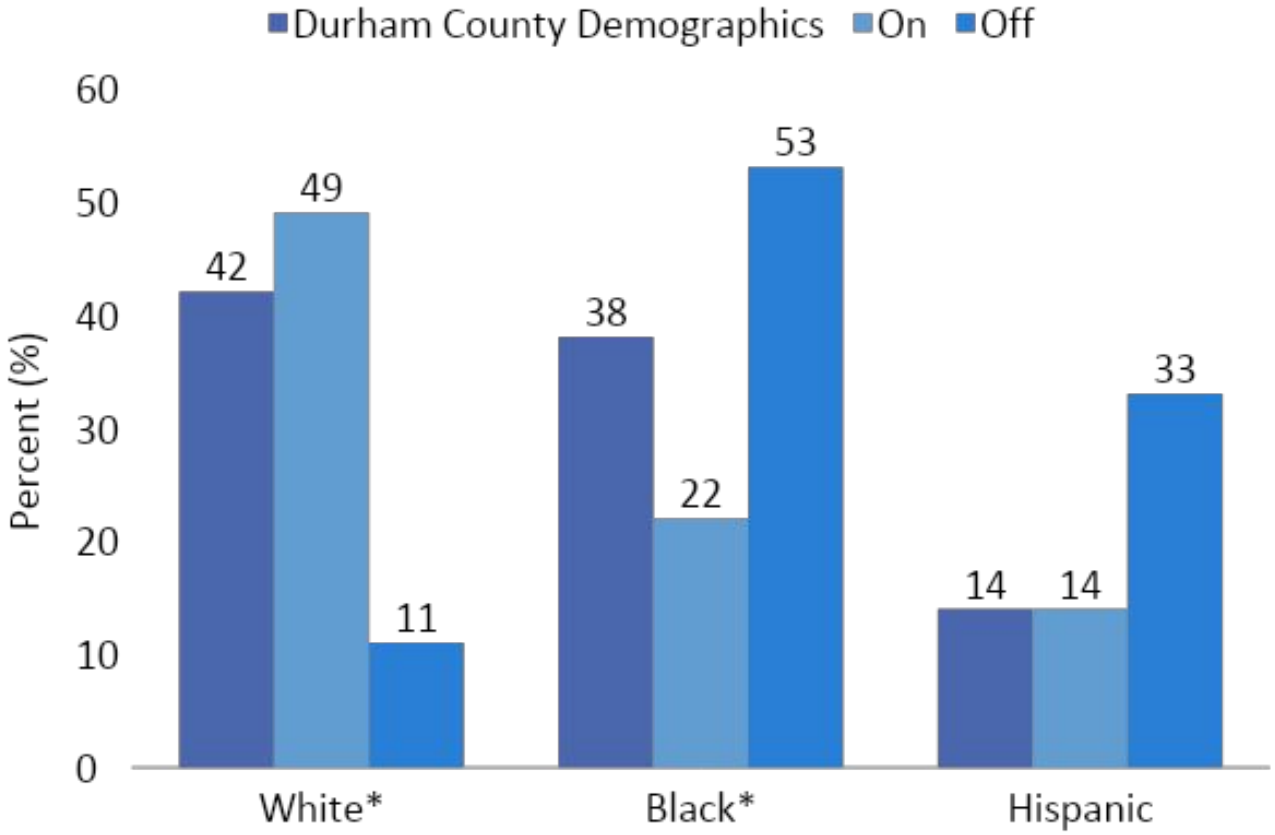


On average, the nearest alcohol retailer for a person was closer to Black non-Hispanics and Hispanics than White non-Hispanics.

This was particularly true of their closest **off-premise** retailer, which was nearly a quarter mile closer for Black non-Hispanic and Hispanic people – significant in a dense environment like Durham.

North Carolina Injury & Violence PREVENTION Branch

Living in a Durham Alcohol Retailer Cluster: Disparate by Race-Ethnicity



*Non-Hispanic

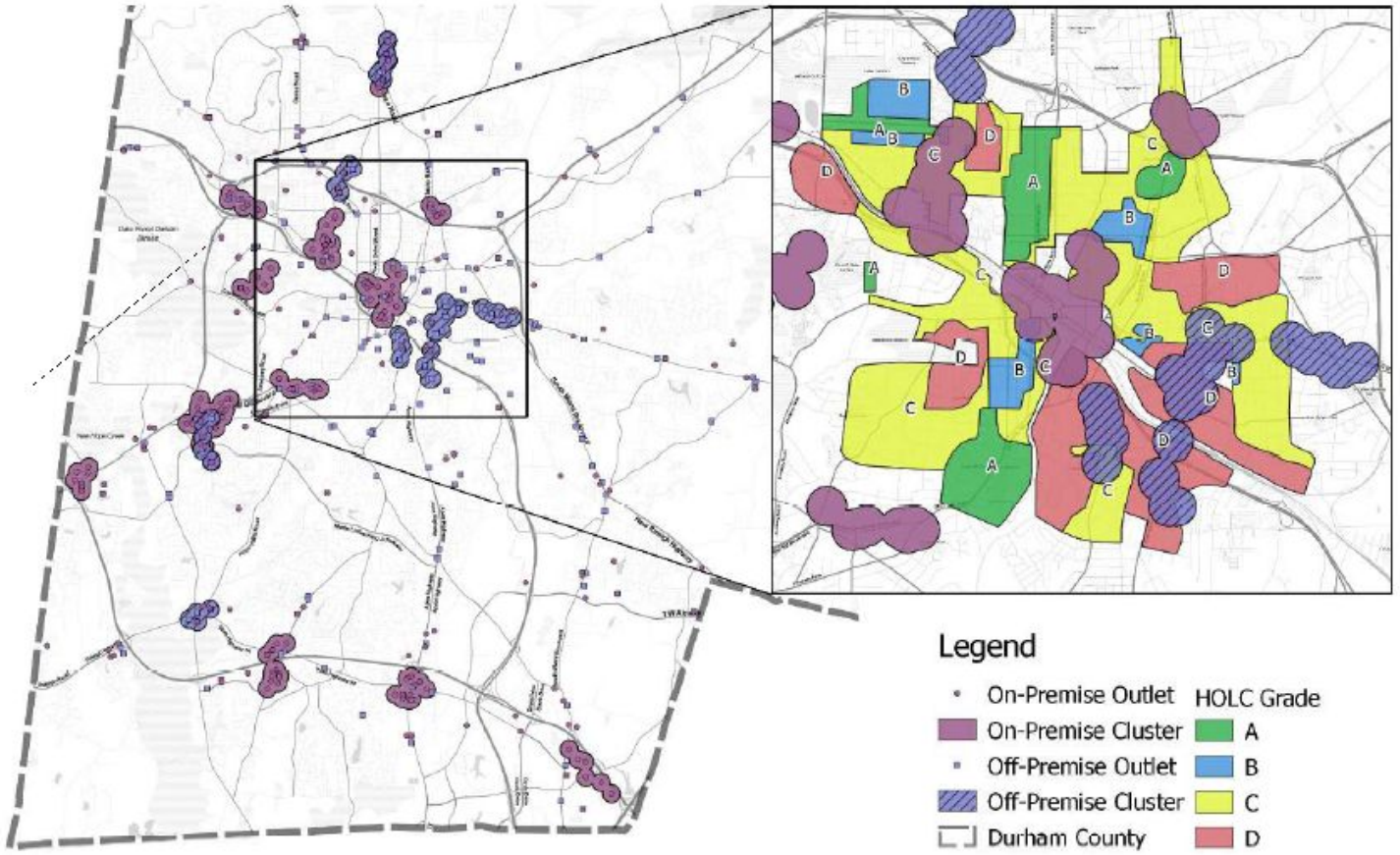
The demographics of people living within alcohol retailer clusters were different.

Hispanic and black residents were more likely to live within an off-premise alcohol retailer cluster than White non-Hispanic residents.

North Carolina Injury & Violence PREVENTION Branch

- * Of defined on- and off-premises clusters in Durham

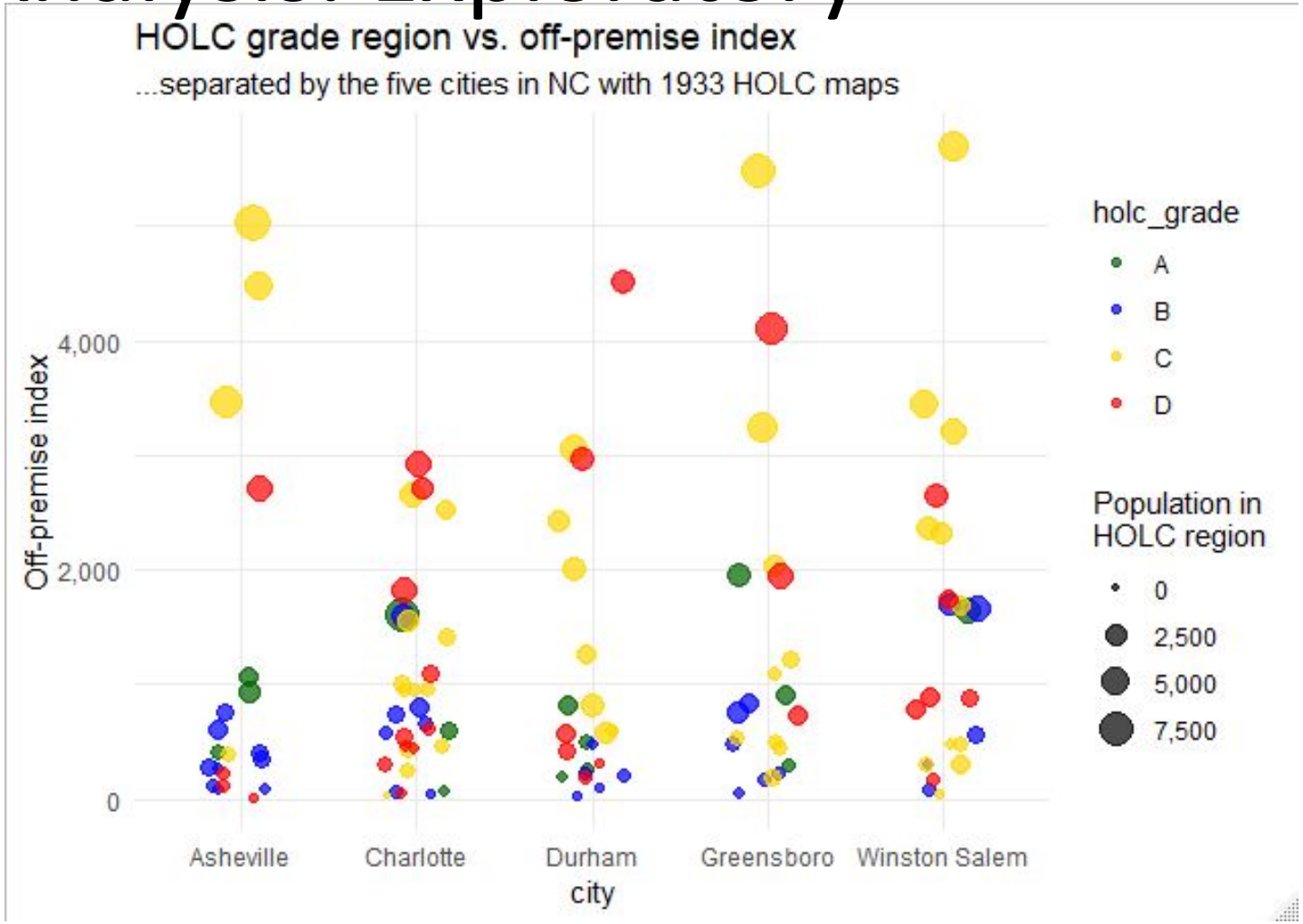
Alcohol Outlet Clusters overlay Historically Redlined Areas in Durham



North Carolina Injury & Violence PREVENTION Branch

Statewide Analysis: Exploratory

Across five North Carolina cities, HOLC C and D grade areas were more densely populated and had higher off-premise alcohol exposure index than A and B grade HOLC areas



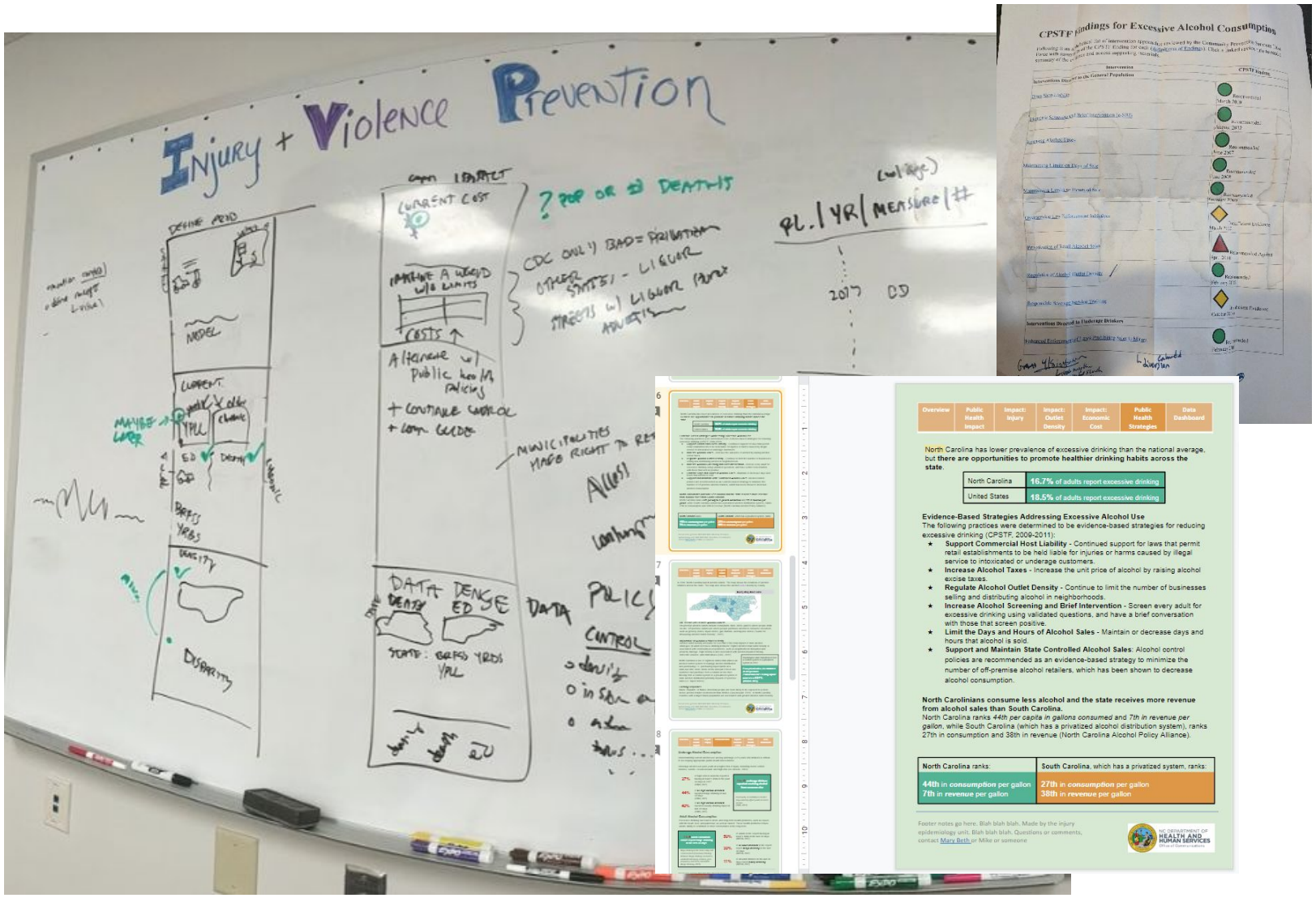
- SOURCE: Analyses in progress, yet to be published

NC Alcohol Dashboard: How we design:

Whiteboarding

Also:

- LucidChart
- PowerPoint
- Visio
- Google Docs
- etc



NC Alcohol Dashboard: Changes from Opioid Dashboard

- Curated public health narrative, not data dump
- Tableau Public front end (vs. R Shiny) (both free)
- Focus on printable standalones along w interactivity

http://bit.ly/NCAlcoholDashboard

NC Alcohol Dashboard: Alcohol-related metrics

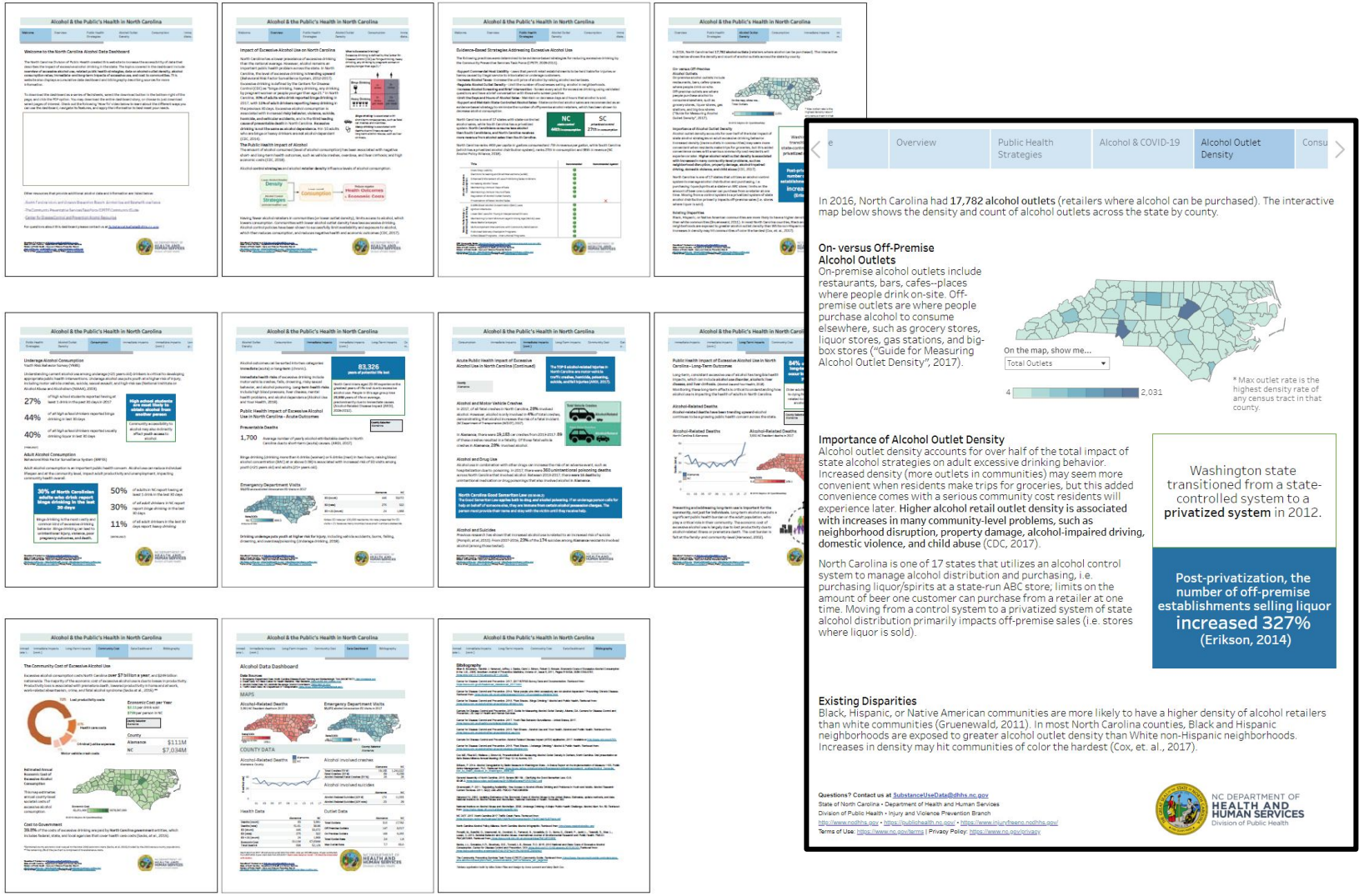
- County metrics
  - Outlet data
    - Total outlets, off-premise, on-premise, outlet rate, max rate
  - Deaths (count, rate)
    - Total, Suicides, Alcohol-related disease impact (ARDI)
  - Emergency department visits
  - Traffic crashes
    - Total, fatal, alcohol-related fatal
  - Economic cost
- Statewide Metrics
  - Behavior survey data (BRFSS, YRBS)
  - Consumption, revenue/gallon, disparities

See prior & current work from CSTE Alcohol Subcommittee on sources for alcohol-related data, including CDC Alcohol Hospitalization Guide (https://www.cste.org/group/Alcohol)

http://bit.ly/NCAlcoholDashboard

Alcohol Dashboard: Final product

- Welcome page
- Overview
- Public health strategies
- **Alcohol outlet density**
- Consumption
- Immediate impacts (1&2)
- Long-term impacts
- Community cost
- Data dashboard
- Bibliography

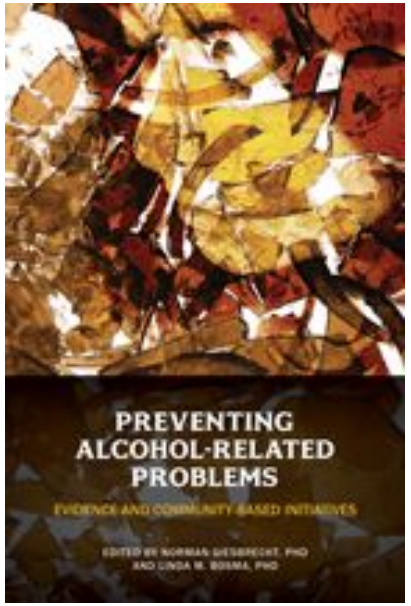


Next Steps

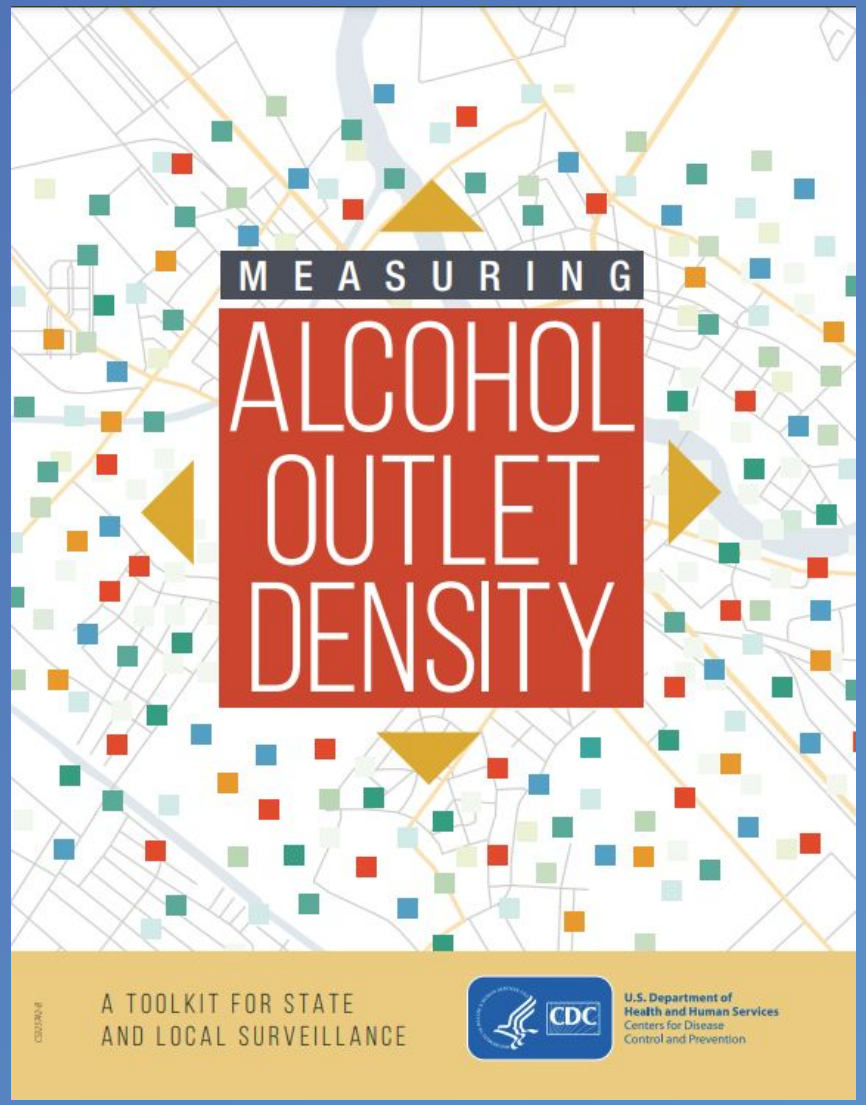
Regulating Outlets That Sell Alcohol in Predominantly African American and Hispanic Neighborhoods

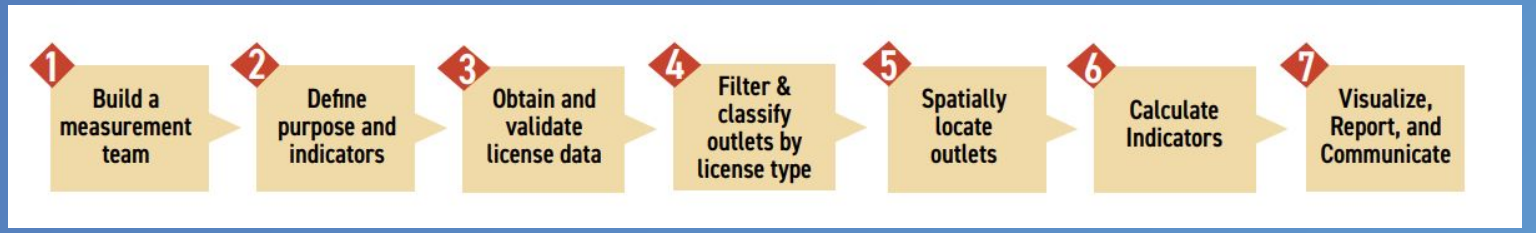
Wanda Johnson Boone

- Celebrate & onboard our new alcohol epi, Fisher!
- Ongoing calculation of outlet density
- On Redlining:
  Preliminary analysis suggests similar redlining stories in 4 other NC cities.
- On Disparities:
  Statewide, as % Black / Hispanic goes up, minimum distance to nearest outlet goes down.
- Tracking of available state & local alcohol-related policies



Workshop


MEASURING
ALCOHOL OUTLET DENSITY
A TOOLKIT FOR STATE AND LOCAL SURVEILLANCE
CDC
U.S. Department of Health and Human Services
Centers for Disease Control and Prevention


1 Build a measurement team
2 Define purpose and indicators
3 Obtain and validate license data
4 Filter & classify outlets by license type
5 Spatially locate outlets
6 Calculate Indicators
7 Visualize, Report, and Communicate

Workshop Portion

For Each Group of Steps:

- Panelist Discussion to Introduce Topic
- Small Group Discussion
- Report Out

Registration Report Out

Got data?

- 57% (n=26) have data in hand

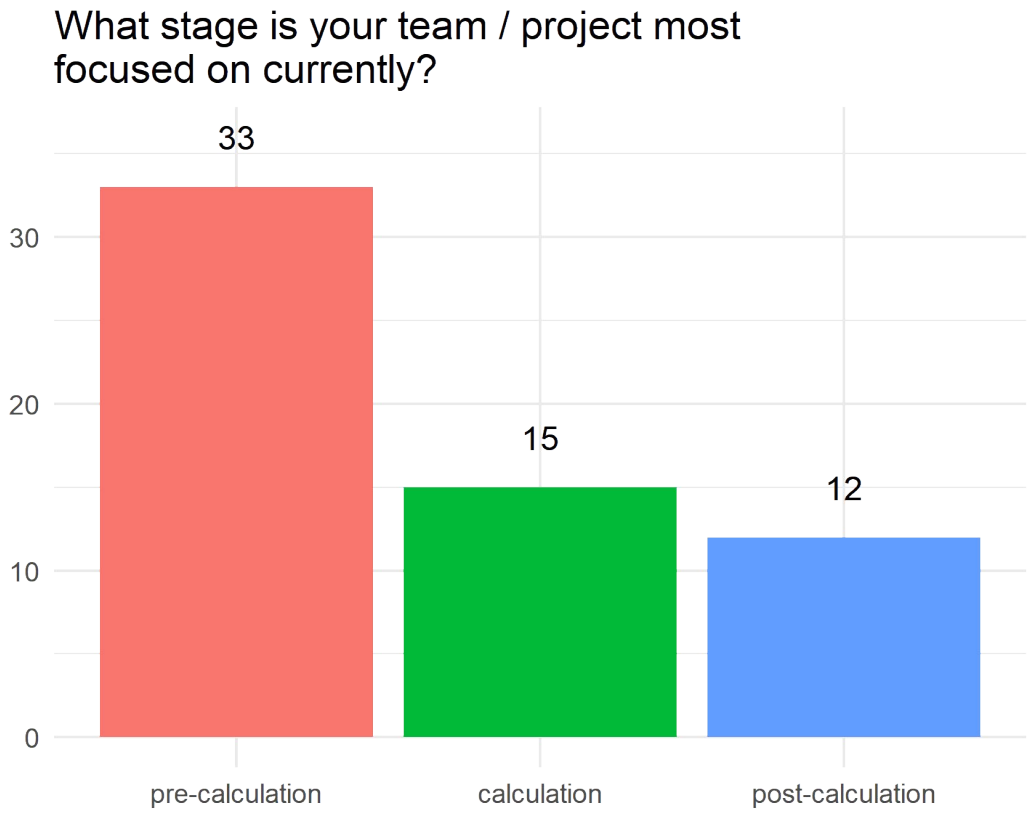
Who's doing the analysis?

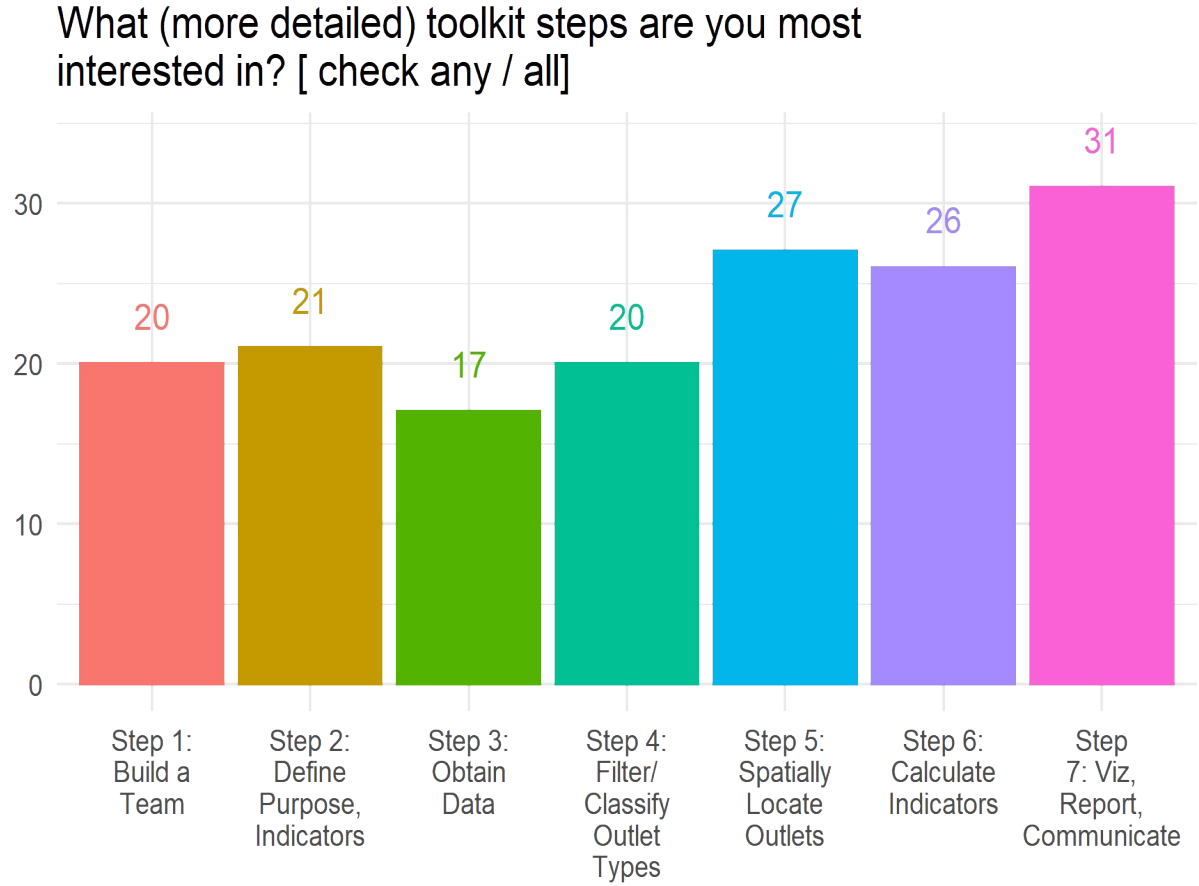
- 35% (n=16) are doing the analysis
- 74% (n=34) have someone else doing analysis

What's your organization?

- 1/3 nonprofit
- 1/3 government
- 1/3 academic, research, policy, and other

Registration Report Out





Pre-Calculation

Steps for Measuring Alcohol Outlet Density

Step 1. Build a measurement team.

1. Build a measurement team
2. Define purpose and indicators
3. Obtain and validate license data
4. Filter & classify outlets by license type
5. Spatially locate outlets
6. Calculate Indicators
7. Visualize, Report, and Communicate

Objectives

A. Gather the team and assign roles.

B. Establish project timeline and goals.

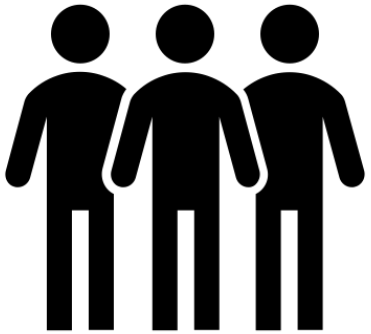
C. Choose and acquire software.

D. Get training.

Step 1 Summary Questions

- Who is on your team, and what are their roles? Is the team missing anyone? Is more training required?
- What is your project timeline? How often will your team meet?
- What are your project goals?
- What software and tools will you use?
- Does your project have or require funding for software, staff time, or contracts with other partners?

Gather Team



- **Data Provider**: knows how to obtain the alcohol outlet density data.
- **Spatial Analyst**: runs spatial analyses, understands underlying statistics and data flow.
- **Map Builder**: takes output of spatial analysis and builds maps and reports.
- **Alcohol License Expert**: knowledgeable about license structure and history.
- **Local Context Expert**: knows the local environment, identifies characteristics that may influence alcohol outlet density such as how population is distributed and neighborhood contextual factors.
- **Epidemiologist, Scientist, or Researcher**: can conduct scientific or epidemiologic research and guide the team in applying relevant alcohol epidemiology principals, consider how interpret the data within the broader alcohol environment or public health context.
- **Administrative Coordinator**: coordinates meeting logistics, tracks progress towards goals.
- **Other**: public speaking, graphic design, policy researcher, etc.

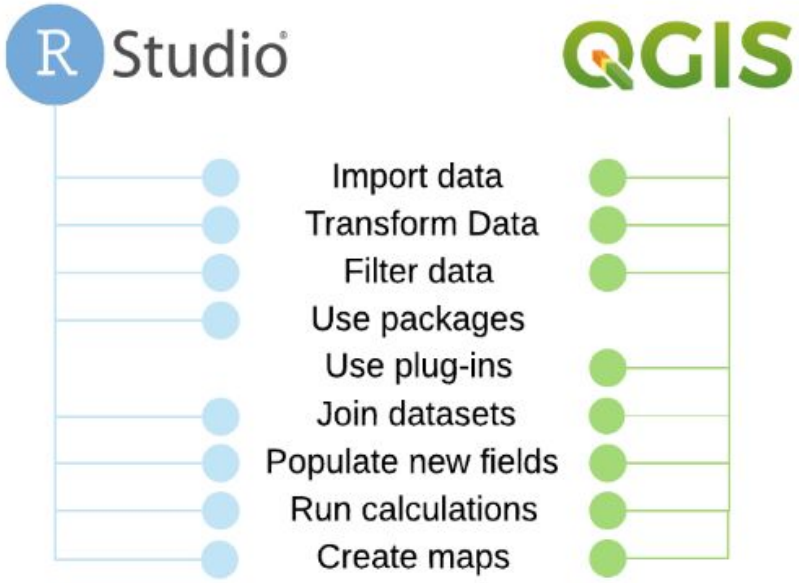
Plans & Tools

Timeline & Goals

- Set timeline and goals
- Make backup plans!

Software Tools

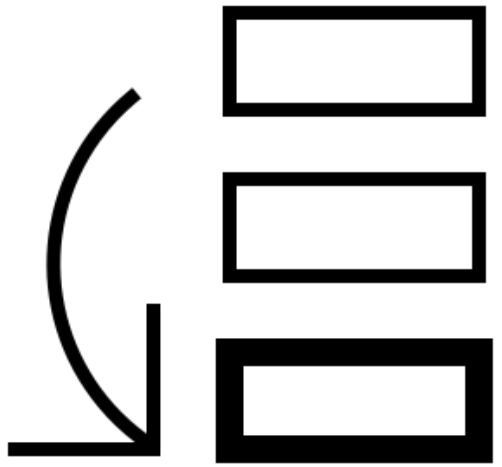
- Cost, availability
- Get training as needed!



Prioritize Questions: Tier 1

Start here!

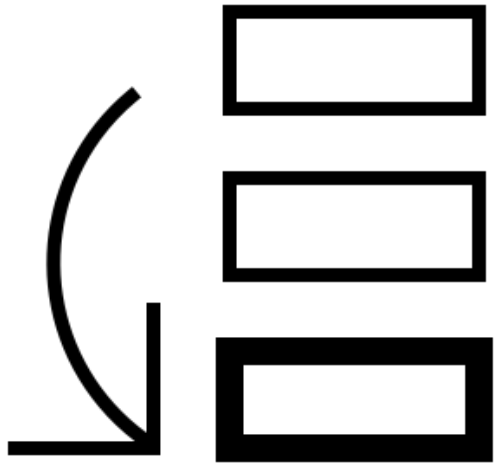
- **Spatial locations (mapped) and count** of alcohol outlets within study zone
- **Overall alcohol outlet density** in study zone
- **Alcohol outlet density differences -** by county, census tracts, or neighborhoods
- Count alcohol outlets by **license type**
- Longitudinal - Has outlet density **changed over time**?
  - If you can obtain **historical data!** If this is the first alcohol outlet density analysis, data obtained for this analysis can serve as baseline for future analyses.



Prioritize Questions: Tier 2

Harder but valuable:

- Density & health measure (confounded) **associations**
- **Disparities**
- **Tobacco, marijuana** outlets
- **Threshold** analyses
- Schools, parks, healthy food associations (**salutagens**)
- …So many more!



Step 2. Define the purpose and indicators.

1. Build a measurement team
2. Define purpose and indicators
3. Obtain and validate license data
4. Filter & classify outlets by license type
5. Spatially locate outlets
6. Calculate Indicators
7. Visualize, Report, and Communicate

Objectives

A. Prioritize alcohol outlet density measurement surveillance questions.

B. Choose indicators of alcohol outlet density to calculate.

C. Choose study zone and regions.

D. Gather region shape and population data.

Step 2 Summary Questions

- What is the main goal of your alcohol outlet density measuring project?
- What questions does your team plan to prioritize?
- What questions are of interest but may take longer to complete?
- How does data availability and team capacity affect your questions and tasks?
- Who will you share your results with and why?

Choose indicators to calculate

Toolkit covers four:

A. Count-based indicators

- Count / rate of alcohol outlets **per square land mile**
- Count / rate of alcohol outlets **per 10,000 people**

B. Distance-based Indicators

- **Outlet-to-outlet**: Average distance from alcohol outlet to its nearest outlet
- **Person-to-outlet**: Average distance from a person to their nearest alcohol outlet

Density Indicators: Pros & Cons

Type of indicator	Indicator	Advantages	Disadvantages	Examples of indicator use in sentence format
Count-based	Number of alcohol outlets per area (in square land miles)	Simple to calculate. Simple to describe in policy.	Can create fractional rates. Does not capture clustering.	The outlet density rate is 3 outlets per mi^2 in Region A. Region A has 2 more outlets per mi^2 than Region B (at 1/mi^2), and twice as many outlets as Region C (1.5/mi^2). Within sub-regions of Region A (e.g., tracts within counties), alcohol outlet density varies between 0.5 outlets/mi^2 and 10/mi^2.
	Number of alcohol outlets per population (10,000 people)	Simple to calculate. Adjusts for population density.	Can create fractional rates. Does not capture clustering.	The number of outlets per 10,000 people in region D is 2.5. There are 2 more outlets per 10,000 people in Region D than in region E (0.5 outlets/10,000). This represents 5 times as many outlets per 10,000 people in region D than in Region E (0.5 x 5 = 2.5).
Distance-based	Average distance from outlet to its next nearest outlet	Captures some cluster dynamics.	Harder to calculate, requires geocoding. Harder to describe in policies.	The average distance between an alcohol outlet and its next nearest outlet is 1 mile in Region F. Even though the total number of outlets in Region G is the same, they are closer to each other (0.5 miles on average) than those in Region F are.
	Average distance from a person to their nearest outlet	Person-centered indicator.	Harder to calculate, requires geocoding. Harder to describe in policies.	The total average distance between a person and their nearest outlet is 1 mile in Region H. However, there are differences by demographics in that region. White non-Hispanic people live on average 1.5 miles to their nearest outlet, while Black people live on average only 0.5 miles to their nearest outlet.

Step 3. Obtain and validate license data.

1. Build a measurement team
2. Define purpose and indicators
3. **Obtain and validate license data**
4. Filter & classify outlets by license type
5. Spatially locate outlets
6. Calculate Indicators
7. Visualize, Report, and Communicate

Objectives

A. Collect outlet and license data.

B. Understand license data structure.

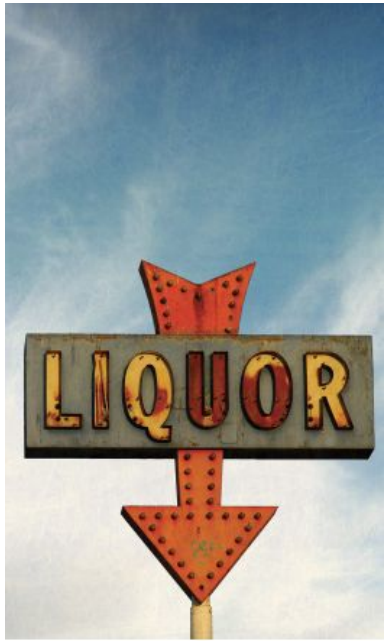
C. Perform joining, cleaning, recoding, and filtering.

Step 3 Summary Questions

- What is the relationship of outlets and licenses in your jurisdiction?
- What outlet or license tables exist? If more than one table exists, how are the tables related?
- What fields are available in these tables? Which are useful? Which must be cleaned?
- What recoding, filtering, formatting, and structural changes need to be made to the original data?

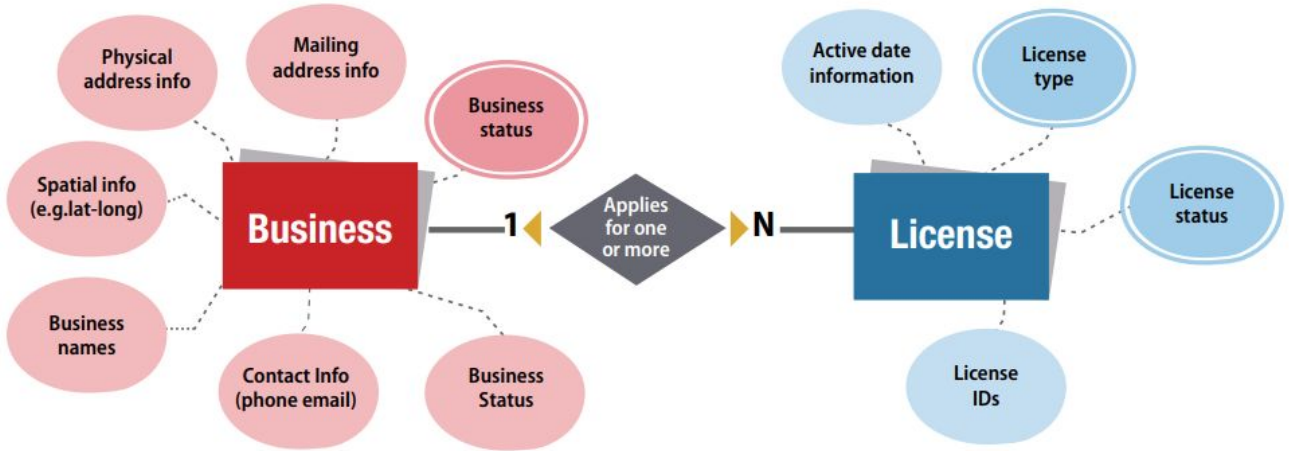
Data Ownership

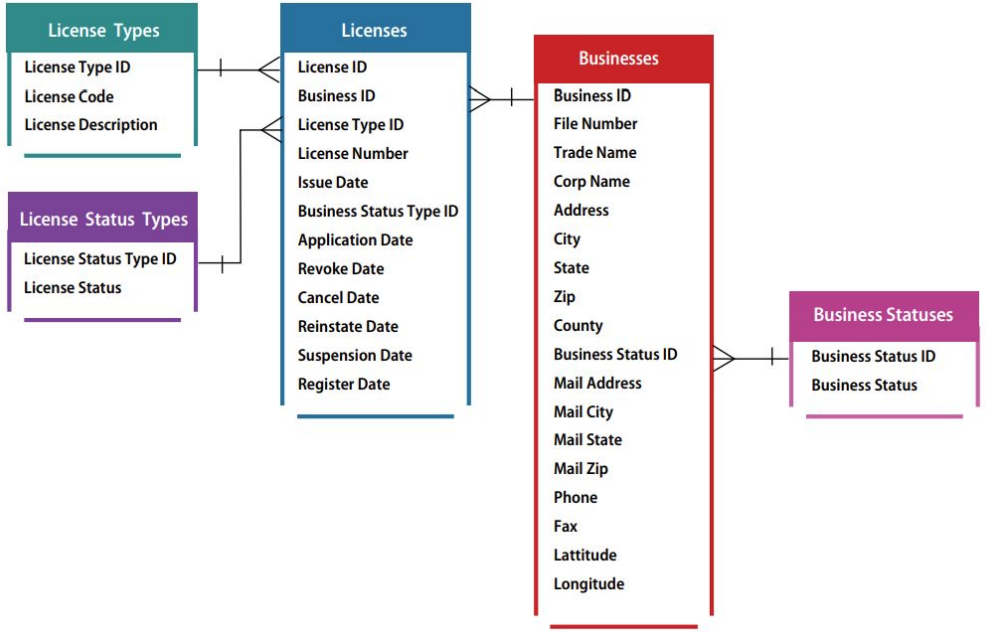
- State / Local Control
- Departments of Revenue, ABC, etc.
- Web scraping & Alternates



Data Structures

- Table relationships?
- Data formats?
- License structures?





Panel Discussion

- How did you juggle keeping partners happy and relevant political landscapes?
- How did your team scope your project? What did partners want?
- Did you collaborate with other spatial public health projects, like tobacco, food, or cannabis?
- Different reasons – why was your state called to do the work?
- What region types did you calculate: county, tracts, cities?
- How did you deal with rural / urban dynamics?
- Who "owned" your data and how did you obtain it?
- How did you clean your data?
- How did you handle data oddities & outliers?

Small Group Discussion

Objectives

A. Gather the team and assign roles.
B. Establish project timeline and goals.
C. Choose and acquire software.
D. Get training.

Step 1 Summary Questions

- Who is on your team, and what are their roles? Is the team missing anyone? Is more training required?
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Small Group Discussion

Objectives

A. Prioritize alcohol outlet density measurement surveillance questions.

B. Choose indicators of alcohol outlet density to calculate.

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D. Gather region shape and population data.

Step 2 Summary Questions

- What is the main goal of your alcohol outlet density measuring project?
- What questions does your team plan to prioritize?
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- How does data availability and team capacity affect your questions and tasks?
- Who will you share your results with and why?

Small Group Discussion

Objectives

A. Collect outlet and license data.

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- What is the relationship of outlets and licenses in your jurisdiction?
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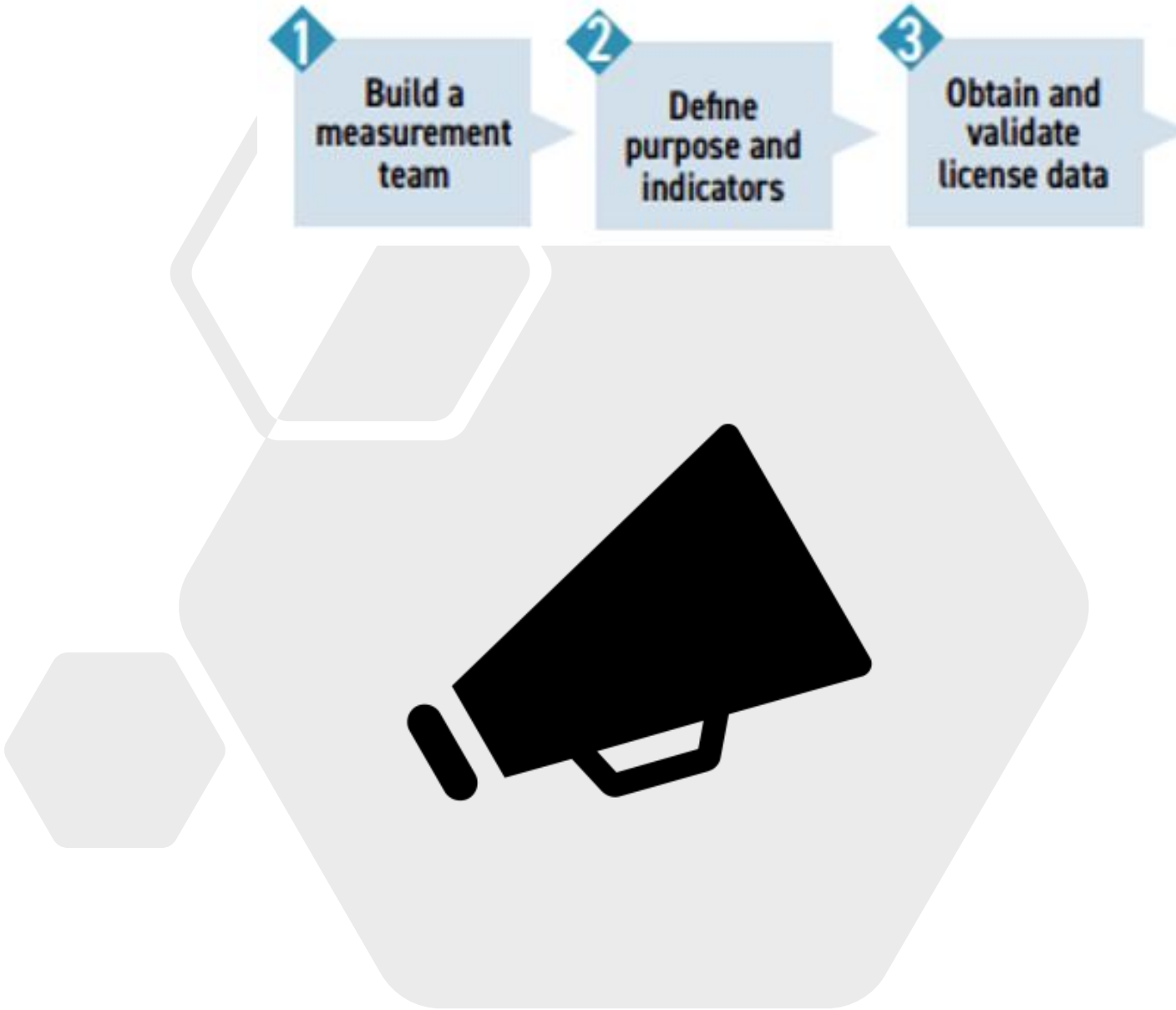
- What recoding, filtering, formatting, and structural changes need to be made to the original data?

Report Out

- Theme
- Theme
- Theme



Calculation

Step 4. Filter and classify outlets by license type.

1. Build a measurement team
2. Define purpose and indicators
3. Obtain and validate license data
4. **Filter & classify outlets by license type**
5. Spatially locate outlets
6. Calculate Indicators
7. Visualize, Report, and Communicate

Objectives

A. Prepare license-type classification table.

B. Join classification table to outlet data.

C. Perform filtering and grouping.

Step 4 Summary Questions

- What outlet or license types exist? Which will you include in your surveillance efforts? Which will you drop?
- How many outlets are there of each type?
- Are there sub-groups of outlet types of specific interest? How many of each group are there?

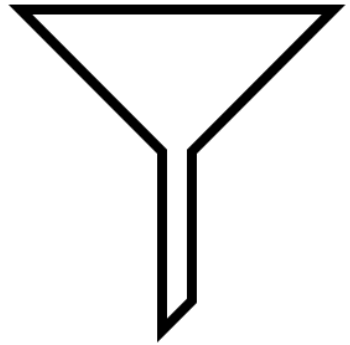
License Type Classification Table

- Start with Frequency Table
- Add analysis context
- Join to flattened outlet data

Table. Example frequency table for licenses – top 10 rows of license types. Added last three columns by hand.

permit_code	permit_description	permit_count	study_include	permit_group1	study_note
AJ	Malt Beverage On Premise	28655	Yes	On	include
AK	Malt Beverage Off Premise	22456	Yes	Off	include
AL	Unfortified Wine On Premise	21616	Yes	On	include
BA	Salesman	19803	No	Drop	Wholesale only
AM	Unfortified Wine Off Premise	19446	Yes	Off	include
AO	Fortified Wine Off Premise	13682	Yes	Off	include
AY	Mixed Beverages Restaurant	10658	Yes	On	include
AN	Fortified Wine On Premise	9846	Yes	On	include
AZ	Mixed Beverages Private Club	3837	Yes	On	include

Filter & Group



- Filter to…
  - Licenses to use in study
  - Allow multiple outlets in same building?
  - Active / inactive?
- Optional: license groups
  - On-premise and off-premise
  - Breweries / beer gardens
  - Etc.
- Document counts of outlets lost at each filter step!

Step 5. Spatially locate outlets.

1. Build a measurement team
2. Define purpose and indicators
3. Obtain and validate license data
4. Filter & classify outlets by license type
5. **Spatially locate outlets**
6. Calculate Indicators
7. Visualize, Report, and Communicate

Objectives

A. Gather shape data, population data, and accessory data.

B. Geocode outlets.

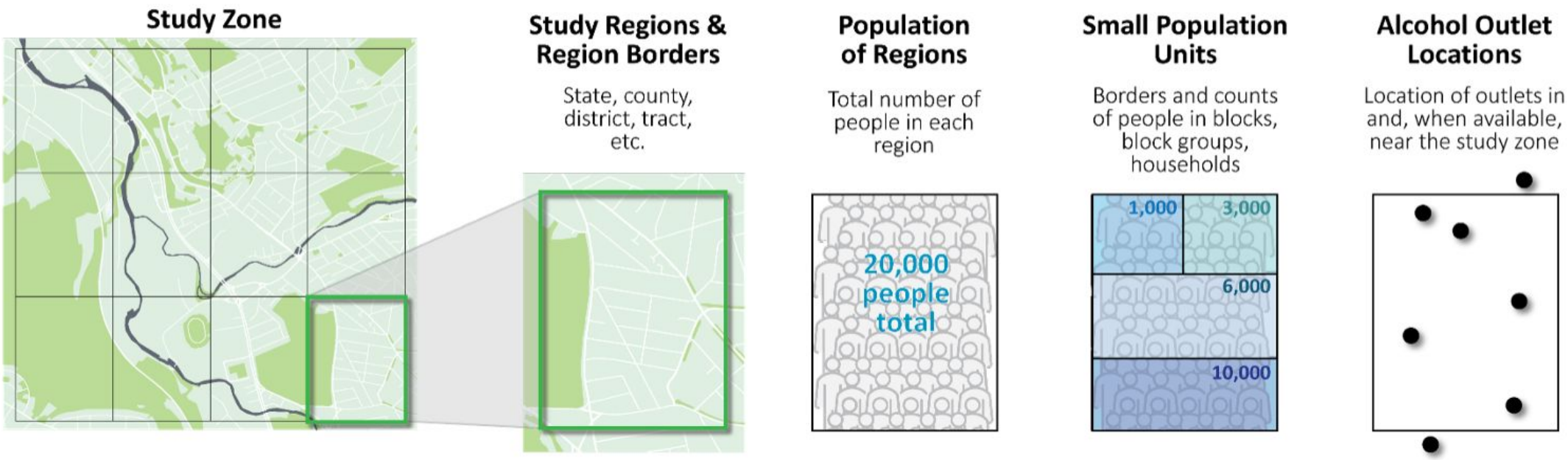
C. Tabulate, review, and improve geocoded results.

D. Spatially project and filter to region.

Step 5 Summary Questions

- How will your team address outlets that are missing spatial data?
- What proportion of outlets did not geocode correctly? Is that proportion acceptable?
- How many outlets were removed for not meeting criteria?

Gather Shape & Population Data

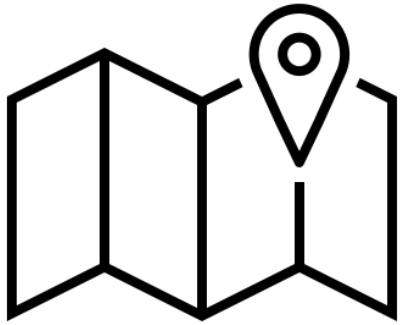


- Optionally gather…
  - Accessory data: Health, crime, demographics, etc.

Geocoding – Do you have to?

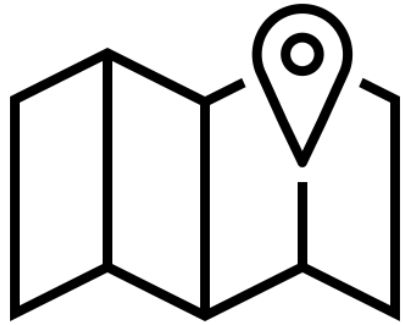
- Can skip geocoding if:
  - Calculating count-based indicators and have a variable describing what region an outlet is in; **or**
  - Already geocoded in license database (congrats!)

- Will need to geocode if:
  - Want alcohol outlet points on your maps
  - Calculating distance-based measures



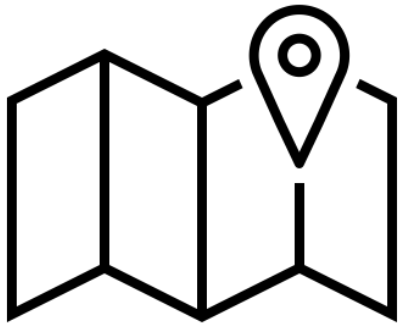
Geocoding – General Principles

- Many ways to geocode
  - Free & commercial geocoders exist (e.g., toolkit uses Geocodio)
  - Work with other state/local government groups (master addy table?)
  - Consider terms of service carefully (e.g., ok to store results?)
  - Want to use for other purposes (HIPAA compliance required)?
- Prepare data
  - Single address line, or separate?
- Save results for efficiency
  - Don’t geocode same address twice



Geocoding – Done! Now what?

- Assess failed or low-accuracy geocodes
- Iteratively improve - review, replace, re-geocode
- Other review methods:
  - Spatial bounding box
  - Manual search / reverse lookup
  - Satellite review of sample



Filter outlets spatially

- Filter outlets by **spatial field**…
  - E.g., a database variable for “state” – filter out non-state outlets

- …or by **spatial relation**.
  - I.e., Calculate spatial intersection of geocoded outlet points and region shapes Assign regions Filter as before

Step 6. Calculate indicators.

1. Build a measurement team
2. Define purpose and indicators
3. Obtain and validate license data
4. Filter & classify outlets by license type
5. Spatially locate outlets
6. **Calculate Indicators**
7. Visualize, Report, and Communicate

Objectives

A. Import data into software.

B. Check projection of spatial data.

C. Count outlets in each region.

D. Join supplementary data by region.

E. Calculate indicators.

Step 6 Summary Questions

- Do any of your chosen analyses require a spatial analysis tool? If so, which ones?
- What projected coordinate reference system (CRS) will your project use? If calculating distance indicators, will you calculate them using the same CRS as the one you use to visualize maps?

Check Projections

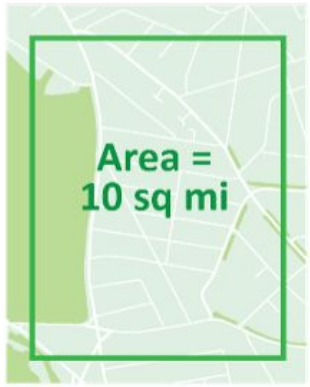
- Projection = math to place shapes on the earth accurately
- Mismatches projects, your points and shapes won't overlap right … or will end up on a different continent or in the ocean!
- Use a local state plan projection (e.g., with x-y points as feet or miles) instead of lat-long coordinates (WGS84) to calculate distances

Pre-Calculation Calculations: Counts, Shapes, & Distances

SHAPES

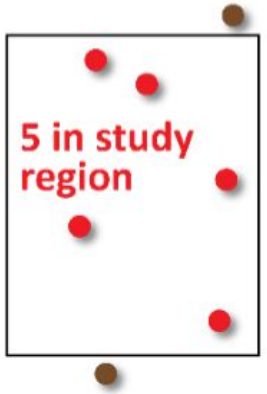
Region Sizes

Calculate or gather region area in square miles



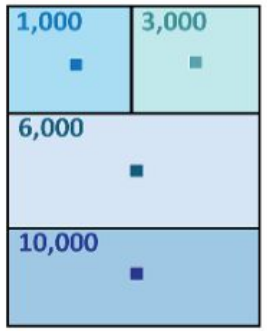
Assign Outlets to Regions

Calculate or gather information about which outlets are inside each region



Identify Population Centers

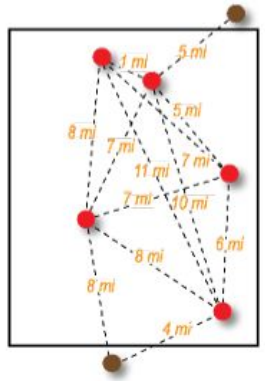
Population counts assigned to center point of small population units



DISTANCES

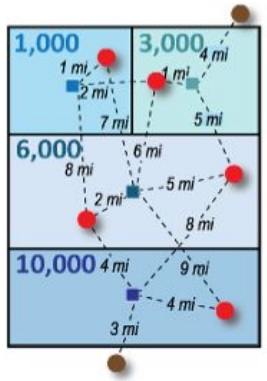
Outlet Distance Table

Calculate distance between each outlet and all other outlets



Population Center to Outlet Distance Table

Calculate distance from population centers to all outlets



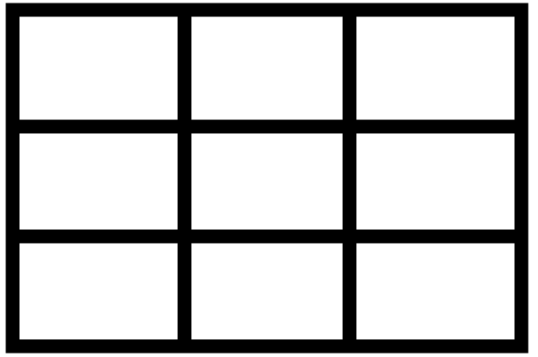
Pre-Calculation Calculations: Count Outlets, Join Population / Areas

- **Count Outlets**
  - **Tabular method**: create frequency table using region variable in dataset
  - **Spatial method**: count outlet points within region shapes (*points-in-polygon* tool, or *st_intersects* function)

- Join **population data** (if not already attached)

- Join or calculate **region land area**

Pre-Calculation Calculations: Distance Tables



- **Outlet-to-Outlet** Distance Table
  - Only need closest non-self distance.
  - Remember that in a full distance matrix, outlets are closest to themselves!

- **Person-to-Outlet** Distance Table
  - Weight small population unit center distances by the number of people at that distance, then average

Calculate Indicators

COUNT-BASED INDICATORS

Easier to calculate

Outlets per square mile *(Fig. 1)*

5 inside region of 10 sq mi

5 / 10 sq mi = 0.5 outlets / mi²

Outlet per 10,000 persons *(Fig. 1)*

2.5 outlets per 20,000 people in region

(5 / 20,000) x 10,000 = 2.5 outlets / 10,000 persons

DISTANCE-BASED INDICATORS

Harder to calculate

Outlet to nearest outlet distance *(Fig. 1)*

On average, the 5 outlets in region are 3.6 miles to their next nearest outlet

(1 mi + 1mi + 5 mi + 7 mi + 4 mi) / 5 = 3.6 mi

Person to nearest outlet distance *(Fig. 2)*

Average miles to nearest outlet from small population centers

$$\frac{(500 \text{ at } 1 \text{ mi}) + (1{,}500 \text{ at } 1 \text{ mi}) + (3{,}000 \text{ at } 2 \text{ mi}) + (5{,}000 \text{ at } 3 \text{ mi})}{20{,}000 \text{ total people}} = 2.3 \text{ mi}$$

Figure 1

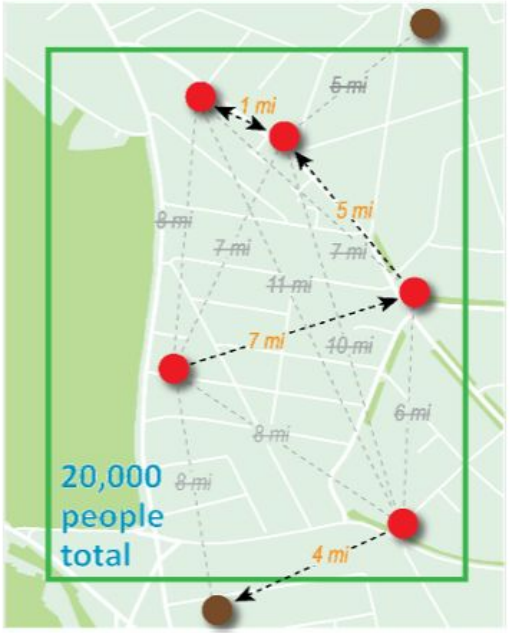
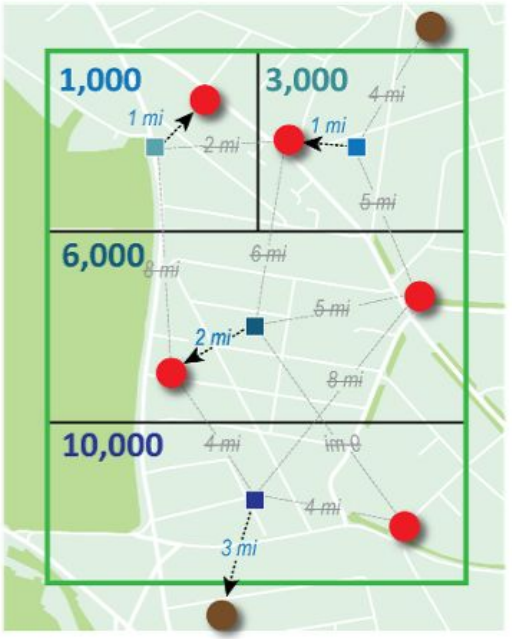
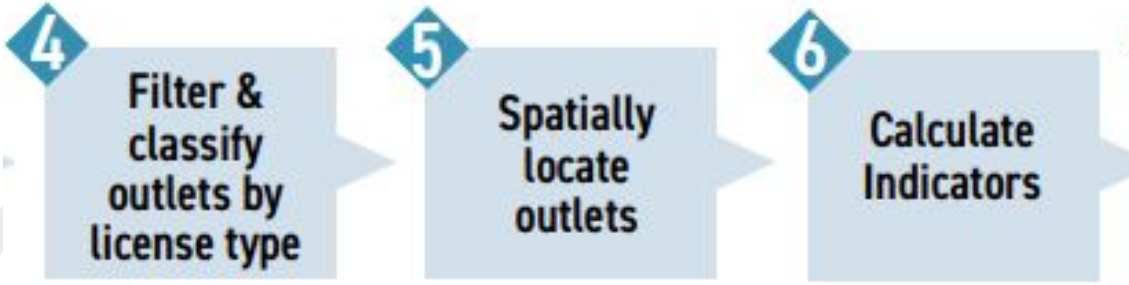


Figure 2



Note: Distances (between outlets or people and outlets) can reach outside region boundary when available for more accuracy. Indicator calculation for a region is only based on the nearest distances for outlets or people within that region.

Panel Discussion



- How did you reach for sustainability? Documentation/SOPs, retaining knowledge transfer, etc.
- How has the changing policy landscape impacted licenses in your states?
- How did you classify license types?
- How did you use census and other population data?

- How did you handle un-geocode-able outlets?
- How did you handle missing / unbelievable outlets?
- How did you handle unique areas in your states, like airports, beach towns, and ski resorts?

- How did you end up calculating outlet density?
- How did you consider population dynamics like “daytime” & commuting populations?
- How did you present data on disparities or engage with efforts for equity?

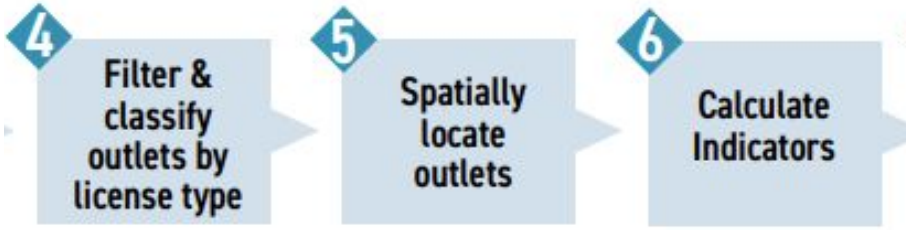
Small Group Discussion

Objectives

A. Prepare license-type classification table.

B. Join classification table to outlet data.

C. Perform filtering and grouping.



Step 4 Summary Questions

- What outlet or license types exist? Which will you include in your surveillance efforts? Which will you drop?
- How many outlets are there of each type?
- Are there sub-groups of outlet types of specific interest? How many of each group are there?

Small Group Discussion

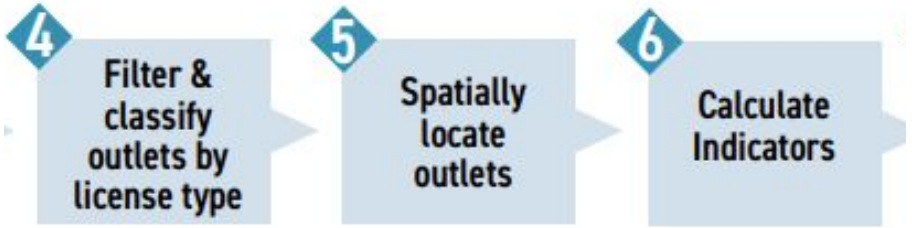
Objectives

A. Gather shape data, population data, and accessory data.

B. Geocode outlets.

C. Tabulate, review, and improve geocoded results.

D. Spatially project and filter to region.



Step 5 Summary Questions

- How will your team address outlets that are missing spatial data?
- What proportion of outlets did not geocode correctly? Is that proportion acceptable?
- How many outlets were removed for not meeting criteria?

Small Group Discussion

Objectives

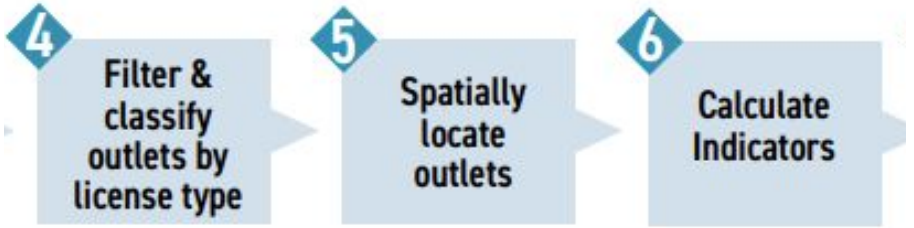
A. Import data into software.

B. Check projection of spatial data.

C. Count outlets in each region.

D. Join supplementary data by region.

E. Calculate indicators.

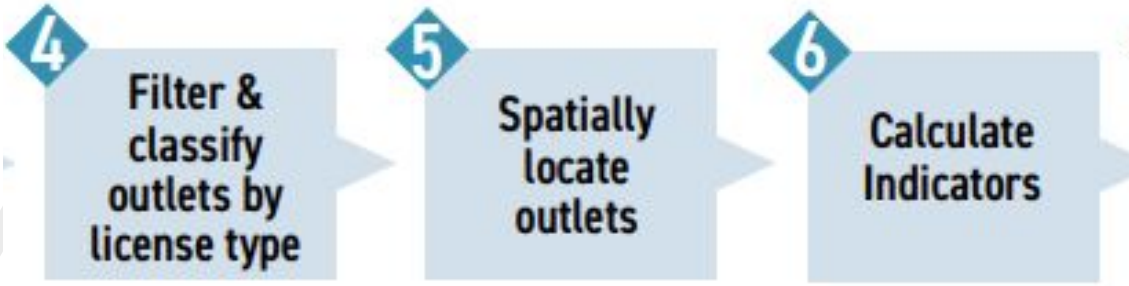


Step 6 Summary Questions

- Do any of your chosen analyses require a spatial analysis tool? If so, which ones?
- What projected coordinate reference system (CRS) will your project use? If calculating distance indicators, will you calculate them using the same CRS as the one you use to visualize maps?

Report Out

- Theme
- Theme
- Theme



Post-Calculation

Step 7. Visualize, report, and communicate.

1. Build a measurement team
2. Define purpose and indicators
3. Obtain and validate license data
4. Filter & classify outlets by license type
5. Spatially locate outlets
6. Calculate Indicators
7. Visualize, Report, and Communicate

Objectives

A. Determine plans to communicate findings.

B. Calculate initial summary statistics.

C. Build graphs to visualize data relationships.

D. Make maps.

E. Design reports.

Step 7 Summary Questions

- Who makes up your intended audience?
- What are your main messages and results to communicate to that audience?
- What is your larger public health framework for addressing alcohol and public health issues? How does alcohol outlet density fit in?
- What visualizations (e.g., maps, graphs) can most effectively communicate these results?
- If other contextual indicators are of interest, what graphs best show the relationship between alcohol outlet density and those other indicators?

Health Communication

Ask yourself

- Who are your audiences?
- What are their current knowledge sets?
- What are your main messages?

Communicate **key concepts** carefully

- “Lower” isn’t Low
- There are no “safe thresholds”
- Confounding can be confusing

Summary Statistics

See examples from before on ways to use indicators in a sentence

Help with communicating key take-aways, faster than maps and graphs

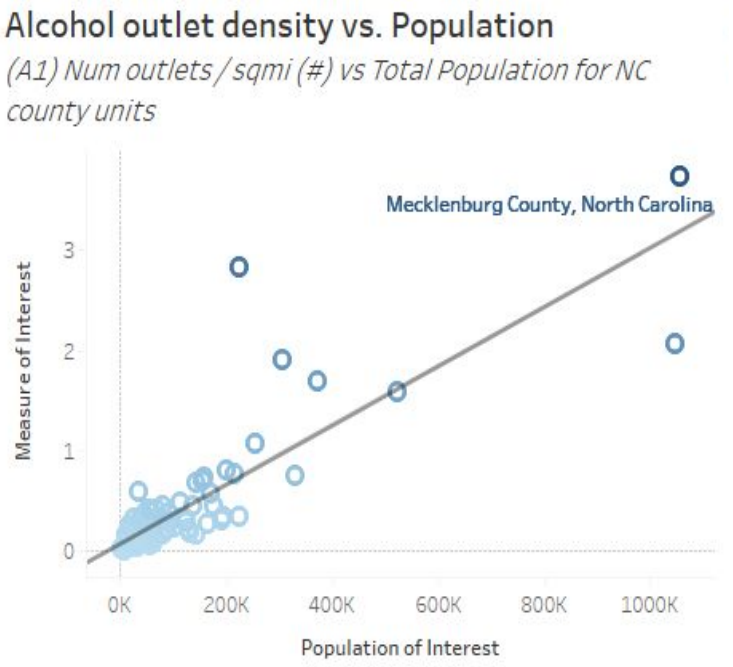
1. Overall counts and density indicators by **full study zone**
   - This helps set a baseline for regions and groups of people

2. Report counts and density indicators by **study regions** or **demographics**

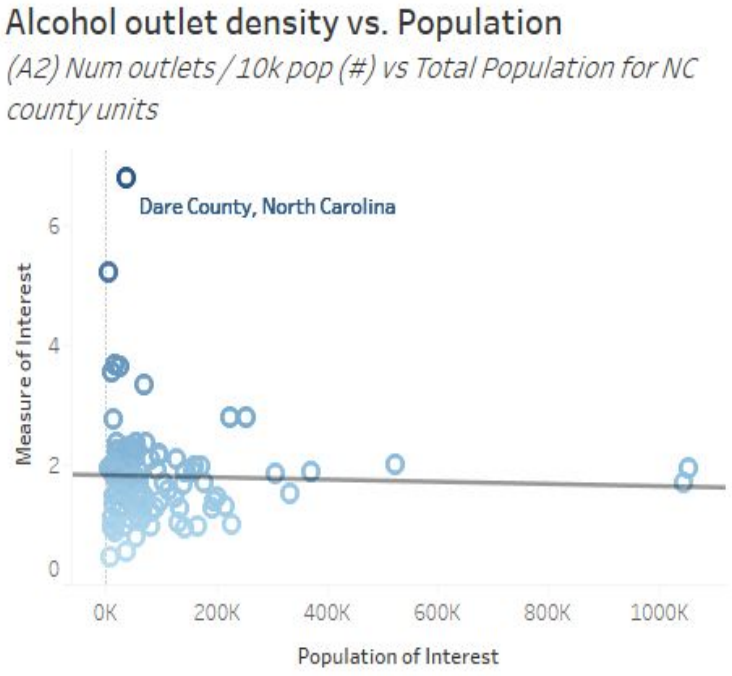
3. Identify **outliers**, zero areas, and skewness issues. Examples:
   - Land area small, outlet counts high? E.g., Beach towns
   - Land area large, outlet counts small? E.g., Rural and some industrial areas

Graphs

- Univariate graphs for data quality, distributions, outliers
- Bivariate graphs for relationship between variables
- Text summaries of major findings



Easy to see outliers on these graphs of NC counties….
(1) **outlets per square mile** vs population (left) and
(2) **outlets per 10,000 residents** vs population (right)



Maps

- Choose level of effort and detail
- Choose legend colors and density groupings carefully
- Consider additional layers to provide context
  - Outlet points, schools, regions of interest, etc.

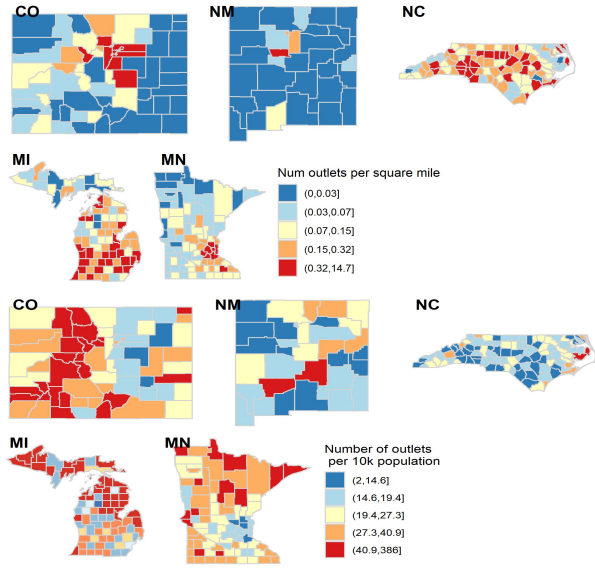
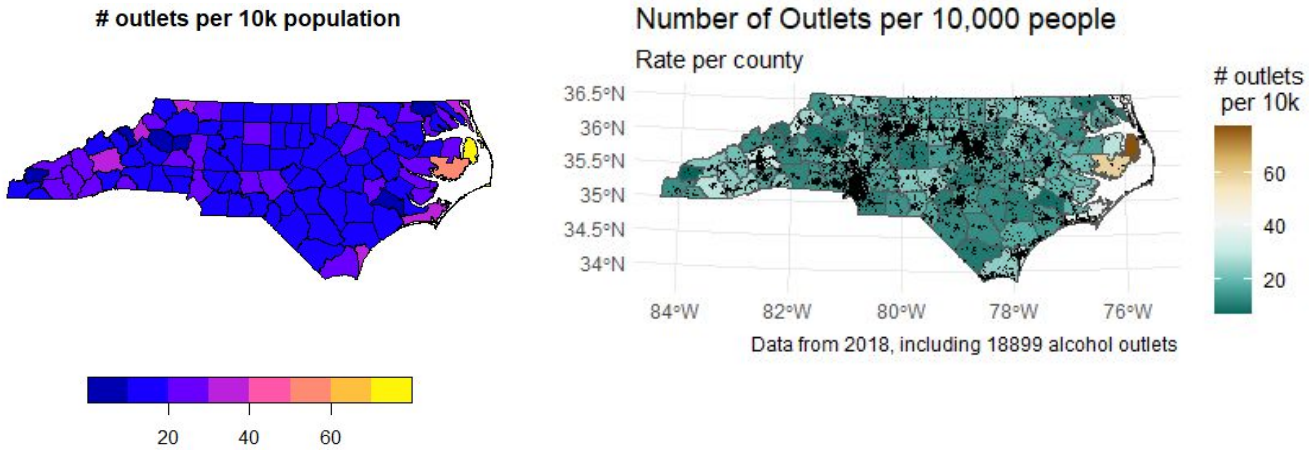


Figure. Different indicators highlight different outlet density dynamics (outlets / square mile vs outlets / 10,000 population)



Figures. Two maps made in R with different levels of effort.

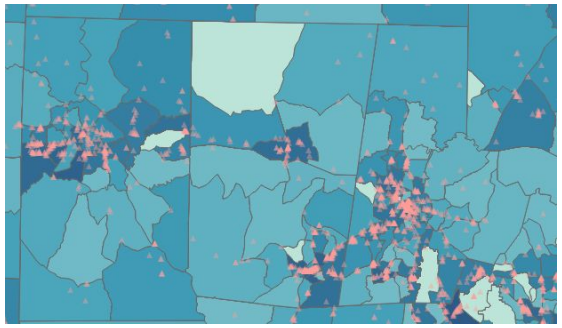
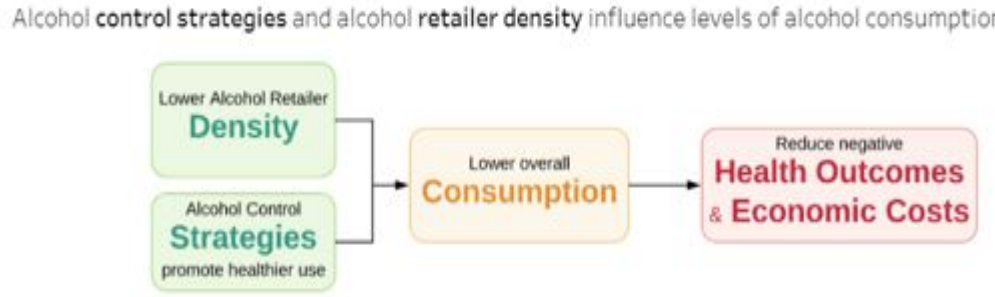
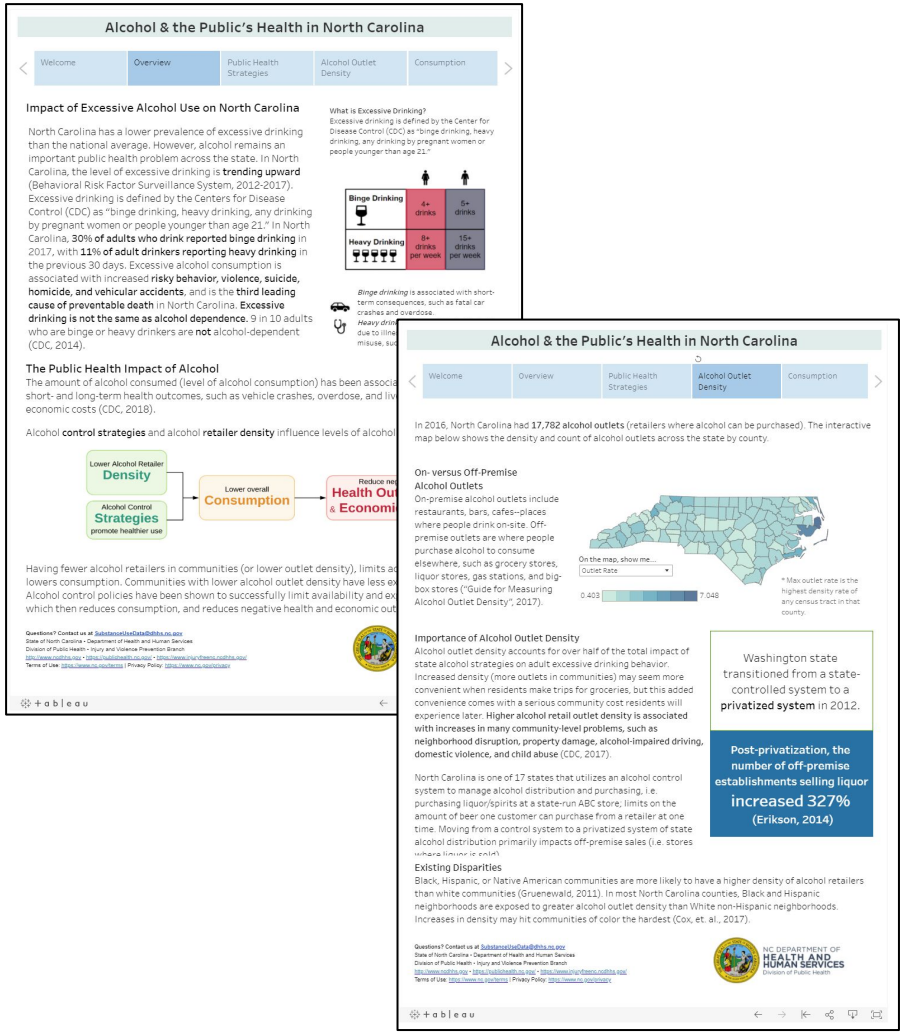


Figure. Alcohol outlet density as a choropleth with alcohol outlet point overlay.

Reports

- Report formats & approaches
- Static and interactive reports
- Orient readers to the **public health perspective** using context, simpler frames, and storytelling
  - Ultimately: why does alcohol outlet density matter?

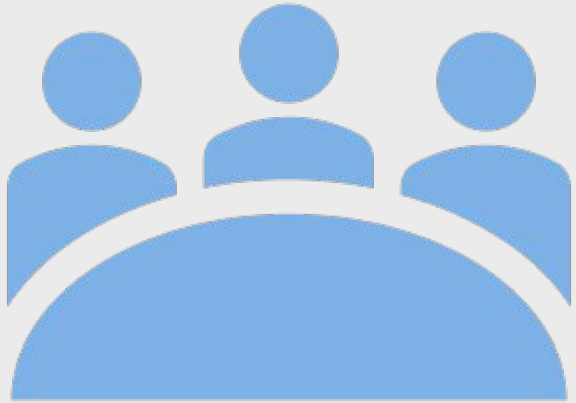




Example Tableau dashboard pages from NC alcohol & public health Tableau story

Panel Discussion

7 Visualize, Report, and Communicate



- How did you communicate concepts like rural / urban dynamics, thresholds, outliers, and disparities?
- How did you make and distribute your maps?
- How did you join other public health data or messaging for action.

Small Group Discussion

Objectives

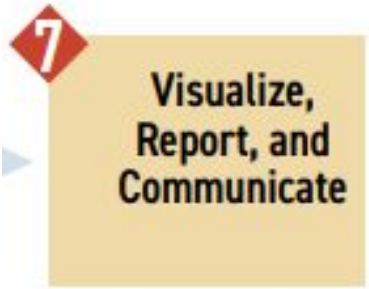
A. Determine plans to communicate findings.

B. Calculate initial summary statistics.

C. Build graphs to visualize data relationships.

D. Make maps.

E. Design reports.



Step 7 Summary Questions

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- If other contextual indicators are of interest, what graphs best show the relationship between alcohol outlet density and those other indicators?

7 Visualize, Report, and Communicate

Report Out

- Theme
- Theme
- Theme

Closing & Next Steps

Jessica?

Next Steps

- Network and collaborate to apply what you've learned locally
- Submit technical assistance requests to the Center for Advancing Alcohol Science to Policy

ta@alcoholsciencetopractice.org

Thanks!

All

NC: License Type Classification Table

- Start with Frequency Table
- Add analysis context
- Join to flattened outlet data

Table. Example frequency table for licenses – top 10 rows of license types. Added last three columns by hand.

permit_code	permit_description	permit_count	study_include	permit_group1	study_note
AJ	Malt Beverage On Premise	28655	Yes	On	include
AK	Malt Beverage Off Premise	22456	Yes	Off	include
AL	Unfortified Wine On Premise	21616	Yes	On	include
BA	Salesman	19803	No	Drop	Wholesale only
AM	Unfortified Wine Off Premise	19446	Yes	Off	include
AO	Fortified Wine Off Premise	13682	Yes	Off	include
AY	Mixed Beverages Restaurant	10658	Yes	On	include
AN	Fortified Wine On Premise	9846	Yes	On	include
AZ	Mixed Beverages Private Club	3837	Yes	On	include

Related Atlanta Study: Reduce density, reduce violent crime

- Defined retailer clusters (on-premise)
- Saw bigger drop in violent crime in cluster that reduced density (index)

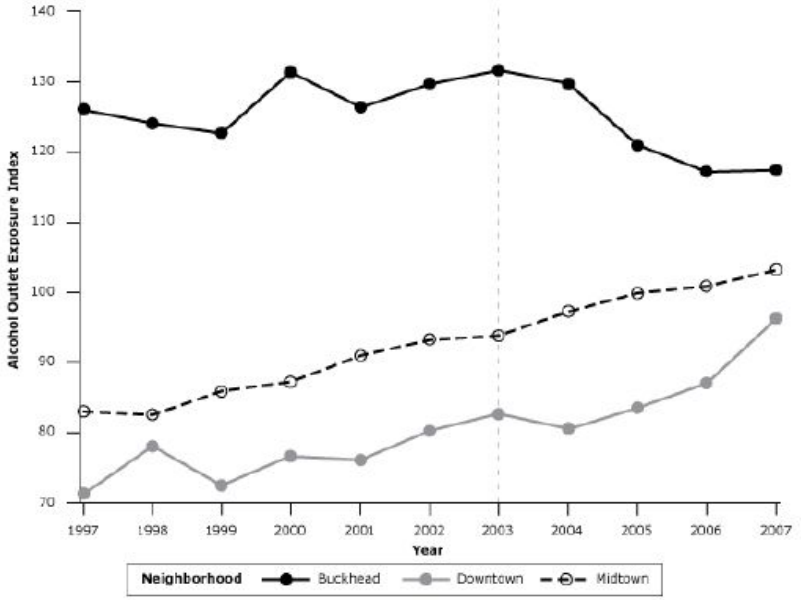


Figure 2. On-premises alcohol outlet exposure indices by neighborhood, Atlanta, Georgia, 1997–2007. This graph shows the temporal change in spatial exposure to on-premises alcohol outlets from 1997–2007 for 3 Atlanta neighborhoods: Buckhead, Downtown, and Midtown.

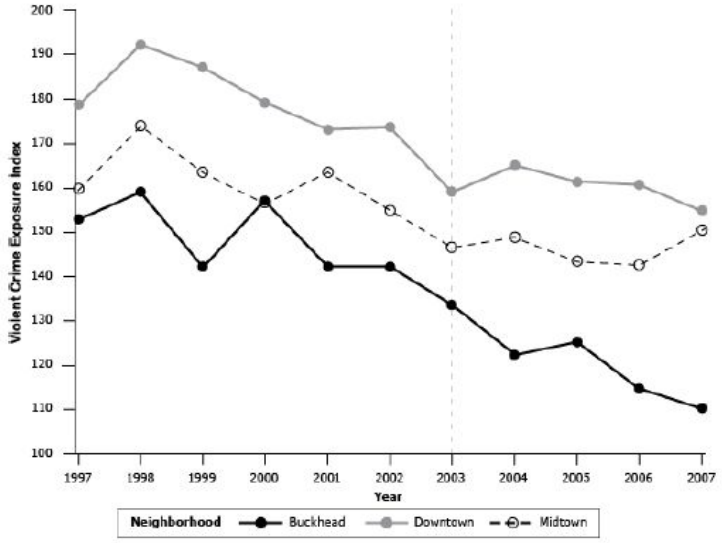


Figure 3. Violent crime exposure indices by neighborhood, Atlanta, Georgia, 1997–2007, showing the temporal change in violent crime exposure from 1997–2007 for 3 Atlanta neighborhoods: Buckhead, Downtown, and Midtown.

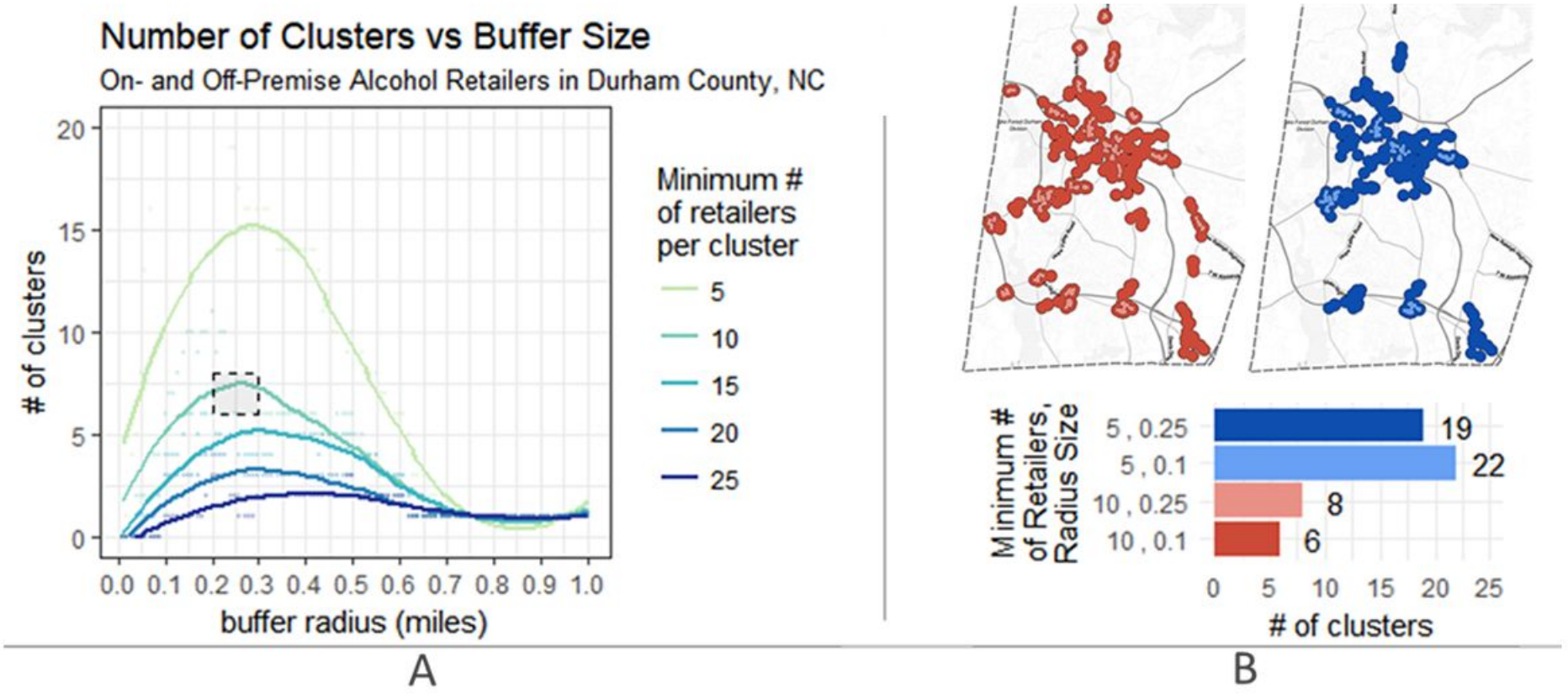
- Zhang, Xingyou, Bonnie Hatcher, Lydia Clarkson, James Holt, Suparna Bagchi, Dafna Kanny, and Robert D. Brewer. "Changes in Density of On-Premises Alcohol Outlets and Impact on Violent Crime, Atlanta, Georgia, 1997–2007." *Preventing Chronic Disease* 12 (May 28, 2015). https://doi.org/10.5888/pcd12.140317.

Extra Slides

All

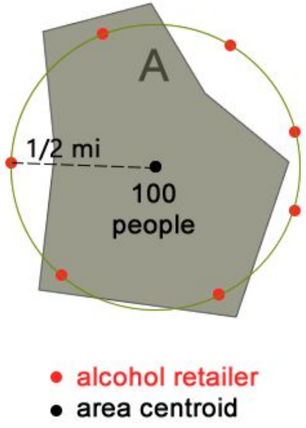
Reinforcing that story:
cluster, index and min-distance methods

- Source: *and Commu*



Reinforcing that story: cluster, index and min-distance methods

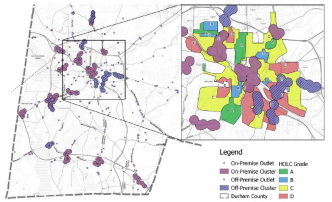
- Source: Boo ...lets That Sell Alcohol in Predominantly African American and Hispanic Neighborhoods.” In *Preventing Alcohol-Related Problems: Evidence and Community-* ... Giesbrecht and Linda M. Bosma, 397–408. n.d.



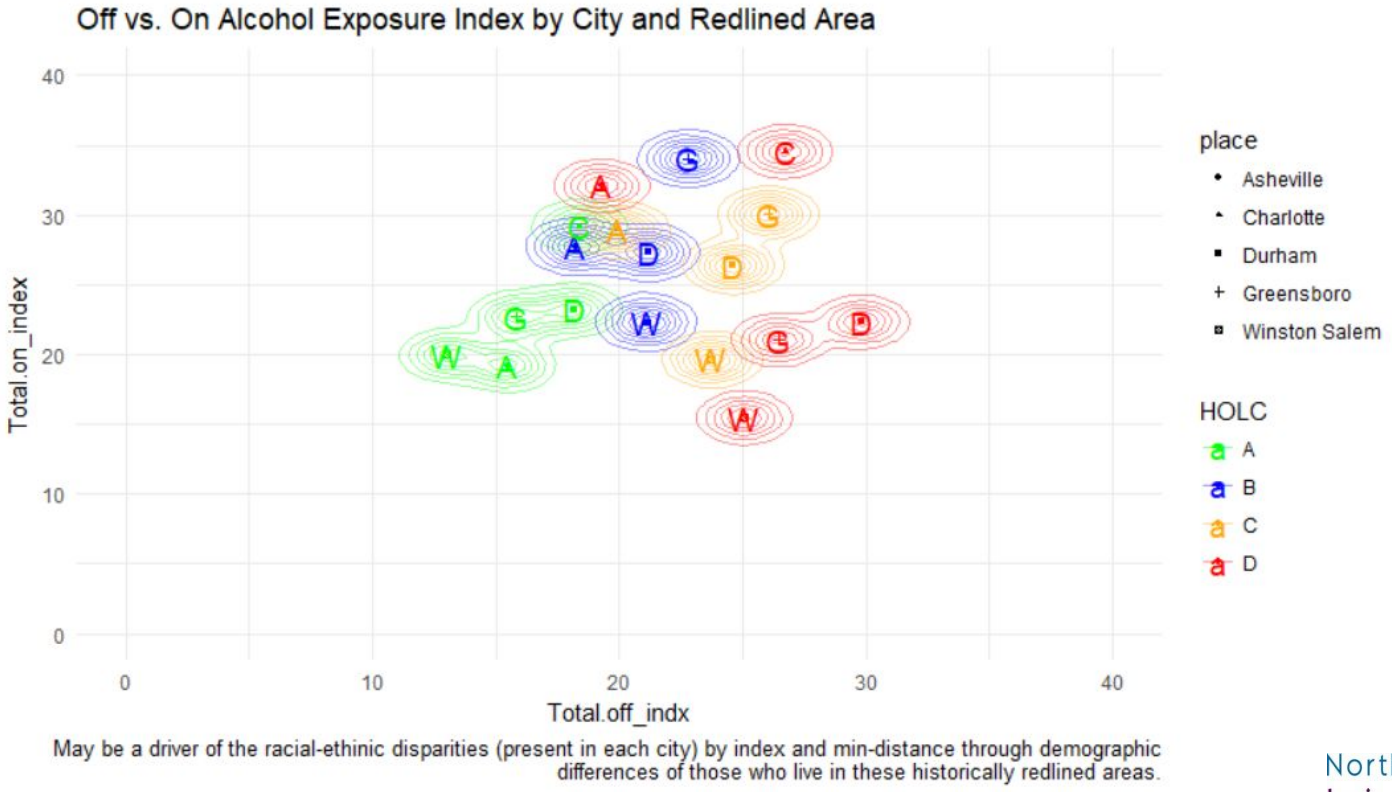
Method	Example Calculation
Distance-Based	The population's closest retailer is at 1/2 mile. *Example measure: 1/2 mile per person.*
Container-Based	A count or rate is built by examining only the retailers within the region (container) A. This excludes potentially proximate, relevant retailer locations and is more a function of the container shape than the population and retailer relationships. *Example measures: 3 retailers per 100 people; 0.03 retailers per person.*
Spatial Access Index	The distance to multiple retailers both in and outside the boundary may be important, especially with administrative boundaries like census elements. Summing the inverse distance to each nearest n retailers ($(1/2)^{-1}$ x 7 = 14) up-weights proximate retailers and allows our measure to both reach outside our container and incorporate multiple exposure sources. *Example measures: 14 mi^{-1} per person; 1,400 mi^{-1} total person-exposure.*

Table 1. Example alcohol retailer environment exposure calculations using distance-based, container-based, and index-based metrics. 100 people live at the centroid of region A. They are equidistant (1/2 mile) to seven alcohol retailer locations. Visualized in Figure 1.

Next Steps: Statewide Redlining



Preliminary, but statewide (five cities with redlining maps) it does seem that historically redlined areas are exposed to more alcohol retailers.

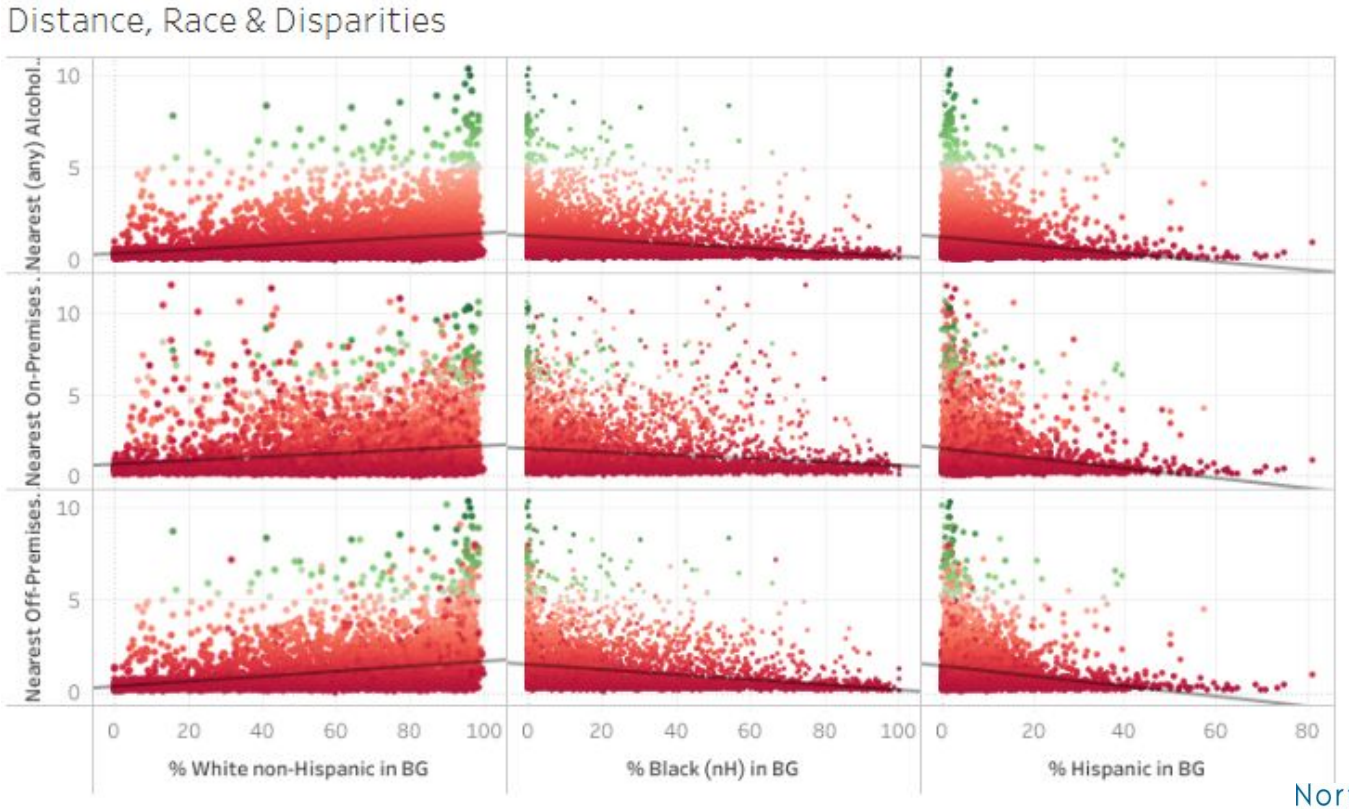


May be a driver of the racial-ethinic disparities (present in each city) by index and min-distance through demographic differences of those who live in these historically redlined areas.

North Carolina Injury & Violence PREVENTION Branch

Next Steps: Statewide Analysis

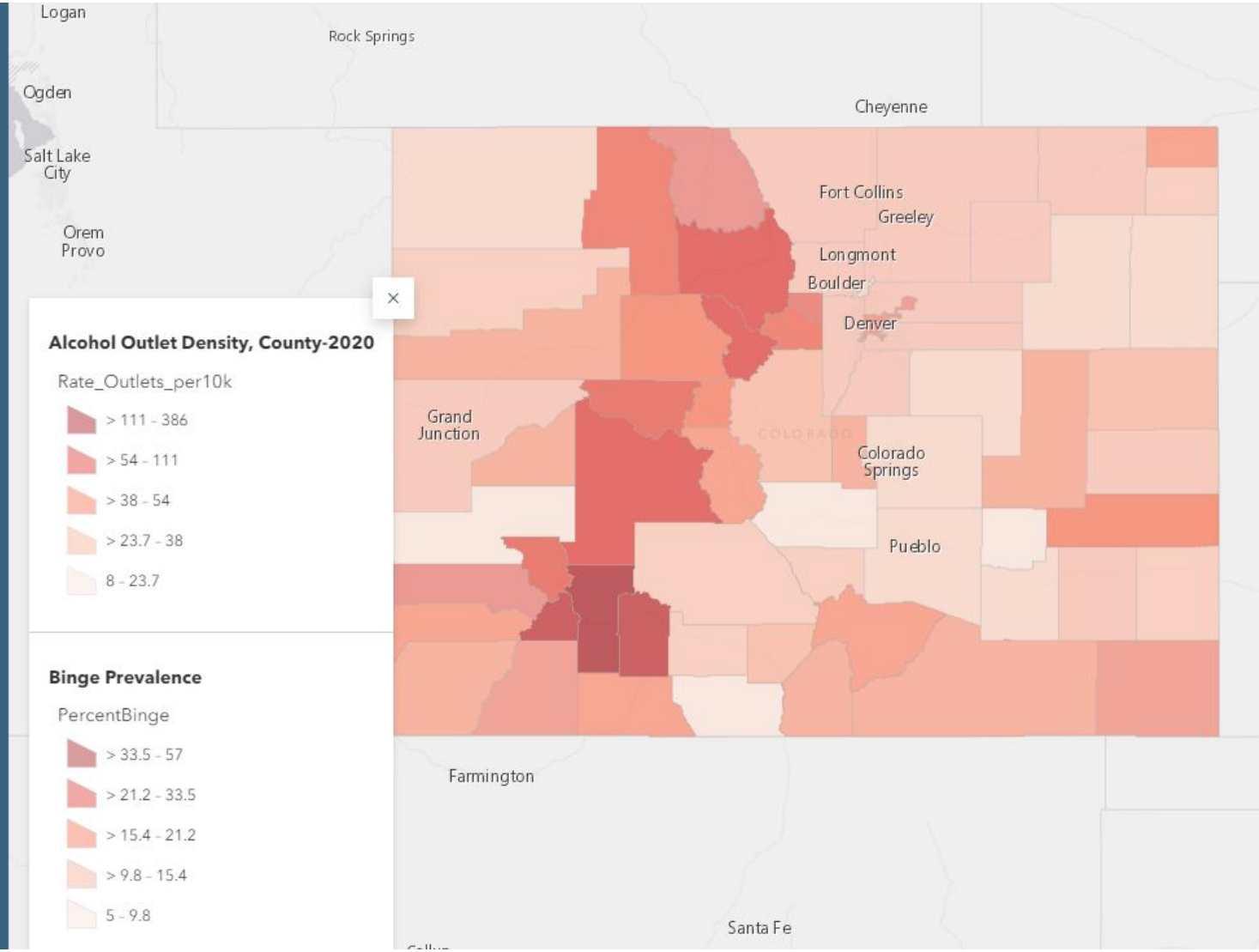
Preliminary: Statewide, as neighborhood % Black or Hispanic increases, the average distance to the nearest alcohol retailer shrinks. The opposite is true for White non-Hispanic neighborhoods



North Carolina Injury & Violence PREVENTION Branch

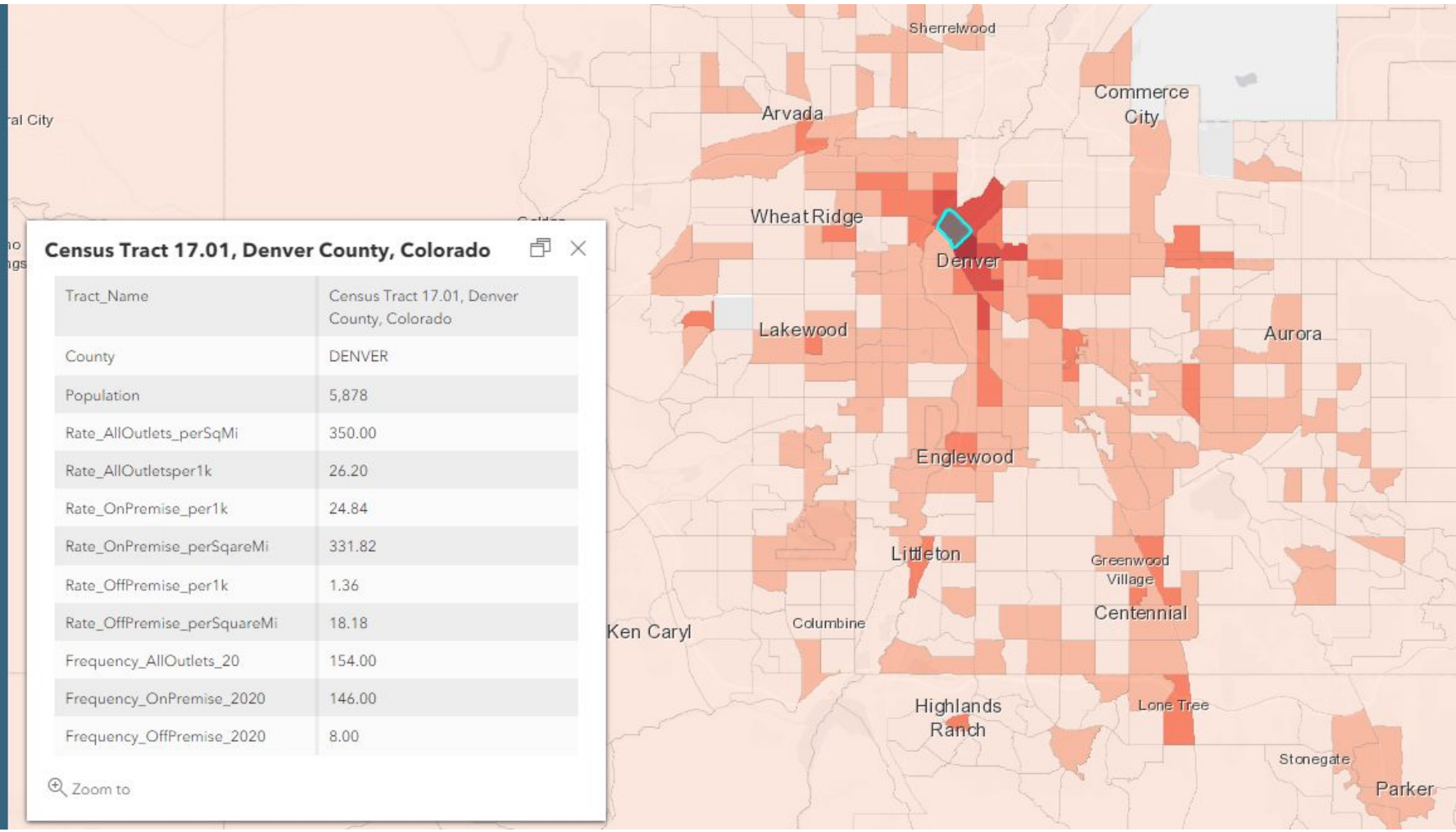
This map overlays the binge drinking prevalence you saw on the previous map and alcohol outlet density. Counties that appear in the darkest shades of red have higher prevalence of binge drinking as well as higher rates of alcohol outlets per 10,000 residents.

Interpreting this map: Counties along the Rocky Mountain corridor, often called rural resort communities, appear to experience some of the highest rates of both binge drinking and outlet density in Colorado. Even though the number of residents is low in these counties, we also have to consider other people who may be exposed to the alcohol outlet density in these areas: tourists or weekend visitors from across Colorado will not be counted in the population density for rural resort communities.



This map illustrates the **rate of alcohol outlets per square mile by census tract**. Darker colored tracts have a higher number of alcohol outlets per square mile than lighter census tracts.

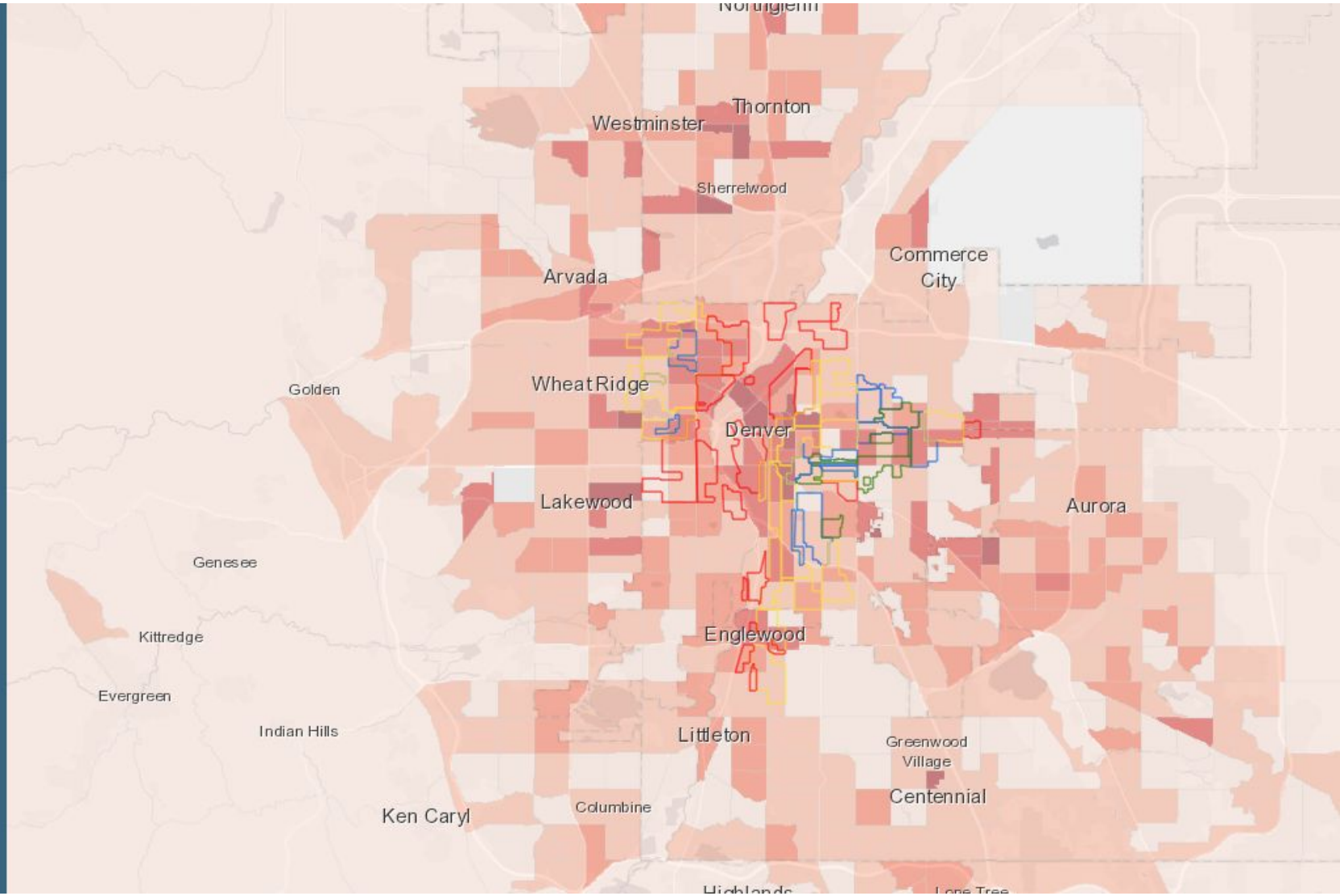
Census tracts in urban areas, such as Denver metro area, have higher outlets per square mile. That means that the nearly 3 million people who live in the Denver metro area likely see alcohol outlets regularly on their way to and from work, school, or recreation.



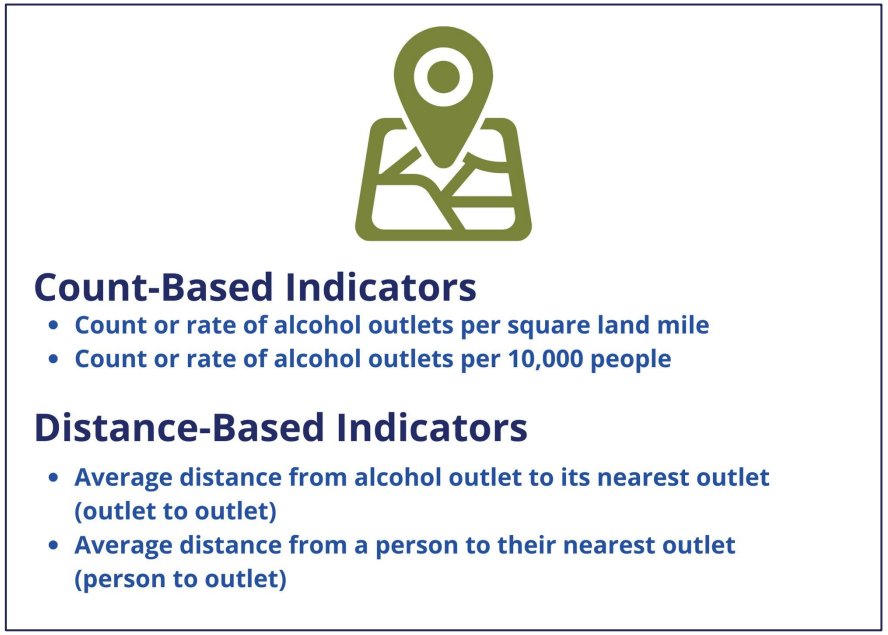
Tract_Name	Census Tract 17.01, Denver County, Colorado
County	DENVER
Population	5,878
Rate_AllOutlets_perSqMi	350.00
Rate_AllOutletsper1k	26.20
Rate_OnPremise_per1k	24.84
Rate_OnPremise_perSqareMi	331.82
Rate_OffPremise_per1k	1.36
Rate_OffPremise_perSquareMi	18.18
Frequency_AllOutlets_20	154.00
Frequency_OnPremise_2020	146.00
Frequency_OffPremise_2020	8.00

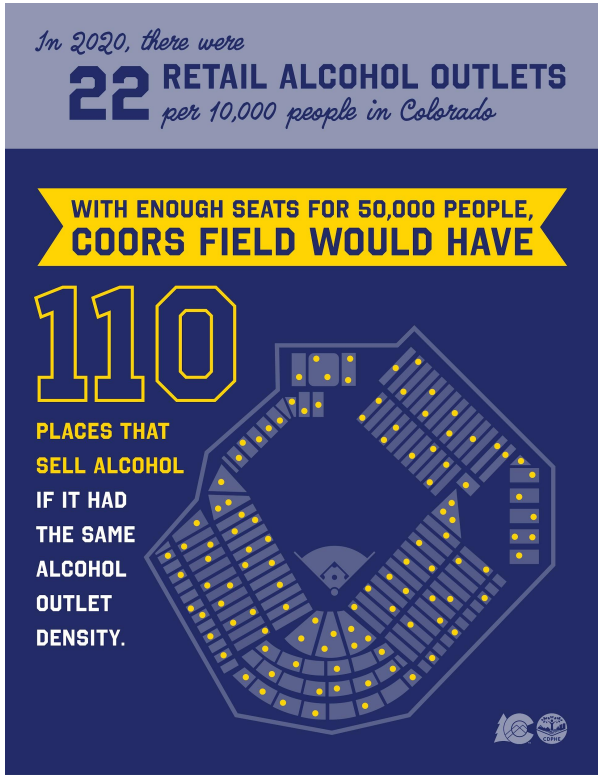
This map overlays historic redlining in Denver neighborhoods over density of off premise alcohol outlets per square mile. Redlining is one form of systemic racism that was used against people of color across the United States in the 1930s. Neighborhoods that are outlined in red and yellow were systematically disinvested, in part by not issuing mortgages or other loans for property in these neighborhoods (10, 12). Click on a neighborhood to read more about its rating.

Interpreting this map: There is noticable overlap and adjacency of higher off-premise alcohol outlet density in the neighborhoods along the north-western and central regions of the city. Tracts that have the highest outlet density *and* were deemed "hazardous" or "declining" by redliners are located in present-day Five Points, Whittier, Highlands, Lower Highlands, and along South Broadway. While



static graphics used in the StoryMap





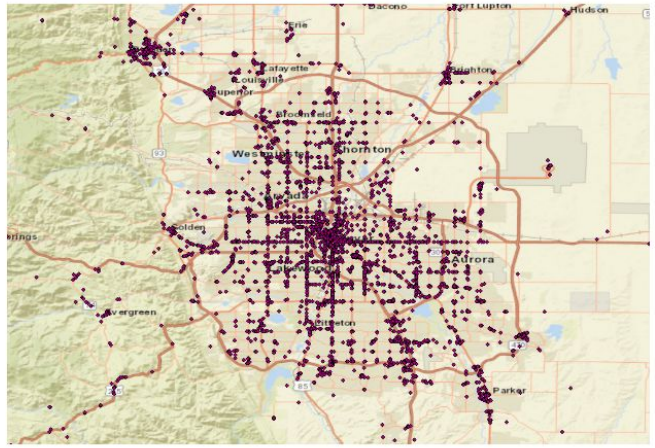
Lessons Learned

- What is ‘safe’ alcohol outlet density?
- Unique geographies
  - who is exposed to alcohol in these places?
- Changing license types are a headache
- Ongoing and continuous improvement

Lessons Learned

Process manual document

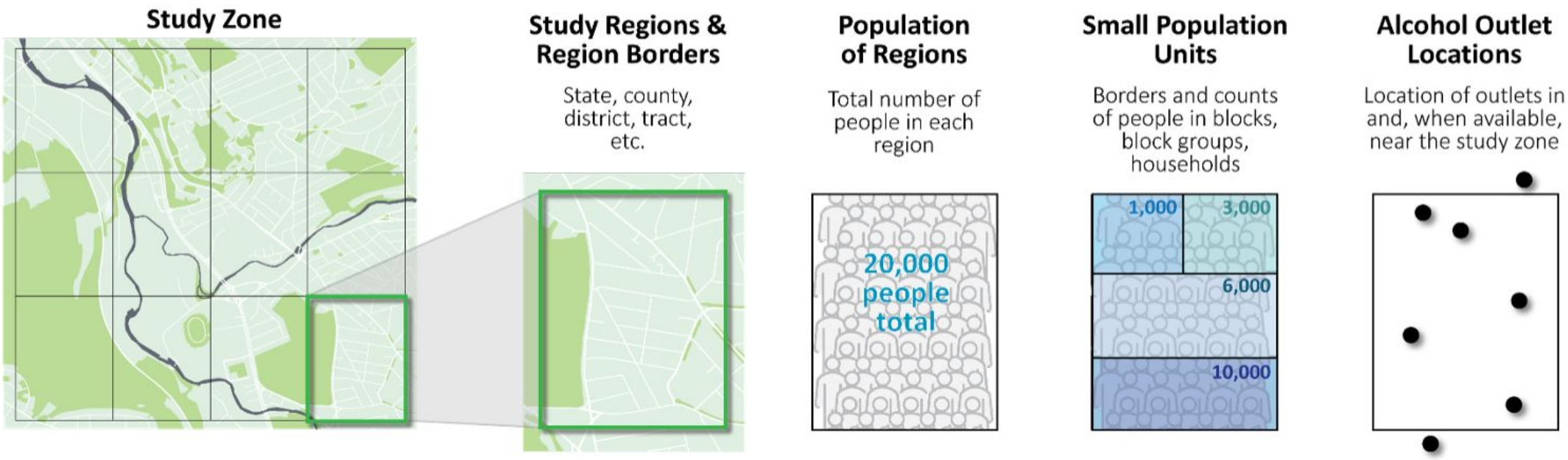
- contact information/position titles for relevant data stewards
- any insider information about license types, tricky geographies (e.g. ski resorts), ideas about visualization & interpretation
- suggested timeline for repeated surveillance



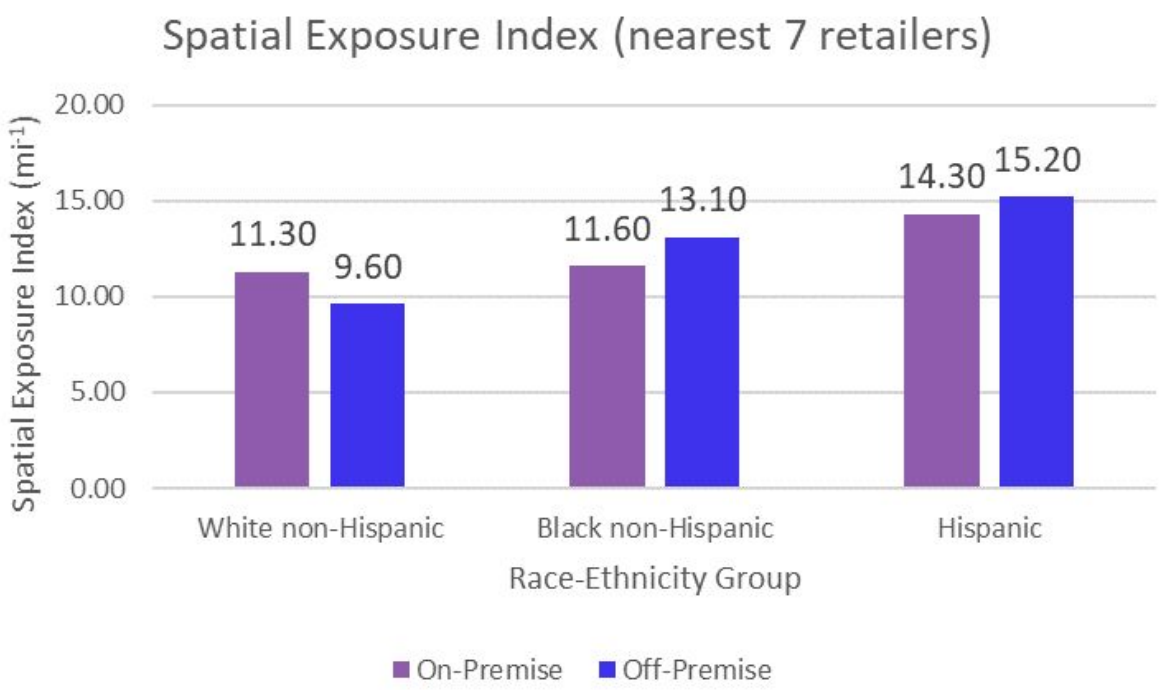
Surveillance of Alcohol Outlet Density in Colorado

Process Manual
First Published November 2021
Last Updated May 2022

NC: Gathered Shape & Population Data



Durham Alcohol Exposure Index in Durham: Disparate by Race-Ethnicity



Combining the distance to their nearest seven retailers, Black non-Hispanics and Hispanics were exposed a to a more dense immediate environment than White non-Hispanics.

This was again particularly true of their closest **off-premise** retailers.

North Carolina Injury & Violence PREVENTION Branch

http://bit.ly/NCAlcoholDashboard

Alcohol Dashboard: Learning from successes

Opioid overdose dashboard: 18,000 hits in last 14mo