



MICOM

MI-Support

Prepared For Anything

A data analysis, capacity building program

Examples of Projects

→ Types of projects we can help with include:

Evaluating the effectiveness of a vaccination campaign

Analyzing data from wastewater testing sites

Building a COVID-19 data dashboard

Creating an RSV disease forecasting model

Automating report of daily Excel files

Hosting MI-Support-led data analysis workshops



Submitting a MI-Support Request

➔ Submit a request through our [Google Form](#)

➔ Not sure about your request or want more information? Email us at micom-misupport@umich.edu

MI-Support Request Form

[MICOM's](#) (Michigan Public Health Integrated Center for Outbreak Analytics and Modeling) MI-Support program aims to assist local health departments with data analysis support.

kmsteffe@umich.edu [Switch account](#)

The name and photo associated with your Google account will be recorded when you upload files and submit this form. Your email is not part of your response.

* Indicates required question

MI-Support Project Request - Washtenaw County Health Department

Hi MI-Support Team,

I am reaching out to request help with building a flu vaccination dashboard. We currently have 1 team member working on this, and it would be helpful to have additional assistance.

This project is not urgent, but we would ideally like to see this ready within the next few months. Please contact me at kmsteffe@umich.edu to discuss further!

Thank you,
Kate Steffes

← → Sans Serif T B I U A ☰ ☷ ☸



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All Code, Files, etc. are available at:
https://micom-hub.github.io/r_workshop_page.html

Please download the
28 March 2025 data files.



Quick Introductions

Name, Department, Role



MICOM

Geography & Mapping in R

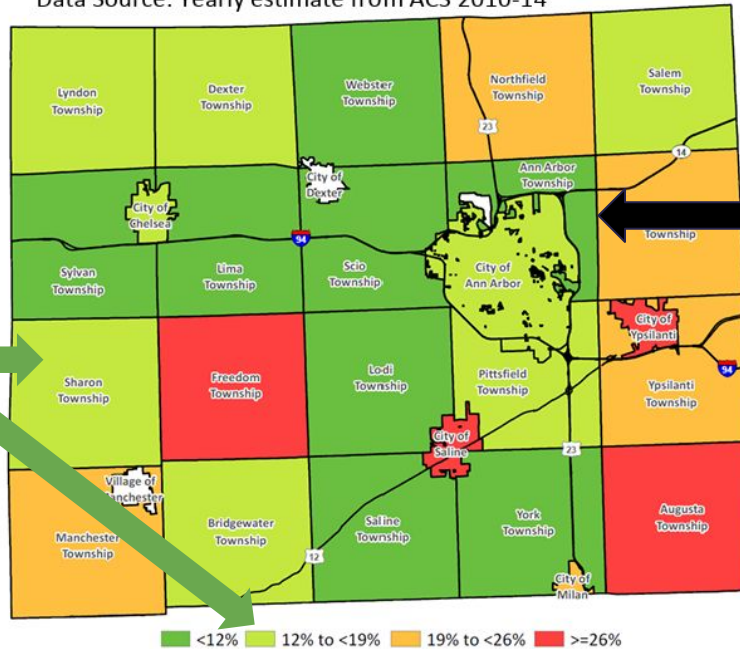
2025-03-28

Making Maps Requires Two Types of Data

Percent of individuals 65+ yrs living below 200% of FPL
Washtenaw County
Data Source: Yearly estimate from ACS 2010-14

The **metric / data**
you want
to present

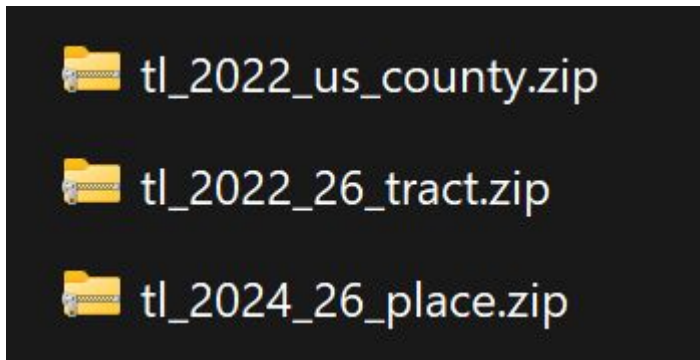
The physical
geography
outlines



Note: Jurisdictions with no color had too few people for accurate ACS estimates.

To make the geographic outlines, we need a “new” Data Type: Shape Files!

Common to download as .zip file:

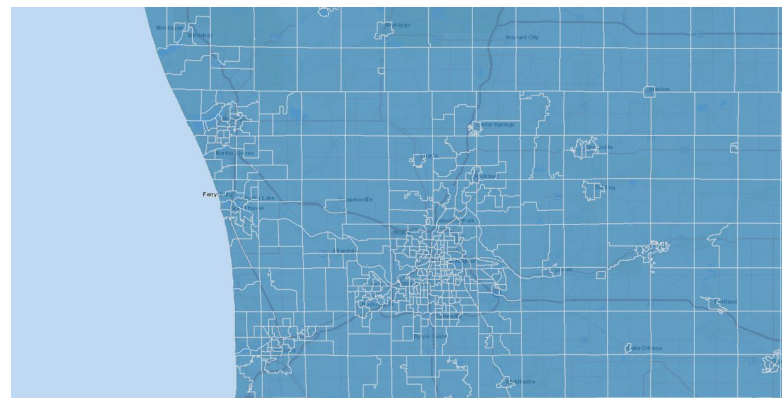
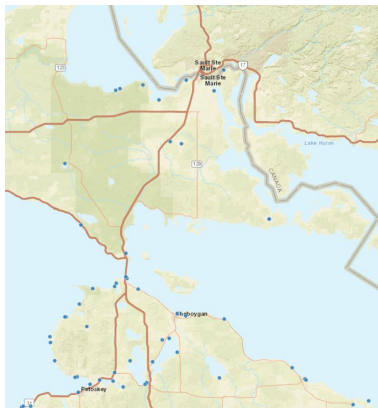


Name	Date Modified	Type	Size
tl_2022_26_tract.cpg	3/4/2025 4:09 PM	CPG File	1 KB
tl_2022_26_tract.dbf	3/4/2025 4:09 PM	DBF File	316 KB
tl_2022_26_tract.prj	3/4/2025 4:09 PM	PRJ File	1 KB
tl_2022_26_tract.shp	3/4/2025 4:09 PM	SHP File	9,101 KB
tl_2022_26_tract.shp.ea.iso.xml	3/4/2025 4:09 PM	Microsoft Edge HTM...	22 KB
tl_2022_26_tract.shp.iso.xml	3/4/2025 4:09 PM	Microsoft Edge HTM...	53 KB
tl_2022_26_tract.shx	3/4/2025 4:09 PM	SHX File	24 KB

But contain more than just a .shp file, and you need all the pieces together in a folder for R to “use” the .shp file

A “new” Data Type: Shape Files!

- The shapefile format is a geospatial vector data format.
- The shapefile format stores the geometry as geometric shapes like points, lines, and polygons. These shapes, together with data attributes that are linked to each shape, create the representation of the geographic data.



A “new” Data Type: Shape Files!

Generally, these files are very large, as they often encode a lot of information.

Common Sources:

- Census.gov:

<https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.html>

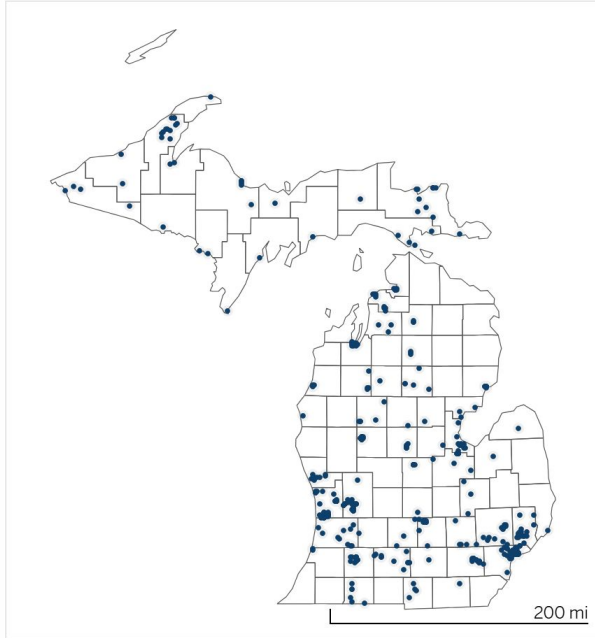
- Michigan GIS Open Data: <https://gis-michigan.opendata.arcgis.com/>

It's also possible to make your own using ArcGIS.

Vocab - Types of Maps: Point Map

(or dot distribution map)

Michigan COVID-19 Wastewater Sampling Sites



Note: This map displays sampling sites that have ever participated in this wastewater monitoring effort in Michigan since 2020. Both active and inactive sites are included.

Point maps are used to indicate exact locations (or central locations) for particular events.

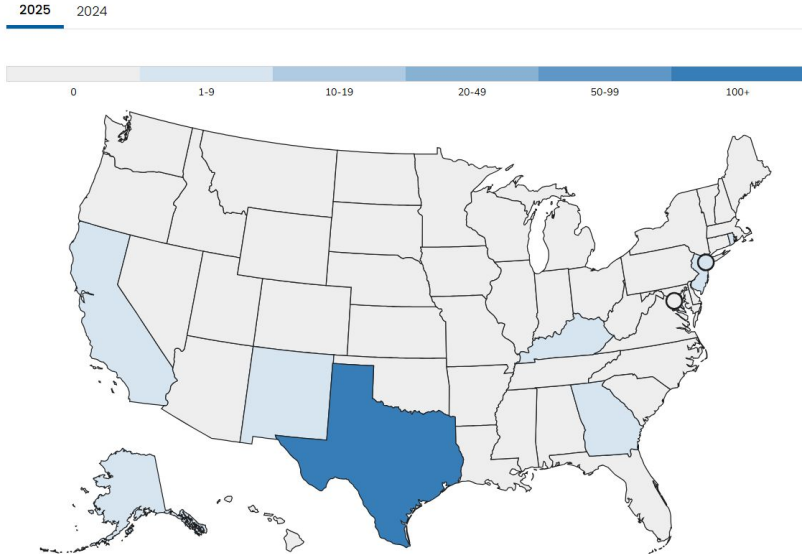
They often serve as the base for network maps.

<https://www.michigan.gov/coronavirus/stats/wastewater-surveillance/wastewater-surveillance-for-covid-19/dashboard>

Vocab - Types of Maps: Choropleth

Map of measles cases in 2024 & 2025

as of February 27, 2025



Data Table

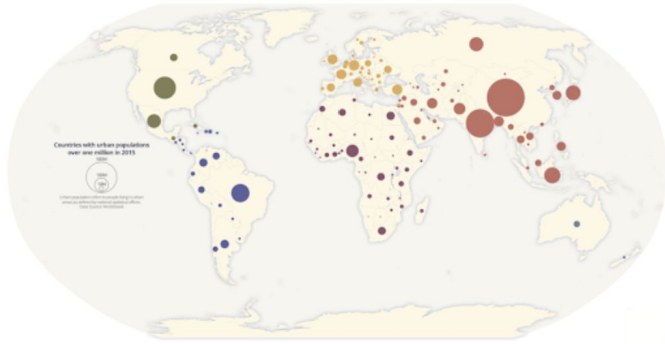


[Download Data \(CSV\)](#)

A type of map where geographic areas are outlined and filled with a color that represents an aggregate summary metric for the area.

<https://www.cdc.gov/measles/data-research/index.html>

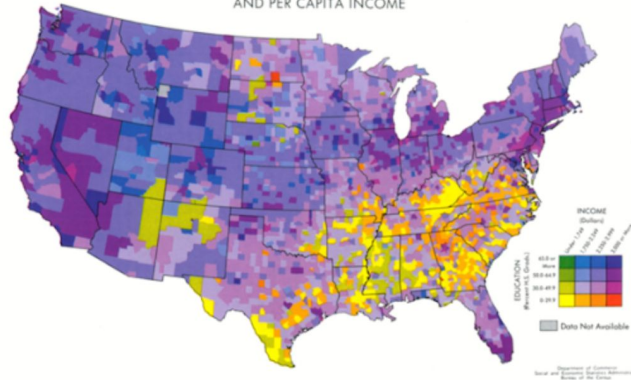
Lots of Maps Types!



**Graduated
Symbol Map**

Bivariate Choropleth Map

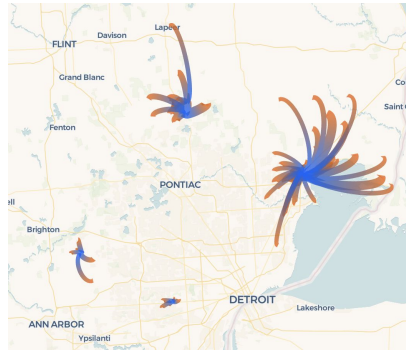
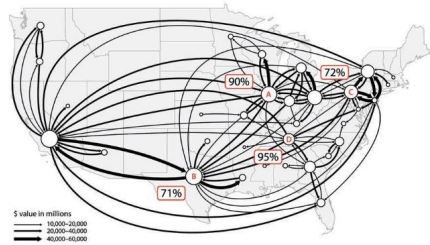
INTERRELATIONSHIP OF EDUCATIONAL ATTAINMENT
AND PER CAPITA INCOME



Heat Map

Lots of Maps Types!

Flow of Goods in U.S.A



Spatial flows and networks

Cartograms

US Presidential Election 2020

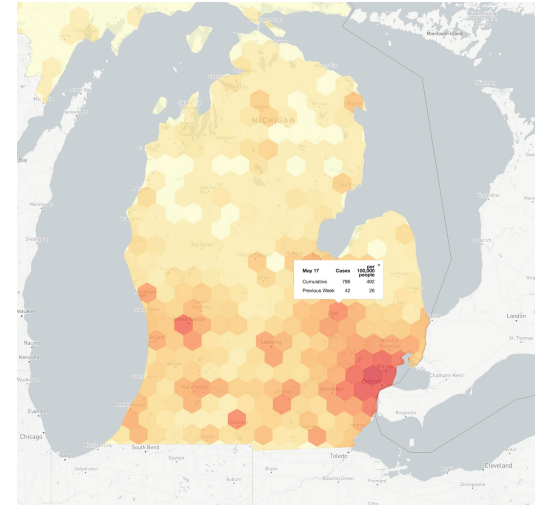
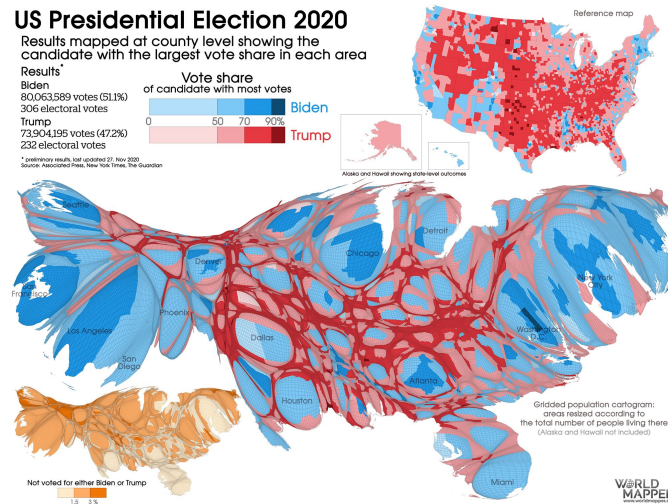
Results mapped at county level showing the candidate with the largest vote share in each area

Results

Biden
80,063,589 votes (51.1%)
306 electoral votes

Trump
73,904,195 votes (47.2%)
232 electoral votes

* preliminary results last updated 07. Nov 2020
Source: Associated Press, New York Times, The Guardian

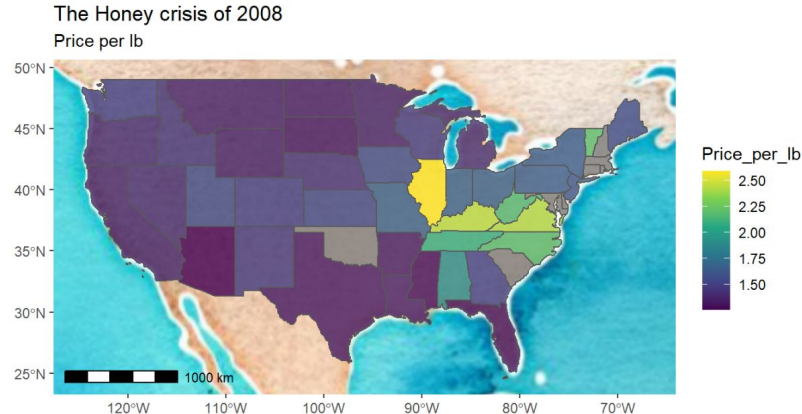


covidmapping.org

Hexbin Maps

R Package For Mapping: ggPlot

```
ggplot(data = honey2008) +  
  annotation_map_tile("stamenwatercolor") +  
  geom_sf(aes(fill = Price_per_lb), alpha = 0.8) +  
  annotation_scale() +  
  scale_fill_viridis_c() +  
  ggtitle(label = "The Honey crisis of 2008", subtitle = "Price per lb")
```



- Good for the basics!
- Static
- Same “layered” logic as tidyverse/general ggplot

https://bookdown.org/nicohahn/making_maps_with_r5/docs/ggplot2.html

R Package For Mapping: leaflet

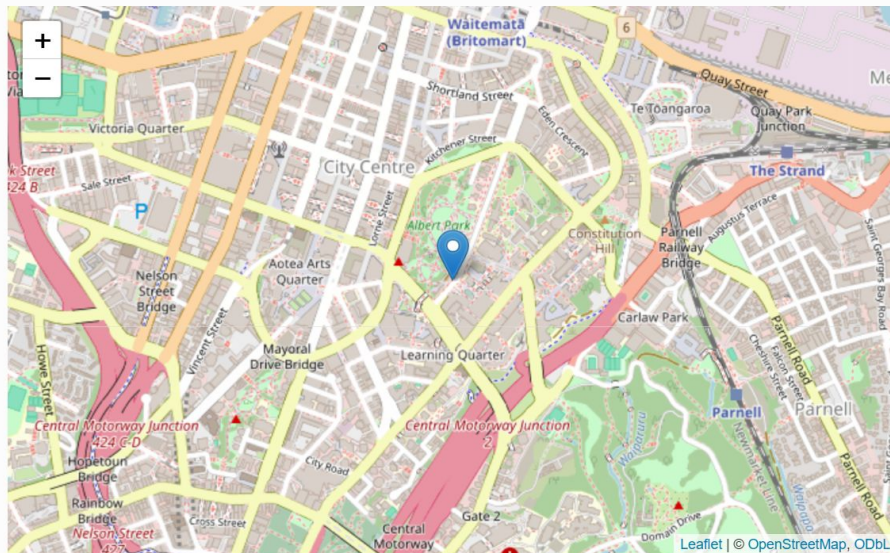
- More advanced/dynamic maps
- Can be interactive
- Still carries the same “layering” logic

<https://rstudio.github.io/leaflet/articles/leaflet.html>

Warning! Leaflet is a Javascript system first - so you often have to specify “leaflet r” in any google searches for help!

```
library(leaflet)
```

```
m <- leaflet() %>%  
  addTiles() %>% # Add default OpenStreetMap map tiles  
  addMarkers(lng=174.768, lat=-36.852, popup="The birthplace of R")  
m # Print the map
```



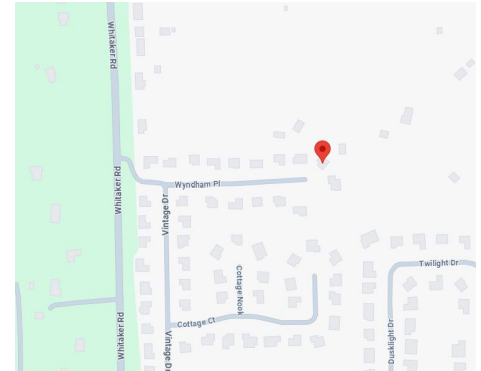
Geocoding Security

**Geocoding: converting from address to lat-long
(and sometimes need to do the reverse)**

**Usually requires sending the address to a service
(google maps, whatever else)**

**This means sharing that data with an outside
service, which can be complex from a
identifying/security perspective (e.g. geocoding
a list of cases)**

**1234 Street
Town, State 56789**



(42.785823, -83.772496)

Geocoding Security

Likely not a regular concern, but -

R library can turn addresses into lat/long coordinates:

- ex. tidygeocoder

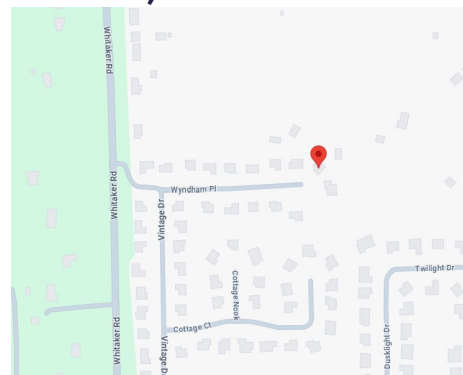
Default uses [Nominatum](#) service, others available - of note is the [Census](#)

None of these options are truly secure, though some are better than others

Local geocoding options exist but can be complicated

<https://cran.r-project.org/web/packages/tidygeocoder/readme/README.html>

1234 Street
Town, State 56789



(42.785823, -83.772496)

What We'll Learn to Do:

Shapefiles:

- Loading them in, what they look like

ggplot:

- Make a choropleth map (map with areas shaded by a variable)
- Make a point map
- Save a map as a png file
- Legends & Legend Placement

leaflet:

- Color Palettes & Base maps
- Make a more intricate choropleth map with points and pop-ups
- Legends (moving them too!)
- Saving a map