Spatial Data Resources for Baltimore City

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Objectives

1. To provide a brief introduction to spatial data

2. To identify open access Baltimore data resources available online

3. To demonstrate data acquisition of various subject matters and data types from multiple platforms

4. To provide examples of real world applications

What is Spatial Data?

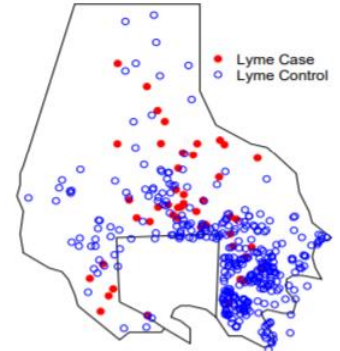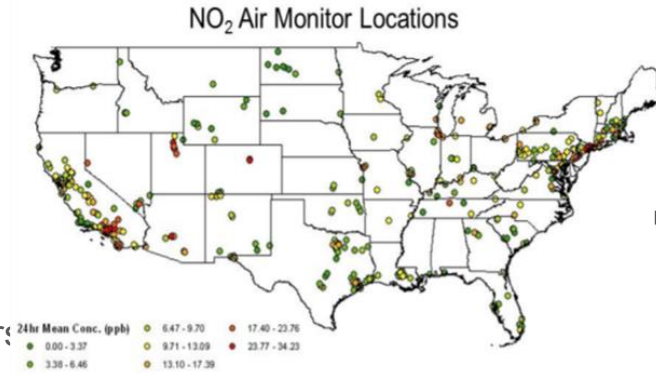Any data that includes geographic locations or addresses

○ Point Pattern

   ■ Location of the event is the data
   ■ (e.g.) location of a crime, sick person
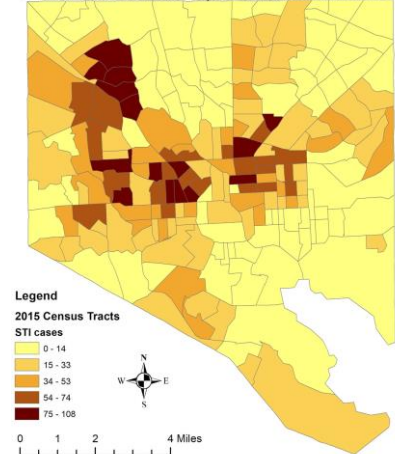
○ Geostatistical

   ■ Measurements are taken at points
   ■ (e.g.) AQ concentrations at air monitors

○ Area Level

   ■ Data that is attributed to an area, rather than a point
   ■ (e.g.) median income per county

Baltimore County Lyme Disease 1989–1990

● Lyme Case
○ Lyme Control

NO₂ Air Monitor Locations

24hr Mean Conc. (ppb)
○ 0.00 - 3.37
○ 3.38 - 6.46
○ 6.47 - 9.70
○ 9.71 - 13.09
○ 13.10 - 17.39
○ 17.40 - 23.76
○ 23.77 - 34.23

Number of STI cases per Tract, Baltimore City

Legend
2015 Census Tracts
STI cases
  0 - 14
  15 - 33
  34 - 53
  54 - 74
  75 - 108

0 1 2   4 Miles

Why do we care about Spatial Data?

- <u>Presentation:</u> data visualization and translation

- <u>Analysis:</u> Spatial Science Paradigm

| Spatial data	GIS	Spatial statistics
Data with location information	Software for mapping	Statistics for analyzing spatial data

File Formats of Spatial Data

- Spatial data can come in many formats

  - Tabular Data (Excel, .csv, or other)
    - Can be attached to spatial data
    - Data can be geocoded

  - Vector data
    - Polygon
    - Line
    - Point

  - Raster
    - Imagery
    - Processed

- We will provide examples of each in our presentation

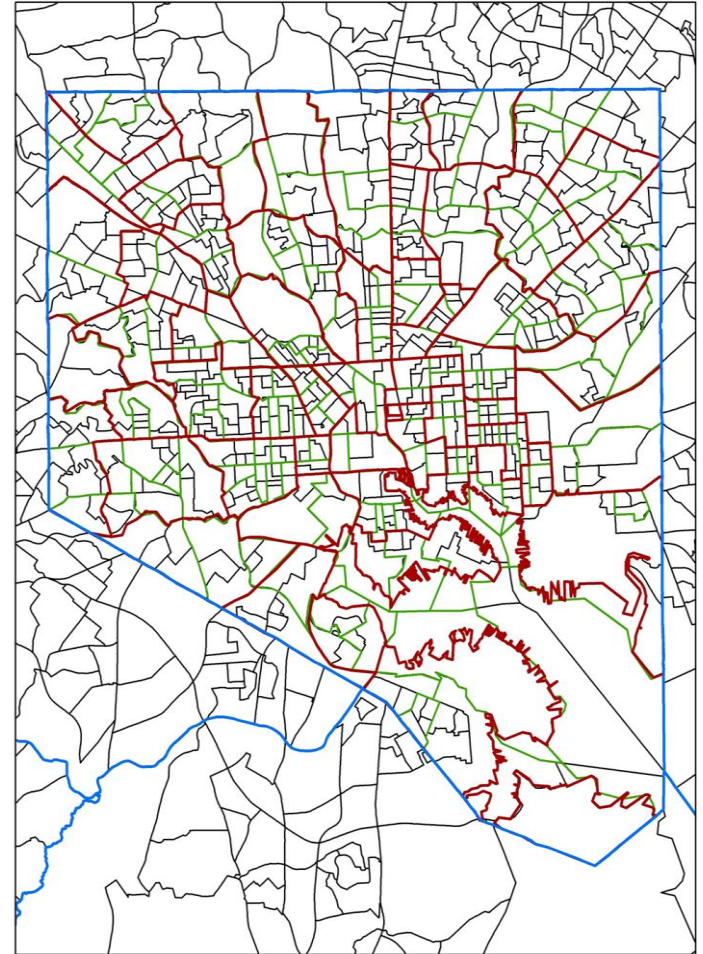

Polygons

Lines

Points
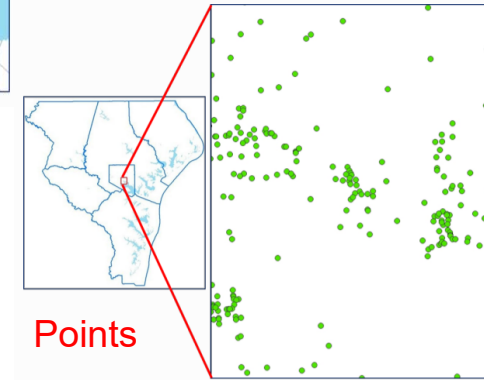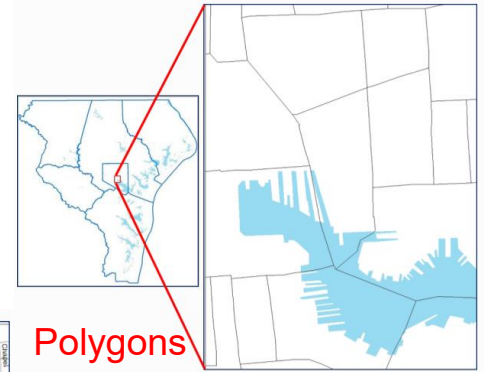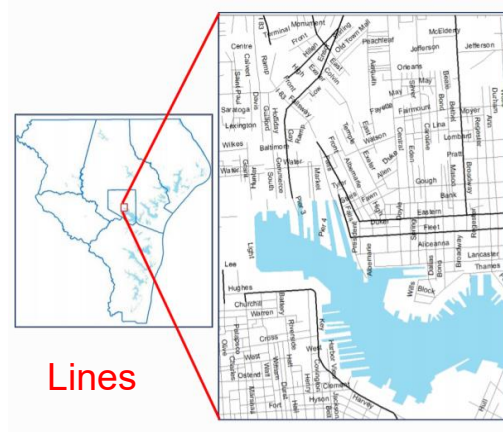
Spatial Divisions of Baltimore City

- **County**
  - Community Statistical Areas (55)
    - Census Tracts (200)
      - Block Groups (650)
        - Blocks
- Neighborhoods

- Zip Codes

Census Geographies of Baltimore

MD Counties | Community Statistical Areas | Census Tracts | Census Block Groups

Sources of Baltimore Data

1. Open Baltimore
   - An open data program managed by the Baltimore City Office of the Chief Data Officer to aggregate data relevant to Baltimore City

2. Baltimore Neighborhood Indicators Alliance (BNIA)
   - An organization at the University of Baltimore aiming to provide accurate data and objective research to describe the social, economic, and quality of life issues impacting the City

3. Baltimore CityView
   - A web based GIS application designed to provide selected spatial information about City of Baltimore overarching businesses, managed by CDO

Sources of Maryland Data

4. Maryland iMAP
   - A mapping and GIS data portal by Maryland state government including access to spatial and non-spatial data and imagery
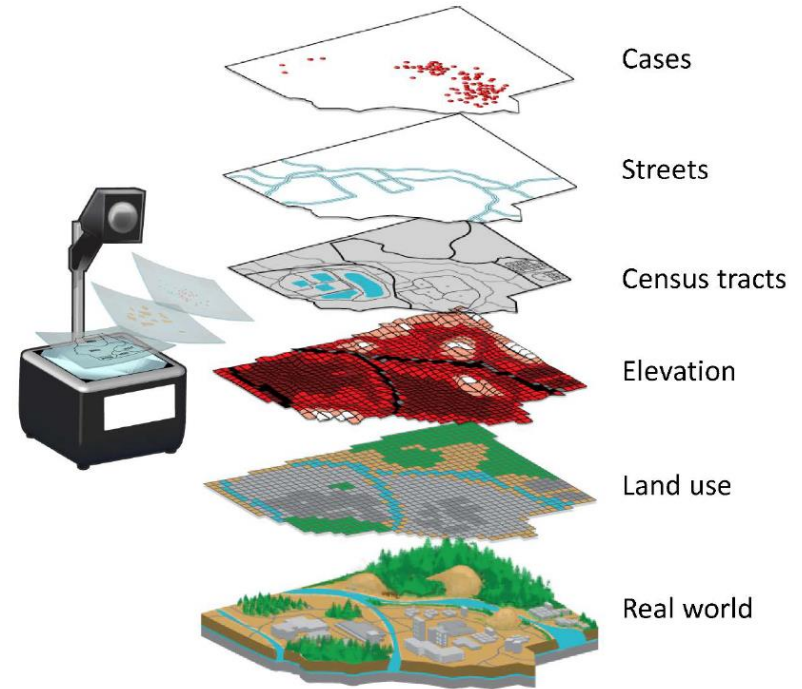
5. Maryland Food System Map

   - An interactive mapping platform displaying data on the food system, environment, and public health, created by Johns Hopkins Center for a Livable Future

6. Other Local and National Sources

Hands-on Demonstration

- We will identify various open data platforms, practice navigating each interface, and download some example files

- We will compile these files together into a single map using ArcGIS software

ArcGIS, a Geographic Information System developed by ESRI, is great for management and analysis of spatial data and for making presentation-level maps

Cases

Streets

Census tracts

Elevation

Land use

Real world

Summary of Sources

	Open Baltimore	**BNIA**	**Baltimore CityView**	**MD iMAP**	**Maryland Food System Map**
Pros	Broad range of data Community can create unique datasets	Well organized CSA indicators Tools for comparing within and between communities	Quick and easy visualization and map creation	Broad range of data across Maryland	Many unique datasets focusing on food systems and agriculture
Cons	Potential quality control issues	Data only available at CSA-level	Data only available as tables	Some data isn't available in Baltimore May require manually subsetting to Baltimore City data	Many datasets are focused on more rural areas, excluding Baltimore City Limited to food system-related variables

Other Local Data Sources

- Department of Health: https://health.baltimorecity.gov/stats-and-data
      Provides links to Baltimore and Maryland data sources focusing on health, as well as links to various health department reports in PDF format.

- Department of Planning: https://planning.baltimorecity.gov/planning-data
      Provides links to raw data sources as well as data products with attention to people and demographics; education, children & economic well-being; transportation & housing; environment & health; and inequality in Baltimore

- GIS and Maps at Johns Hopkins: http://guides.library.jhu.edu/gis/popular-sources
      Provides a list of, and links to, popular data sources that focus on Baltimore and Maryland.

- Urban Health Institute: http://urbanhealth.jhu.edu/resourcenet/
      JHSPH affiliated institute focusing on East Baltimore. Provides a list of links to various Baltimore statistics data sources.

- Maryland Department of Housing and Community Development: https://dhcd.maryland.gov/Maps/Pages/default.aspx
      Provides a variety of interactive maps with information (mostly by county) on neighborhood characteristics and measures of economic development and well-being

National Data Sources

- The Census (American FactFinder): https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml
  - Very broad range of data, does not include shapefiles

- The Census (TIGER/Line): https://www.census.gov/geo/maps-data/data/tiger-line.html
  - Various shapefiles

- National Centers for Environmental Information: https://www.ncdc.noaa.gov/data-access
  - Climate and environmental data, affiliated with National Oceanic and Atmospheric Administration

- Enivronmental Protection Agency: https://edg.epa.gov/metadata/catalog/main/home.page
  - Broad range of environmental data

- Centers for Disease Control and Prevention: https://www.cdc.gov/datastatistics/index.html
  - Broad range of health data

- United States Geological Survey: https://www.usgs.gov/products/data-and-tools/gis-data
  - Environmental and satellite-derived imagery

- National Aeronautics and Space Administration: https://earthdata.nasa.gov/
  - Satellite-derived imagery

Considerations

- Beware redundancy of data between sources
  - Pick which platform works best for you and your objectives

- Interactive tools are helpful for exploration online but it's necessary to download the data for your own analyses

- Manually download individual datasets or batch download bulk data
  - Consider using (Application Programming Interface) API approaches
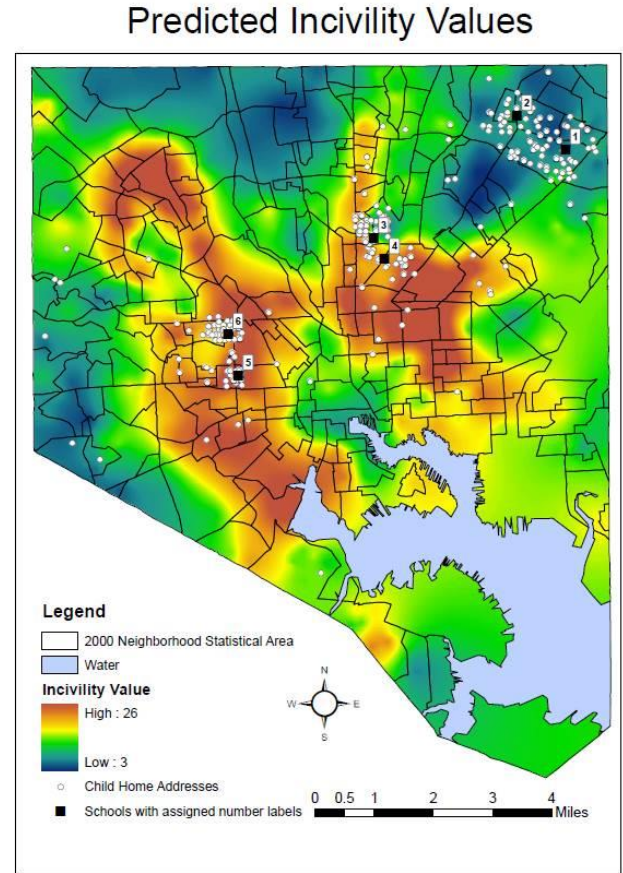 - Consider using R, an open source statistical computing language

Spatial Data Applications

- Baltimore City Food Environment

- Developed by CLF

- A food desert is defined as an area which meets four criteria:
  - Median Income under 185% of Federal Poverty Level
  - Household Vehicle Availability is under 30%
  - Distance to Supermarkets is more than 0.25 miles
  - Healthy Food Availability Index (HFAI) is under 9.5

Baltimore City Food Environment: 2018 Report
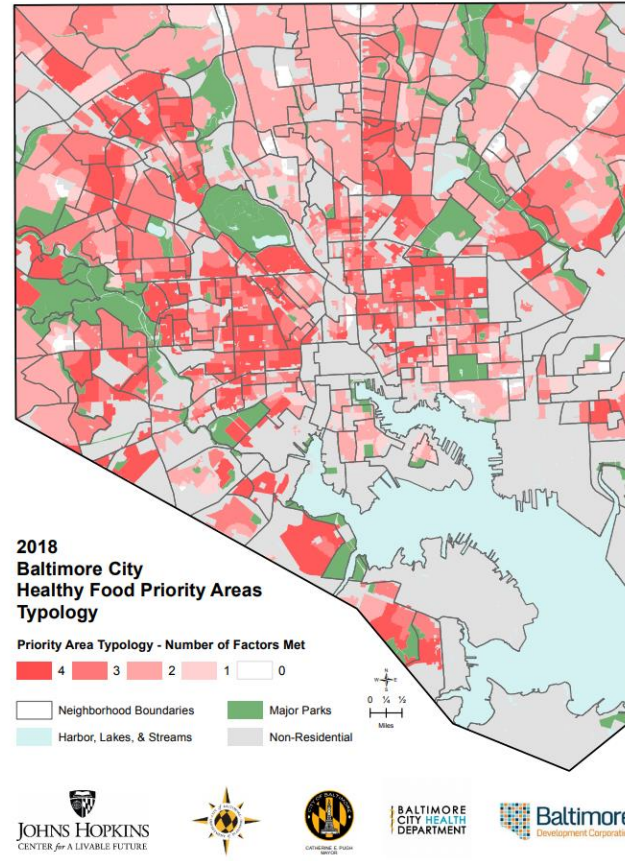
Spatial Data Applications

- Incivility information collected using Neighborhood Inventory of Environmental Typology (NIfETy) method (98 factors summed to 1 total score)

- Incivility scores were assigned to centroids of a sample of city blocks

- Spatial statistics used to predict incivility at all locations in the city

- Higher levels of incivility have been associated with lower levels of perceived safety, potentially impacting whether children walk to school


Predicted Incivility Values

Legend
- 2000 Neighborhood Statistical Area
- Water

Incivility Value
- High : 26
- Low : 3
- ○ Child Home Addresses
- ■ Schools with assigned number labels

0 0.5 1   2   3   4
Miles

Curriero et al., 2013

Spatial Data Applications

- *Vibrio parahaemolyticus (Vp)* bacteria is one of the leading causes of foodborne illness

- Found in the waters of the Chesapeake Bay, and accumulates in oysters

- Associated with water temperature, turbidity, and other variables

- Spatial statistics used to predict *Vp* concentrations throughout the Bay
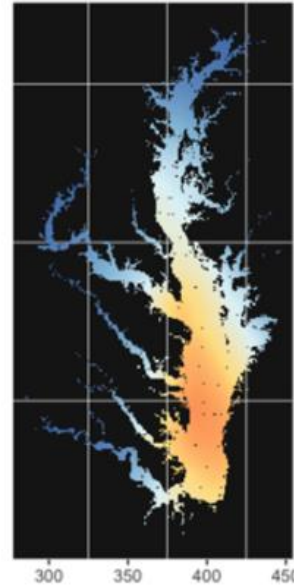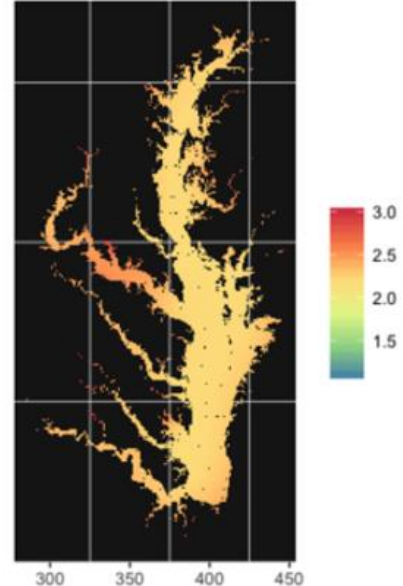
Davis et al., 2017

Give GIS a Go!

Spatial Science for Public Health Center website provides additional information and resources available:

https://www.jhsph.edu/research/centers-and-institutes/spatial-science-center-for-public-health/index.html

Discovering the World Through GIS

A Showcase of Work in GIS and Spatial Analysis

Introductions

Frank C. Curriero, PhD

Director
Spatial Science for Public Health Center
Associate Professor
Department of Epidemiology and Biostatistics

Jamie Harding, MS

GIS Specialist
Center for a Livable Future
Johns Hopkins Bloomberg School of Public Health

Wednesday, November 15, 2017
Noon – 1:30 p.m.
Feinstone Hall
Wolfe Street Building

Work by students, staff and faculty will also be presented in the form of a poster session. All are welcome!

For more information, please contact the Spatial Science for Public Health Center at SSPHC@jhu.edu.

For disability access information or listening devices, please contact Scott Klein at sklein1@jhu.edu or 410-614-1550.

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