

Leveraging GIS Mapping for Social Determinants of Health Interventions



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Who are we?

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Objectives for this session

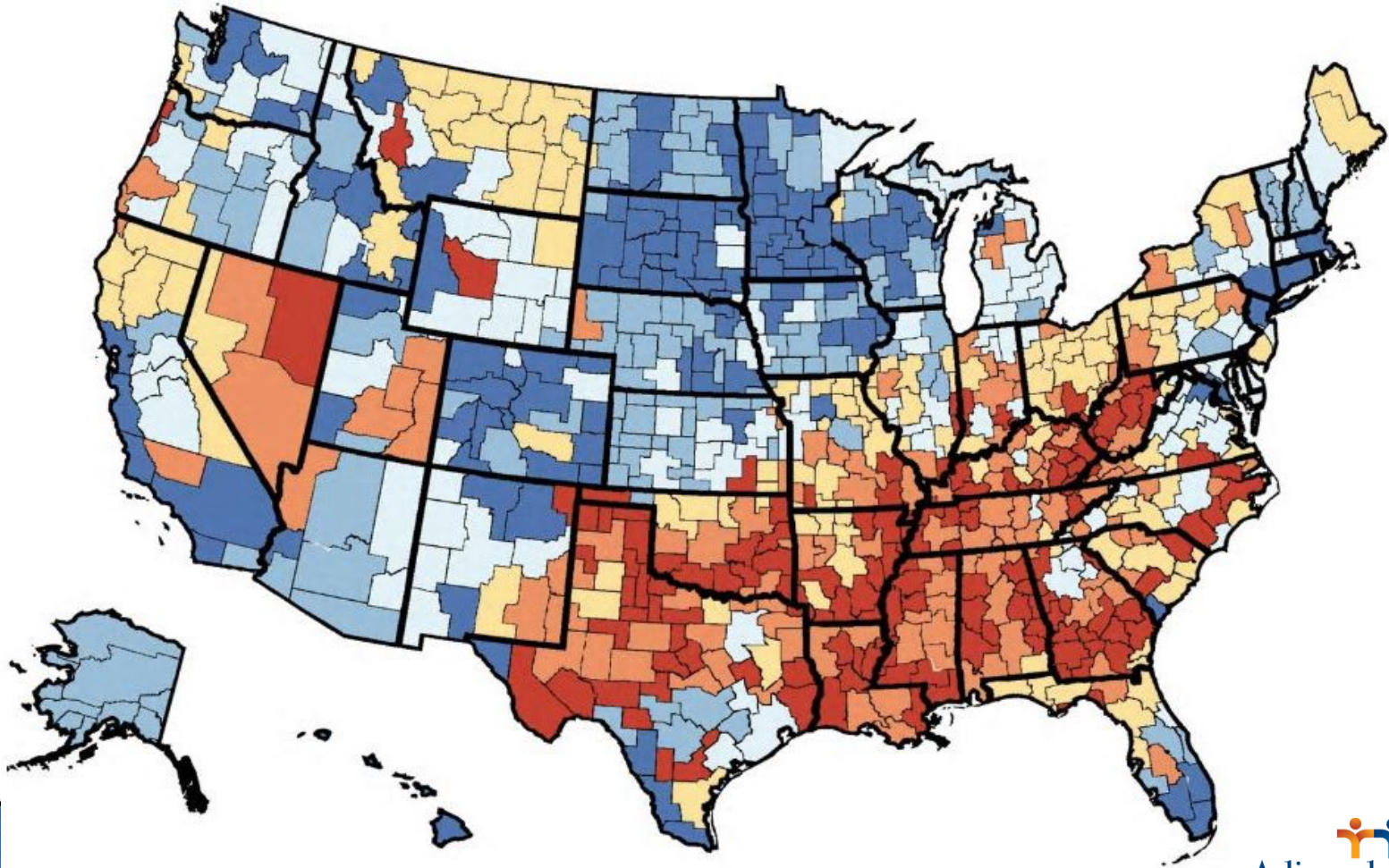
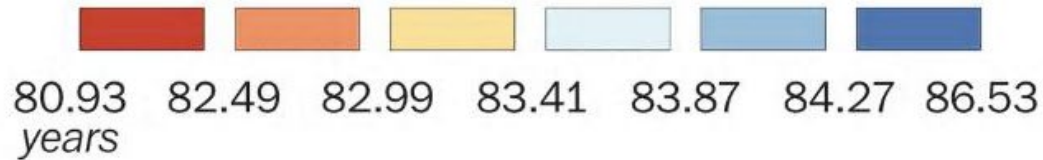
- ▶ Demonstrate GIS as a population health management tool
- ▶ Display social determinants of health on maps of our region
- ▶ Discuss specific use cases

Why Use Geographic Information Systems? (GIS)

- ▶ The future will bring added complexity that will require us to understand our patient population at a highly detailed level
- ▶ We're moving into a care environment where, more than ever, the ACO will be responsible for the whole person's care
- ▶ GIS can answer some questions commonly addressed by Excel or Minitab (e.g. statistics)
- ▶ Where you live does affect your health outcomes

The geography of life expectancy

Average life expectancy at age 65



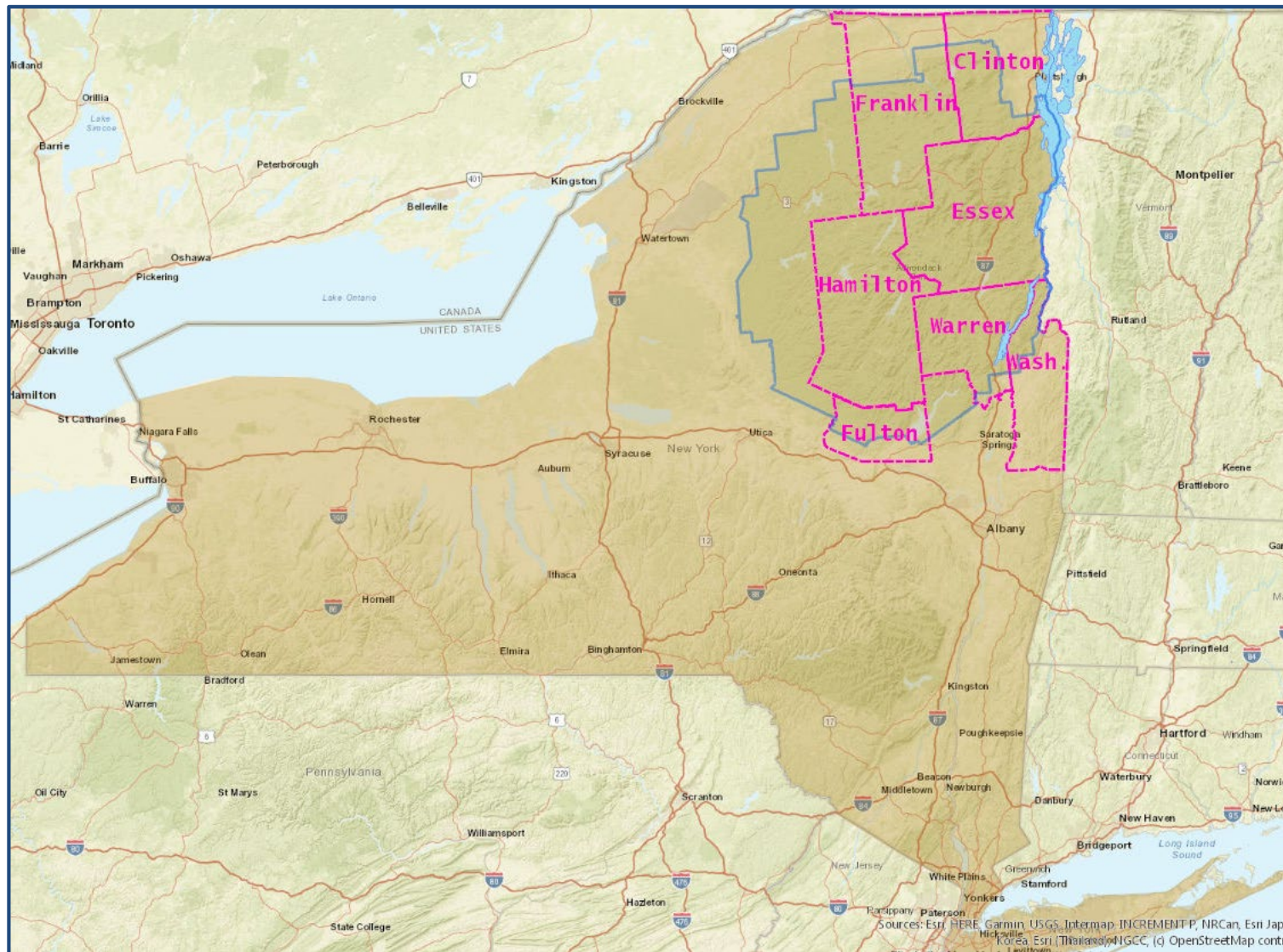
Your address affects your health

It has almost become a truism:

*Where you live is correlated with
when you'll die
and
how healthy you'll be in the meantime*

Introduction to GIS

A tool for displaying health outcomes and social determinants of health in a fresh way





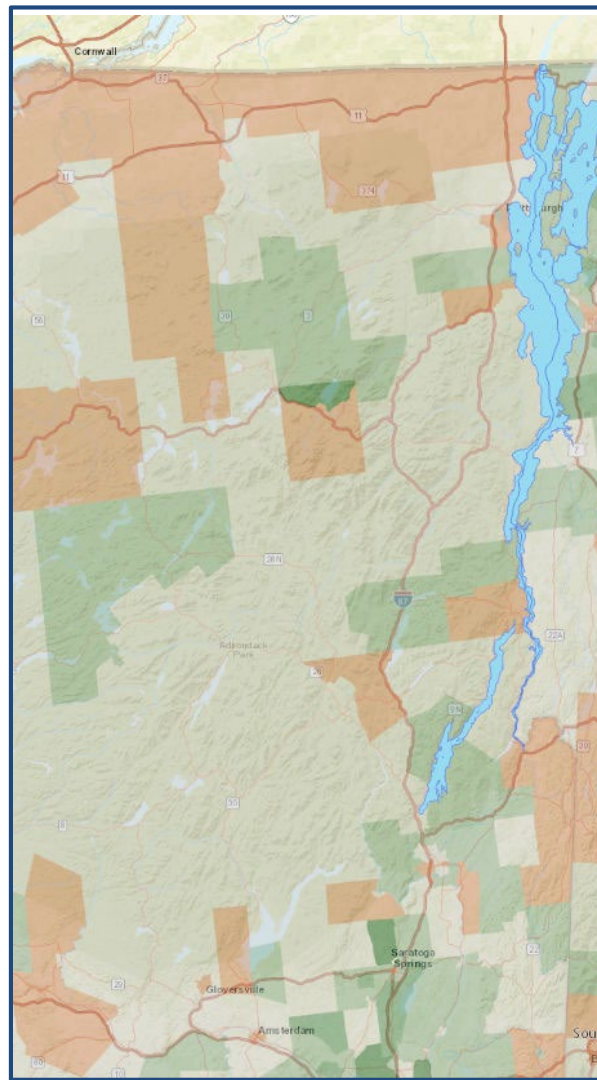
Maps will focus on a 7-county region surrounding the Adirondacks

Individual elements we use to build a map

- ▶ Polygon (area) features
 - HealthyADK.org
 - Adirondack Health Institute (AHI) surveys
 - Census
- ▶ Line features
 - County borders
 - Public bus routes
- ▶ Point features
 - Medical resources
 - Sources of food
 - Beneficiary addresses

LEGEND

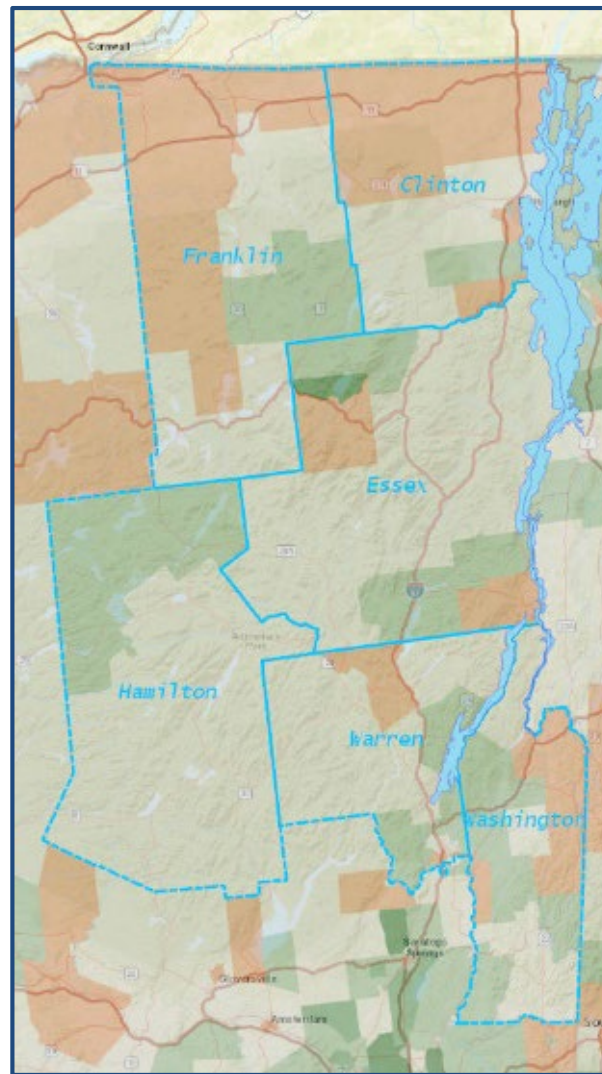
-  Worse than US poverty ratio
-  Better than US poverty ratio



How do we use GIS to build a map from these elements?



LEGEND

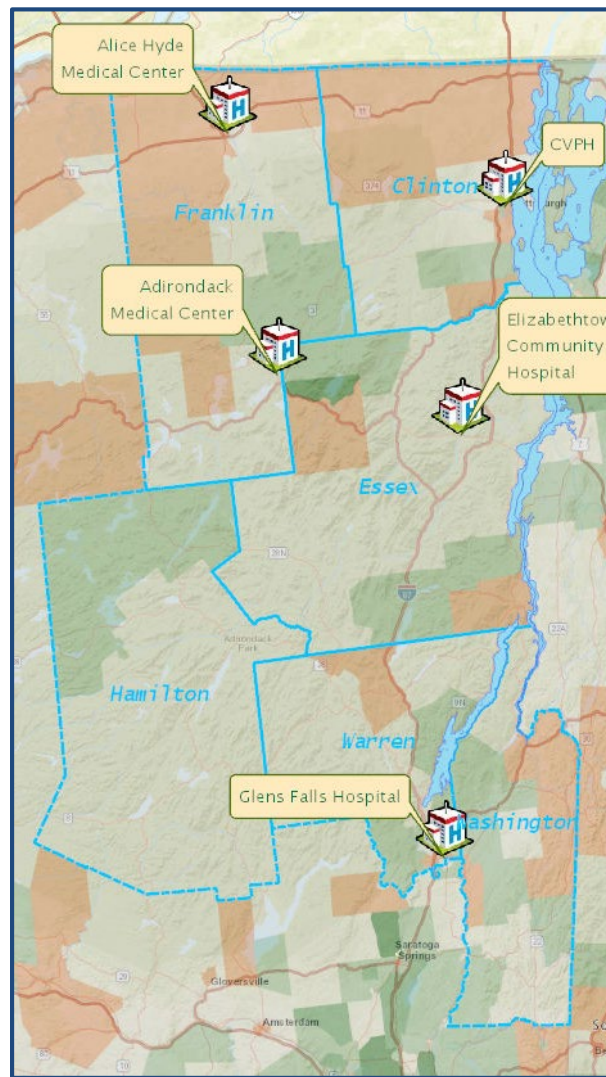
-  Worse than US poverty ratio
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How do we use GIS to build a map from these elements?

LEGEND

-  Worse than US poverty ratio
-  Better than US poverty ratio



How do we use GIS to build a map from these elements?

Please keep in mind...

- ▶ We are still in the process of mapping the full range of social and medical needs in our region, with the goal of improving delivery of care
- ▶ We tried to place all health care and relevant food sources on these maps, but might have missed some
- ▶ The majority of our maps depict Clinton County and Plattsburgh because most requests have originated there

Social Determinants of Health (aka SDoH)

SDoH are...

- Conditions in which people are born, grow, live, work and age
- Circumstances shaped by distribution of money, power and resources*

There isn't consensus on a single set of SDoH: there are many different indicators

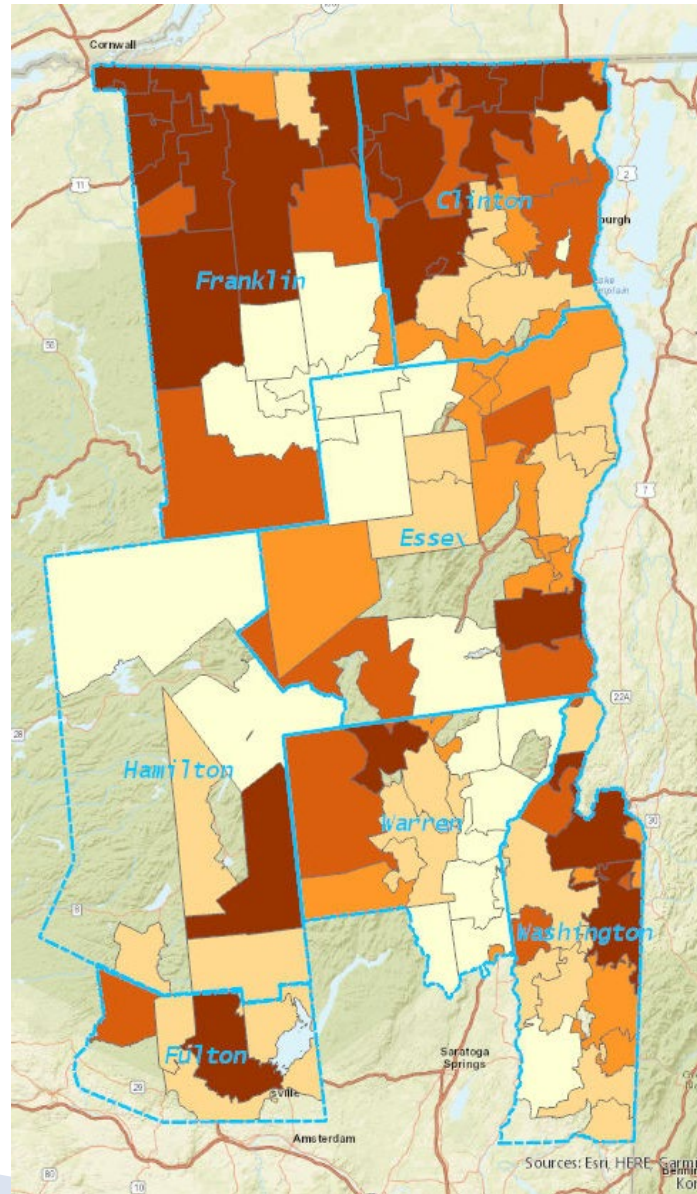
GIS displays potential correlations between place, health, and SDoH

AHI SocioNeeds Index from HealthyADK.org

A composite measure of socioeconomic need that correlates with poor health outcomes

Darker = higher need

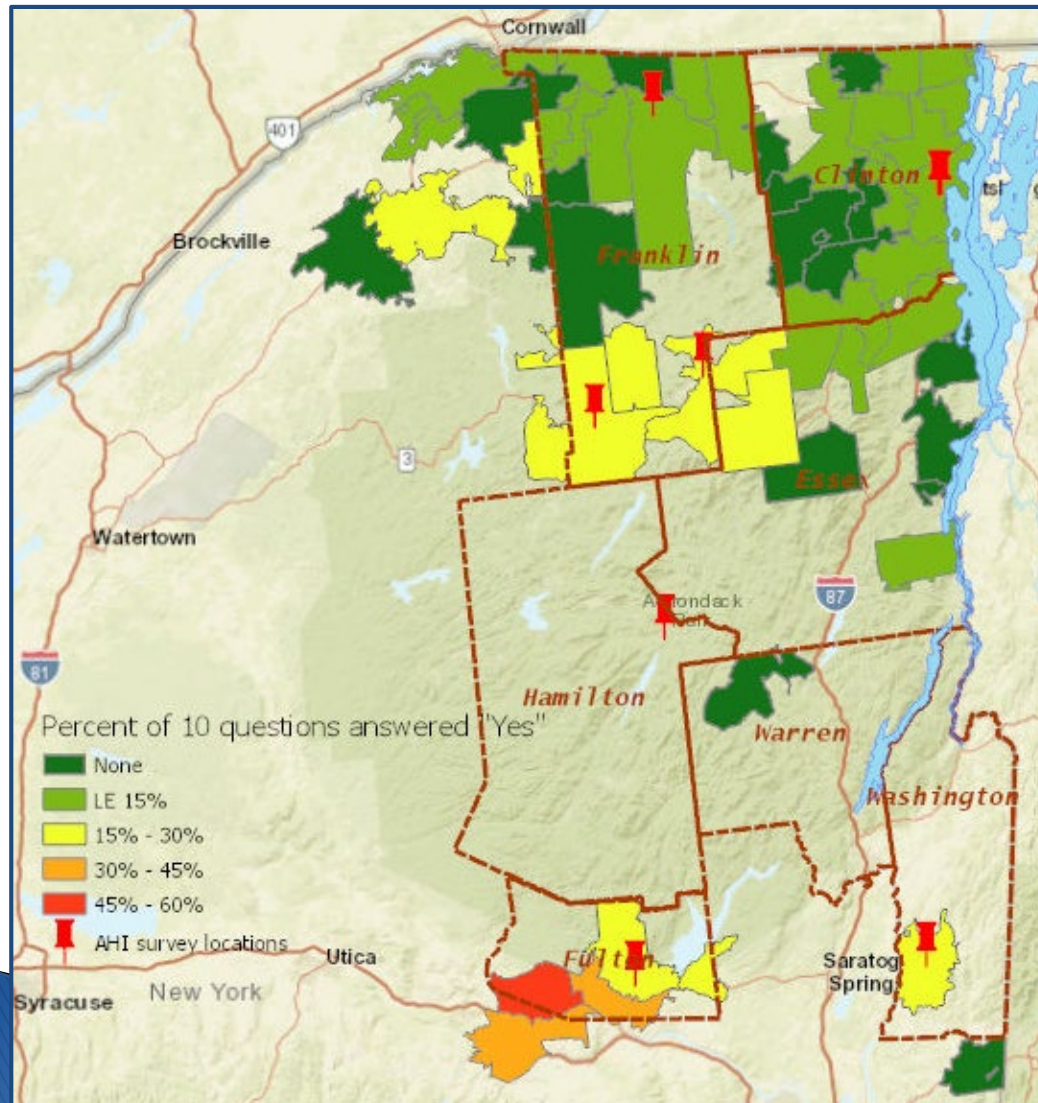
Scores range 0–100



Factors include:

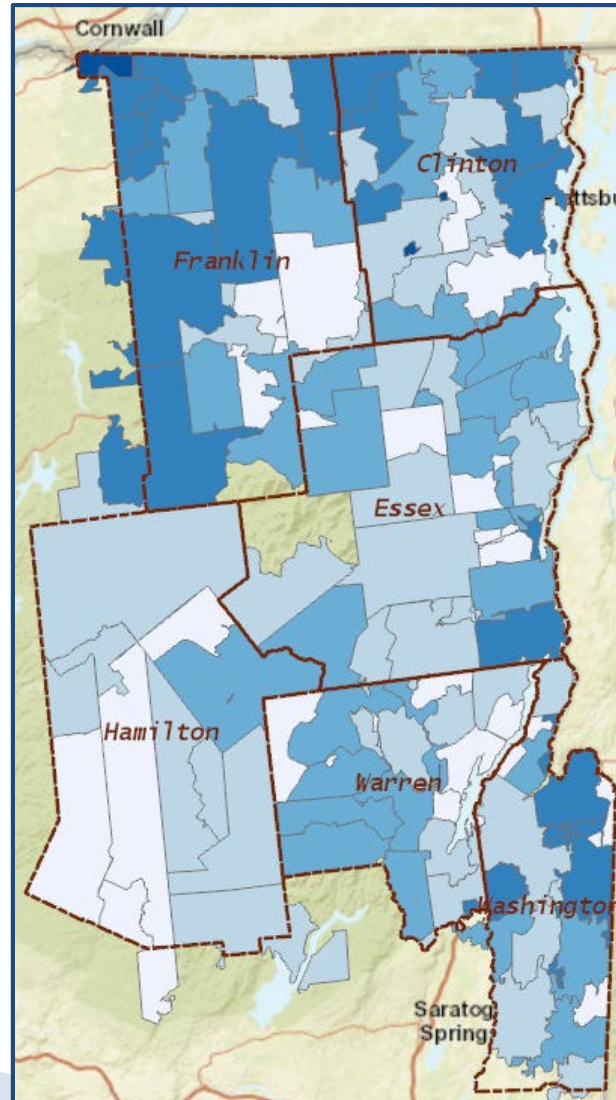
- Poverty
- Occupation
- Education
- Language

AHI Social Determinants of Health survey: Very early results

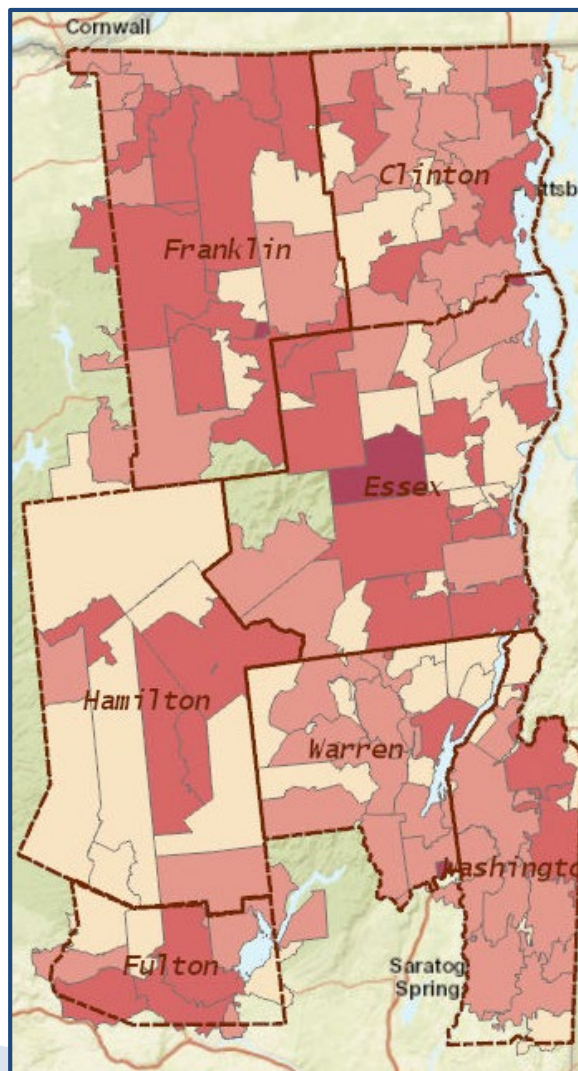


- ▶ % respondents indicating need
- ▶ Red = higher need
- ▶ Green = lower need

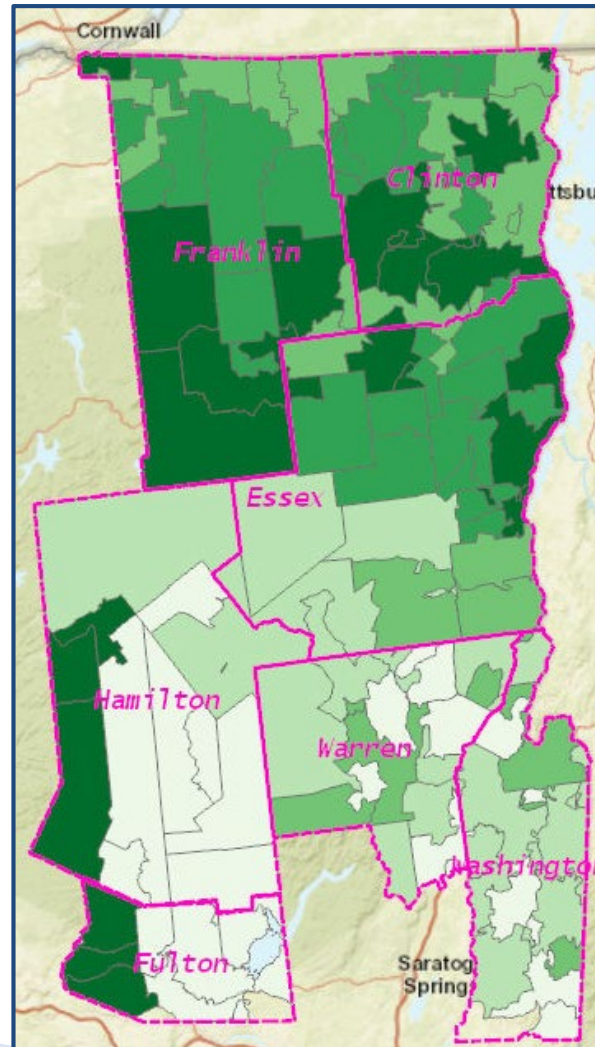
Robert Graham Social Deprivation Index: Darker is worse



Percent of residents without a car: Darker areas less likely to have a car



Percent over 65 and in poverty: Darker areas have higher poverty

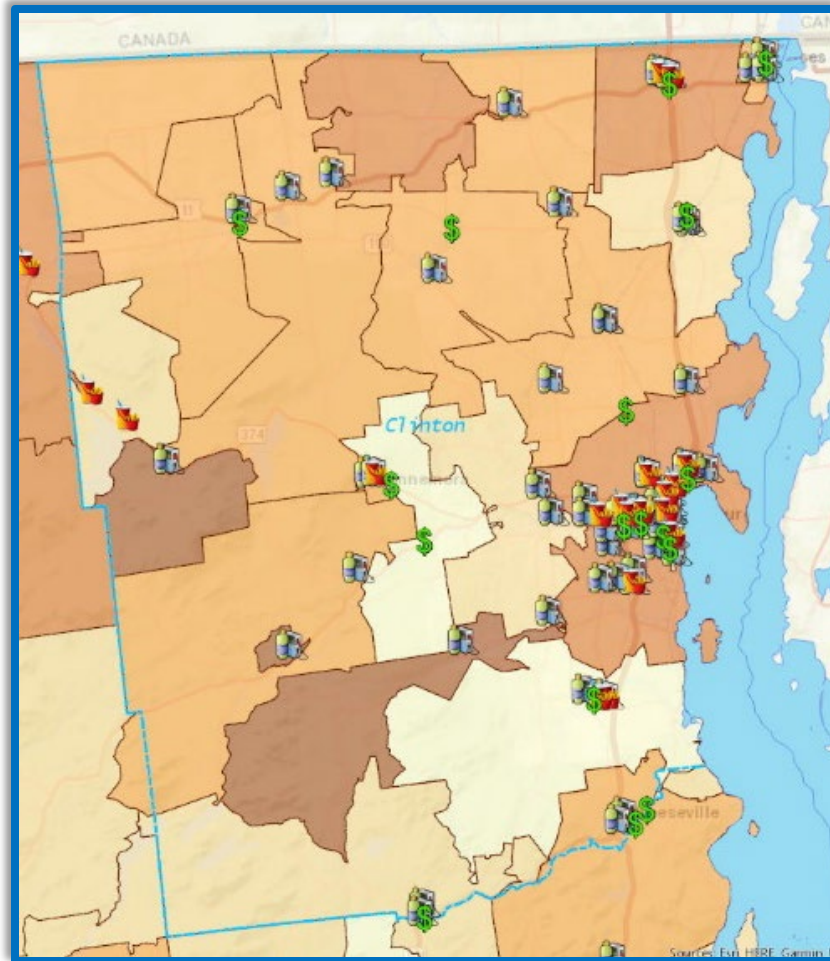


Use cases

Social determinants of health
alongside demographics
and health outcomes
in our region

Use case #1

Food deserts...



...and food swamps

in Clinton County

Desert? *Swamp*??

Food deserts are “residential areas with limited access to affordable and nutritious food.”* You live in one if you’re more than one mile (urban) or ten (rural) from fresh food.



A *food swamp* is “an area with a high-density of establishments selling high-calorie fast food and junk food, relative to healthier food options.”* In a swamp, the ratio of bad food to good is about 4:1.



Food access and your diet: Swamps matter more than deserts



- ▶ Access to a grocery doesn't help
 - A 2011 study* suggested that having a grocery nearby did not correlate with diet



- ▶ Access to fast food does harm, mostly to the poor
 - The same study showed that fast food near home *did* affect diet, especially in low-income areas

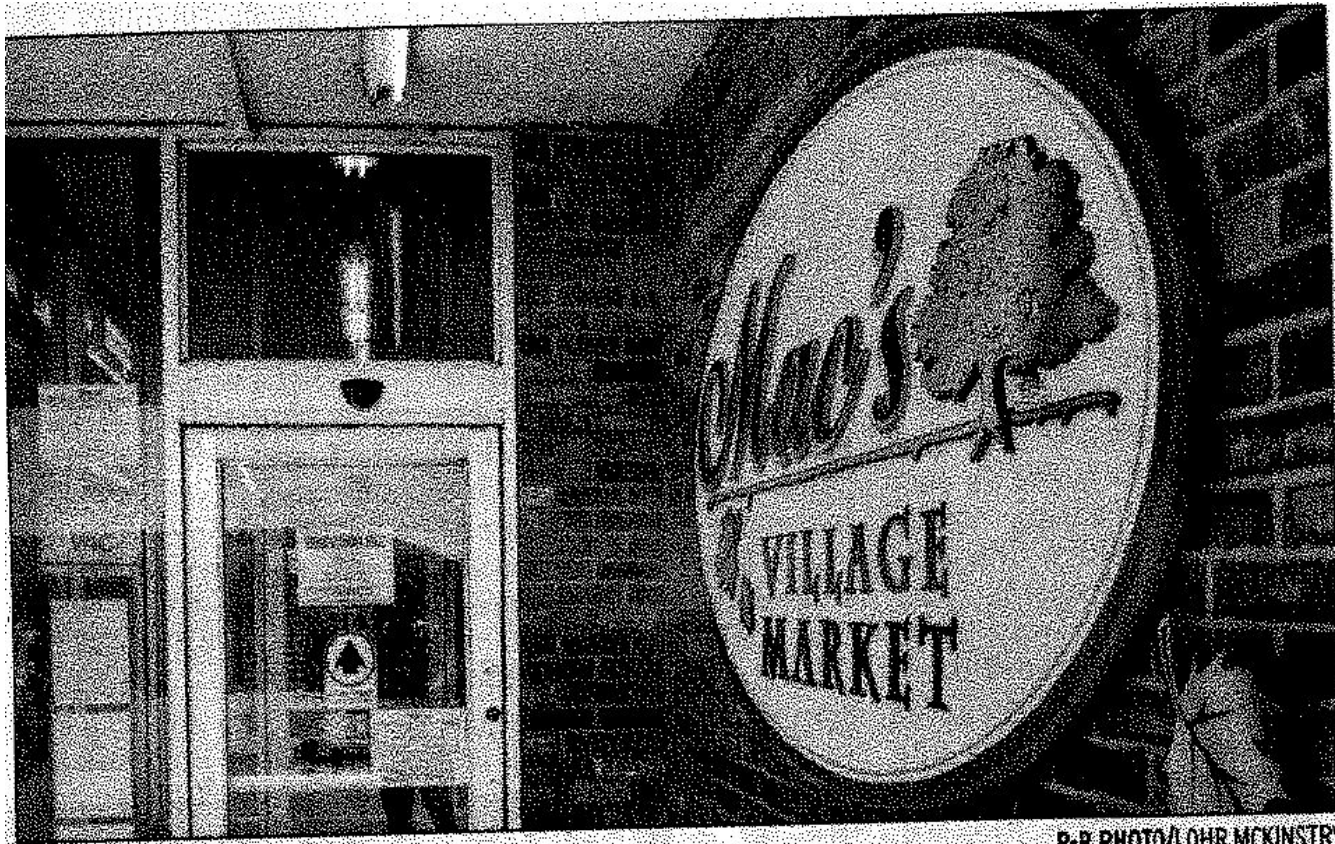
What about Dollar stores?



There are 30,000 Dollar Generals and Dollar Trees in the US

These (and other) dollar stores...

- ▶ Number more than Walmart and Starbucks combined
- ▶ Target small towns and rural areas
- ▶ Undercut and crowd out neighborhood groceries
- ▶ Feed more Americans than Whole Foods

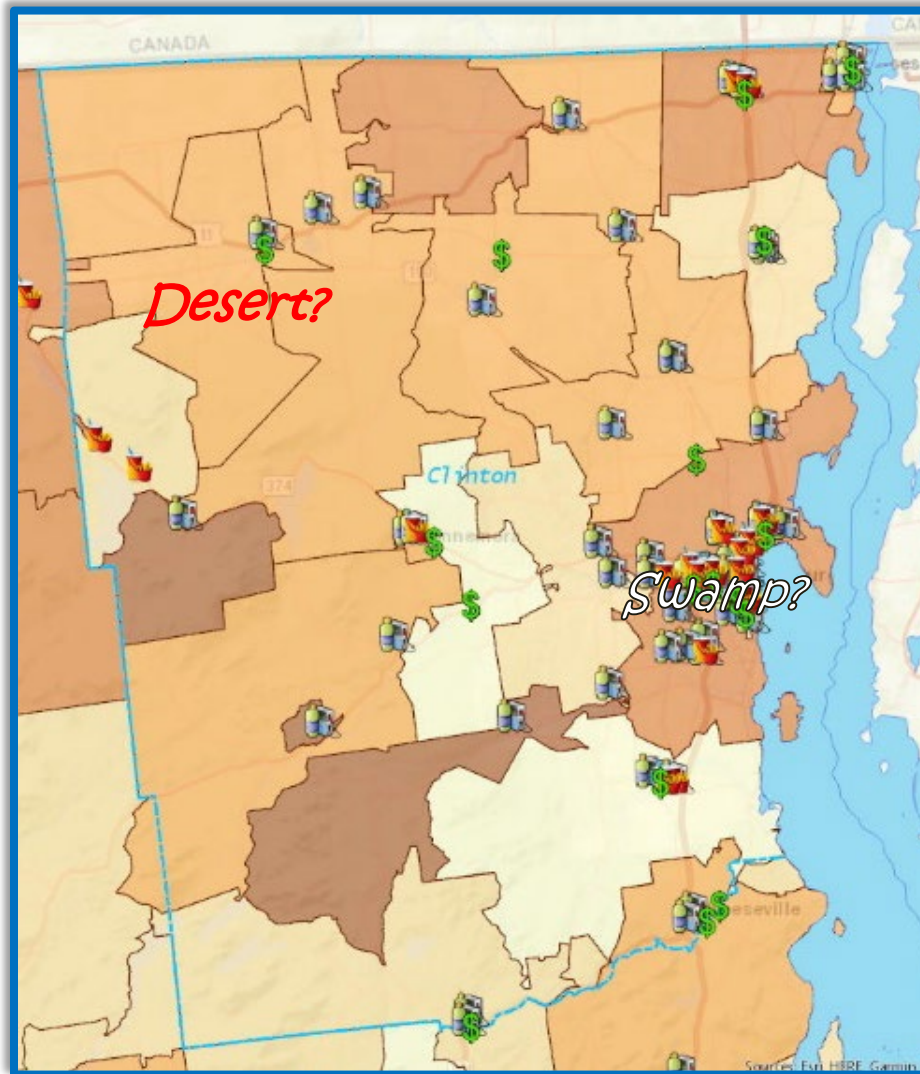


P-R PHOTO/LOHR MCKINSTRY

Mac's Market in Moriah's Port Henry hamlet announced will close Aug. 31, leaving residents driving at least a half hour to buy groceries.

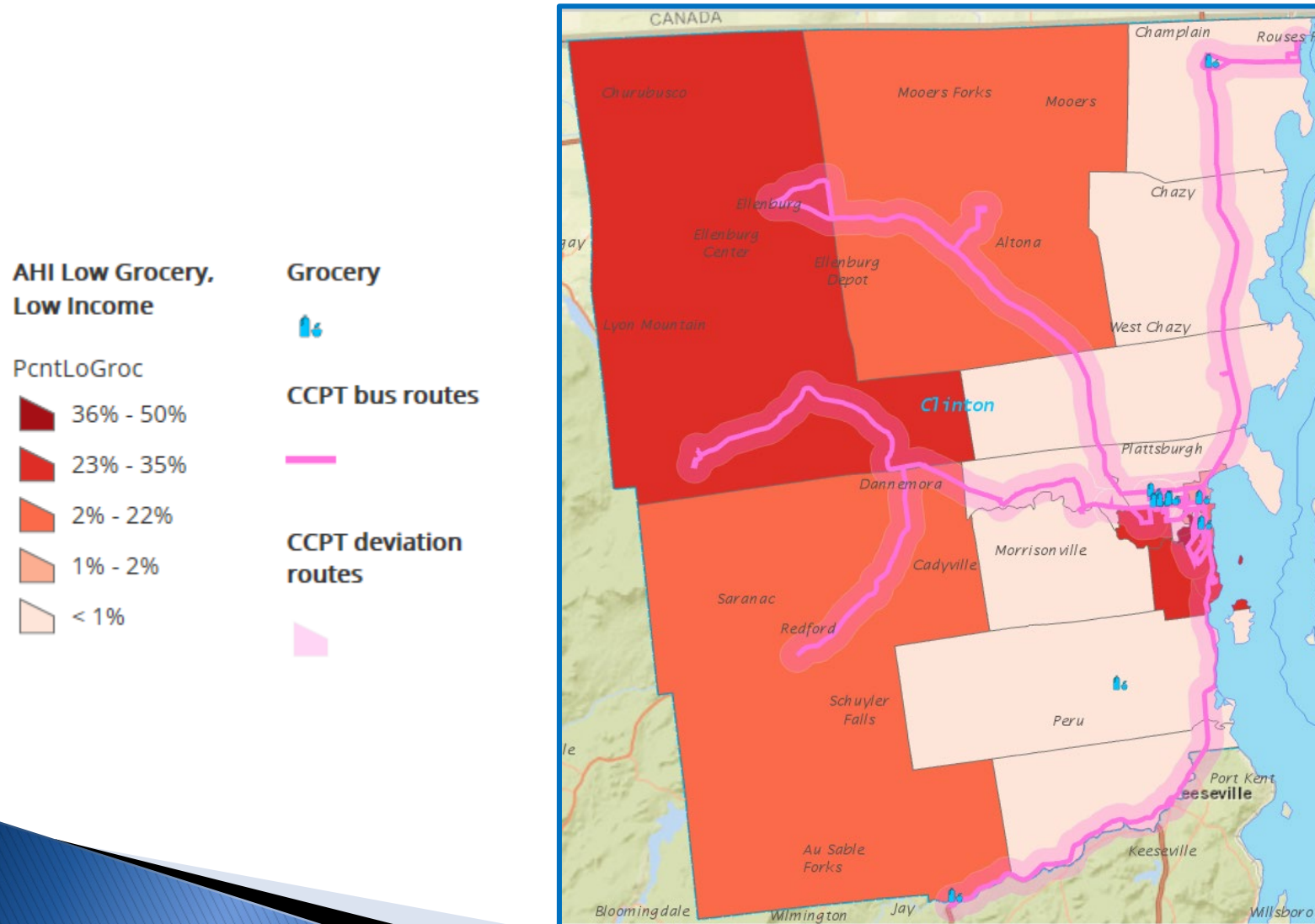
Port Henry recently lost Mac's, its only grocery*

Where are some deserts and swamps in Clinton County?

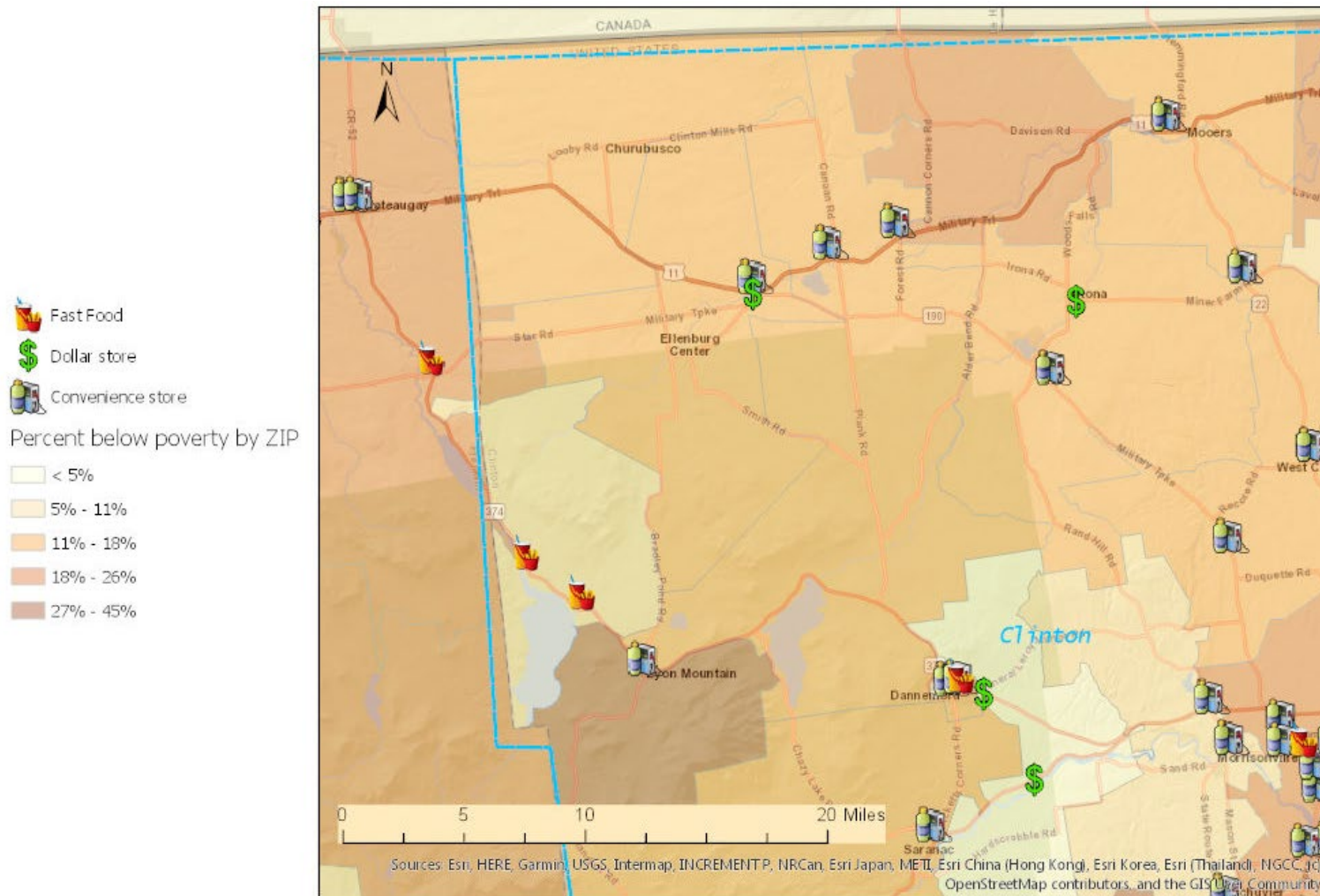


Income and grocery access:

Darker areas are lower on both metrics



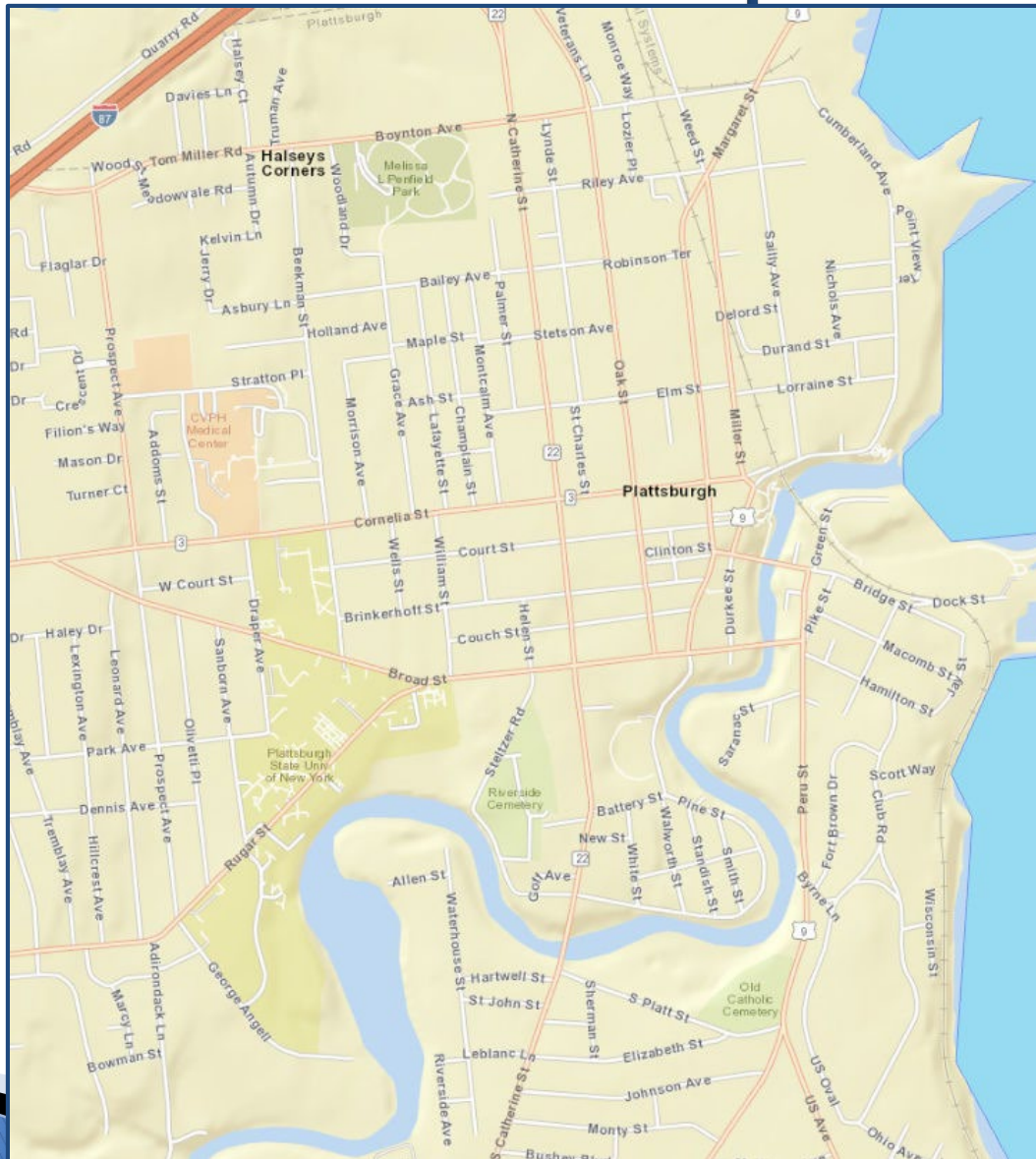
Northwestern Clinton County: Food desert?



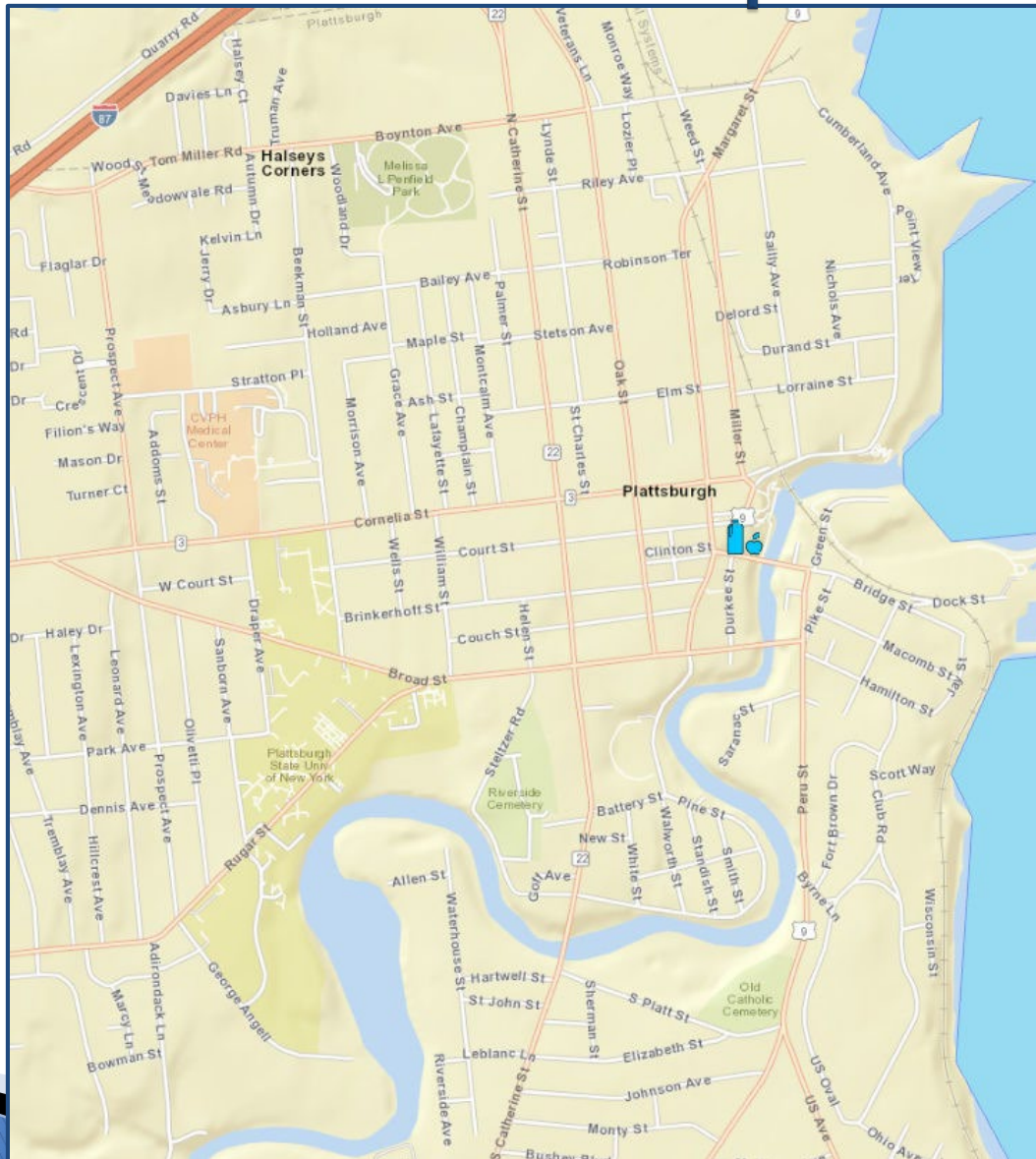
Food d



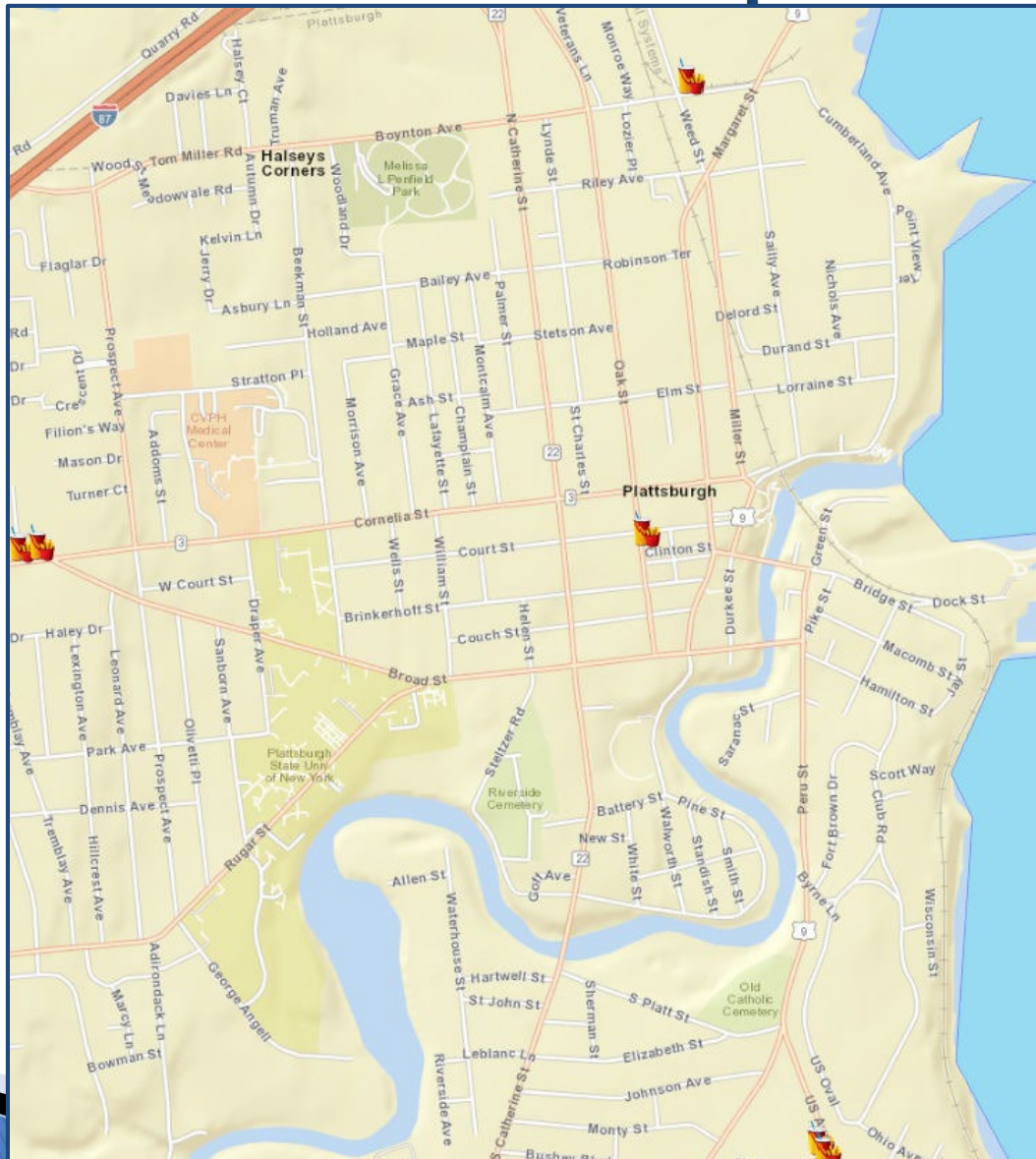
Downtown Plattsburgh: Food swamp?



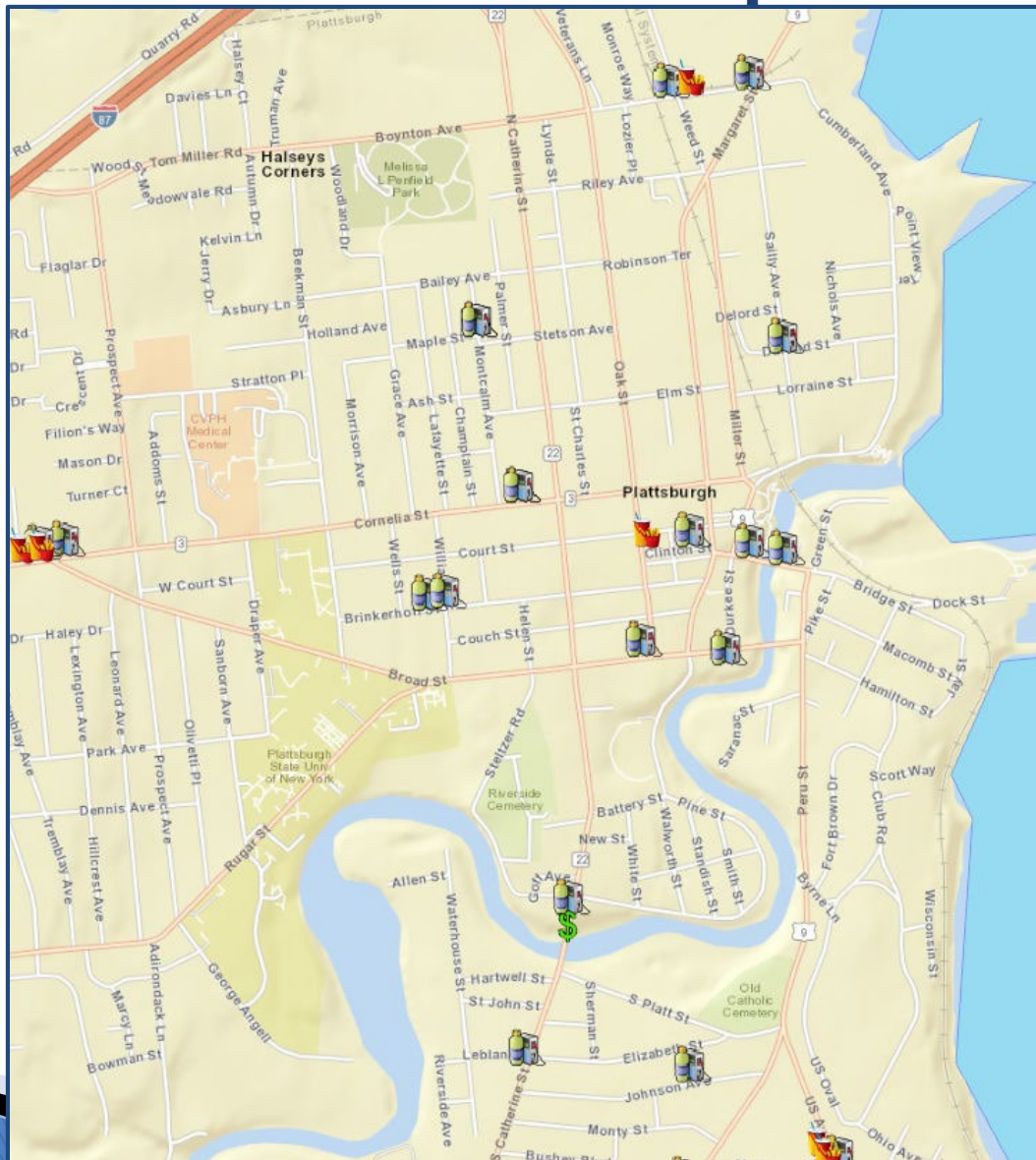
Downtown Plattsburgh: Food swamp?



Downtown Plattsburgh: Food swamp?



Downtown Plattsburgh: Food swamp?



Fast Food



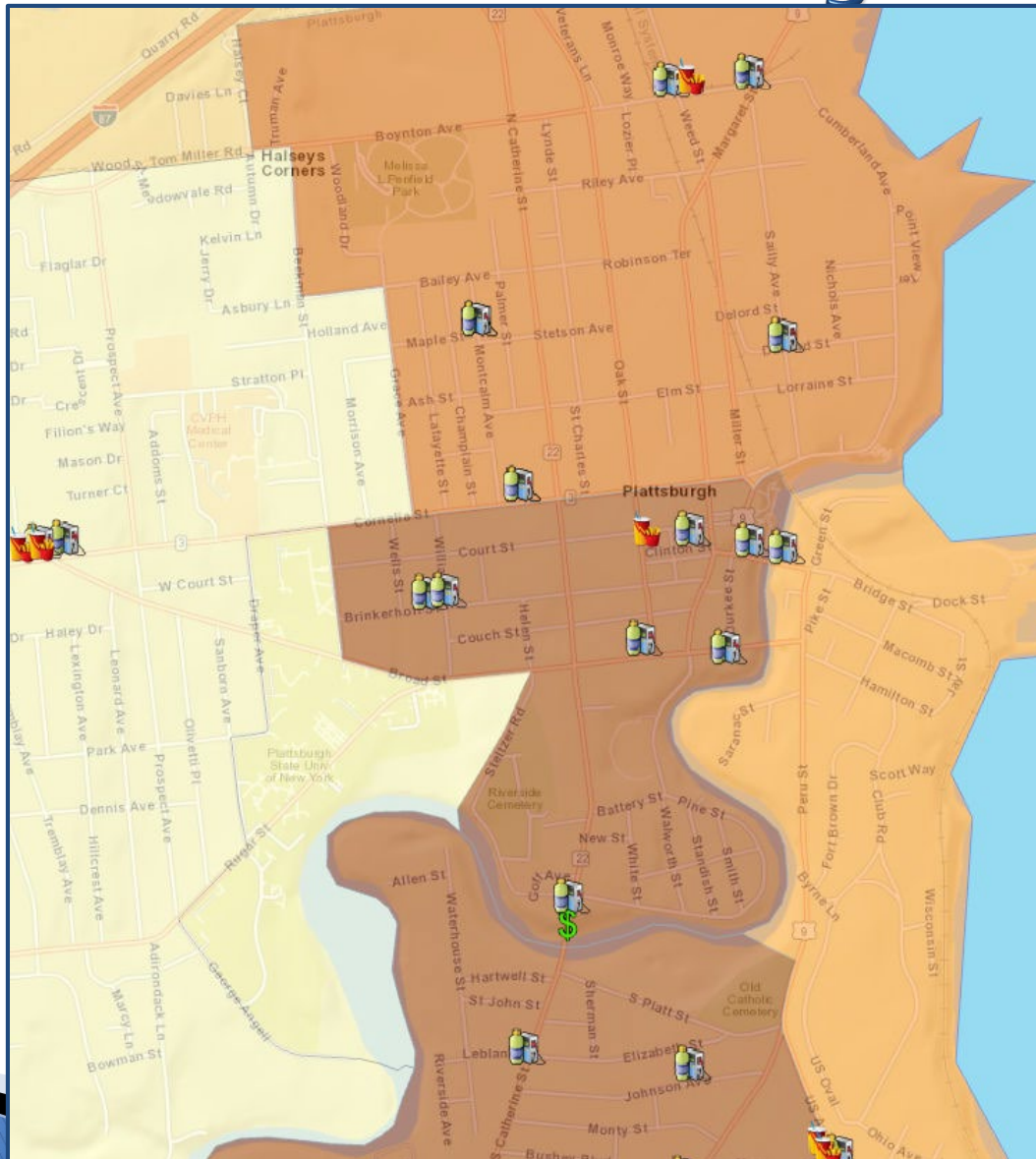
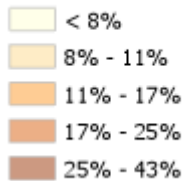
Dollar store



Convenience store

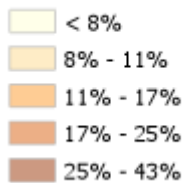
Downtown Plattsburgh: Low income area has few good choices

Percent in poverty



Downtown Plattsburgh: Low income area has few good choices

Percent in poverty

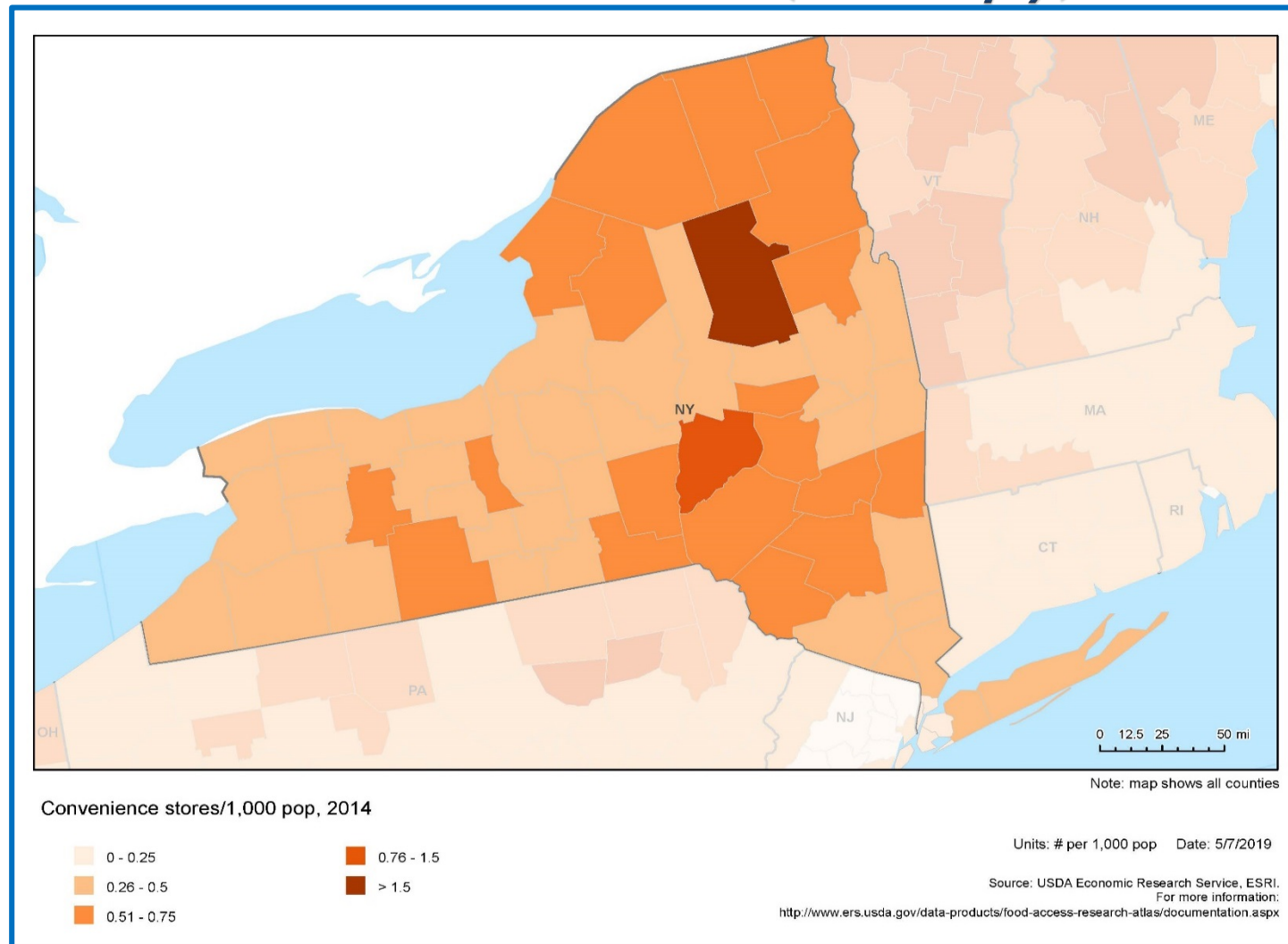


New York State

How does the ACO region
compare to the rest
of the state?

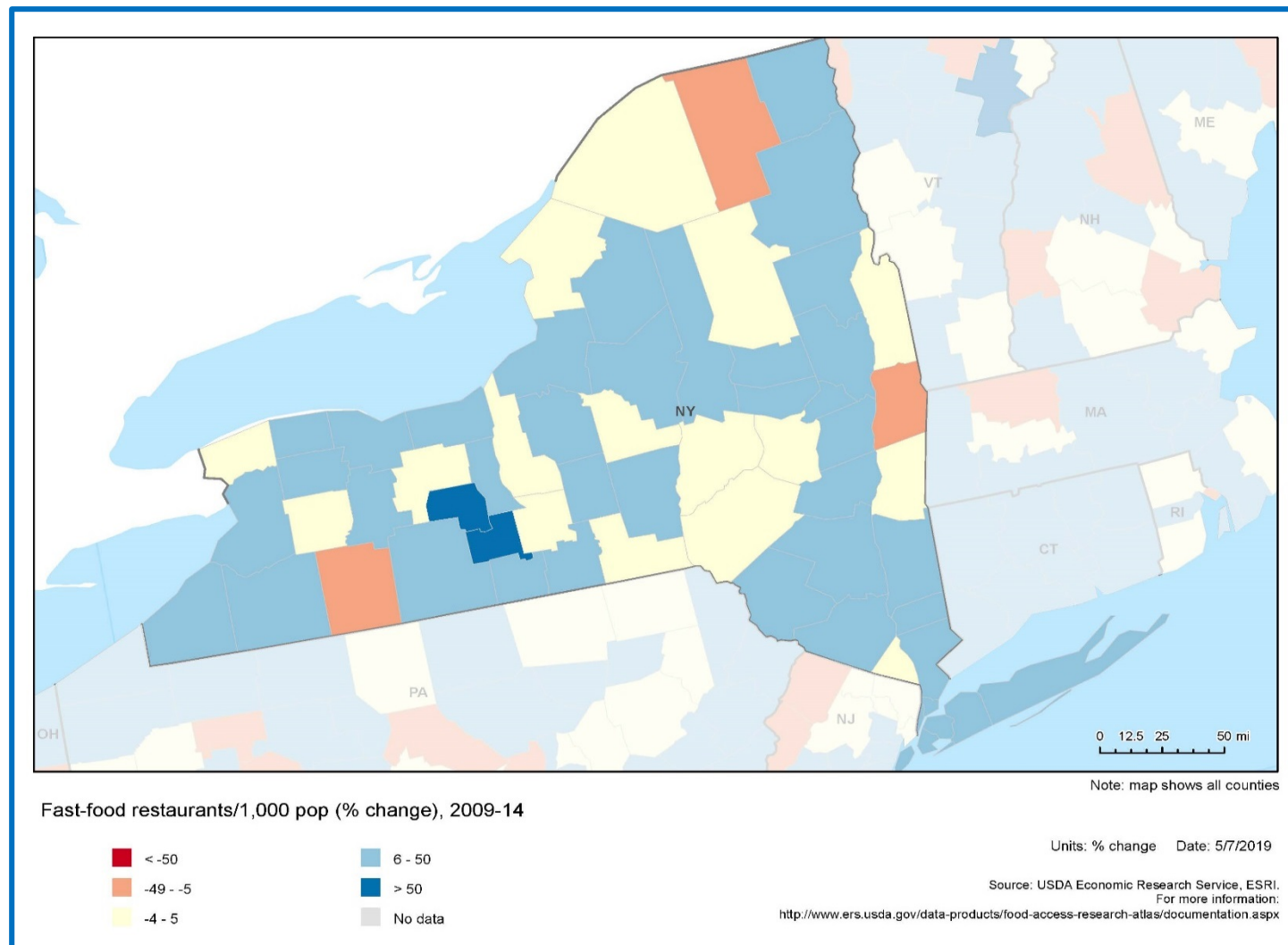
USDA data, convenience store density

Darker is worse (*swampy*)

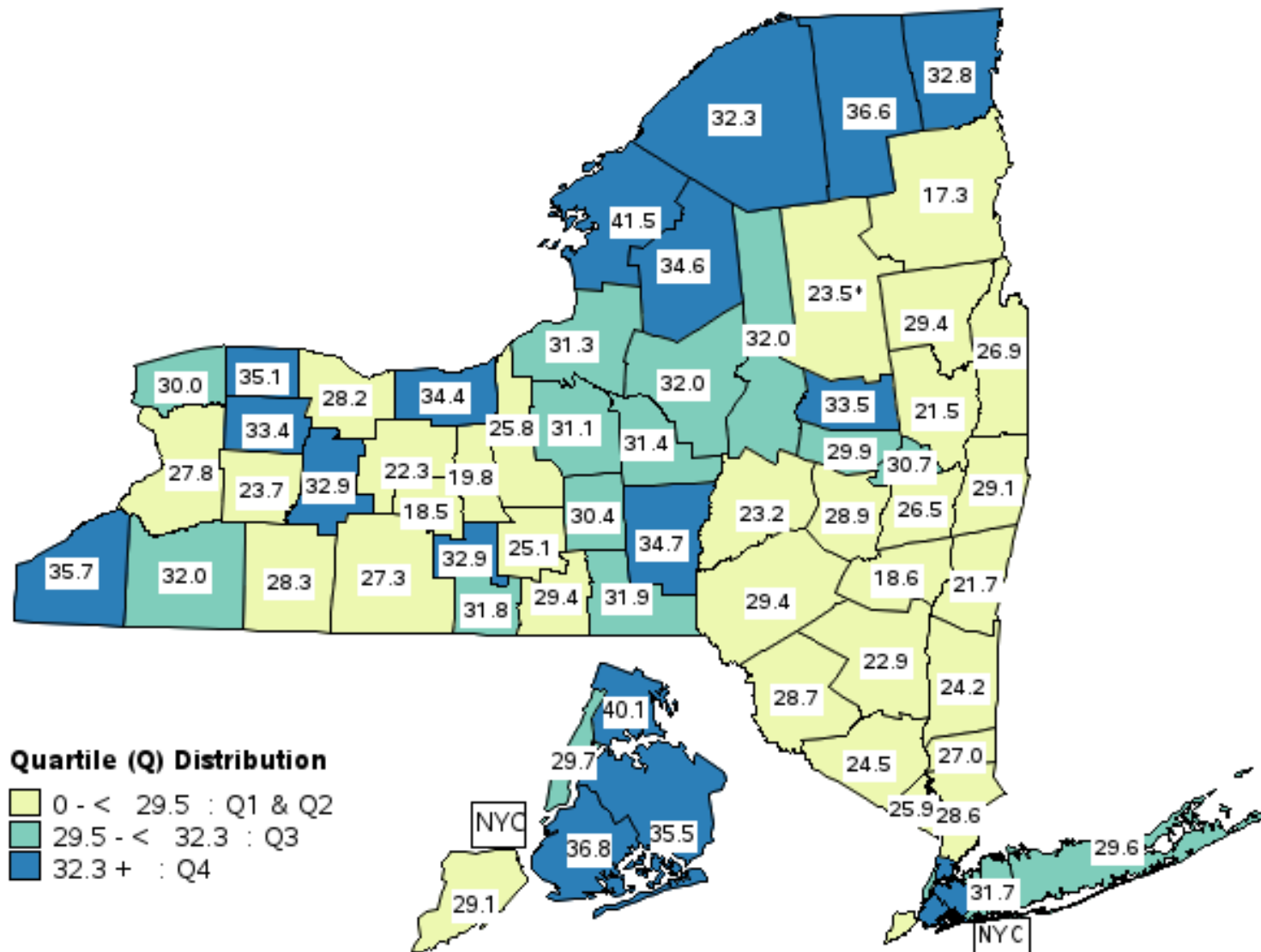


Increased fast food density over time

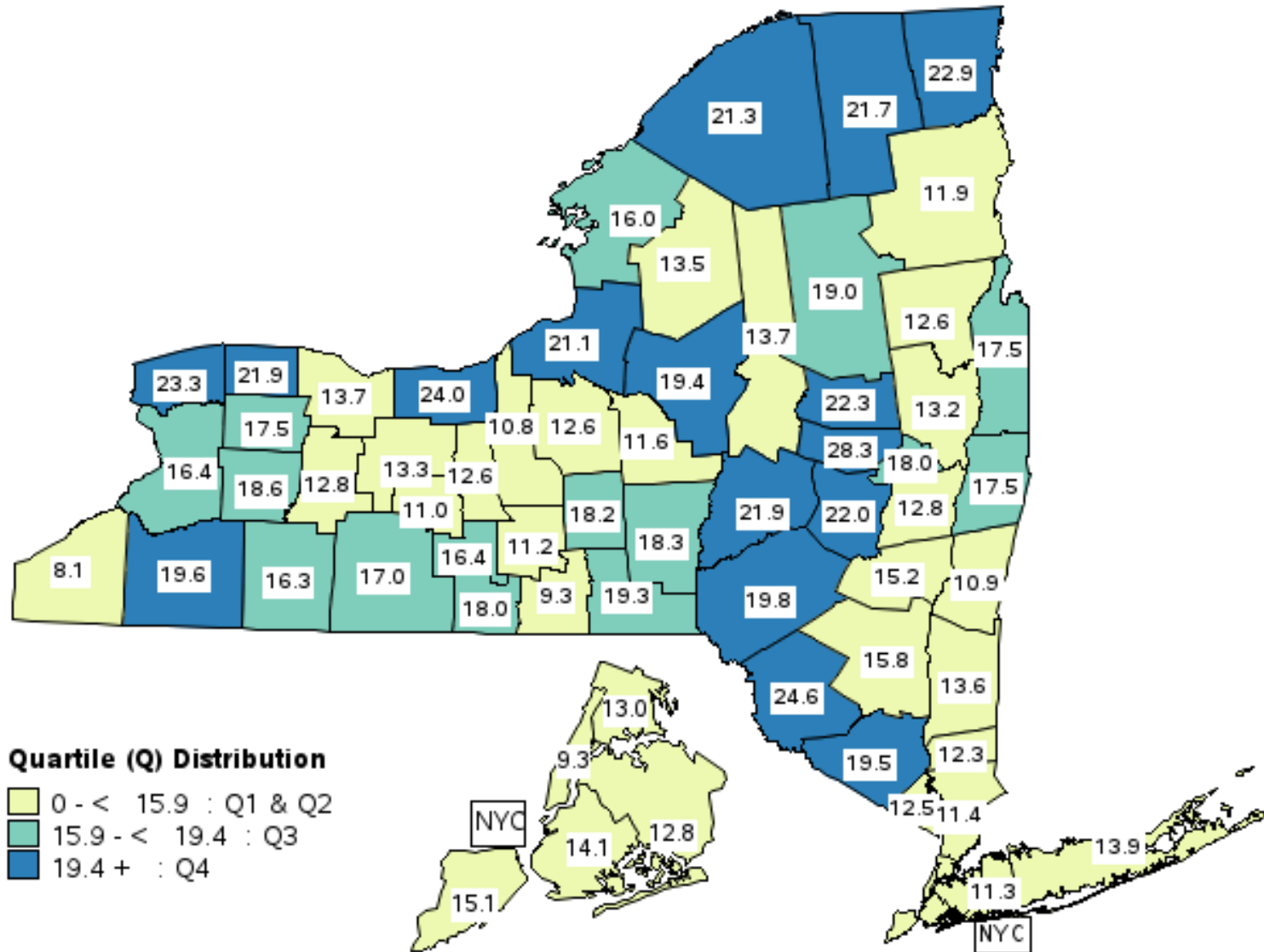
Blue is worse



BRFSS data: % eating less than one piece of produce daily



SPARCS data: Heart attack hospitalization rates



And now for some good news!

Plattsburgh Collaborators Improving Healthy Food Access



A number of organizations in the Plattsburgh Population Health Network (PHN) are coordinating projects to improve food access and address food insecurity with the help of DSRIP innovation funding. Clinton County Public Health Department is leading the effort, working with a large, multi-disciplinary group of partners, including Plattsburgh Primary Care Pediatrics, The University of Vermont Health Network – Champlain Valley Physicians Hospital, Adirondacks ACO, JCEO, Clinton County Mental Health, Behavioral Health Services North, and many others. Clinton County Public Health has developed a food insecurity screening algorithm for providers to use to better understand the root cause of a patient's unmet food needs and facilitate appropriate referrals to meet identified necessities.

More good news!

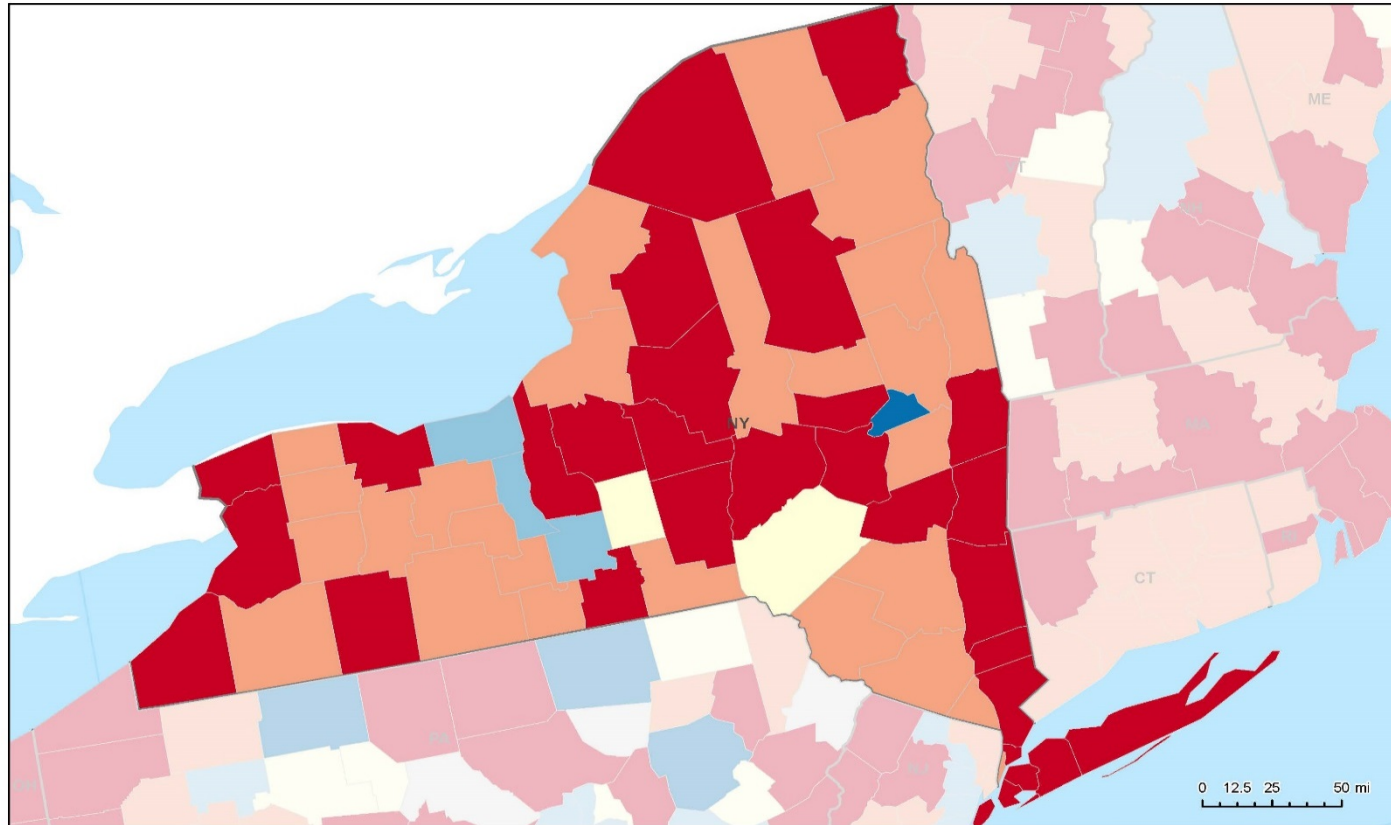
The Farmacy in Keeseville



Filling a void left by grocery closures while supporting local farmers

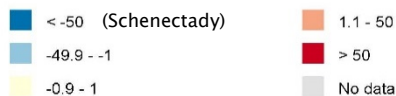
Still more good news!

Increasing farm markets (Red is best)



Note: map shows all counties

Farmers' markets/1,000 pop (% change), 2009-16



Units: % change Date: 5/7/2019

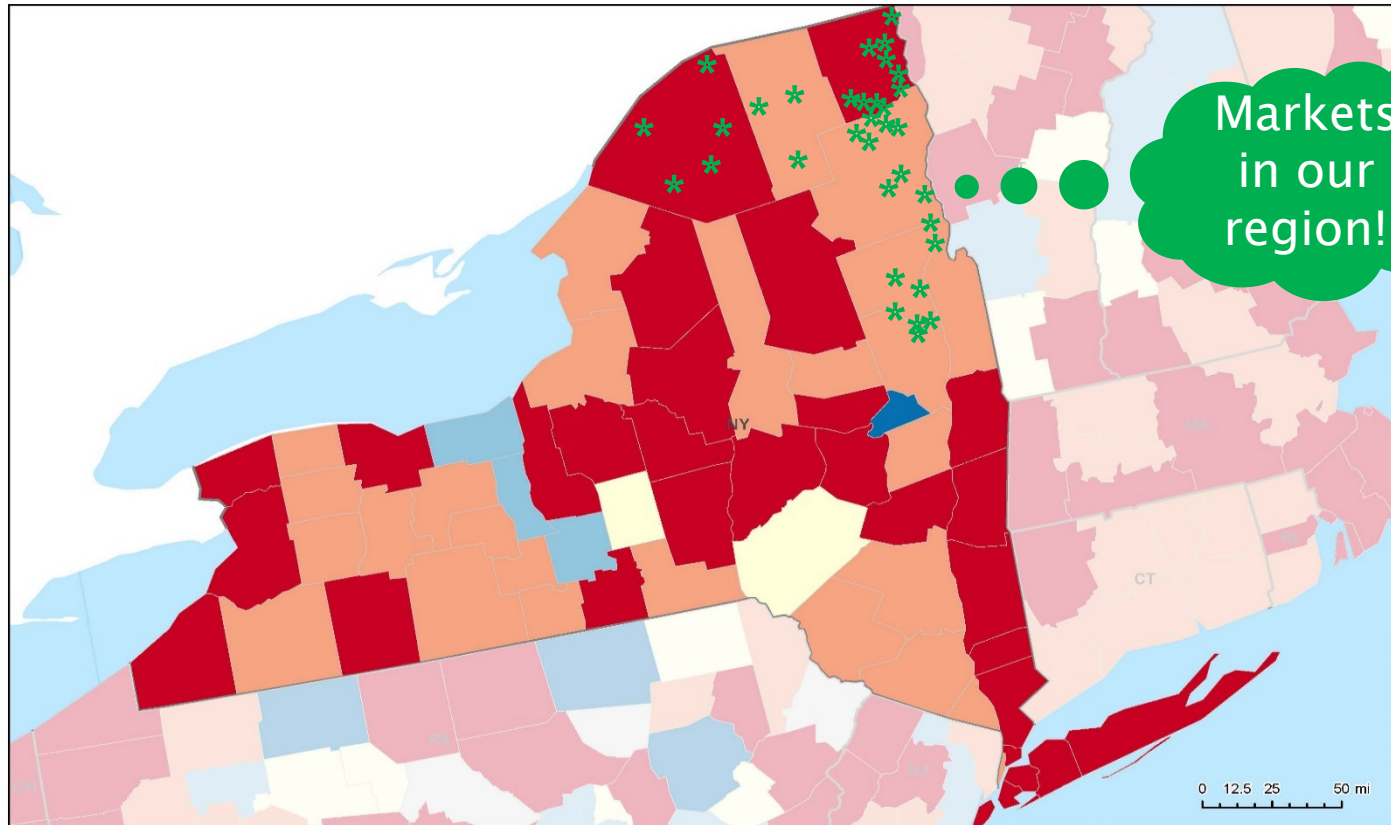
Source: USDA Economic Research Service, ESRI.

For more information:

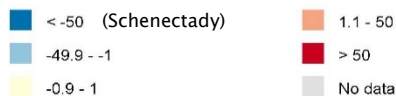
<http://www.ers.usda.gov/data-products/food-access-research-atlas/documentation.aspx>

Still more good news!

Increasing farm markets (Red is best)



Farmers' markets/1,000 pop (% change), 2009-16



* Farm stand or market

Units: % change Date: 5/7/2019

Source: USDA Economic Research Service, ESRI.

For more information:

<http://www.ers.usda.gov/data-products/food-access-research-atlas/documentation.aspx>

Use case #2

Prevention Quality Indicators

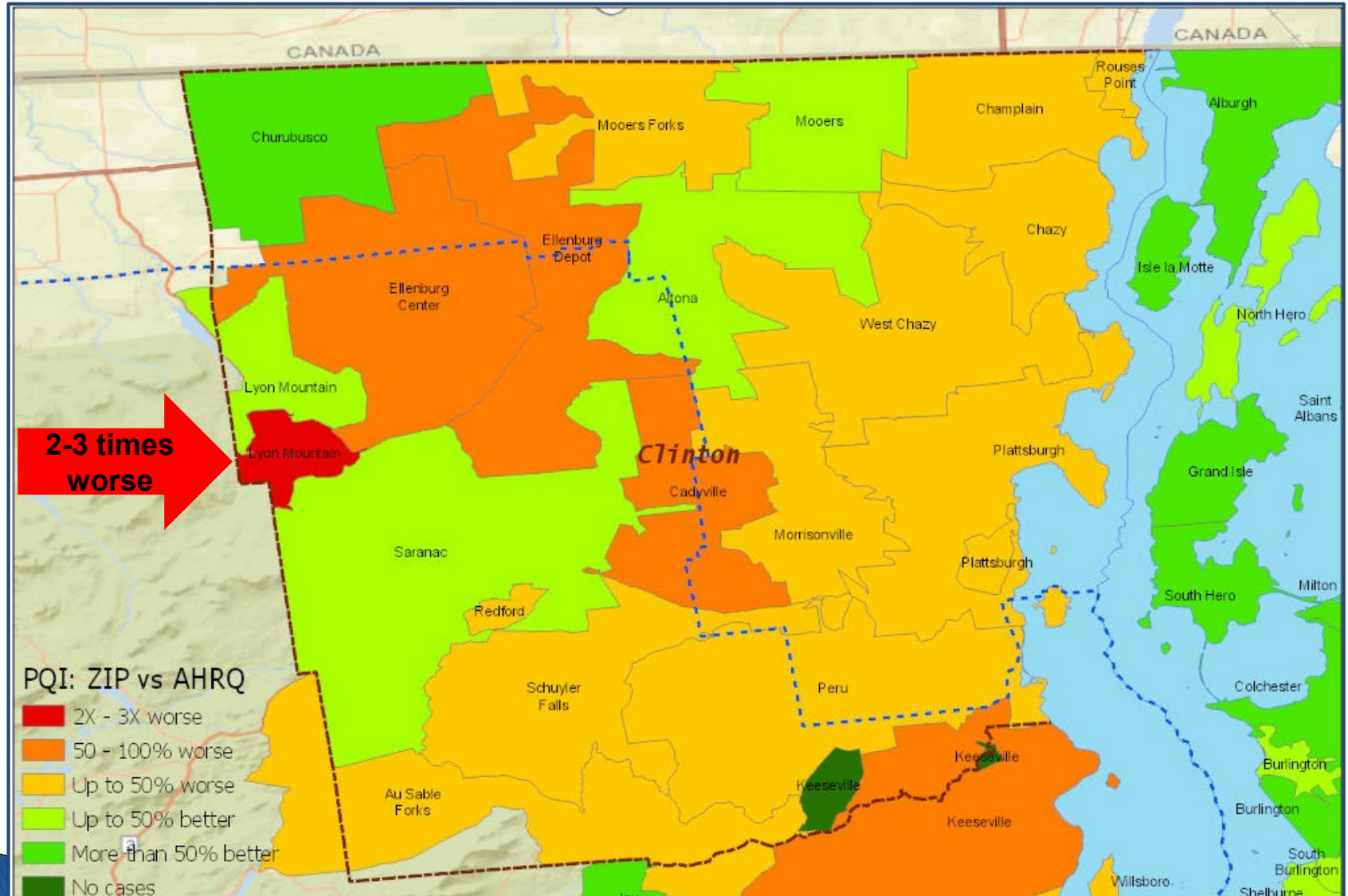
Population health and Prevention Quality Indicators (PQIs)

What are PQIs?

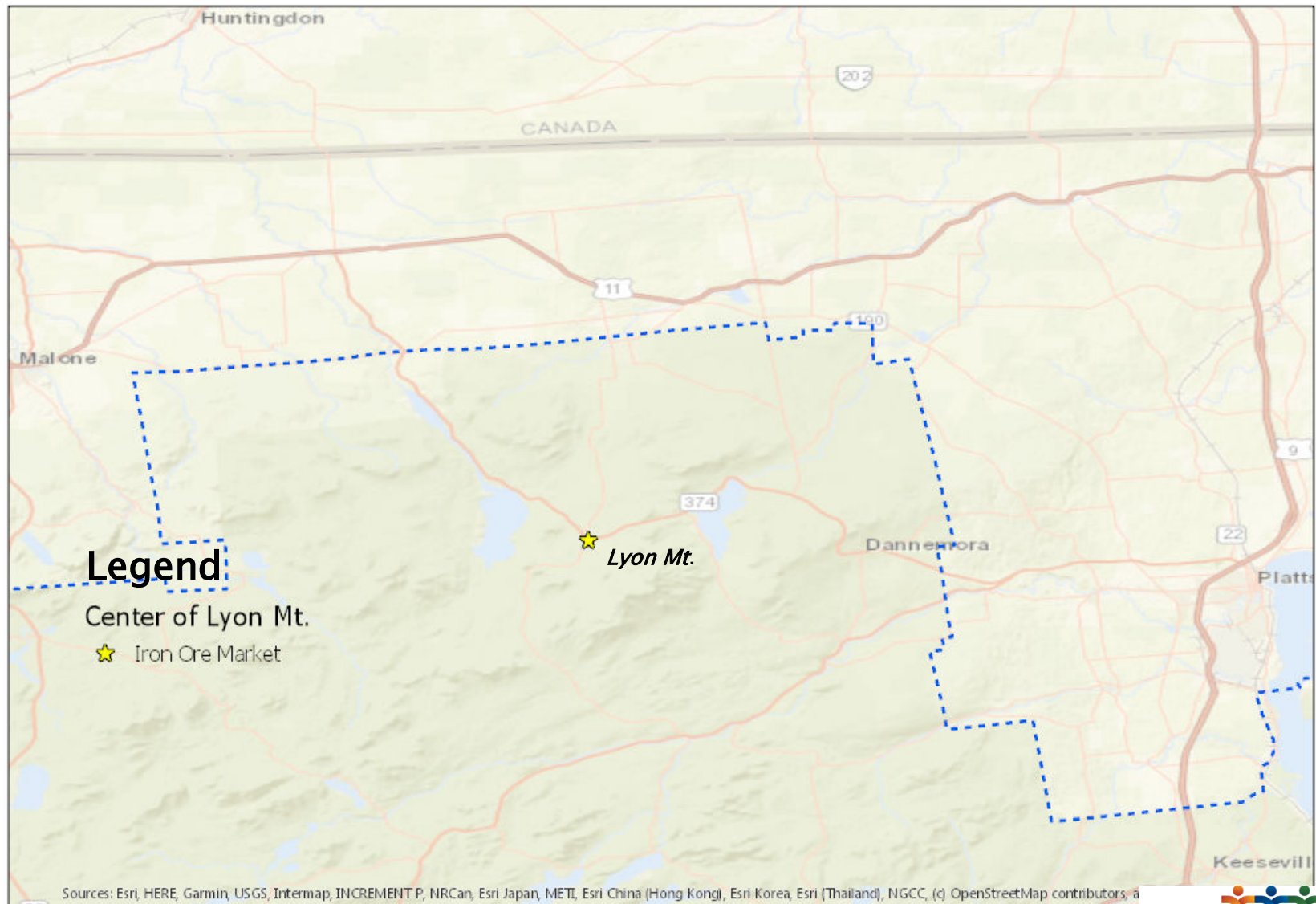
- AHRQ-defined measures that identify rates of potentially preventable inpatient admissions
- Numerators are inpatient admissions with primary diagnoses that are considered preventable
- Denominators are the population numbers from the area in which the patient lives
- An example would be: the rate per 100,000 residents of inpatient admissions where heart failure was the primary diagnosis

PQI composite in Clinton County

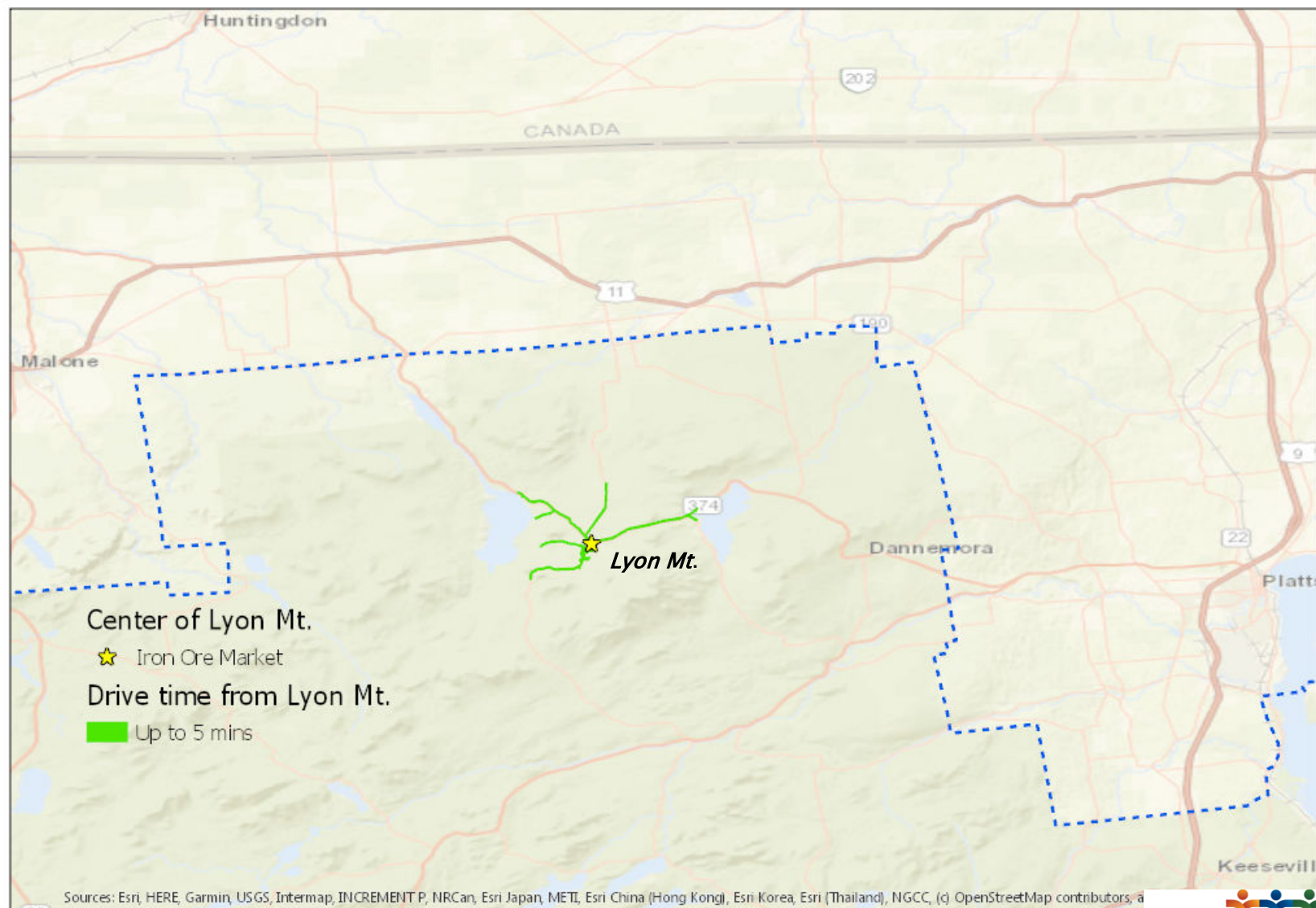
Lyon Mt. stands out



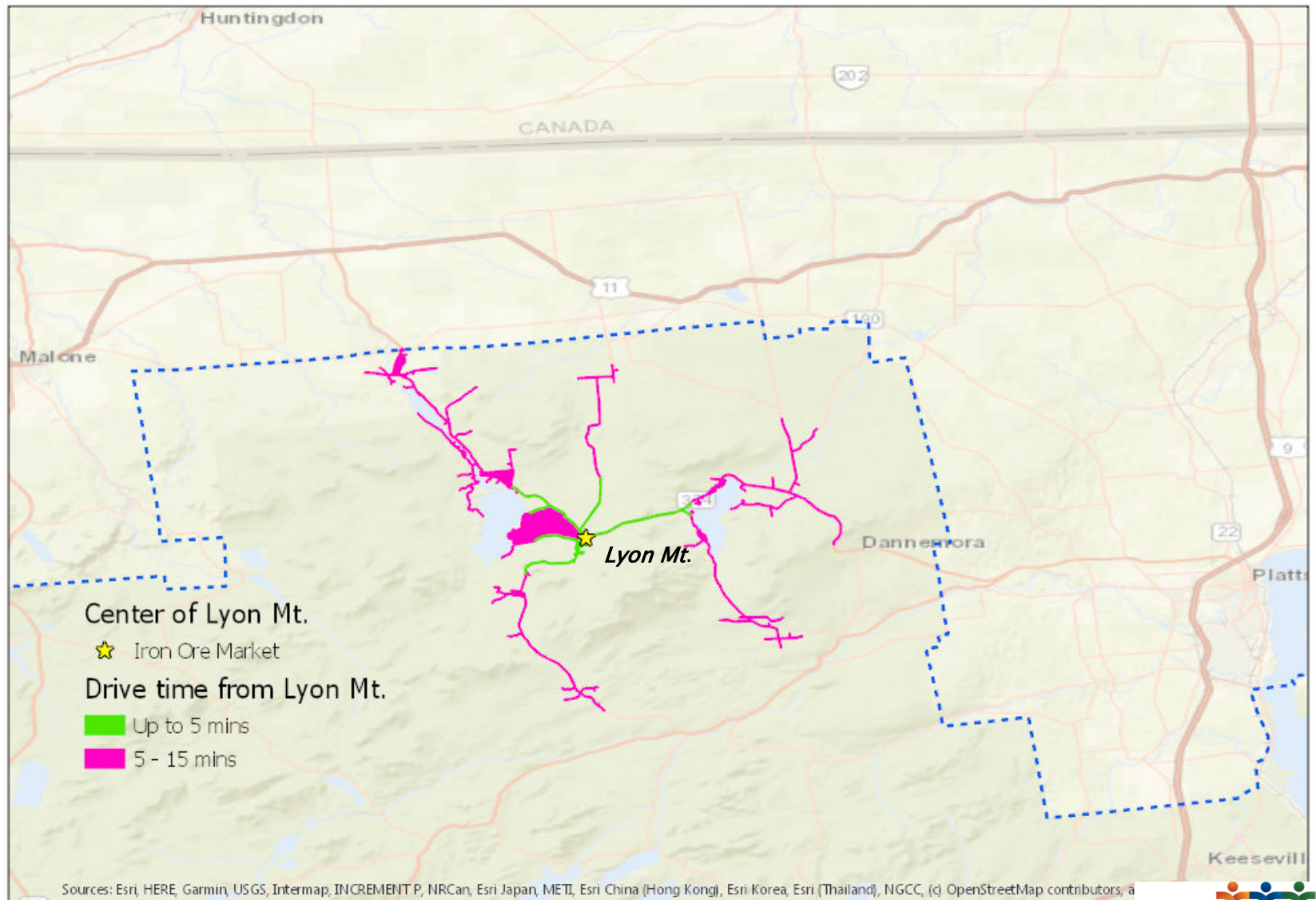
Lyon Mt. proximity to medical care and food



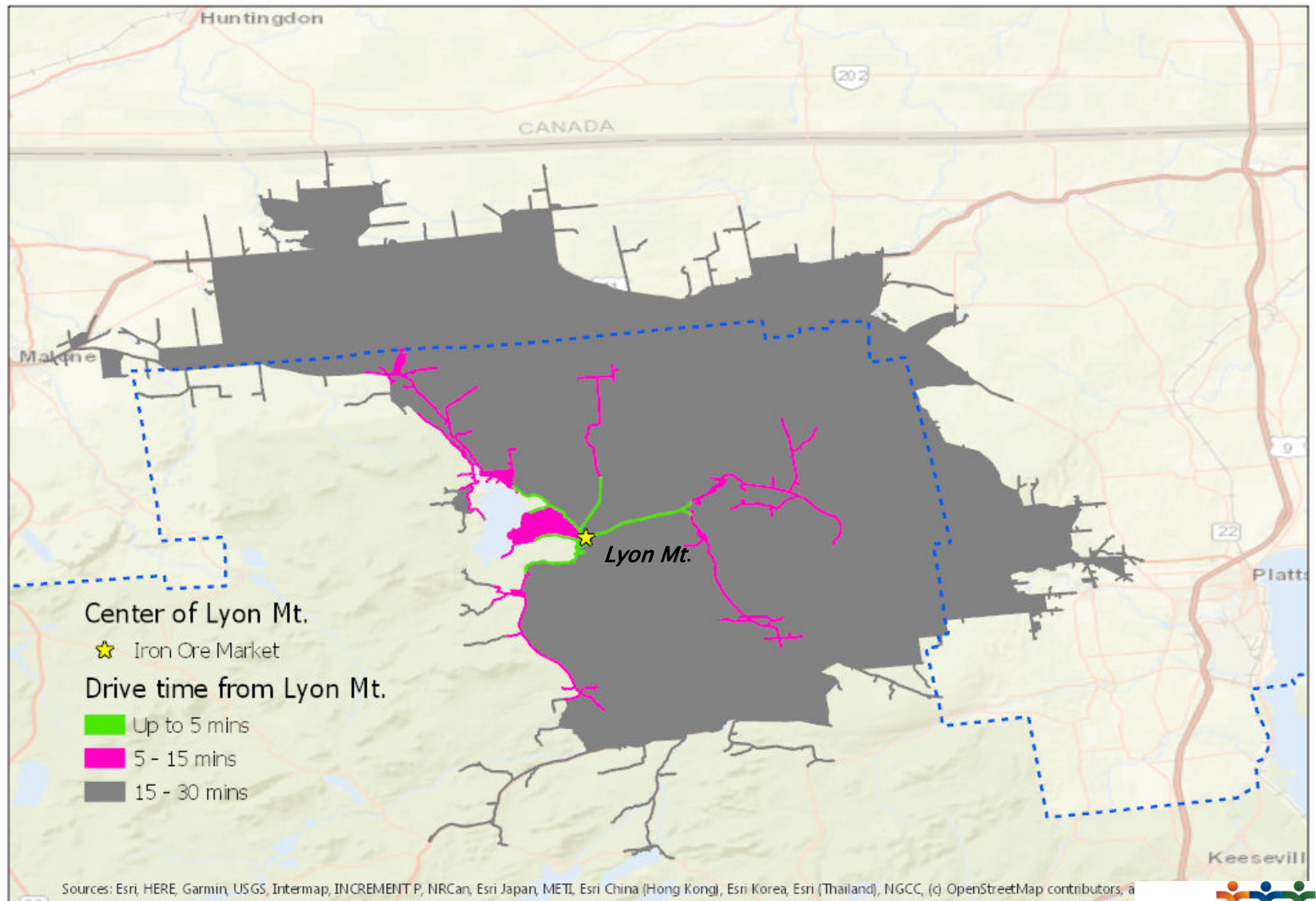
Lyon Mt. proximity to medical care and food



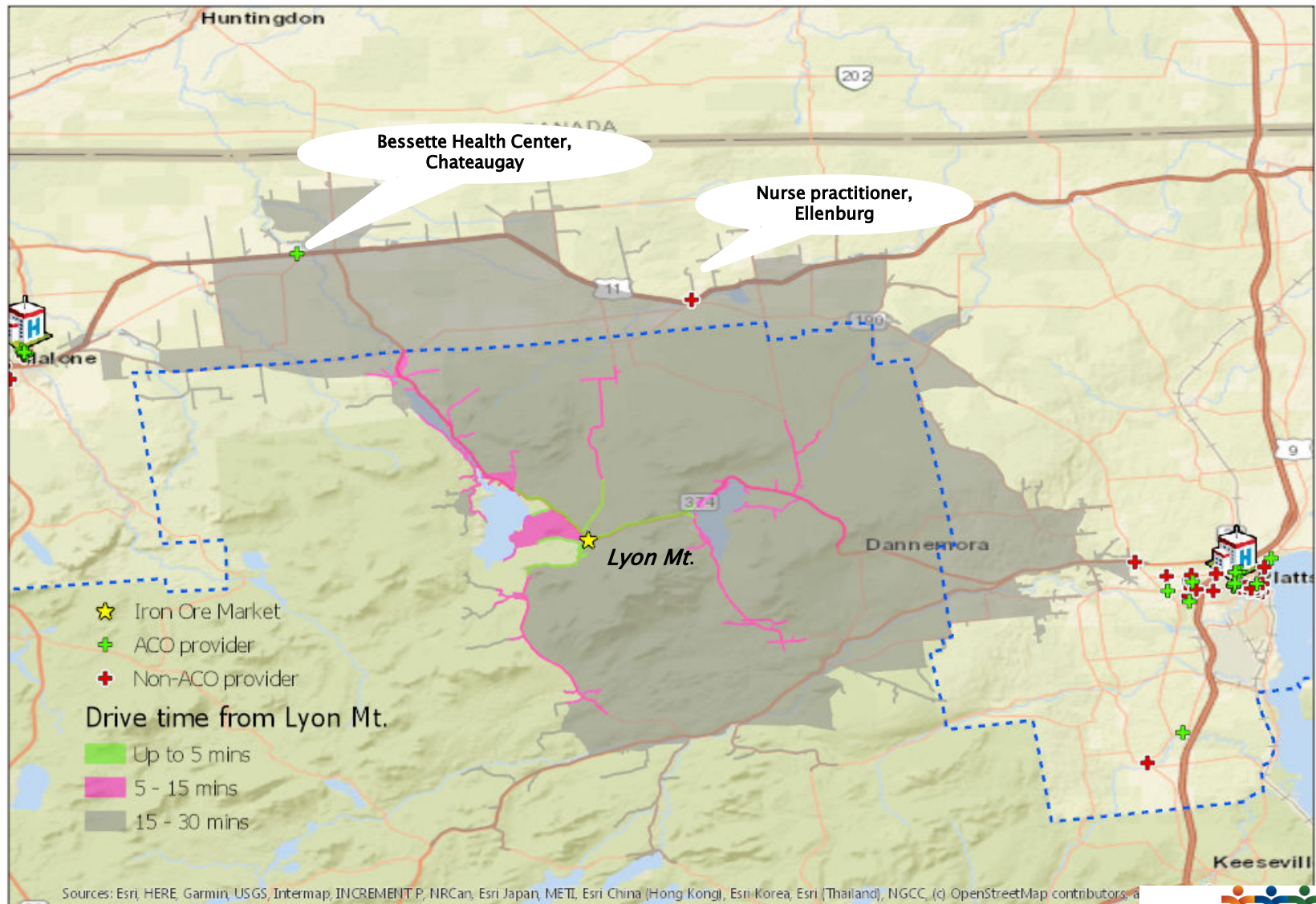
Lyon Mt. proximity to medical care and food



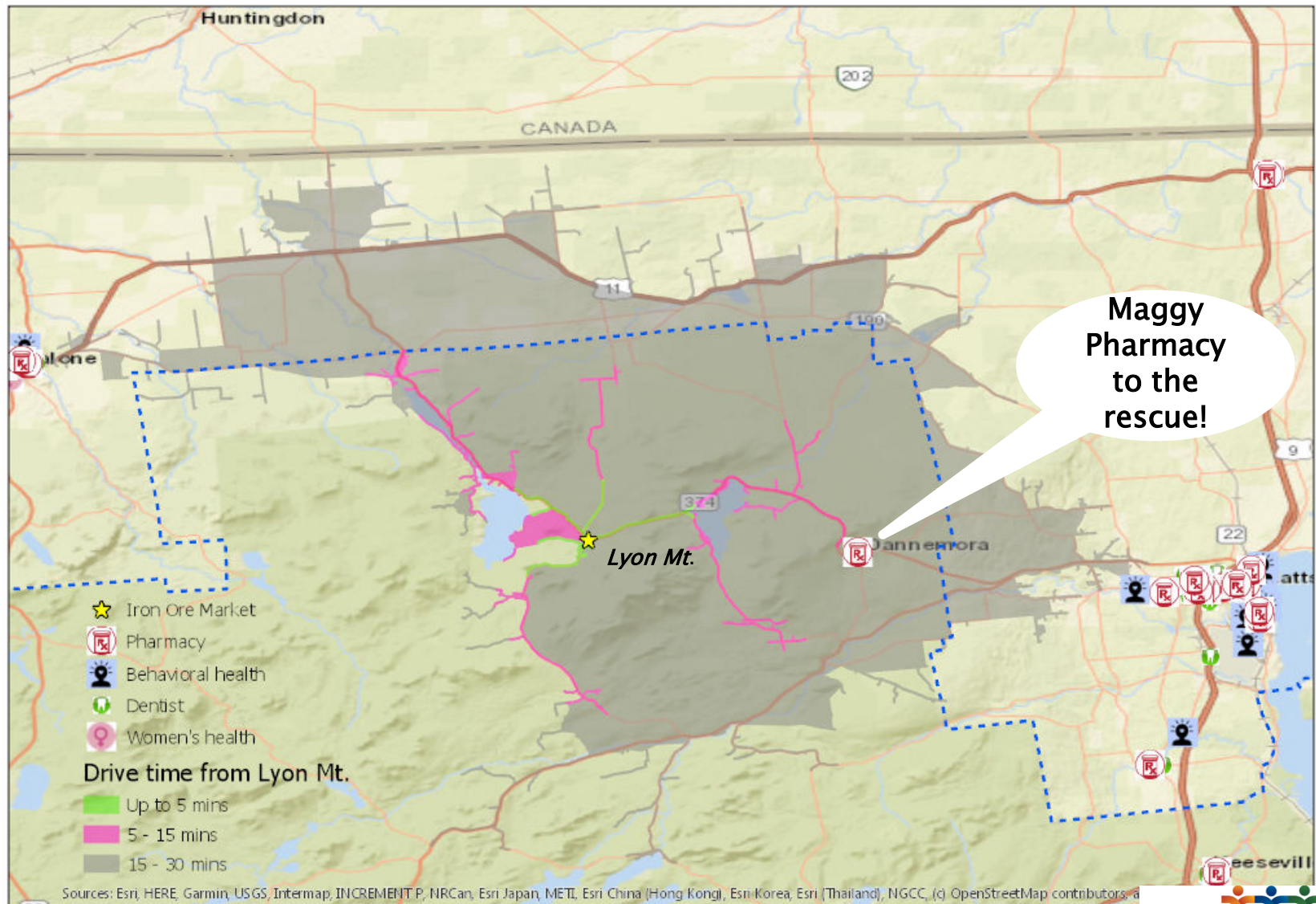
Lyon Mt. proximity to medical care and food



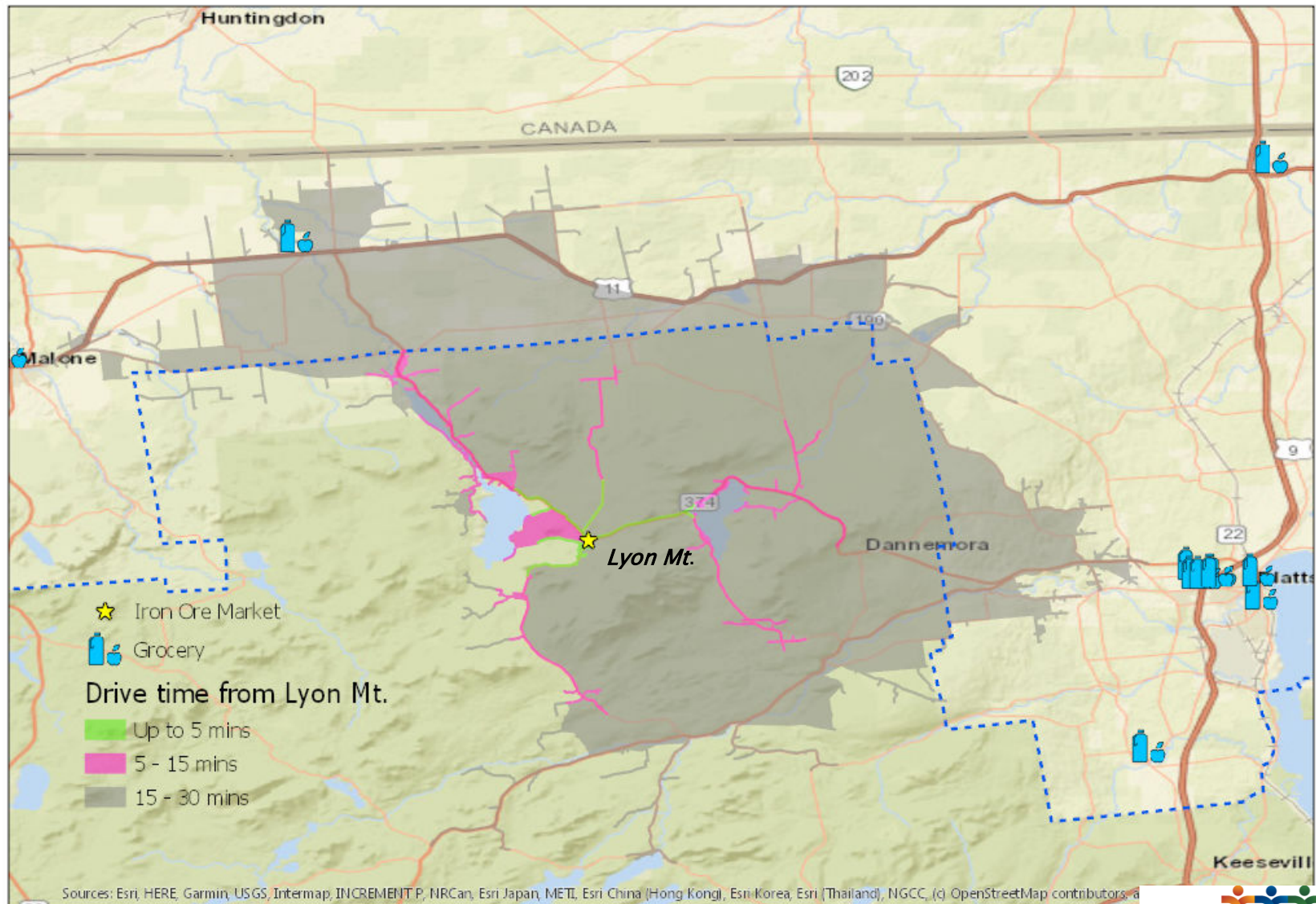
Lyon Mt. proximity to medical care and food



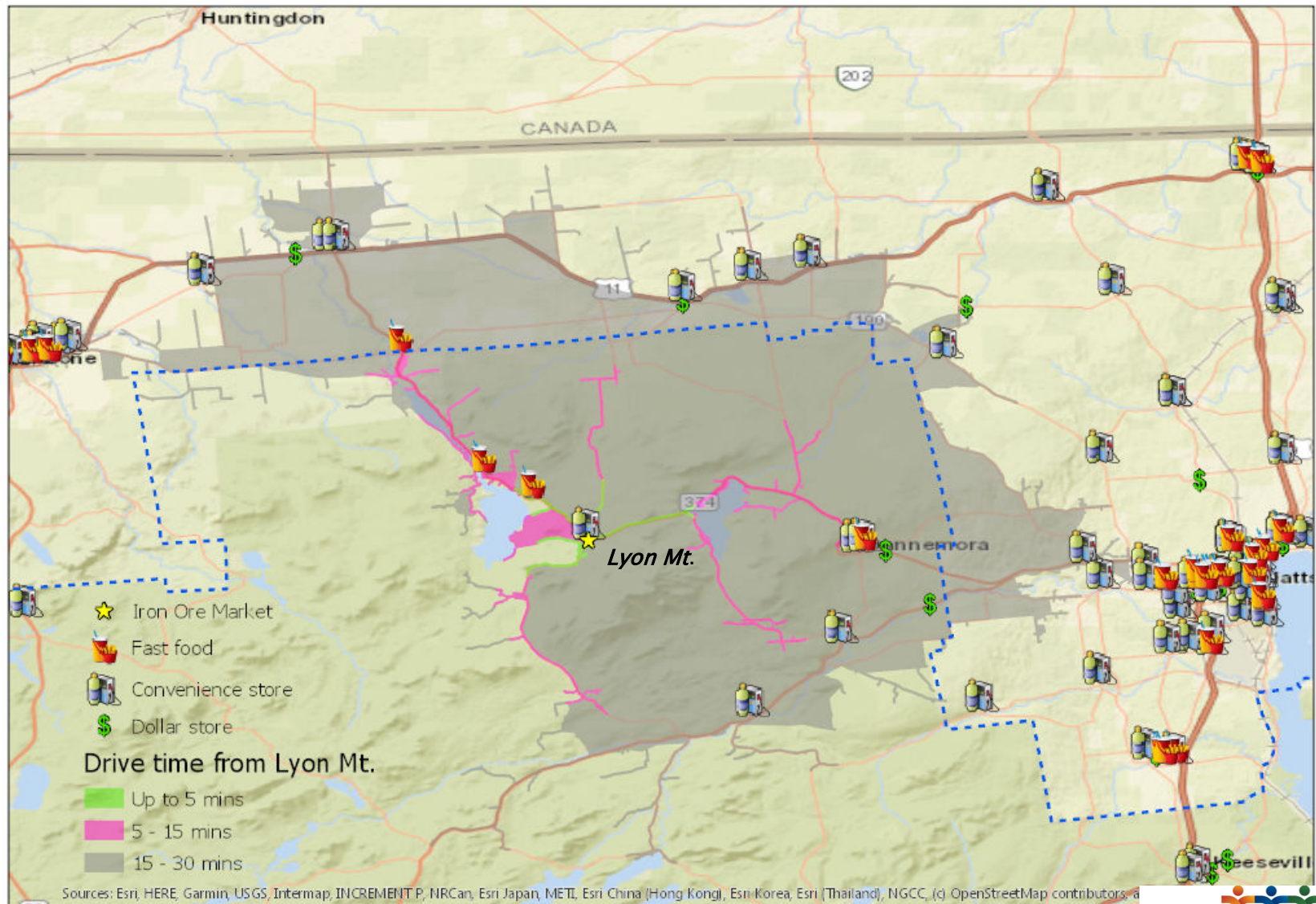
Lyon Mt. proximity to medical care and food



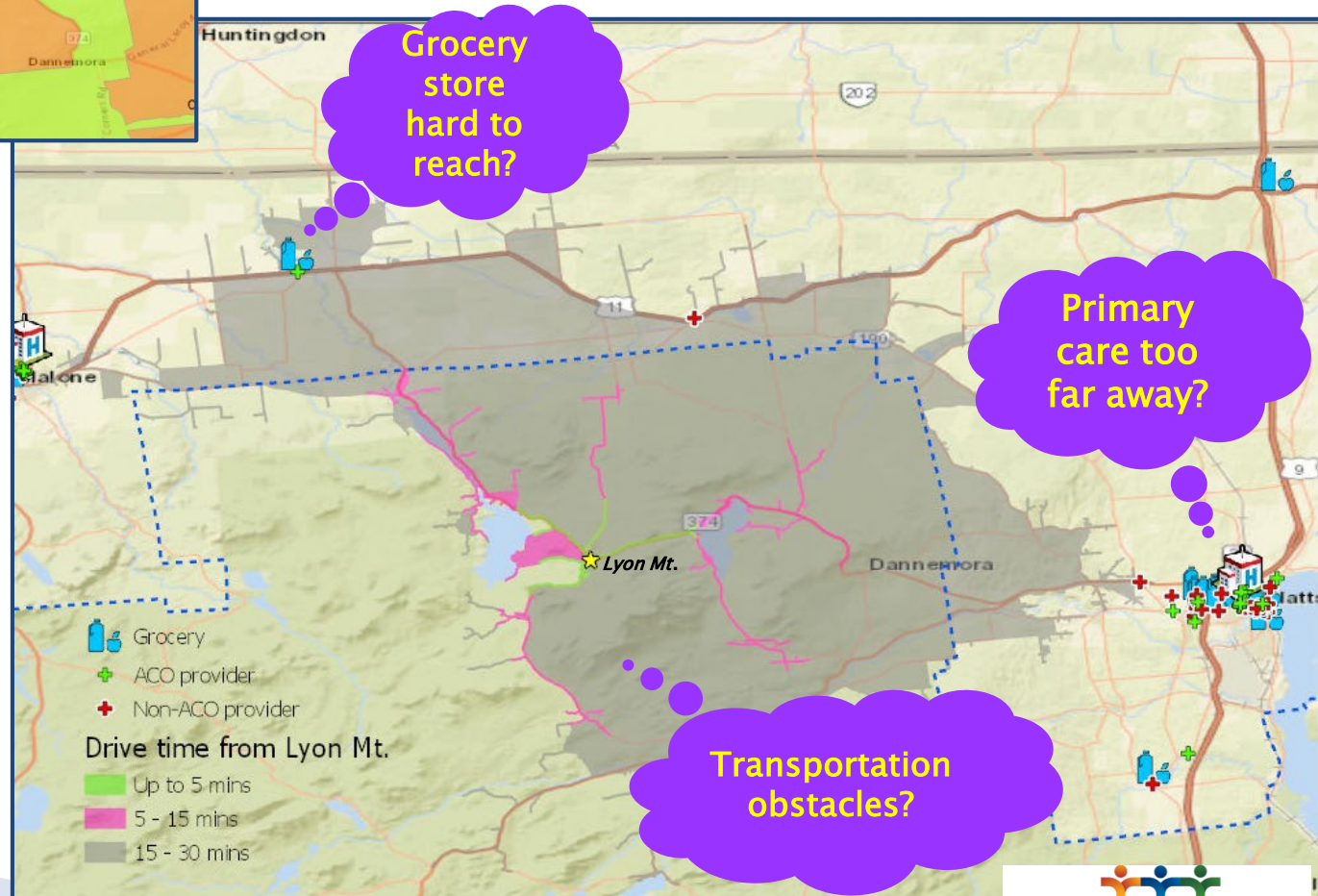
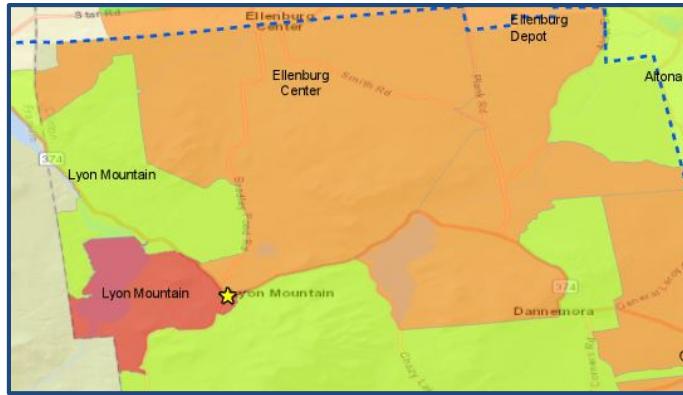
Lyon Mt. proximity to medical care and food



Lyon Mt. proximity to medical care and food



What could be happening in Lyon Mt?



What else is happening in Lyon Mt?

Compared to Clinton County as a whole, Lyon Mt. ...

Is older

Median age = 59 years (vs. 40 years in Clinton County)

38% are 65 years and older (vs. 14%)

69 elderly for every 100 working-age residents (vs. 21)

Is less educated

66% did not attend college (vs. 47%)

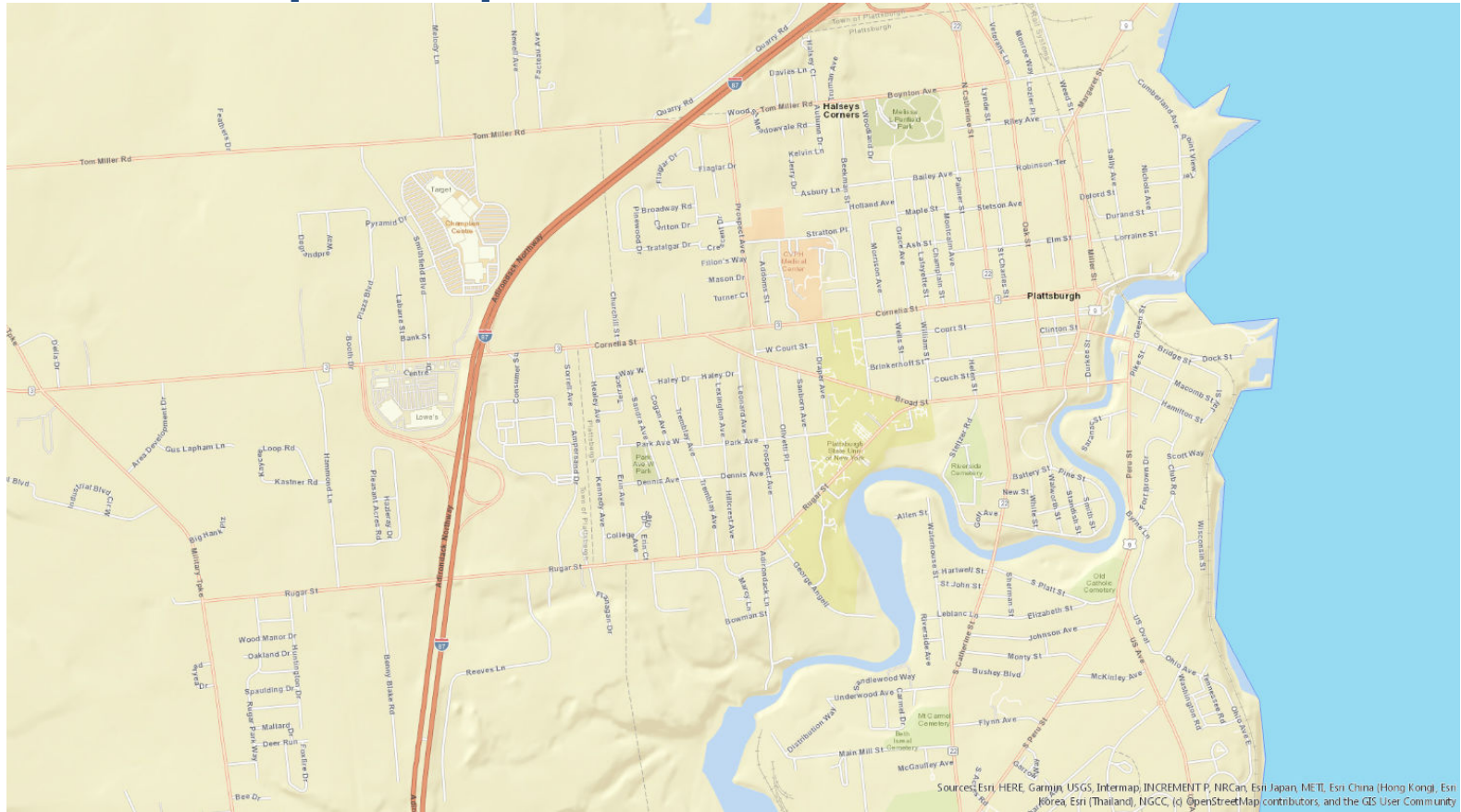
Has more people living in poverty

19% of adults (vs. 14%)

Use case #3

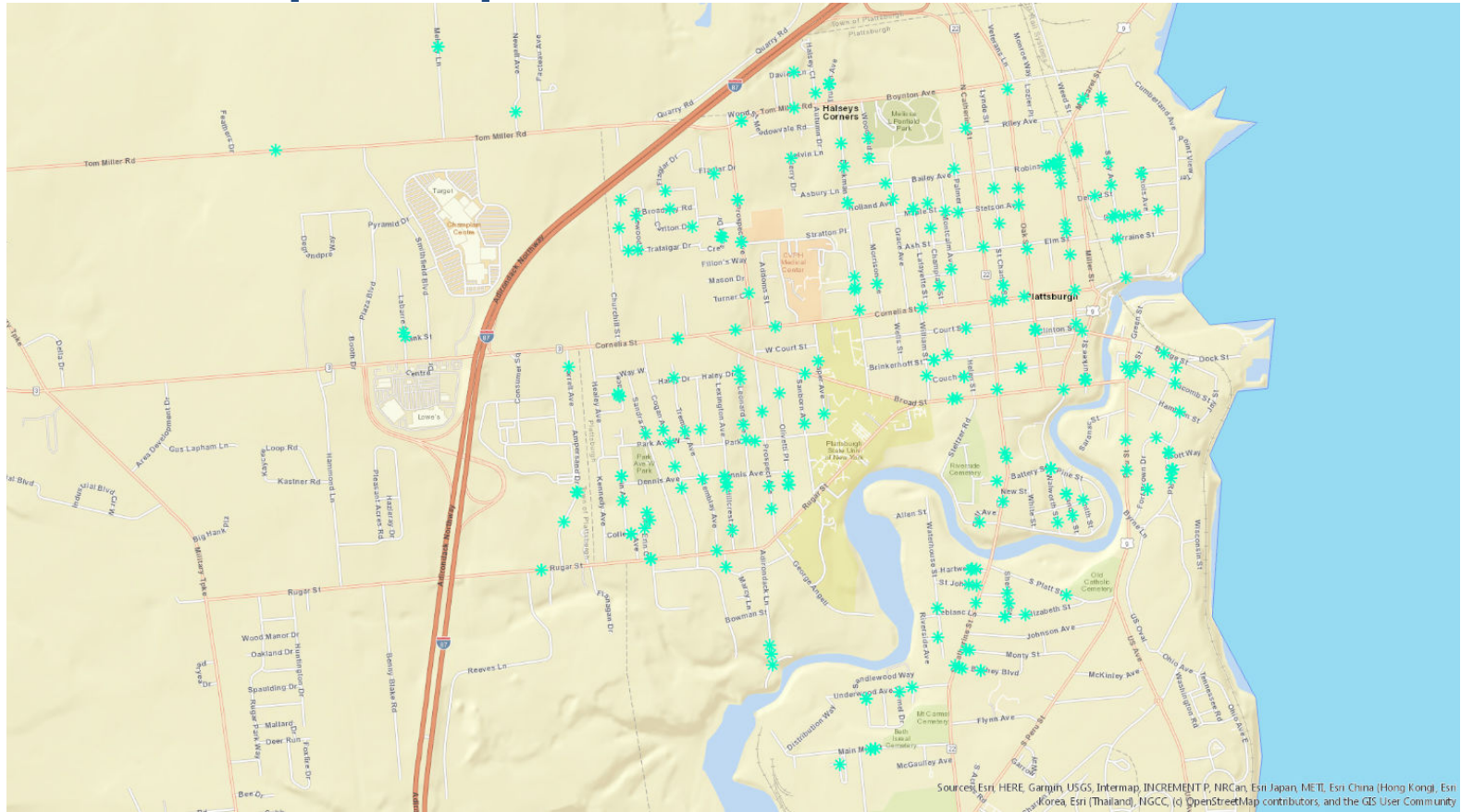
Medicare Annual Wellness Visits in Plattsburgh:
Can a map – or the bus – help?

Can a map help increase Medicare AWWs?



Downtown Plattsburgh

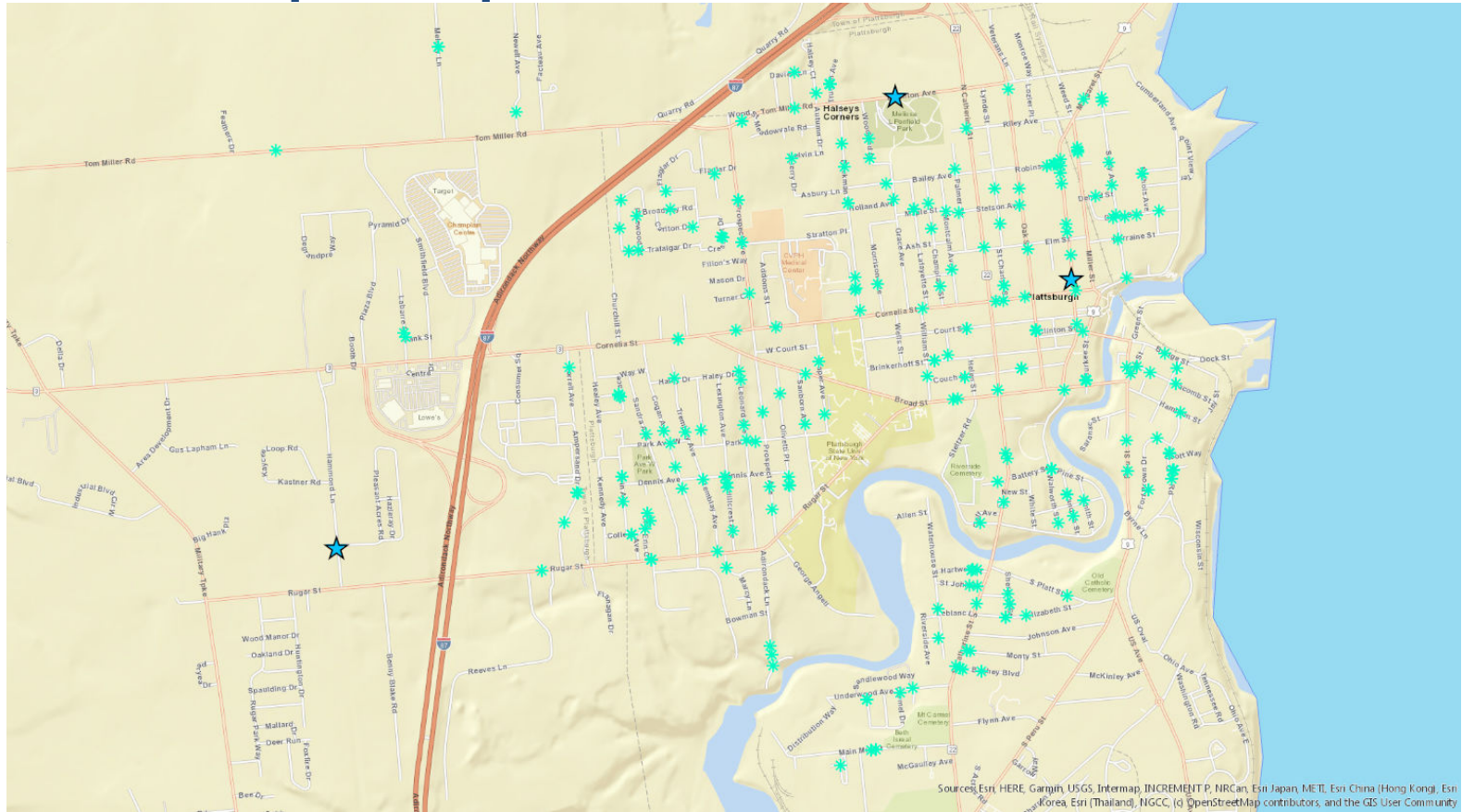
Can a map help increase Medicare AWWs?



Asterisks denote Medicare beneficiaries with no annual wellness visit this year

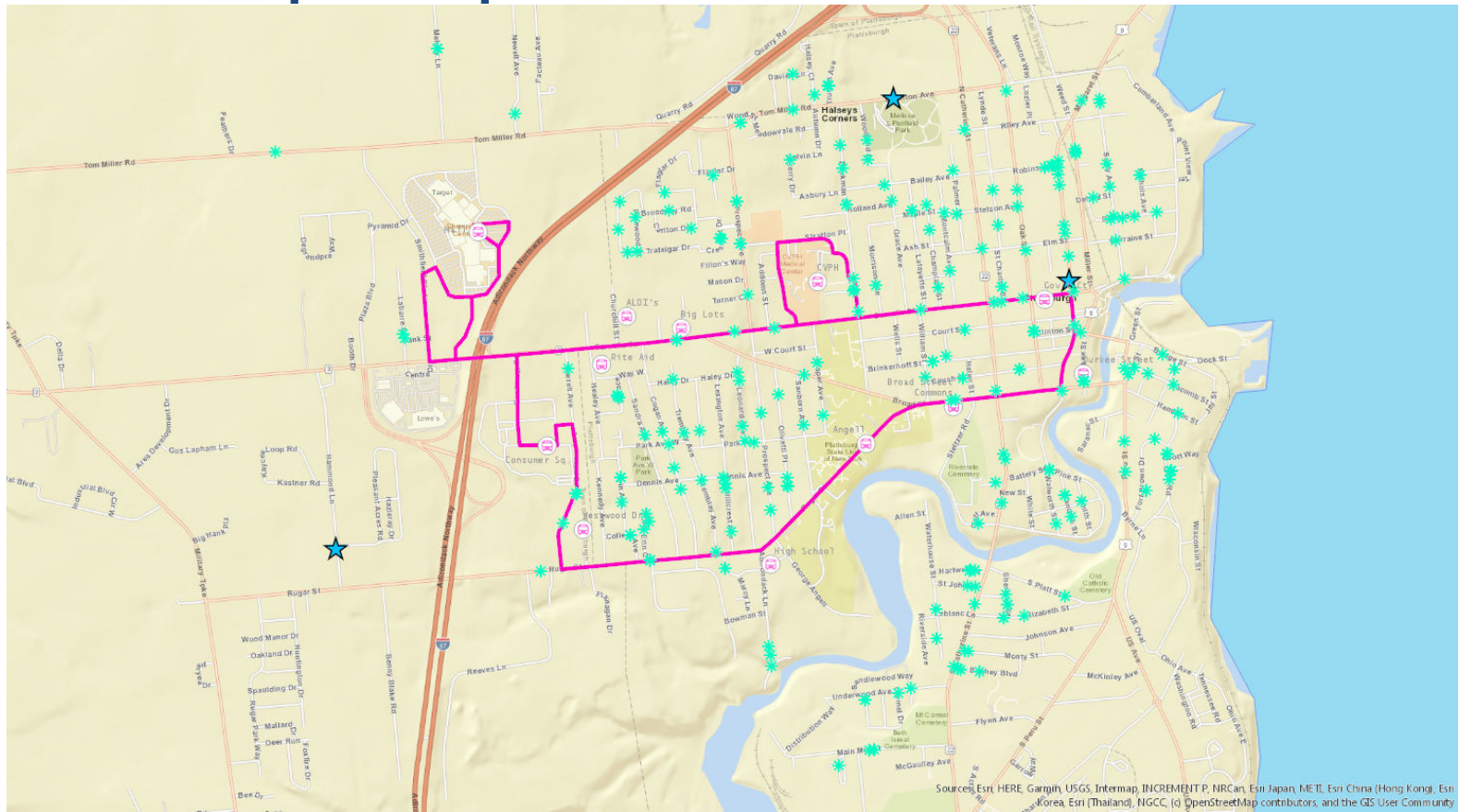
Beneficiaries shown here are attributed to providers at one of three Plattsburgh practices

Can a map help increase Medicare AWWs?



Stars show attributed provider locations

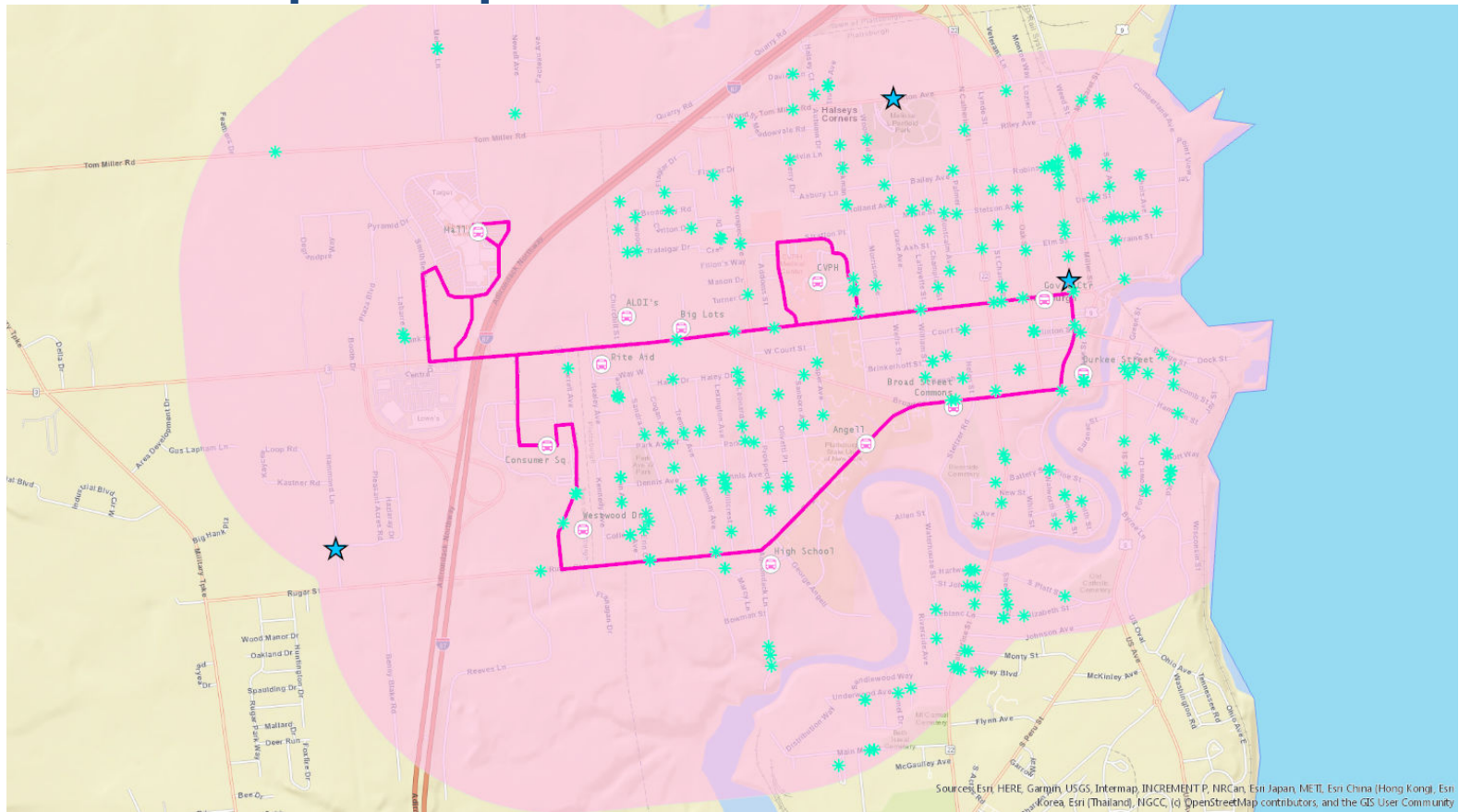
Can a map help increase Medicare AWWs?



Pink represents Clinton County Public Transit bus route and stops

- Some individuals live near a bus stop
- One of the practices is right at a stop
- But most patients – and two providers – aren't near one

Can a map help increase Medicare AWWs?



Pink cloud symbolizes deviation zone for bus route

Given 24 hours notice, the CCPT bus driver will deviate from the route to pick up or drop off passengers within this zone

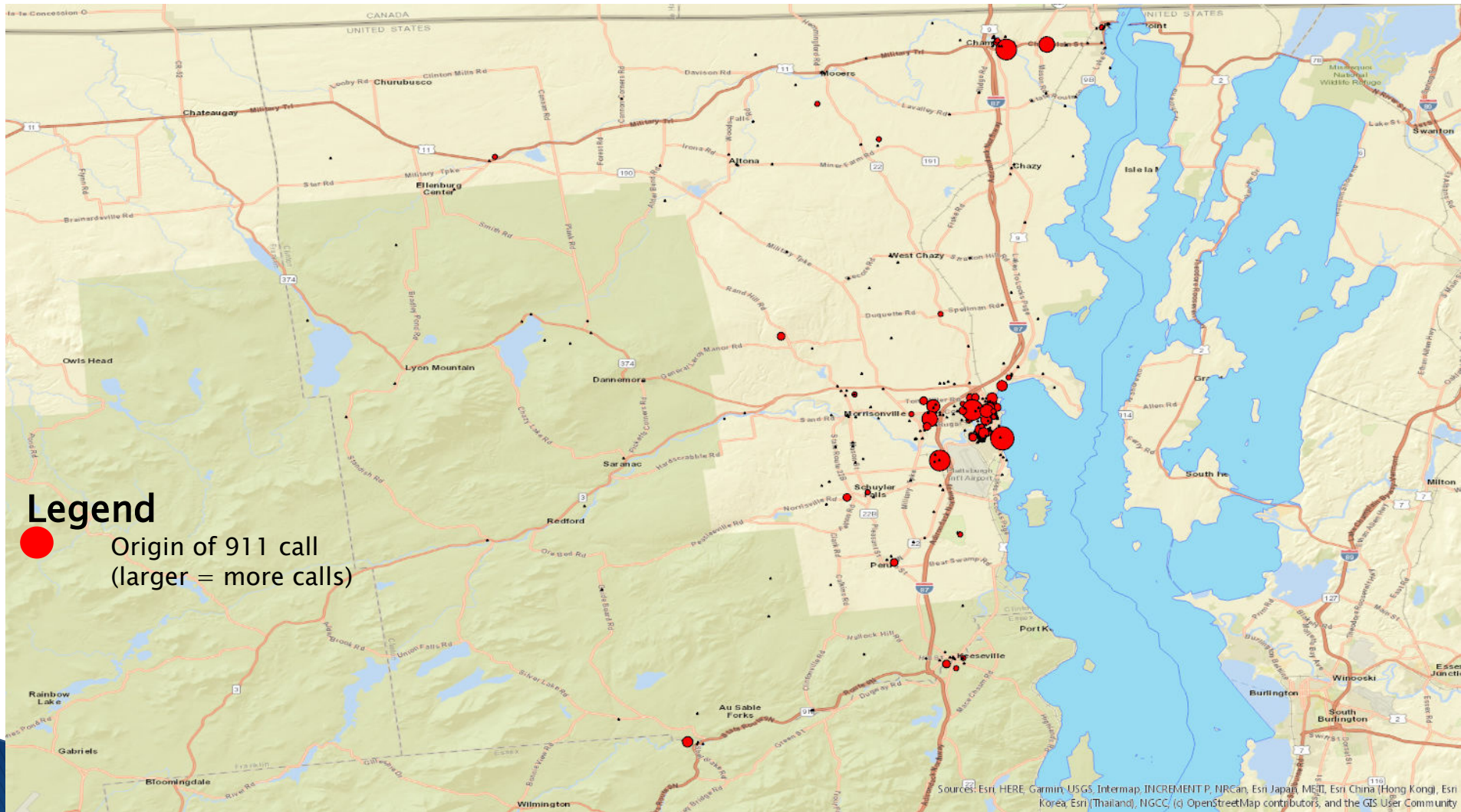
Public transportation is here to help!

- ▶ Each county bus line has deviation zones
- ▶ GIS allows us to show providers how far their patients live from the practice
- ▶ We can combine addresses with deviation zones to create a work list for practices
 - Who needs an appointment?
 - Do distance and transportation present obstacles?
 - Are home and provider office within deviation zone?
 - Are patients aware of the zone?
 - Could hand out bus schedules

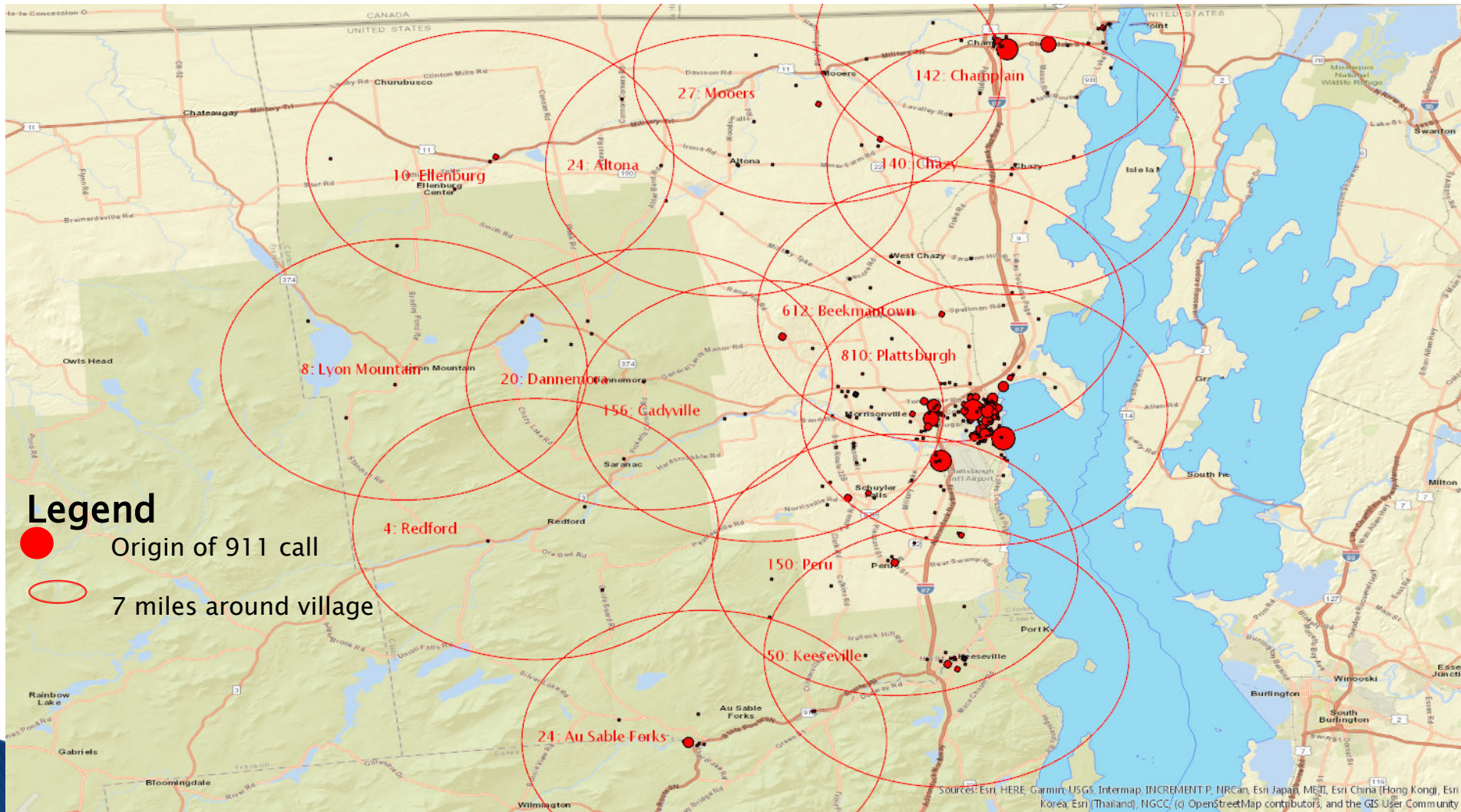
Use case #4

Where are CVPH 911
calls coming from?

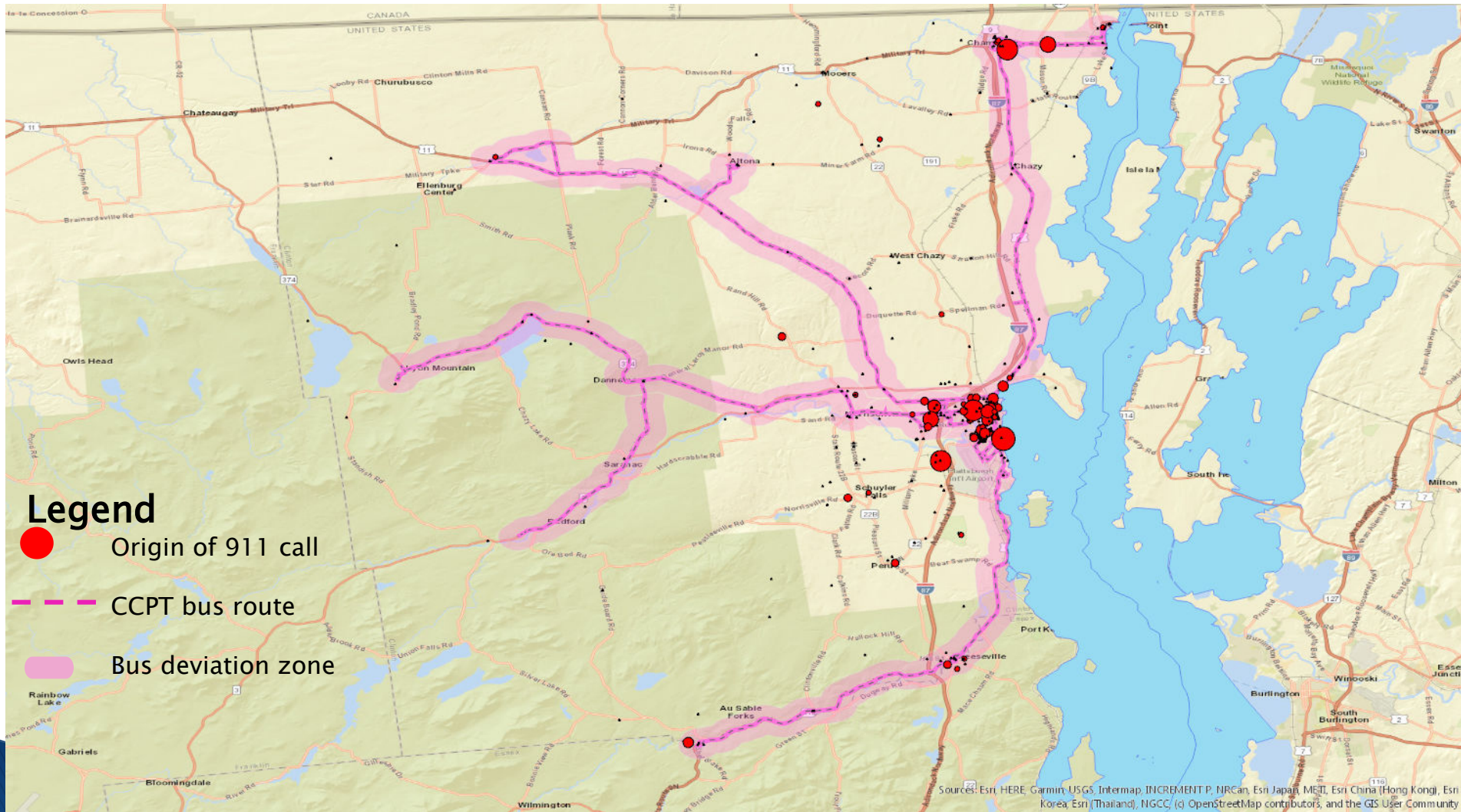
Non-emergent CVPH ambulance calls



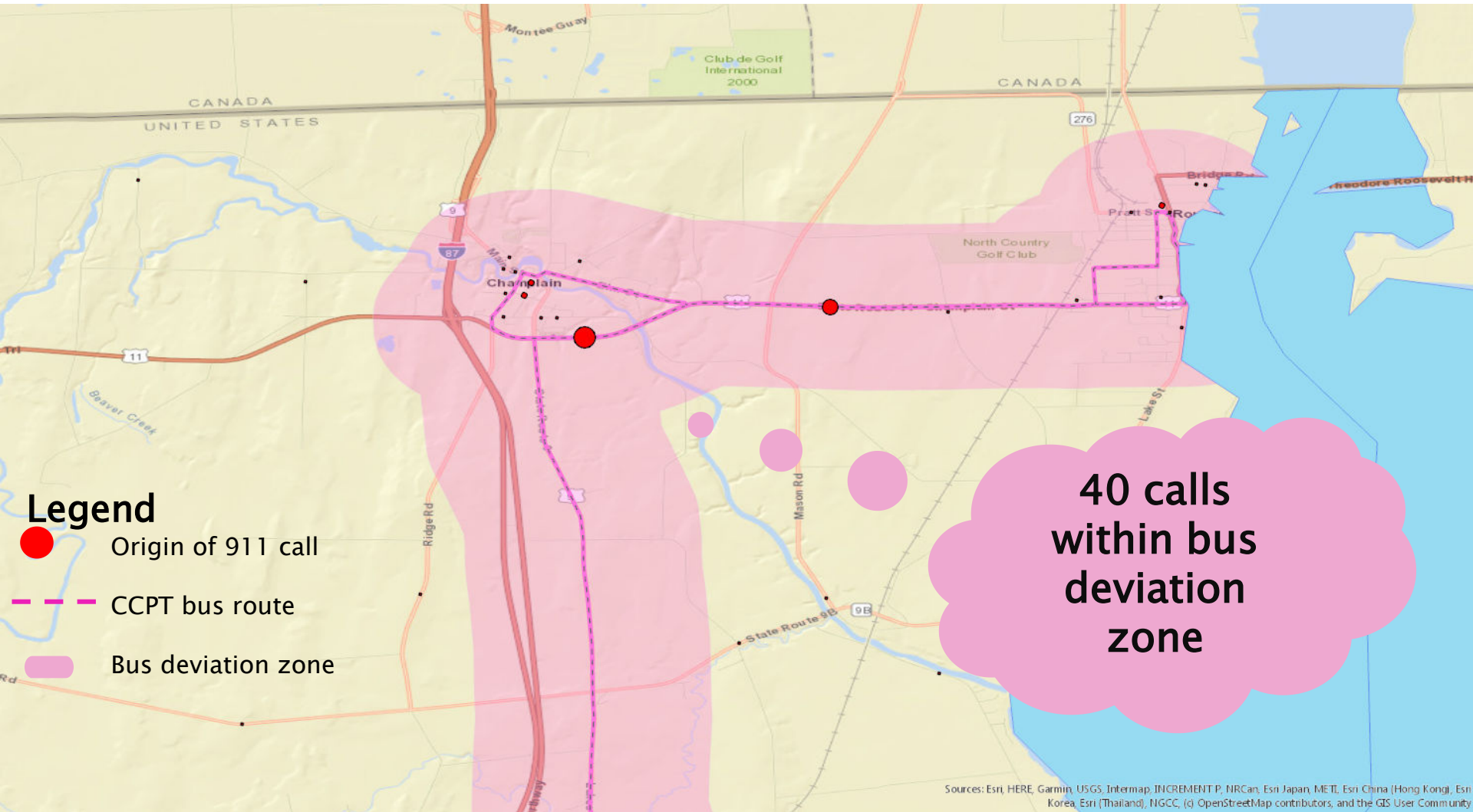
Non-emergent CVPH ambulance calls



Non-emergent CVPH ambulance calls: Could the bus help?



Non-emergent CVPH ambulance calls: Could the bus help in Champlain?



Interactive maps on the web

- *Healthy ADK*

- Just had an upgrade!
- Loads of maps you can build with regional data

- *NYS DOH Community Health Indicator maps*

- Easy to use, general maps
- https://webbi1.health.ny.gov/SASStoredProcess/guest?_program=/EBI/PHIG/apps/chir_dashboard/chir_dashboard&p=np&ind_id=Ng96

- *USDA Food Environment Atlas*

- Very cool: shows % change in several SDoH markers (e.g. farm markets, fast food)
- <https://www.ers.usda.gov/data-products/food-environment-atlas/go-to-the-atlas/>

Thank you!

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Questions?

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