

Place matters for injury prevention and trauma care

Charles Branas

Gelman Professor and Chair, Department of Epidemiology
Columbia University, Mailman School of Public Health

c.branas@columbia.edu



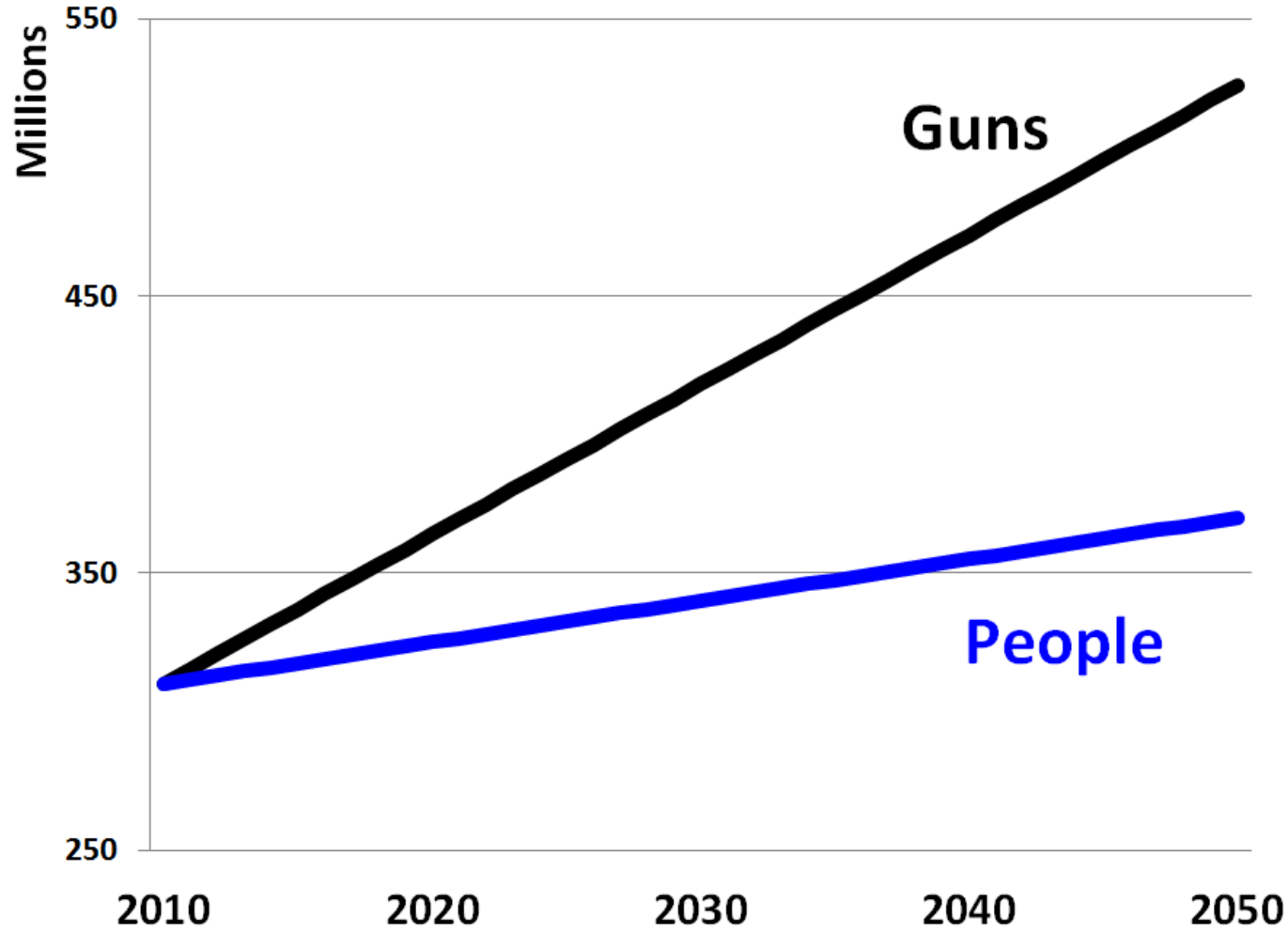
Urban
Health
Lab.org

US Births and Deaths in 2010

- About 310 million people
- About 4 million people born
- About 2.5 million people died

- About 310 million civilian firearms
- About 5.5 million guns born
- About 100,000 guns died

One gun per person in the US, and growing



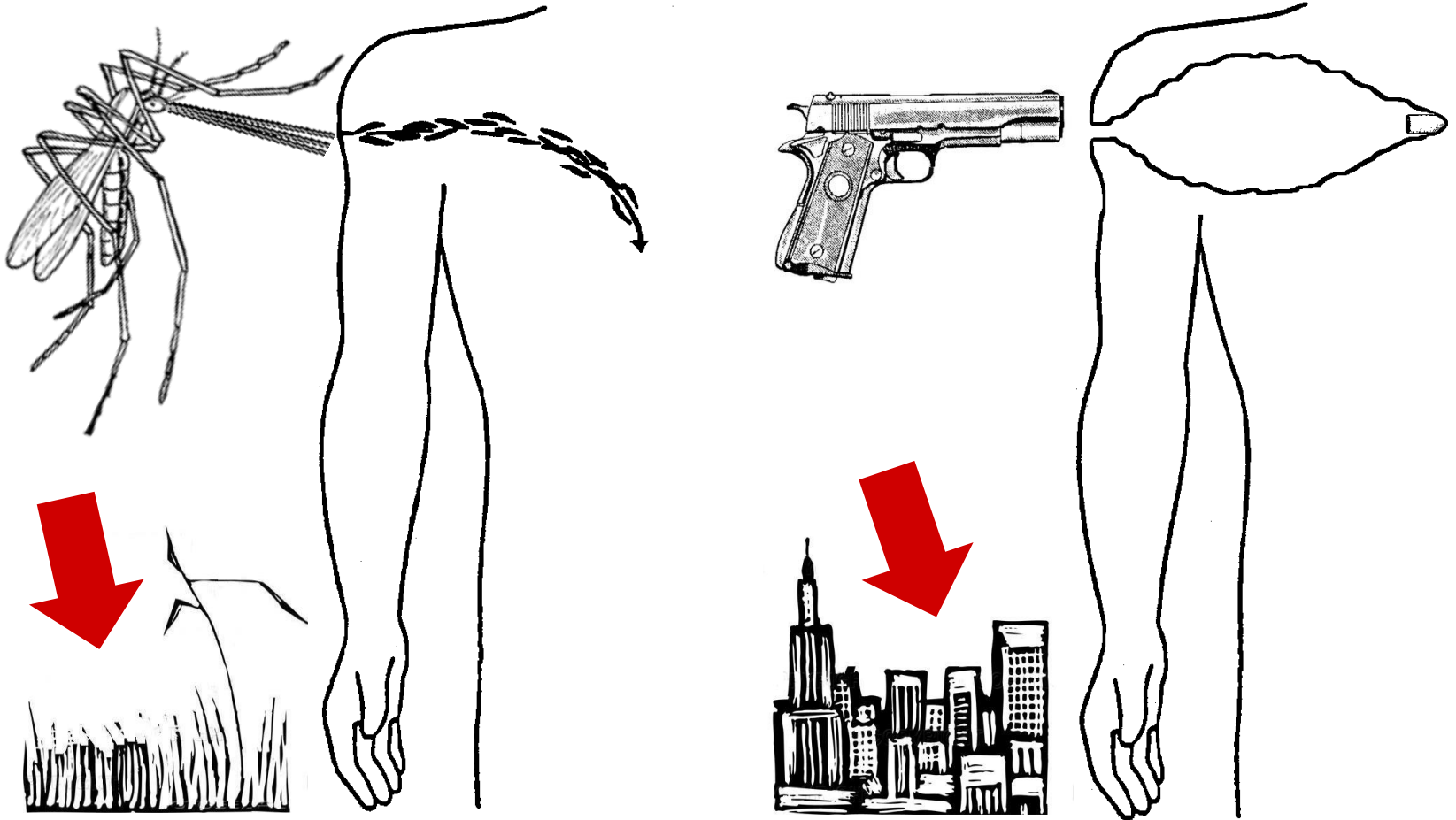
Got any better ideas?



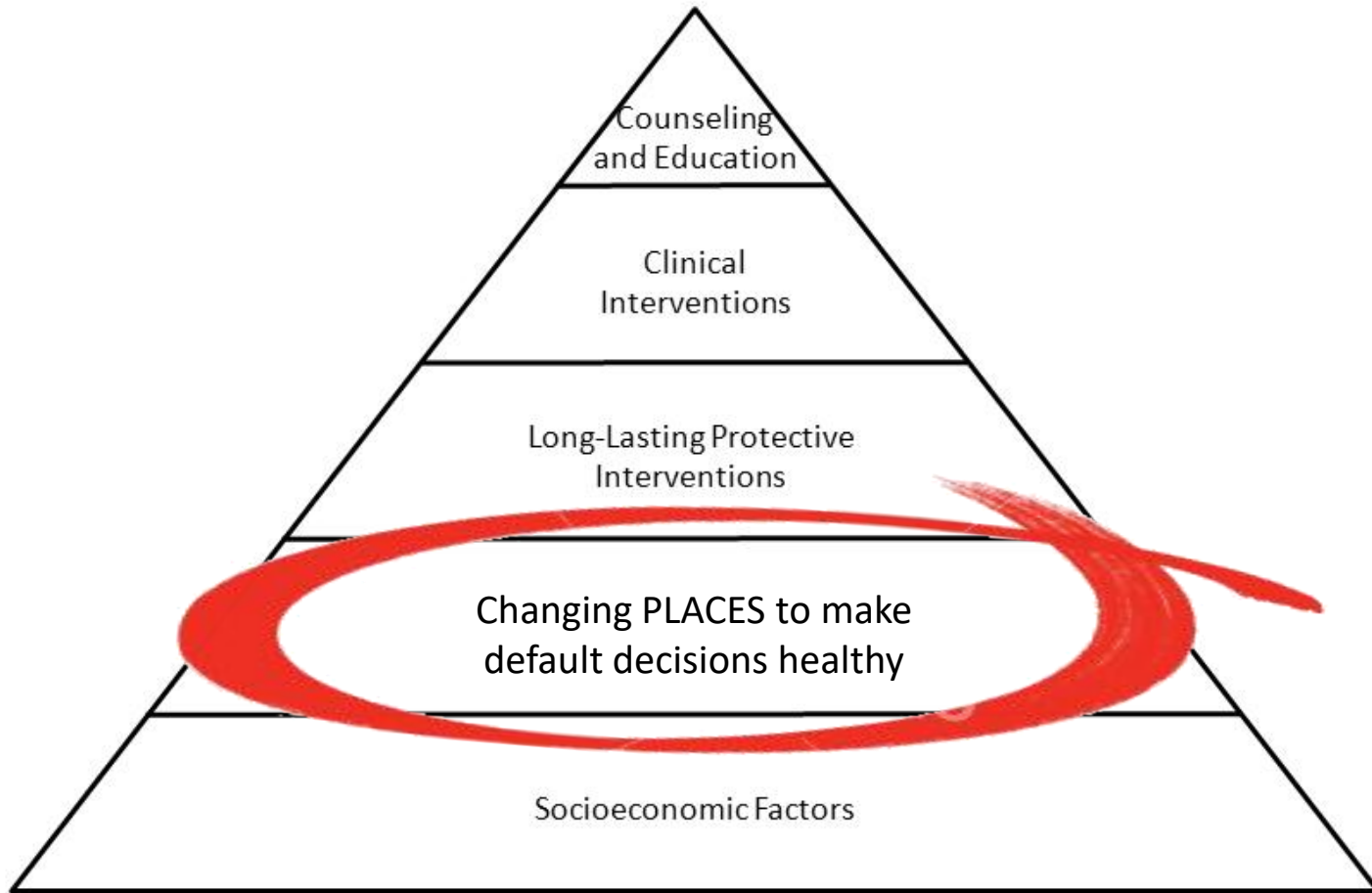
**Urban
Health
Lab.org**

People, Pathogens, Places

“If a brackish tidal pool is breeding mosquitoes ... filling it in may be far more likely to continue reducing malaria years after funding has run out ... than expecting local community members to continue regular applications of larvicide.”

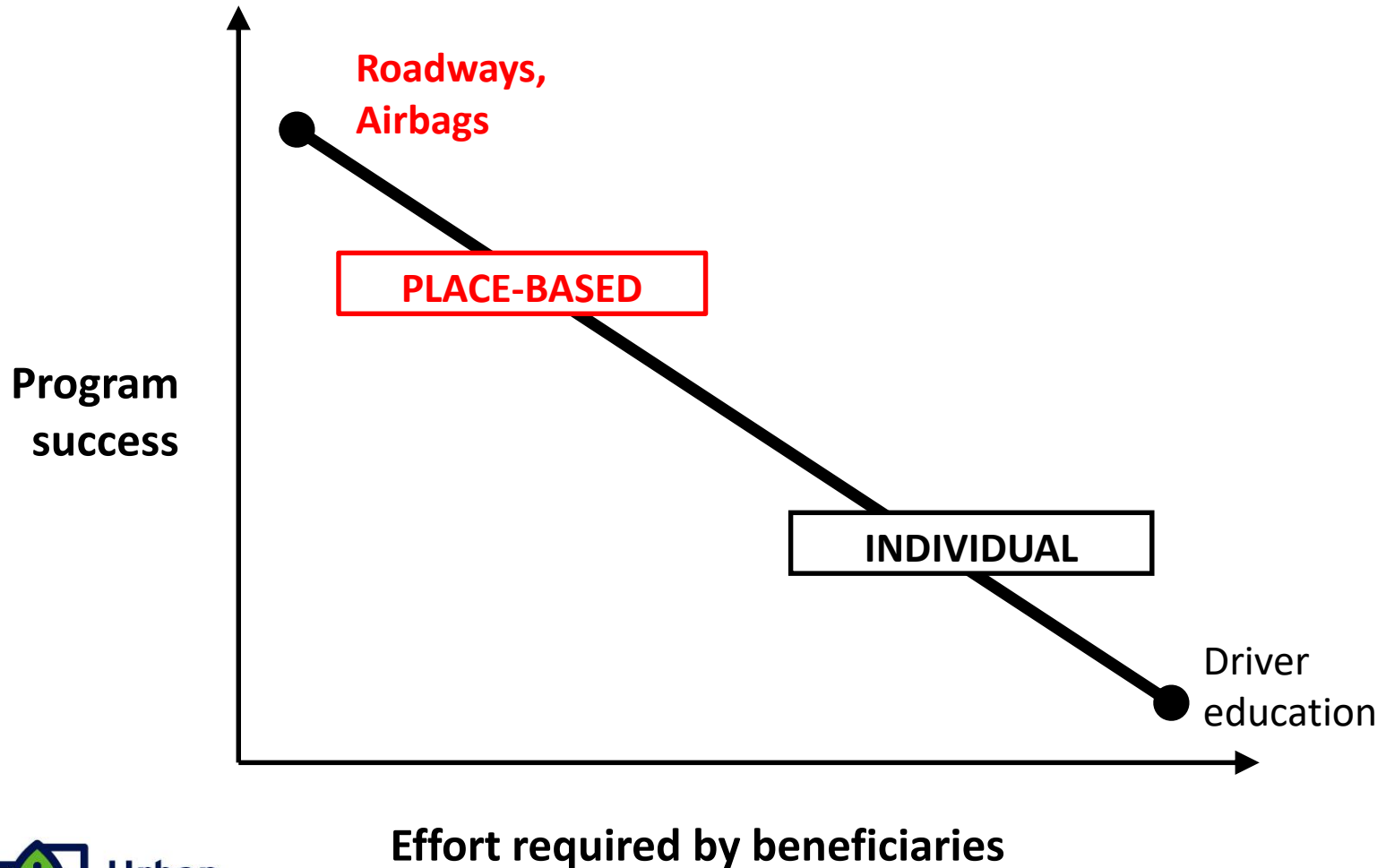


Changing Places affects “More People for Longer Periods of Time”



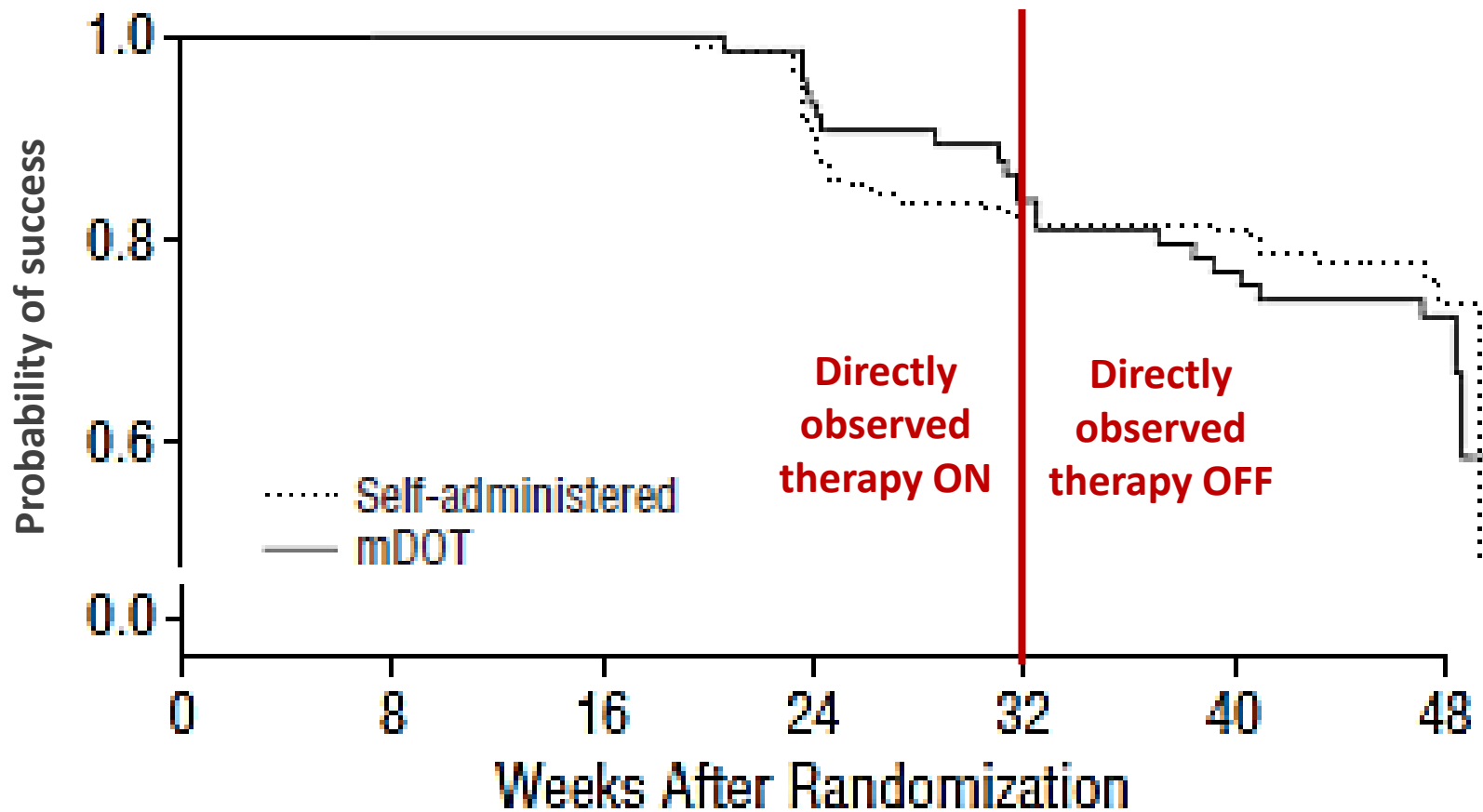
Changing Places

“Makes the Healthy Choice the Easy Choice”

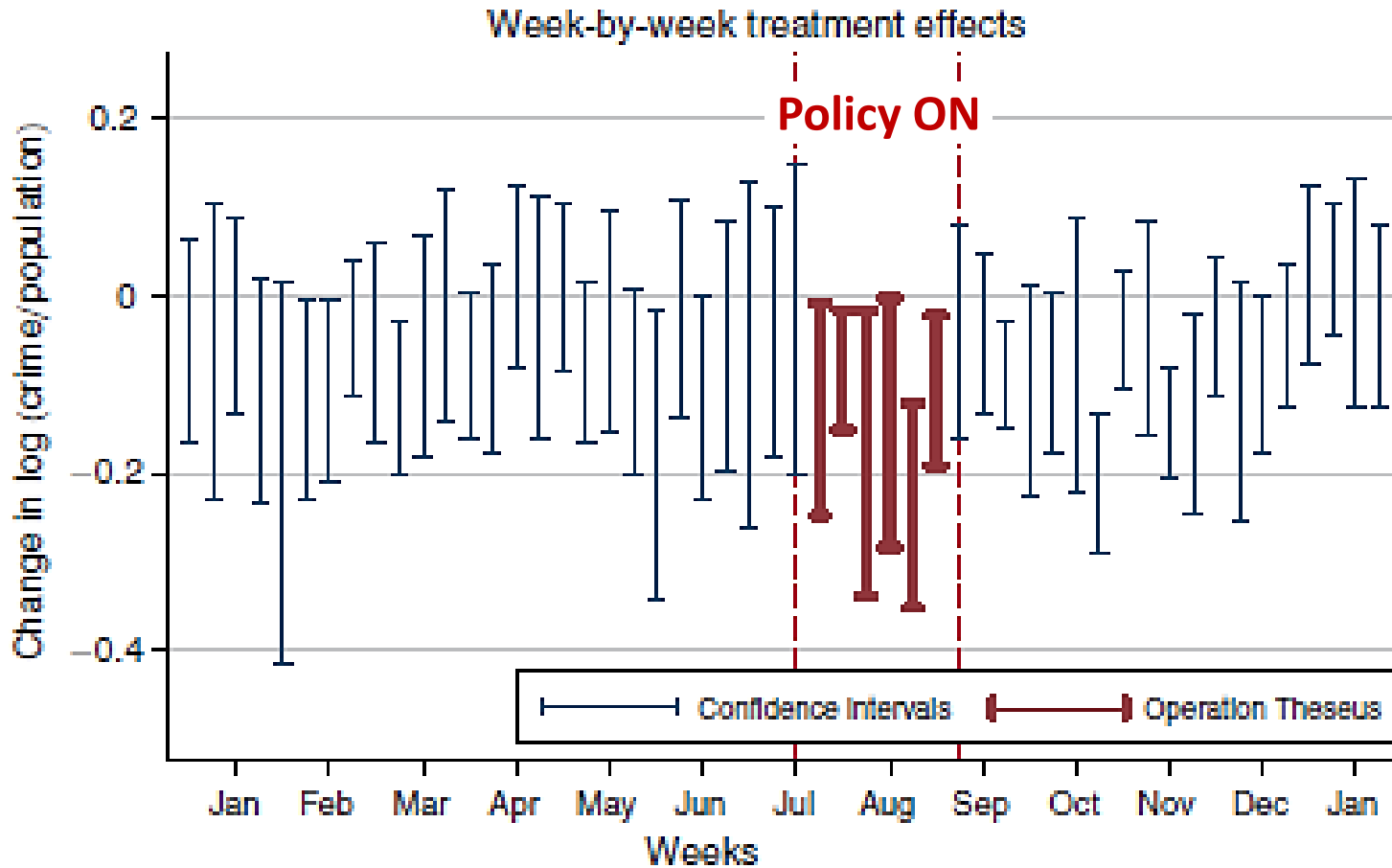


Medical provider presence and HIV

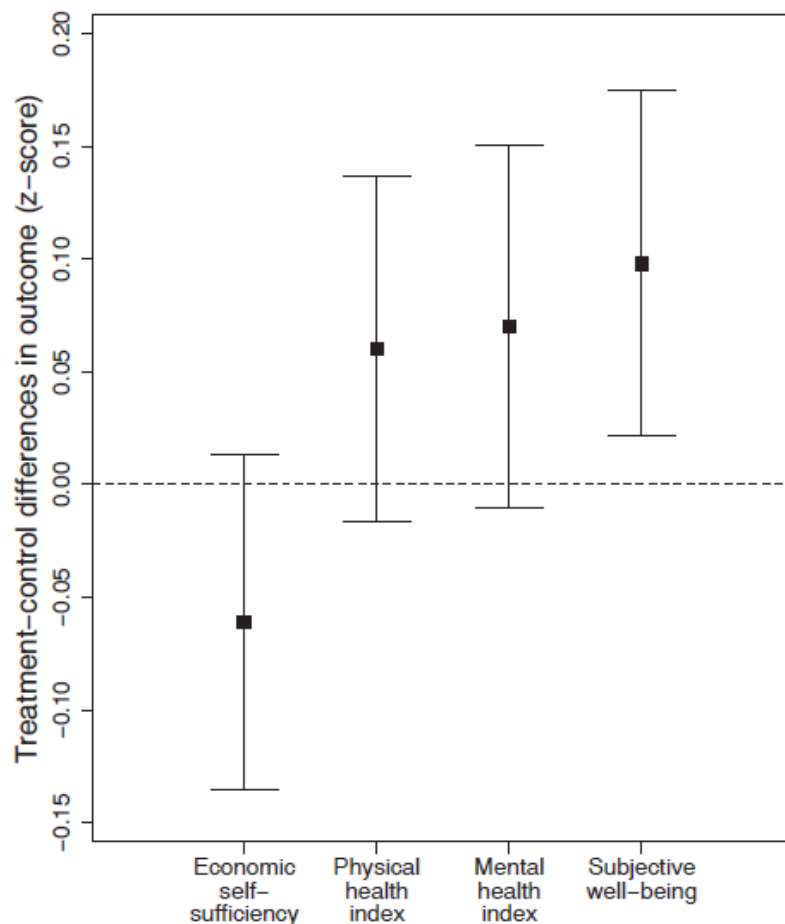
“Drugs don't work in patients who don't take them.” – CE Koop



Police presence and crime

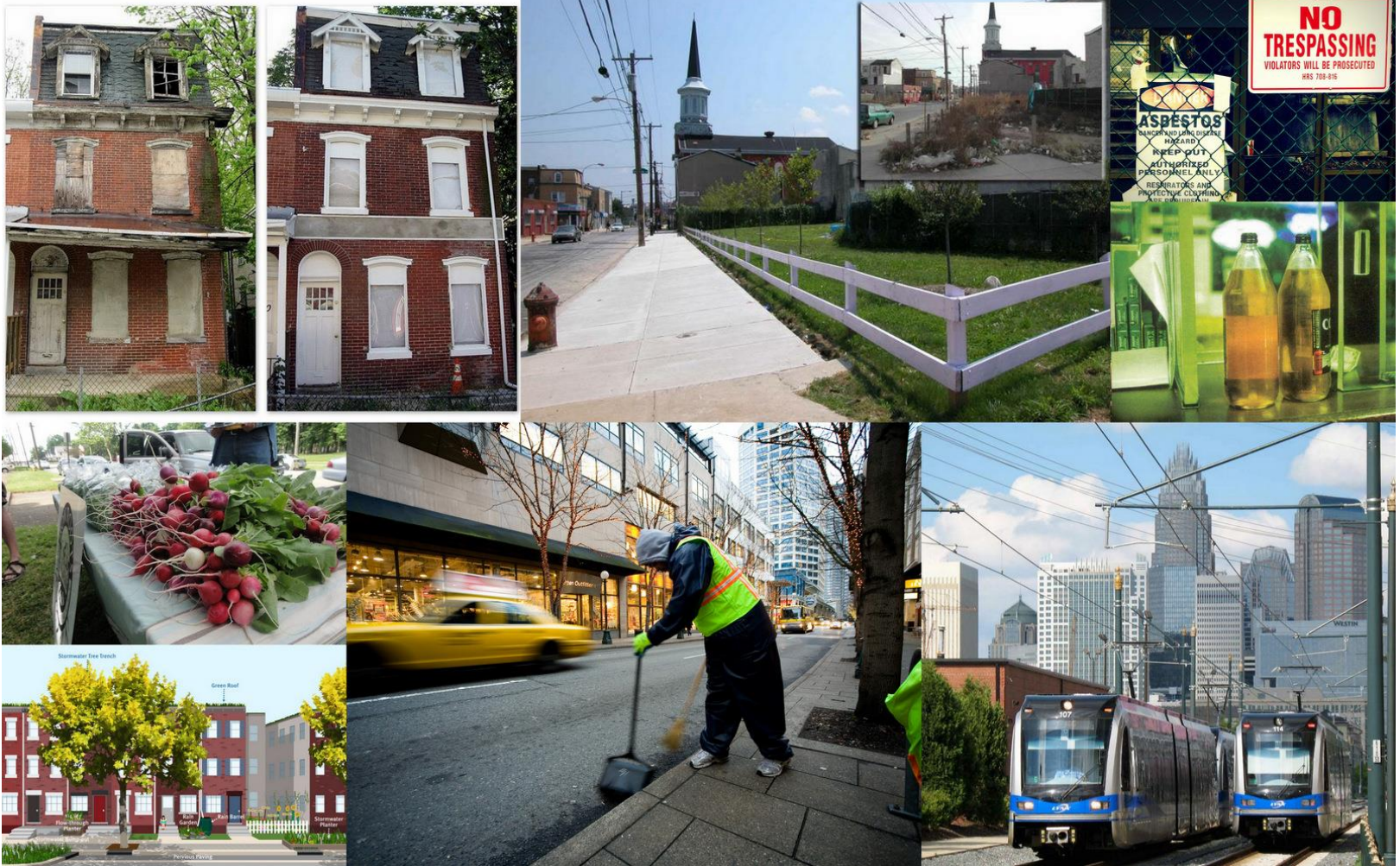


Moving to Opportunity: “A bold housing relocation experiment”



- 3-arm, 5-city HUD randomized trial:
 - (1) **Experimental group** – housing vouchers to move out of poverty (n=1700)
 - (2) **Comparison group** – housing vouchers to move anywhere (n=1300)
 - (3) **Control group** – no vouchers (n=1400)
- Less obesity, diabetes, unhappiness
- More depression, conduct disorder
- Landmark scientific work showing impact of place
- But are we really going to move people as a place-based policy?
- Cost and ethical considerations

“In situ” – Structural, Scalable, Sustainable



Standardized treatment protocol



Before



During



After



Before

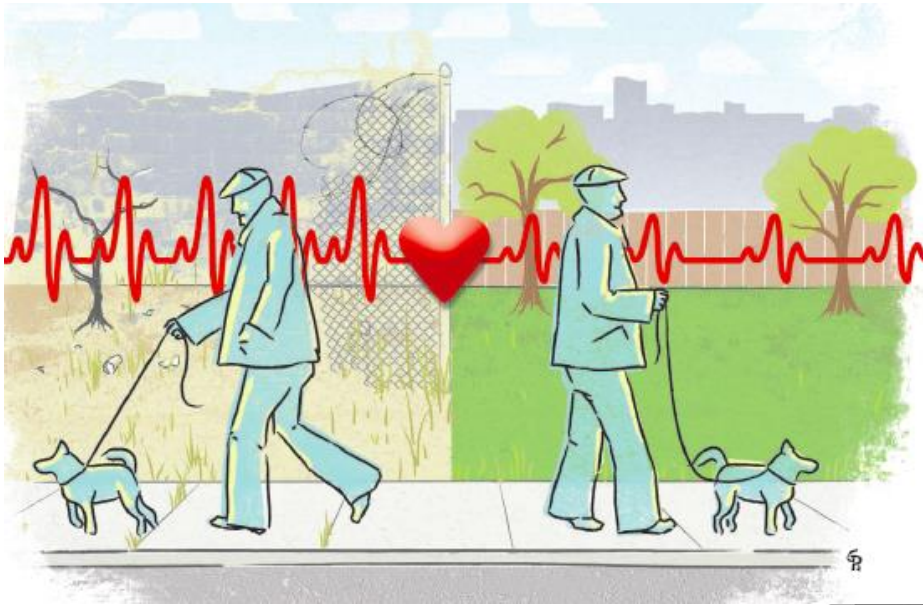


During



After

Community Input and Early Trials

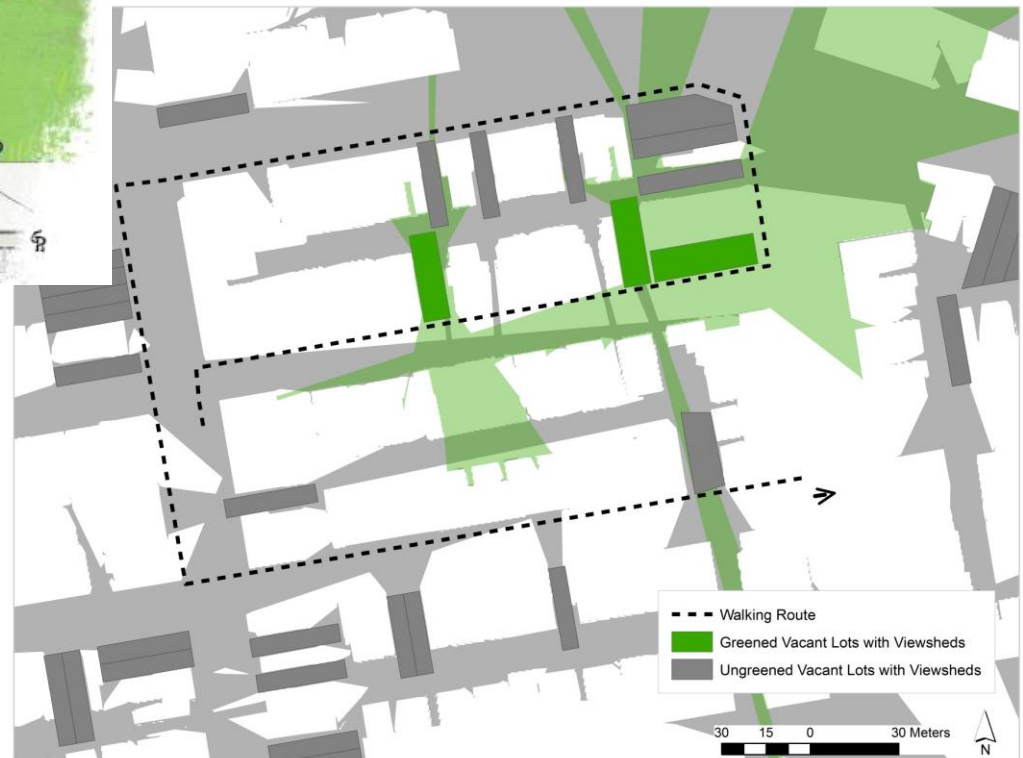


Significant drop in heart rate when in view of newly greened lots

“You got to watch yourself walking past the lots because you don’t know who’s out there.”

“It’s not safe walking past [abandoned homes] because the one across from me looks like it’s getting ready to cave in.”

“If I could change things I would. There wouldn’t be so many vacant lots [and] abandoned houses.”

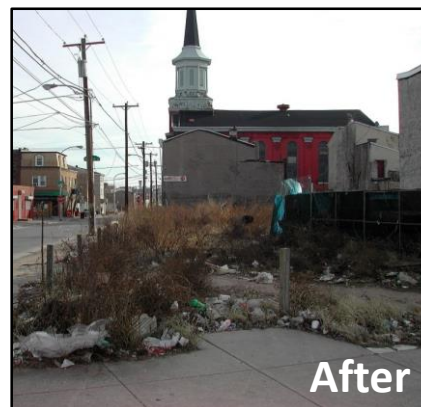


Greening Vacant Lots

n = 4,436



n = 13,308



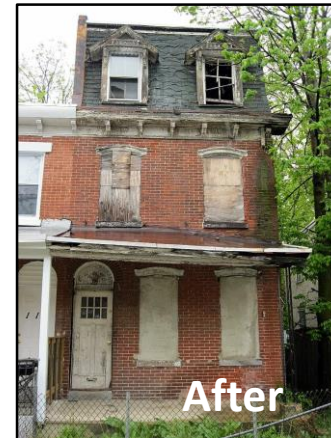
- Significant **-8% drop** in gun violence
- Every \$1 invested **returns \$26.00**

Fixing Abandoned Buildings

n = 676



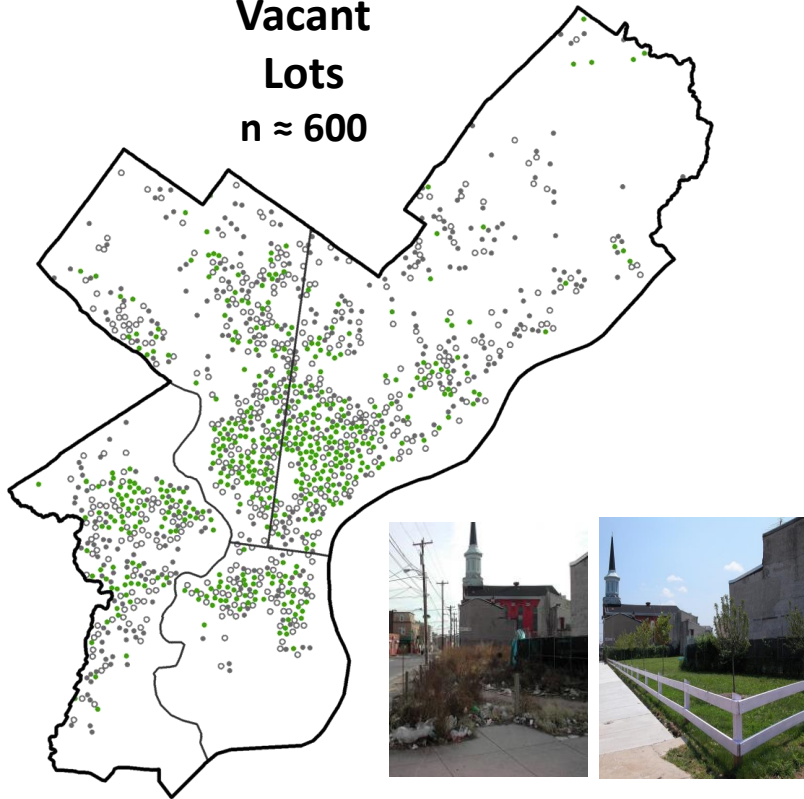
n = 676



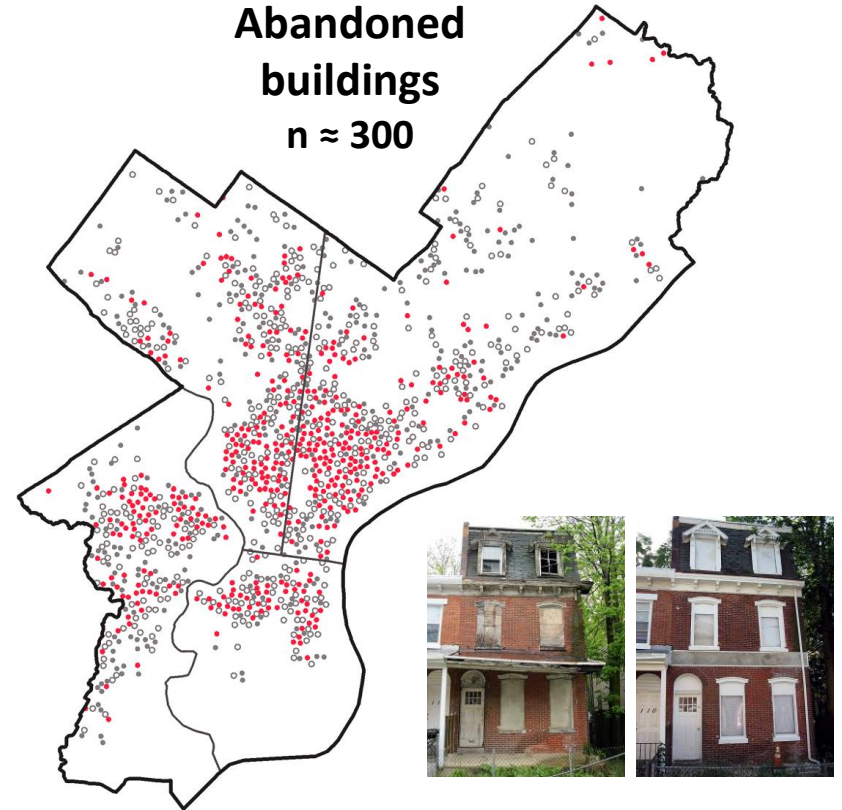
- Significant **-39% drop** in gun violence
- Every \$1 in **returns \$5.00**

Active federally funded RCTs

**Vacant
Lots
n ≈ 600**



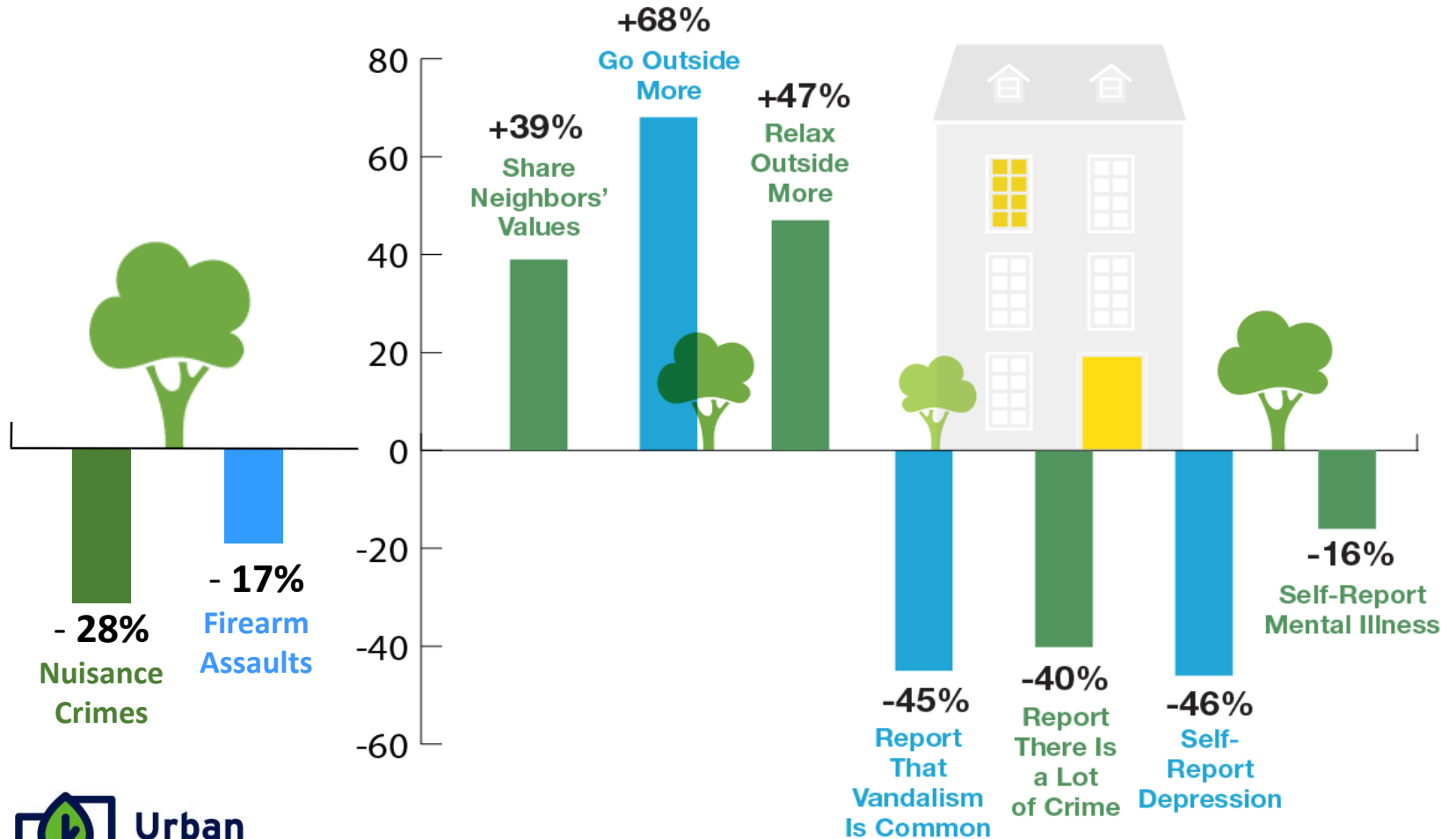
**Abandoned
buildings
n ≈ 300**



- Cleaning + Greening + Maintenance
- Cleaning + Maintenance
- Control Lots

- Cleaning + Building + Maintenance
- Cleaning + Maintenance
- Control Buildings

Significant vacant lot RCT results



Win-win science



Trauma care

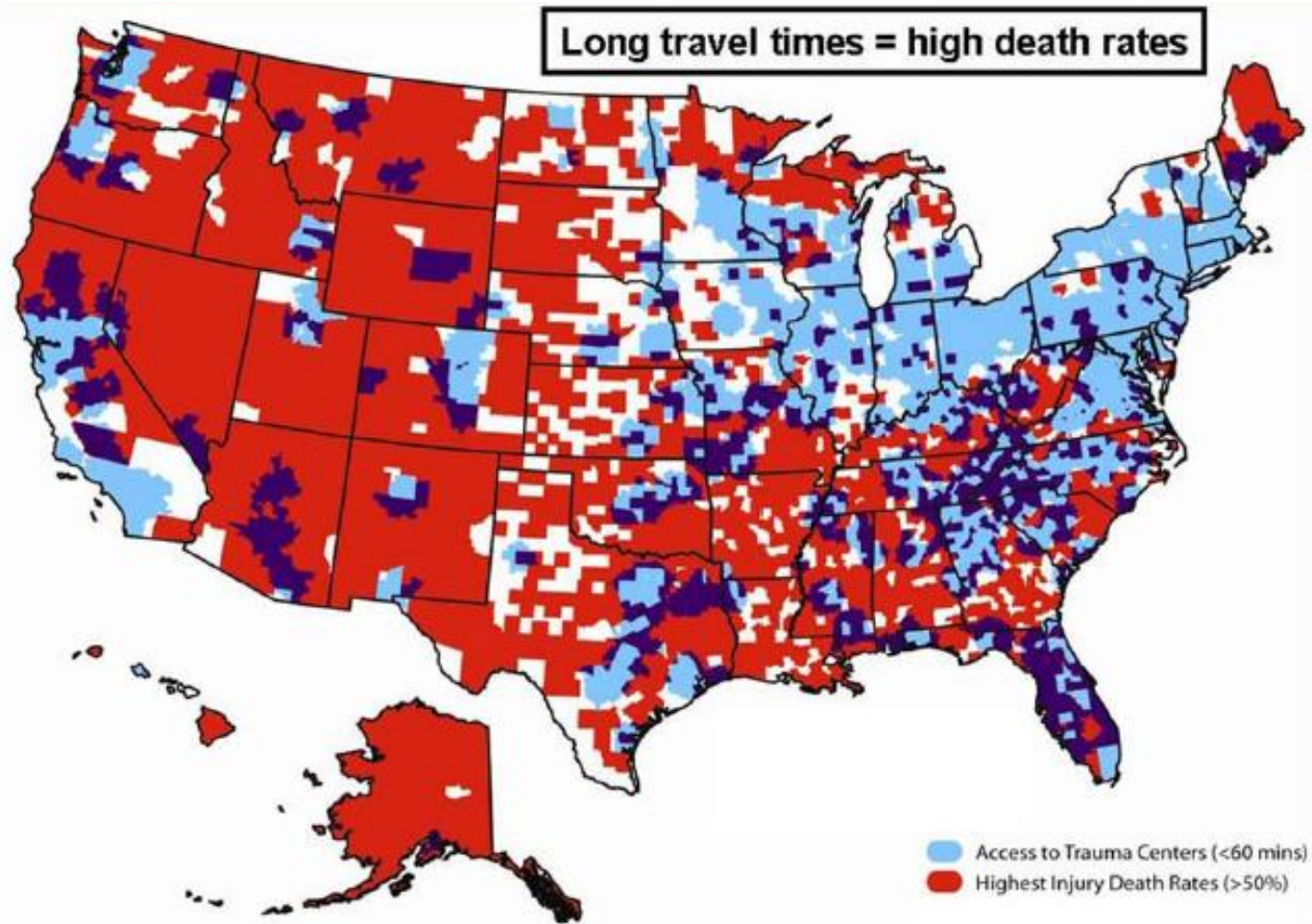
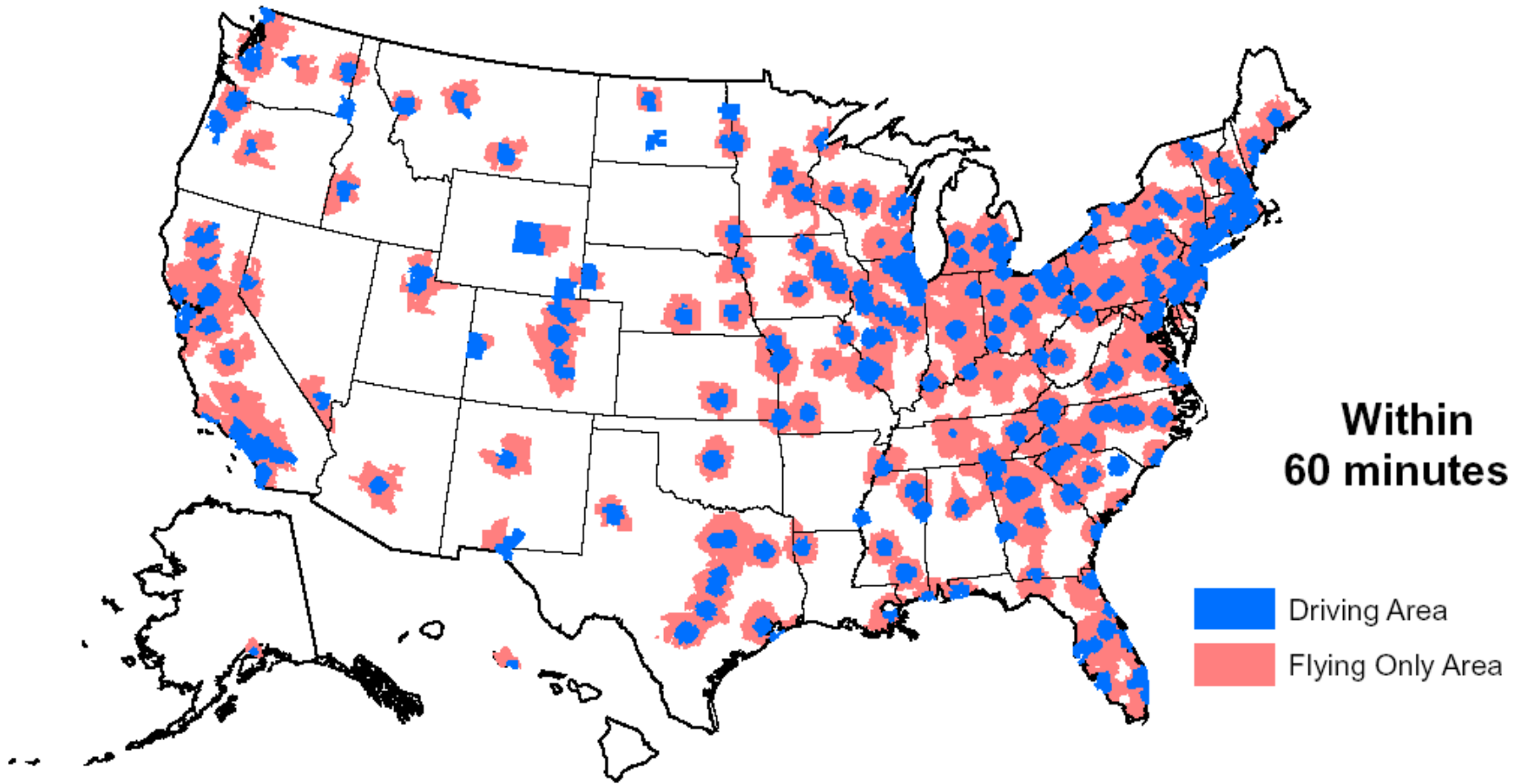


Figure 11. Access to trauma centers. (Courtesy of Charles Branas, PhD, Cartographic Modeling Laboratory, University of Pennsylvania, 2009).



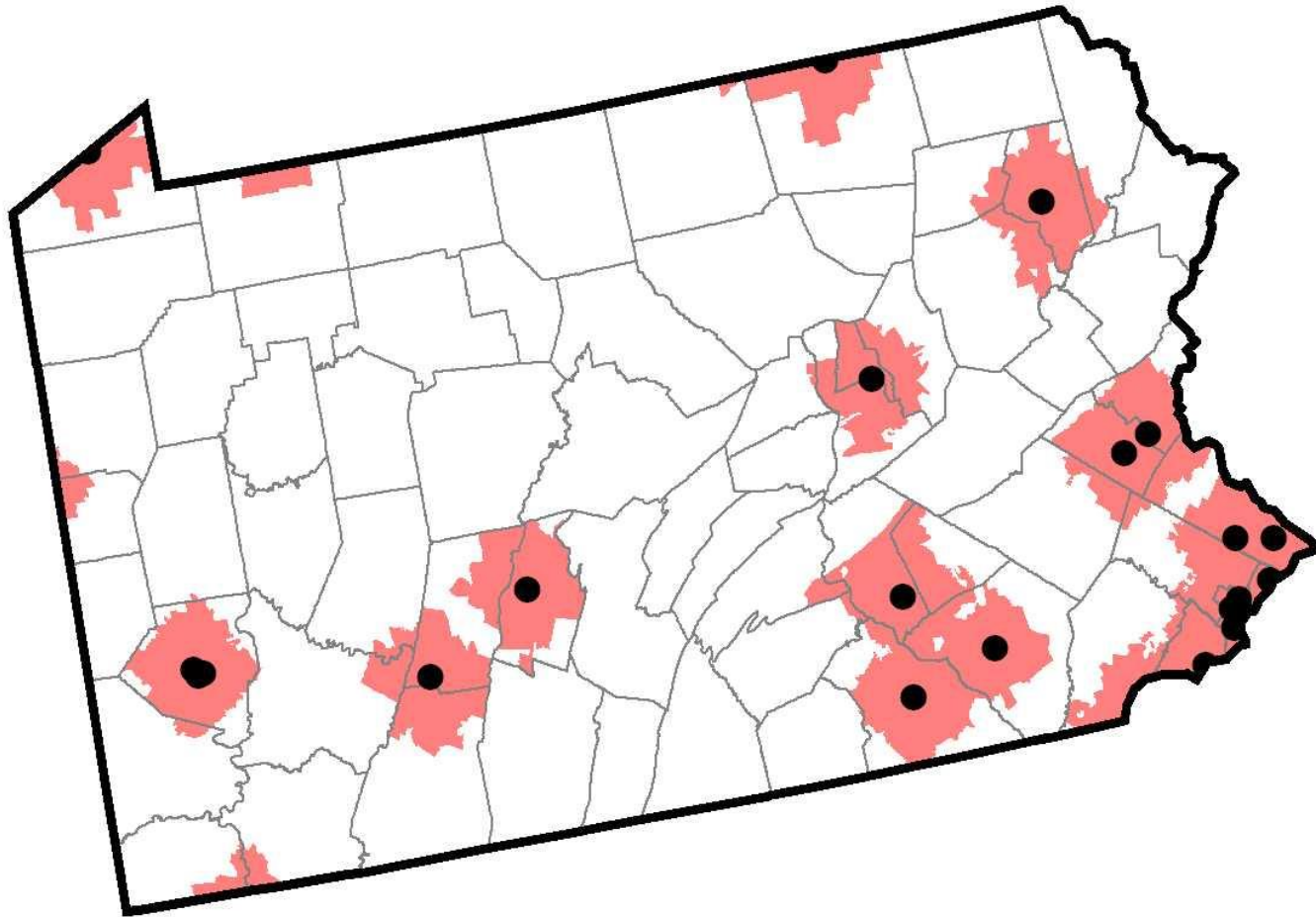
Driving and Flying

84.1% of US population with trauma center access in 60 minutes

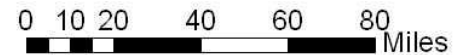


Geographic access - driving only

(within 45 mins)

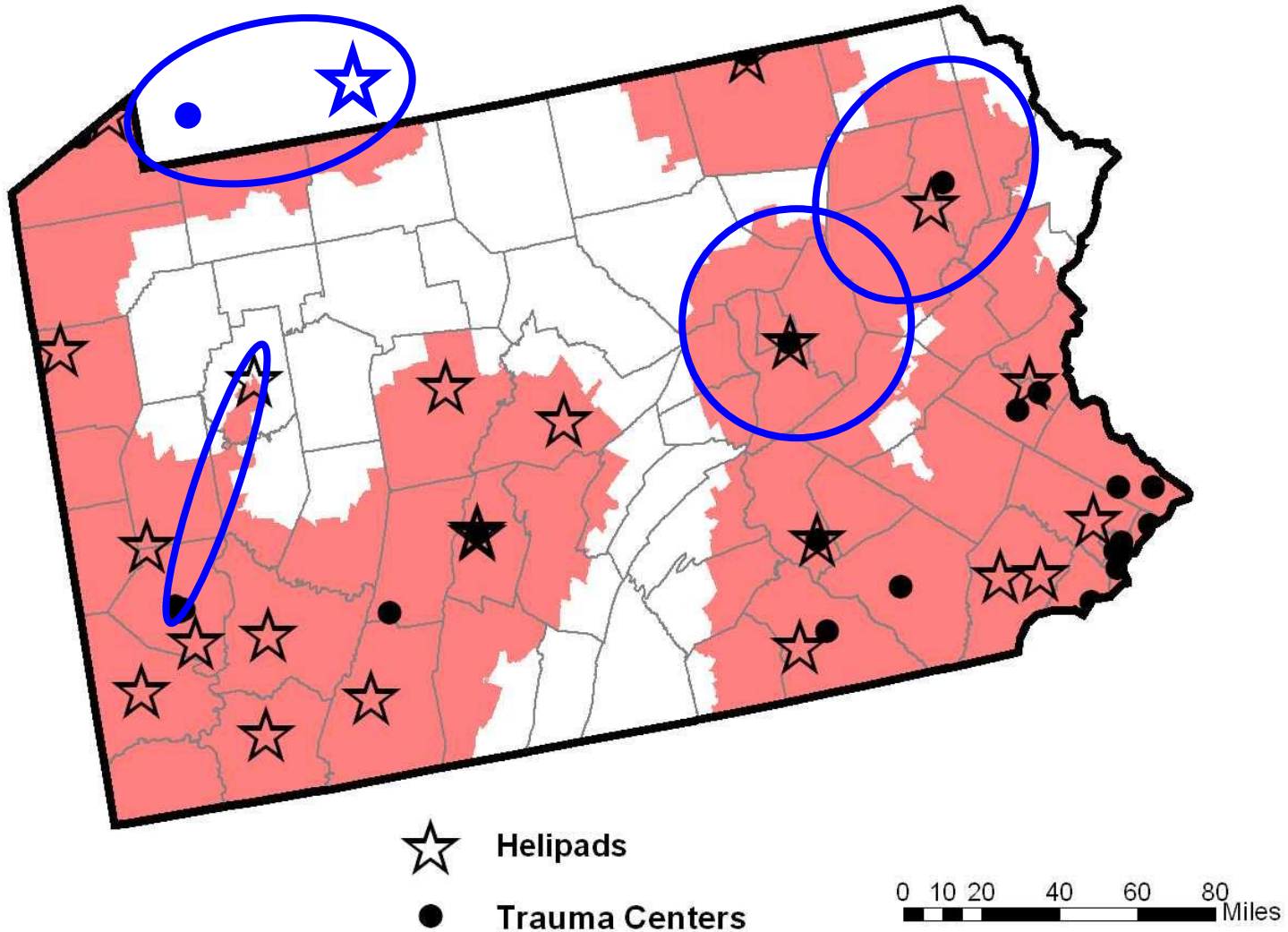


● Trauma Centers

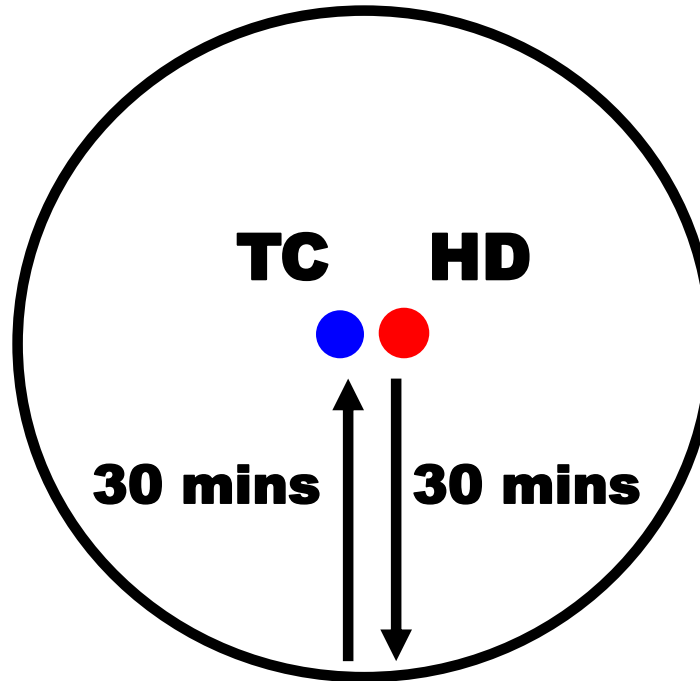
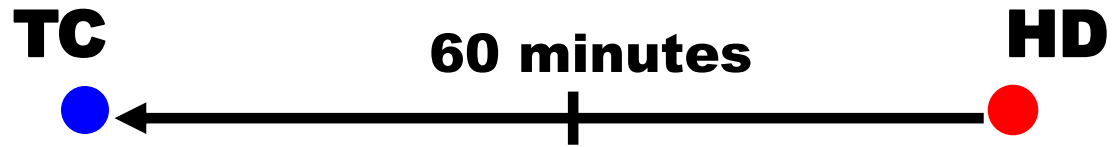


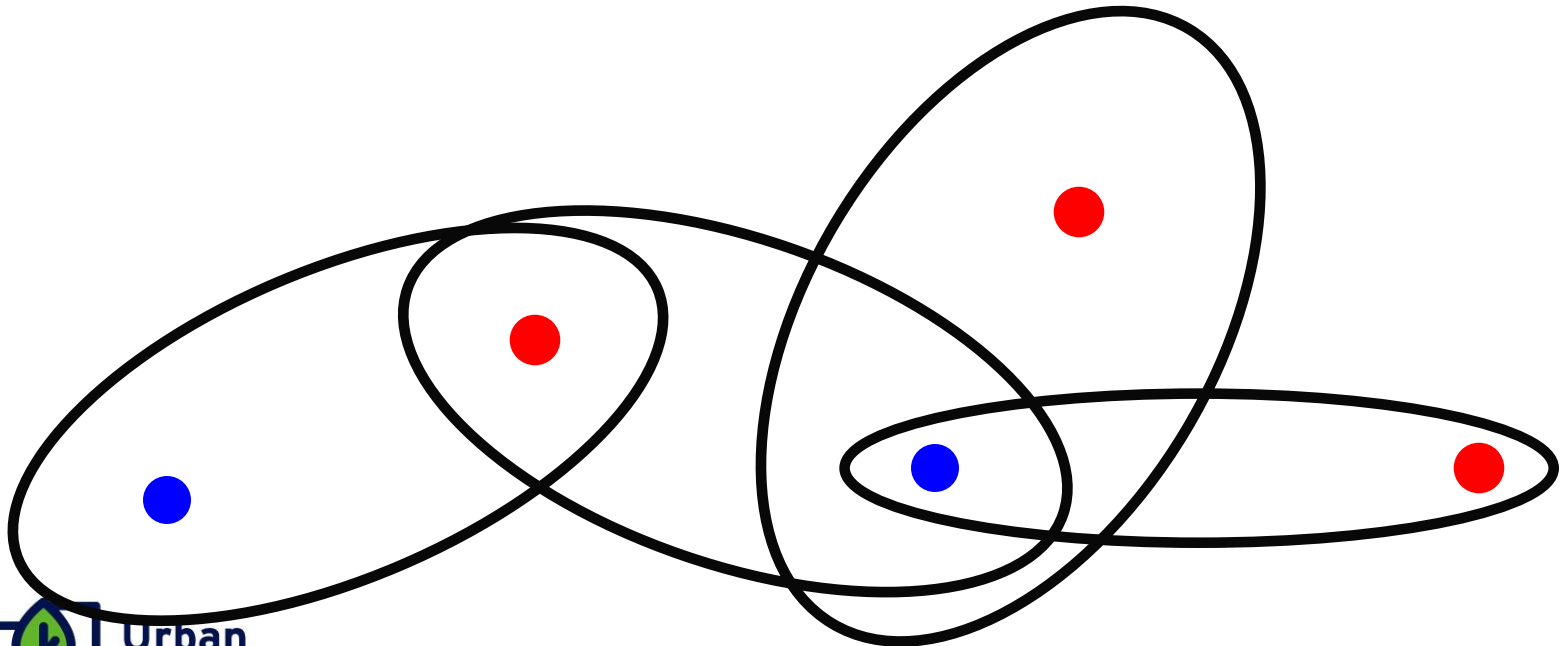
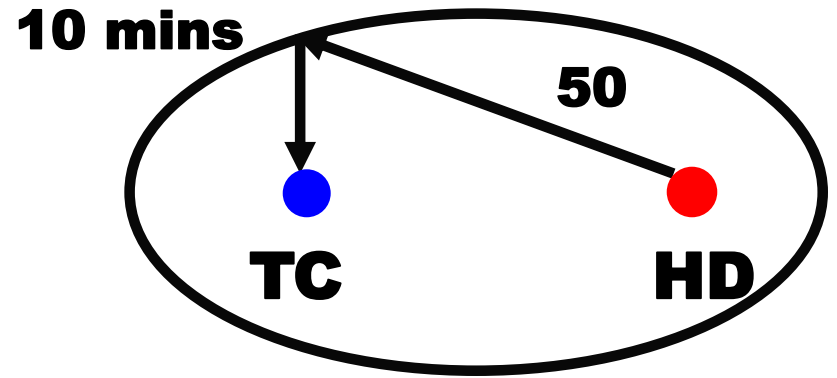
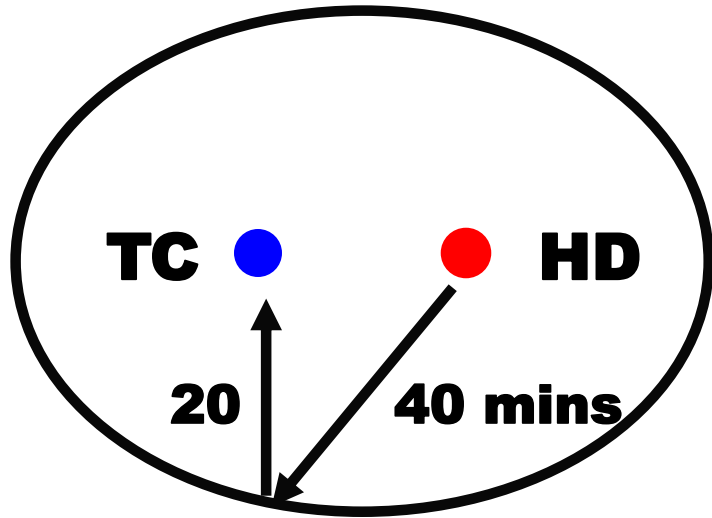
Geographic access - driving and flying

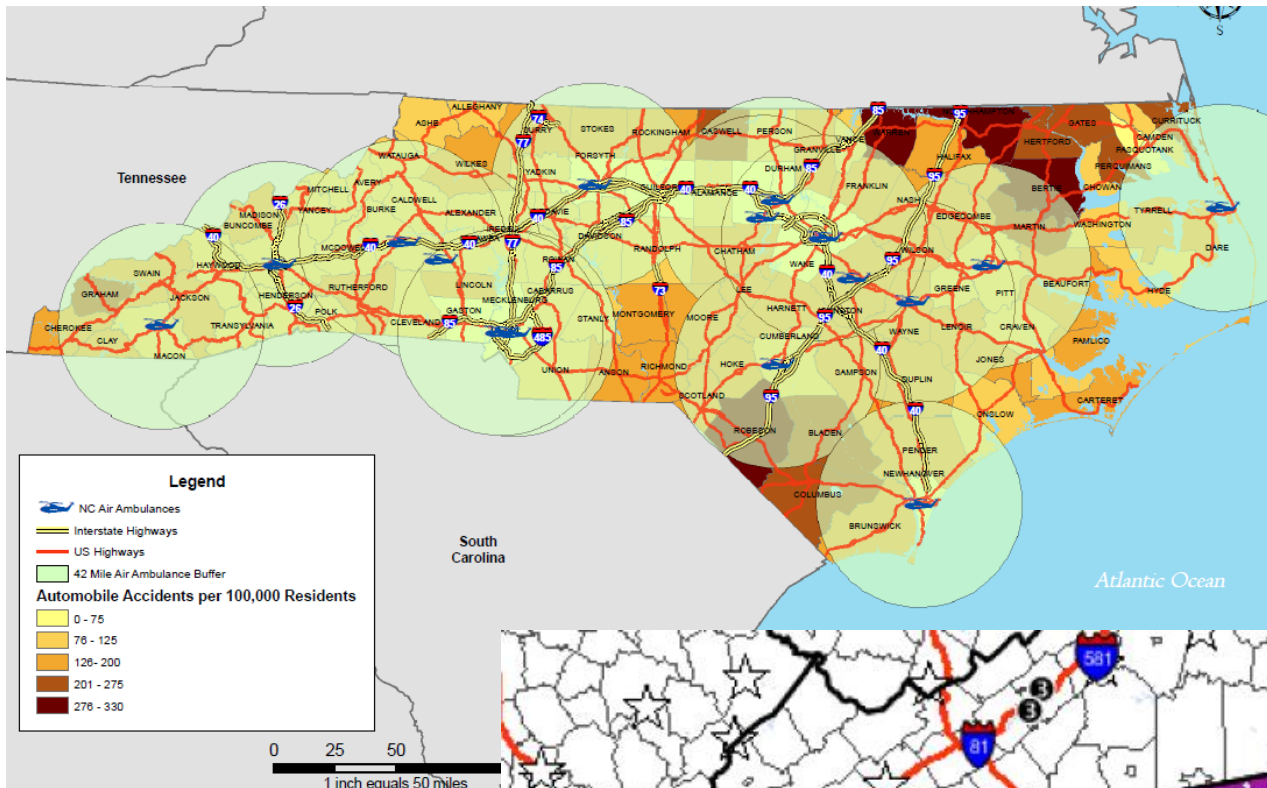
(within 45 mins)



Trauma Center – Helicopter Depot Pairs

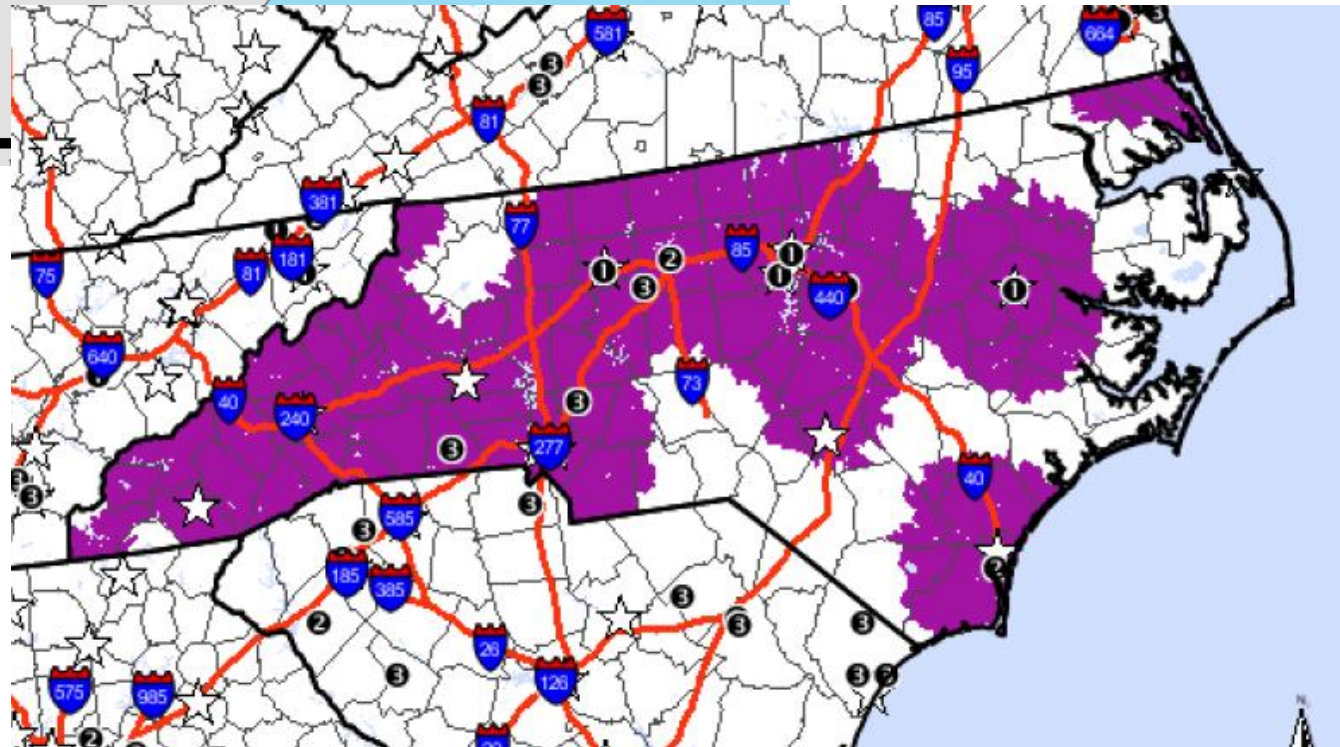




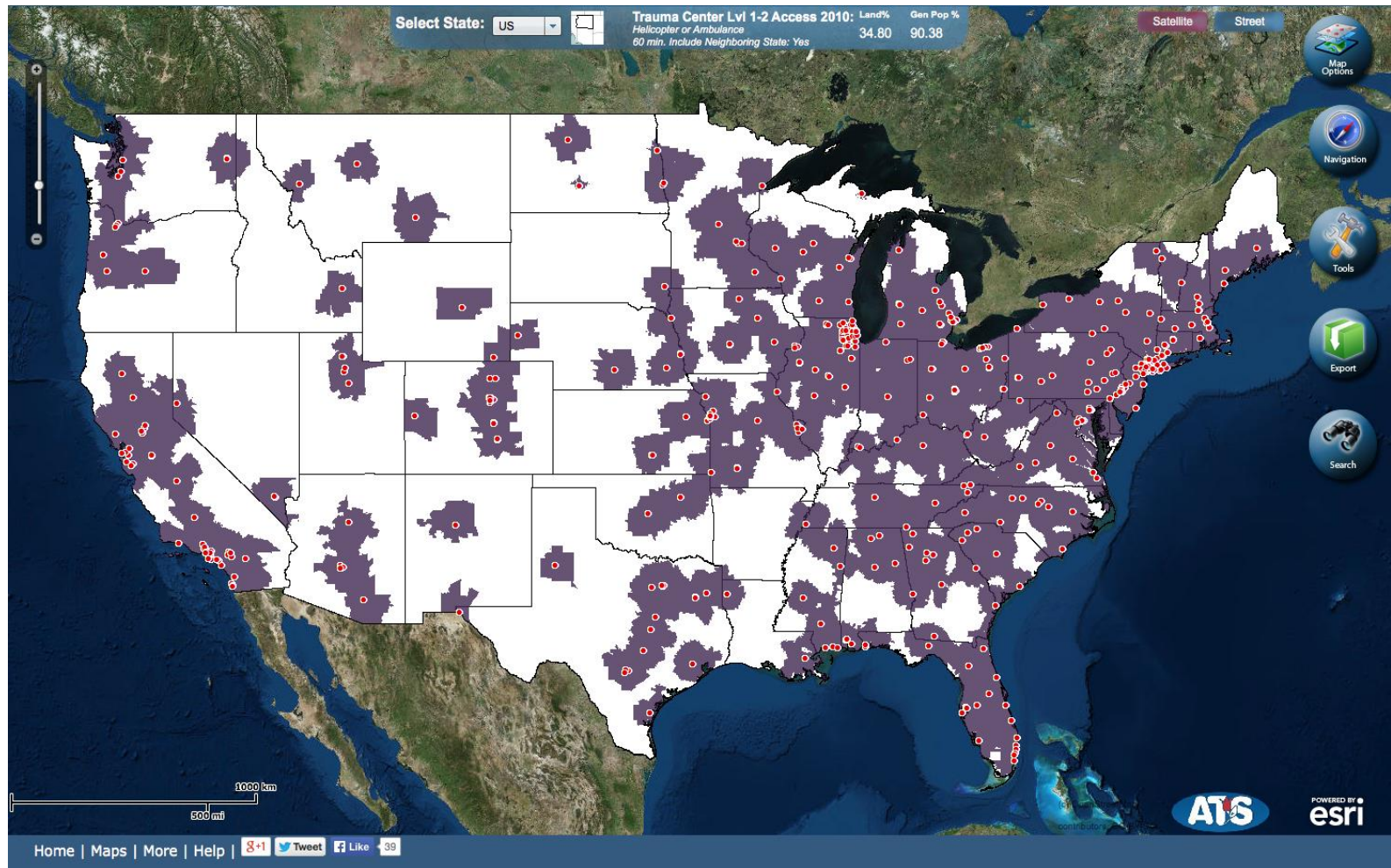


2008

2008



Geo-analytics and decision support for precision health



<http://www.traumamaps.org/>

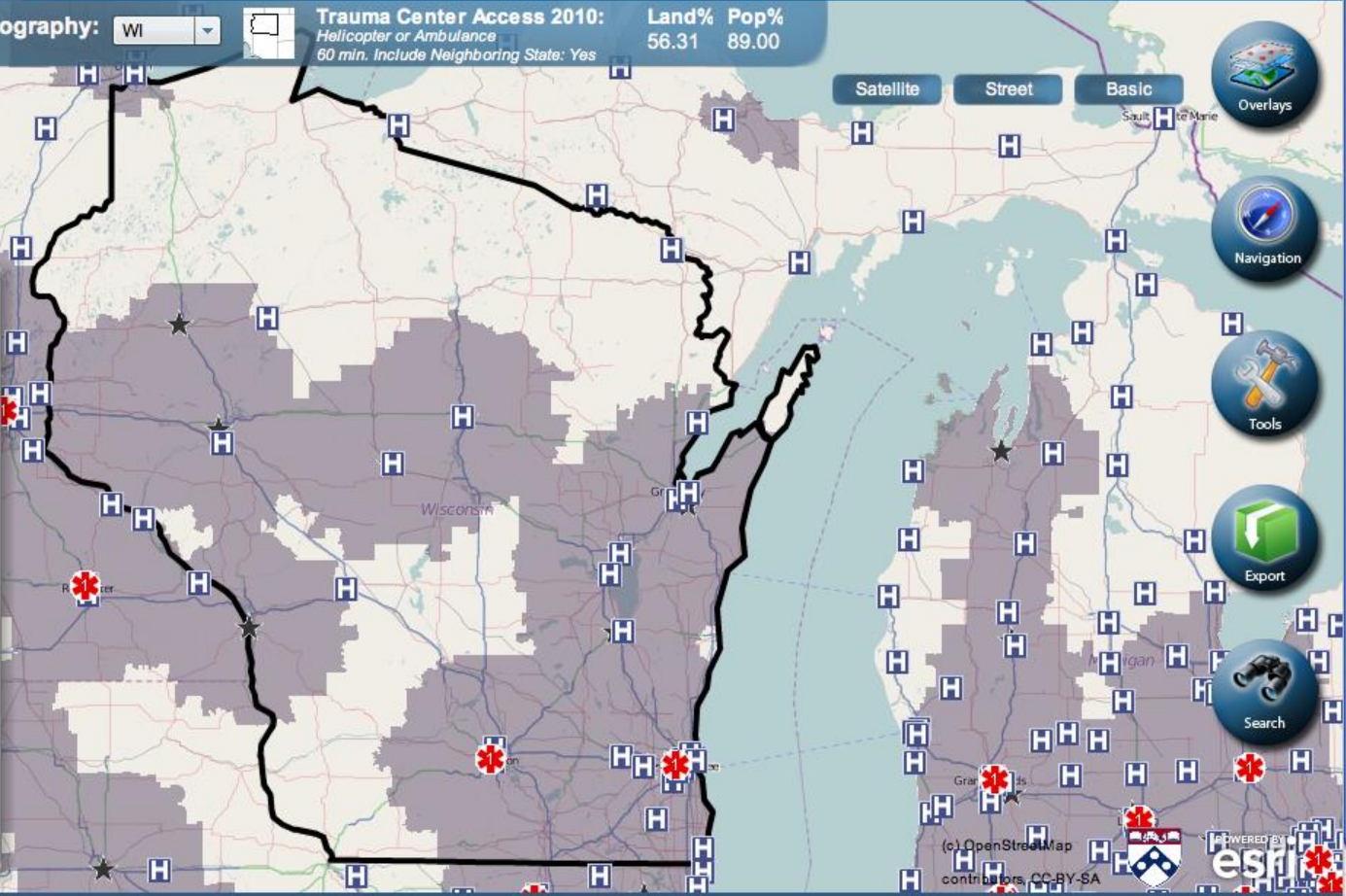
ATIS AMERICAN TRAUMA SOCIETY
IMPROVING CARE. SAVING LIVES

Geography: WI Trauma Center Access 2010: Land% Pop%
Helicopter or Ambulance 56.31 89.00
80 min. Include Neighboring State: Yes

Satellite Street Basic



- Access Layers
- Trauma Centers Level 1
 - Trauma Centers Level 2
 - Trauma Centers Level 3
 - Trauma Centers Level 4
 - Trauma Centers Level 5
 - Other Hospitals
 - Base Helipads
 - State Borders
 - County Borders
 - ZIP Code Borders
 - Voting District Borders



(c) OpenStreetMap contributors CC-BY-SA

POWERED BY esri



Geography: **NM**
Trauma Center Access 2010: Land% Pop%
Helicopter or Ambulance 10.44 60.87
60 min. Include Neighboring State: Yes

Access Layers

Select Type
Adult Level 1 and 2 Trauma Centers

Select Access Time
60

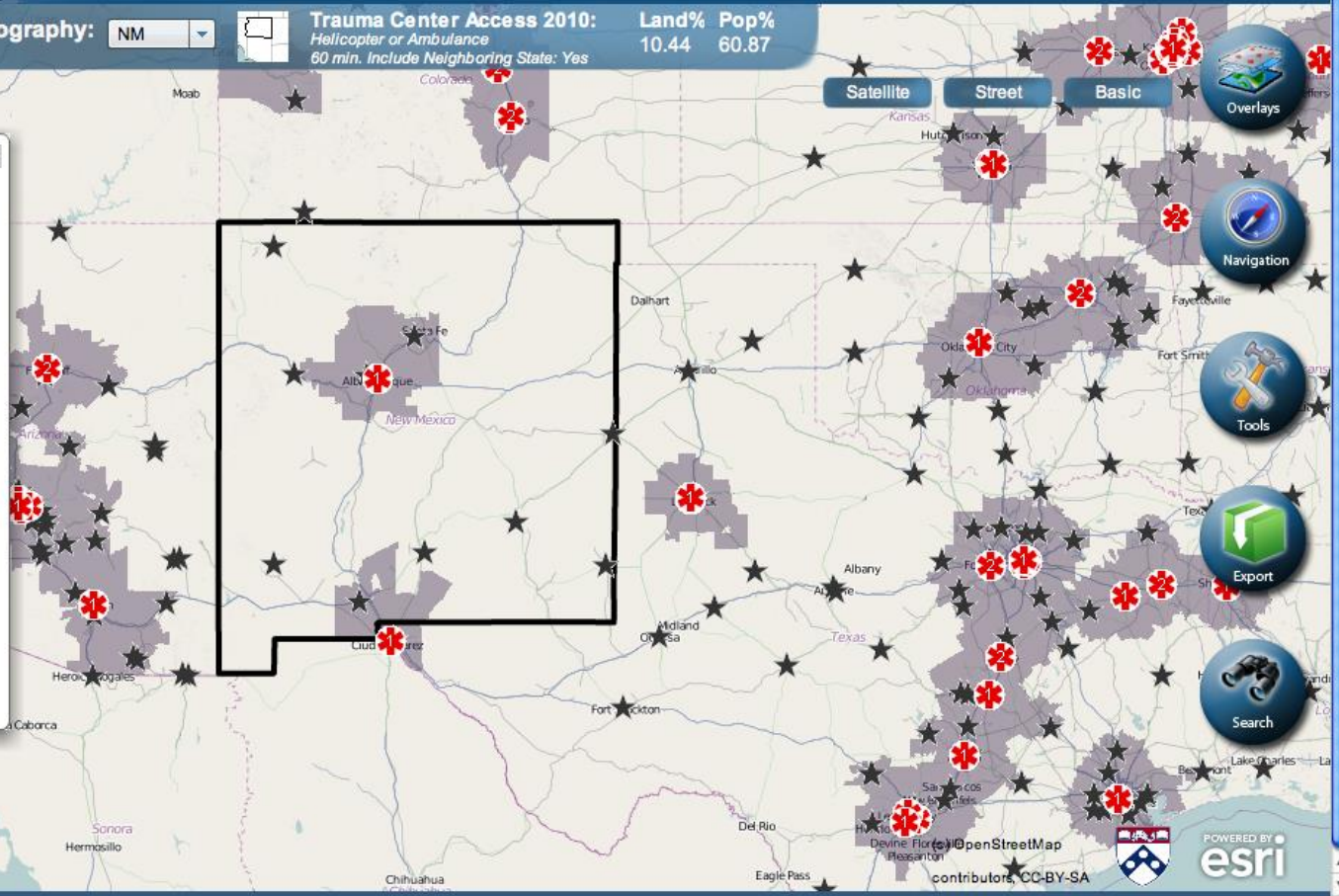
Select Transport Method
Helicopter or Ambulance

Include Neighboring States
Yes

Update/Show Map Clear Access

Access Transparency

For additional layers see the Layers tab.



Satellite Street Basic

Overlays

Navigation

Tools

Export

Search

Safari File Edit View History Bookmarks Window Help

Trauma Access Maps

http://www.traumamaps.org/Trauma.aspx

PRIVATE Google

HHS SSL Net...rk Extender Gmail Penn email Apple Yahoo! Google Maps YouTube Wikipedia News (415) Popular

ATS AMERICAN TRAUMA SOCIETY
IMPROVING CARE, SAVING LIVES

Geography: **NM**

Trauma Center Access 2010:
Helicopter or Ambulance
60 min. Include Neighboring State: Yes

Land% Pop%
10.44 60.87

Satellite Street Basic

Overlays

Navigation

Tools

Export

Search

Search

Search for Hospital:

*Enter part of name and/or state, case sensitive

Name

State

Map Your Address:

Street

City

State

Zip Code

Close Window After Search

500 km
300 mi

Home | Maps | More | Help

POWERED BY **esri**


www.traumamaps.org

Safari File Edit View History Bookmarks Window Help (1:01) Mon 9:00 AM

Trauma Access Maps

http://www.traumamaps.org/Trauma.aspx PRIVATE Google

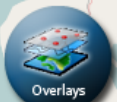
HHS SSL Net...rk Extender Gmail Penn email Apple Yahoo! Google Maps YouTube Wikipedia News (415) Popular


AMERICAN TRAUMA SOCIETY
 IMPROVING CARE, SAVING LIVES


Geography: WI

Trauma Center Access 2010:
Helicopter or Ambulance
 60 min. Include Neighboring State: Yes


Land% Pop%
 56.31 89.00




Overlays




Navigation



Tools



Export



Search

Search x

Search for Hospital:

*Enter part of name and/or state, case sensitive

Name

State

Map Your Address:

Street

City

State


Zip Code

Close Window After Search

Results: Zoom to Hospital by Clicking Name x

NAME	CITY	STATE	URL
Carondelet St. Joseph's Hospital	Tucson	AZ	-
St. Joseph's Hospital and Medical Center	Phoenix	AZ	http://www.mha.chw.edu/

100 km / 50 mi

(c) OpenStreetMap contributors, CC-BY-SA  POWERED BY **esri**

[Home](#) | [Maps](#) | [More](#) | [Help](#)

www.traumamaps.org



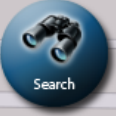
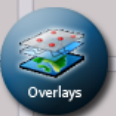
Geography: WI



Trauma Center Access 2010: Helicopter or Ambulance 60 min. Include Neighboring State: Yes

Land% 56.31 Pop% 89.00

Satellite Street Basic



Search

Search for Hospital:

*Enter part of name and/or state, case sensitive

Name

State

Map Your Address:

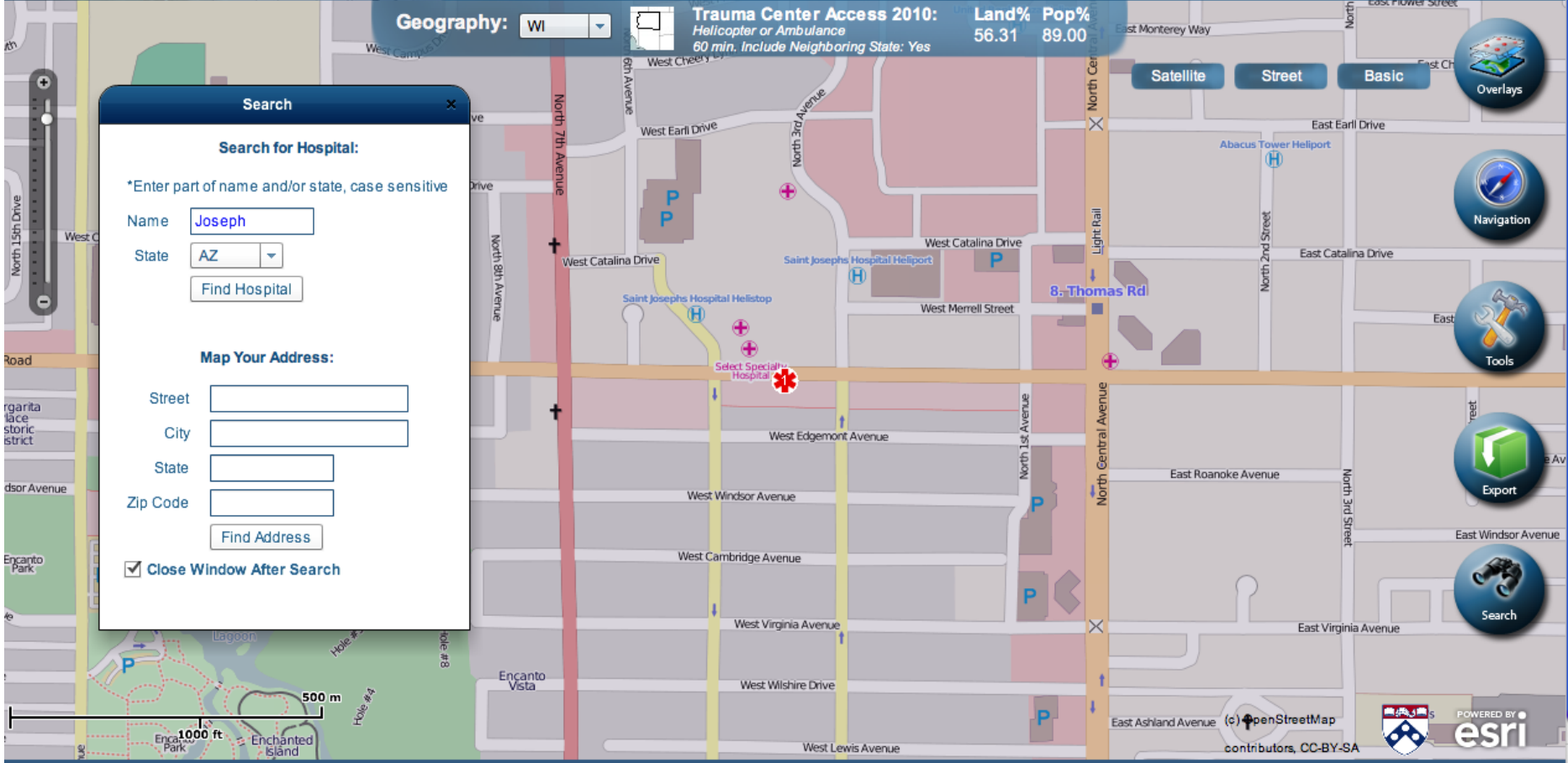
Street

City

State

Zip Code

Close Window After Search





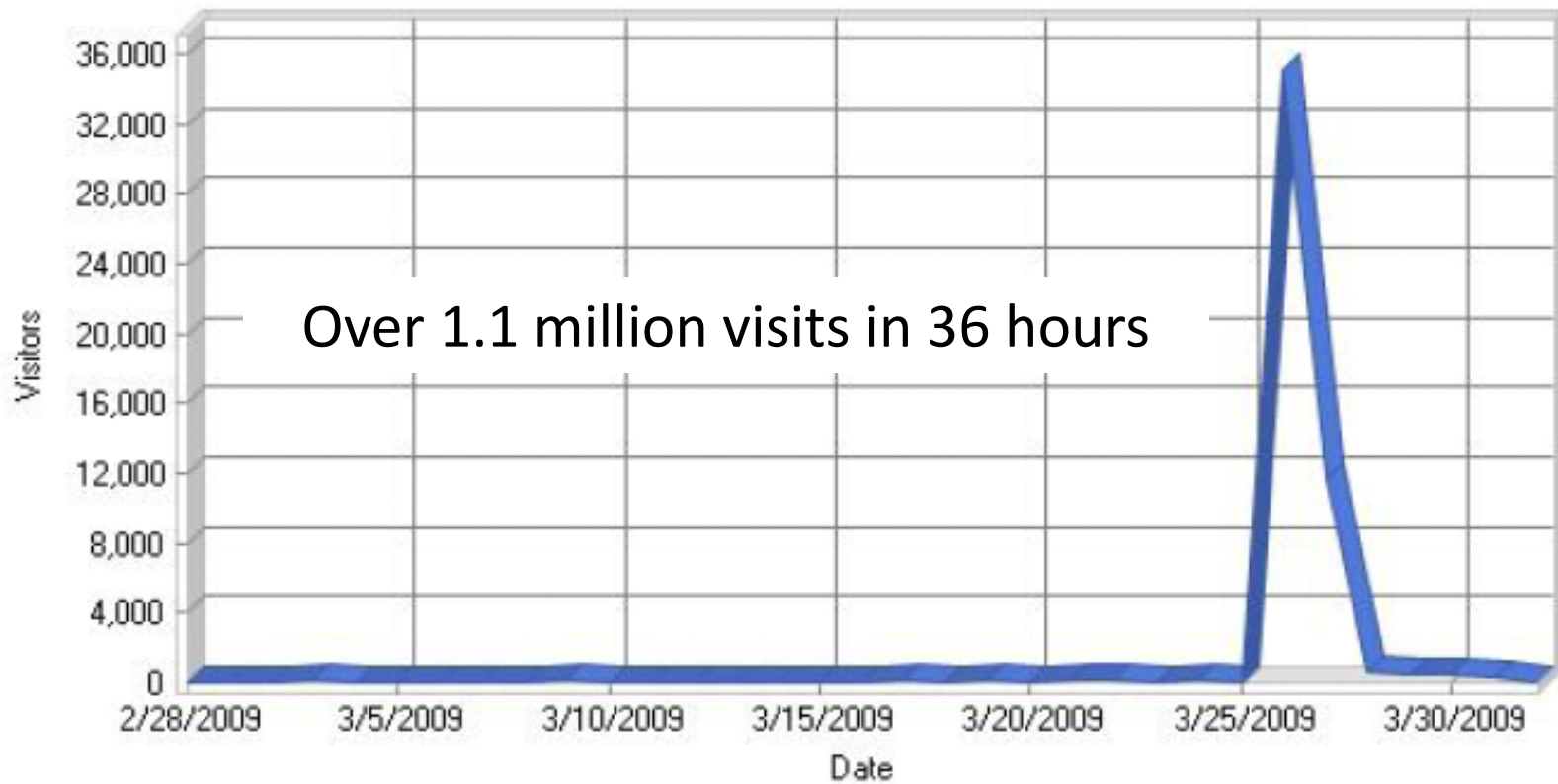
- Produced Healthy People 2020 benchmarks
- “Cottage industry” of US replications: EDs, pediatric hospitals, burn centers, cardiac centers, stroke centers, disaster response
- CDC and NCSL: many individual, federal and state users - at least 2 states created trauma centers using our maps
- Country replications: New Zealand, Canada, UK



Natasha's lesson helps save Ohio girl

3/31/2009

Daily Visitors



Urban Health Lab.org

TIME

Tuesday, Jul. 19, 2011

10 Dangerous Places to Vacation: Why Where You Live, Work or Play Matters for Your Health

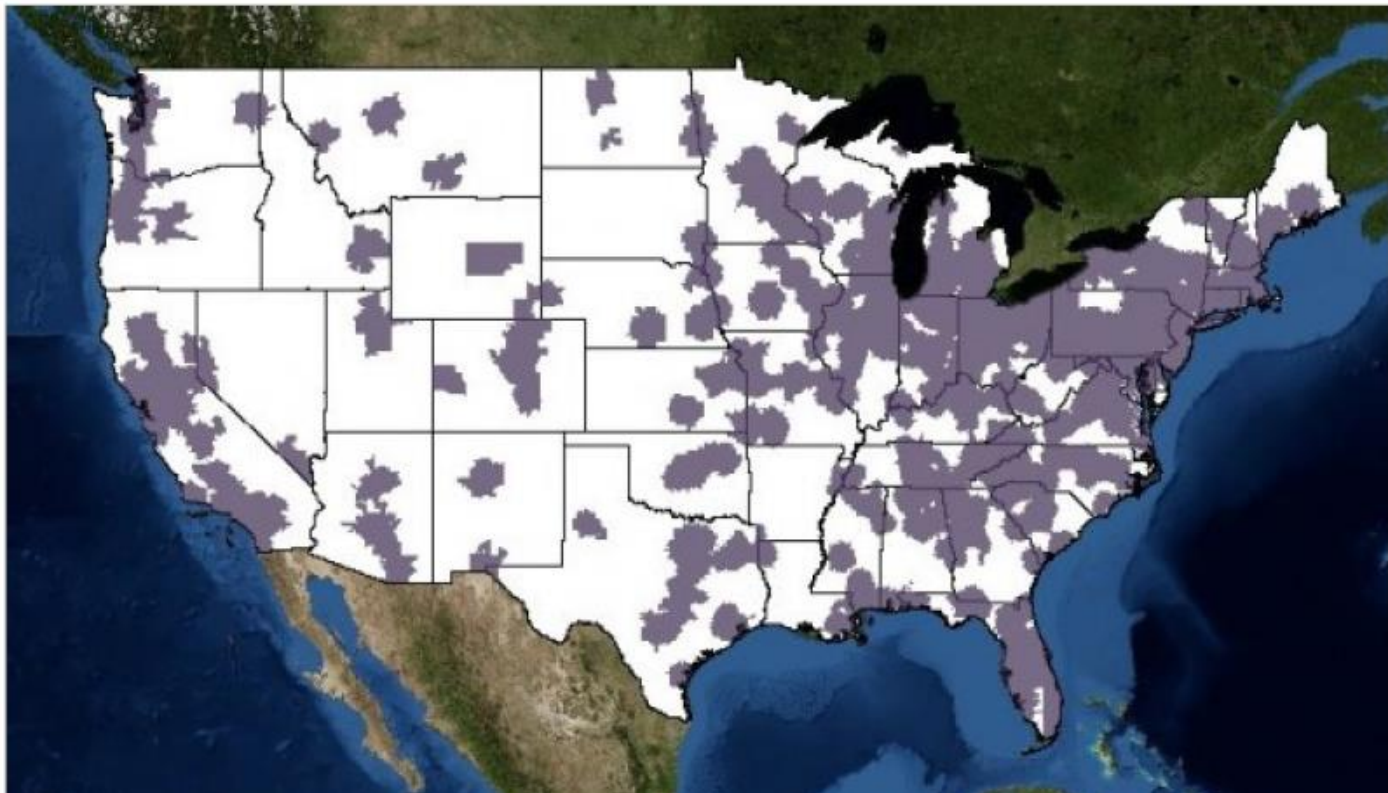
By Zachary F. Meisel

Advanced hospital trauma care isn't usually on the list of things most families think about when planning their summer travel. But it might interest them to know just how remote some popular U.S. vacation spots are, at least when it comes to access to the kind of care that saves lives in cases of severe injury.

On Monday, the American Trauma Society released an [interactive map](#) that allows users to gauge availability of care across the entire U.S. You can pick a location — searchable by state, congressional district or ZIP code — and figure out whether it falls within a "safety" zone: an area in which you're within 45 minutes to an hour from advanced trauma care, either by ambulance or helicopter, in case of a health emergency. ([See pictures of Brooklyn's all-volunteer ambulance corps.](#))

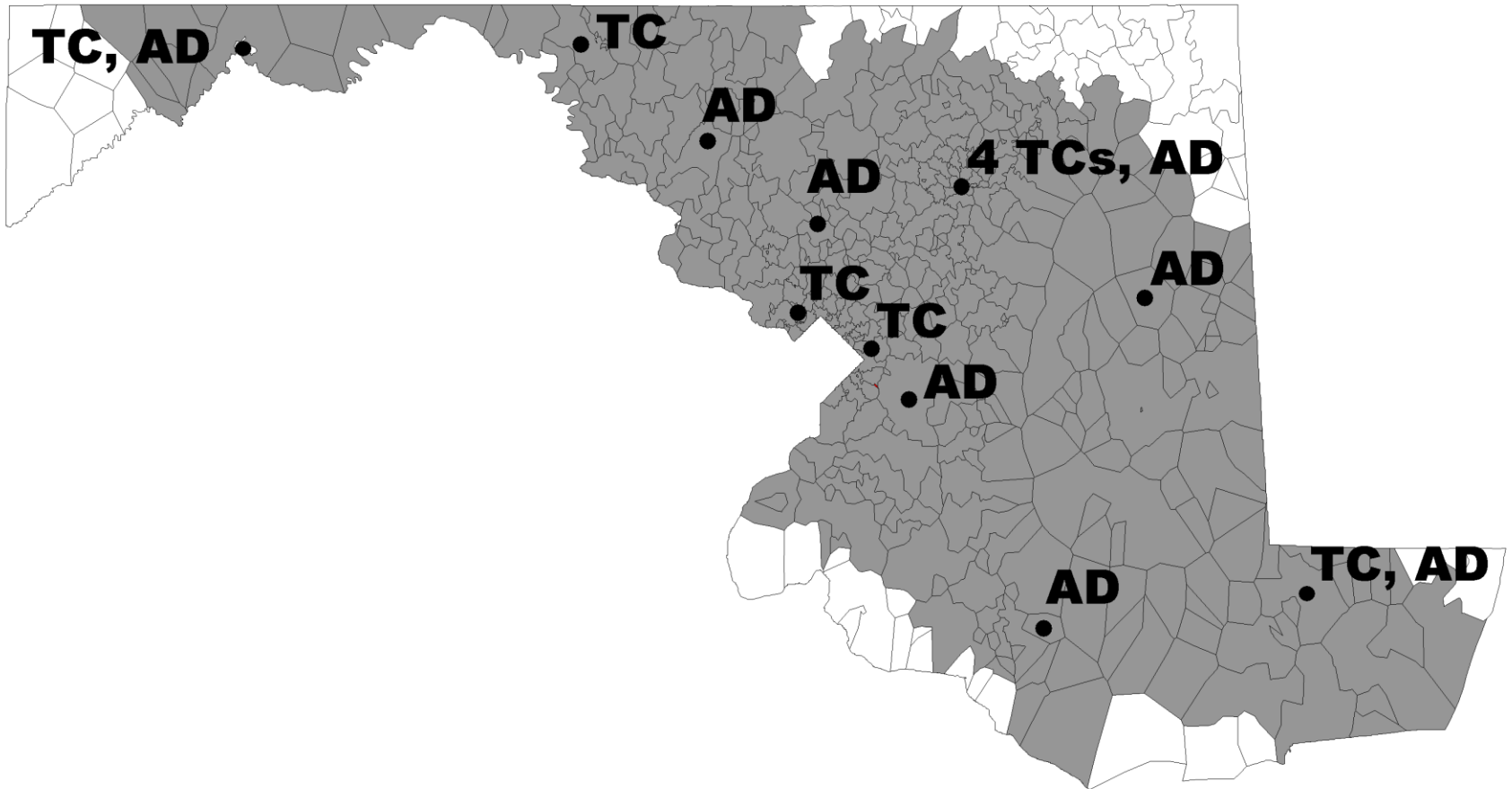
HELL FOR LEATHER®

This is where it's safe to crash



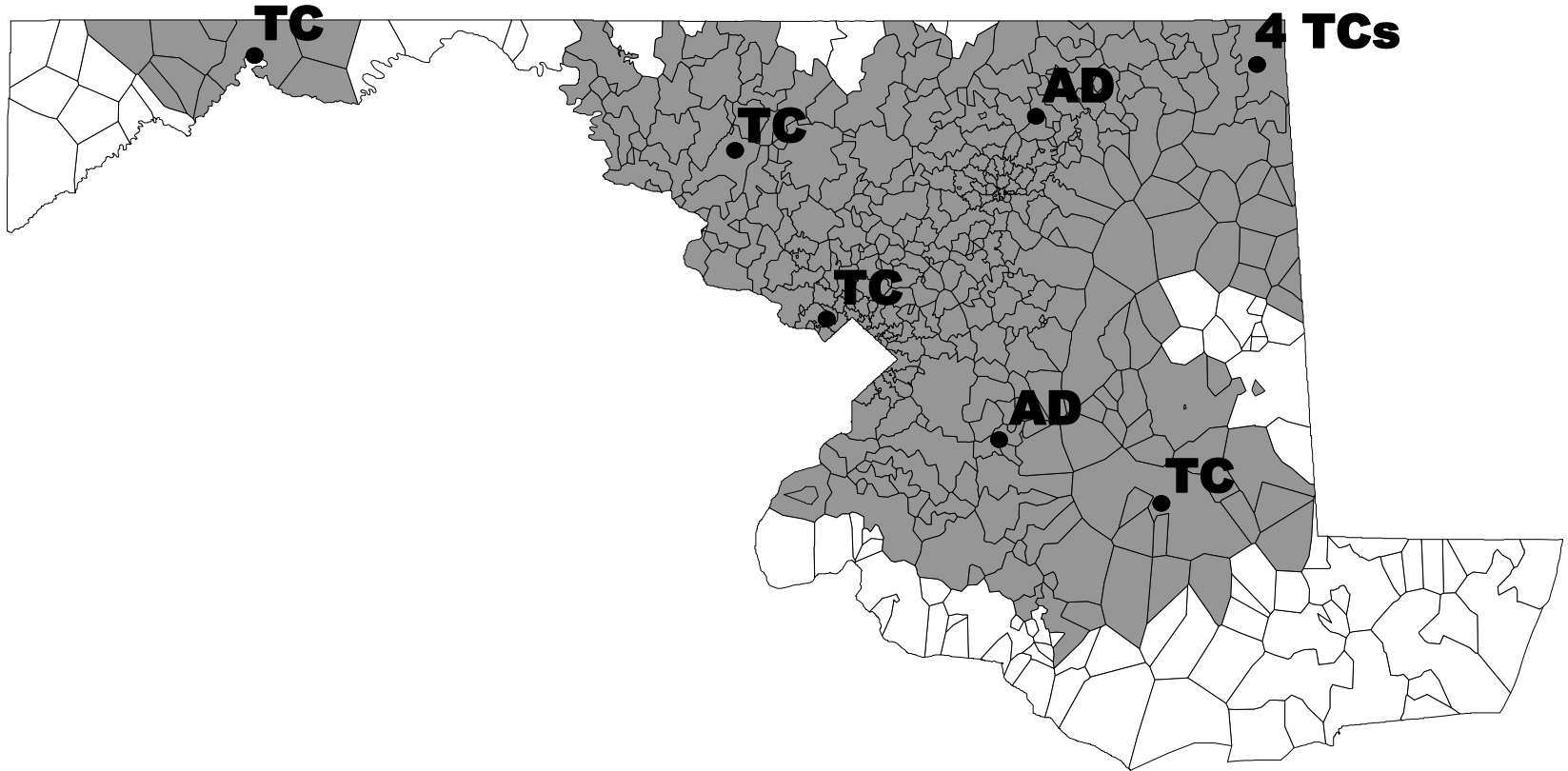
So what?

- First national assessment of geographic access to trauma centers.
- But only of existing resources - i.e. where *are* trauma centers located?
- What about policy questions like - where *should* trauma centers be located?



Existing system coverage within 45 minutes (94.8%)

System Reconfiguration 1

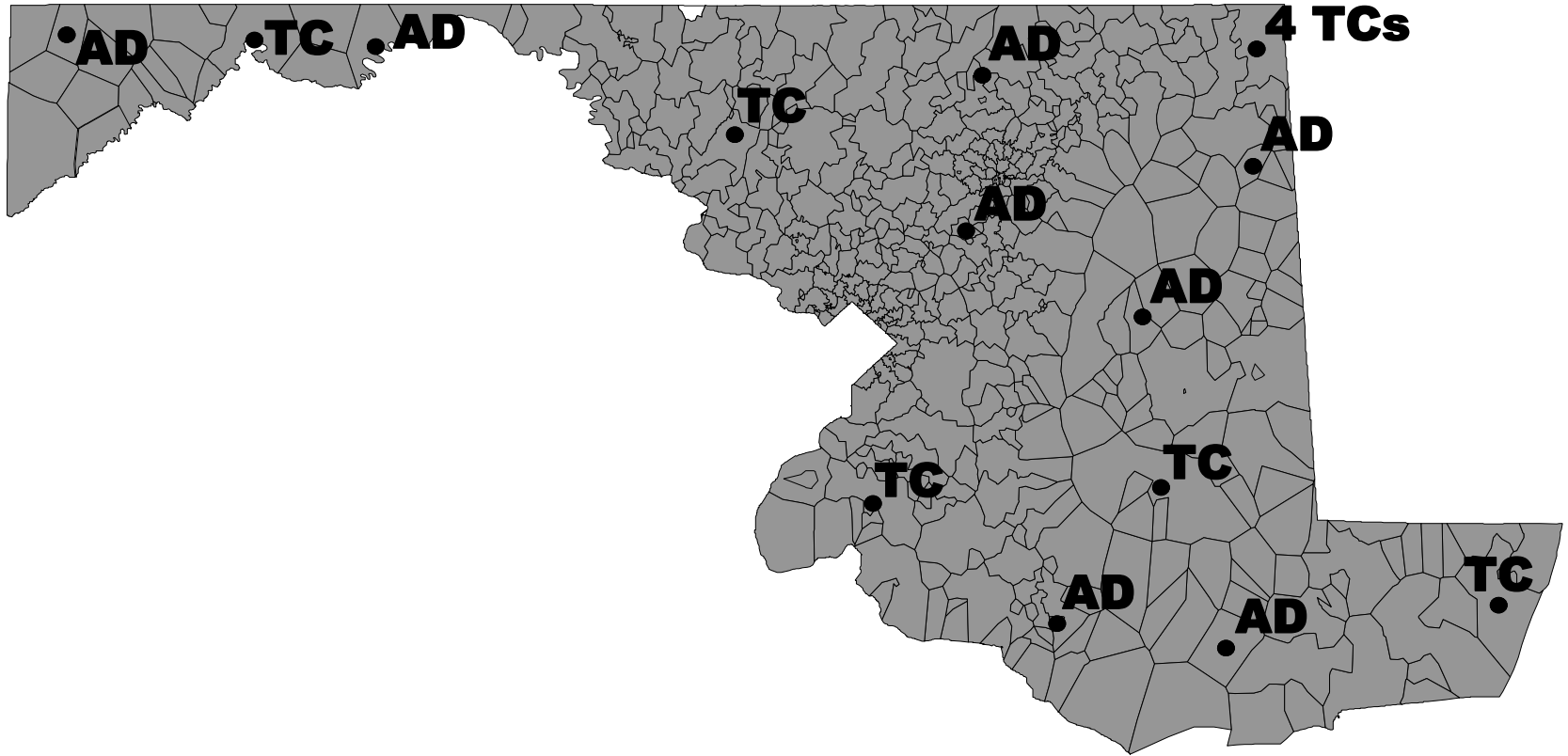


**Same coverage (94.2%)
less 1 TC and 6 ADs**



Urban
Health
Lab.org

System Reconfiguration 2



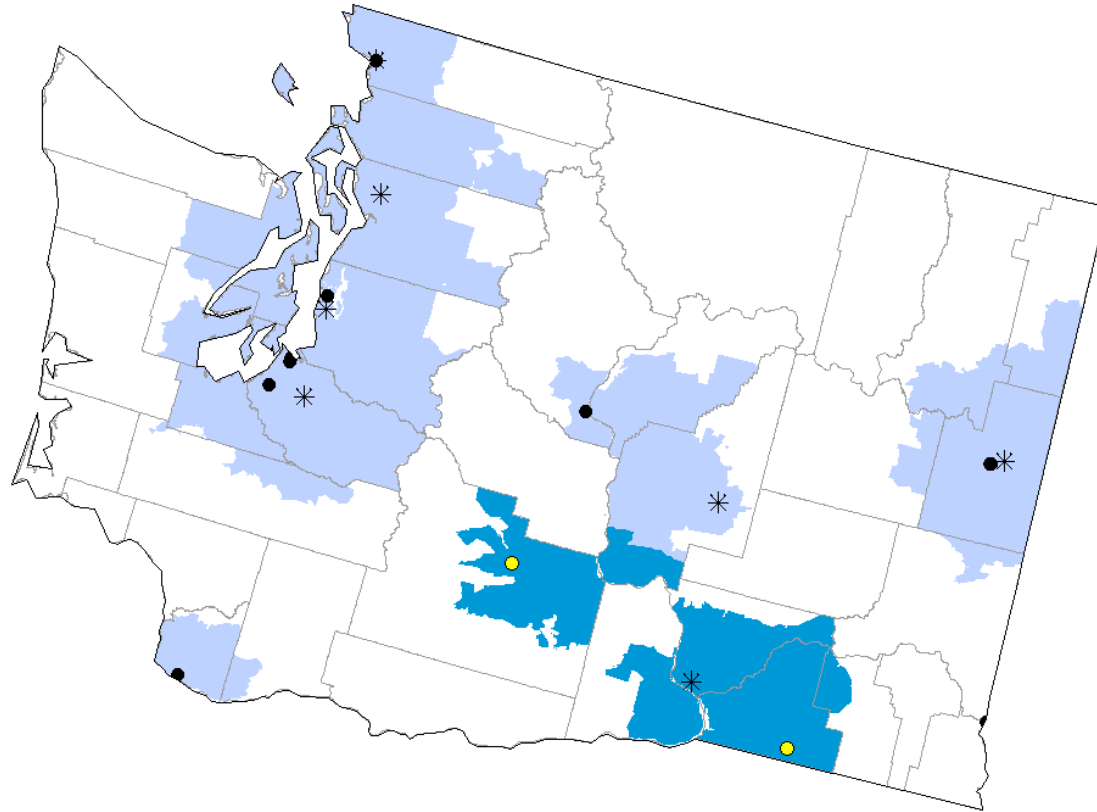
Same investment (9 TCs, 8 ADs) 5% more coverage
(461 sippy)



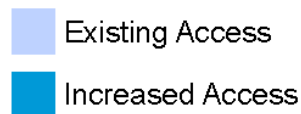
Urban
Health
Lab.org

Add 2 Trauma Centers

3.7% max gain in WA – 9.2% average gain in multiple states (60 mins)

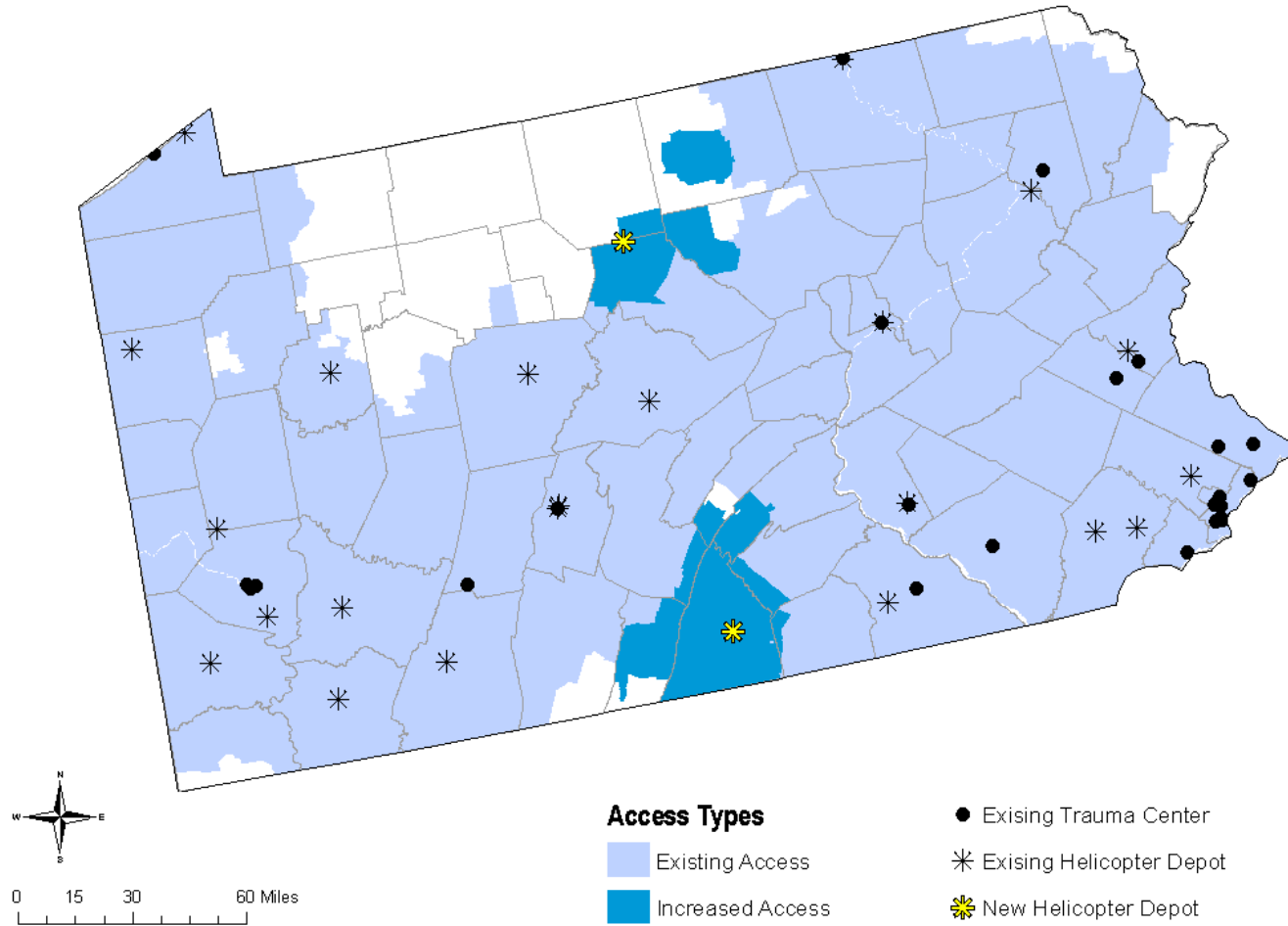


- Existing Trauma Center
- * Existing Helicopter Depot
- New Trauma Center



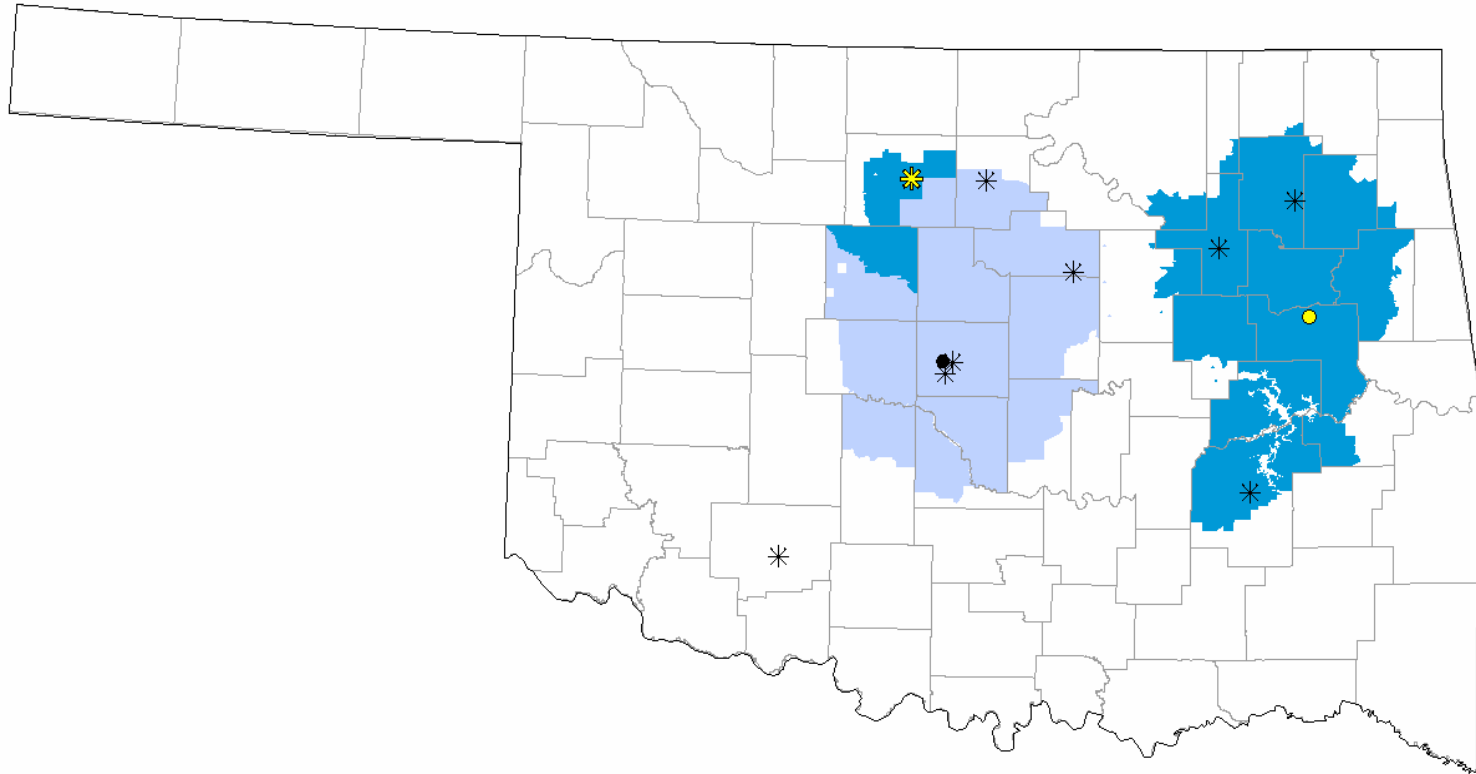
Add 2 Helipads

3.0% max gain in PA – 5.2% average gain in multiple states (60 mins)



Add 1 Trauma Center, 1 Helipad

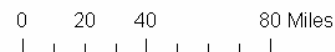
33.2% max gain in OK – 9.4% average gain in multiple states (60 mins)



- Existing Trauma Center
- * Existing Helicopter Depot
- New Trauma Center
- ✳ New Helicopter Depot

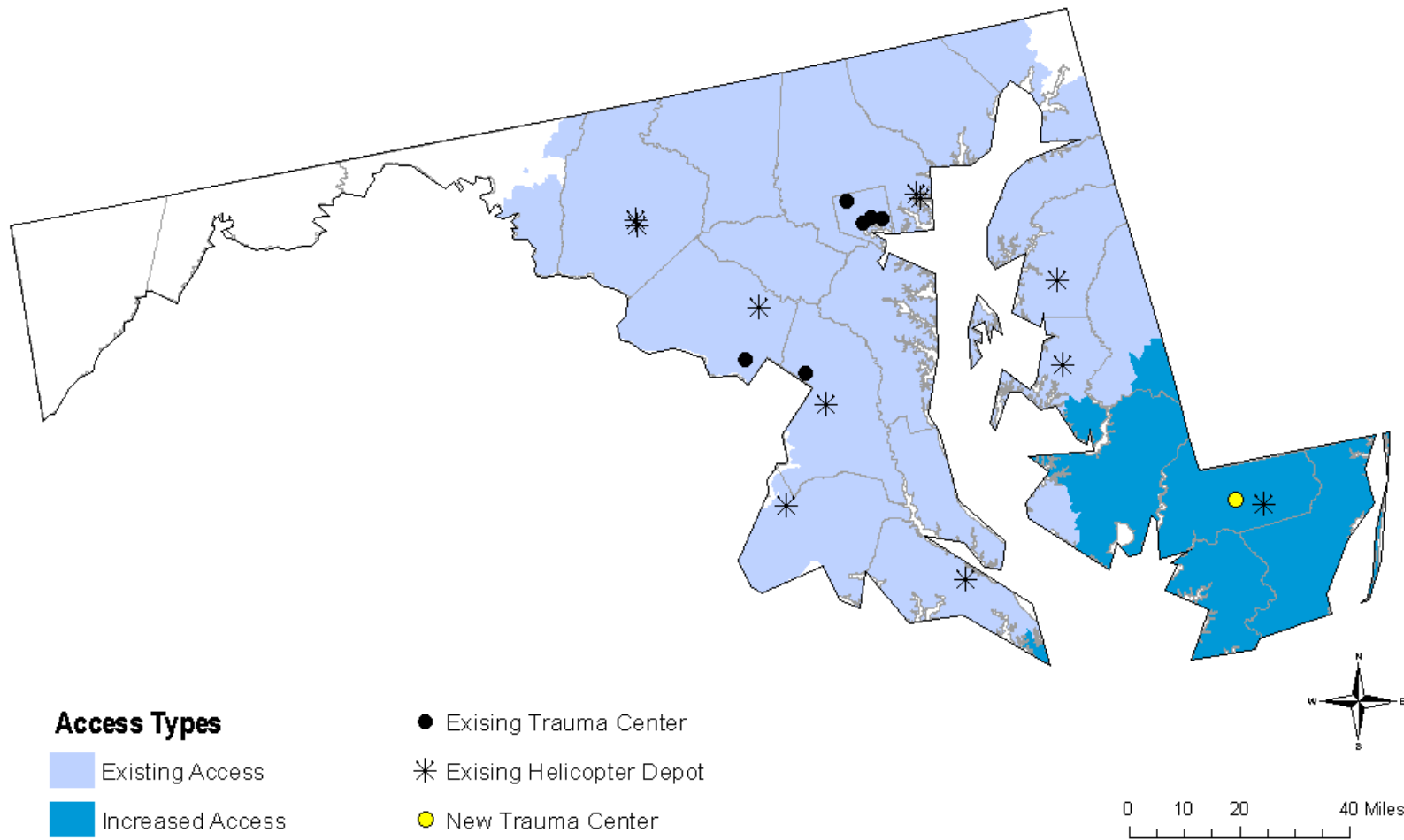


- Existing Access
- Increased Access



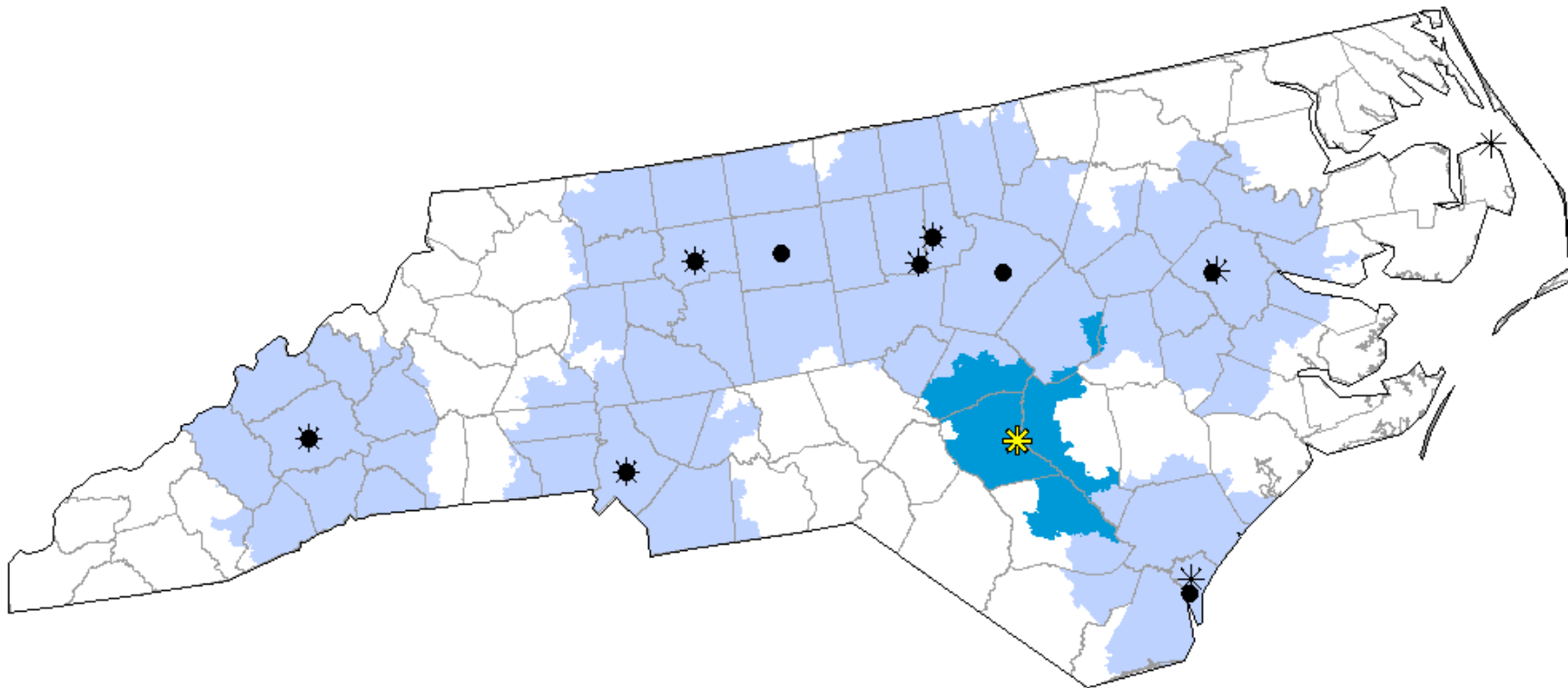
Add 1 Trauma Center

7.8% max gain in MD – 6.4% average gain in multiple states (60 mins)



Add 1 Helipad

5.8% max gain in NC – 3.4% average gain in multiple states (60 mins)



Access Types

- Existing Access
- Increased Access

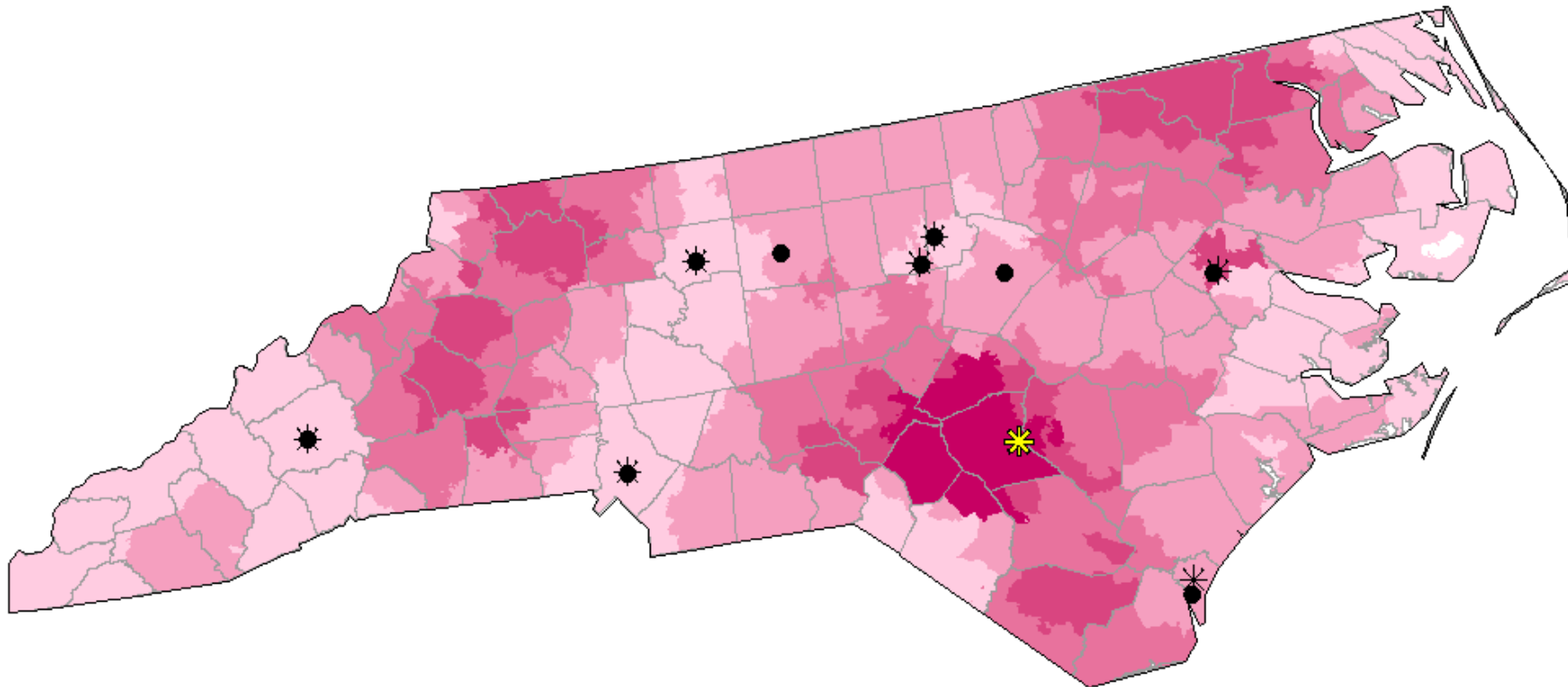
- Existing Trauma Center
- Existing Helicopter Depot
- New Helicopter Depot



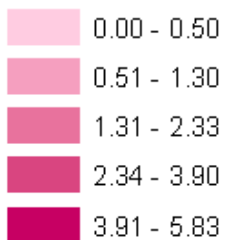
0 20 40 80 Miles

Add 1 Helipad

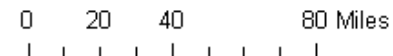
5.8% max gain in NC – 3.4% average gain in multiple states (60 mins)



New Helicopter Depot

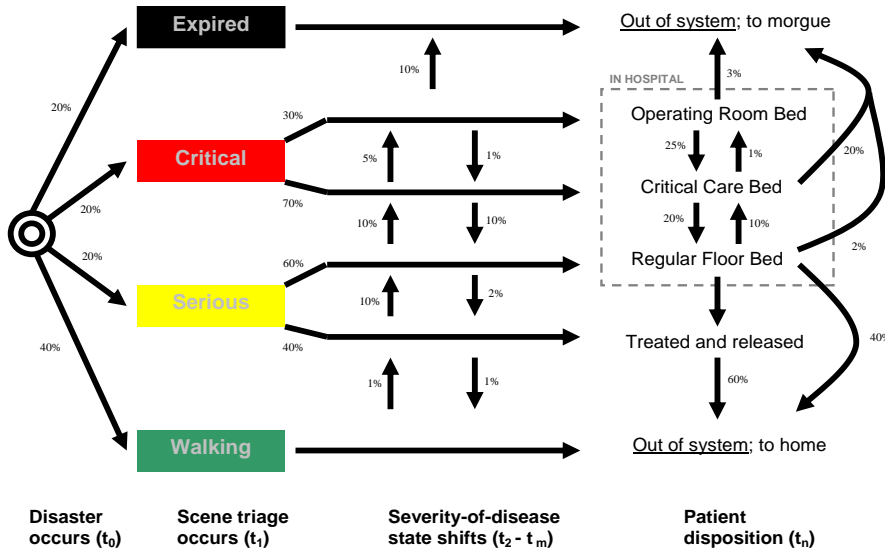


- Existing Trauma Center
- * Existing Helicopter Depot
- ✱ New Helicopter Depot

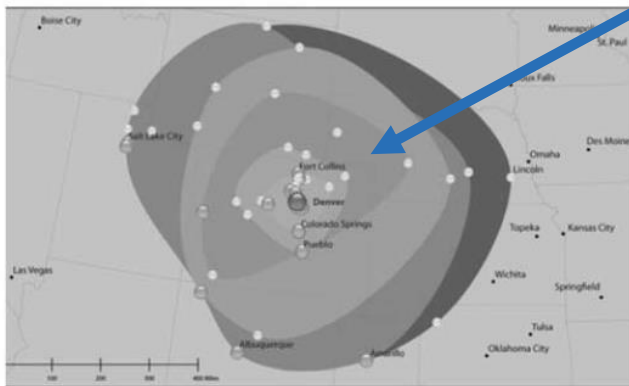


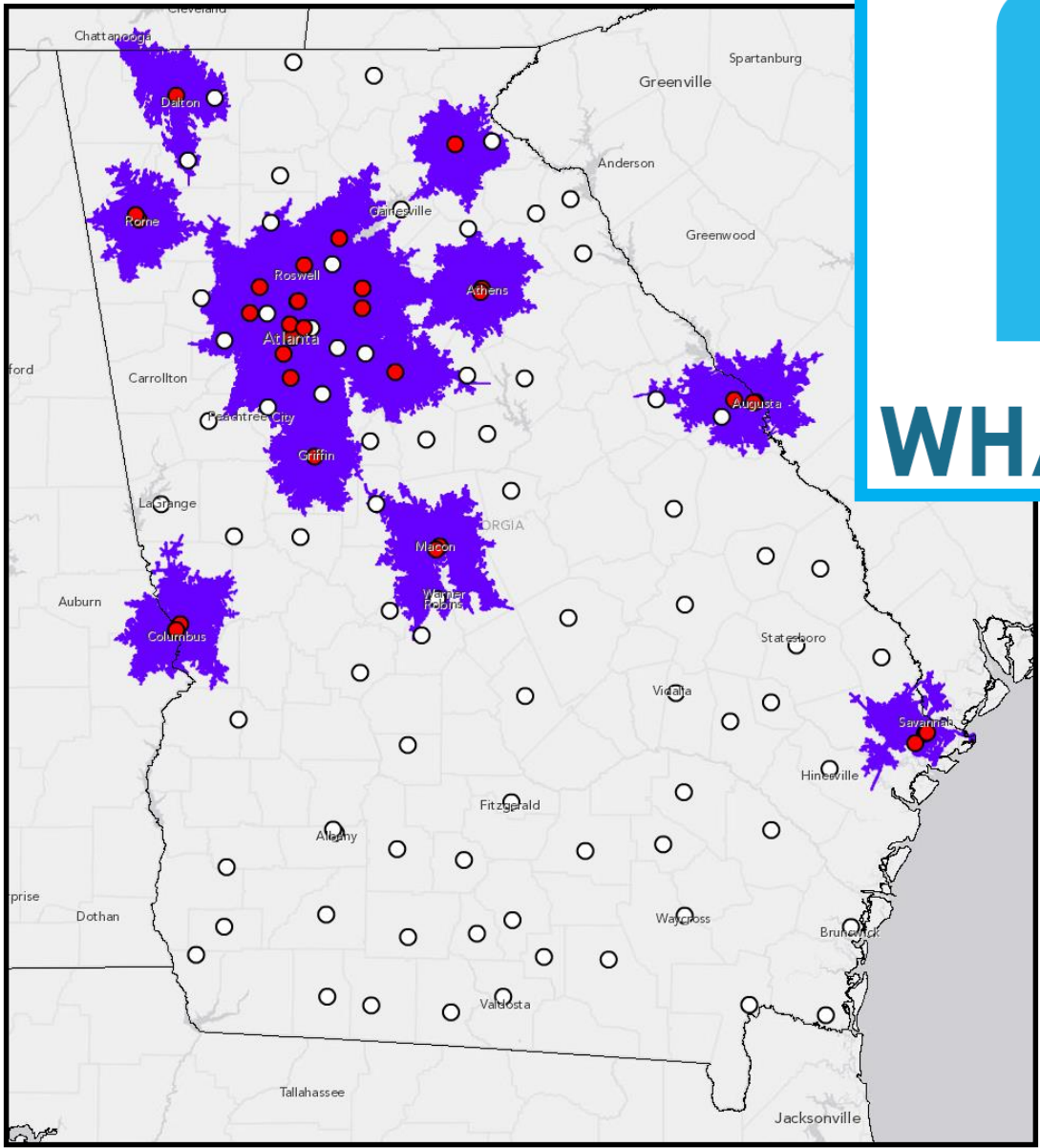
Geo-Optimization for Disaster Response

Dynamic simulation-optimization tool in 25 largest US cities



Carr © 2016 Prehospital and Disaster Medicine





Urban Health Lab.org

Take home points

1. Place matters, a lot – visually, biologically, sociologically
2. Don't expect individual treatments to work if the places people live in remain chaotic, unhealthy, and isolated
3. Changing places can be potent stand-alone treatments, and need not be complex or expensive to have big impact