Using GIS in Planning Behavioral Health Preventive Services

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Health Impact of Mental Illness & Alcohol/Drugs

- Global Burden of Disease (Murray & Lopez, 1996)
  - Include non-fatal health outcomes
  - Remove focus from mortality only
- Disability-adjusted Life Years (DALYS)
  - Basic metric in global burden methodology
- $DALY_i = YLL_i + YLD_i$
  - YLL = Years of life lost
  - YLD = Years lived with disability
    - Adjusted for the severity of the disability (quality of life)
  - 1 DALY = loss of 1 year of full health
  - Comparable and additive across illnesses

Health Impact of Mental Illness & Alcohol/Drugs

- Burden of disease attributable to mental illness/substance use disorders expected to rise from 12.3% in 2000 to 14.7% in 2020 (Murray & Lopez, 1997 *Lancet)*
- Tobacco (4.1%) & alcohol (4.0%) are the 4th and 5th leading risk factors worldwide for burden of disease (Rodgers et al. 2004 PLoS*)*
- Tobacco and alcohol are the first and second leading risk factors for North America (Said & Wegman, 2007)

General Themes for Planning Behavioral Health Prevention

1. How do you change a system, (CD prevention) from one in which services are provided at locations where agencies were invited to be, to a system that is responsive to areas and populations with the greatest need for services?

Note: CD=chemical dependence

General Themes for Planning Behavioral Health Prevention

2. How do we develop a system in which service provider decisions about their programs are based on information and data, rather than notions, beliefs, and previous practice (e.g., we've always done it this way).

Mission of Planning Process

- To develop a CD/MI prevention system that is responsive to general as well as differentiated population risk factors.
- To create a system of assessment that drives:
  - (a) decision making about where to provide programs (needs assessment)
  - (b) how providers assess the impact and delivery of their programs
  - (c) the examination of the actual impact of the services on key outcomes in subareas of Erie County, NY.

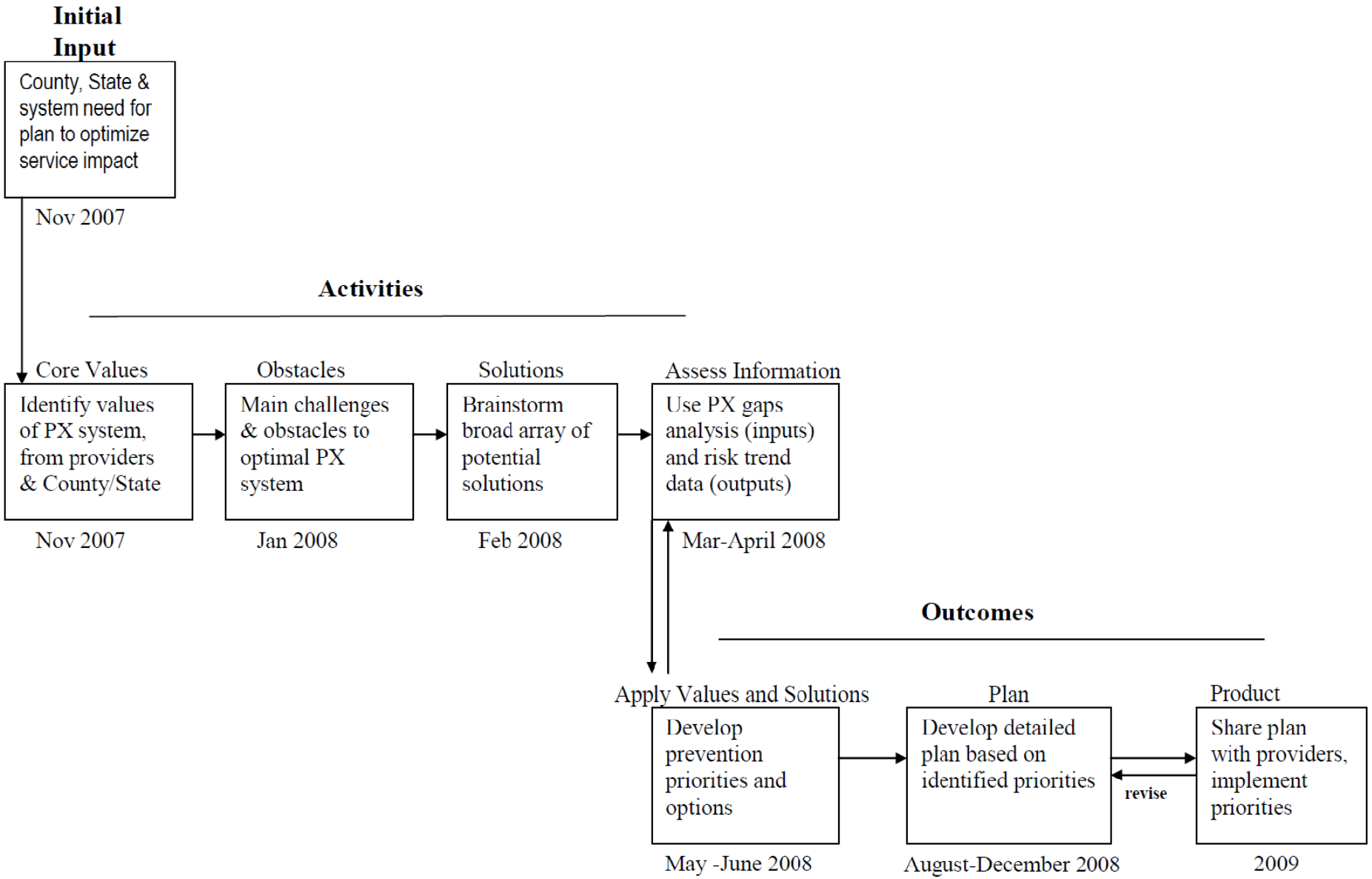
Comprehensive Prevention Plan

- Interactive planning process
  - CHSR, ECDMH, all CD/MH providers
  - Sustained planning effort
- Driven by data and provider knowledge and experience
  - Also PARIS, OASAS, SAMHSA
- Inclusive of CD and mental illness prevention
- Focus: Achieving excellence for our prevention system

Utilization of GIS Analyses and Maps in the Planning Process

- Maps and related geographic analyses were used as relevant background information.
- The planning participants utilized the GIS info, as well as their professional experience, training, and other information known to them, to
  - identify challenges for the prevention system
  - to brainstorm responses to those challenges
  - to develop prevention system priorities
  - to identify general principles on how to plan, deliver, and assess prevention services.

Comprehensive Prevention Planning Concept Model



Risk Indicator Database (RIDB)

- Purpose: To provide valid, archival data to be used for needs assessment, especially to identify populations at higher risk for CD
- Initiated in 2001, updated and enhanced continually since then.

Development of RIDB

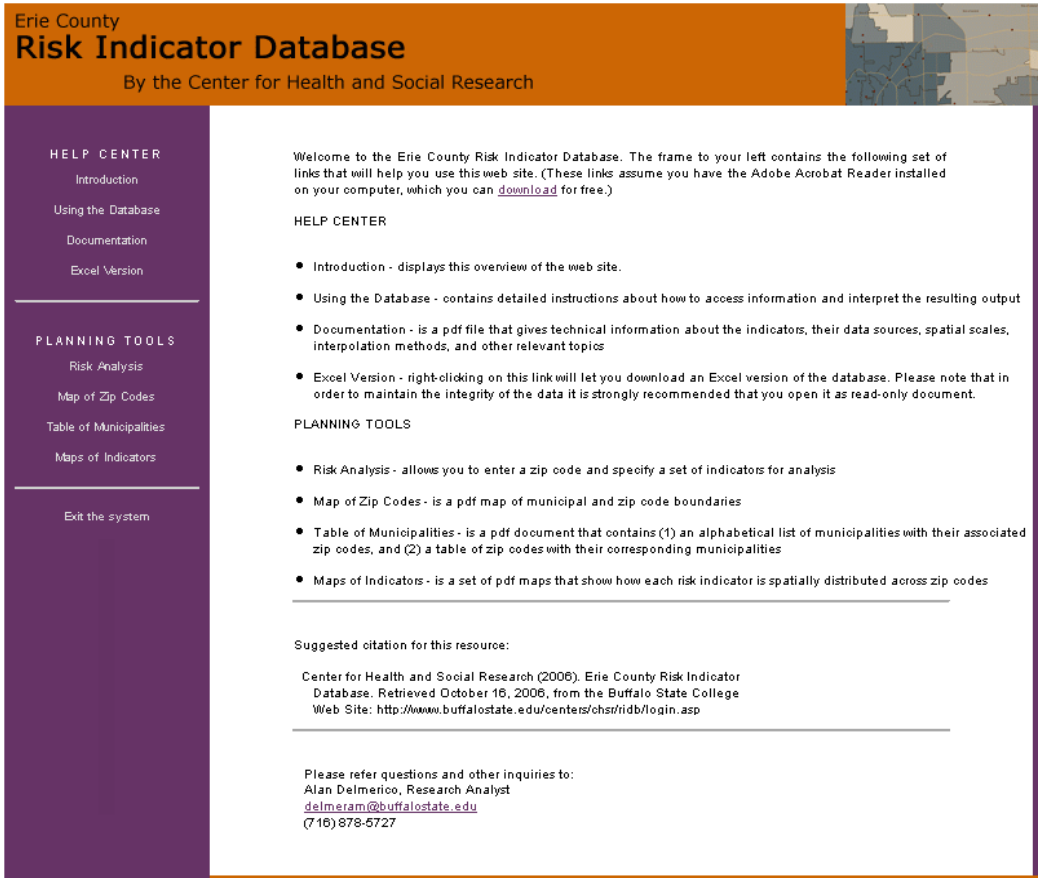
- Identification of archival data [census, health, crime, alc availability etc.]
- Validation of the small area [tracts, zip codes] version of indicators using Erie County Health Outcomes survey data
- Matching the indicators to the Hawkins/Catalano risk and protective factor model (PX model used by OASAS)

RIDB Utilization

- Providers overcame fear of objective needs assessment information
- Learning community of providers/ECDMH/CHSR/other agencies was developed
- Utilization of RIDB required a simple user interface [even basic searching by zip/census tract was difficult for most providers], additional assistance was needed to interpret the RIDB risk factors

RIDB Software Example I

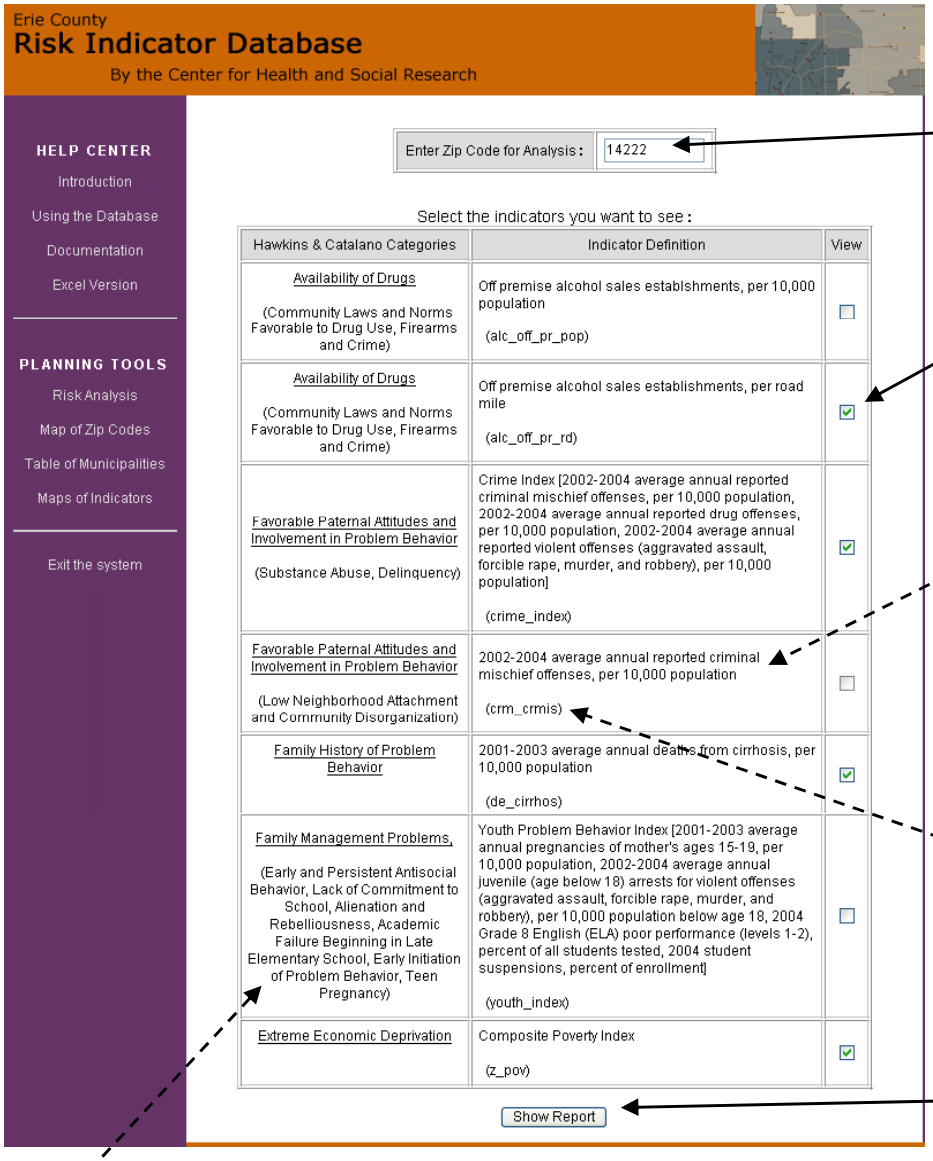
Main Navigation Screen



- The main navigation screen for the RIDB web interface explains the content and links available in the **Help Center** and **Planning Tools.**
- The **Help Center** provides detailed instructions for using the database and interpreting the results, technical documentation for the indicators, and a downloadable MS Excel version of the database.
- **Planning Tools** provides links to the analytical components of the web interface via the ***Risk Analysis*** link, as well as access to maps of the indicators and tools for identifying ZIP codes of interest.

RIDB Software Example II

Risk Analysis



Input ZIP code of interest

Choose the desired indicators for analysis (the default setting is all indicators)

Descriptions for each indicator, including its denominator (e.g. per 10,000 population)

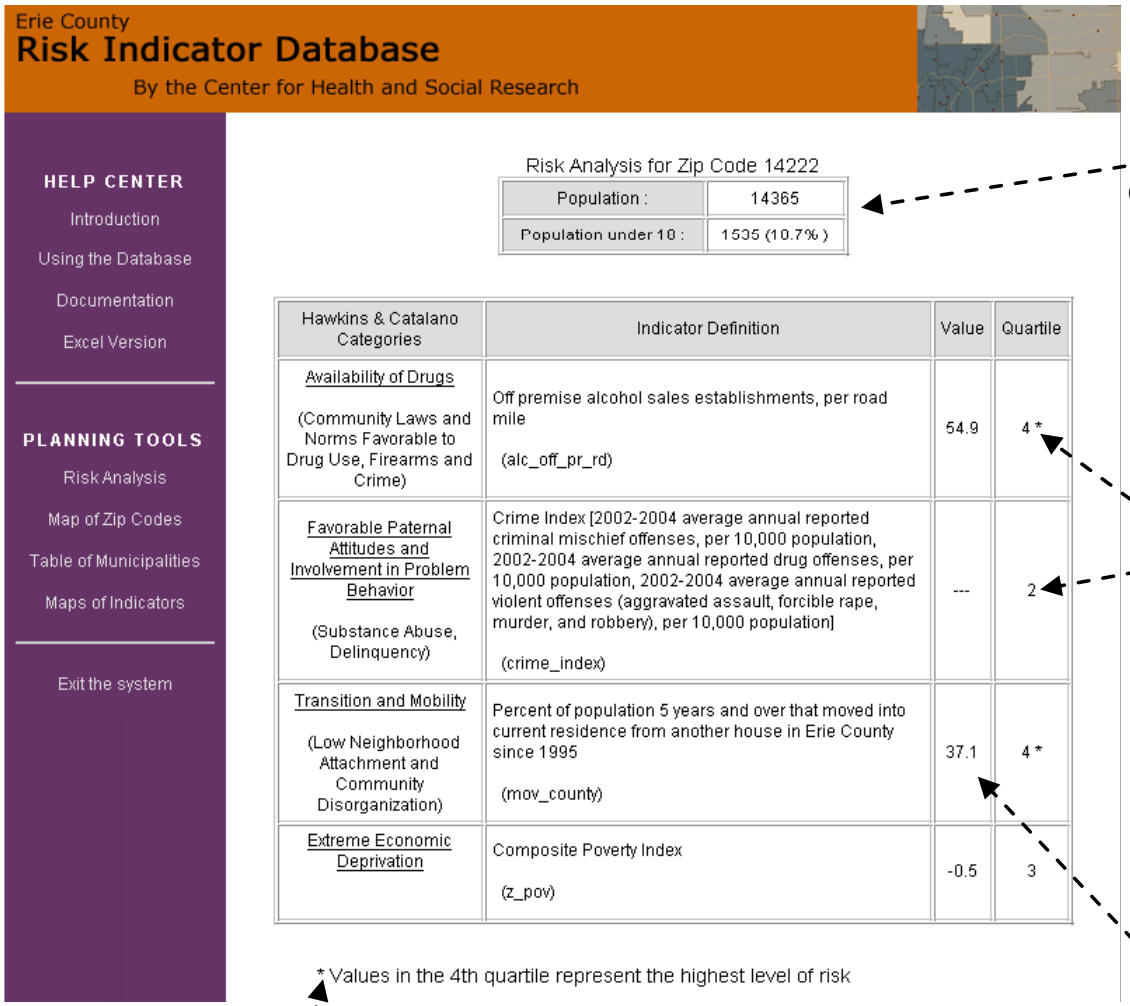
The variable name for the indicators are listed in parentheses

Click the **Show Report** button to produce the output table for the selected ZIP code

Hawkins and Catalano model categories that are associated with the indicator

RIDB Software Example III

Output Table



Erie County
Risk Indicator Database
By the Center for Health and Social Research

HELP CENTER
Introduction
Using the Database
Documentation
Excel Version

PLANNING TOOLS
Risk Analysis
Map of Zip Codes
Table of Municipalities
Maps of Indicators

Exit the system

Risk Analysis for Zip Code 14222

Population :	14365
Population under 18 :	1535 (10.7%)

Hawkins & Catalano Categories	Indicator Definition	Value	Quartile
Availability of Drugs (Community Laws and Norms Favorable to Drug Use, Firearms and Crime)	Off premise alcohol sales establishments, per road mile (alc_off_pr_rd)	54.9	4 *
Favorable Paternal Attitudes and Involvement in Problem Behavior (Substance Abuse, Delinquency)	Crime Index [2002-2004 average annual reported criminal mischief offenses, per 10,000 population, 2002-2004 average annual reported drug offenses, per 10,000 population, 2002-2004 average annual reported violent offenses (aggravated assault, forcible rape, murder, and robbery), per 10,000 population] (crime_index)	---	2
Transition and Mobility (Low Neighborhood Attachment and Community Disorganization)	Percent of population 5 years and over that moved into current residence from another house in Erie County since 1995 (mov_county)	37.1	4 *
Extreme Economic Deprivation	Composite Poverty Index (z_pov)	-0.5	3

* Values in the 4th quartile represent the highest level of risk

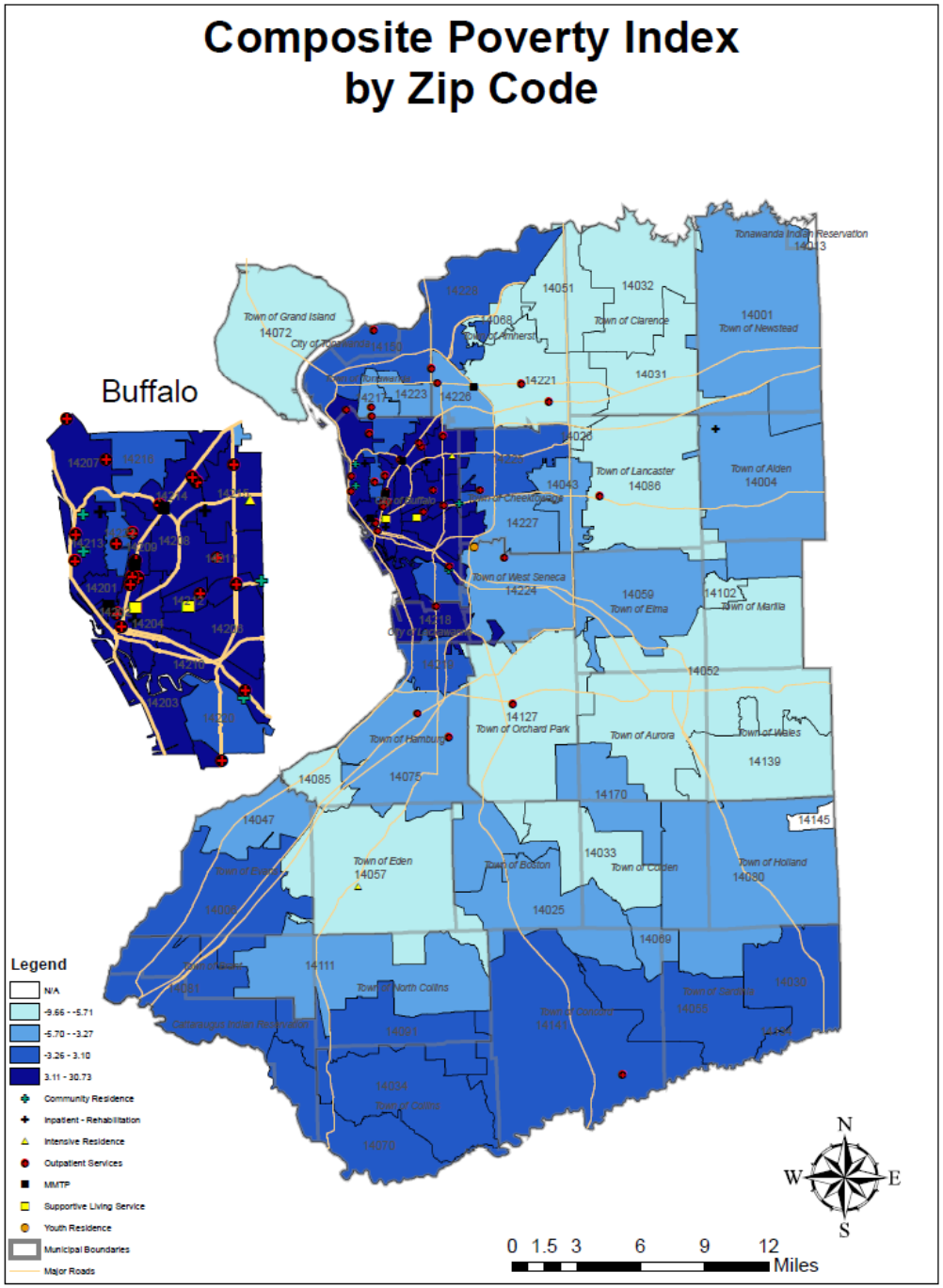
ZIP code population characteristics, including raw number and percent of the population under 18

Quartile Values

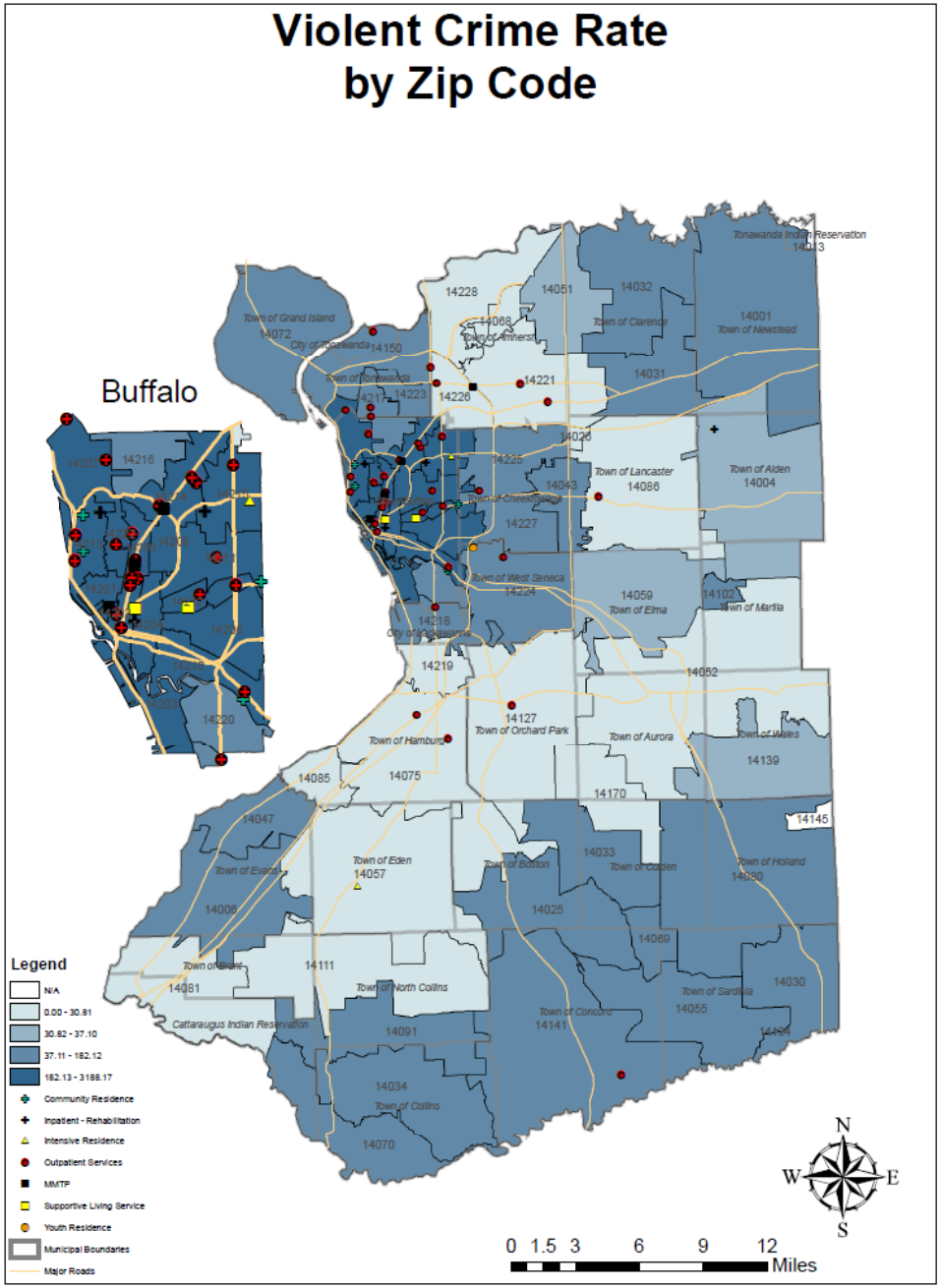
Raw Value of Indicator (see Indicator Definition for details)

Values in the 4th quartile are marked with an asterisk, highlighting that these values represent the highest level of risk

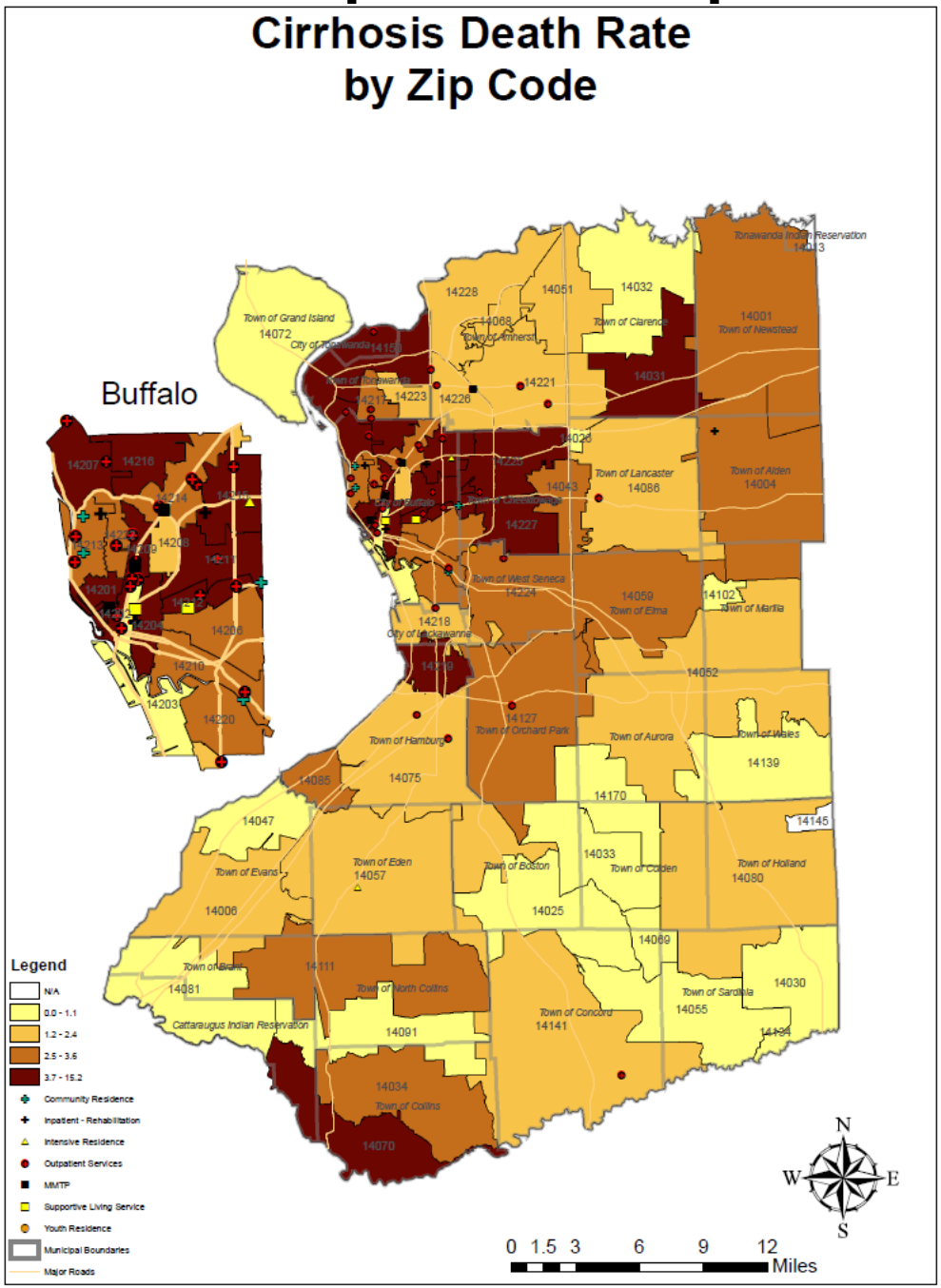
RIDB Example Map I



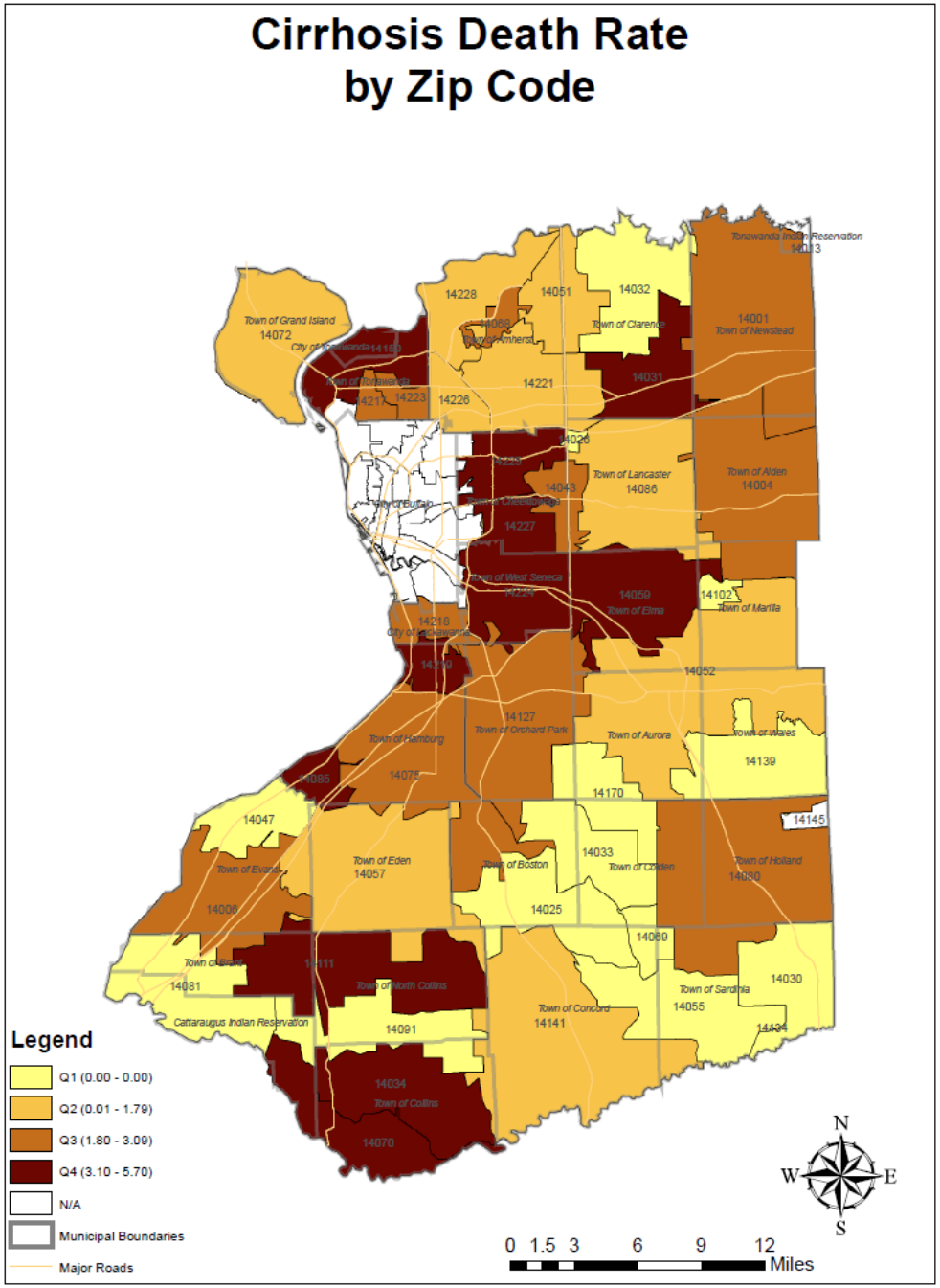
RIDB Example Map II



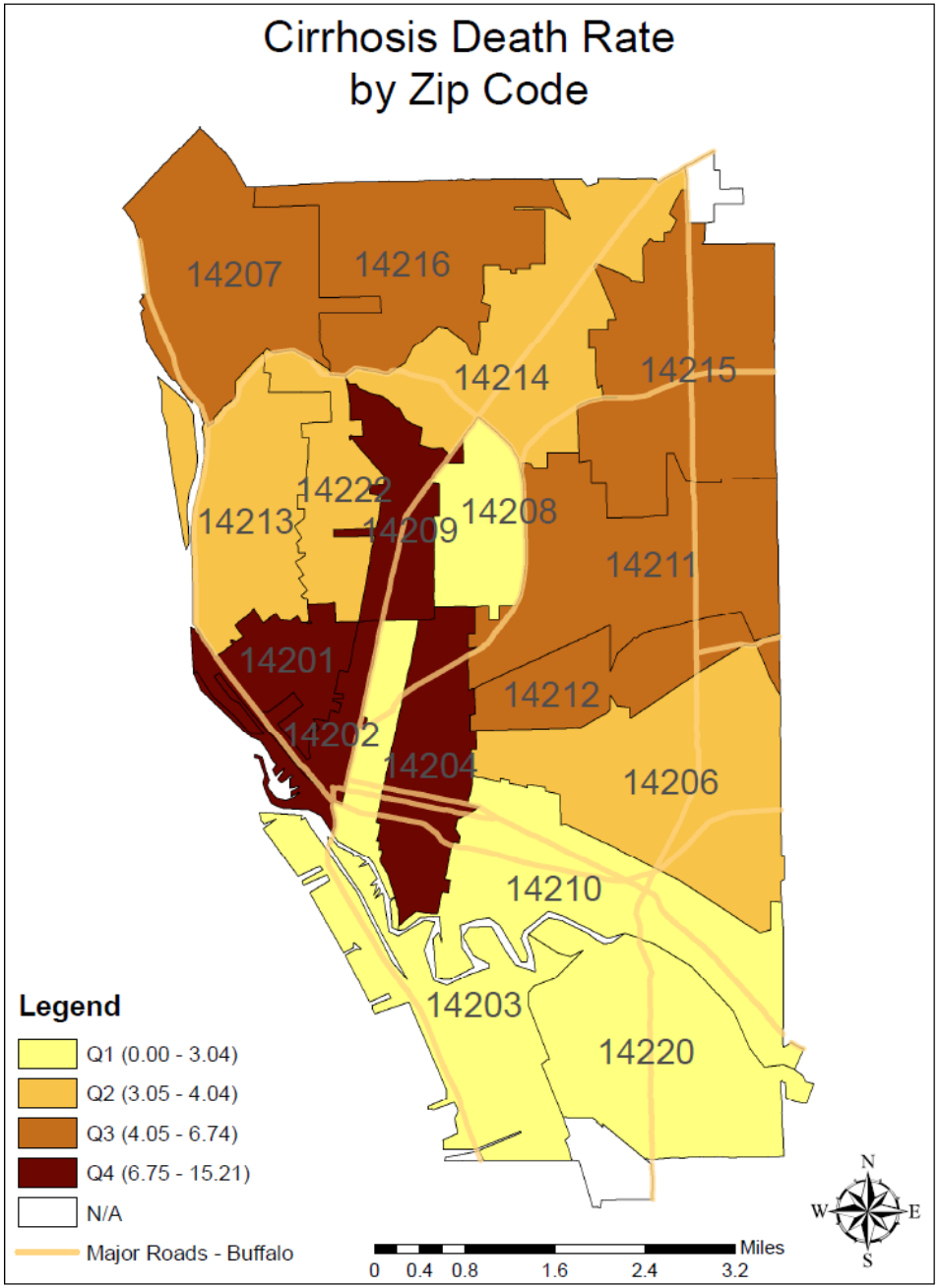
RIDB Example Map III



RIDB Example Map - Updated Areas I



RIDB Example Map - Updates Areas II



Prevention Gaps Analysis

- Are all areas of the County receiving prevention programming?
  - What types of programs?
- How do programs match to the community risks/need?
- Mapped prevention programs by type and compared to RIDB.

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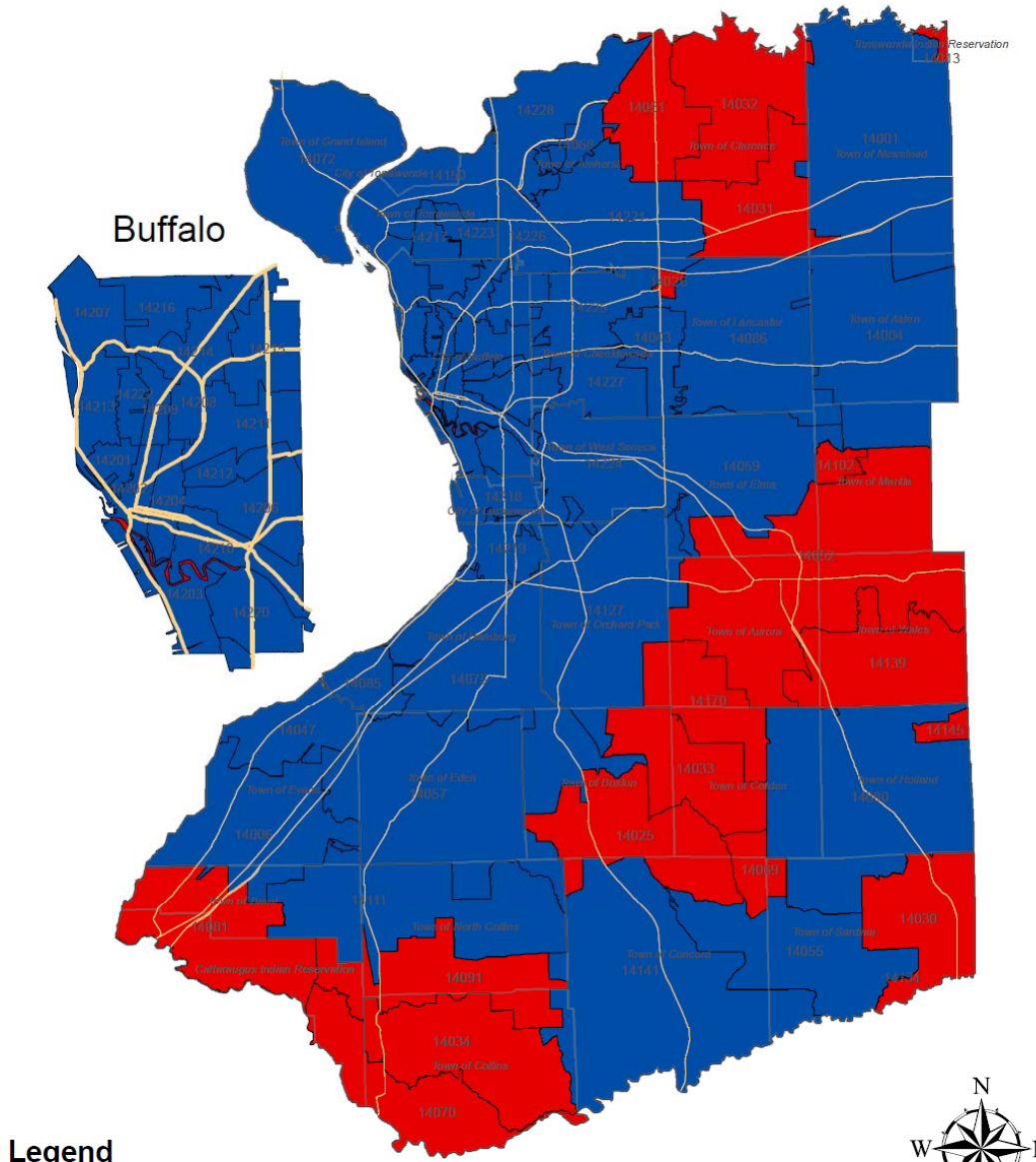
Erie County Prevention Programs by Zip Code: Prevention Programs (Any Age Level and Program Type)



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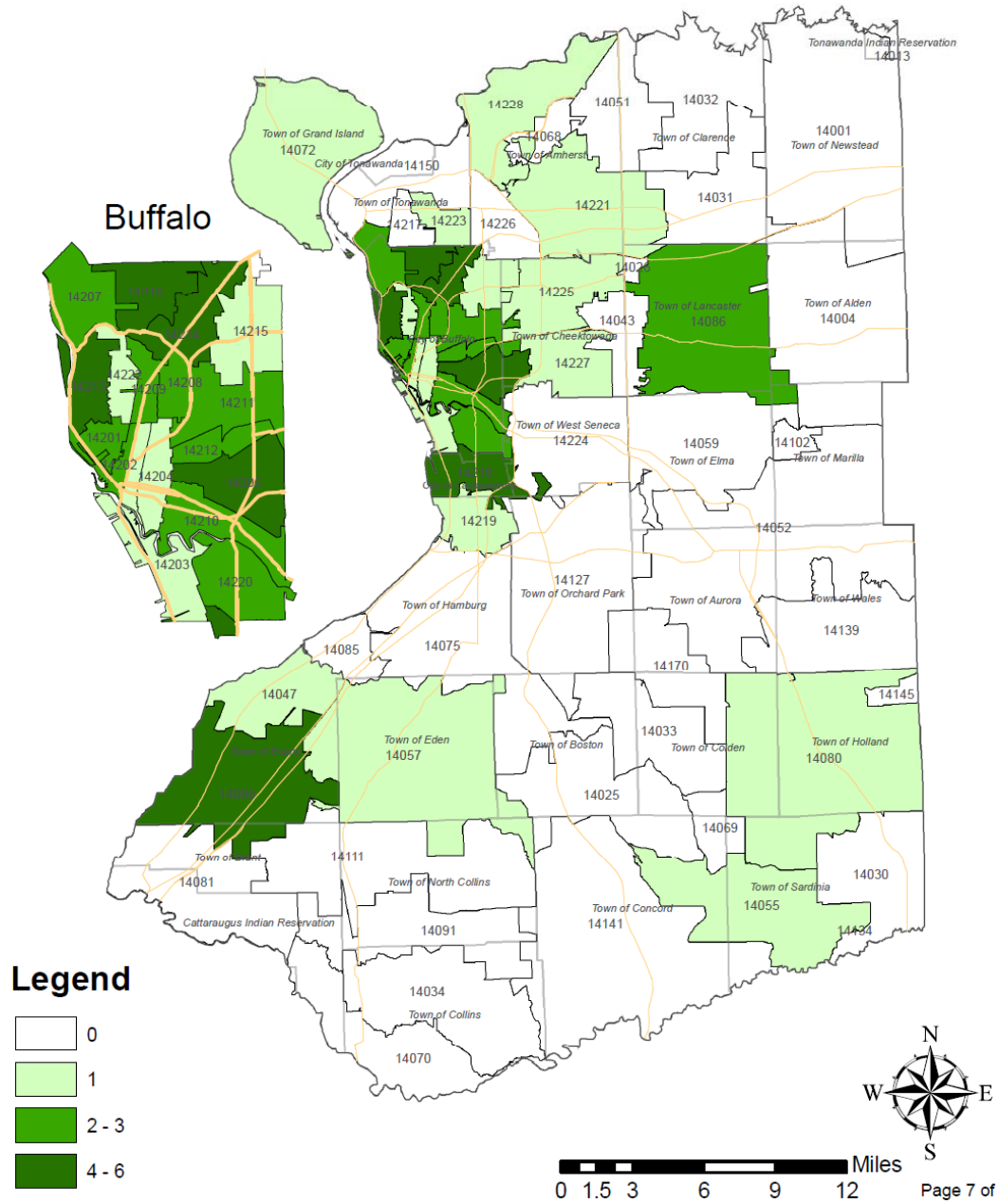
Erie County Prevention Programs by Zip Code: Sum of Middle School Programs (Any Program Type)



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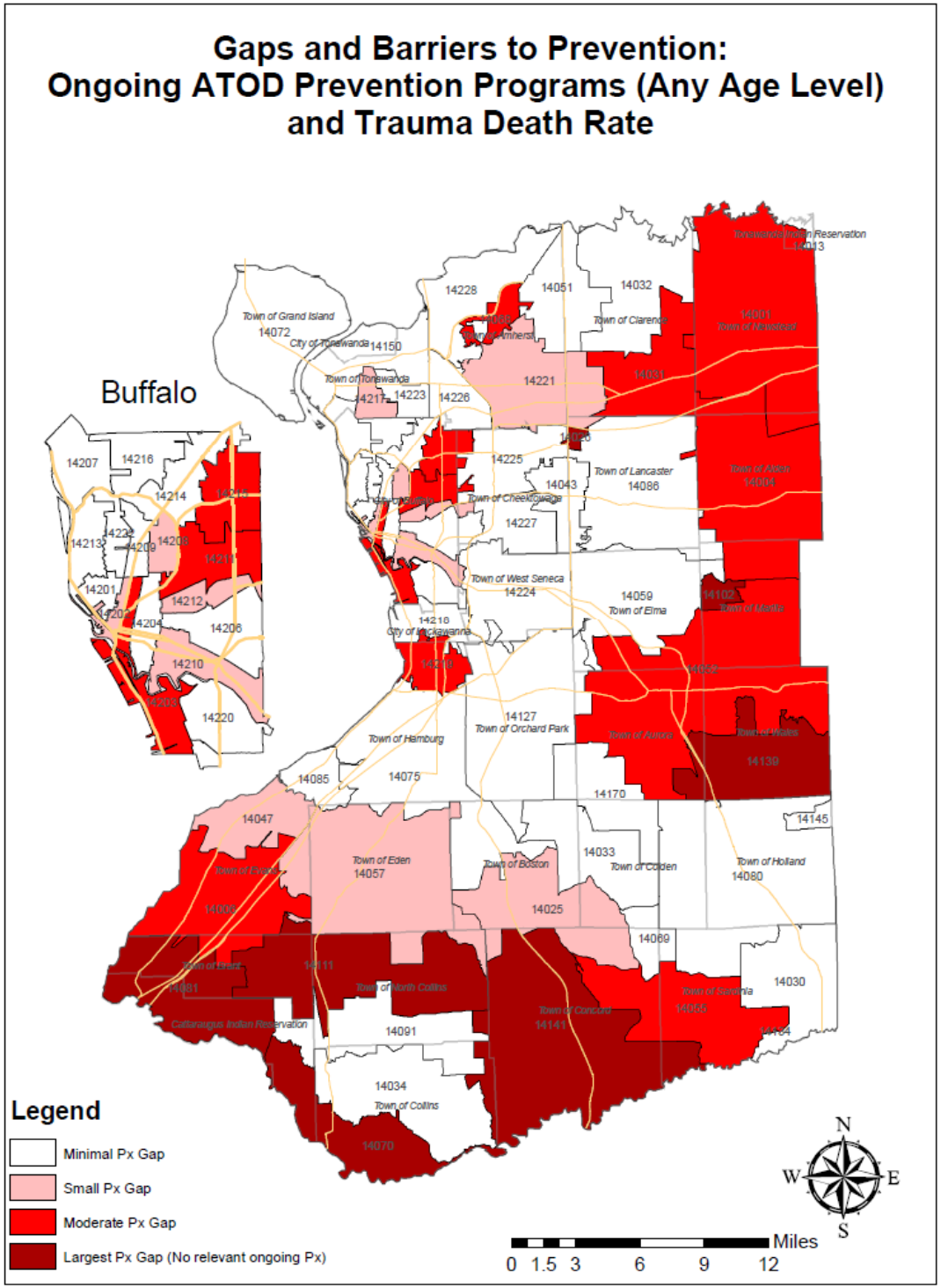
Gaps and Barriers to Prevention: Ongoing ATOD Prevention Programs (Any Age Level) and Trauma Death Rate



Impact of Gaps Analysis

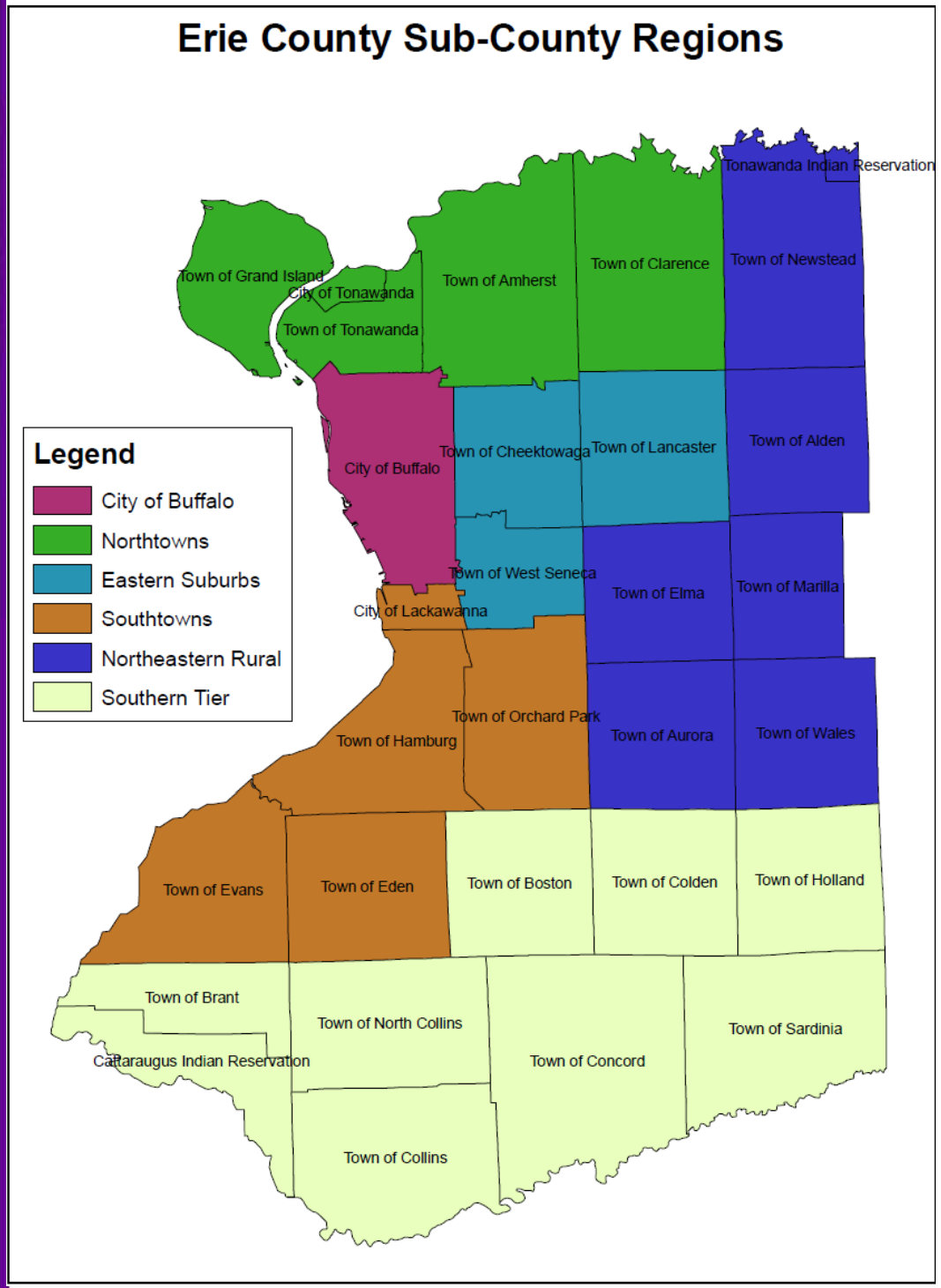
- Showed scope of need for broader prevention coverage
  - PX type (ATOD vs other), age group
- Provided tangible evidence that much needed to be done (no areas had full comprehensive prevention coverage)
- Utilized in the development of the comprehensive plan
  - Drove discussion about what the system is, where it is, what it should accomplish

System Outcomes and Impact Assessment

- System impact assessment
  - beyond the scope of agency-level evaluation
- Major challenges for system assessment
  - especially at sub-county level
  - lack of readily available data
  - need for trend/comparative analysis
- Focus on major impact—does PX/TX services affect crucial outcomes

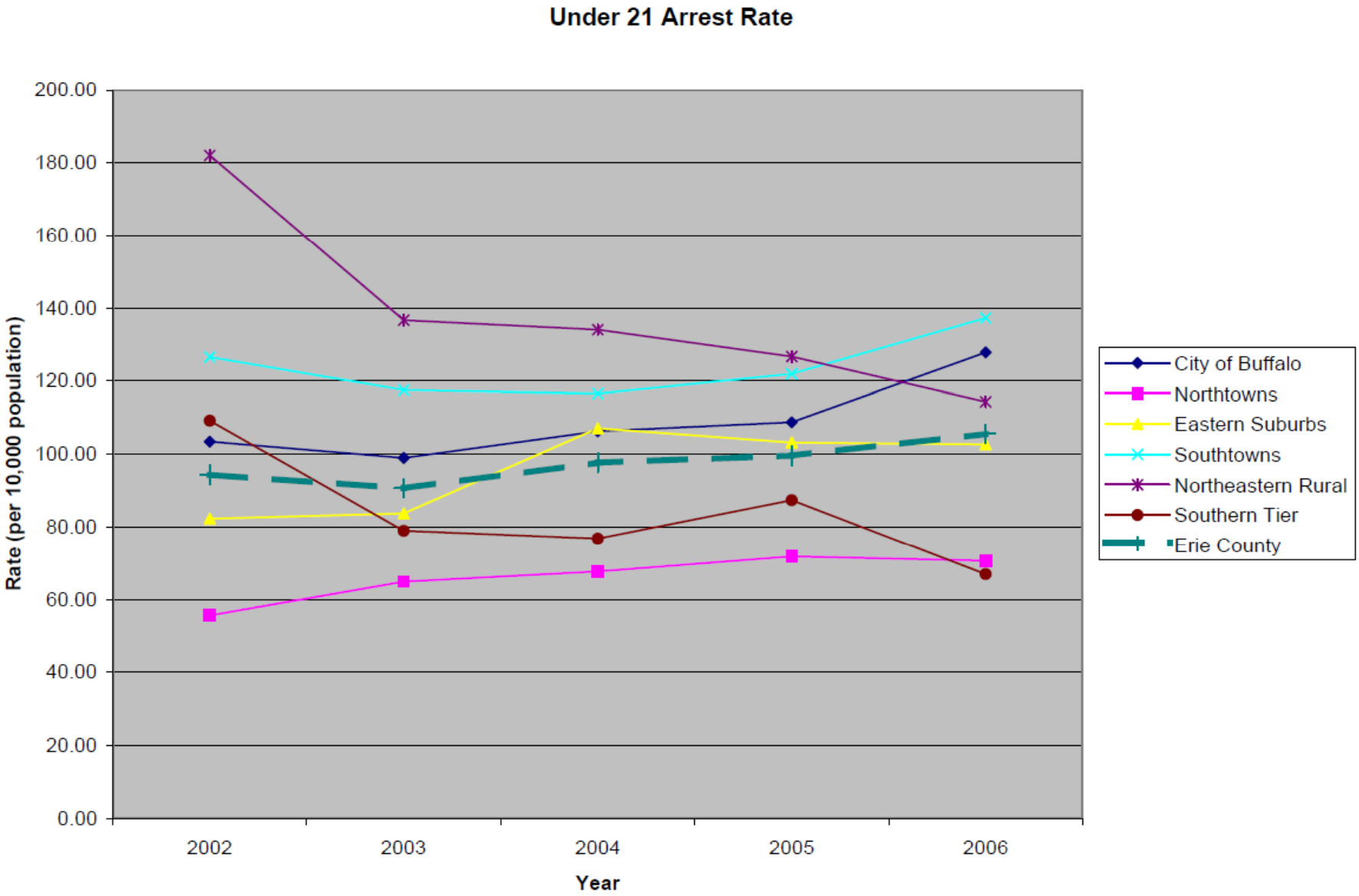
PX/TX System Impact Approach

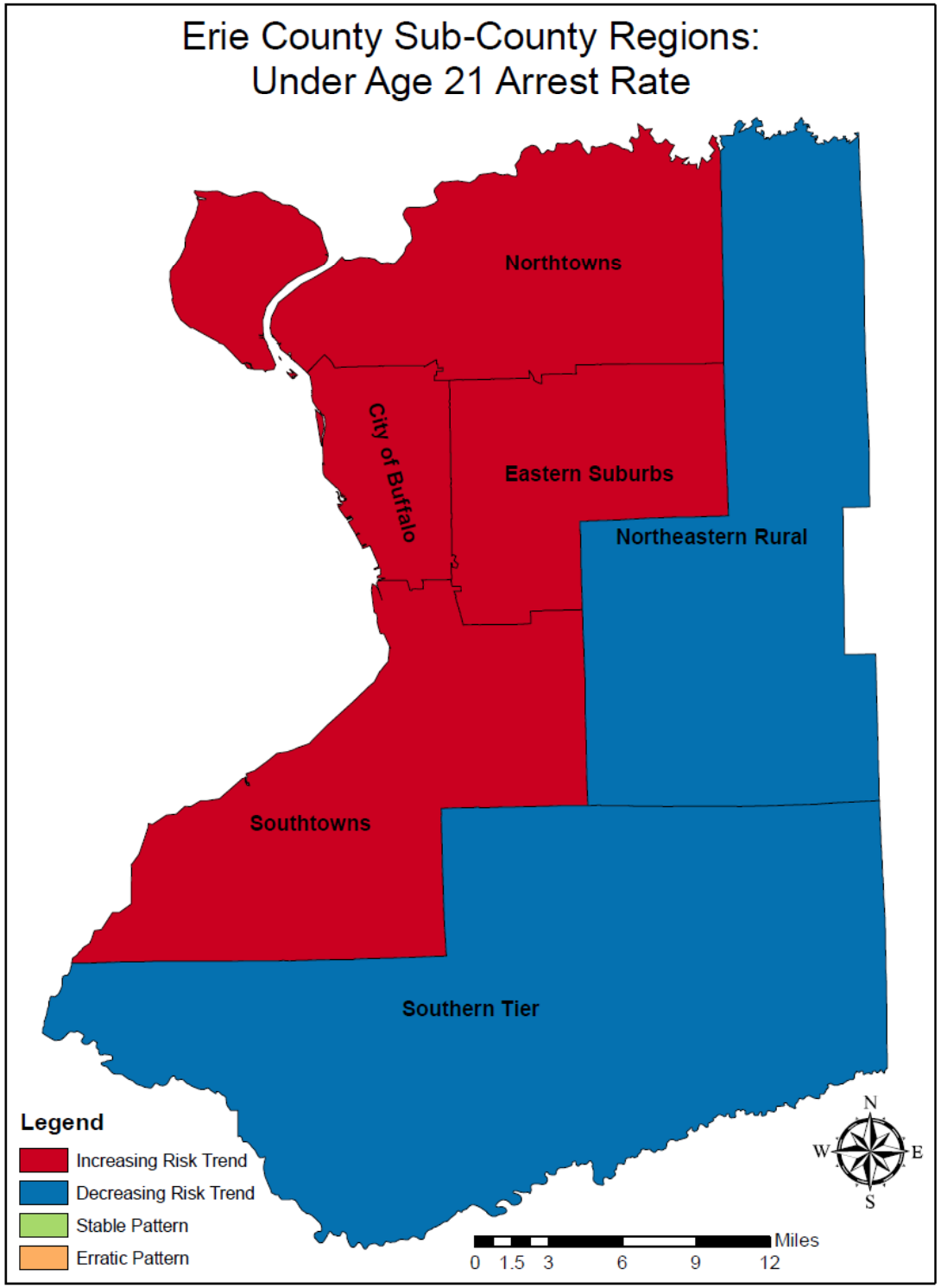
- Develop contiguous sub-county regions
- Population sufficient for stable yearly estimates – allows trend analysis
- Measures selected to match SAMHSA national outcomes measures (NOMs)
  - Key areas: reduced morbidity, crime/CJ, educational outcomes, capacity
- Initial assessment utilized archival data
  - Dept of Health, CPS, Dept of Education
- Future plan to add sub-region surveys



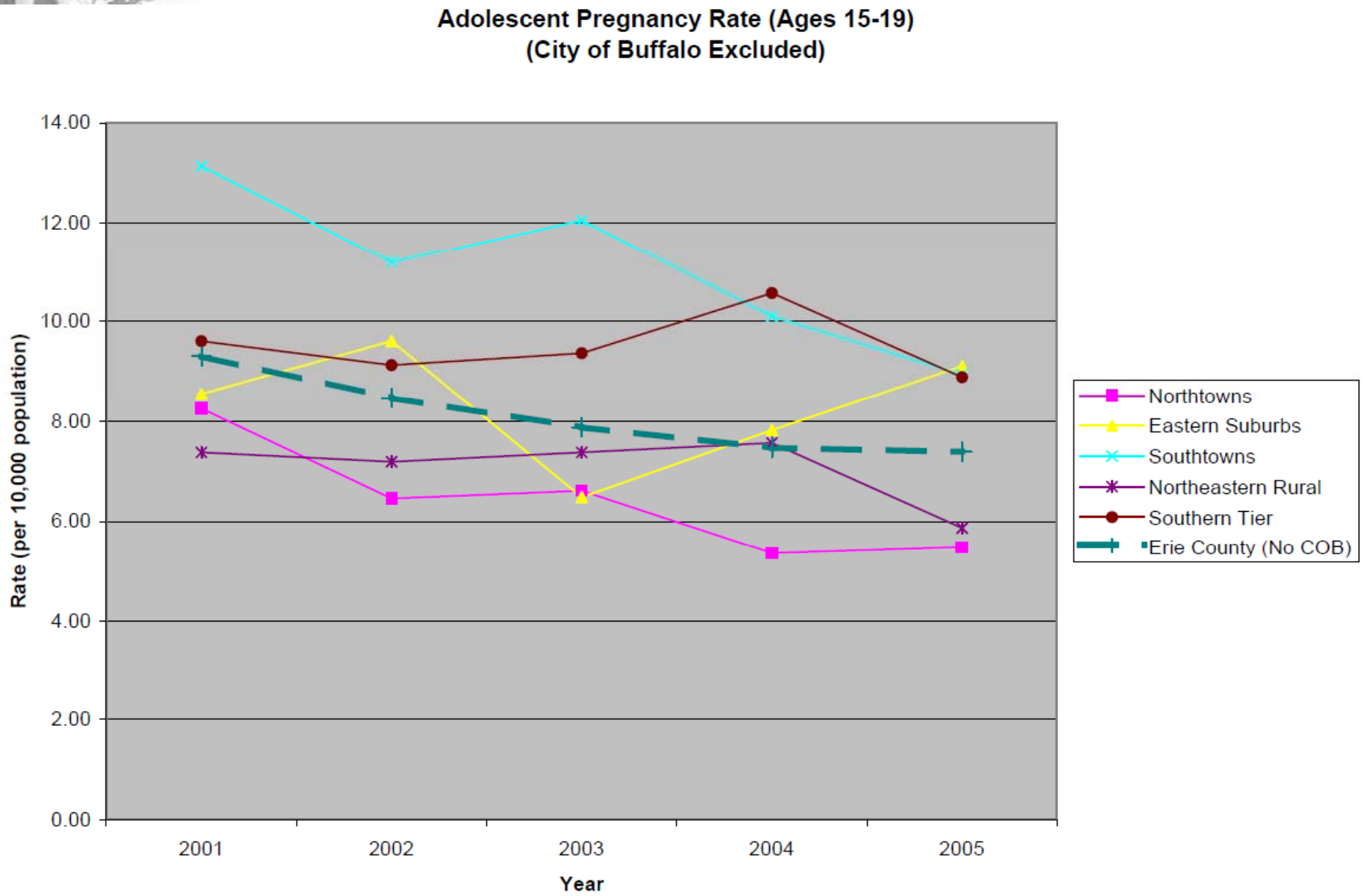
Region	Population
Buffalo	276,059
Northtowns	252,016
East Suburbs	173,968
Southtowns	127,095
Northeast. Rural	52,160
Southern Tier	40,092

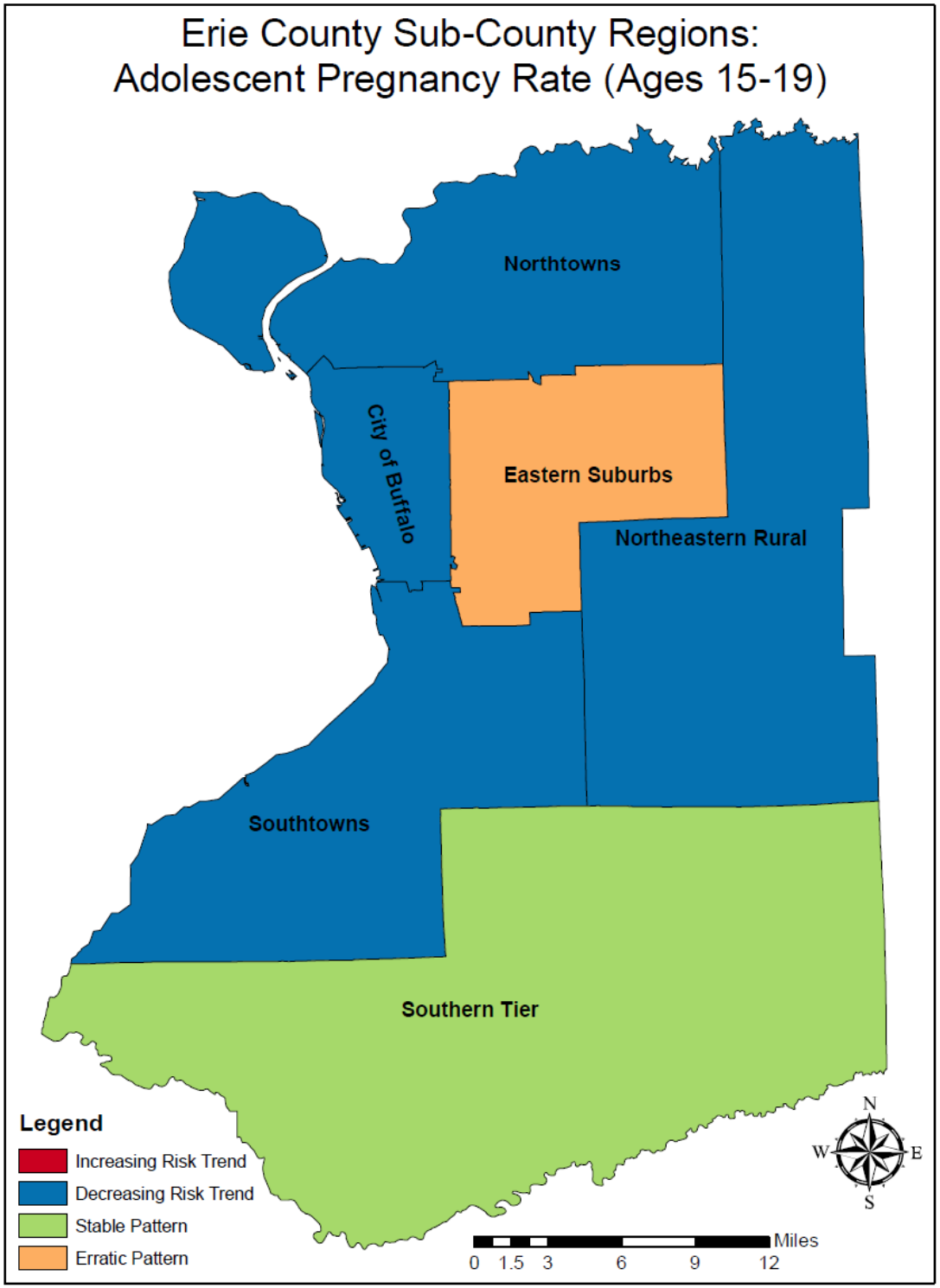
Trend Example: <21 Arrests

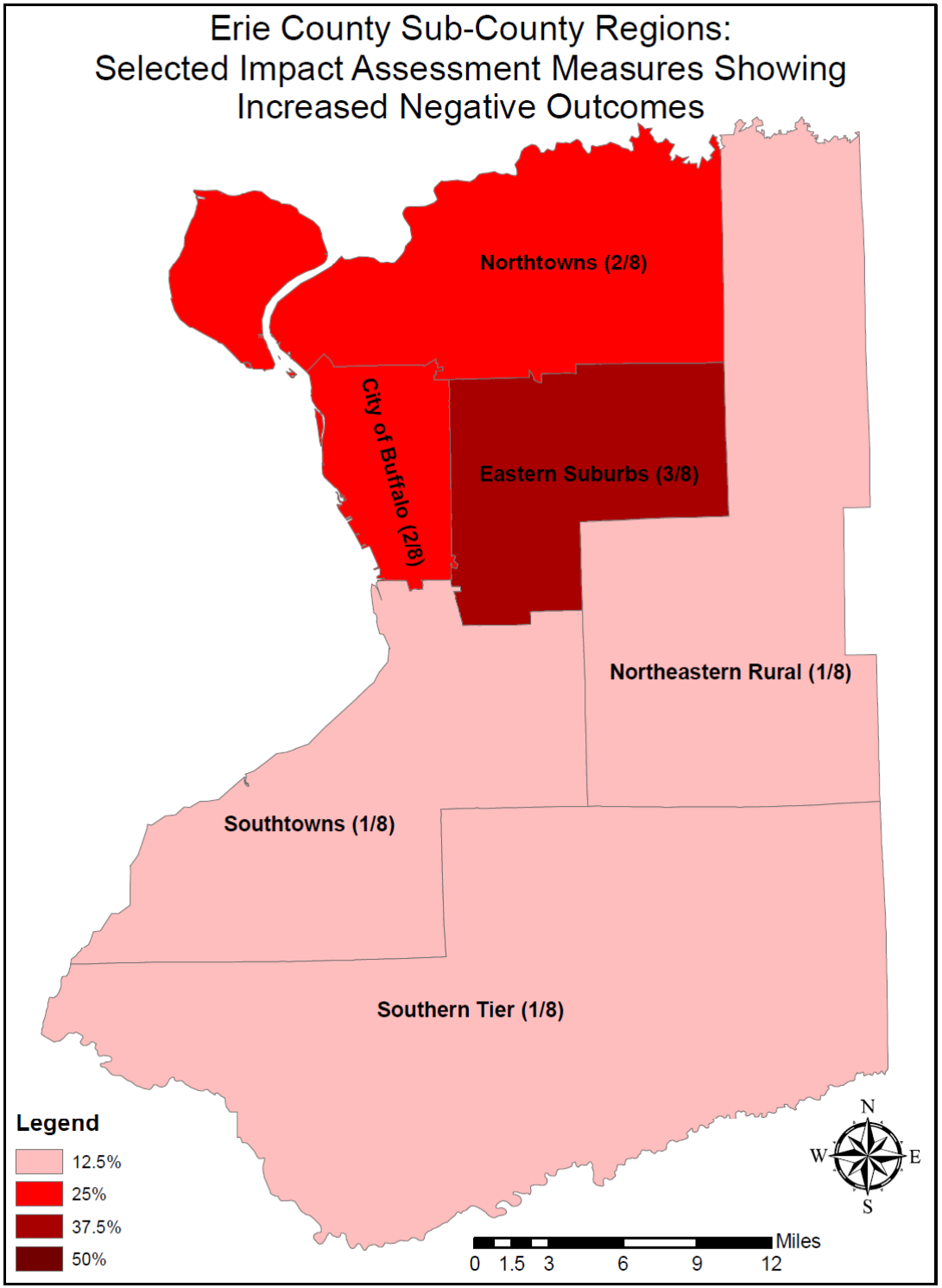



Erie County Sub-County Regions:
Under Age 21 Arrest Rate
Northtowns
City of Buffalo
Eastern Suburbs
Northeastern Rural
Southtowns
Southern Tier
Legend
Increasing Risk Trend
Decreasing Risk Trend
Stable Pattern
Erratic Pattern
N
W
E
S
Miles
0 1.5 3 6 9 12

Trend Example: Adol. Preg.




Erie County Sub-County Regions:
Adolescent Pregnancy Rate (Ages 15-19)
Northtowns
City of Buffalo
Eastern Suburbs
Northeastern Rural
Southtowns
Southern Tier
Legend
Increasing Risk Trend
Decreasing Risk Trend
Stable Pattern
Erratic Pattern
N
W
E
S
Miles
0 1.5 3 6 9 12


Erie County Sub-County Regions:
Selected Impact Assessment Measures Showing
Increased Negative Outcomes
Northtowns (2/8)
City of Buffalo (2/8)
Eastern Suburbs (3/8)
Northeastern Rural (1/8)
Southtowns (1/8)
Southern Tier (1/8)
Legend
12.5%
25%
37.5%
50%
N
W
E
S
Miles
0 1.5 3 6 9 12

How to Use PX/TX Impact Info

- Compare subcounty regions with the trends for the County as a whole.
- Compare the trends in subcounty areas with the type and number of prevention services being provided to assess whether services are adequate.
- Compare the overall trends in Erie County with other counties of similar composition (e.g., Monroe, Onondaga).
- Add survey data from subcounty regions
- Assess for convergent impact

Comprehensive Prevention Plan

Erie County Department of

Mental Health

2009-2012

Components of Comprehensive Plan

1. **Process of Developing the Plan**
2. **Mission Statement Summary**
3. **Providing Prevention Services: Goals and Guiding Strategy**
4. **Environmental Prevention Strategy**
5. **System Impact and Outcomes**
6. **System Coordination and Collaboration**
7. **System Development**
8. **Chemical Dependency/Mental Health Career Enrichment**

Selected Plan Details: Mission

System Goals (SG):

To delay alcohol, tobacco, and other drug (ATOD) use and the onset of unhealthy problem behaviors (including, but not limited to, gambling, violence, and other anti-social behaviors); to prevent ATOD abuse/dependence and mental illness; to promote and maintain mentally and physically healthy, and socially and culturally competent, people. (SG1)

To provide a continuum of prevention services (universal, selective, indicated) (SG2)

- Specific statements on target populations and prevention resources
- Each section in plan specifically linked to the mission

Selected Plan Details (Sec 3 Prov. PX Serv.)

- Reach the entire population of Erie County with some prevention services, which will require the coordination of environmental prevention approaches and direct delivery prevention programming.
- Align the most intensive prevention services (i.e., multi-session, ongoing programs usually delivered in schools) with the geographic areas or populations at highest risk of developing substance abuse and mental health problems, as defined by the risk and protective factor approach

Selected Plan Details (Sec 3 Prov. PX Serv.)

- Utilize data sources on risk and protective factors (e.g., archival, Risk Indicator Data Base [RIDB, a source on subareas of Erie County for archival data aligned with the risk and protective factor model], key informants, focus groups, surveys) to justify changes in target population.

Conclusions: GIS and Behavioral Health Planning

- GIS provides key information for behavioral health planning
- GIS expertise alone is insufficient—content knowledge is crucial
- GIS well-suited for a collaborative process
  - Fosters buy-in from participants
  - Drives interactive process
- Need to work closely with government agencies and service providers
- Match GIS analyses to the process

Buffalo State

The End!