

# Using GIS in the Response to an Infectious Disease Outbreak

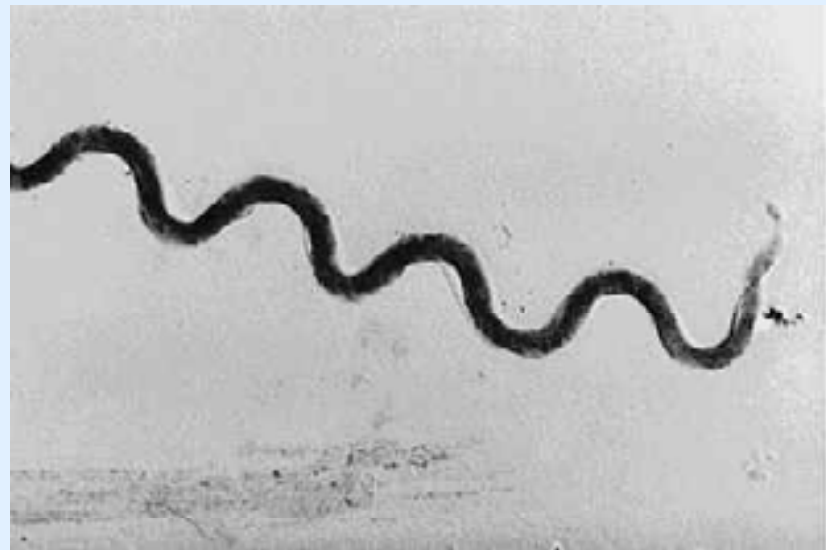
*Fatema Mamou, MPH  
Epidemiologist  
Genesee County Health Department  
Flint, MI*

# Genesee County, MI



## Background: Syphilis - A Quick Review

- Syphilis is a systemic disease caused by the spirochete, *Treponema pallidum*
- Disease manifests in stages
  - Primary
  - Secondary
  - Latent
  - Tertiary

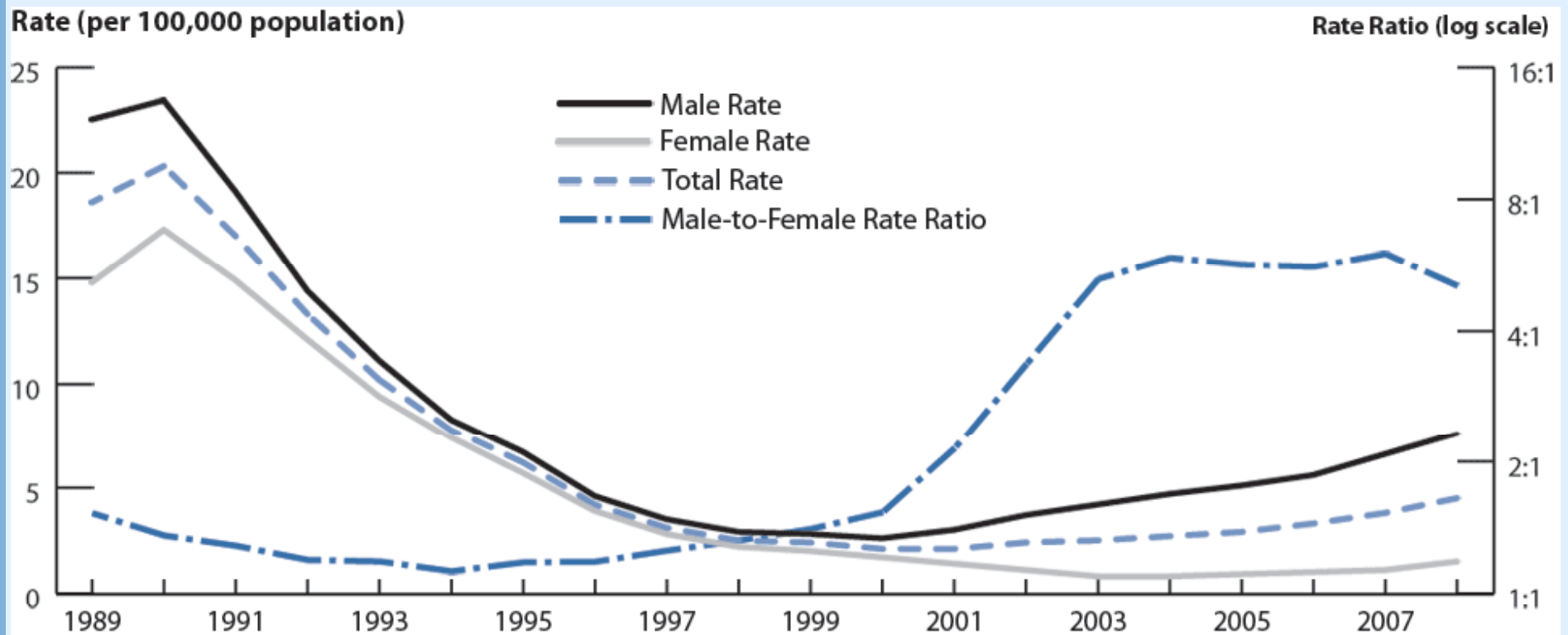


## Background: Transmission

- Primary mode of transmission is by sexual contact
  - Greatest infectivity during primary stage
  - Infection may also be passed during secondary and early latent stages
  - Transmission probability per partner is approximately 30%
- Next most common is transfer across the placenta from mother to fetus
- Penicillin effective for treatment

# Syphilis Epidemiology

P & S Syphilis by Gender - United States, 1989 - 2008

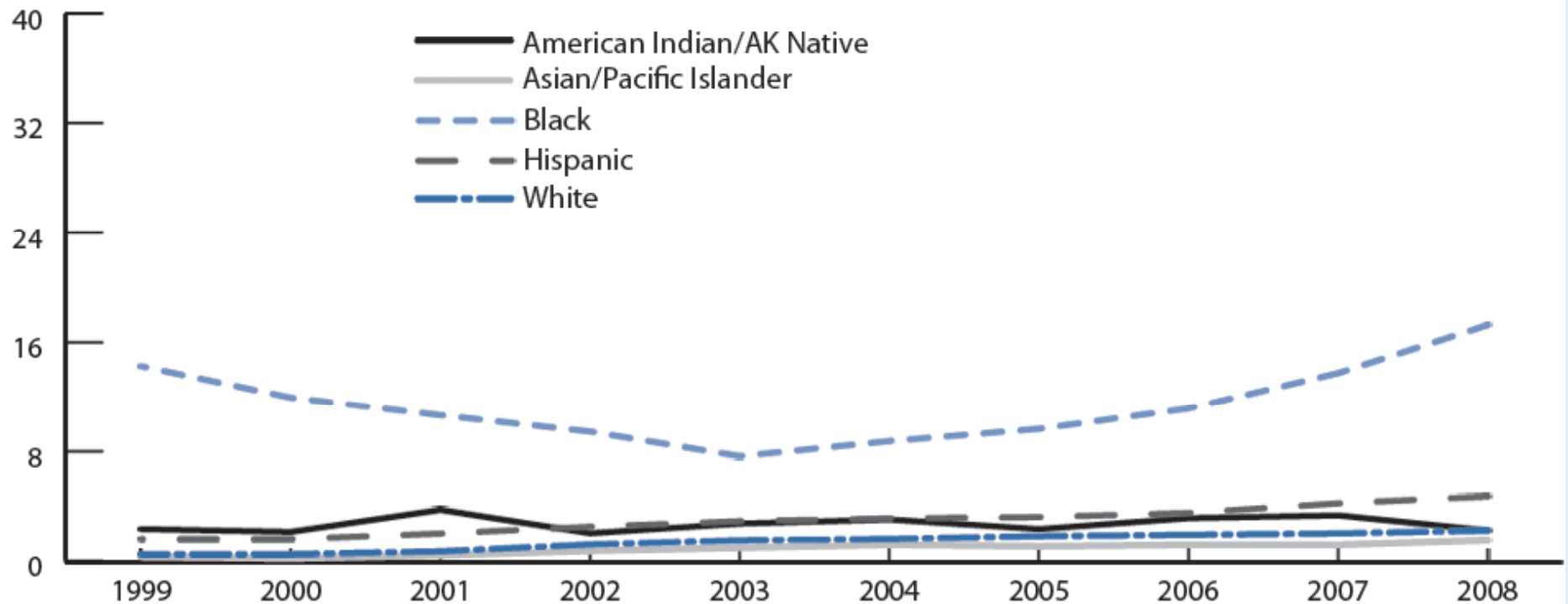


❖ Source : CDC

# Syphilis Epidemiology

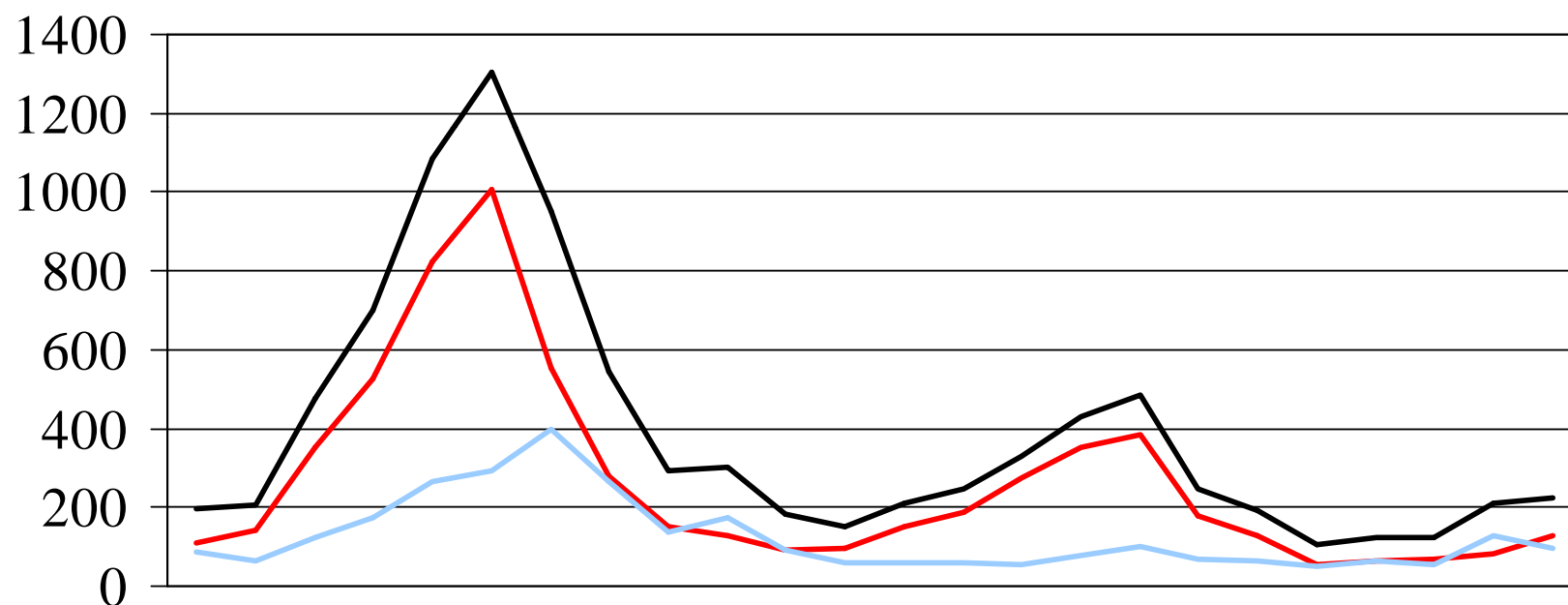
P & S Syphilis by Race- United States, 1998 - 2007

Rate (per 100,000 population)



❖ Source : CDC

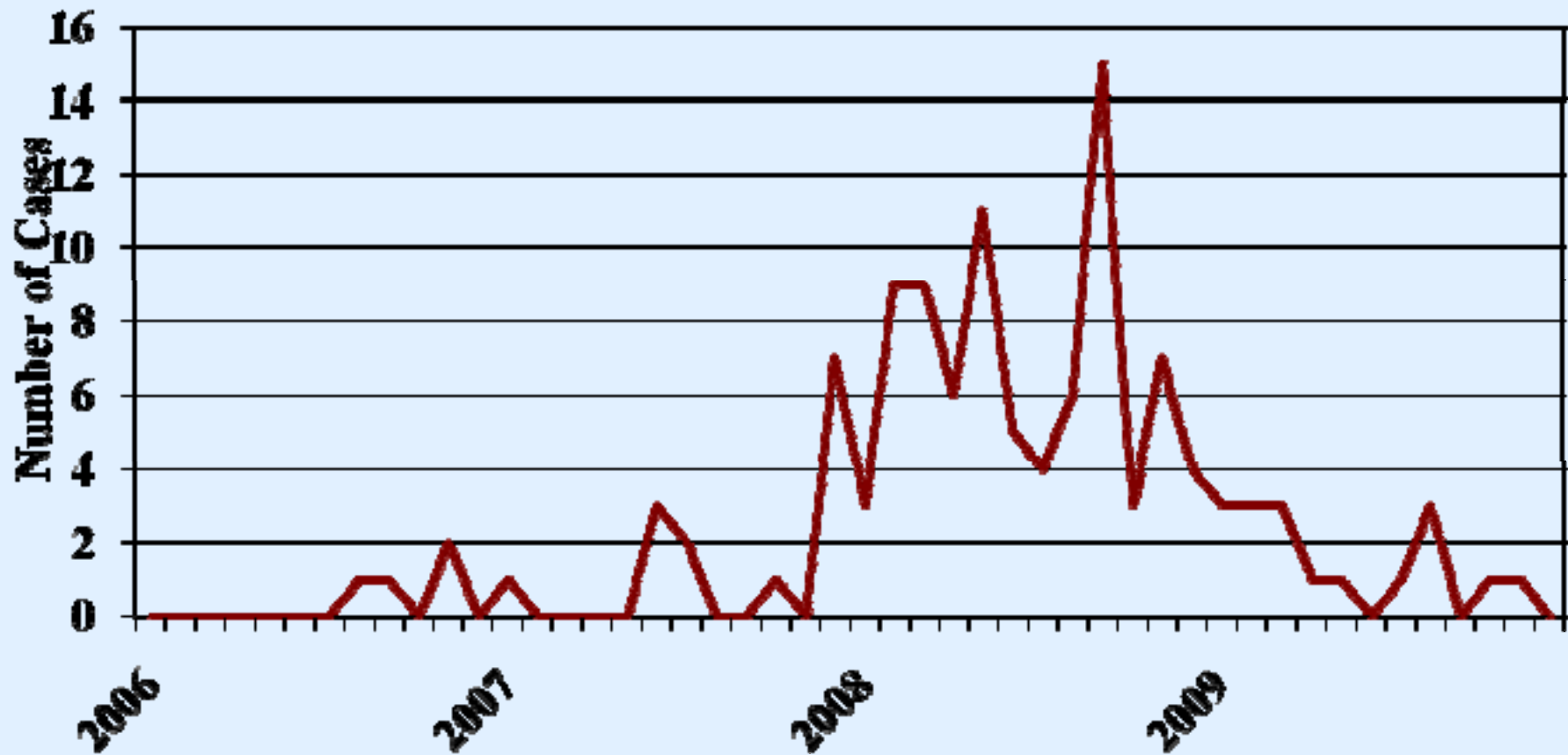
# P & S Syphilis by Region - Michigan, 1986-2008



	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
— Michigan	198	205	476	700	1086	1303	951	543	292	304	183	153	211	249	330	428	486	249	192	105	125	123	212	224
— Detroit	111	142	354	526	822	1008	552	277	153	130	92	94	152	189	274	351	384	179	126	54	63	68	83	127
— Outstate	87	63	122	174	264	295	399	266	139	174	91	59	59	60	56	77	102	70	66	51	62	55	129	97

❖ Source : MDCH

## P&S Syphilis 2006-2009 By Month Genesee County, MI





# Challenges

- First time Genesee County has experienced a syphilis outbreak
  - No other areas of Michigan experiencing similar increases in syphilis
- Challenging disease
  - Complexity of disease
  - An estimated 20% of syphilis cases are never diagnosed or reported, i.e. no common source
  - Sensitive subject matter
- Hard to reach population
  - Syphilis outbreaks occur when a population has changes in behaviors
  - High risk behaviors
  - Access to care

# Syphilis Outbreak Response

- Enhanced surveillance and outbreak planning
  - Michigan Department of Community Health
  - Cross-divisional teamwork
  - Use of data to drive decisions
- Rapid response
  - Increasing awareness among the health care community
  - Targeted testing of at risk populations
  - Public Information Campaign
- Increased community involvement
  - Working with community organizations and businesses to offer testing of at risk populations
  - Assisting with alerting those at risk of becoming infected with syphilis

# Syphilis Outbreak Response

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# Use of Surveillance Data to Guide Interventions & Assess Progress

- Aggregate epidemiological data
- Individual case information
- Geographical analysis

# Epidemiological Data of 82 Cases

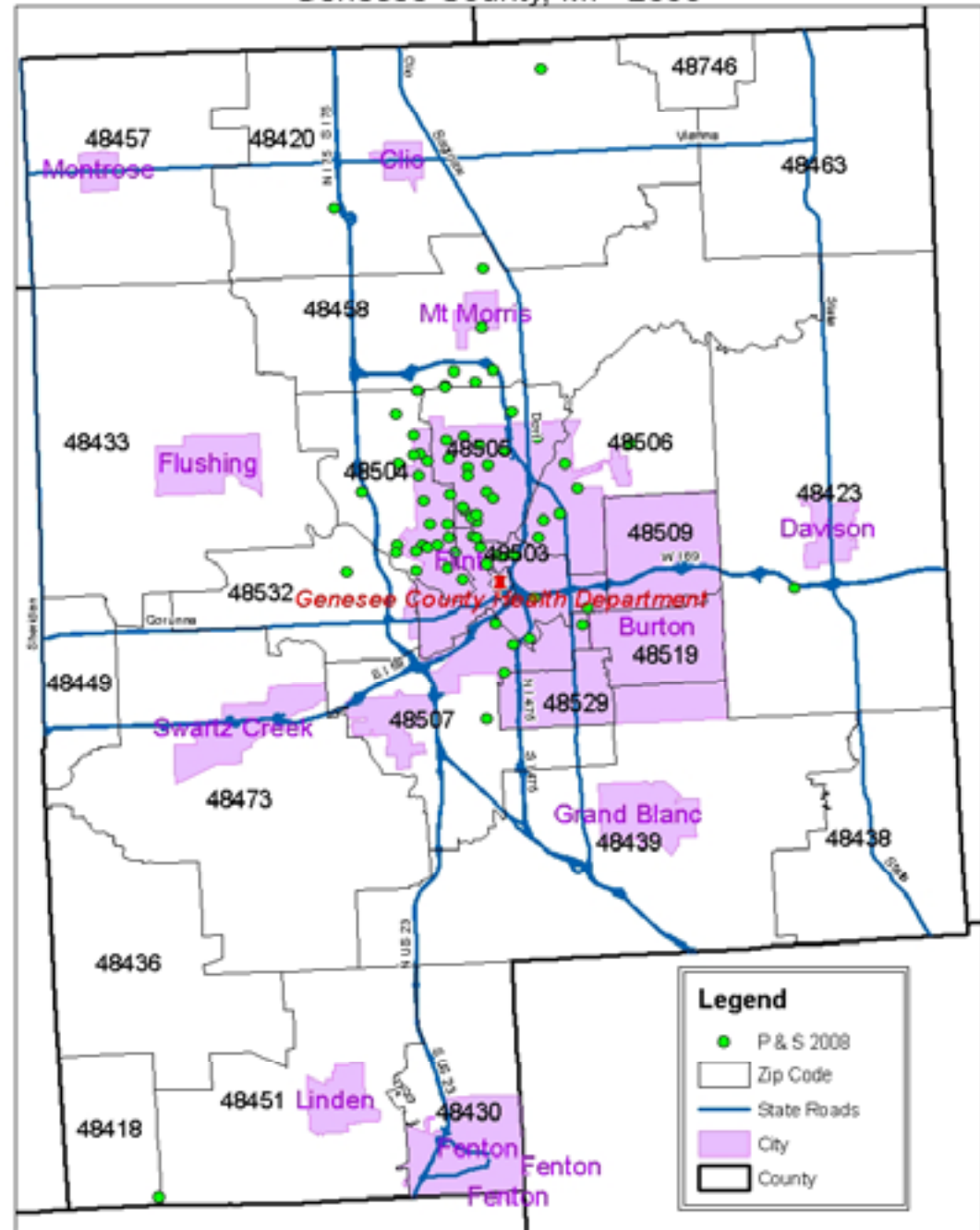
- Race: 72 (87.8%) African American, 10 (12.2%) White
- Gender: 47 (57.3%) Male, 35 (42.7%) Female
- Age
  - Average: 33.3 years
  - Range: 15-61 years
  - Males Average: 36.6 years
  - Females Average: 28.9 years
- Location: 67 (81.7%) Flint
- Provider:
  - 32 (39%) Emergency Departments
  - 24 (29.3%) Public (GCHD Adult Clinic)
  - 23 (28.0%) Private
  - 3 (3.7%) Jail

## Risk Factors

- 46.3% admit to substance use
- 31.7% admit to anonymous partners
- Trading sex for drugs or money
- Multiple partners
- 7 (8.5%) MSM
- 4 HIV positive

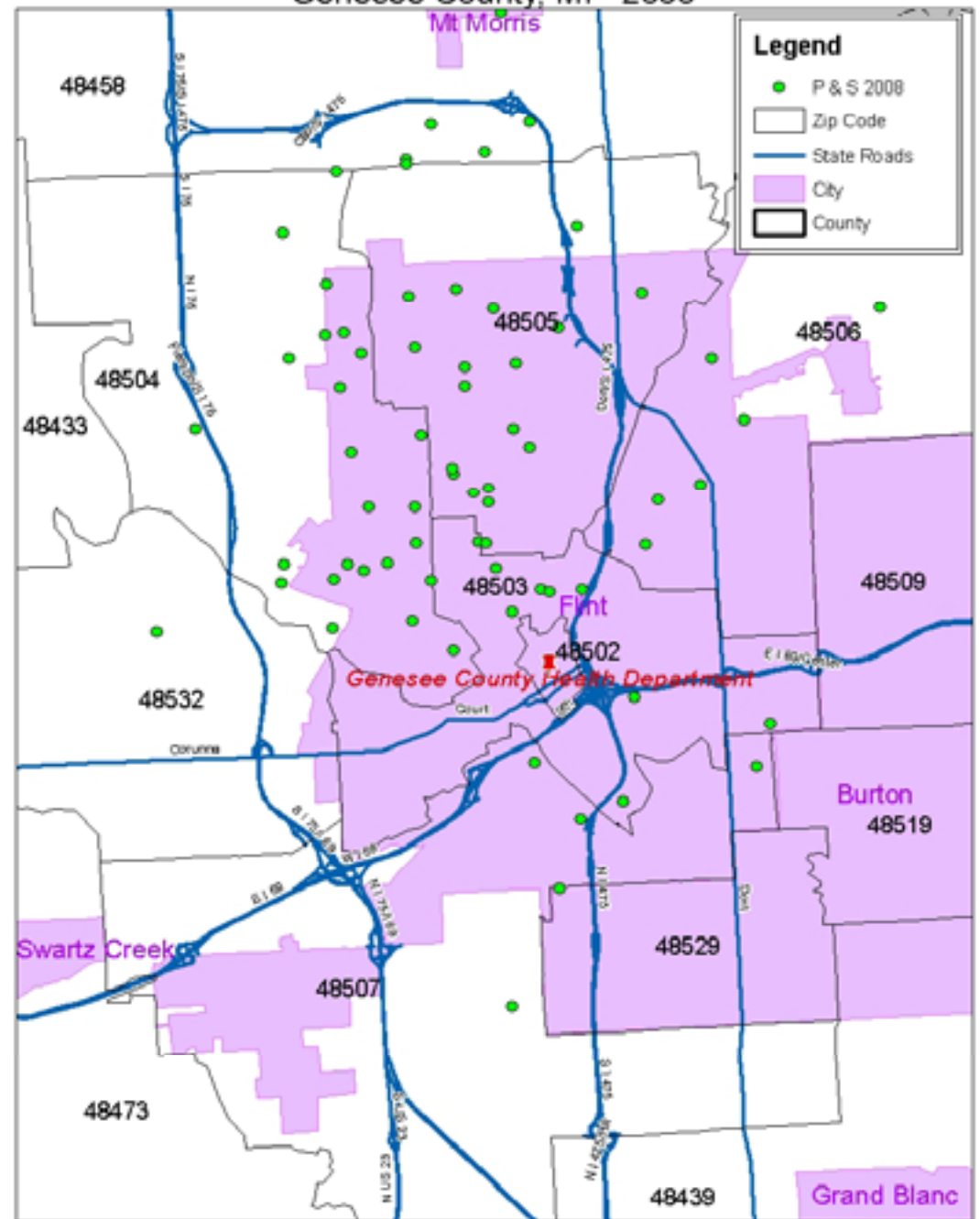
# Geographic Analysis of Syphilis Cases (n=82)

Primary and Secondary Syphilis Cases  
Genesee County, MI - 2008



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Primary and Secondary Syphilis Cases  
Genesee County, MI - 2008

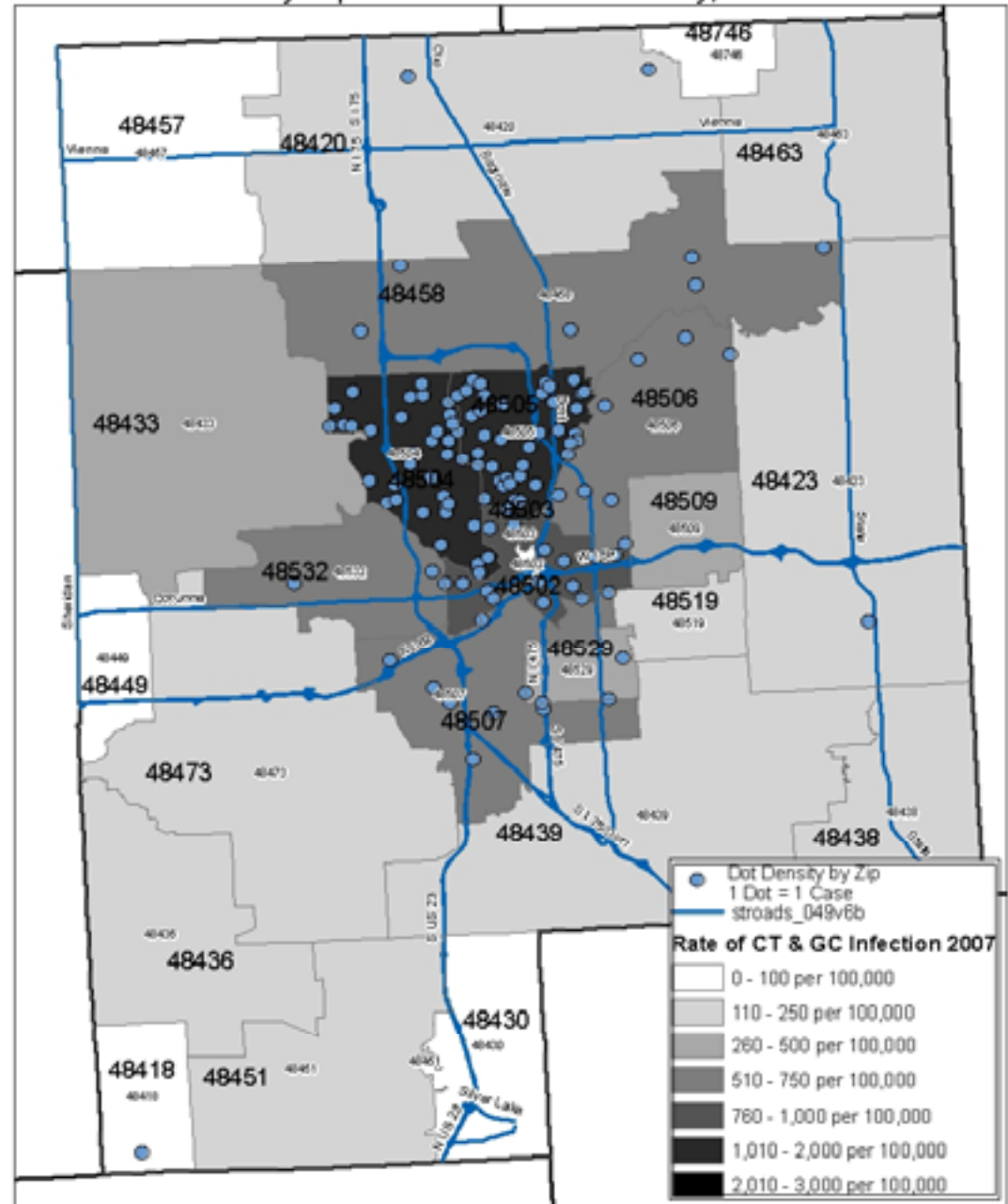




# Targeting Areas of Highest Risk

- Targeted testing
  - Rates of Sexually Transmitted Diseases
  - Linked Cases

Primary and Secondary Syphilis Cases, 2008 versus  
Rate of Chlamydia and Gonorrhea Infection, 2007  
by Zip Code Genesee County, MI



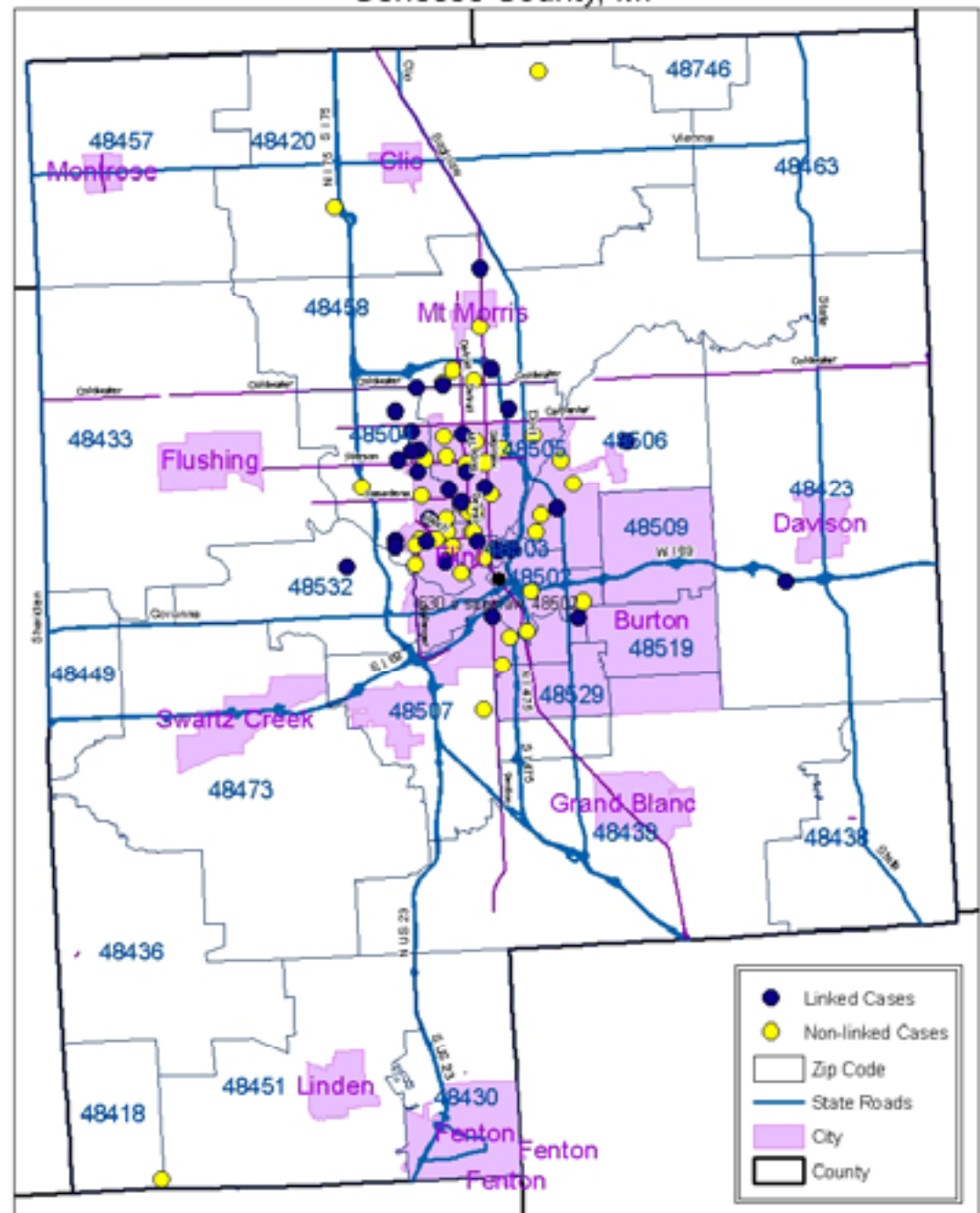
# Outbreak Response: Health Care Community

- Hospitals
  - Genesee County Emergency Departments
  - Infection Control Practitioners
  - OB-GYN Departments
- Laboratories
- Community Health Clinics

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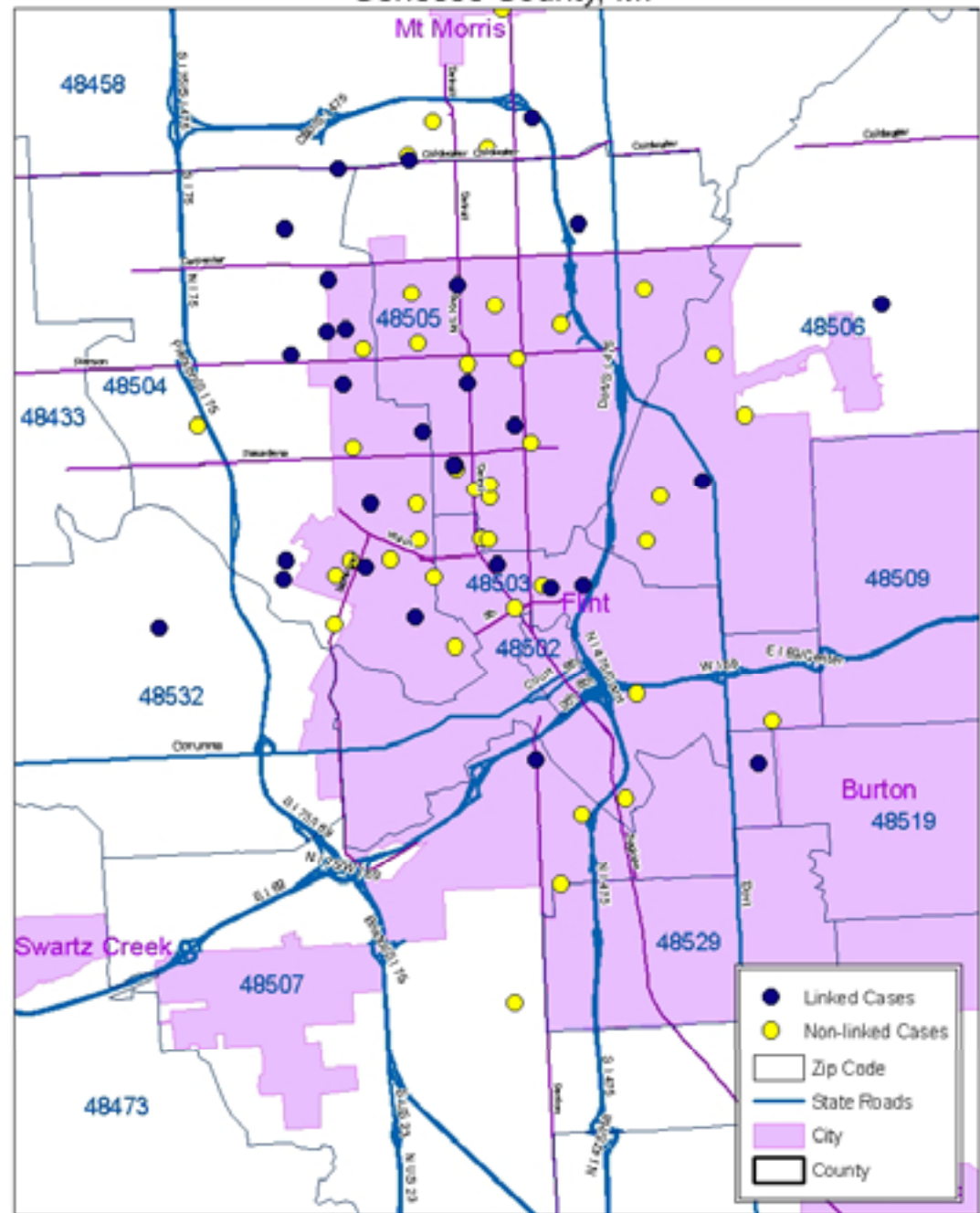
Primary and Secondary Syphilis Cases, 2008  
Genesee County, MI



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Primary and Secondary Syphilis Cases, 2008  
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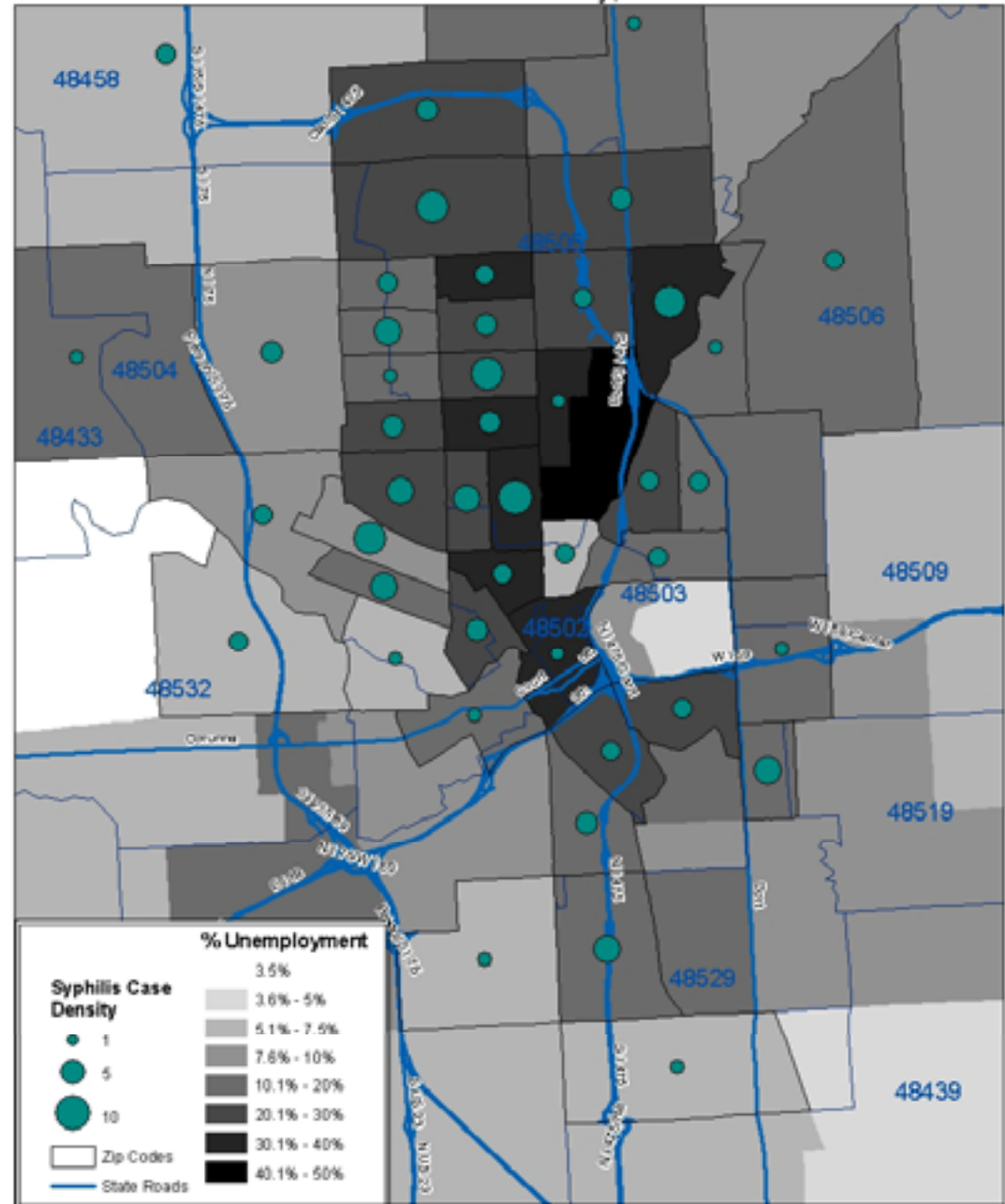
# Testing of At Risk Populations

- Jail
- Field testing
  - High risk populations such as commercial sex workers
  - Apartment complexes in high risk areas
  - Adult Entertainment
  - Bars/Nightclubs
- Community Organizations and Events
  - Churches
  - Health Fairs

# Targeting Areas of Highest Risk

- Education and outreach
  - *Employment*
  - Poverty Status
  - Education

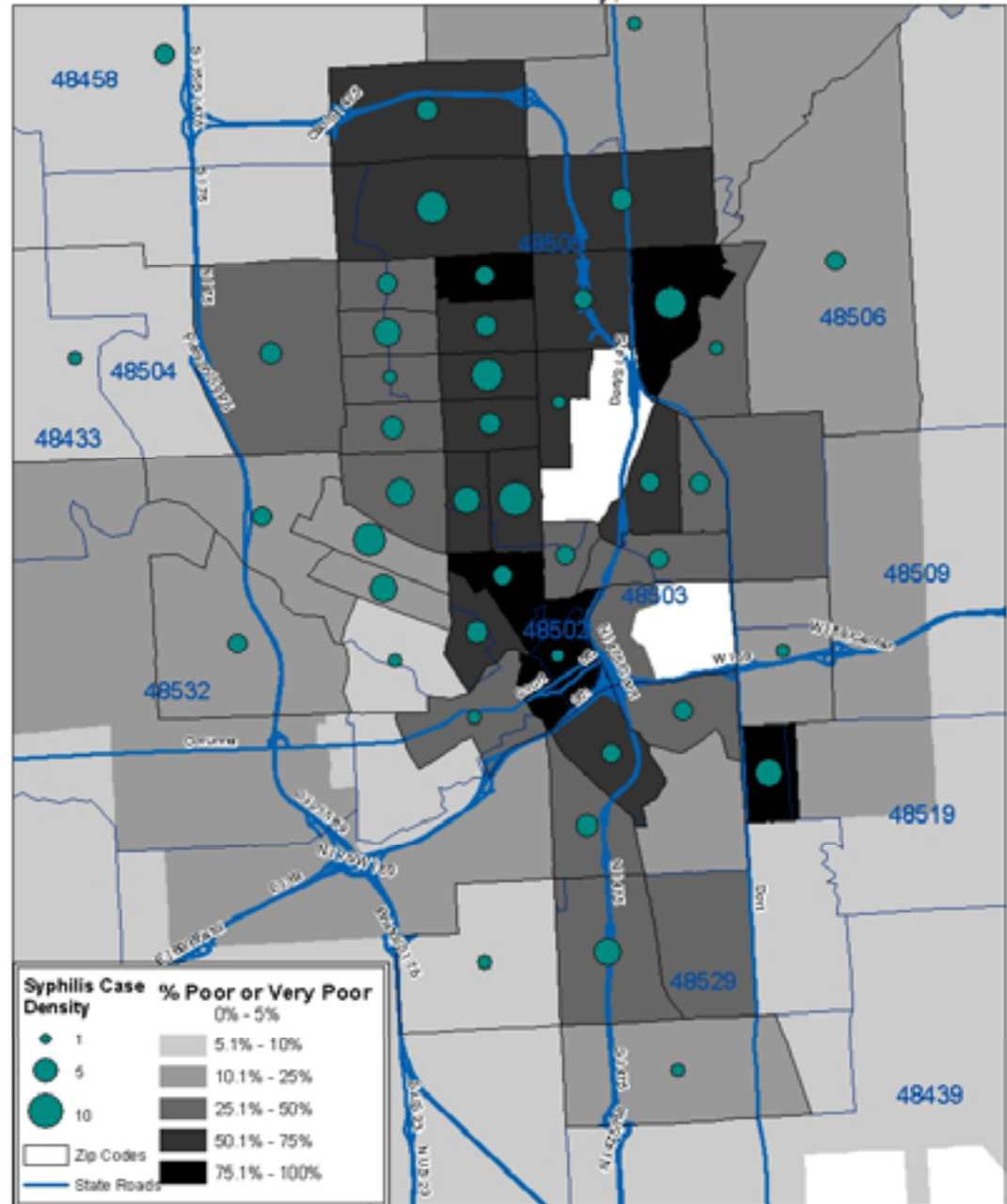
Primary and Secondary Syphilis Cases, 2008 and  
% Unemployment by Census Tract  
Genesee County, MI



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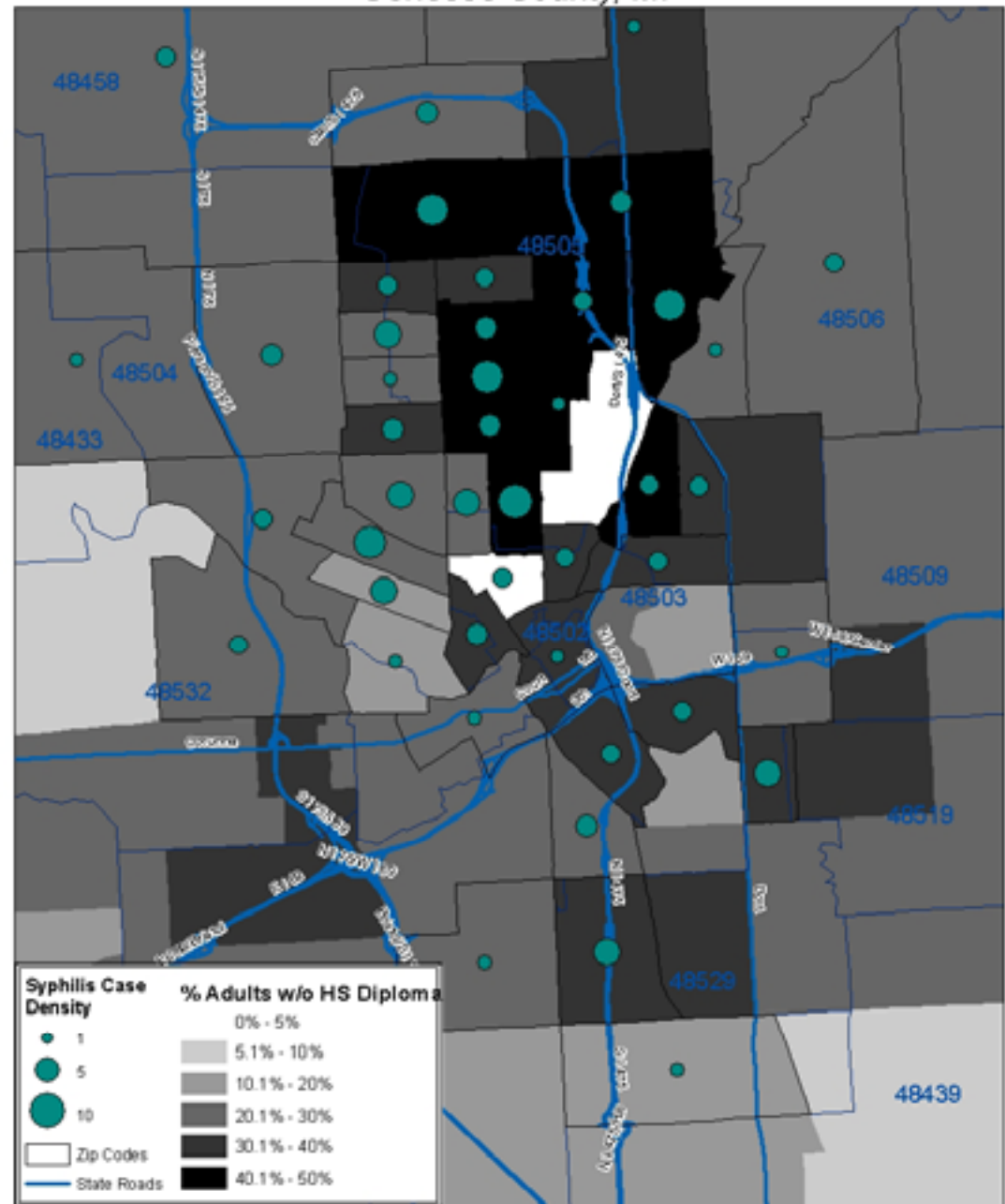
Primary and Secondary Syphilis Cases, 2008 and  
% Poor or Very Poor by Census Tract  
Genesee County, MI



# Targeting Areas of Highest Risk

- Education and outreach
  - Employment
  - Poverty Status
  - *Education*

Primary and Secondary Syphilis Cases, 2008 and  
% Adults without a High School Diploma by Census Tract  
Genesee County, MI





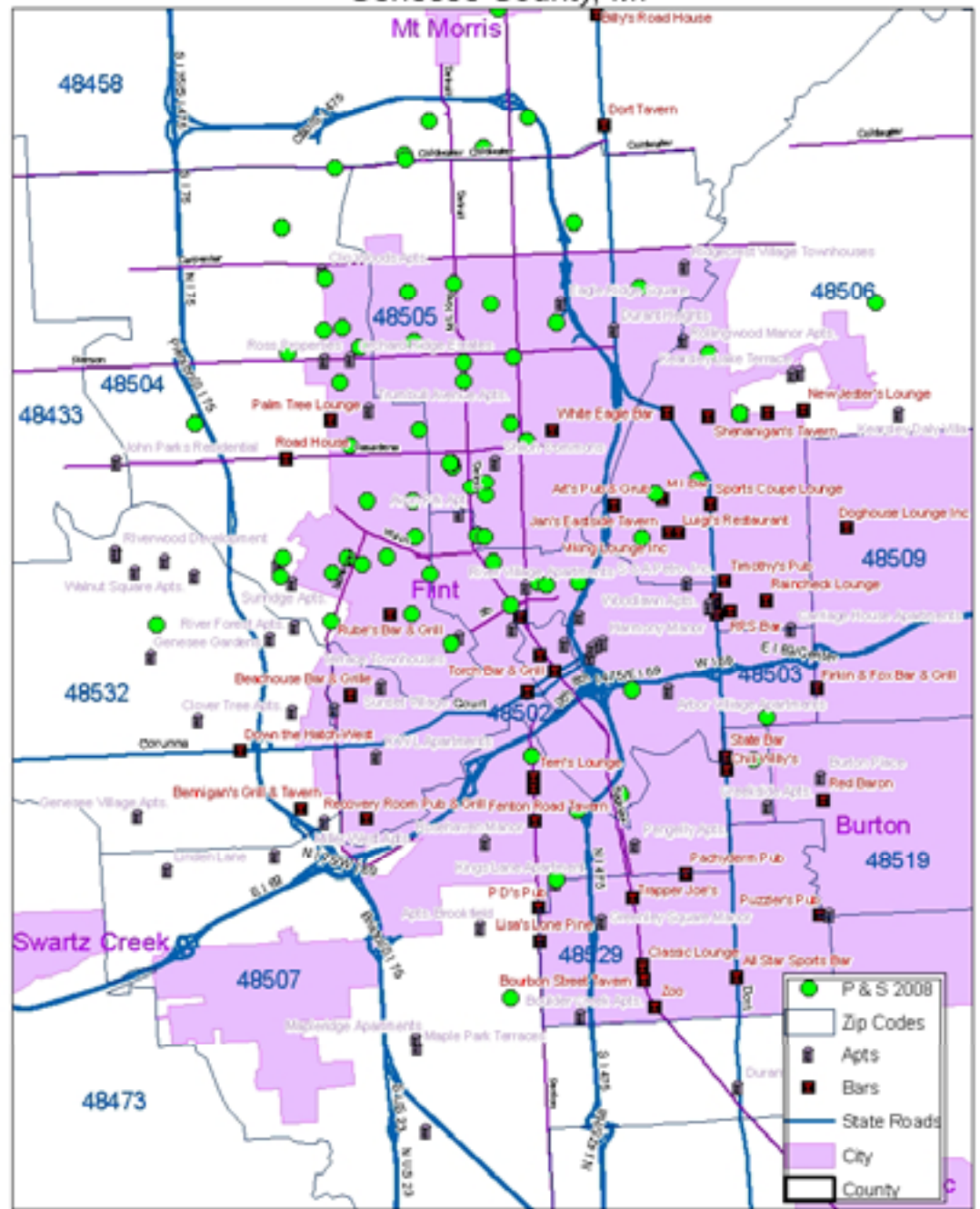
# Public Information Campaign

- Press releases
- Newsletters
- Flyers
- Billboard campaign
- Radio Campaign

# Targeting Areas of Highest Risk

- Education and outreach
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  - Linked Cases

Primary and Secondary Syphilis Cases, 2008  
Genesee County, MI



# Flyers

- Individualized flyers, posters, and bulletins for community partners
  - Community Mental Health
  - Churches
  - Community Organizations
  - Bars and Nightclubs
  - Schools/Universities
- GCHD Adult/Teen Clinic Information handouts



Right now there is a syphilis outbreak in Genesee County!

You may be at risk!

- Unprotected sex with multiple partners?
- Exchanged sex for drugs or money?
- Men who have sex with men?
- Have painless sores or skin rashes?



oms.



This is an urgent message from the Genesee County Health Department:

Currently, there is a **SYPHILIS OUTBREAK** in Genesee County!

#### Outbreak Information

- In April 2008, the Genesee County Health Department (GCHD) reported that Genesee County is experiencing a **syphilis** outbreak.
- Flint and Genesee County are seeing the highest number of **syphilis** infections ever reported.
- Widespread outreach is being conducted to contact and test those at risk of becoming infected with **syphilis**.
- GCHD is working with community organizations and businesses to offer onsite and after hours **syphilis** testing.

**Syphilis is a sexually transmitted disease**

**Syphilis is detected with a simple blood test**



Genesee County Health Department  
**Adult & Teen Clinic**

McCrex Courts & Human Service Center (2nd Floor)  
McCrex South (Downtown Flint)  
600 S. Saginaw Street, Flint, MI 48902  
Phone: (810) 257-3440

#### Clinic Hours

7:45-11:00 am & 12:45-4:00 pm (M, W, Thu & Fri)  
12:45-4:00 pm (Tuesdays Only)

Walk-in Clinic! Free Condoms!

#### GET TESTED TODAY!

Confidential STD Testing  
Free HIV testing  
Free Condoms  
Information about STDs

Ages 13 and older  
(By parental consent needed)

Testing and Treatment Available for  
**Syphilis**, **Gonorrhea**, **Chlamydia**, and  
**Trichomonas**\*

\*These disease can have symptoms that are not easily noticed or no symptoms at all.  
Have regular exams if you are sexually active.  
Always use condoms.

# Billboard and Bus Campaign

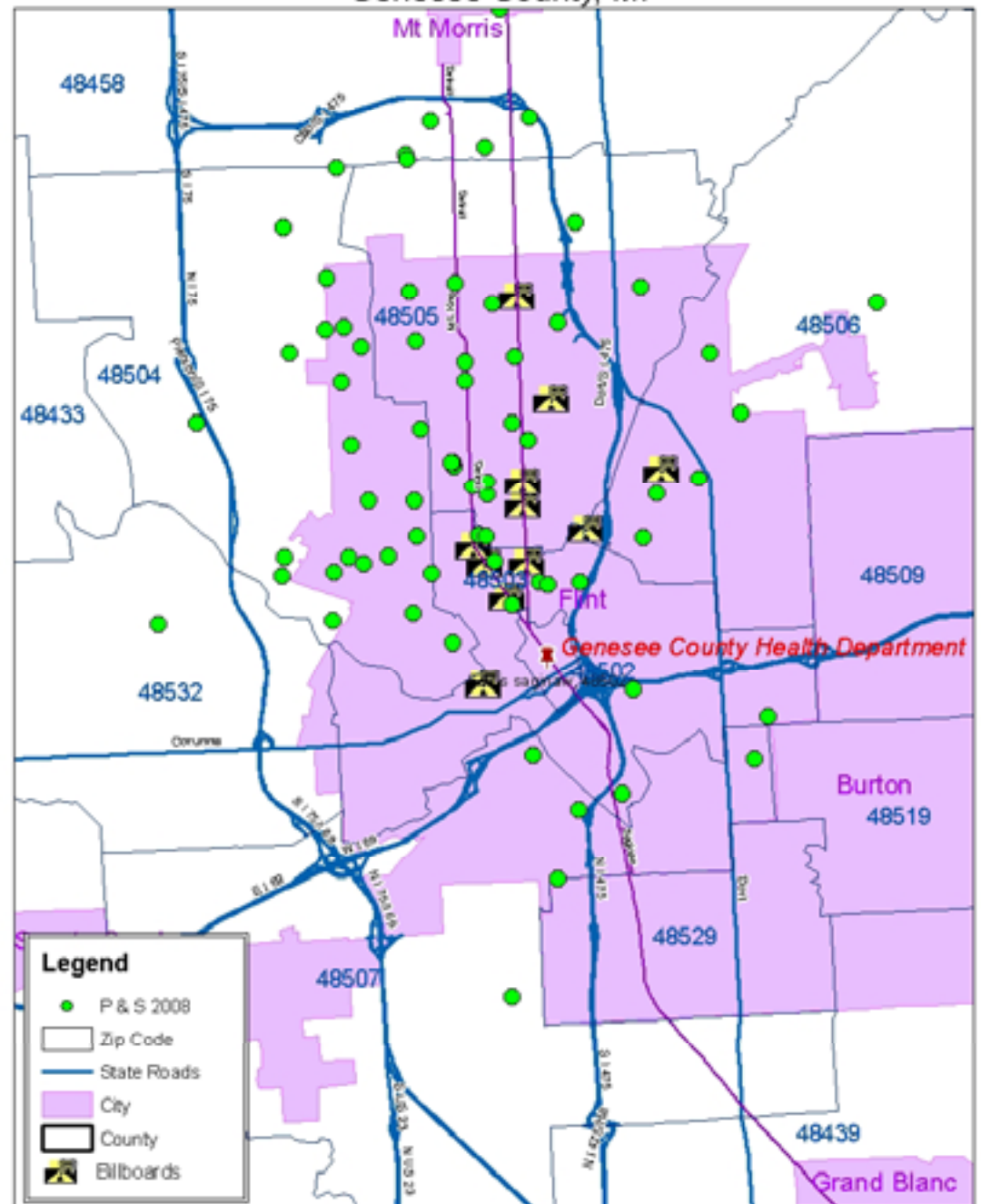
- October '08 - February '09
- Various City of Flint locations



# Targeting Areas of Highest Risk

- Billboard Campaign

Primary and Secondary Syphilis Cases, 2008  
Genesee County, MI



# Conclusions

- In 2009 cases decreases >75%
- Use of GIS was critical in management of this outbreak
  - Targeted interventions such as testing
  - Targeted education
- Limitations
  - No spatial analysis
  - Temporal analysis



**Genesee County  
Health Department**

***Better Life Through Better Health***

Contact Information:

Fatema Mamou, MPH  
Epidemiologist  
Genesee County  
Health Department  
630 S. Saginaw St.  
Flint, MI 48502  
Ph:(810)768-7971  
[fmamou@gchd.us](mailto:fmamou@gchd.us)

**Thank You!**