

# New methods to define TB risk and control urban TB

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# Tuberculosis in Developed Countries

- Relatively few persons have tuberculosis
- Therefore universal screening with tuberculin is unproductive
- Various groups recommend screening “high risk populations”
- Optimizes performance of tuberculosis skin test
- how to define “high risk group” is uncertain

# Contact investigations-most common form of targeted screening?

- As usually performed contact evaluation uses a concentric circle model that was developed at a time when most contacts occurred within the home and family
- Transmitted TB is often not detected in contact investigations
- This has led to the suggestion that investigations be not only person orientated but also place orientated in design

Question is how to design  
location based investigations?

# Tuberculosis Genotyping and Surveillance Network Regional Laboratories and Sentinel Surveillance Sites



TB cases diagnosed Jan 1 1993 – Dec 31, 2000  
n = 991

Culture-negative or clinical  
cases  
n = 163 (16.4%)

Culture-positive TB cases  
n = 828 (83.6%)

No viable clinical isolate for  
molecular analysis  
n = 301 (36.4%)

Culture-positive TB cases with viable clinical  
isolate for molecular analysis  
n = 527 (63.6%)

Missing typing data  
n = 9 (1.7%)

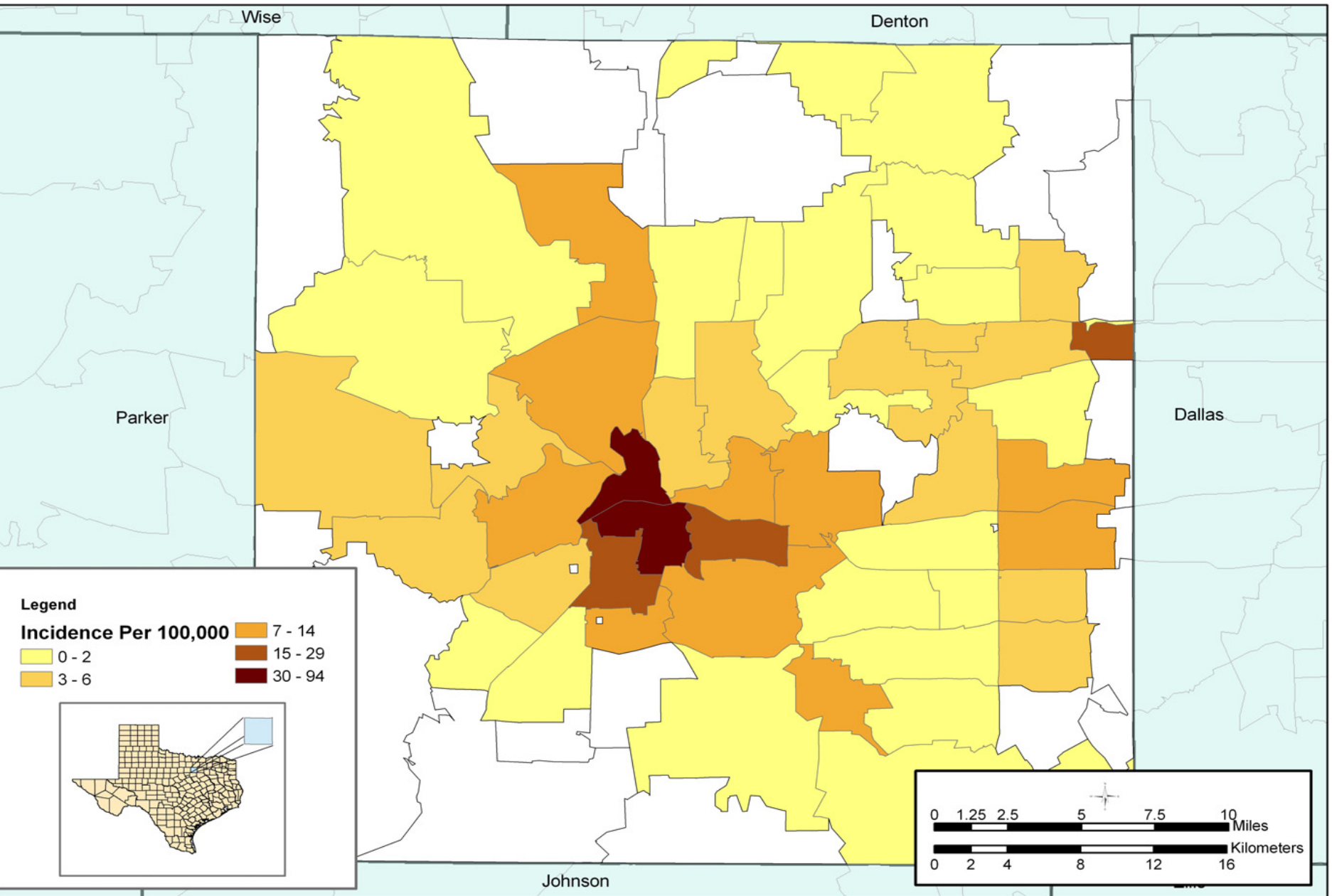
IS6110-RFLP and PCR  
Spoligotyping performed  
n = 518 (98.3%)

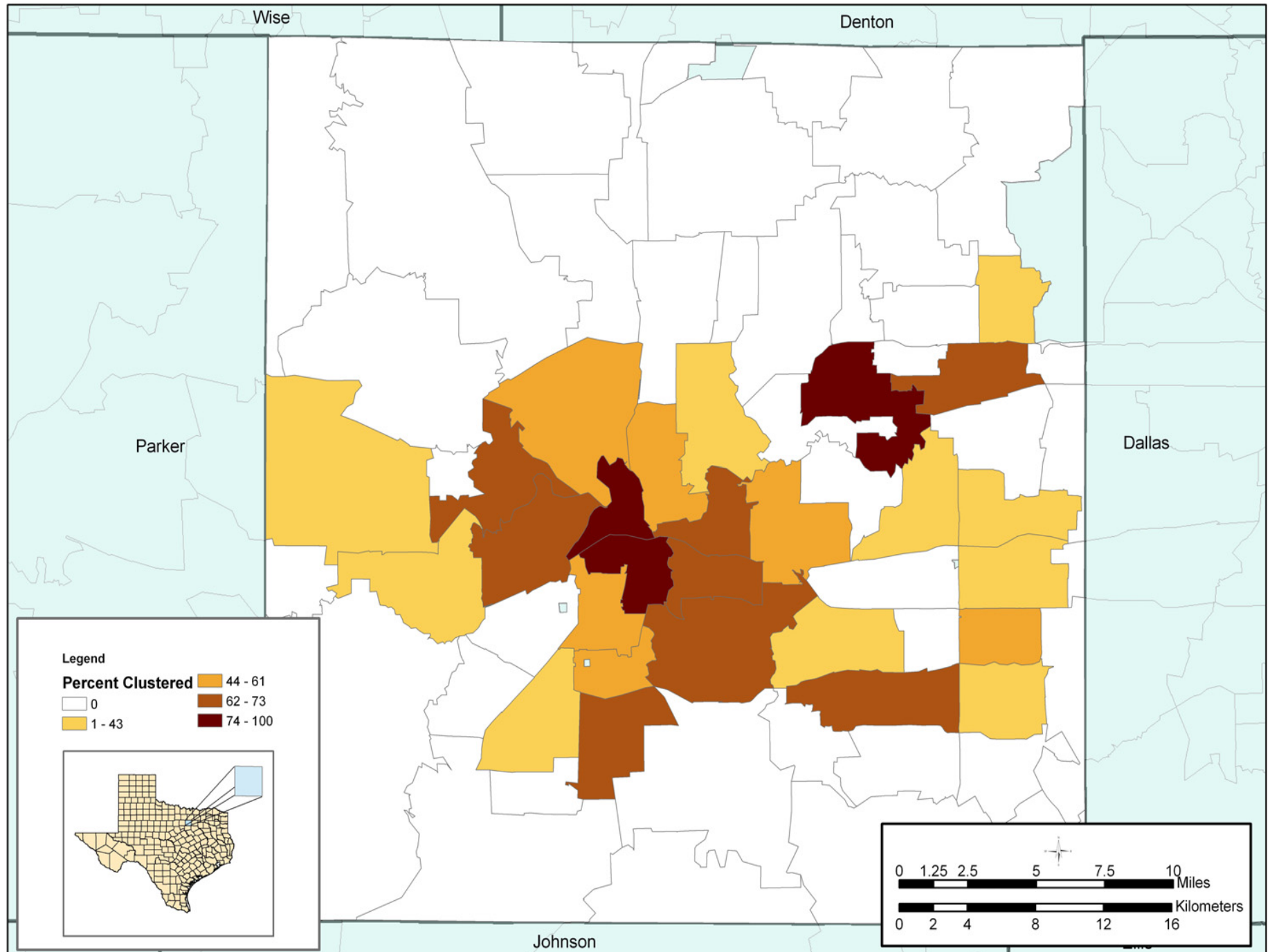
Lived outside Tarrant  
County at time of  
diagnosis  
n = 30 (5.8%)

Molecularly  
clustered cases  
n = 292 (59.8%)

Unique (molecularly non-  
clustered) cases  
n = 196 (40.2%)

48 clusters  
(2 – 95 patients per cohort)

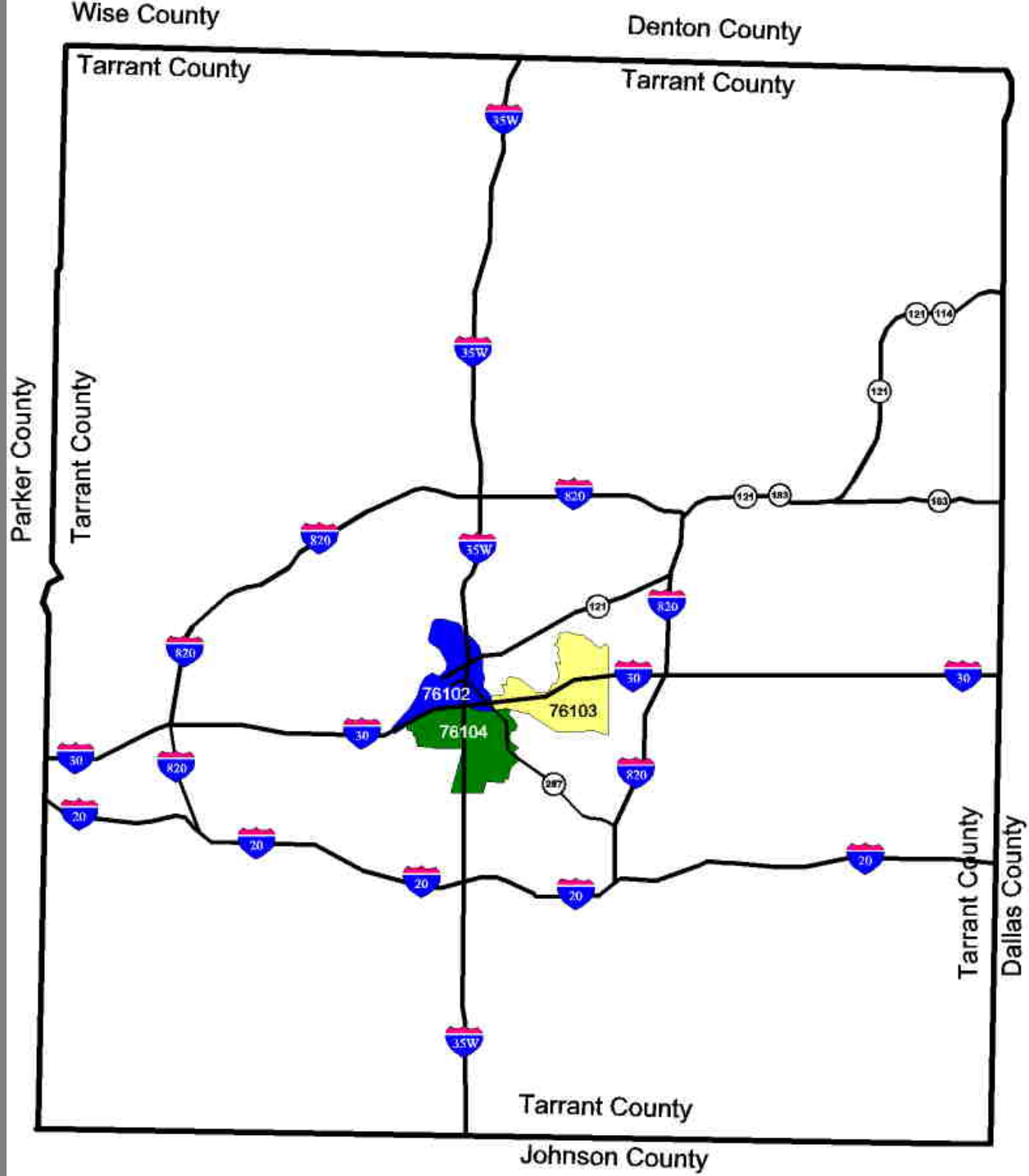






# Factors associated with genotypic clustering

|                      | <i>N</i> (%)* | OR   | 95%CI     | <i>p</i> -value |
|----------------------|---------------|------|-----------|-----------------|
| Homelessness         | 33 (11)       | 12.4 | 2.9, 52.1 | <0.001          |
| Living in Zip Code 1 | 41 (14)       | 6.2  | 2.4, 16.1 | <0.001          |
| U.S. born            | 235 (81)      | 5.3  | 3.5, 7.9  | <0.001          |
| African-American     | 23 (42)       | 2.7  | 1.8, 4.0  | <0.001          |
| Male gender          | 214 (73)      | 1.9  | 1.3, 2.8  | 0.001           |
| Living in Zip Code 2 | 40 (14)       | 1.9  | 1.0, 3.6  | 0.038           |
| Living in Zip Code 3 | 9 (3)         | 0.3  | 0.1, 0.7  | 0.03            |

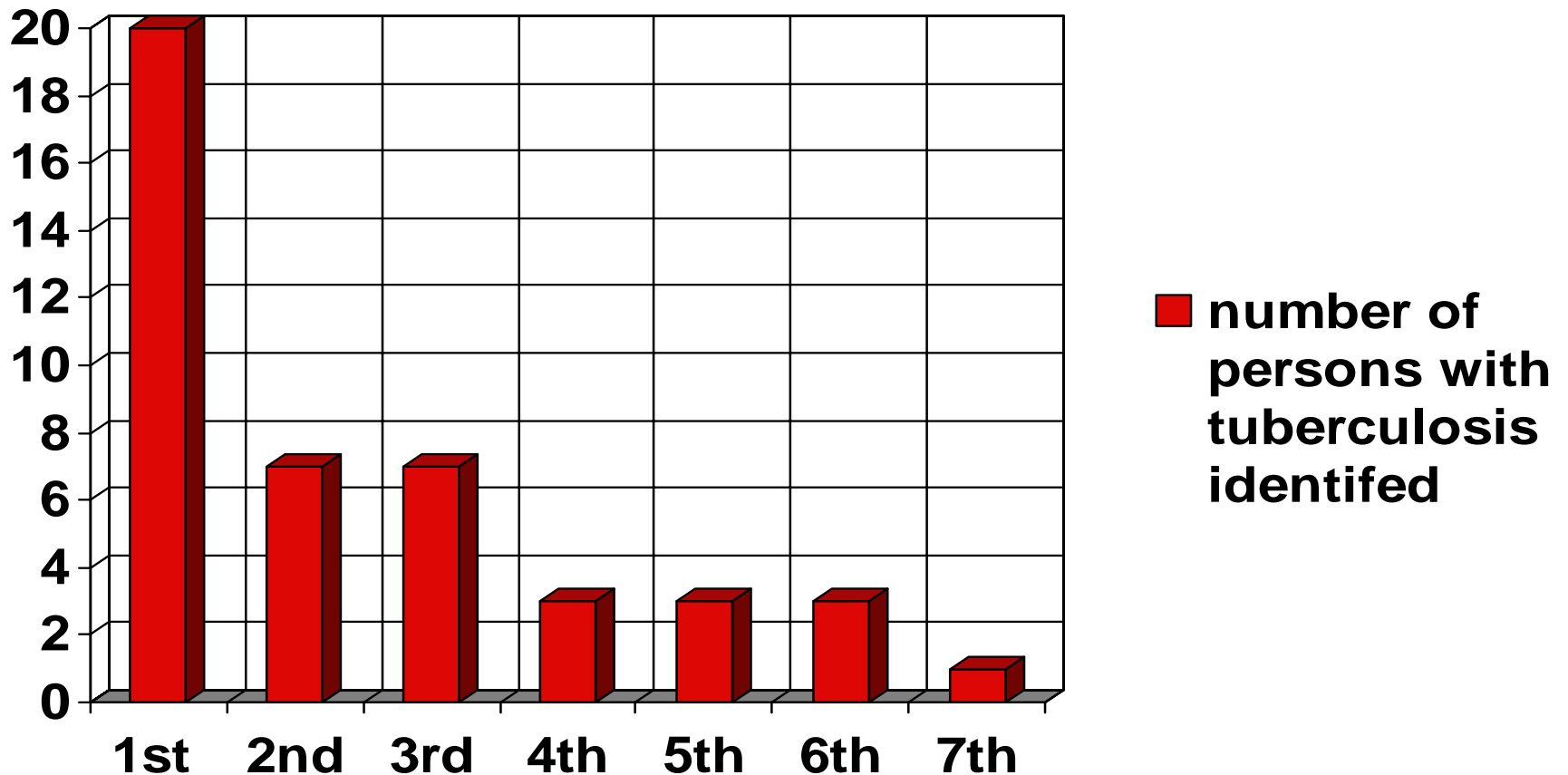




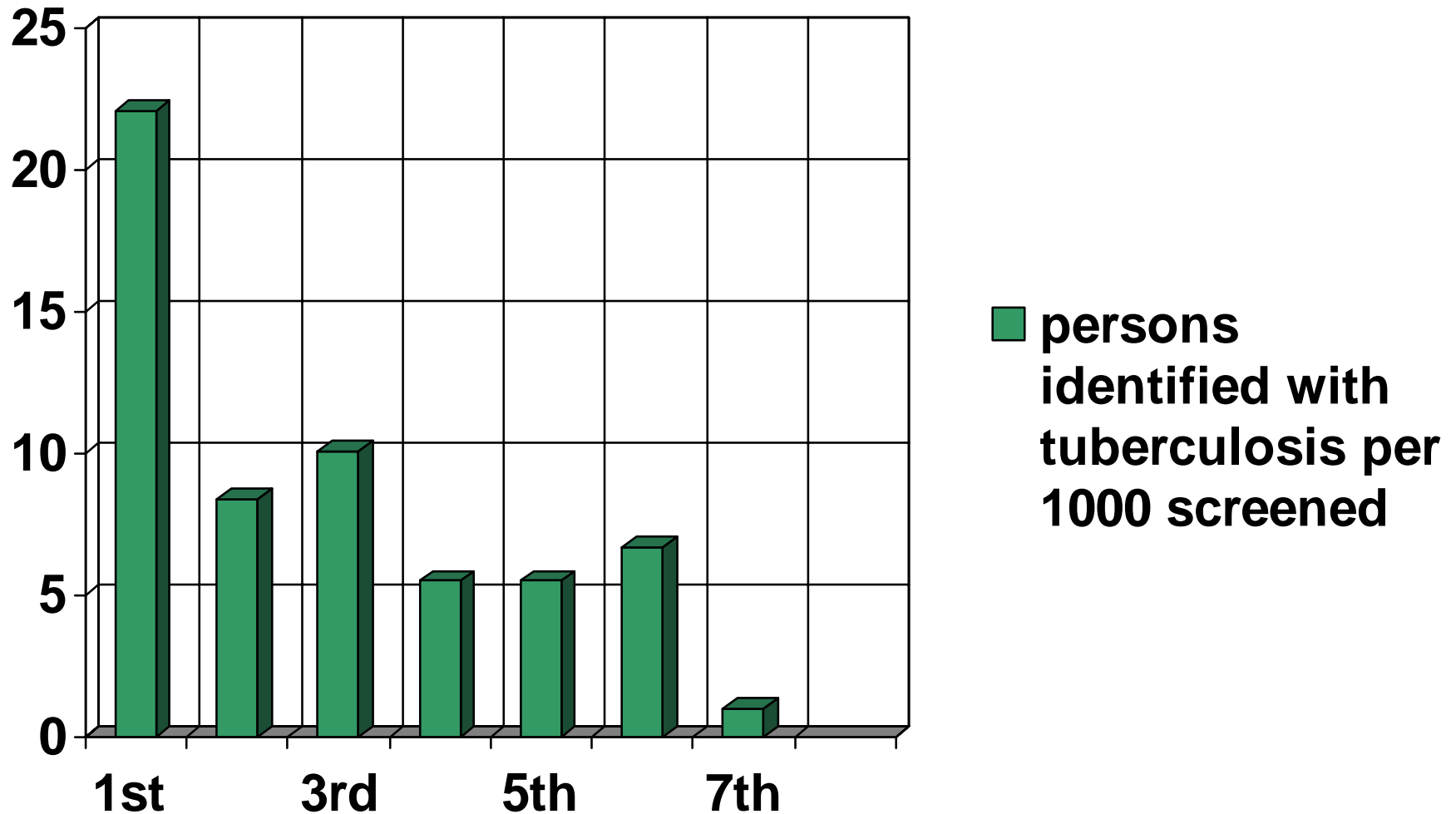




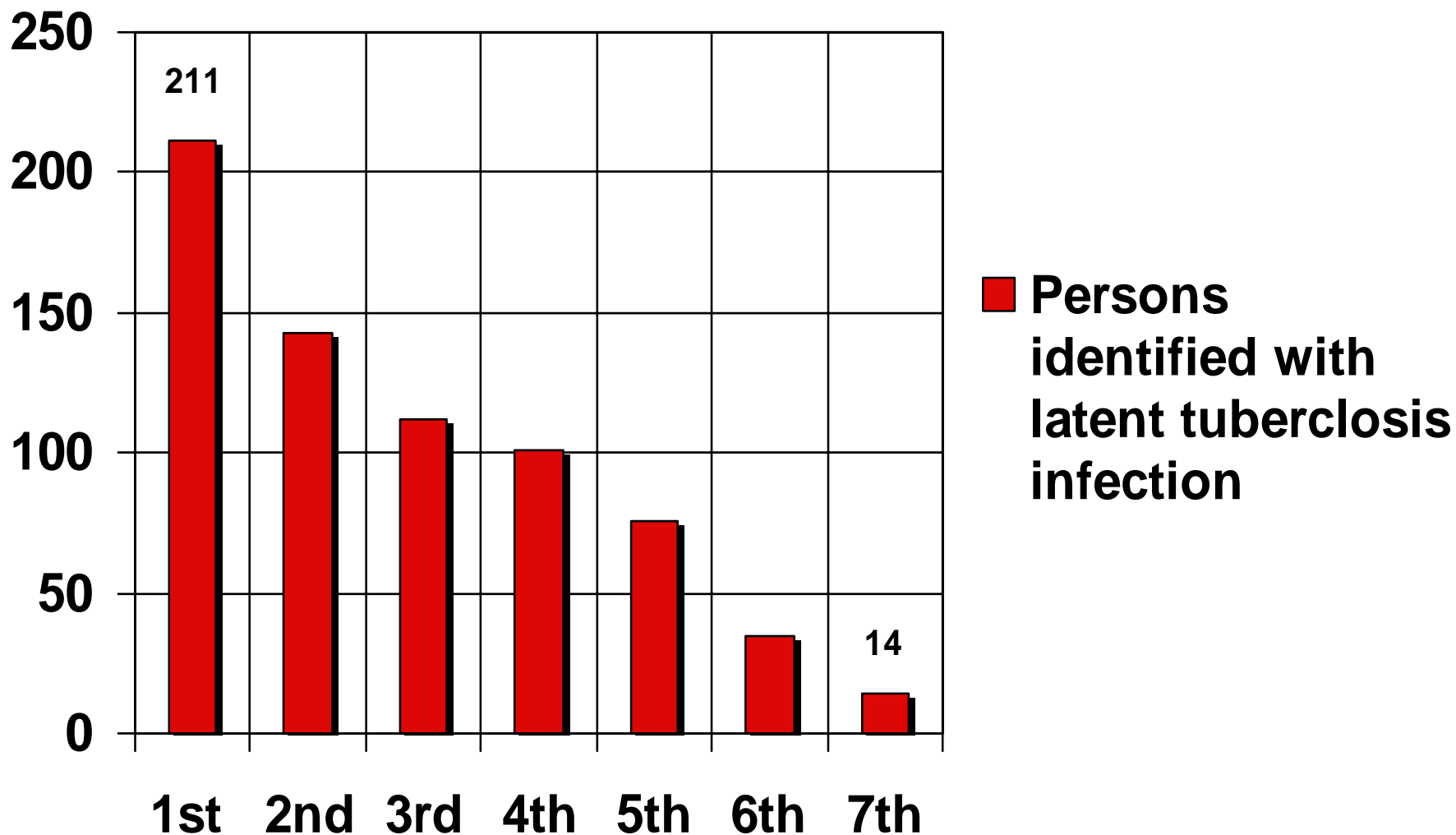
# Outcome of genotyping-GIS location based screening



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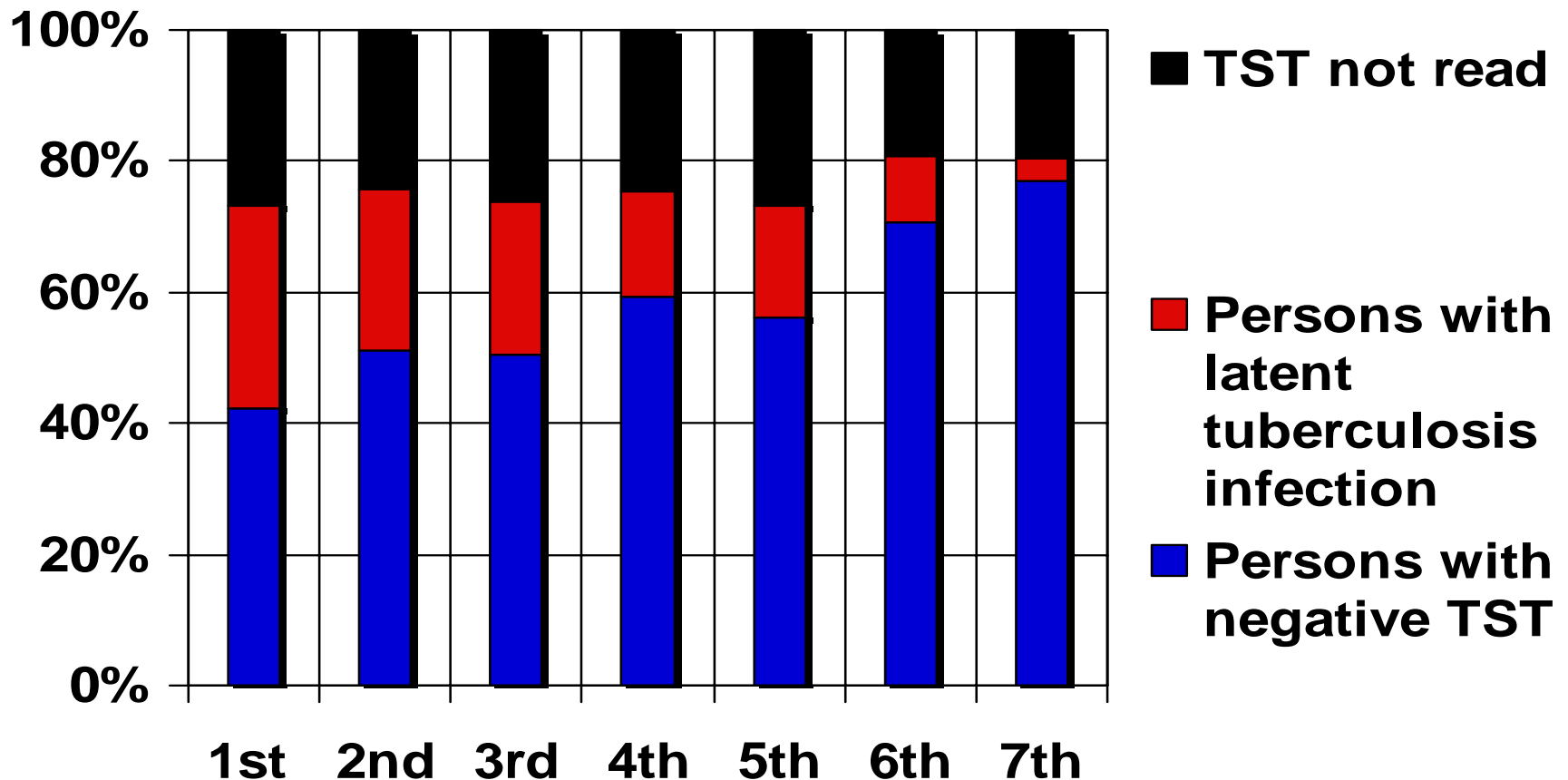


# Outcome of genotyping-GIS location based screening

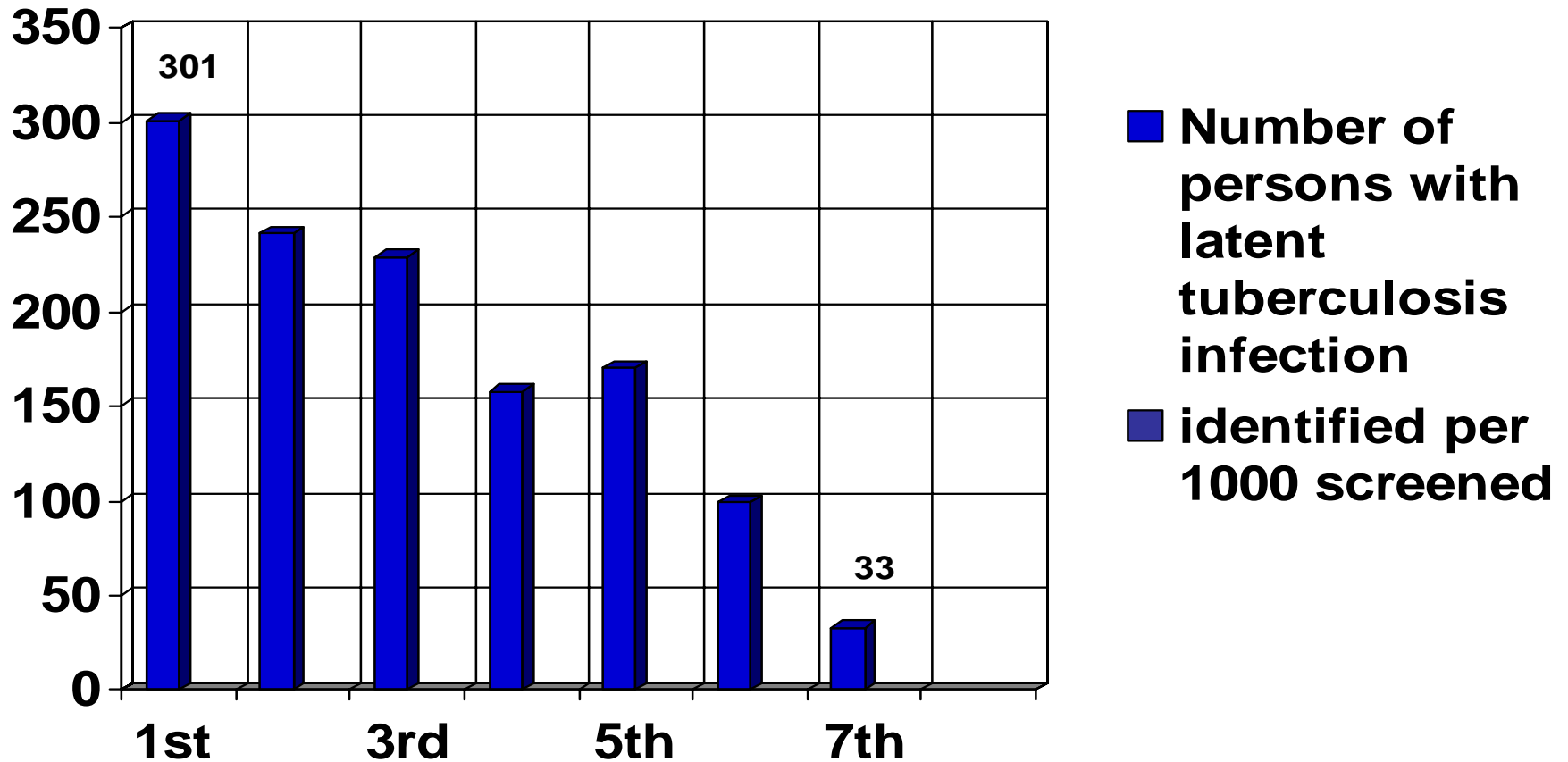




# Outcome of genotyping-GIS location based screening



# Outcome of genotyping-GIS location based screening



# Genotyping-GIS location based screening

- Can identify population for screening enriched with tuberculosis
- Can identify population for screening enriched with latent tuberculosis infection



# Outcome of genotyping-GIS location based screening treatment for TB

- 40/41 persons with tuberculosis completed therapy. None required legal quarantine to hospital.
- 1/41 lost. Mexican male who had arrived U.S. from Mexico 7 days before. In Fort Worth 2 days. Said he was staying. I believed him. Disappeared after 2 weeks of therapy. Not located in area, jail, or morgue.

# Outcome of treatment of LTBI

| LTBI                      | N%         | N Completing adequate treatment (%) <sup>1</sup> | Median treatment completed |
|---------------------------|------------|--|----------------------------|
| Identified                | 681        |  |                            |
| Treatment initiated       | 474 (70)   | 313 (66)   |                            |
| Long course <sup>2</sup>  | 364 (54)   | 231 (63)   | 0.69                       |
| Short course <sup>3</sup> | 123 (27.4) | 81 (66)  | 0.73                       |

<sup>1</sup> Completed at least 80% of recommended doses

<sup>2</sup> 6 mo of INH daily or biweekly or INH/RIF bi-weekly

<sup>3</sup> 4 mo of RIF daily or RIF/PZA daily

## Outcome of treatment of LTBI

| LTBI              | % (N)    | N Completing adequate treatment (%) | Median treatment completed |
|-------------------|----------|-------------------------------------|----------------------------|
| Lost to follow-up | 21 (146) | 0                                   | 0.44                       |
| Refused           | 4 (26)   | 0                                   | 0                          |
| Transferred       | 3 (20)   | -                                   | 0.40                       |

# Things we knew and learned

- We knew screening, to be successful, had to be win-win-win (meet needs of all)
  - win-patients = be easy, get health improvement, get screening card
  - win-community based organizations  
=safer workplace for clients and employees
  - win-Health department = find TB



# Things we learned

- Things that are not important to me may be very important to others!!
- Screening card developed “a life of its own”



## **TB Screening Card**

Tarrant County Health Department

**NAME: Moonan, Collin Patrick**

**SS# 999-99-9999 DOB: 09/15/2002**

**CXR# 001 TST: 0 SD: 04/01/03**

**Expires: 09/15/04**

**Not intended for legal ID but for screening clearance only!**

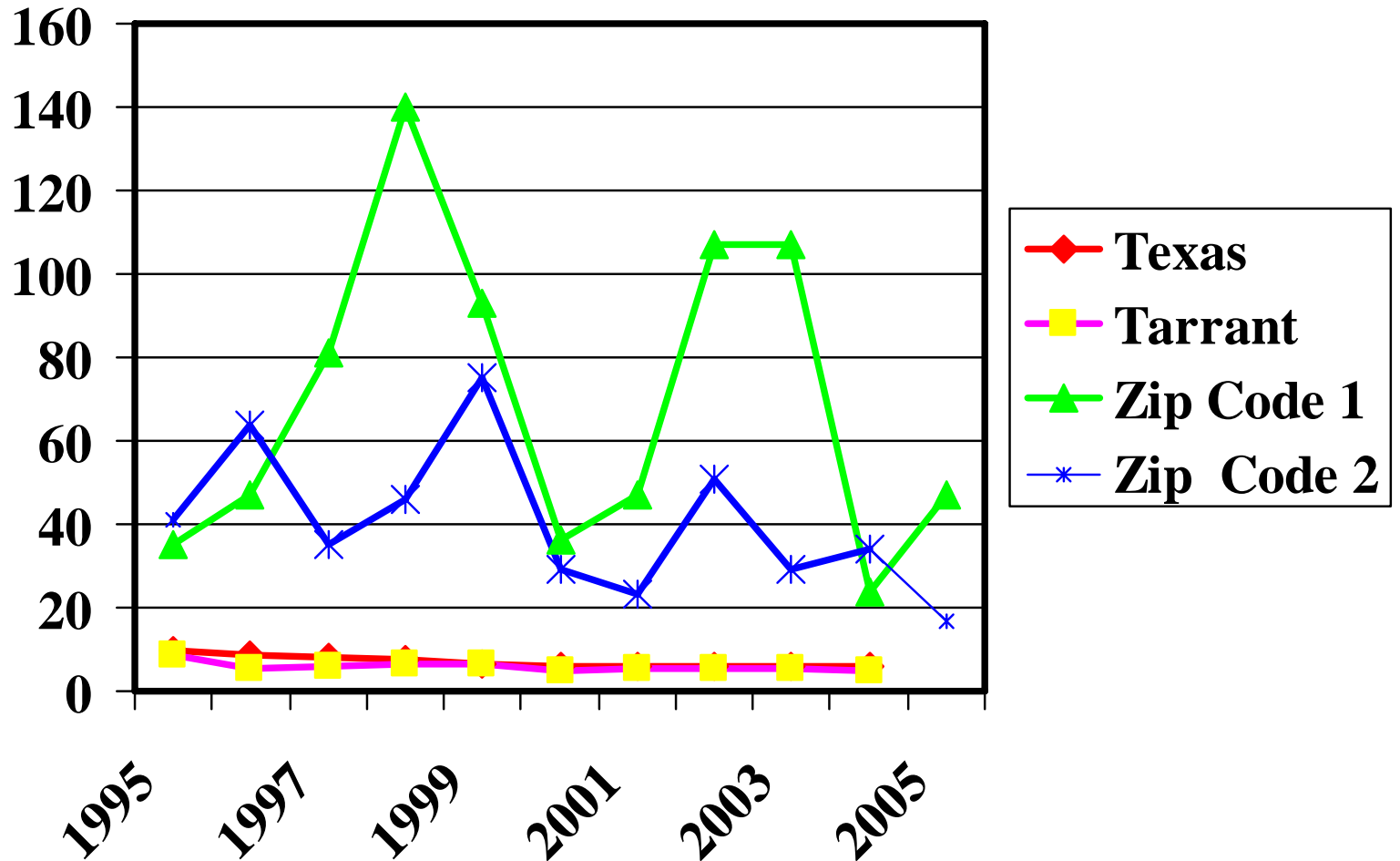
# Things we learned

- Genotyping-GIS can identify locations with populations at high risk tuberculosis.
- Screening at those locations can identify persons with tuberculosis and LTBI.
- Treatment of tuberculosis and LTBI discovered by genotyping-GIS can be completed successfully.
- Community based organizations support is essential for success.

# Things we still hope to learn

- Can genotyping-GIS location based screening with treatment reduce transmitted TB (as measured clustering)??
- Can genotyping-GIS location based screening with treatment reduce transmitted TB (as measured by incidence)??

# TB Case Rates 1995-2005



1993

time

INTERVENTION  
START

compare equal  
times before &  
after start of  
ongoing intervention

cluster A

cluster B

cluster C

cluster D

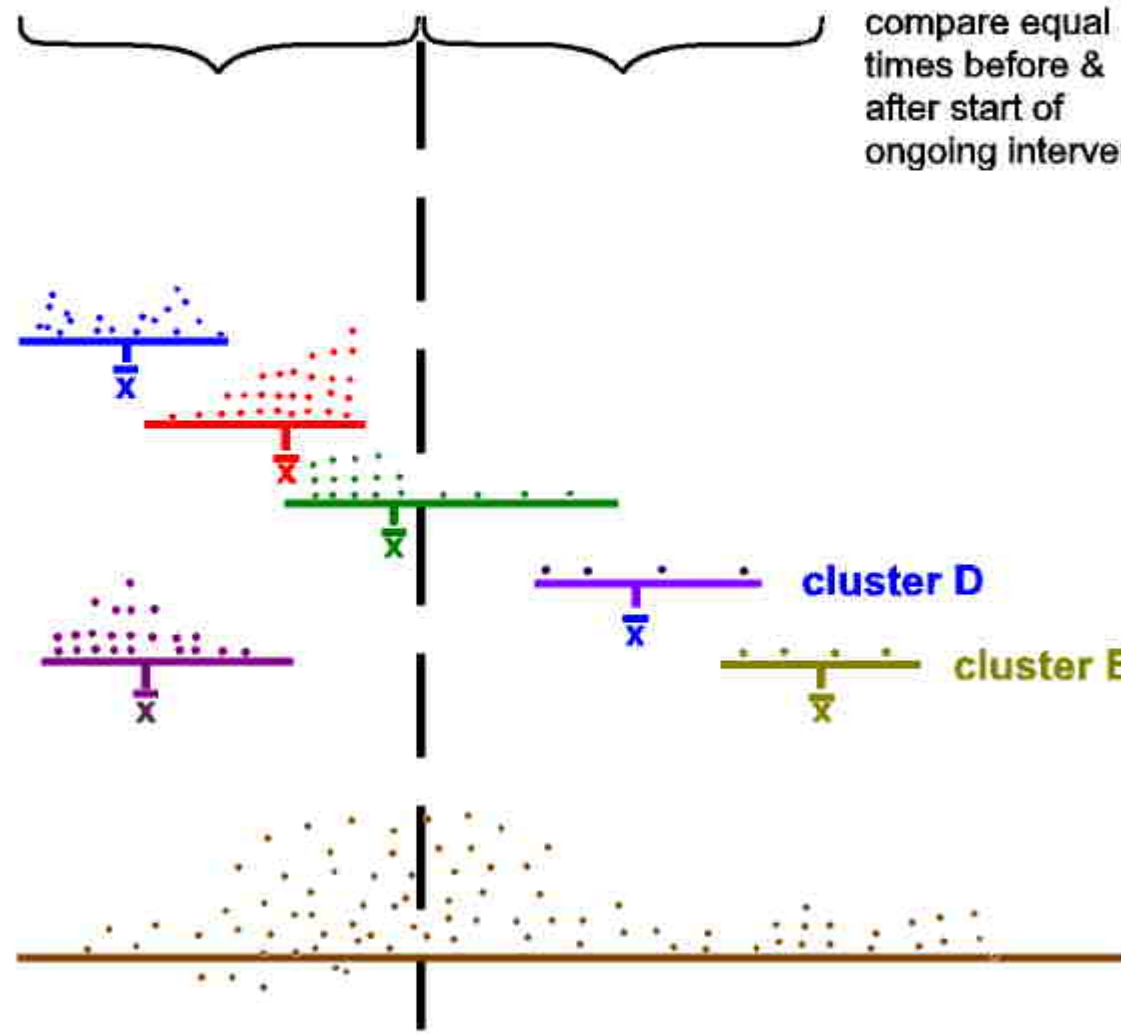
cluster F

cluster E

Strain 210

1993

2004?



# Treatment based on Genotyping- GIS location based screening

- Can be as successfully completed as for groups screened by other methods including contact investigations

# Outcome of genotyping-GIS location based screening

- 1913 individuals received a second evaluation by TST (52.5%), of these 104 (5.4%) became positive
- There were 1,326 person years of observation
- During the first 14 months 14.3 conversions per 100 person-years of exposure
- During the last 14 months 2.2 conversions per 100 person-years of exposure



# Background

- Since 1980, the TCHD has performed active surveillance screenings at local homeless shelters with some success
- screening and medical evaluation was offered on voluntary basis
- averaged 1 active case identified per 100 chest x-rays performed (1986 – 1992)
- in the period from September 1992 to March 2002, only 2 cases were identified out of 2911 chest x-rays performed

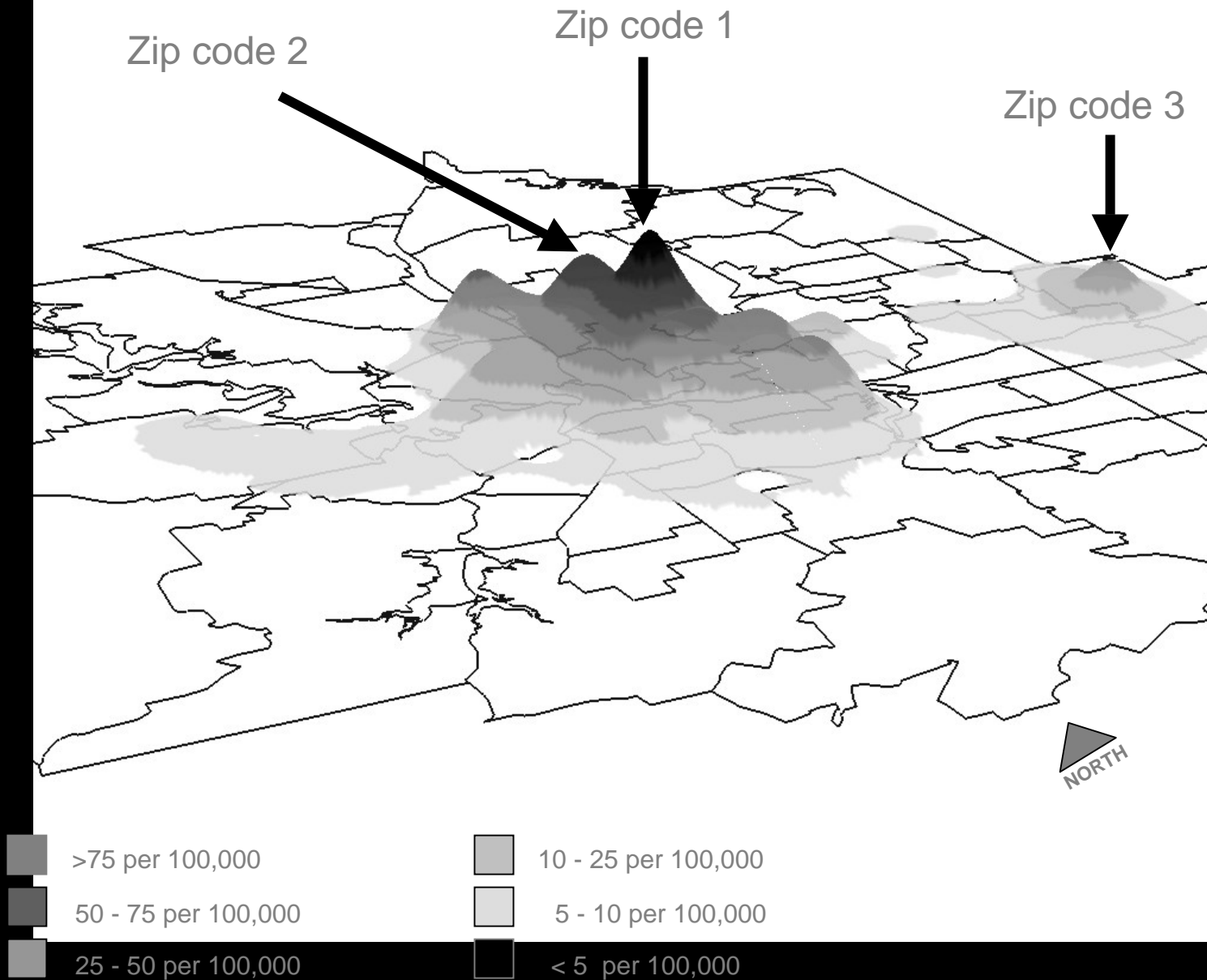
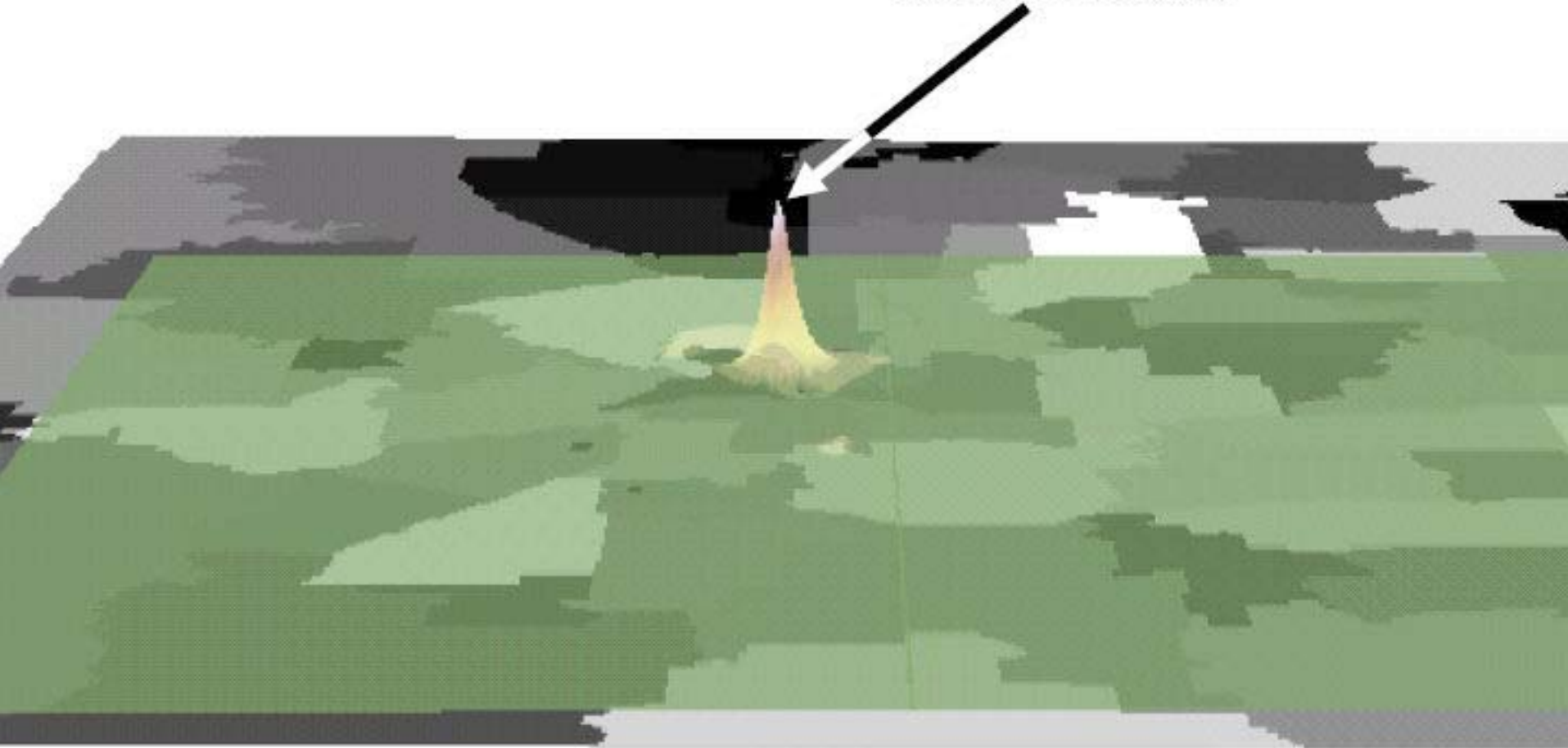


Figure 3. Three dimensional representation of tuberculosis incidence

TB cases diagnosed Jan 1 1993 – Dec 31, 2000  
n = 991

Shelter A: 29 genotypically  
clustered Cases

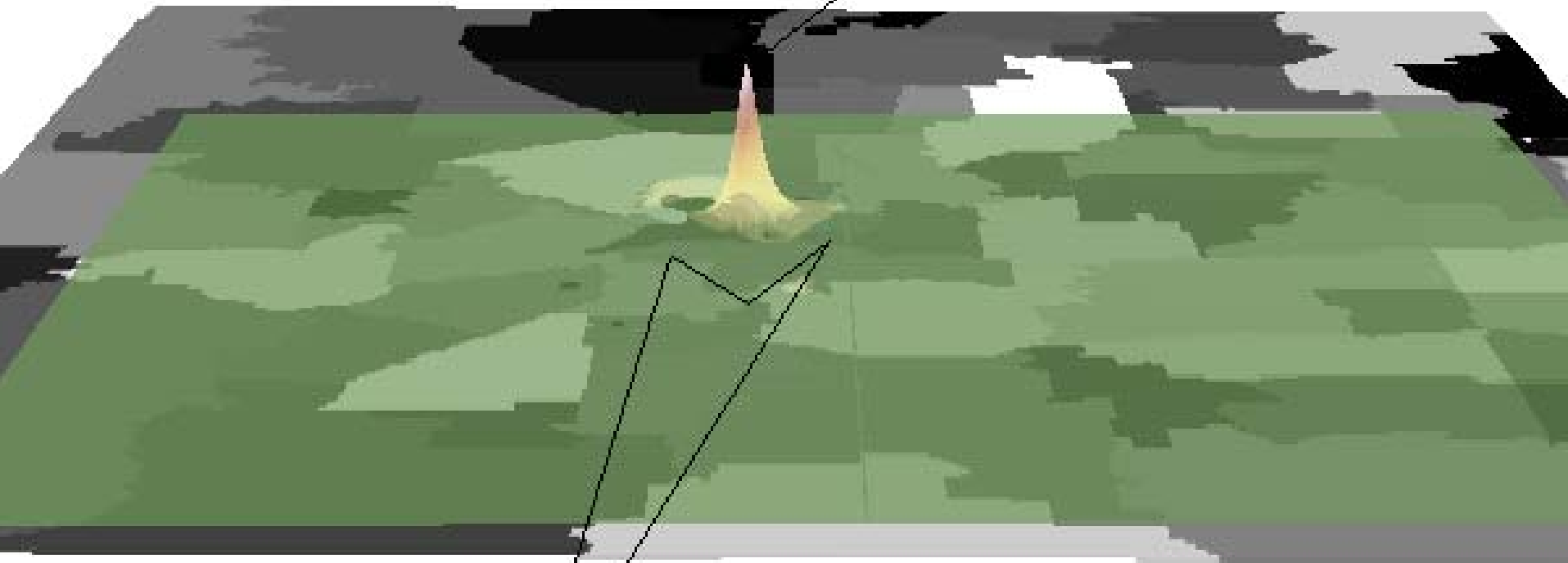


48 clusters  
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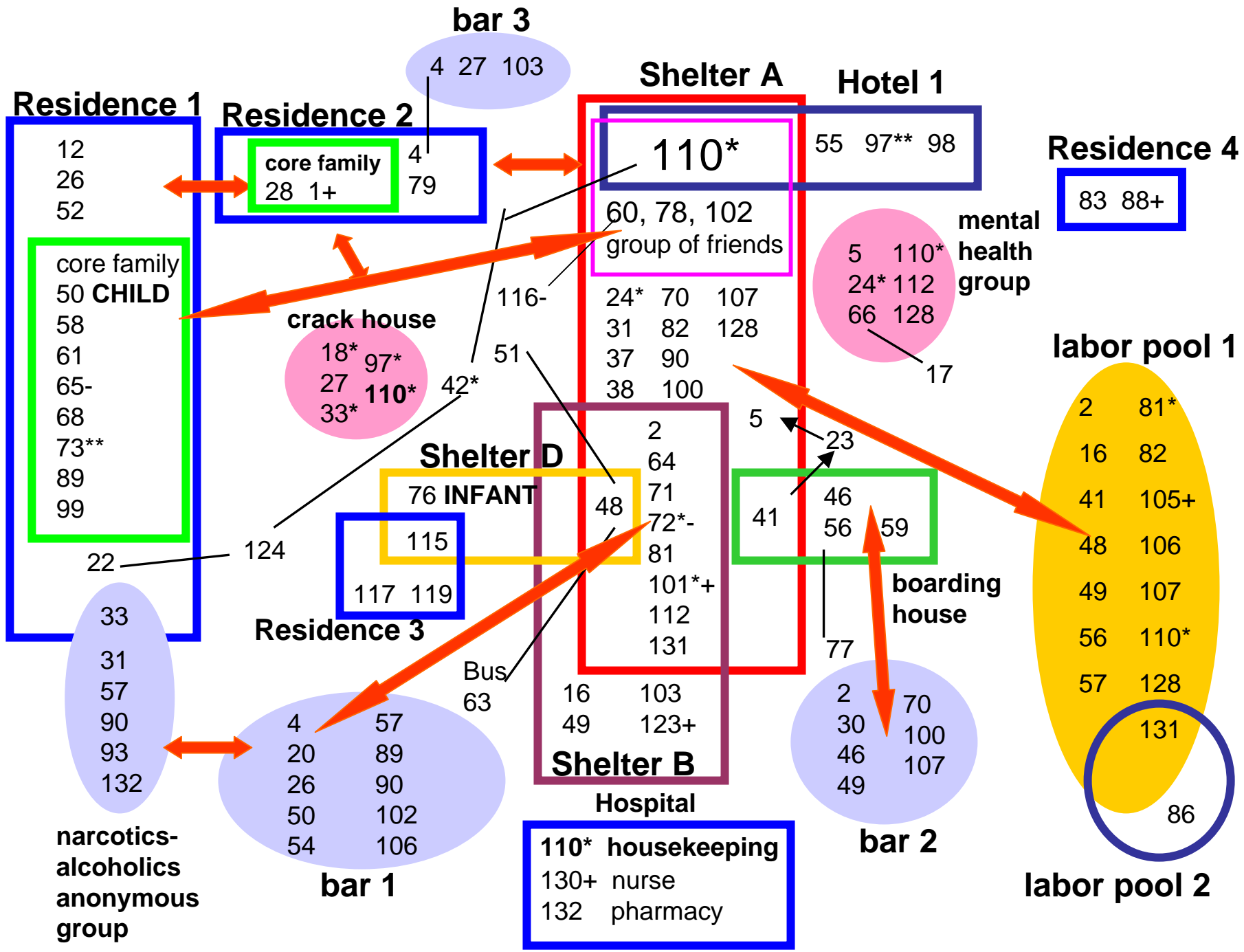


2400 Cypress (29)

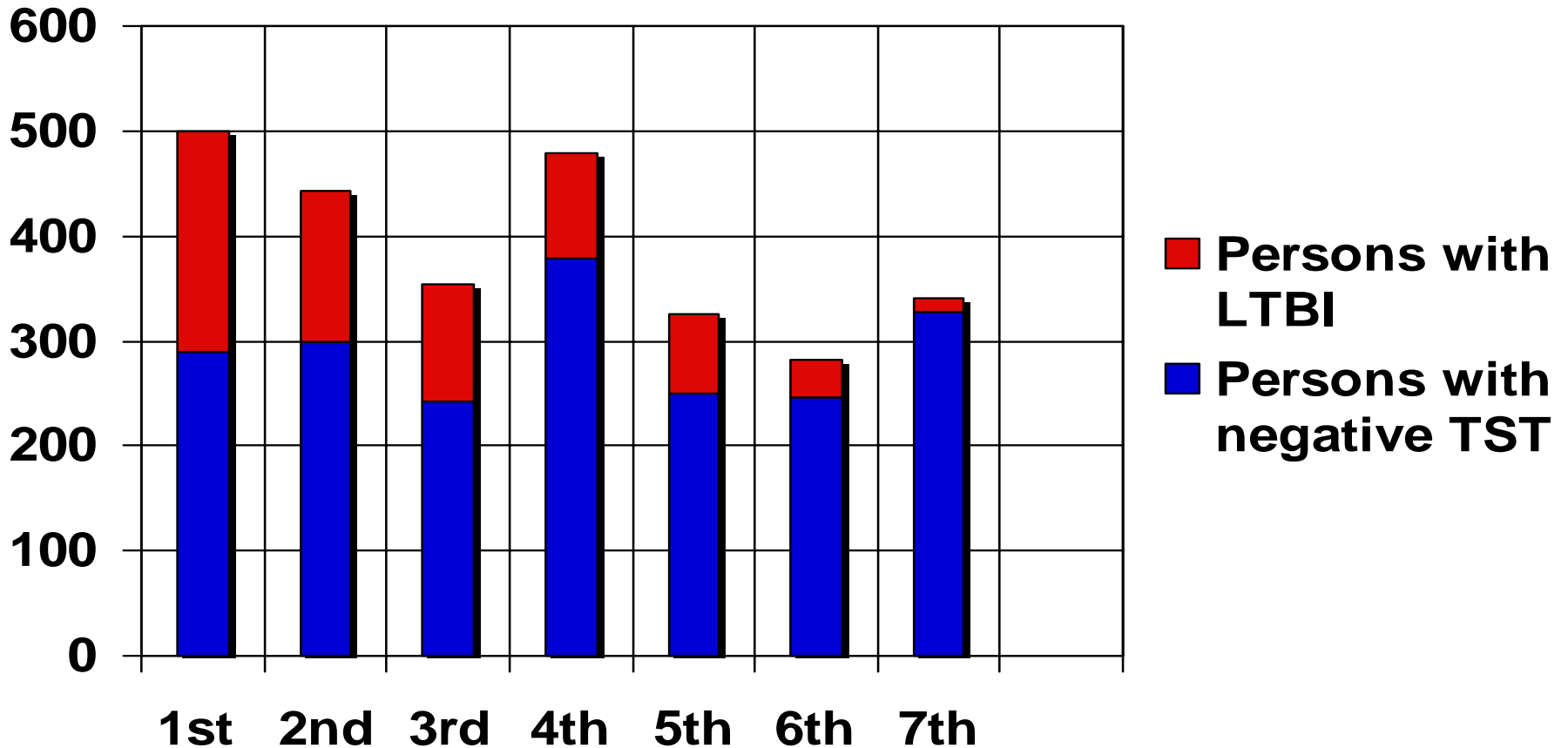


76102 (94.4/100,000) and 76104 (55.2/100,000)





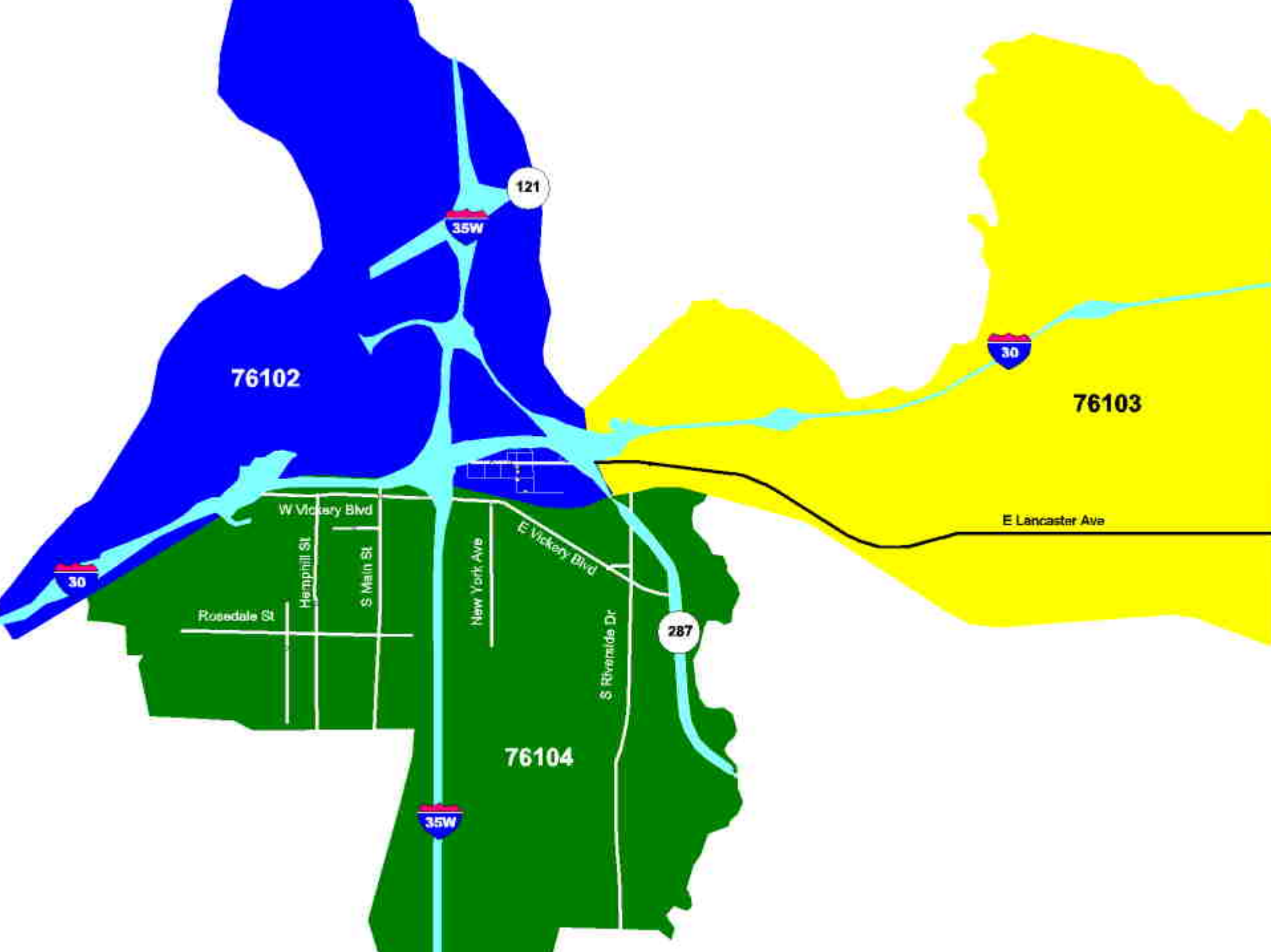
# Outcome of genotyping-GIS location based screening





# Spoligotyping

- PROs
  - rapidity of PCR
  - distinguishes H37Ra from clinical strains
  - comparison to National CDC database
- CONs
  - less discriminatory, predominating spoligopatterns
  - membrane availability
  - PCR of nonviable organisms



76102

76103

76104

121

35W

30

30

287

35W

W Vickery Blvd

Rosedale St

Herpphill St

S Main St

New York Ave

E Vickery Blvd

S Riverside Dr

E Lancaster Ave