



# EVALUATION OF LATENT TUBERCULOSIS INFECTION SCREENING IN THE FIELD

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# Presenter Disclosures

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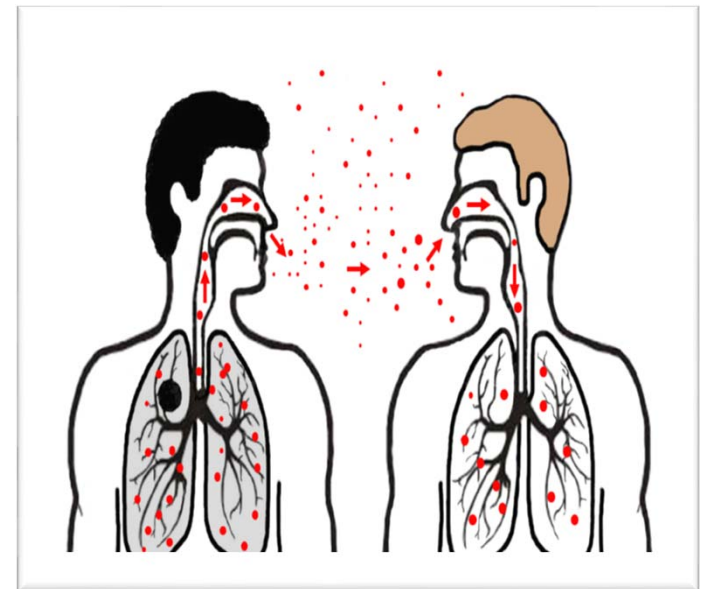
The following personal financial relationships with commercial interests relevant to this presentation existed during the past 12 months:

No relationships to disclose



# Tuberculosis (TB)

- Caused by *Mycobacterium tuberculosis*
- TB is spread via droplet nuclei
- The best way to stop transmission is to:
  - Isolate infectious persons
  - Provide effective treatment to infectious persons as soon as possible



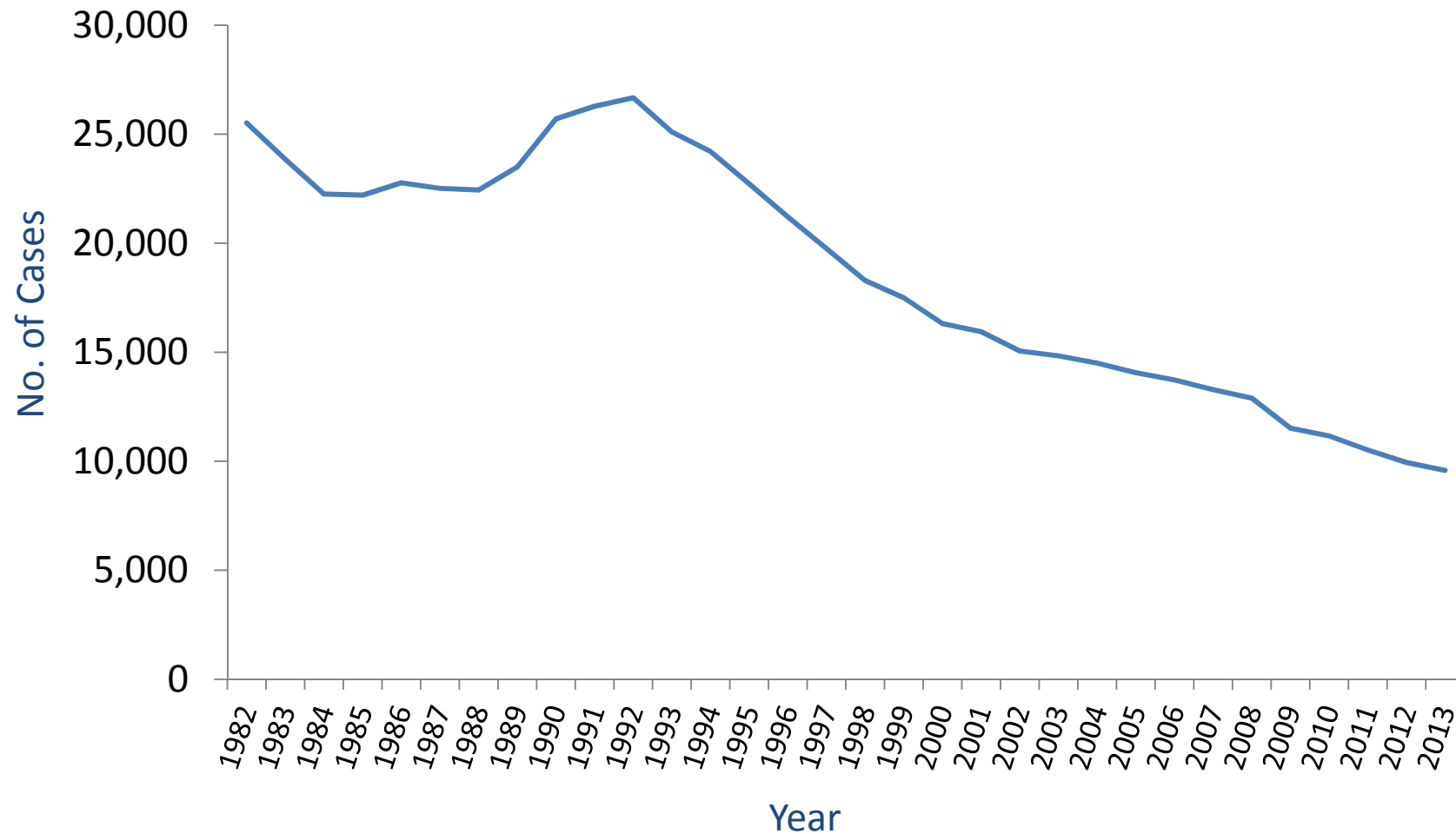


# Latent TB Infection vs. TB Disease

Latent TB Infection (LTBI)	TB Disease (in the lungs)
<b>Inactive</b> , contained tubercle bacilli in the body	<b>Active</b> , multiplying tubercle bacilli in the body
TST or blood test results usually <b>positive</b>	TST or blood test results usually <b>positive</b>
Chest x-ray usually <b>normal</b>	Chest x-ray usually <b>abnormal</b>
Sputum smears and cultures <b>negative</b>	Sputum smears and cultures may be <b>positive</b>
<b>No symptoms</b>	<b>Symptoms</b> such as cough, fever, weight loss
<b>Not infectious</b>	<b>Often infectious</b> before treatment
<b>Not a case</b> of TB	<b>A case</b> of TB



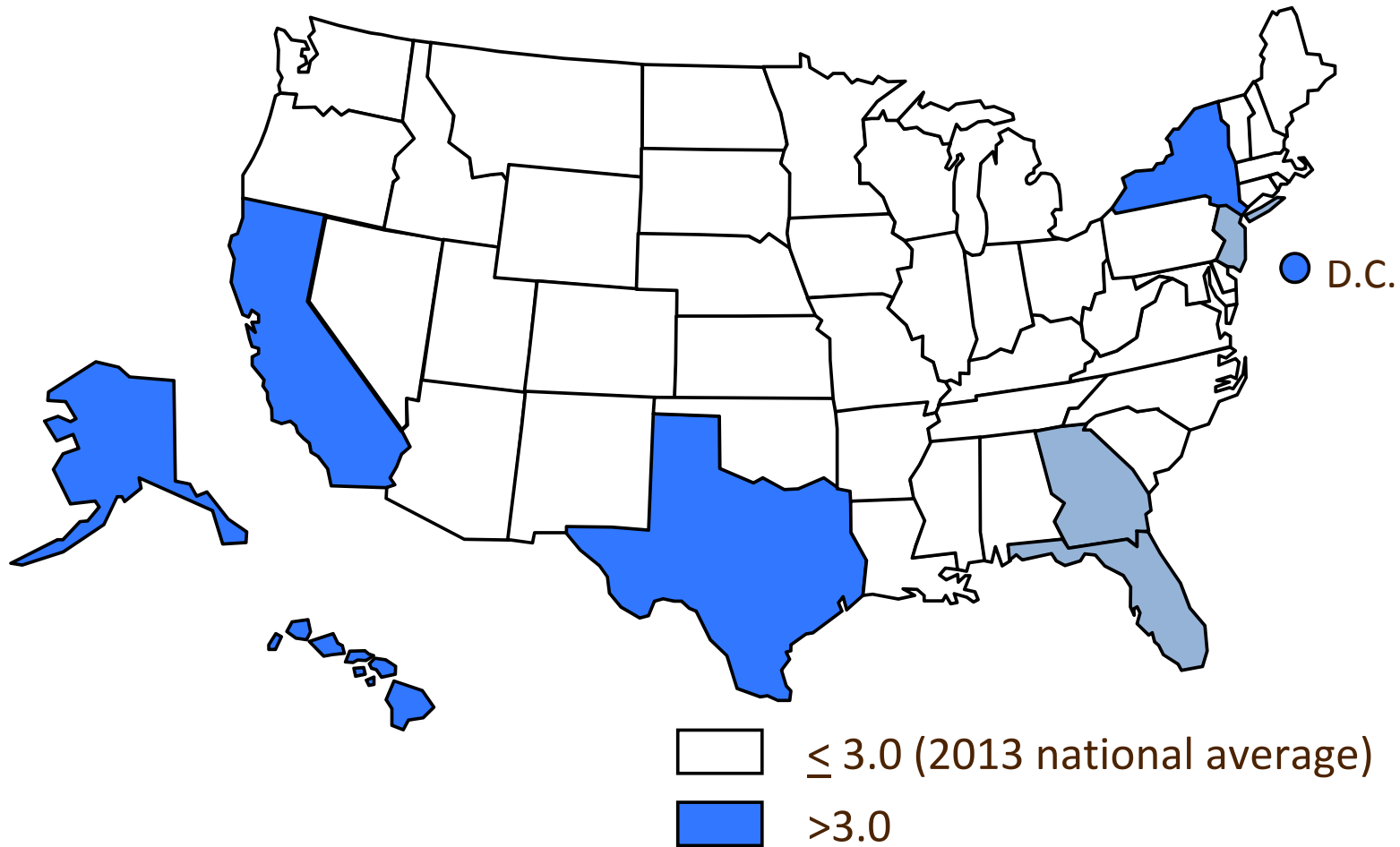
# Reported TB Cases United States, 1982–2013\*



\*Updated as of June 11, 2014.



# TB Case Rates,\* United States, 2013



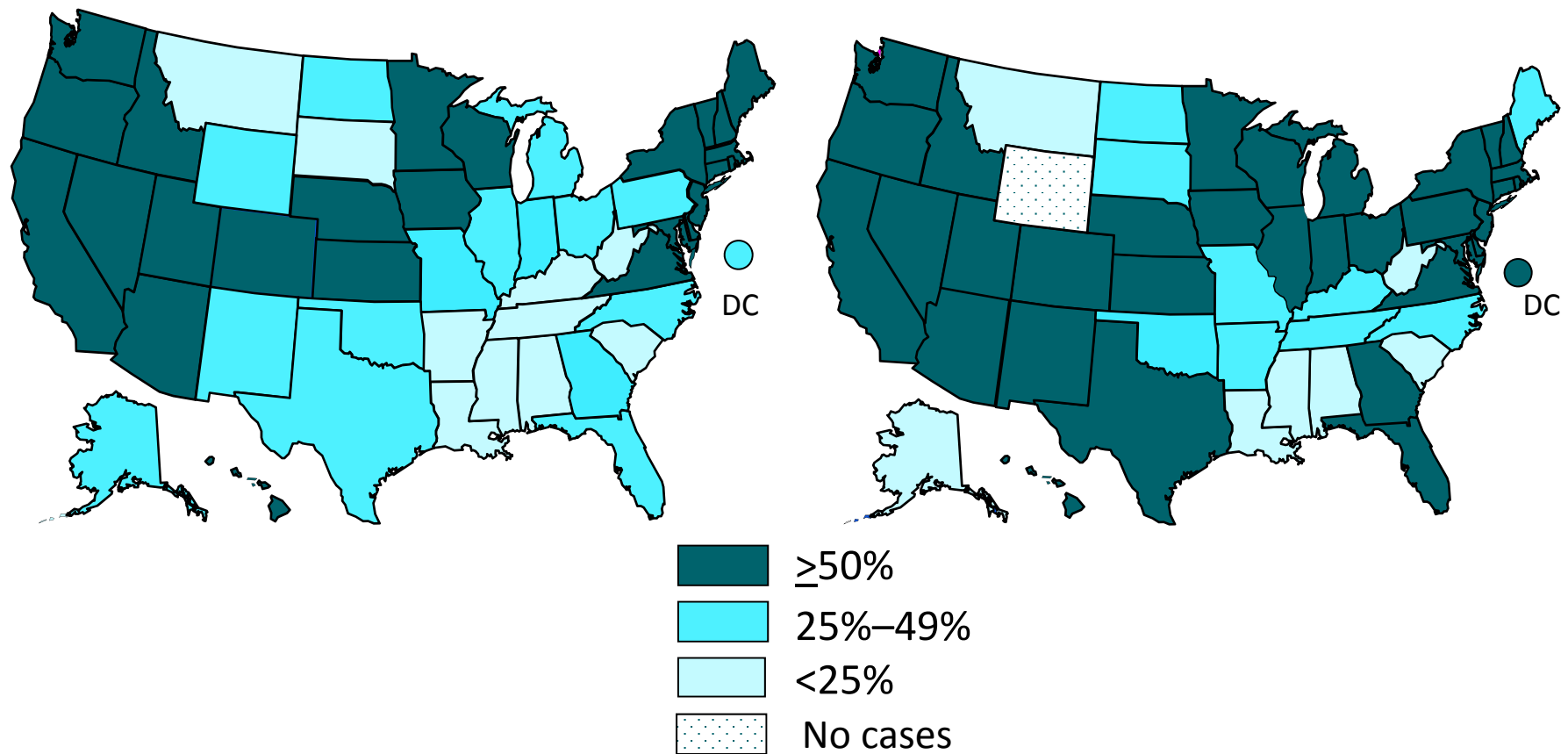
\*Cases per 100,000.



# Percentage of TB Cases Among Foreign-born Persons, United States\*

2003

2013

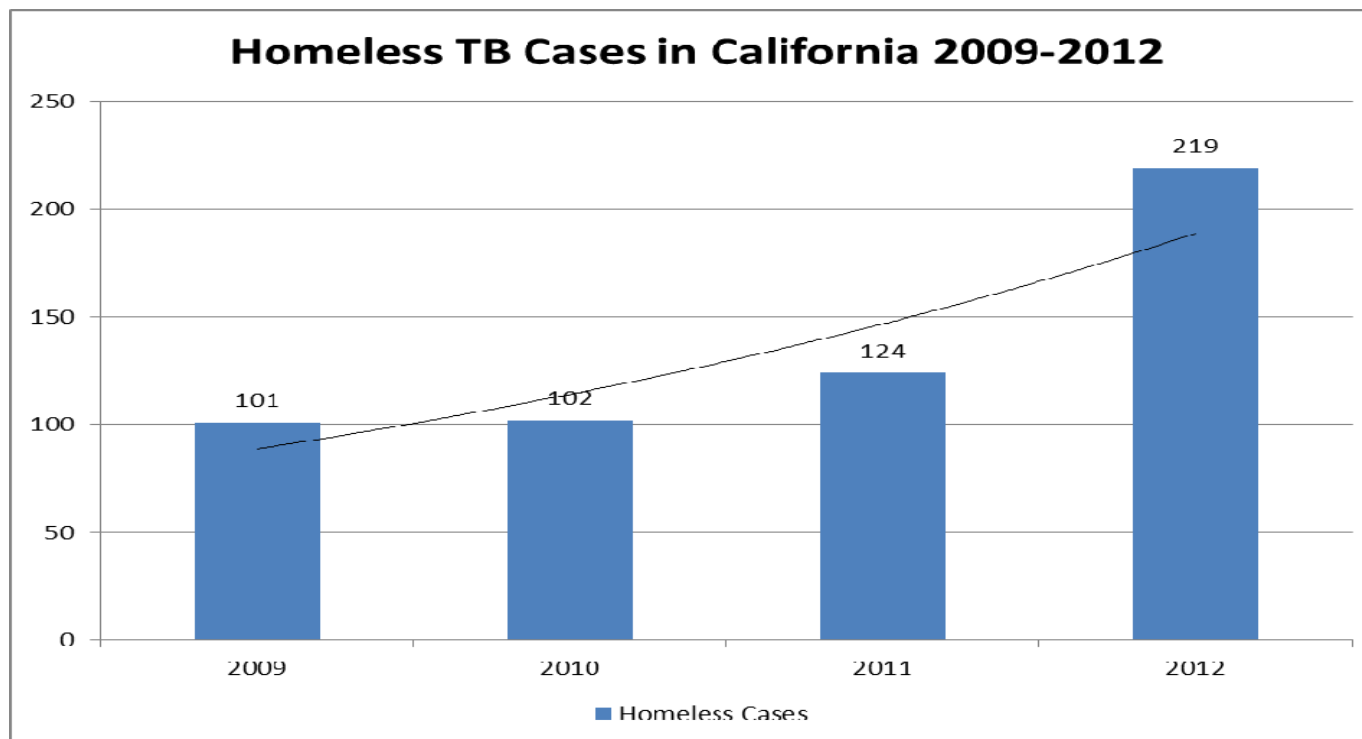


\*Updated as of June 11, 2014.



# Assessment

- In 2012, California reported the highest number of tuberculosis (TB) cases in the United States
  - Largest groups are Foreign born (79%) and homeless (5.9%)







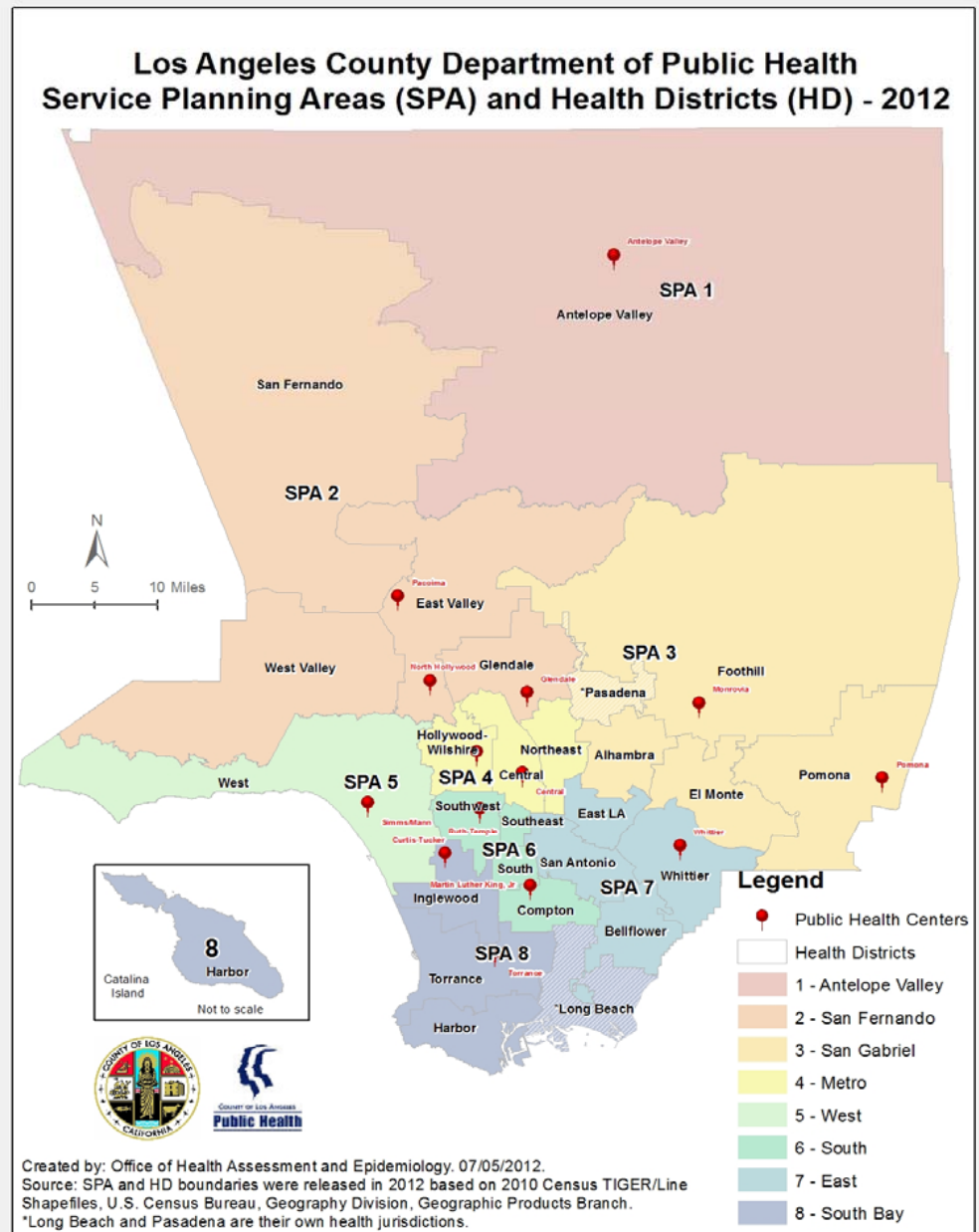
- In December 2012, CDC identified a TB homeless outbreak in Los Angeles County





# Los Angeles County

- 10 million residents
- 88 cities
- 4,000 square miles
- 8 Service Planning Areas (SPA) with 26 health districts
- 14 Public Health Centers
- 165 Public Health Nurses (generalist)

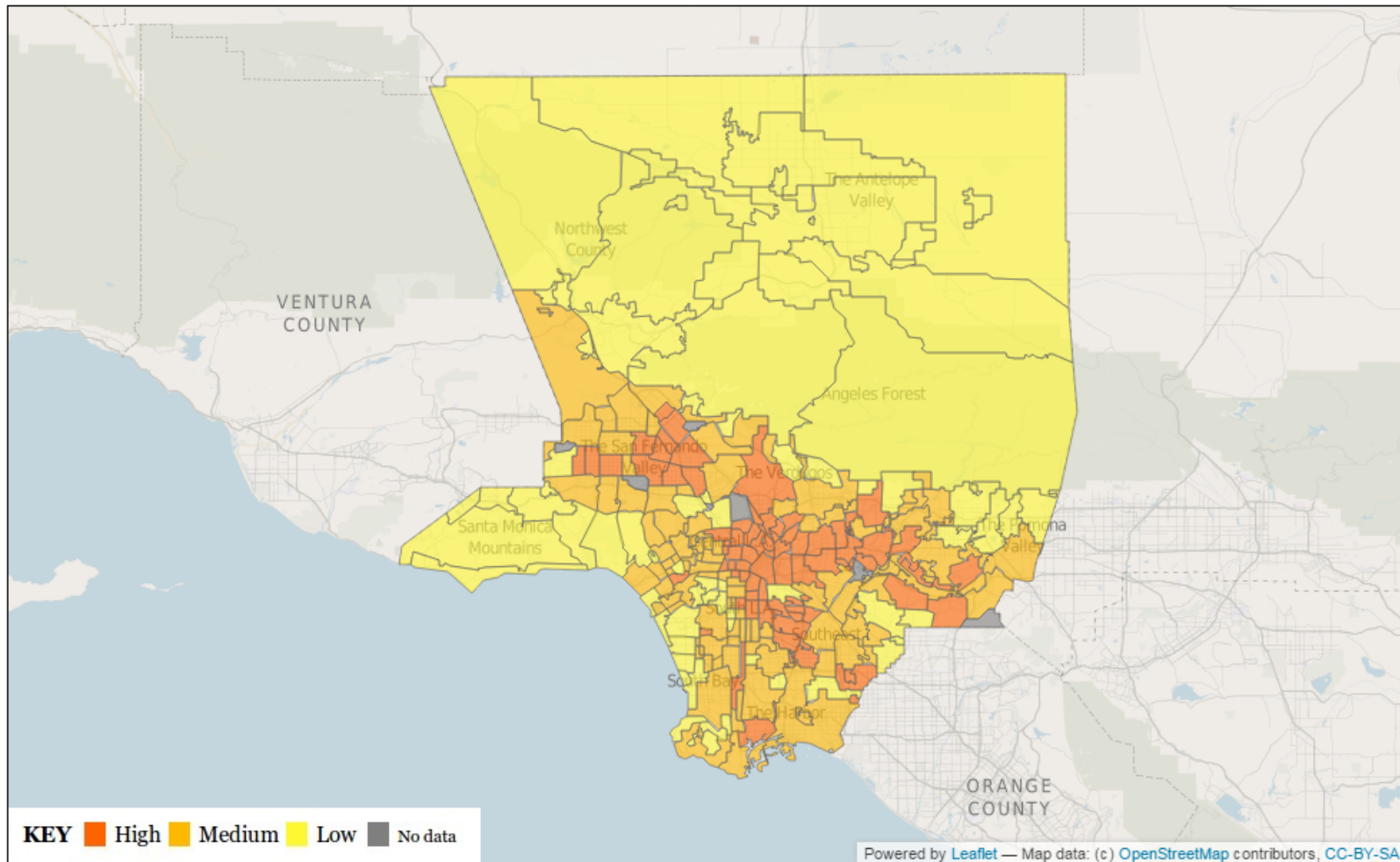




MAPPING L.A. > RANKINGS > ANCESTRY

# Foreign Born

Select one of L.A.'s 272 neighborhoods to see where it ranks

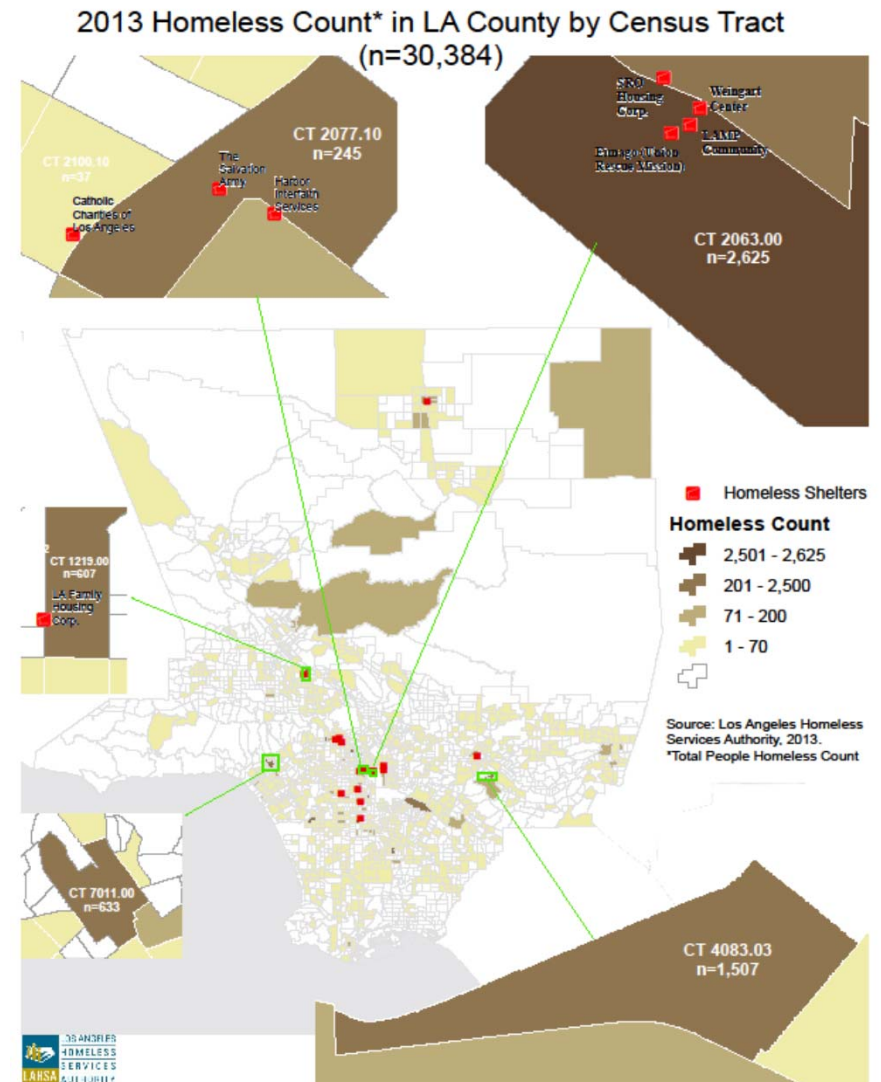


The percentage of **foreign born** measures the portion of the population born in another country.



# Homeless in Los Angeles County

- 39,463 (2013) homeless
- L.A. second to New York City in homeless
- Nationwide decline of homeless, but an increase in LA County





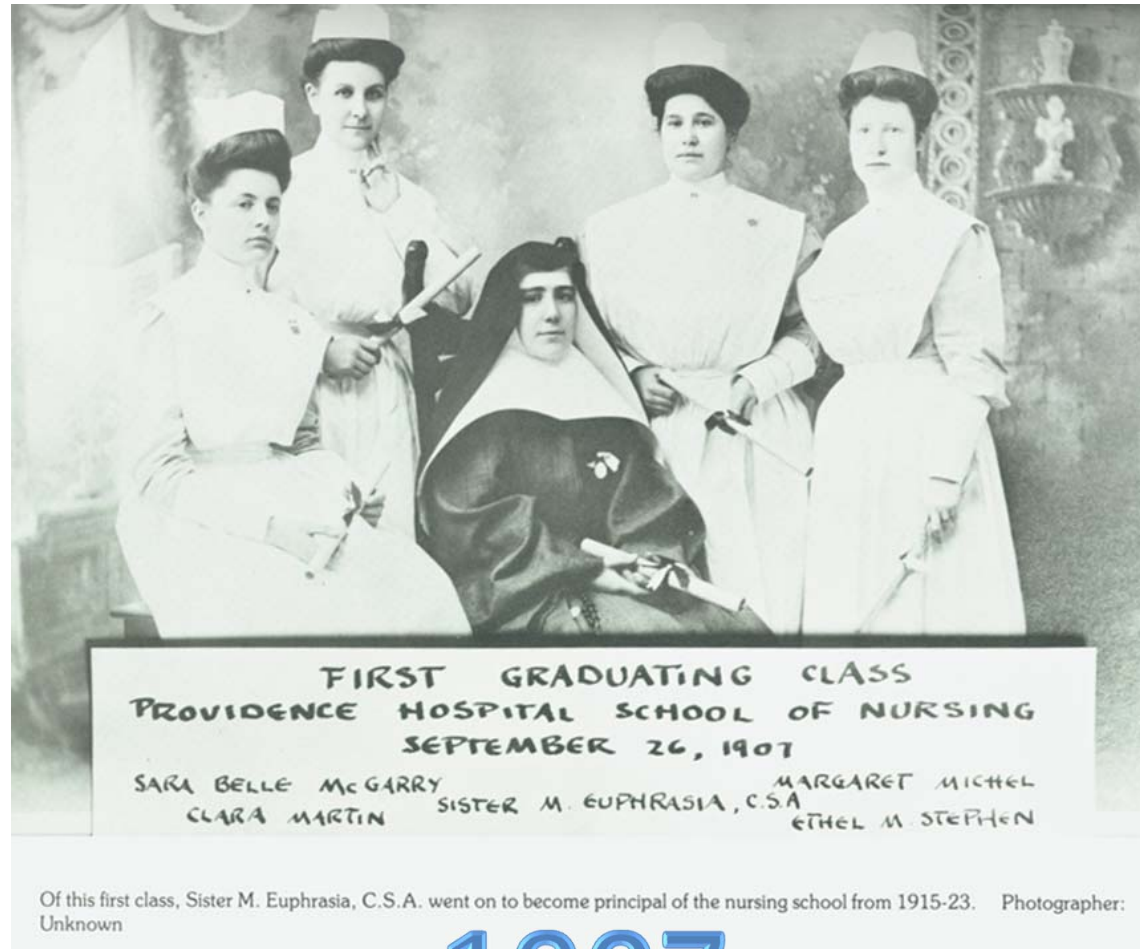
# Assessment

Current practice in LA County 2012:

- Using TST as the only method for screening for TB
- Since 1907 Tuberculin Skin Test (TST) has been the test of choice for TB screening
- New technology offered an evidence based practice alternative to TST called IGRA



# Screening for TB: Tuberculin Skin Test



1907



# Tuberculin Skin Test (TST)

- Advantages
  - Using it since 1907
  - Intradermal
  - Low cost
- Disadvantages
  - Return visit for reading
  - Lacks accuracy
  - Interacts with BCG vaccine and other mycobacterium (that are not TB)



# Technology Advancing Medicine

- In 2001 a new blood test was developed to screen for TB

## Interferon-Gamma Release Assay

(IGRA)

Blood test that is specific to Mycobacterium Tuberculosis

2 vendors:

Quantiferon (QFT) Gold

TSPOT





# Screening for TB: Interferon-Gamma Release Assay



2001



# IGRA Test

- Advantages
  - No return visit necessary
  - Accuracy
  - Does not interact with BCG vaccine or other mycobacterium
  - Lower cost in the long run
- Disadvantages
  - Higher cost for test (lower cost on the long run!)
  - Venipuncture
  - Incubation or laboratory processing is necessary



# Evidence Based

	Sensitivity		
	QFT	TSPOT	TST
Schluger & Burzynski (2010)	76%	88-90%	71%
Menzies, Madhukar & Comstock (2007)	76%	88%	63%
Sadatsafavi et al. (2010)	64.2%	50%	70.9%

**Sensitivity** : True Positive  
Ability to yield a positive result when person actually has that condition

**Specificity** : True Negative  
Ability to yield a negative result when the person does not have that condition

	Specificity		
	QFT	TSPOT	TST
Schluger & Burzynski (2010)	97%	88-92%	66%
Menzies, Madhukar & Comstock (2007)	97.7%	92.5%	66%
Sadatsafavi et al. (2010)	99.6%	90.6%	68.3%
Diel et al. (2011)	100%	98%	88.7% (55-95%)



# CDC Recommendations

Using an IGRA in the following populations:

- Persons who have received BCG (either as a vaccine or for cancer therapy); and
- Persons from groups that historically have poor rates of return for TST reading.
- For those 5 years old or older

**GOAL: Screen contacts, homeless and foreign born  
with IGRA**

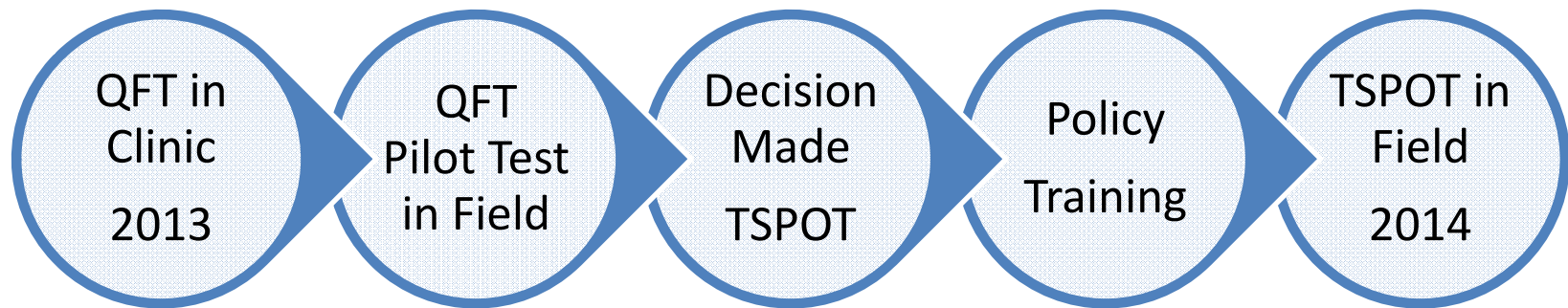


# Plan

- February 2013 Policy Implementation to use IGRA in the *clinics* only using QFT
  - Field Testing for Contact Investigation
    - Integral part of stopping the spread of TB
    - Key role of public health departments
    - Occur in the field setting (home, workplace, schools, etc.)
- In February 2014 expanded the policy to include IGRA testing in the *field* using TSPOT



# Implementation





# Evaluation

1. Compared TB Control data for
  - Contact investigation screening completion rates
  - Latent TB infection rate
2. Cost Analysis
  - Cost
  - Cost impact analysis
3. Track usage of IGRA in the field



# Results: Screening Completion

Screening completion includes:

- Negative TST or IGRA
- Positive TST or IGRA and Negative CXR

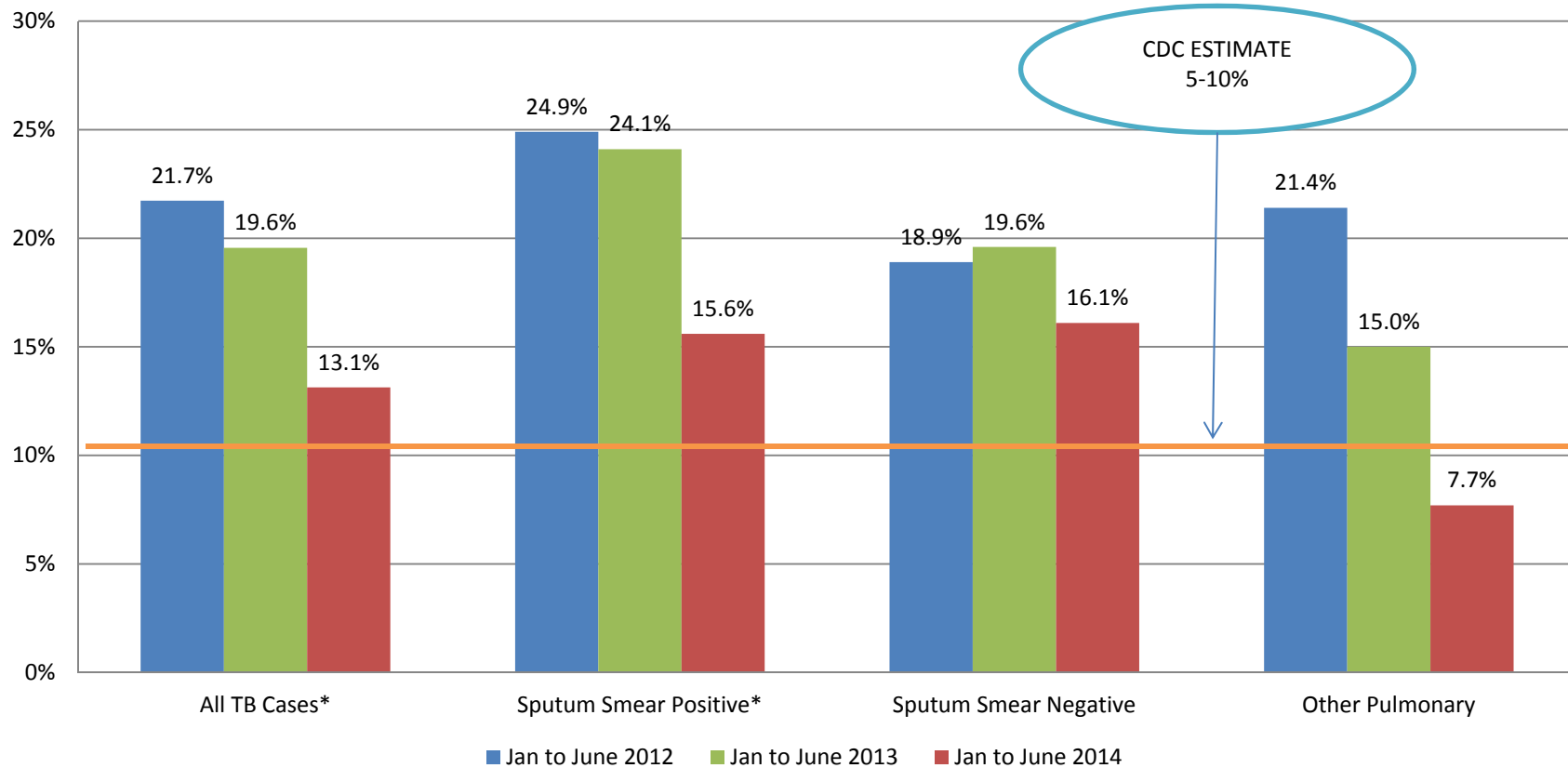
	Number of TB Cases Investigated	Number of Contacts	Number of Contacts Screened	Percent completed Screening	LTBI Positivity Rate
Jan to June 2013	178	3223	3146	97.6%	19.6%
Jan to June 2014	143	1383	1337	96.6%	13.1%





# Results: Latent TB Infection Rate

## 2013 and 2014 Latent TB Infection Rates Comparison



$$\chi^2 (1, N= 3731) = 31.85, p= .0000$$



# Results: Cost-Analysis

## LTBI Screening Cost in the field

ITEM	TST	IGRA
Test	0.28	46.50
PHN Time 15 min visit 1	13.28	13.28
PHN Time 15 min visit 2	13.28	0.00
<b>Screening Total</b>	<b>\$26.84</b>	<b>\$59.78</b>

## LTBI Treatment Cost for 9 month course

Xray 1 view	5.60
Radiology Technician 15 min	7.32
Radiologist MD 15 min	56.25
<b>Xray Total</b>	<b>\$69.17</b>
INH 300mg x9 mos	18.90
B6 50mg x9 mos	2.70
<b>Prescription Total</b>	<b>\$21.60</b>
Baseline Liver Function test x1	7.50
Follow up AST/ALT x9	2.20
RN blood draw 10 min	8.10
MD visit 15 min x1	24.41
RN visit 15 min x9	109.37
Clerk 10 min x9	28.53

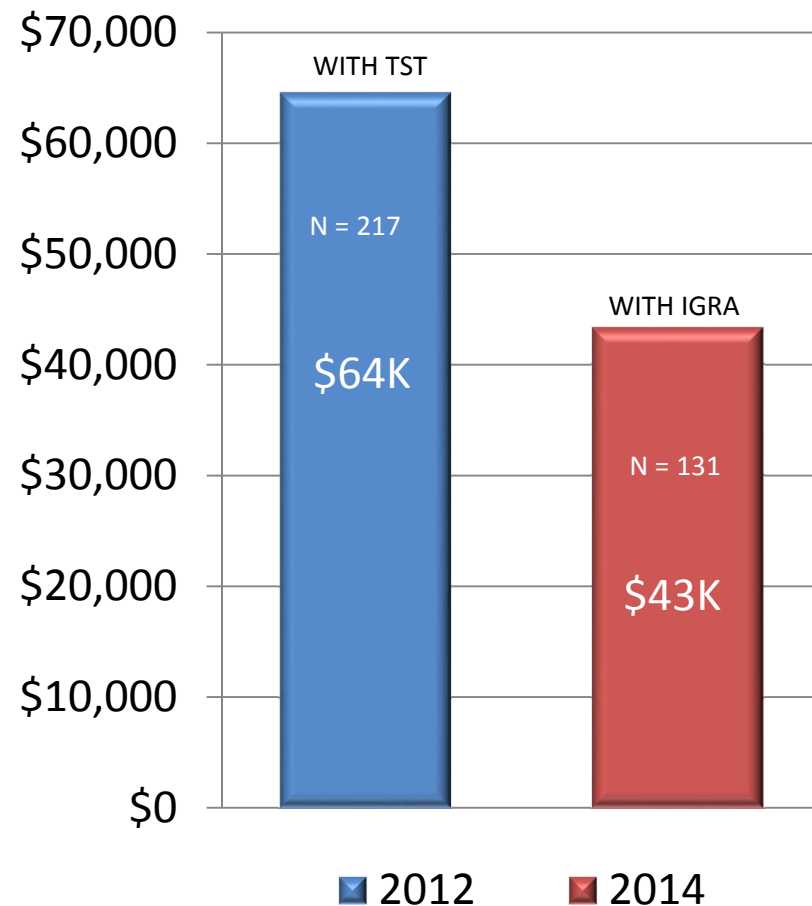


## Results: Cost Impact Analysis

	TST	IGRA
Test	26.84	59.78
9 month LTBI Treatment	270.88	270.88
Screening Total	<b>\$297.72</b>	<b>\$330.76</b>

**For 1,000 contacts screened, there is an estimated cost savings of \$21,288.78.**

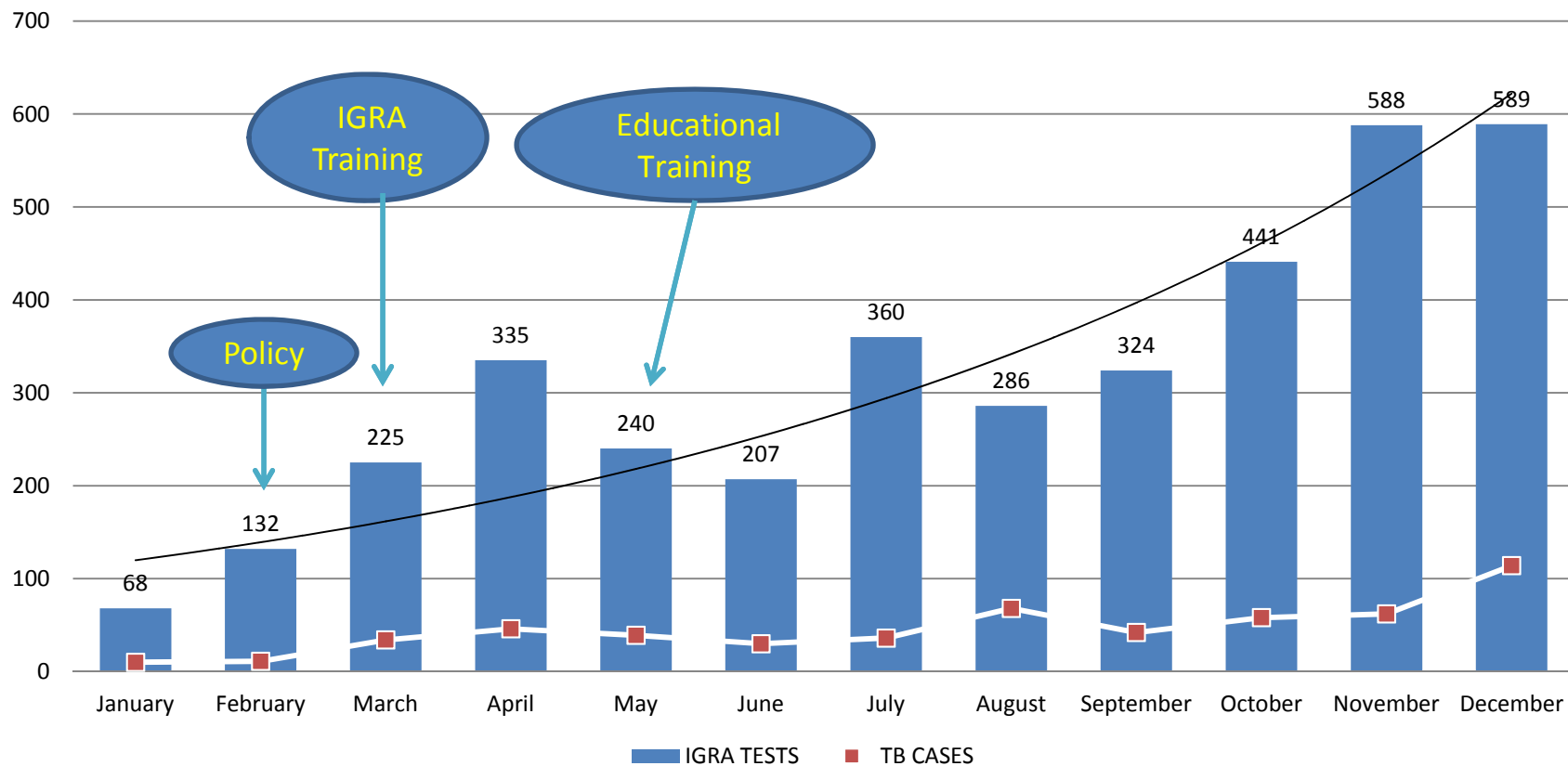
1,000 Contacts Screened	TST	IGRA
LTBI RATE	21.7%	13.1%
# Estimated Contacts with LTBI	217	131





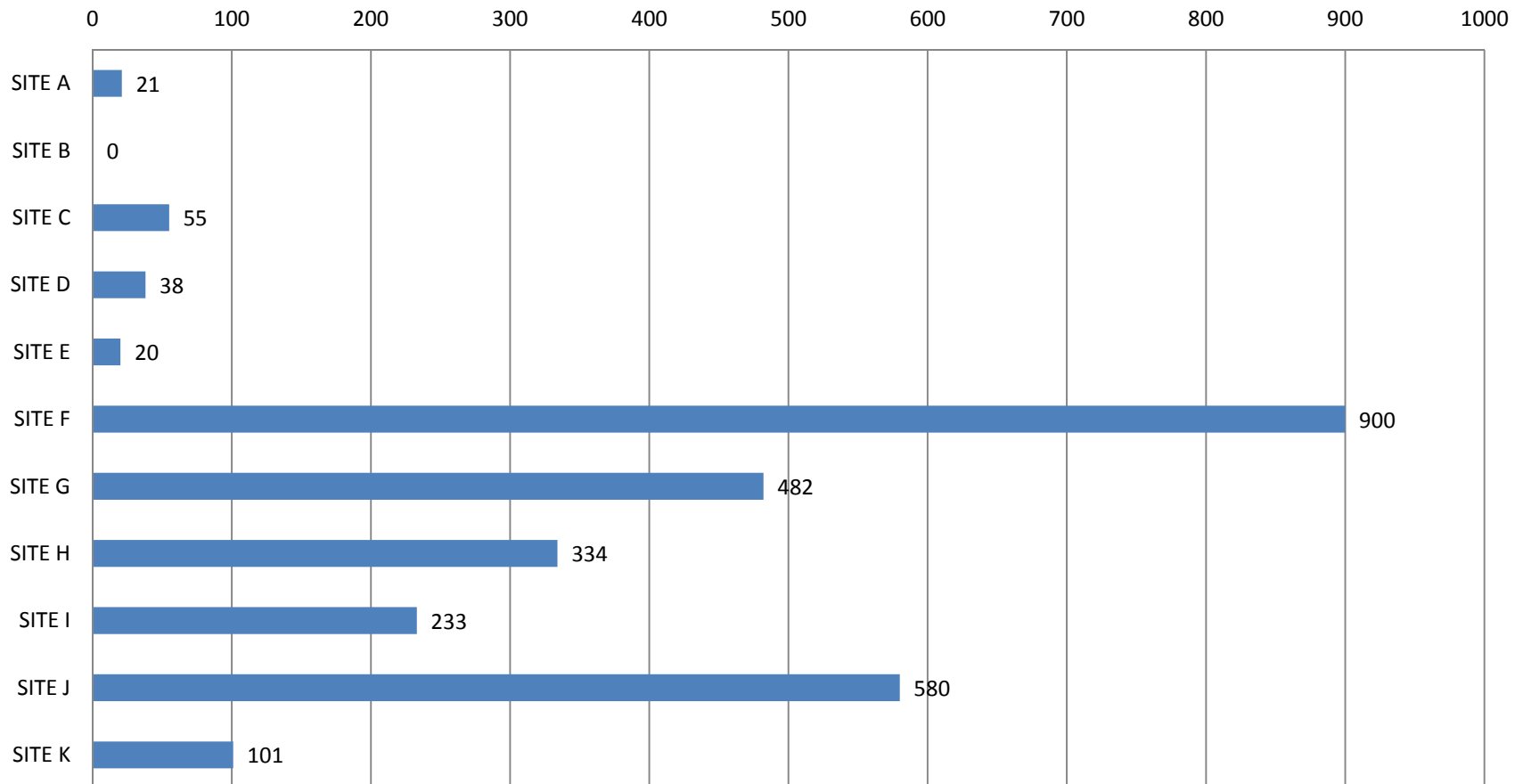
# Results: Usage of IGRA

## 2014 IGRA USAGE IN THE FIELD





## IGRA USAGE BY SITE JAN-DEC 2014







## Benefits of IGRA

- Less false positives!!
- Reduce unnecessary exposure to patient:
  - Chest x-ray
  - LTBI treatment with INH
- More accurate results!!



## Lesson Learned

- **Change is not easy**
- A policy does not mean nurses will change their practices
- Training does not mean nurses will change their practices
- Looking at overall data doesn't mean everyone has adopted the change
- Cost-analysis are important in the evaluation of changes in nursing practice
- The outcomes of the patient should drive change



# Screen for TB with an



COUNTY OF LOS ANGELES  
**Public Health**

