# Maryland Epidemiology and Genotyping Update

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## TB Annual Meeting
## March 22, 2016

# Presentation Outline

- Global TB Epidemiology (2014)

- Maryland TB Epidemiology (2015)
  - TB case numbers and trends
  - Demographics
  - Drug resistance
  - Comorbidities
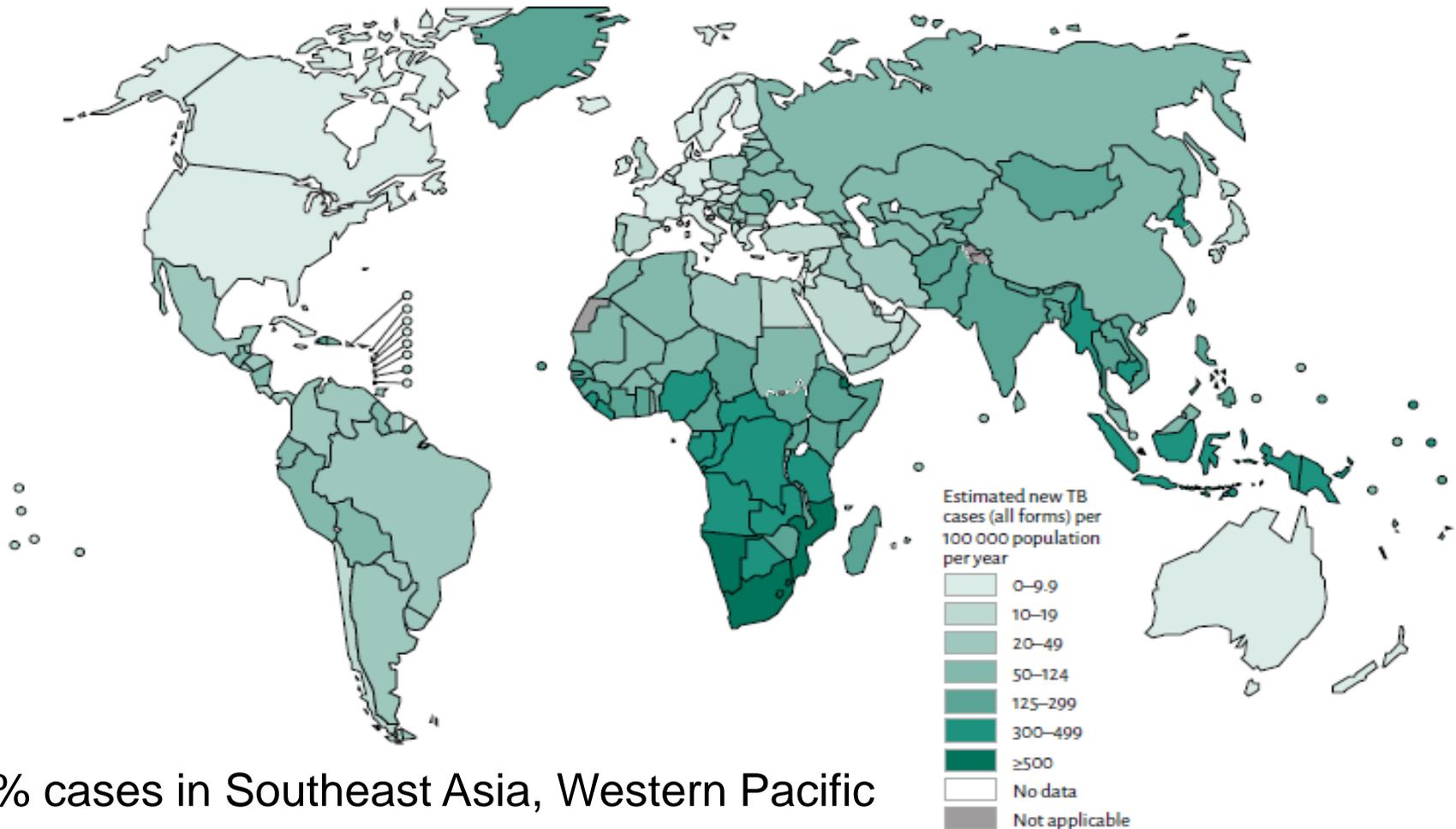  - Genotyping

- TBESC Update

# Global TB epidemiology - 2014

- **No. 1 infectious disease cause of death**

- No. 5 all-cause of death worldwide

- No. 3 all-cause of death in women of child-bearing age

- >9 million estimated incident "new" cases

- 80,000 TB deaths among HIV-negative children

# WHO Estimates of TB incidence, 2014



**FIGURE 2.6**
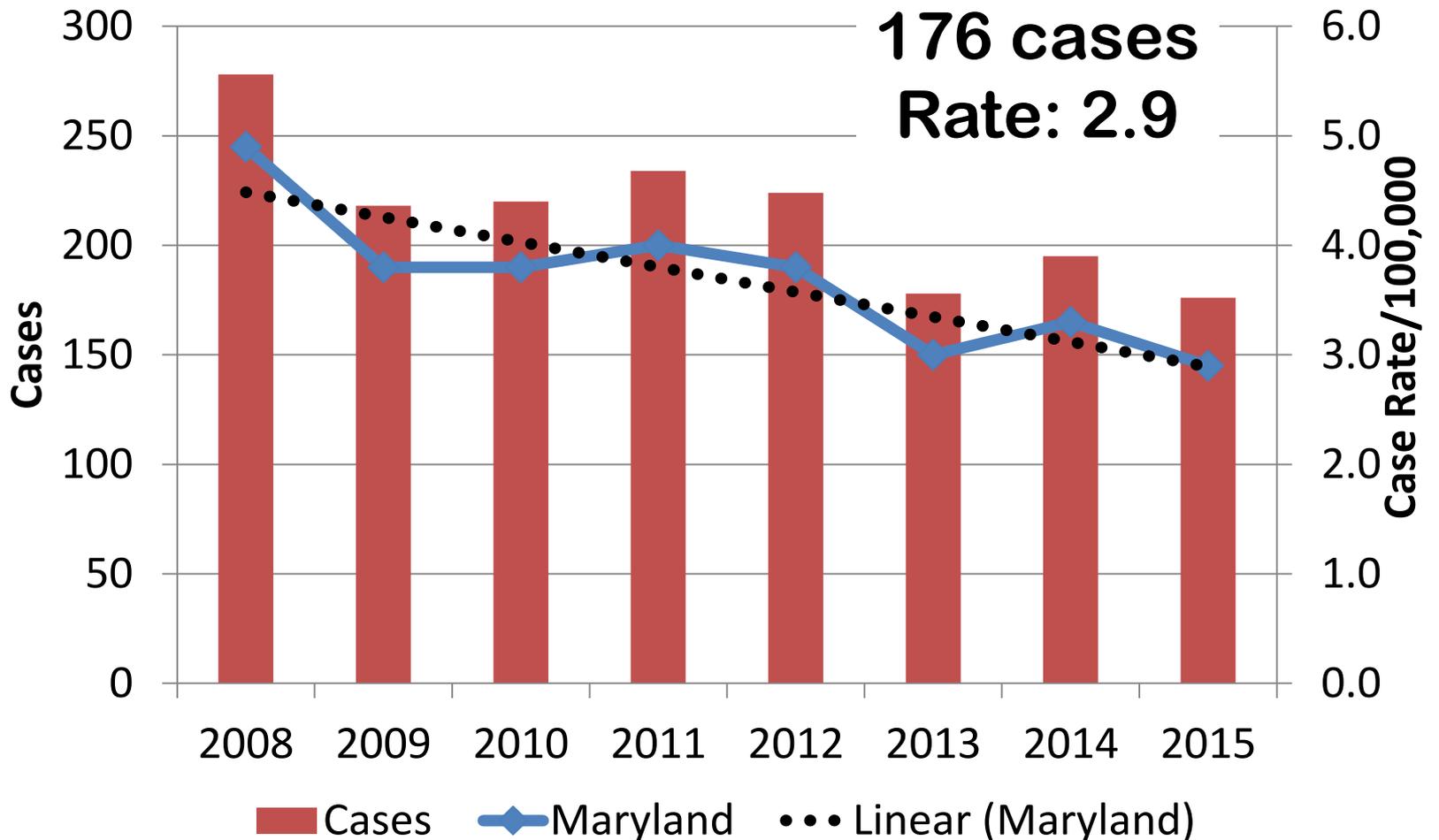
Estimated TB incidence rates, 2014

Estimated new TB cases (all forms) per 100 000 population per year

- 0–9.9
- 10–19
- 20–49
- 50–124
- 125–299
- 300–499
- ≥500
- No data
- Not applicable

56% cases in Southeast Asia, Western Pacific
(35% China and India); 25% in Africa

**Global Tuberculosis Report 2015. World Health Organization.**

# Have germs, will travel…
# Migrating populations

*Source: Population Action International*

# Maryland TB, 2008-2015



**176 cases**
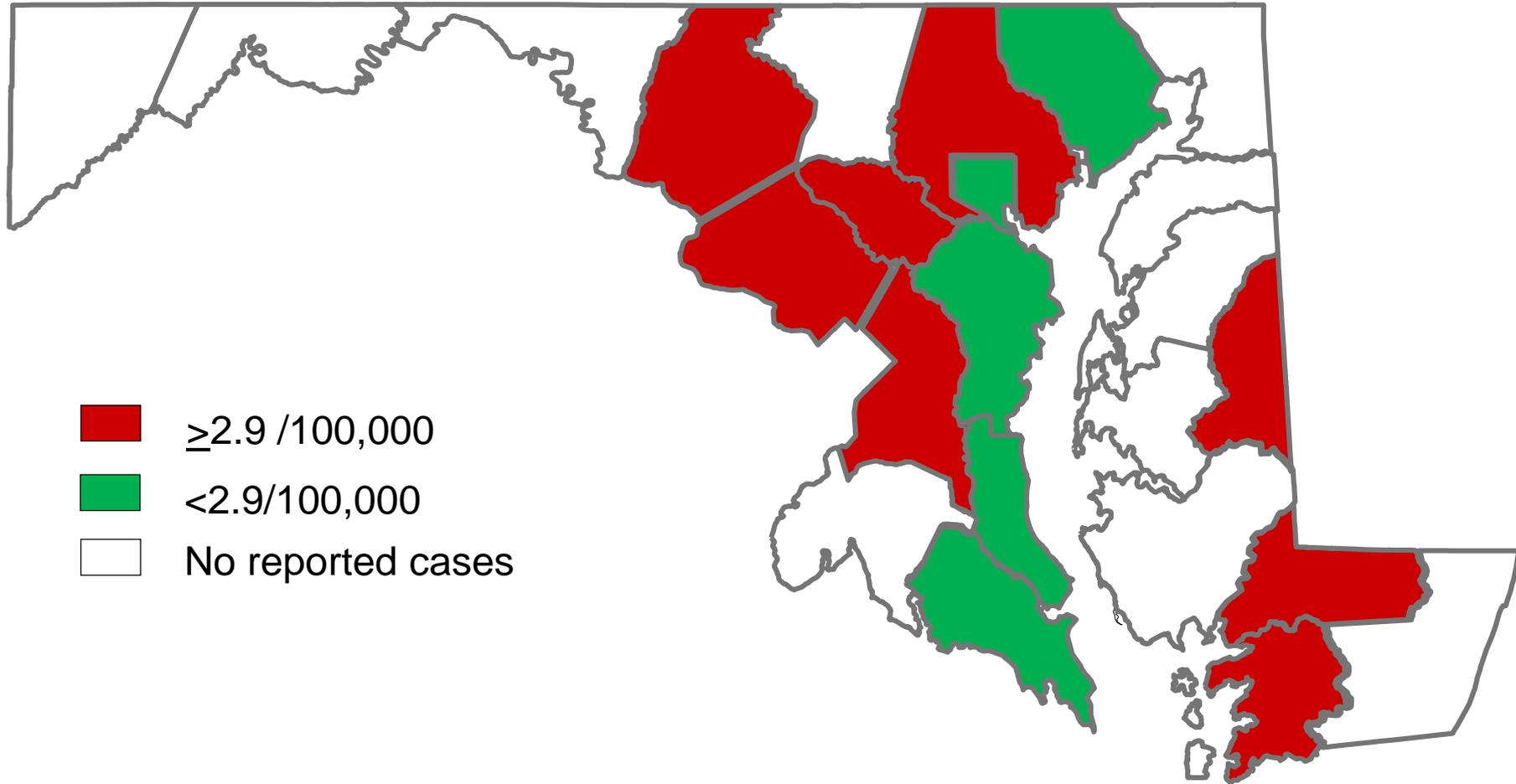**Rate: 2.9**

# TB Case Rates per 100,000, United States, 2015
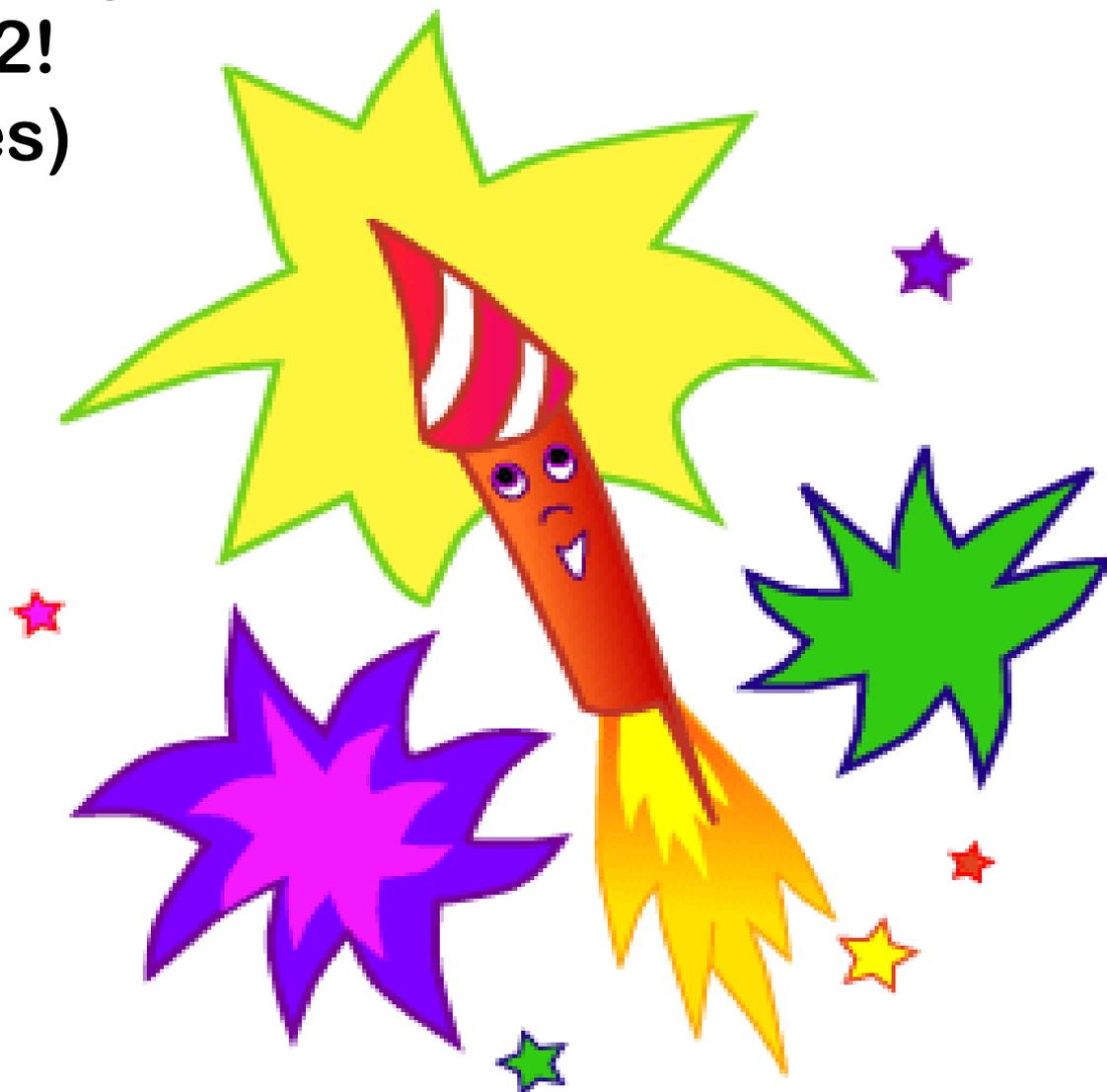


D.C.
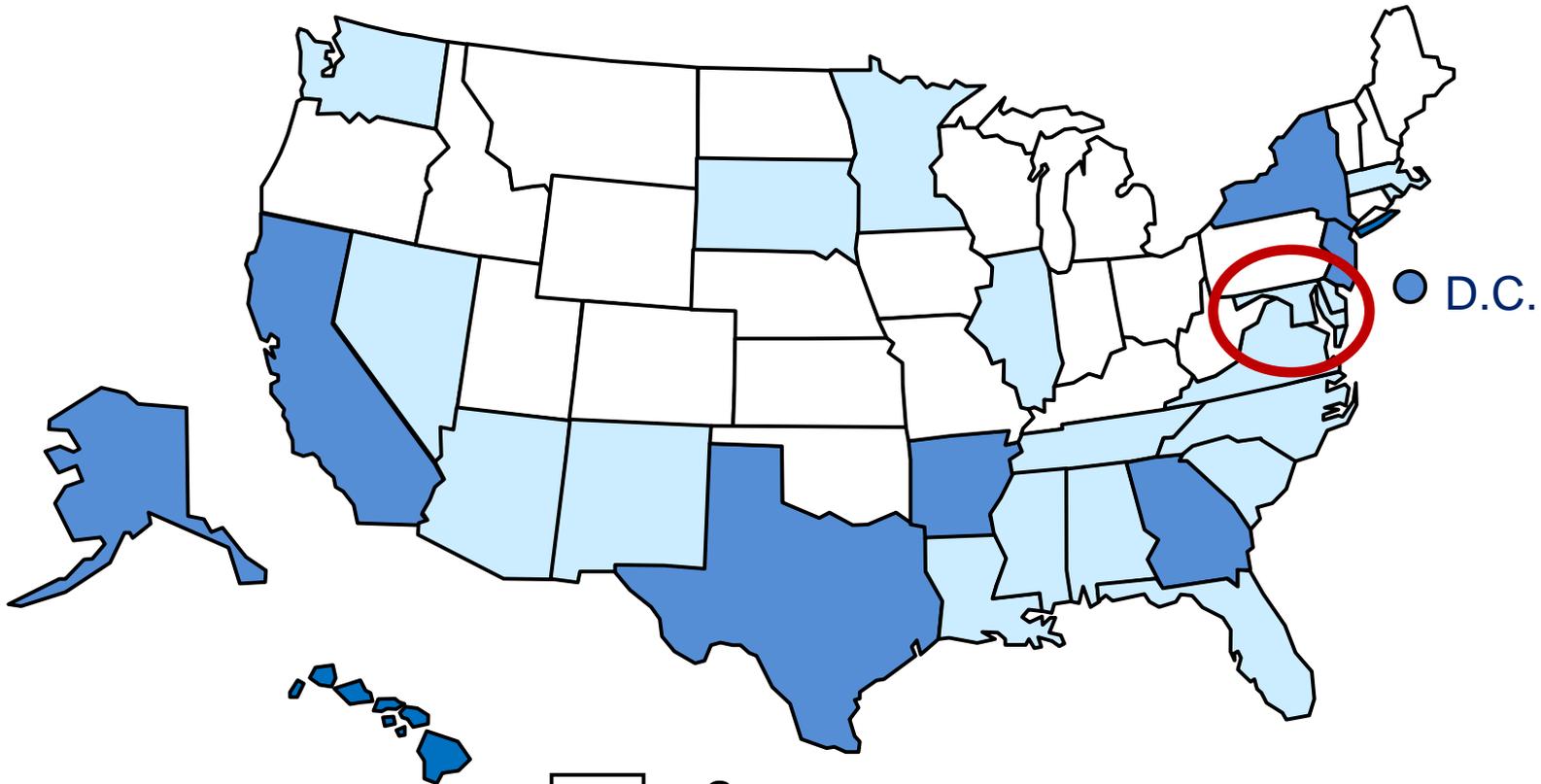
Legend:
- <2
- 2-3
- >3 (provisional national average)
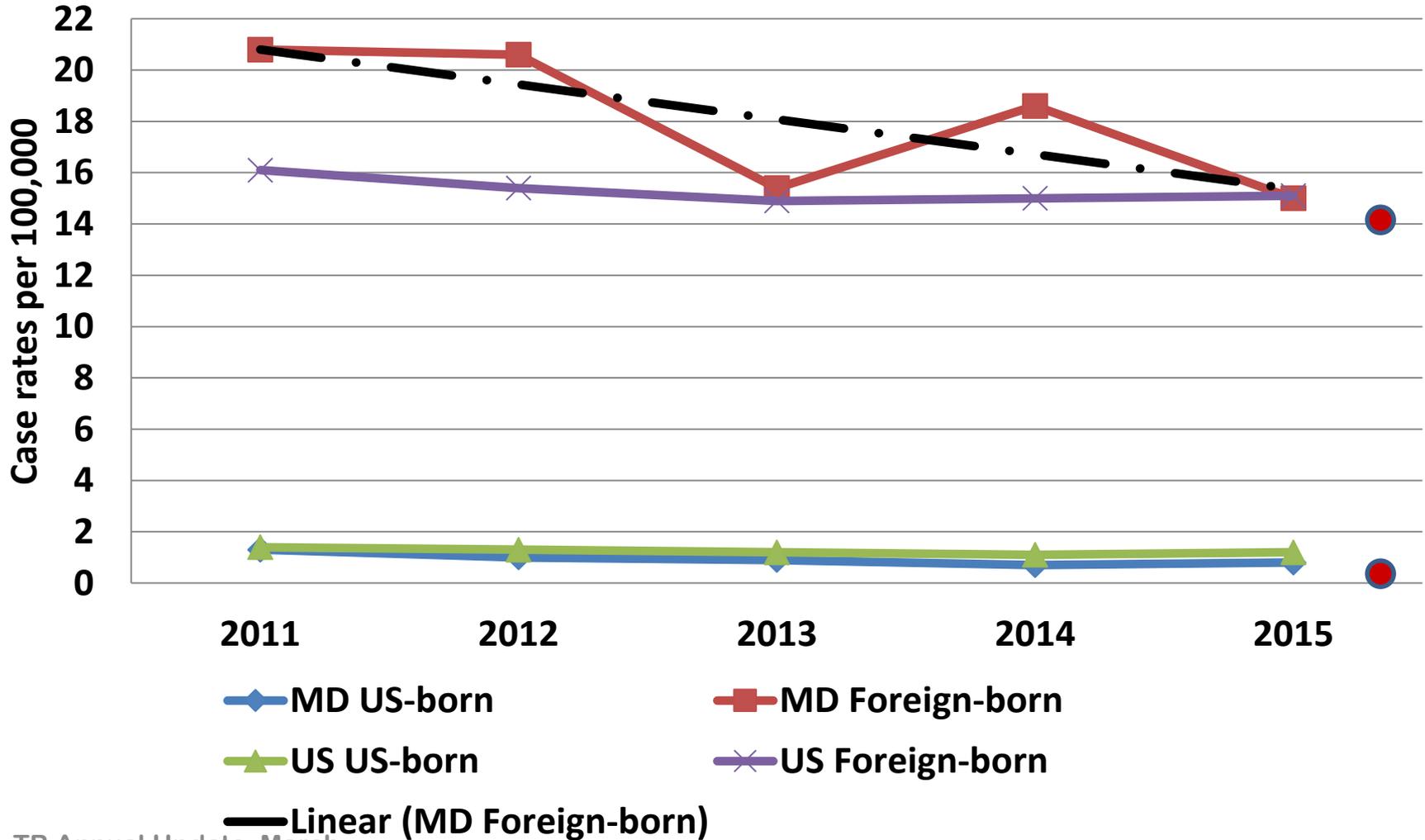
**(1ˢᵗ case increase in U.S. since 1992)**  CDC, 3/24/2016

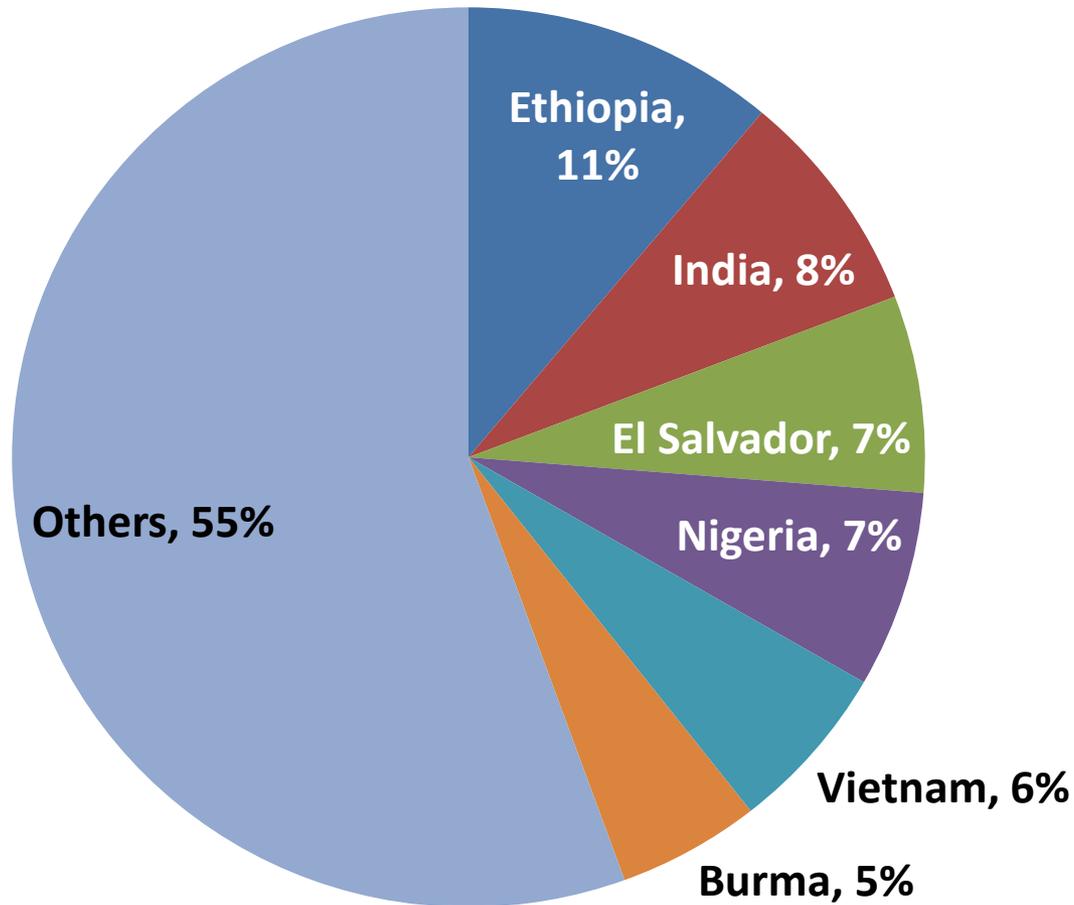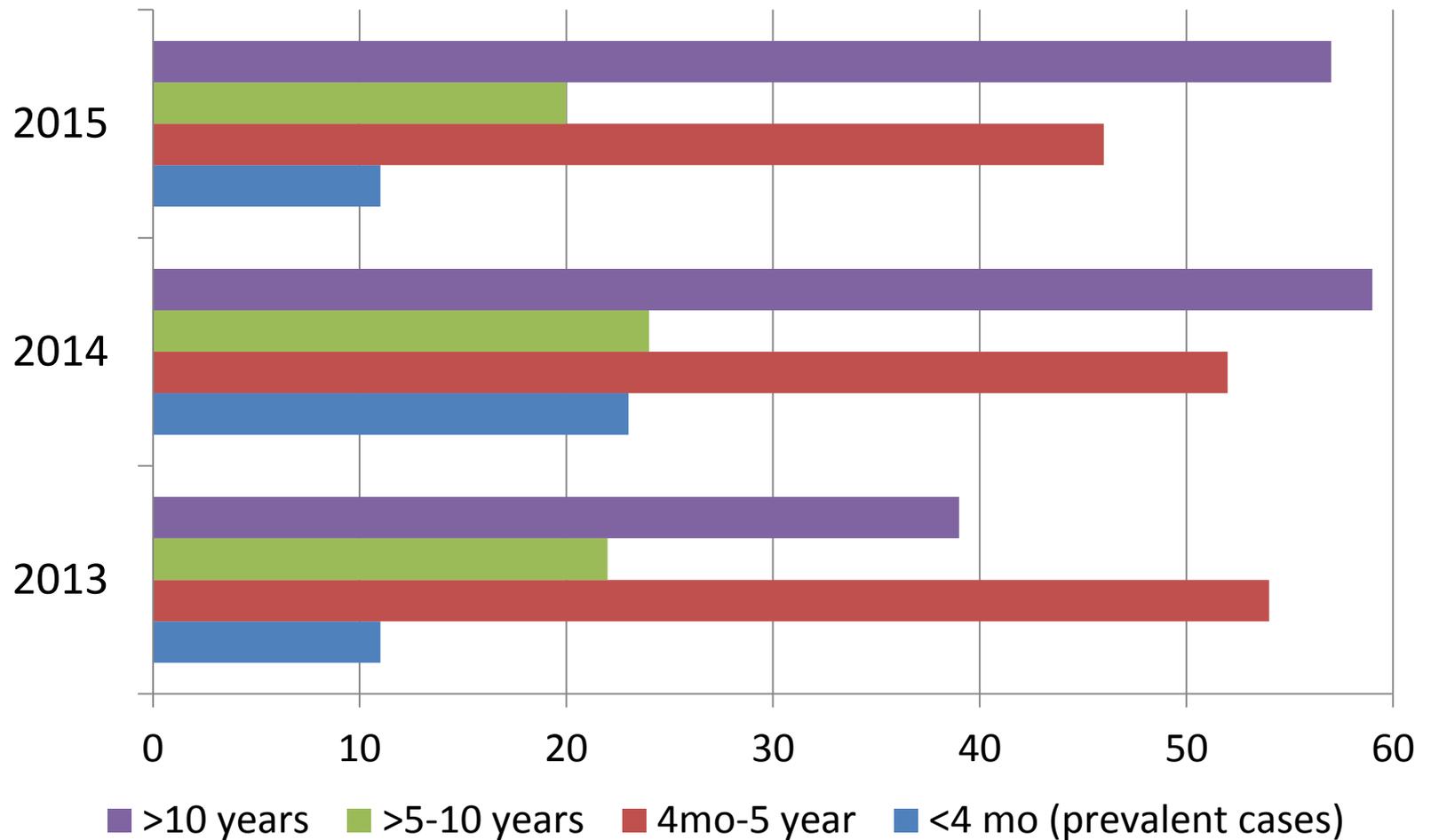# State TB Case Rates per 100,000 Population, by Jurisdiction, 2015



Legend:
- ≥2.9 /100,000
- <2.9/100,000
- No reported cases

# Baltimore City
# Rate: 2.2!
# (14 cases)

# TB Rates among US and Foreign Born, Maryland vs. US, 2015
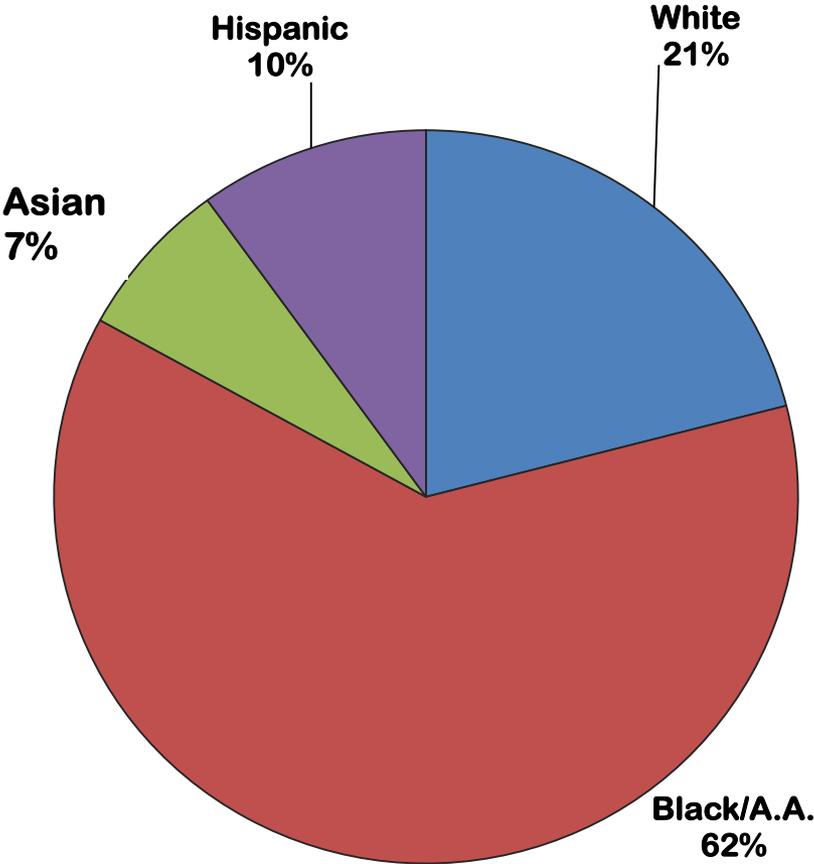
# 6 Top Countries of Origin-MD, 2015



Ethiopia, 11%

India, 8%

El Salvador, 7%

Nigeria, 7%

Vietnam, 6%

Burma, 5%

Others, 55%

# Foreign-born TB Case Numbers, by Time from U.S. Arrival to Diagnosis, 2013-2015



Legend: ■ >10 years   ■ >5-10 years   ■ 4mo-5 year   ■ <4 mo (prevalent cases)

# TB Cases by Race and Origin, 2015

## U.S. Born

- White 21%
- Hispanic 10%
- Asian 7%
- Black/A.A. 62%

## Foreign Born

- Other 2%
- White 3%
- Hispanic 26%
- Black 34%
- Asian 35%
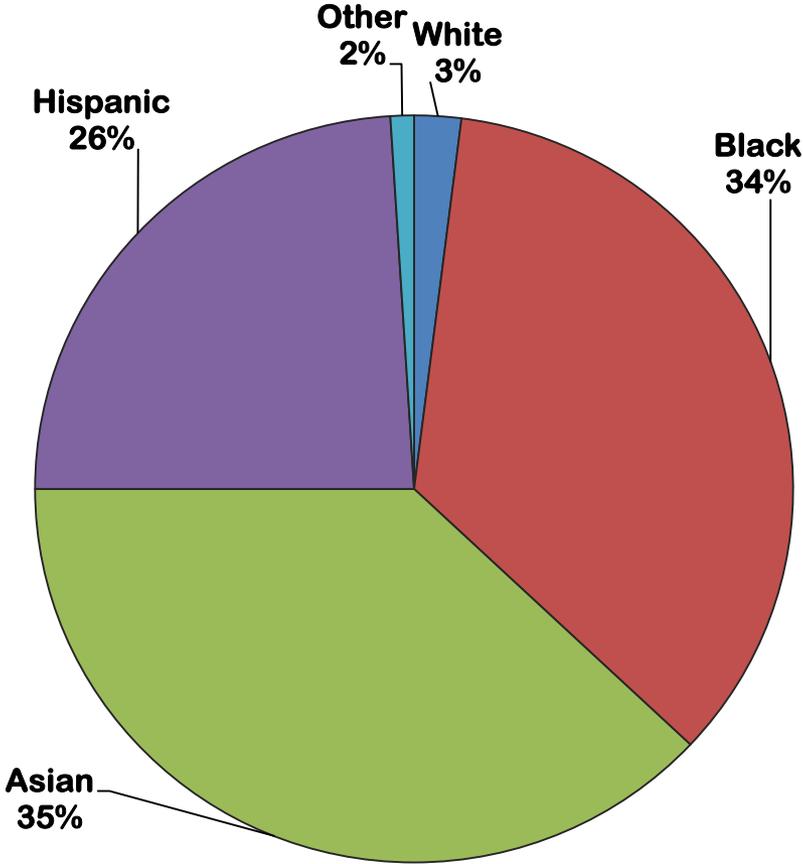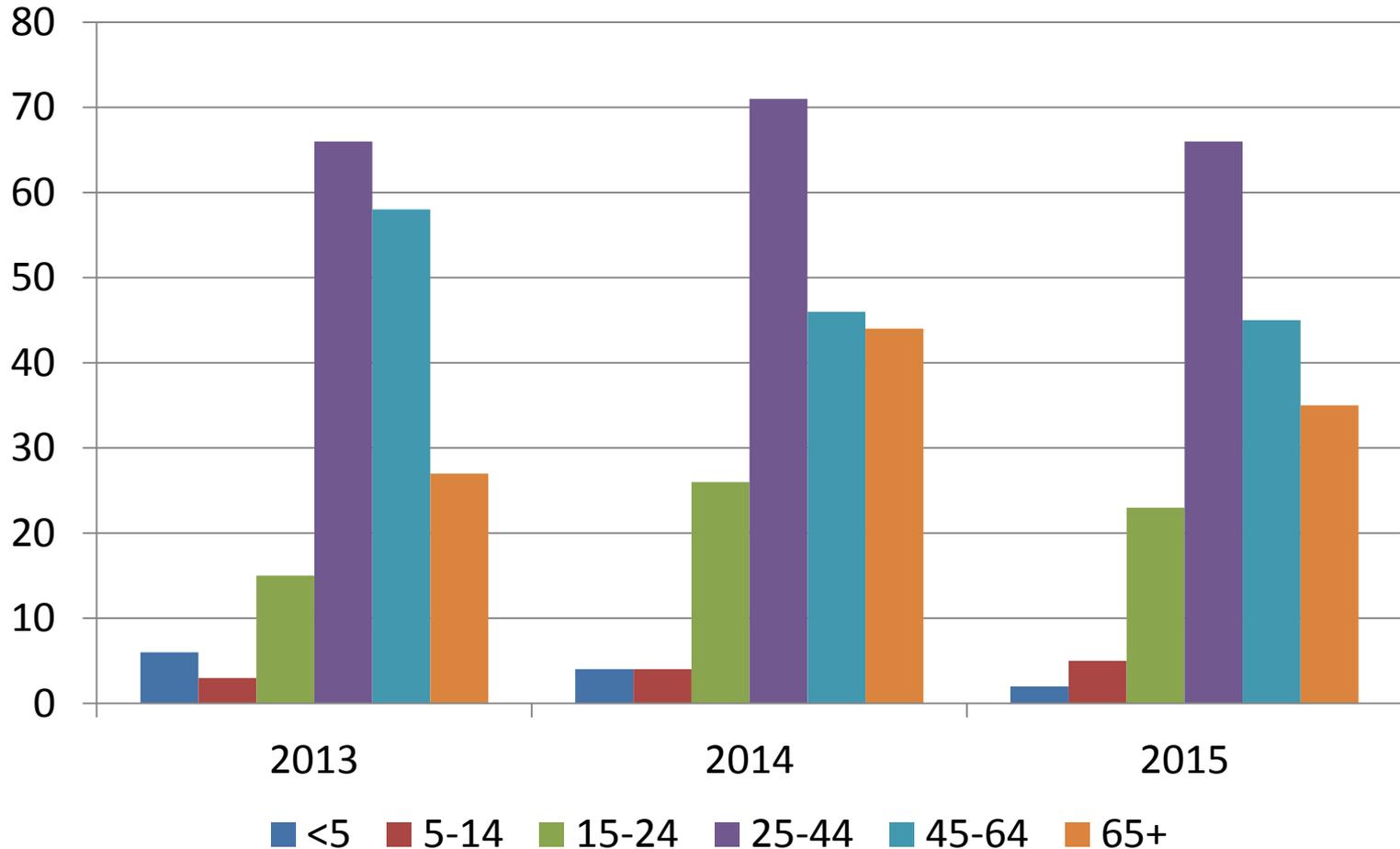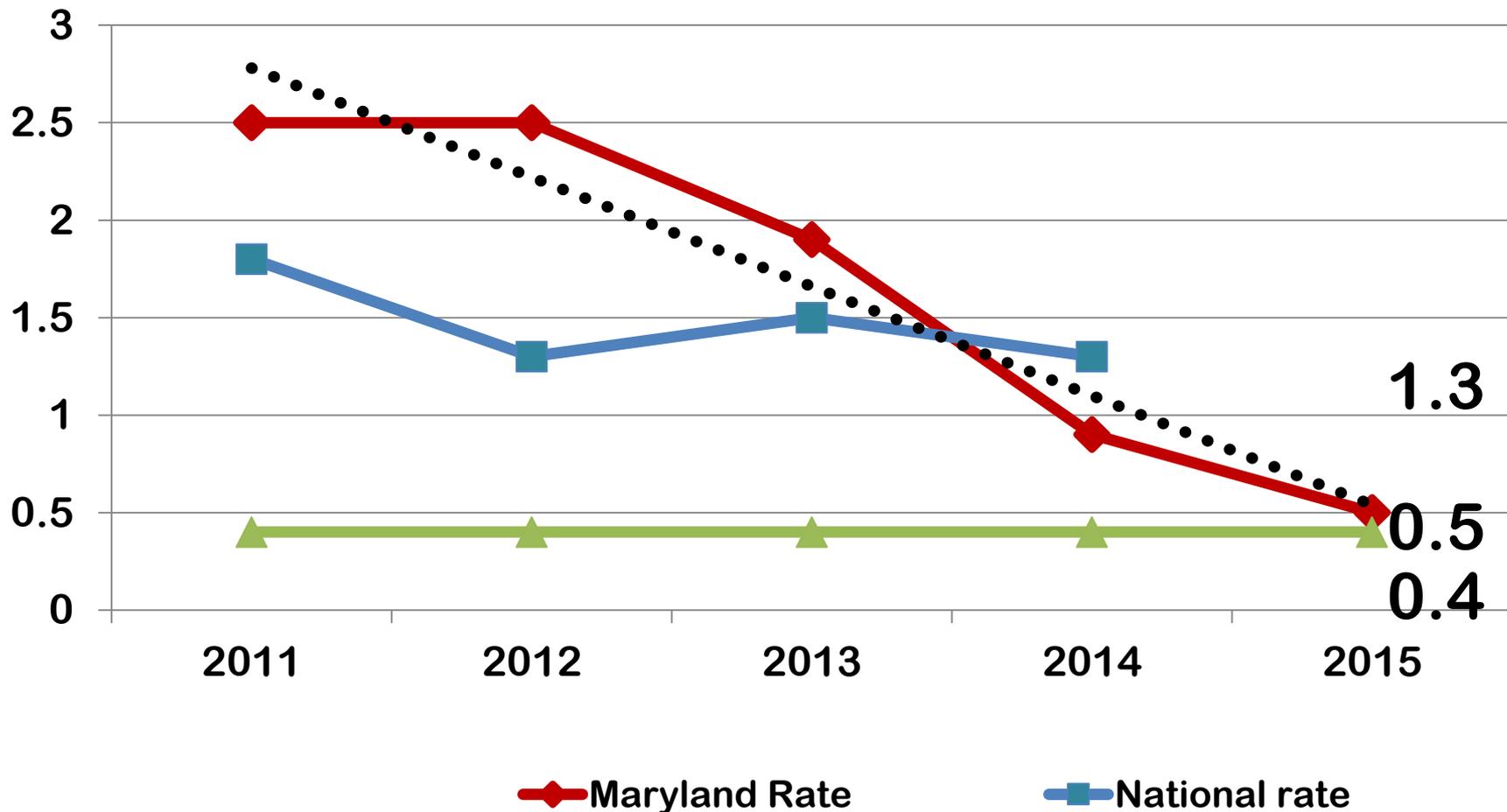
# Cases by Age Group  Maryland, 2013-2015
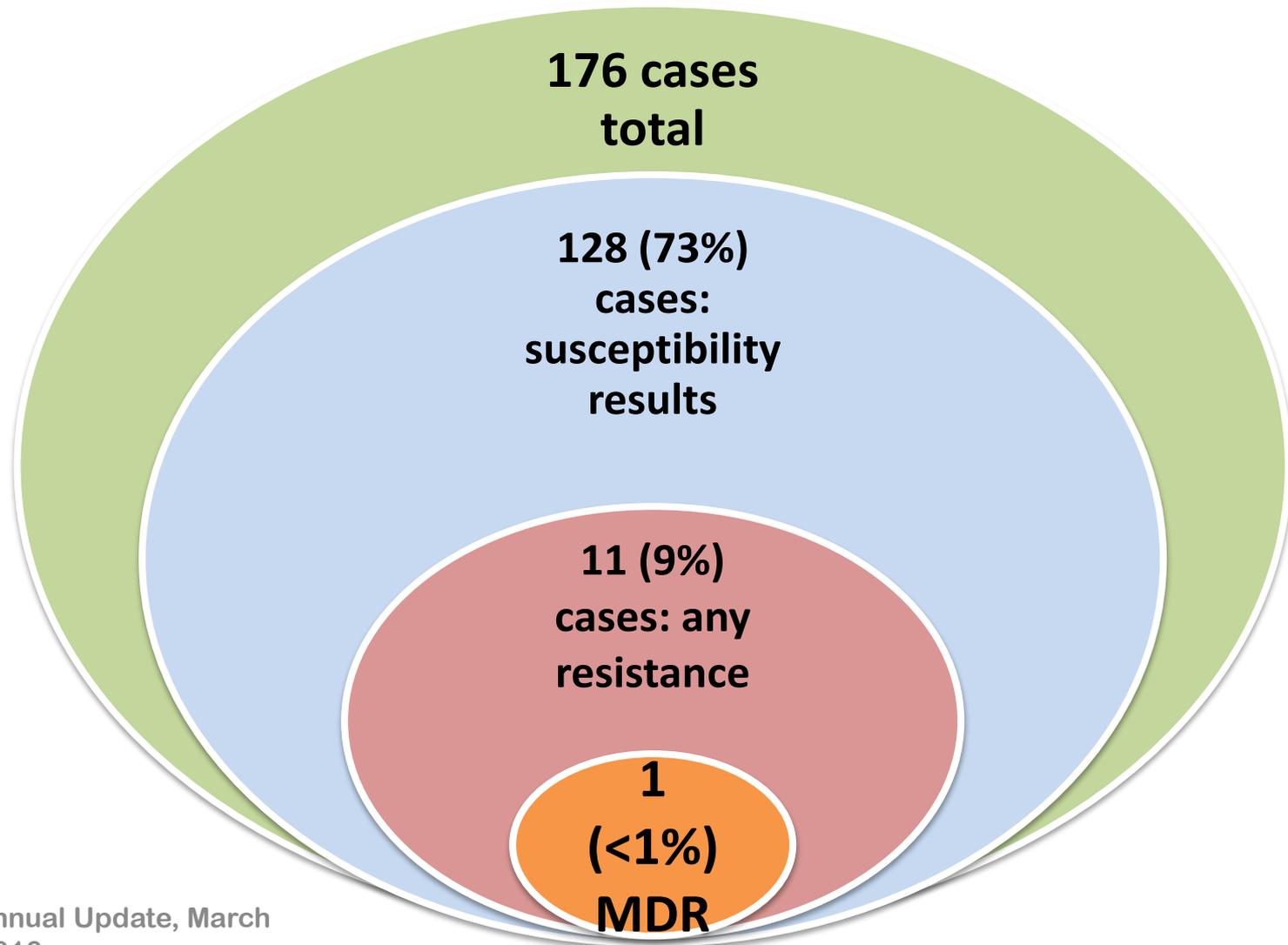
# The Canary in the Coal Mine

- **Children under 5 years old**
  - At high risk for TB meningitis, disseminated TB
  - Disease can progress quickly
  - Can represent undiagnosed adult cases
  - Important to find source case
    - Stop further transmission

# Case Rates per 100,000 in Children <5 Years of Age; Maryland vs. US, 2011-2015



1.3

0.5

0.4

Maryland Rate     National rate

# Maryland Drug Resistance, 2015

**176 cases total**

**128 (73%) cases: susceptibility results**

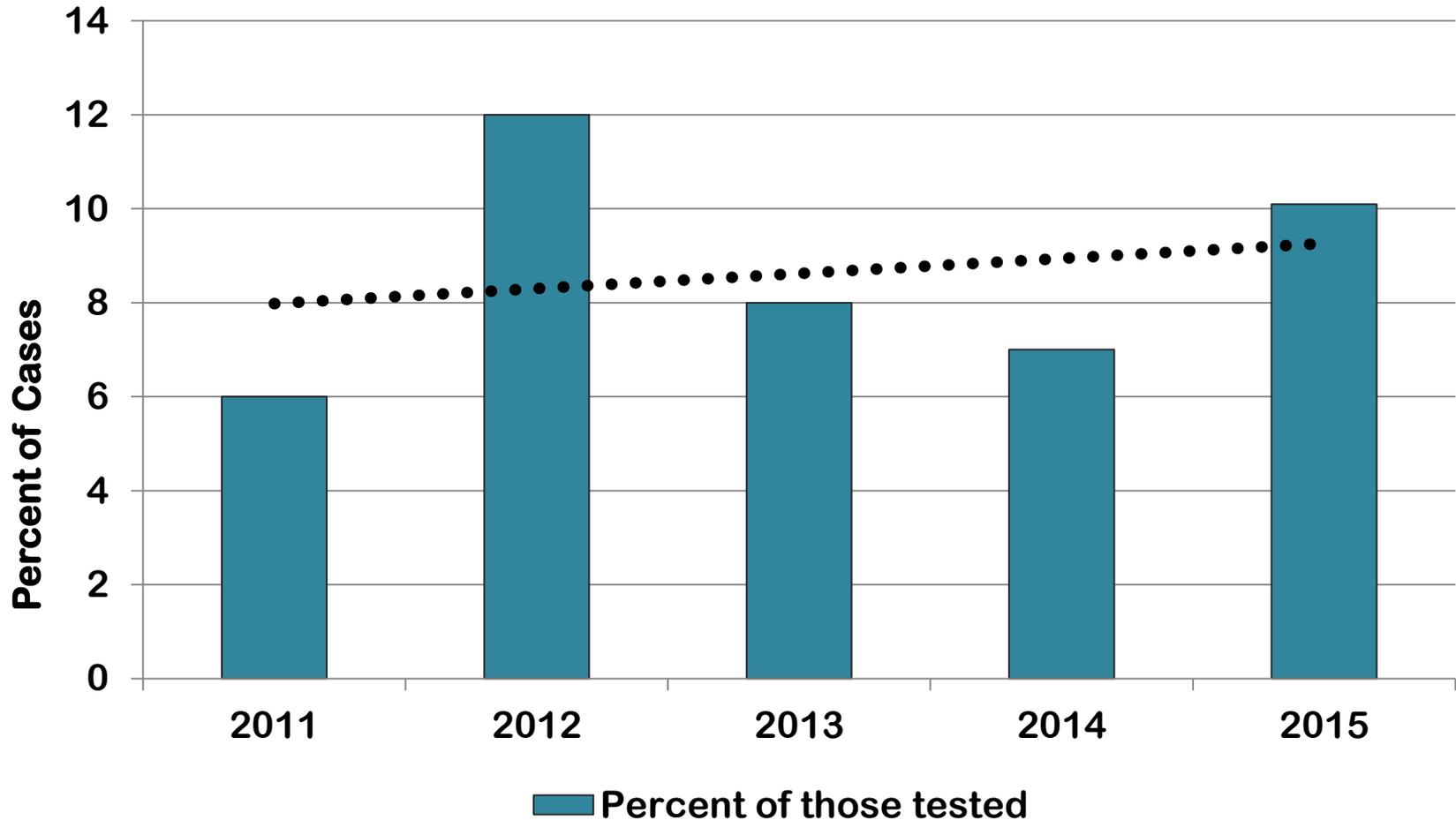**11 (9%) cases: any resistance**

**1 (<1%) MDR**

# With Fewer Cases Why Are We Still Working So Hard?
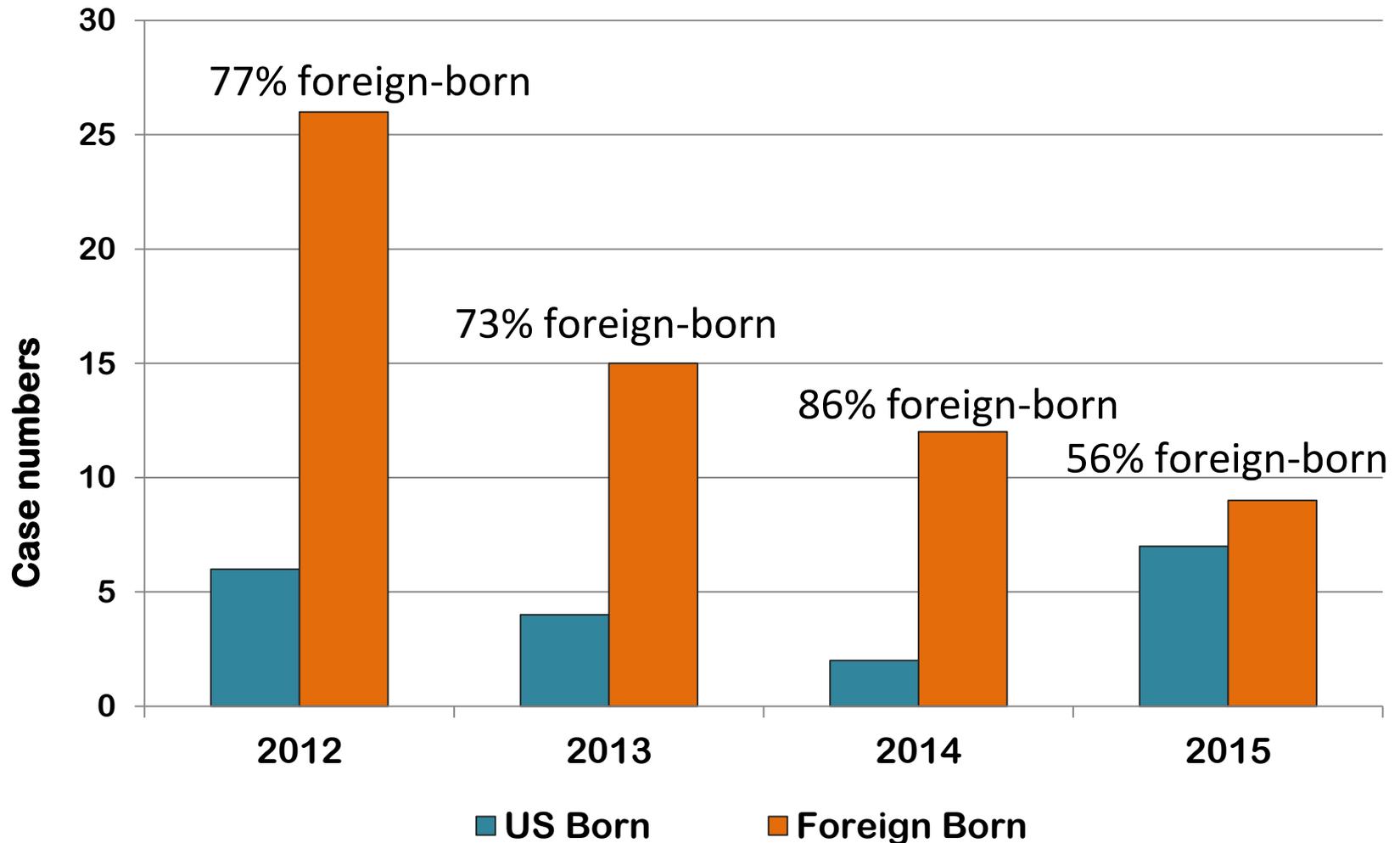
- Risk factors
  - TB HIV co-infection
  - Co-morbidities (DM, COPD)
  - Pregnancy
  - Substance abuse
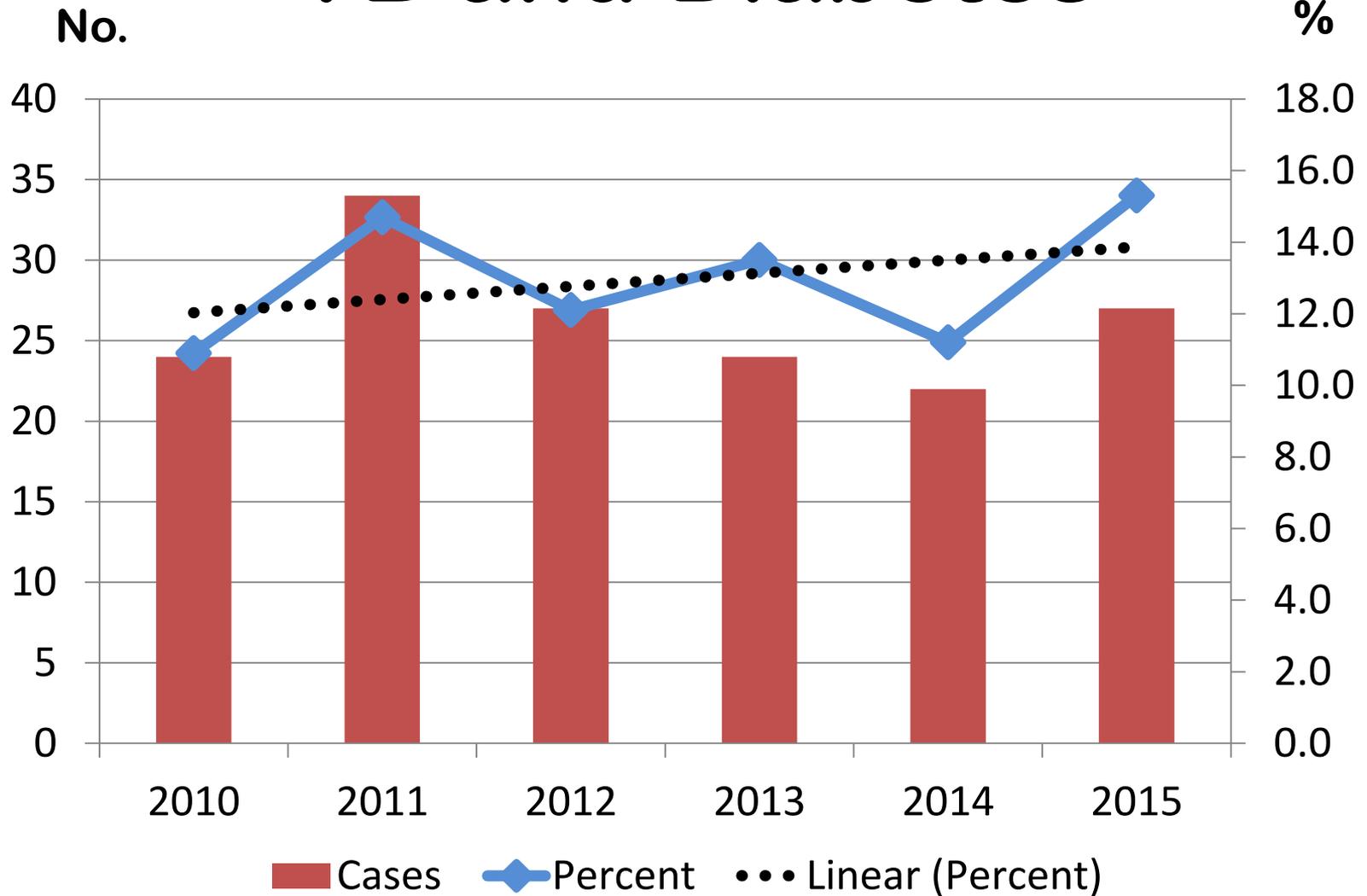- They are more complex!

# TB HIV Co-Infection Rate Trends, 2011-2015

# Numbers of TB HIV Co-Infection, Origin of Birth, 2012-2015

# TB and Diabetes

# TB-DM project (2014-2016)
# Richard Brooks, MD, MPH, EIS officer

"Quick and dirty" findings  for 1.5 years of NEDSS data:

Compared to TB patients without diabetes, TB-DM were:

- Two times more likely to be **sputum smear positive**
- 2.4 times more likely to be **cavitary**
- Four times more likely to have an **indeterminate IGRA**
- **Four times more likely to die** during TB treatment

# TB-DM project (2014-2016)
# Richard Brooks, MD, MPH, EIS officer

**A couple of anecdotes:**
1.  Among TB patients/ suspects:
    **YOU** have diagnosed previously
    unknown DM-TB

    HgbA1c as high as 14.4!

3.  TDM among TB-DM patients:
    **YOU** identified low RIF absorption
    in some patients, and increased
    RIF doses to therapeutic levels

# *Mtb* Genotype Clustering

- Local Health Department calls CTBCP

- Provider or ICP calls CTBCP

- CTBCP gets routine genotyping report from CDC (TB-GIMS) and calls LHD

- CDC (TB-GIMS) sends an "Alert"

- Laboratory calls CTBCP

# TBESC Update: Protocol Part B TB Prevention Cascade

|  | TB case rate (active TB) | # cases of active TB |
|---|---|---|
| **Current U.S. (2014)** | **30 cases/million** | **9412** |
| TB 'pre-elimination' | <10 cases/million | <3200 |
| TB 'elimination' | <1 case/million | <320 |

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# Why now?
# Reaching TB Pre-elimination and Elimination

- Plateau in TB case numbers

- TB transmission is limited, though persistent

- New tests (IGRAs) for diagnosing LTBI

- Shorter treatments for LTBI, with high completion rates

- Combined strategies needed to hasten time to TB elimination:

  – Reduce foreign born new arrivers with TB and untreated LTBI

  – Among individuals with LTBI, increase the proportion that are treated (***treatment as prevention***)

A.N. Hill et al, Epidemiol Infect 2012;140:1862

# A.N. Hill et al, Epidemiol Infect 2012;140:1862
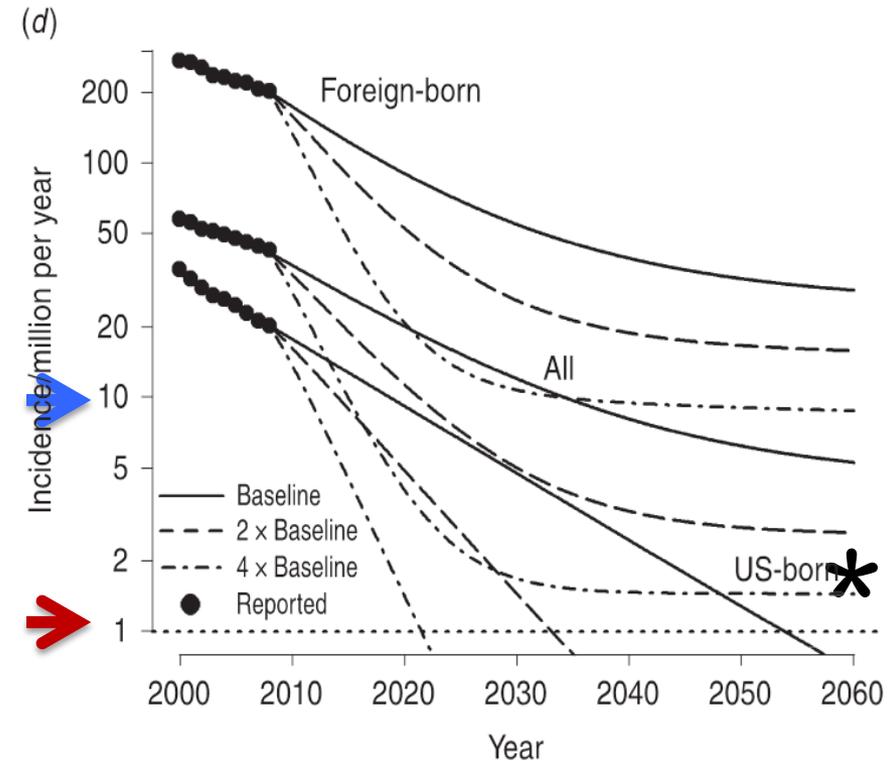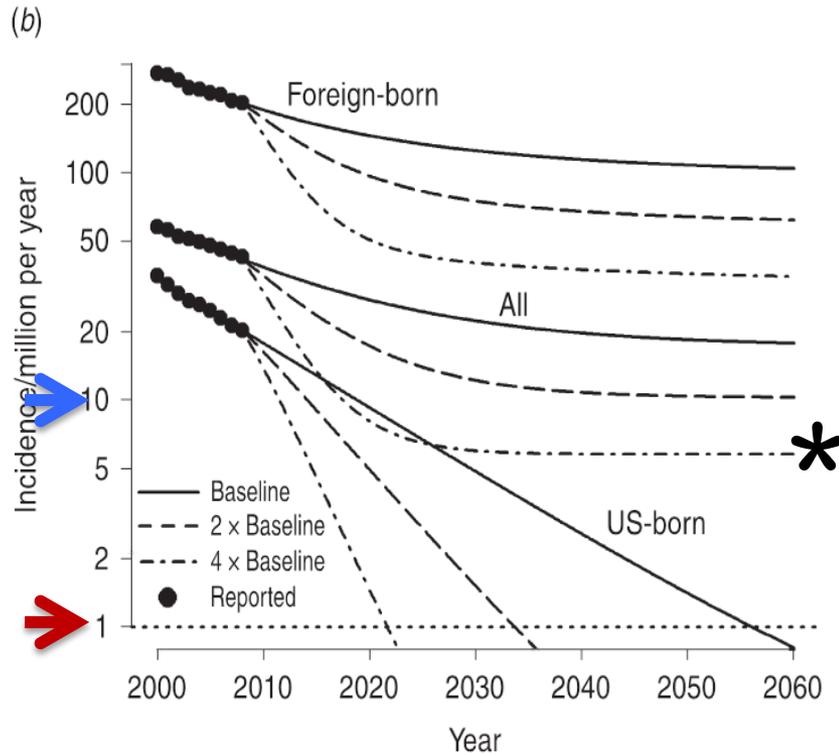


**Pre-elimination target (<10/mill) met by ≈ 2025 IF**
- Treatment rate for chronic LTBI is quadrupled starting 2008.
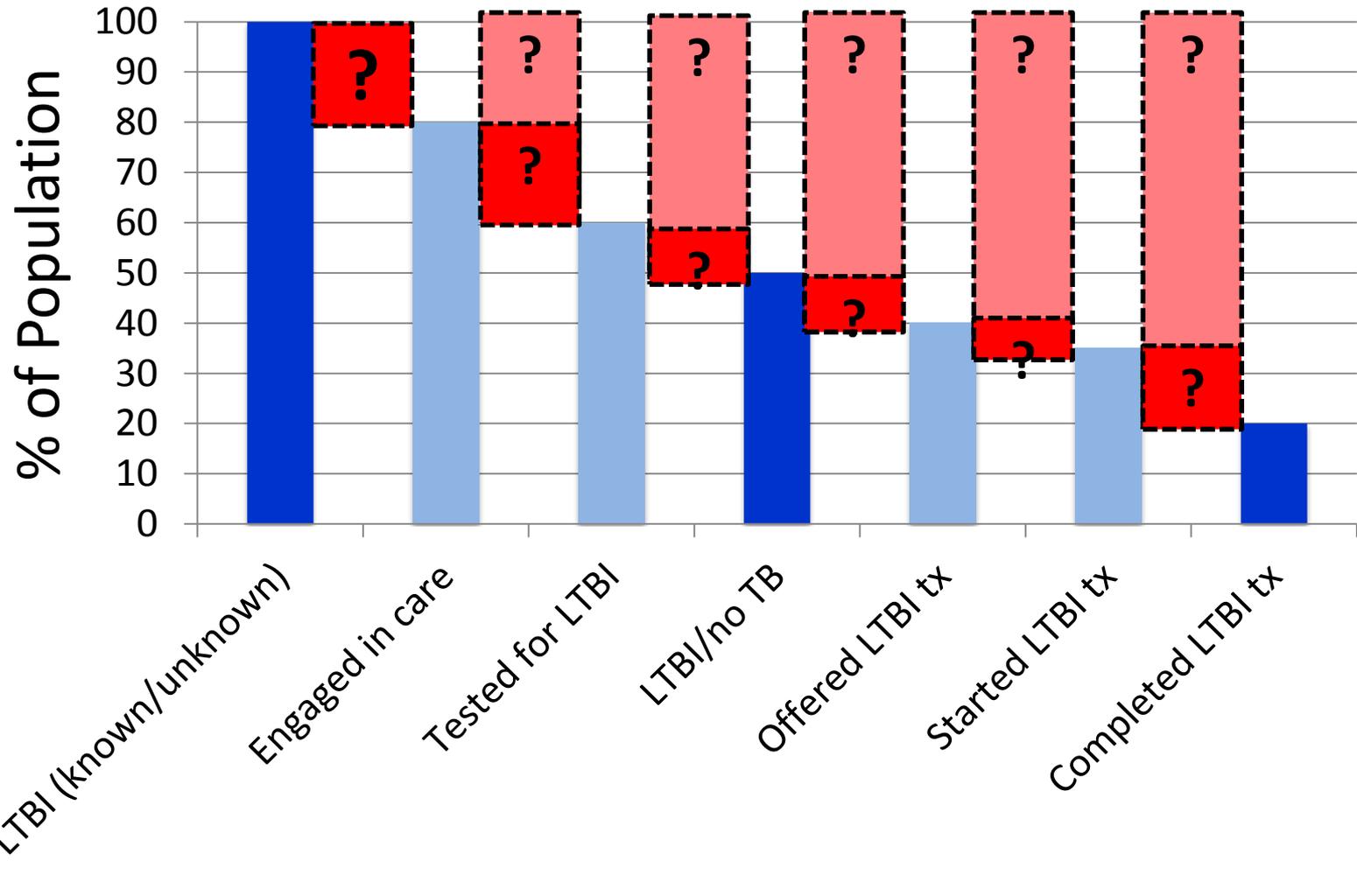
**Approaching elimination (<1/mill ) after 2030 IF**
- Treatment rate for LTBI is quadrupled starting 2008.
- Assumes prevalence of chronic LTBI in FB arrivals is reduced to 25% of baseline.

# TB Prevention Cascade
## ("Treatment as Prevention")
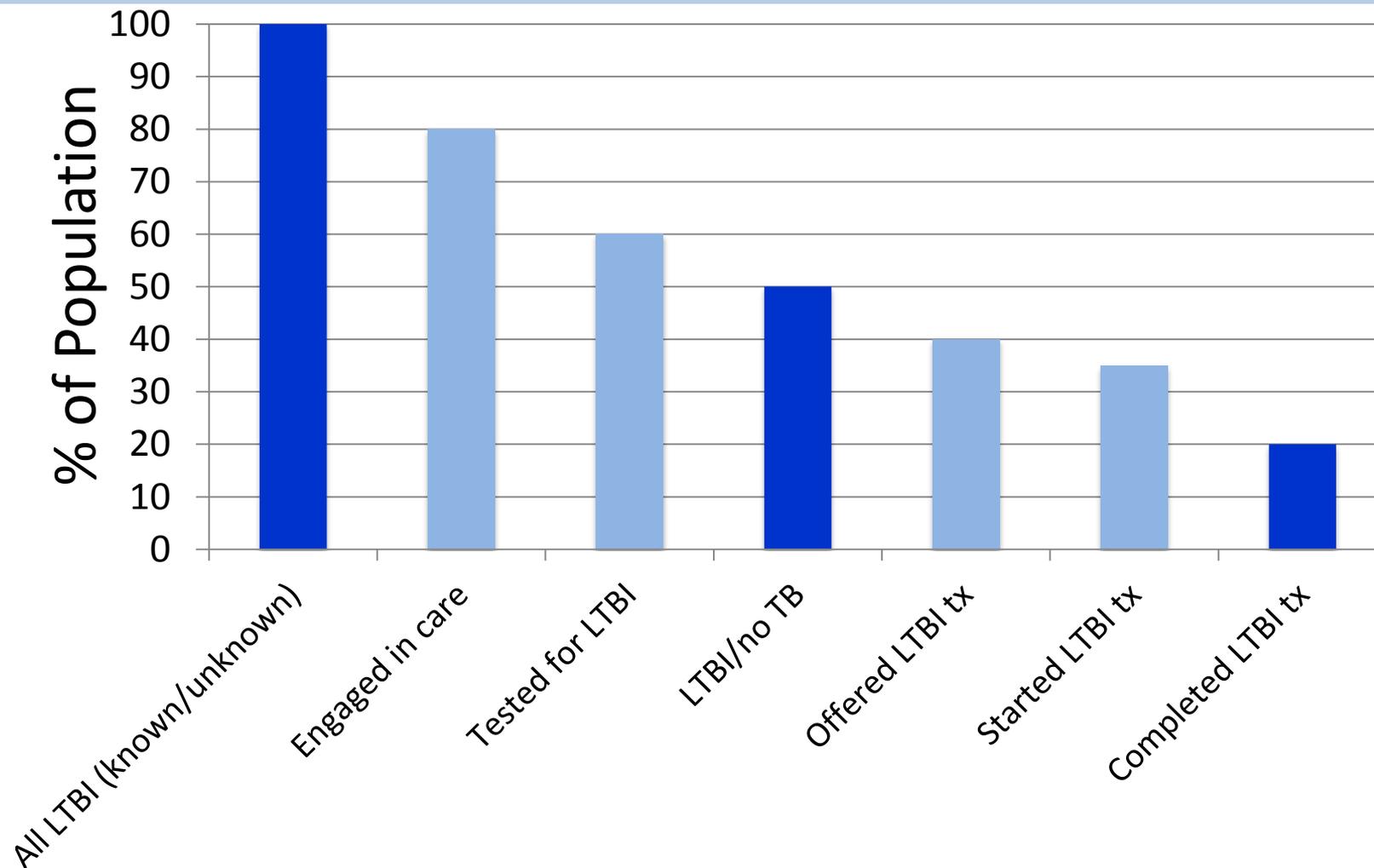
# TB Prevention Gaps in Care
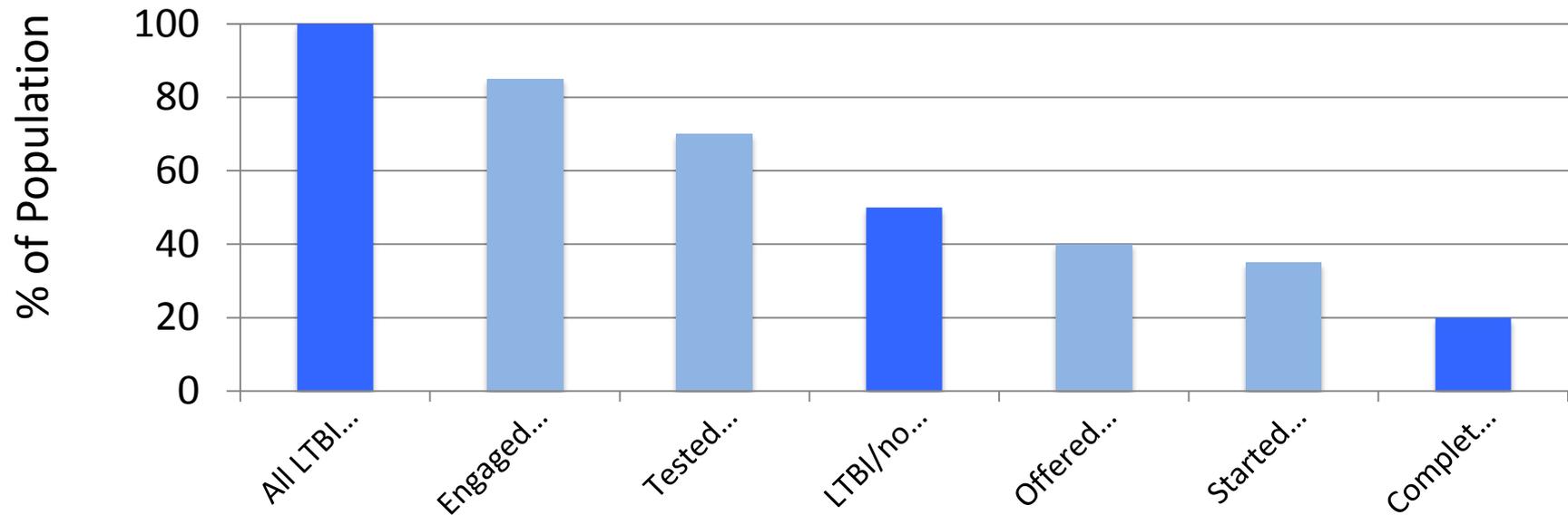


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# Theme for TBESC Part B!

# Challenges to TB Elimination

- We don't know much about the 'at risk' populations – WHO, WHERE, HOW MANY?

- We don't know WHICH non-health dept. providers serve 'at-risk' populations of interest and  WHERE they are located

- We don't know who IS and IS NOT receiving TB services outside the health department
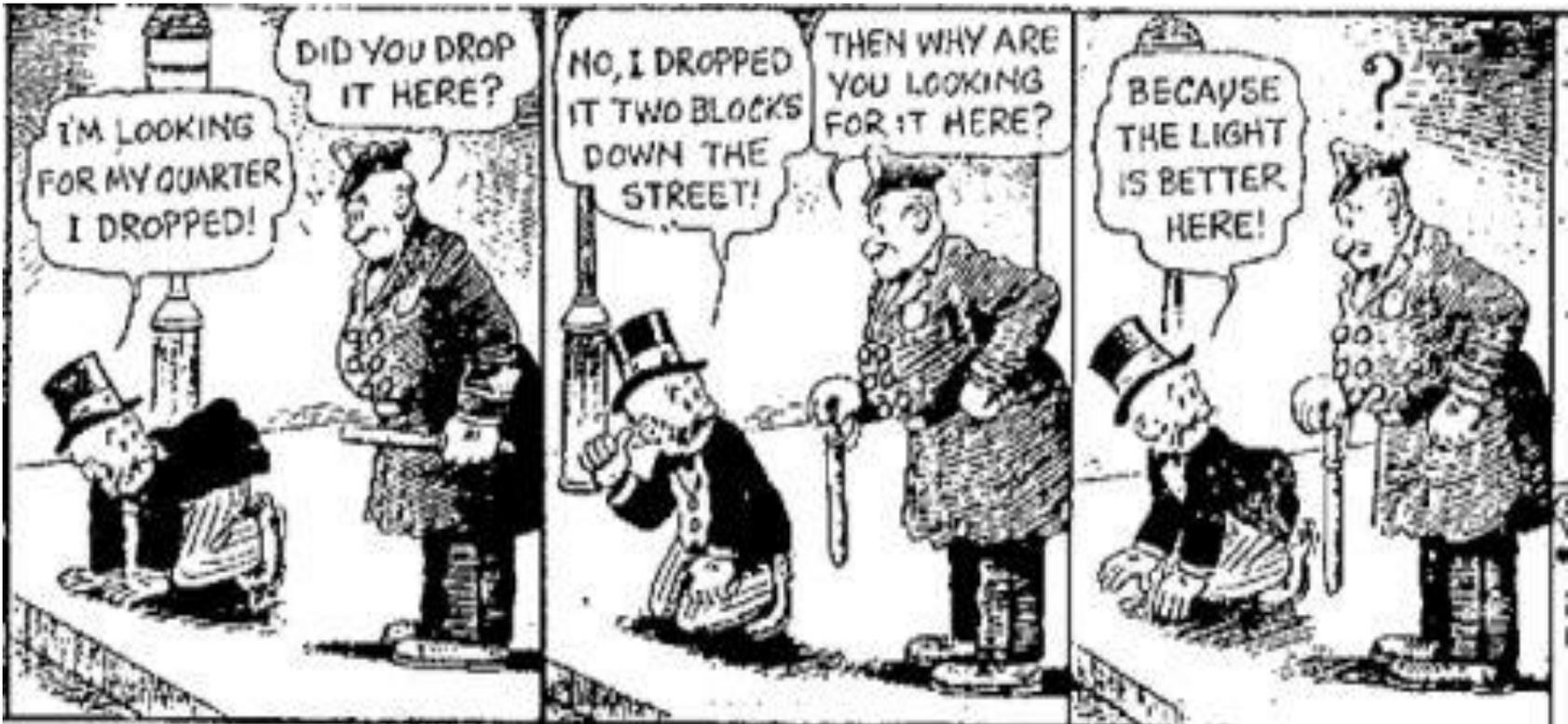
| | % of Population | | | | | | |
|---|---|---|---|---|---|---|---|
| | All LTBI... | Engaged... | Tested... | LTBI/no... | Offered... | Started... | Complet... |
| **LTBI services-Health Dept TB Clinics** | | X | X | X | X | X | X |
| **LTBI services – Other Clinics** | | X | X | X | X | X | X |
| **Modeling existing data (census, ACS, BRFSS, TBESC, etc.)** | X | X | X | X | X | X | X |

# Low Hanging Fruit - Collecting Data from Health Department TB Clinics

- We can do better but can't get to TB Elimination!

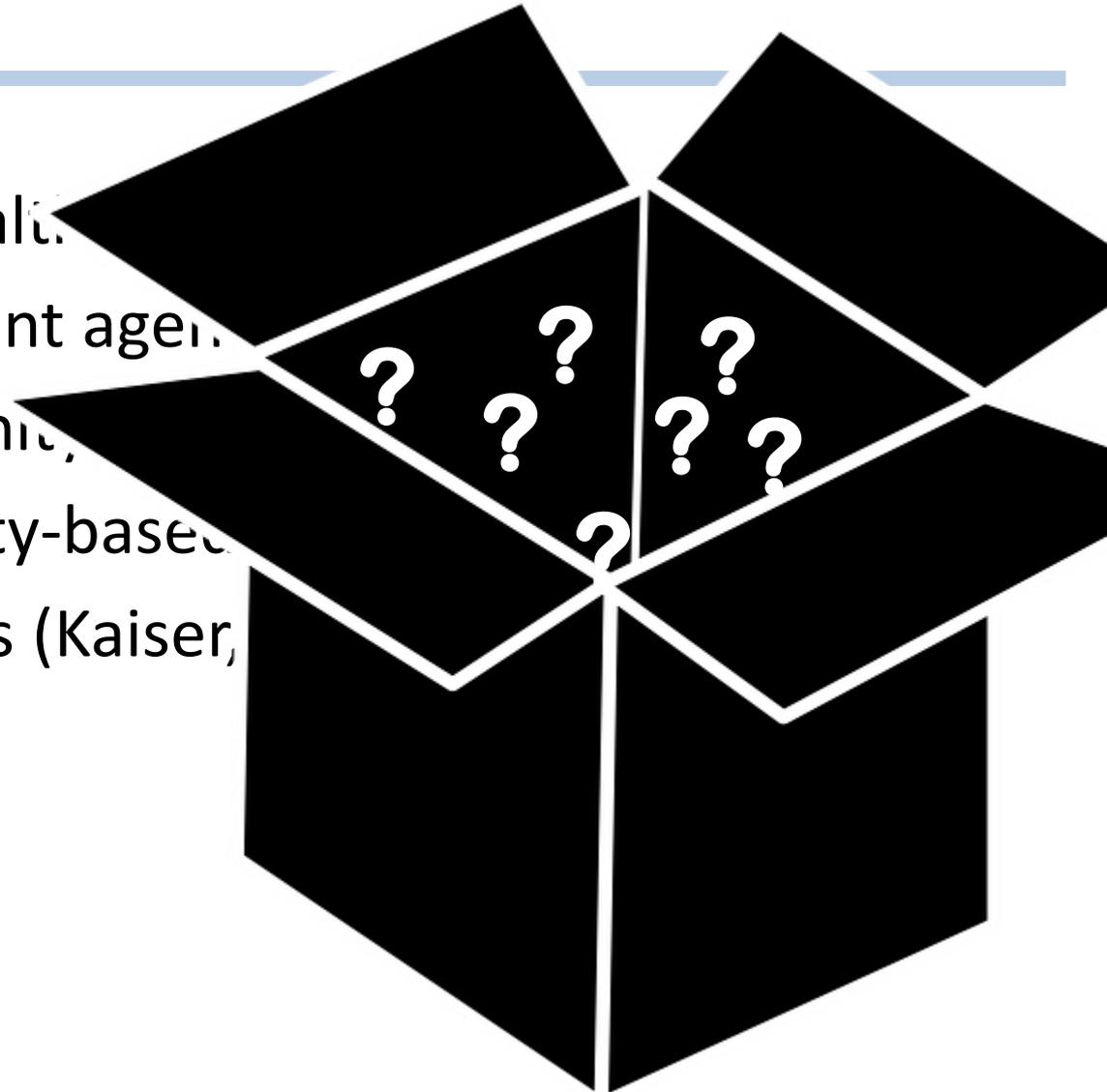- Funding cuts = fewer populations served by HD
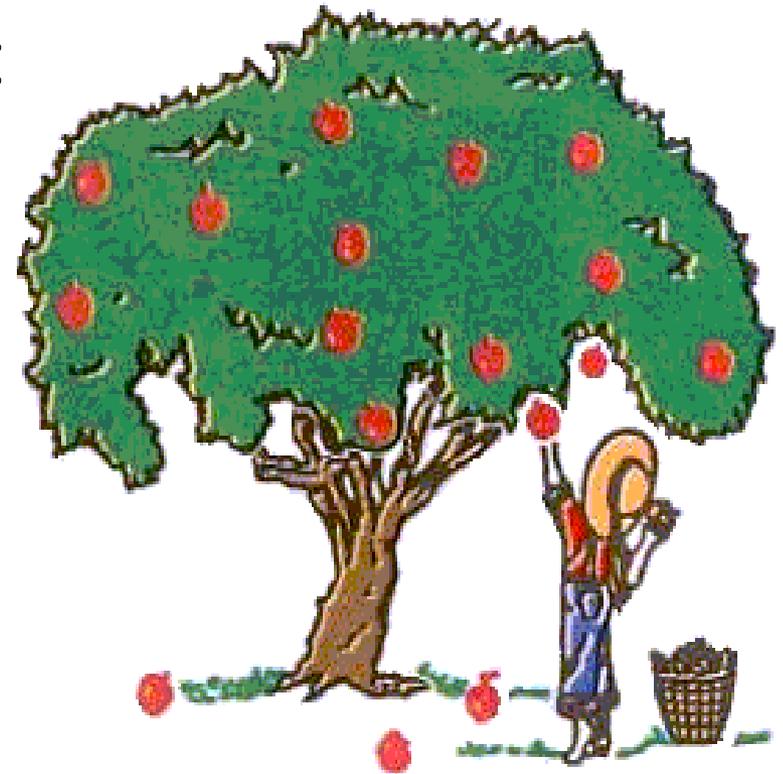
# Then there's the old Mutt and Jeff story …

# Potential non-HD Providers

- Other public healt...
- Other government agen...
- FQHCs, Communit...
- Other community-base...
- Private providers (Kaiser,...

# Seattle – Locating High Risk Populations and Their Providers



Overlaying Cases and Clinics

Cases
- 0 - 5
- 6 - 10
- 11 - 15
- 16 - 20

2007-2014

# Questions?