



Tuberculosis in Low Incidence States

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Case presentation :

The case of the wayward professor

- RC is a 35yo woman from a country of high TB incidence who presented to her PCP 2 years earlier c/o cough
- The PCP at that time placed a PPD and ordered a CXR
- The PPD was 10mm and the CXR was “abnormal” so she was sent to a pulmonologist

Case:

The wayward professor continued

- The pulmonologist attributed the CXR abnormality to BCG vaccination and the cough to allergies.
- Sputum was not obtained
- Lost to follow-up for two years
- Came back to her PCP accompanied by her husband “MC”, A faculty member at a prominent university
- Active hemoptysis in the waiting room

Case:

“The chase begins”

- The PCP is very concerned about TB again
- A CXR is obtained and arrangements are made to have the pt seen immediately in the ER by a different pulmonologist
- They never show citing the fact that the husband does not think she has TB
- The health department is notified

Case

- The patient's husband is called at home and the rationale and need for evaluation is expressed in carefully chosen words with their concerns addressed
- The plan was that the patient may go to the ER of their choosing and will be met by me to discuss the case and obtain sputum
- Patient and husband never went but sent an impostor who came to the Emergency Department with a chief complaint of "I don't have TB"

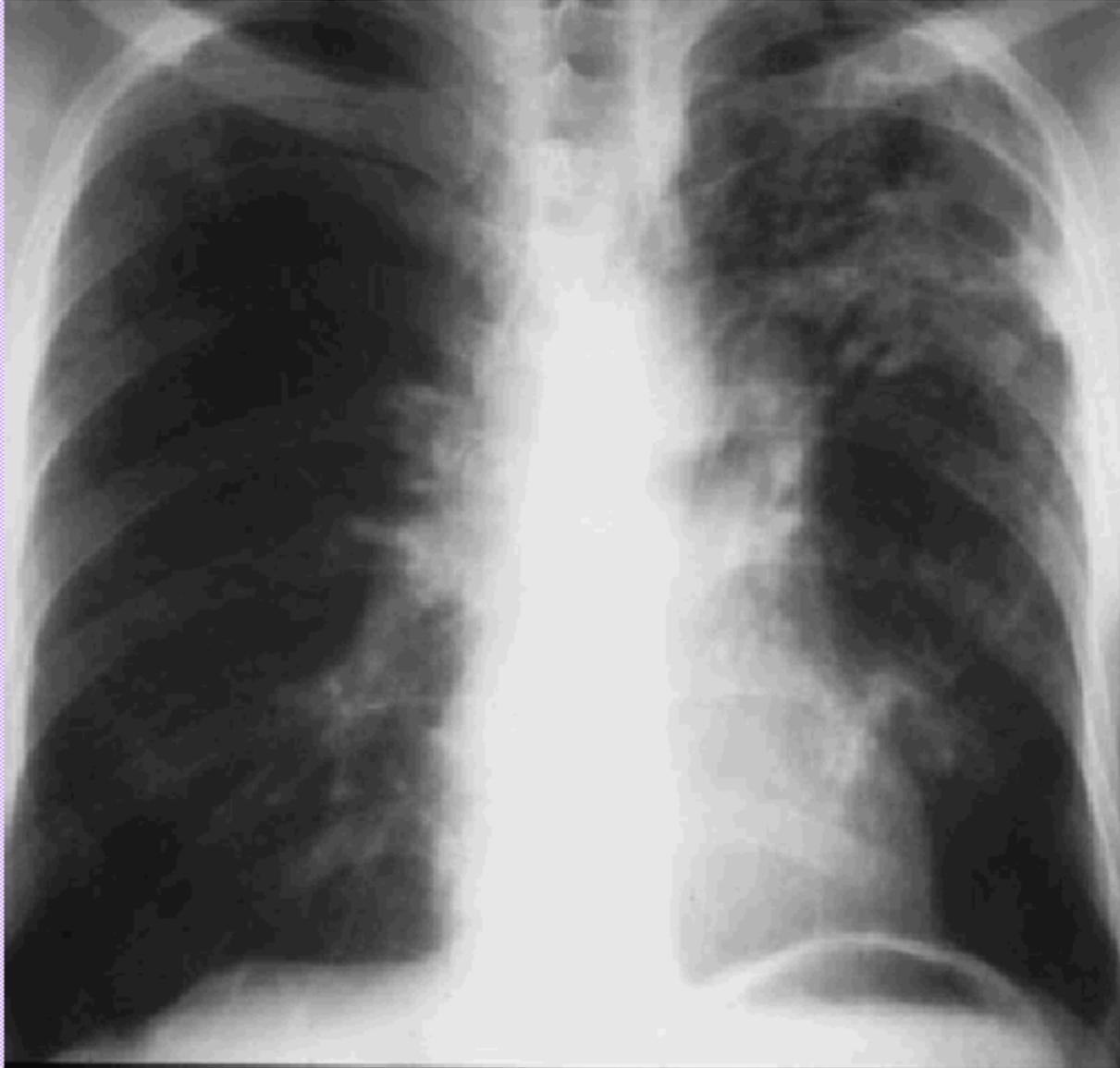
Lost to follow-up

(For a little while)

- After much deliberation and legal wrangling the HD sent a police officer to the home to locate the family
- The officer was informed by MC that he sent his wife and kids away so that they would not be subject to the “conspiracy”
- Threatening phone calls from family
- Heard nothing for 6 weeks until a call from another state on the west coast

The exciting conclusion to our story

- RC was diagnosed with smear positive cavitory TB after presenting to a local ER with hemoptysis once again
- Placed on court-ordered DOT and was banned from travel by the judge until therapy cleared her sputum
- MC felt humiliated by this and immediately brought his children to the health department for evaluation—skin tests were more than 25mm
- MC was evaluated with a CXR...



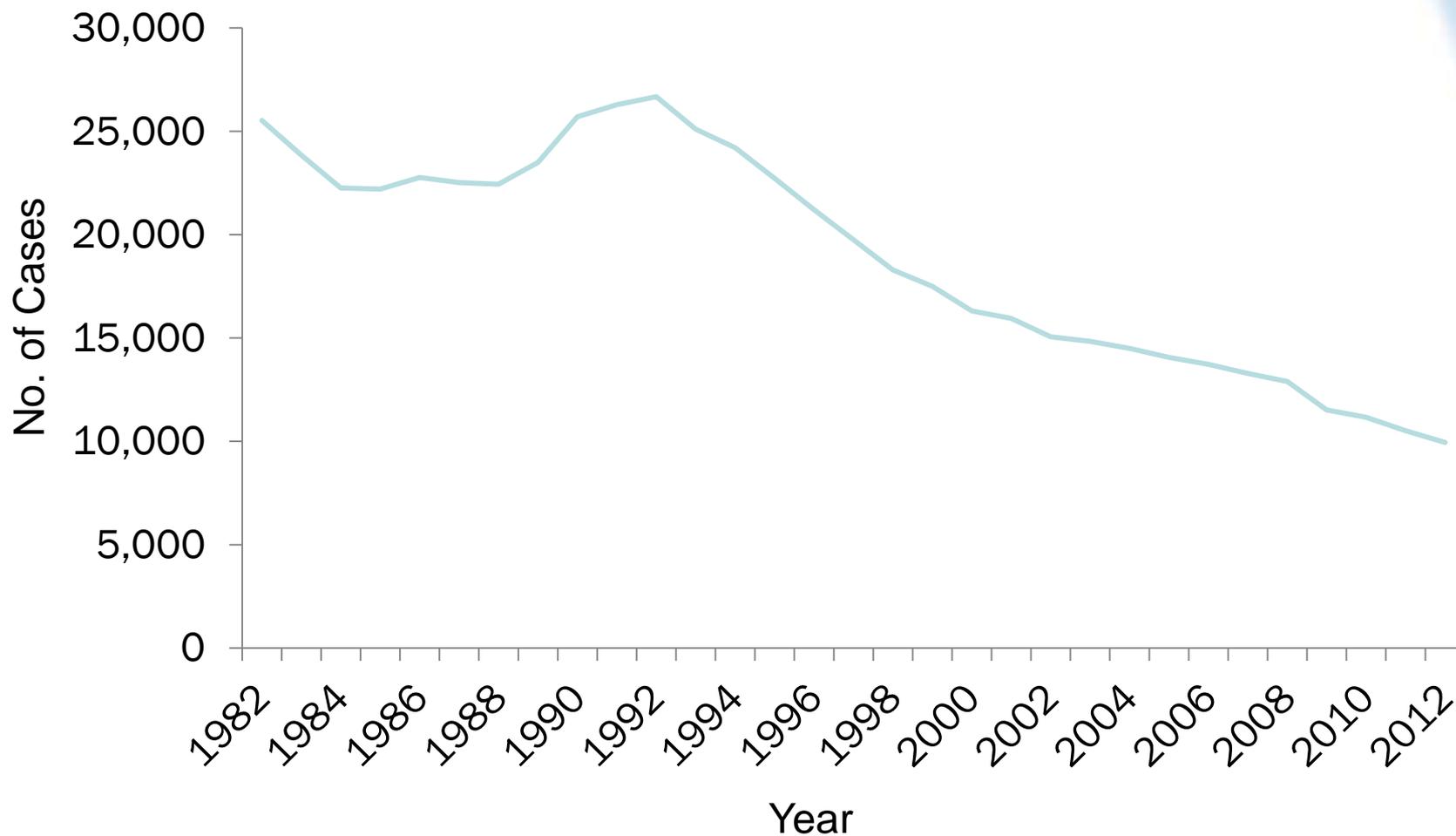
*The microbe is nothing... the terrain
is everything*

LOUIS PASTEUR



Epidemiology of TB in the United States

Reported TB Cases United States, 1982–2012*



*Updated as of June 10, 2013.



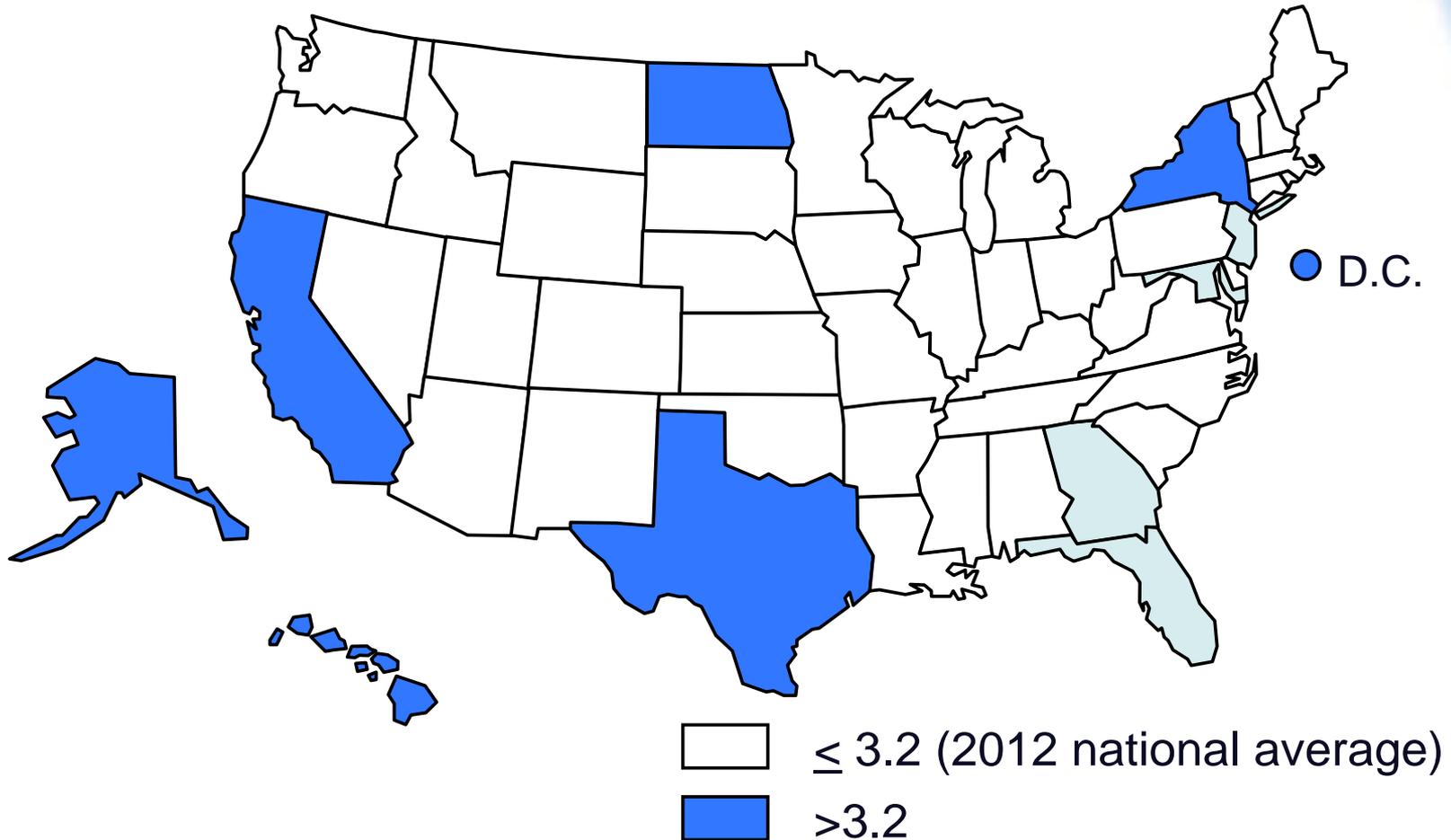
TB Morbidity

United States, 2007–2012

Year	No.	Rate*
2007	13,282	4.4
2008	12,895	4.2
2009	11,520	3.8
2010	11,163	3.6
2011	10,517	3.4
2012	9,945	3.2

*Cases per 100,000. Updated as of June 10, 2013.

TB Case Rates,* United States, 2012

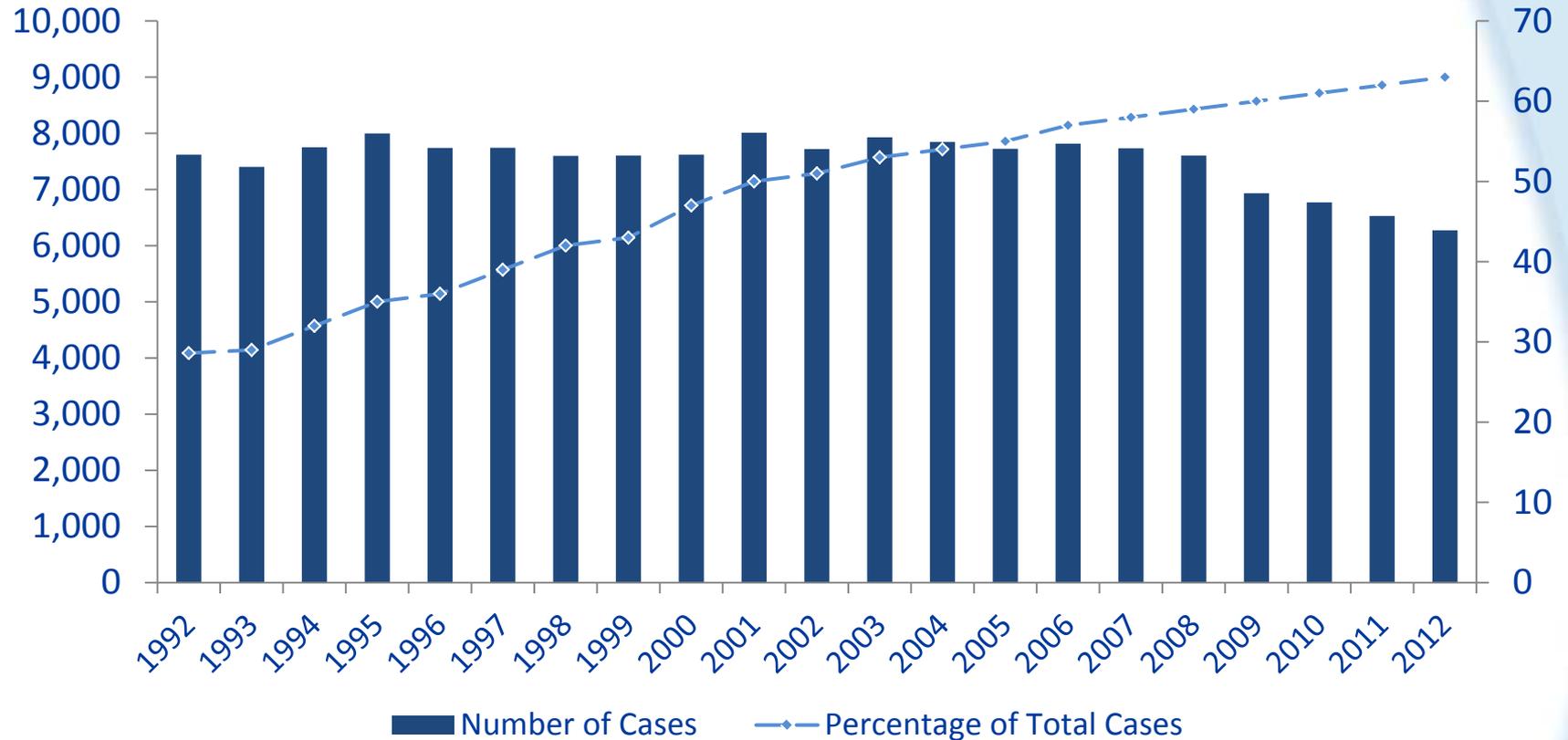


*Cases per 100,000.

Trends in TB Cases in Foreign-born Persons, United States, 1992 - 2012*

No. of Cases

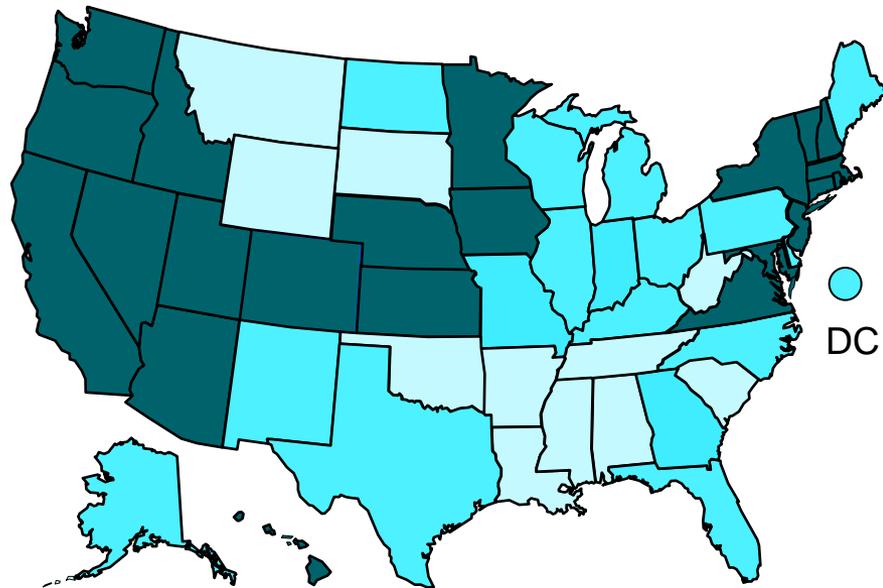
Percentage



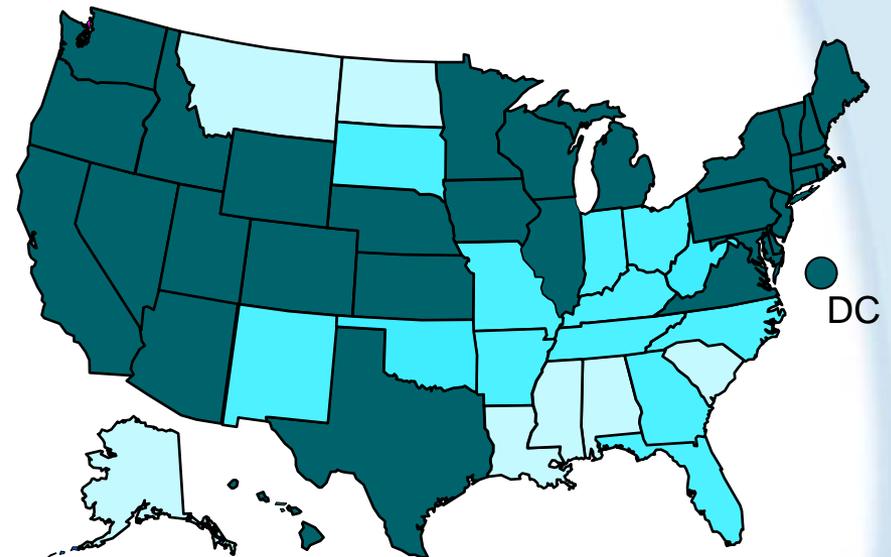
*Updated as of June 10, 2013

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

2002

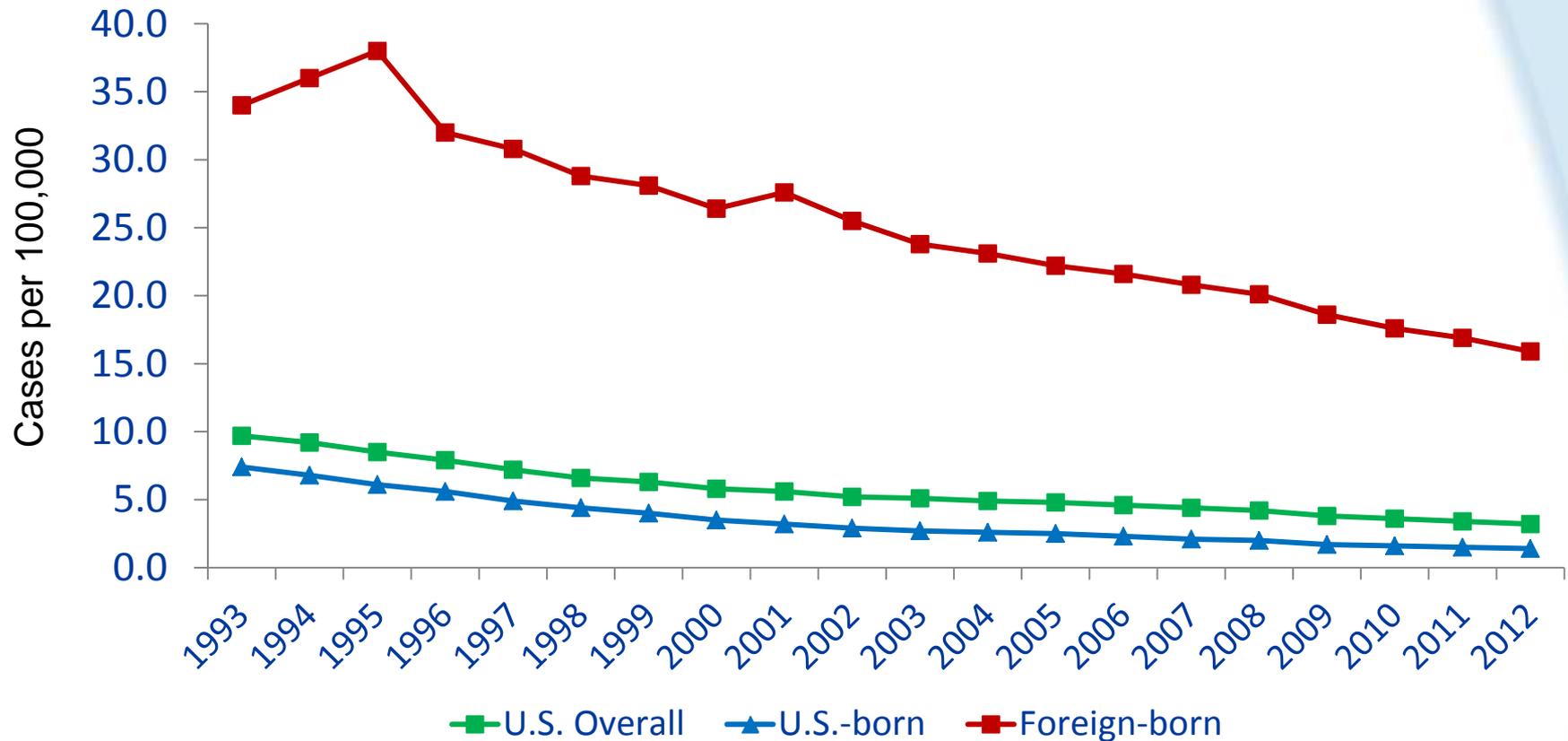


2012



*Updated as of June 10, 2013.

TB Case Rates in U.S.-born vs. Foreign-born Persons, United States, 1993 - 2012*



*Updated as of June 10, 2013.

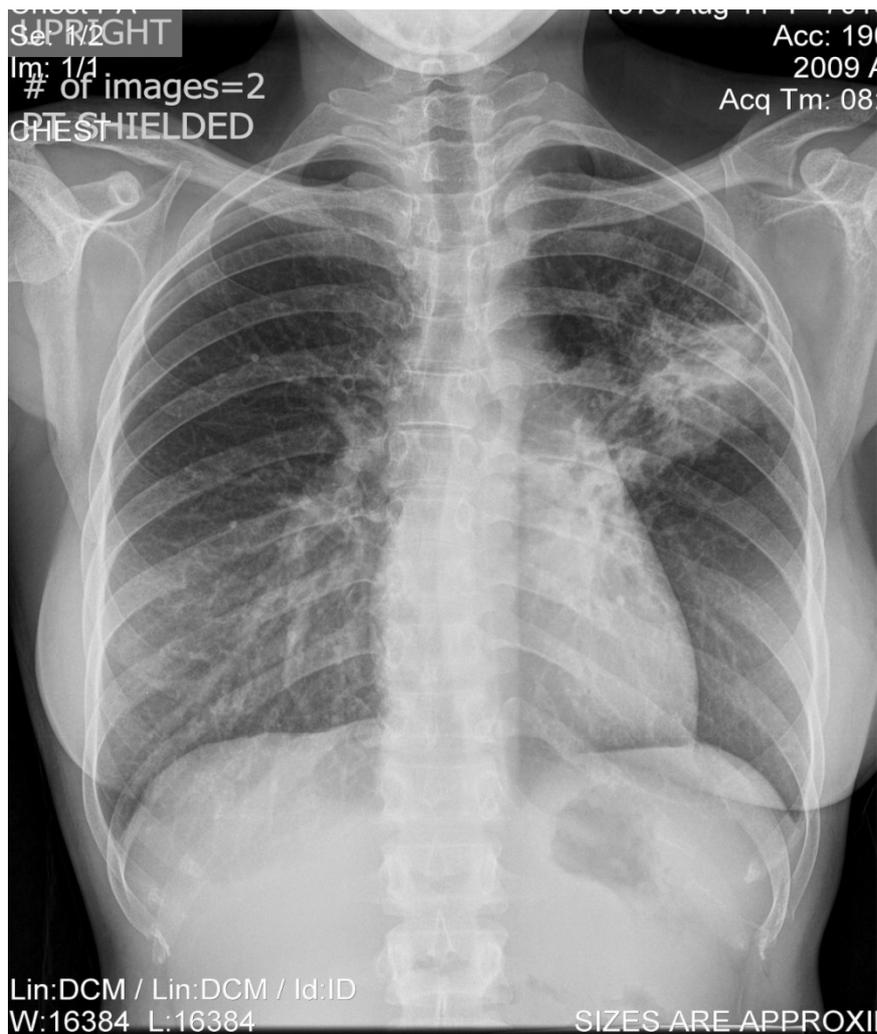
Components of a TB Prevention and Control Program

- There are six components of TB Prevention and Control Programs
- Every state health department needs the basic framework for a TB control program that includes all six components, and a designated program director.
- Sufficient capability in each of the following components is necessary for progress toward TB elimination:

Six Key Components

- Planning and developing policy
- Finding and managing suspected and confirmed tuberculosis cases
- Finding and managing latent tuberculosis infection
- Providing laboratory and diagnostic services
- Collecting and analyzing data
- Providing consultation, training, and education

Challenges



The decrease in TB incidence to historic low levels creates challenges for public health officials who are working to sustain programs and systems, especially when low incidence fails to indicate the full efforts required for comprehensive TB control.

Specific Challenges

- Loss of healthcare providers or specialists with TB expertise
- Scarcity of special facilities for prolonged health care
- Laboratory costs and decreased proficiency
- Travel in rural areas
- Loss of funds and personnel dedicated to TB control

Sustainability

- These challenges, particularly sustainability, are shared by TB programs in all states but are amplified by circumstances in low-incidence states.
- The Advisory Council for the Elimination of Tuberculosis (ACET) recommends that TB control programs in states or regions that have achieved low TB incidence status seek innovative approaches to meet these special challenges.
- ACET recognizes that the best solutions will be unique to each state and locality.

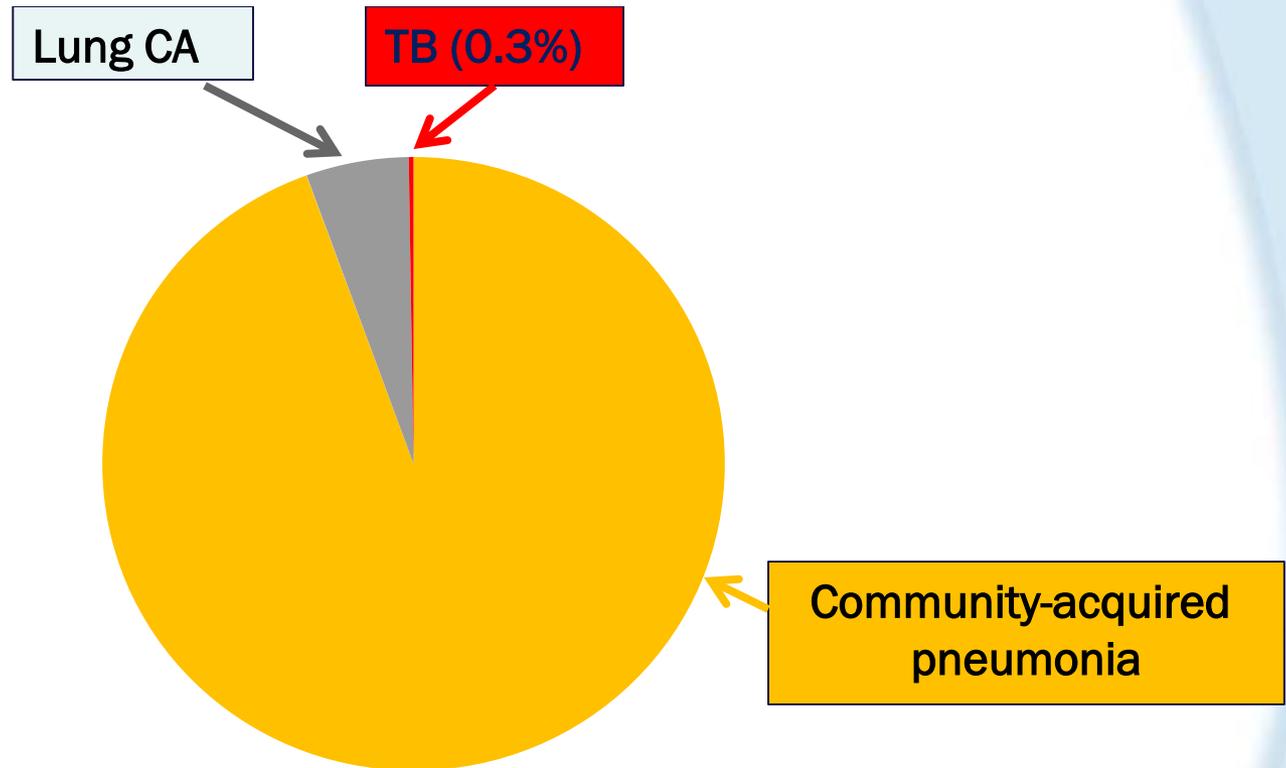


Consequences of Success

Patients Evaluated for TB at CDC-funded Public Health Laboratories, 2008-2009

	2008	2009	% change
Patients evaluated for TB	103,708	97,568	-5.9%
Patients with cultures positive for <i>M. tuberculosis</i>	4,972	4,217	-15.2%
Ratio of patients evaluated to patients diagnosed with TB	21 : 1	23 : 1	

Getting Physicians to “Think TB” is asking them to look for a needle in a haystack



Can Physicians be Educated to “Think TB”?

- As TB rates decline, general medical expertise and education targeted at TB will decline
- “Think TB” campaigns may have impact in targeted situations:
 - In high-risk communities
 - During outbreaks
- Untargeted campaigns may not be successful

Can Physicians be Educated to “Think TB”?

Challenges During TB Outbreaks

- **Most media stories about TB “outbreaks” describe contact investigations at schools**
- **Most contact investigations at schools do not detect additional TB cases**
- **Health Departments often work hard to keep information on large TB outbreaks out of media**

Measuring TB Diagnostic Delay

Results from TBESC Task Order 23: National Study of Early Diagnosis of TB in the African-American Community

Co-Principal Investigators:

Dolly Katz, Ph.D., CDC

Rachel Royce, Ph.D., M.P.H., RTI International

Charles Wallace, Ph.D., Texas Department of Health

Summary of Findings from Task Order 23: Study of Patient and Provider Delay

- ❑ Snap shot in time (rather than trend over time)
- ❑ Both patient and provider delay observed
- ❑ Delay not worse for African Americans compared with whites

Contribution of Provider Diagnostic Delay to 27 TB Outbreaks Investigated by CDC*

Contributing factors	Number of Outbreaks where item was considered a contributing factor
Prolonged infectious period	24
Provider-related diagnostic delay	12
Patient-related delay in access to care	6

* From: Mitruka et al., EID 2011;17(3):425



The Road to TB Elimination



Building (Maintaining) Capacity in Low Incidence States

Ending Neglect: Progress Toward TB Elimination

Improve access to and efficiency in using clinical, epidemiological, and other technical services by

- Regionalizing TB elimination activities**
- Using a combination of federal and multistate initiatives**

Source: Institute of Medicine Report: Ending Neglect

The Task Order 6 Goal:

Identify best practice models for regional capacity-building in low-incidence areas

Task Order 6 Methods:

- Assess needs
- Develop interventions
- Implement interventions
- Evaluate interventions

Needs Assessment

- Describe TB epidemiology in the region
- Describe infrastructure for TB control
- Identify challenges in each area of TB control
 - Core TB program functions
 - Private sector and partnerships
 - Laboratory
 - Training/Education

TB Cases and Rates in Four Western Low Incidence States

State Population 2006	Cases in 2006	2006 case rate
Idaho (1,466,465)	20	1.4
Montana (944,632)	13	1.4
Utah (2,550,063)	34	1.3
Wyoming (515,004)	4	0.8

Identified Needs

- **Clinical consultation**
- **Comprehensive guide to TB control for field and program staff**
- **Laboratory services assessment**
- **Training and education**
- **Outbreak surveillance**

Intervention Areas

Intervention Areas:

1. Policy & Planning
2. Clinical Consultation
3. Laboratory Services
4. Surveillance

Outcomes:

- TB Control Manual Template
- Regional Warm line
- Surveys of laboratory practice
- Regional laboratory trainings
- Regional use of genotyping
- Outbreak Response Plan Template

Intervention Areas

Intervention Areas:

5. Training and Education

6. Advocacy/Collaboration

7. Program Evaluation

Outcomes:

Training needs assessment

Conduct regional trainings

Regional TB Elimination Plan

Idaho case management
teleconferences

Evaluation of interventions

TB Control Manual Template

Create a TB control manual template that translates national guidelines into “how-to guide” for field and program staff

- Applicable to low-incidence states
- Customizable to address each state’s unique epidemiologic and infrastructure circumstances
- Standardizes case management/CI and clinical practice

Available at www.nationaltbcenter.edu

Clinical Consultation

- **Four states have access to specific medical consultants (Charles Daley, Charlie Nolan, Randall Reves) through the FJ Curry National TB Center Warmline**
- **Advantage compared to usual operation Warmline:
Built relationships and continuity**

Laboratory Services

- **Assessed mycobacteriology laboratory practices across 4-state region**
- **Identified areas of concern**
 - Lab safety issues
 - Turnaround times
 - Reporting issues
- **Held laboratory trainings (included those from public and private sector)**
- **Ongoing network to share problems and solutions**

Surveillance

- **Regional approach to using genotyping data**
 - **Data sharing agreements**
 - **Regional genotyping coordinator**
 - **Routinely reviews genotyping data across region**
 - **Provides expertise and consultation to region and states**
 - **Facilitates communication between states**
 - **Policies and procedures for reviewing and sharing cluster findings**

Surveillance cont.

- Identified 7 inter-state PCR clusters
 - 2 PCR clusters with isolates having different RFLP patterns
 - Rv/Ra “cluster”
 - Follow-up pending on 2 PCR clusters
- 1 regional outbreak among homeless
- Identified issues related to duplicate reporting of results in 2 different states
 - Developed lab notification system to prevent duplicate reporting in future

Outbreak Response Plan Template

- **Outbreak response definitions**
- **Roles and responsibilities**
- **Communication and education**
- **Checklists for all activities**

Case Management Teleconferences

- **Bi-monthly teleconferences in Idaho with state and local participation**
 - Local PHN presents case in standard format
 - State TB controller guides discussion
 - Include external TB experts (nurses and M.D.)
- **Evaluation using CDC framework documented the usefulness of the ID case management teleconference format**
- **In New England, a regional case conference model**

Lessons From Task Order 6

- Building capacity and sustaining improved TB control practices requires dedicated resources and infrastructure
- Selective application of regional approach
 - Not applicable for all TB activities
- TB elimination requires not only maintenance; *enhancement* of TB control required
 - TB in foreign-born
 - Cultural competence
 - Further prevention planning and activities
 - TB in American Indians- a racial disparity

Conclusion and Next Steps

- **Best-practice models**
 - **TB Manual Template**
 - **Outbreak Response Plan Template**
 - **Regional Surveillance Approach**
 - **Laboratory Advisory Group**
 - **Idaho Case Management Teleconferences**
- **Complete evaluation of these models and present findings to national TB audience**
 - **Post model tools at www.nationaltbcenter.edu**



Effective Targeted Testing and Treatment of Latent TB Infection

Necessary Steps to an Effective Targeted Testing Program

- Target testing individuals who are from populations that are high-risk for progressing to active disease
- Establishing who in those populations are infected—diagnosing LTBI
- Medically evaluating infected persons
- Initiating therapy
- Completing therapy

Targeted Testing

- Targeted tuberculin testing programs should be designed for one primary purpose:
To identify persons at high risk for TB who would benefit by treatment of LTBI.
- “The decision to tuberculin test is the decision to treat (and complete)”

At higher risk

- A risk of TB that is substantially higher than that of the general population of the United States is associated with:
 1. Recent infection with *Mycobacterium tuberculosis*
 2. The presence of clinical conditions that are associated with an increased risk of progression of LTBI to active TB

Groups at Increased Risk of TB Disease

- Targeted testing identifies persons at risk for TB who would benefit by treatment of LTBI, if detected
- Highest risk individuals would be those recently infected or those with clinical conditions associated with and increased risk of progression to active disease
- Screening of low-risk persons such as administrative screening should be replaced by targeted testing whenever possible

How do we know that recent infection is a risk factor for developing active disease?

- Two controlled trials looking at the efficacy of LTBI treatment of contacts to TB cases in mental hospitals
- The skin tests of 1472 participants in the placebo arm converted from negative to positive
- In the first year of follow up 19 developed active disease (12.9 cases per 1000 person-years) versus only 17 persons over the next 7 years (1.6 cases per 1000 person-years)
- A study of British schoolchildren found similar results with 54% of those developing active disease doing so within the first year and 82% within 2 years

Who should be targeted for LTBI screening?

- Because of risk of recent infection to obvious high priority groups are recent contacts and documented skin test converters
- Persons from higher risk regions of the world will have TB rates that approach those of their home countries for several years after arrival to the US
- Review local epidemiological data but other groups to screen may include those in institutional settings, corrections, homeless individuals
- Consider likelihood of adherence prior to starting

Table 2. Incidence of active tuberculosis (TB) in persons with a positive tuberculin test, by selected risk factors

Risk factor	TB cases/1,000 person-years
Recent TB infection	
Infection <1 yr past	12.9 (6)*
Infection 1–7 yr past	1.6
Human immunodeficiency virus (HIV) infection	35.0–162 (28)
Injection drug use	
HIV seropositive	76.0 (31)
HIV seronegative or unknown	10.0 (31)
Silicosis	68 (36)
Radiographic findings consistent with prior TB	2.0–13.6 (32–34)
Weight deviation from standard	
Underweight by $\geq 15\%$	2.6 (35)
Underweight by 10–14%	2.0
Underweight by 5–9%	2.2
Weight within 5% of standard	1.1
Overweight by $\geq 5\%$	0.7

* Numbers in parentheses are reference numbers.

Table 3. Relative risk* for developing active tuberculosis (TB), by selected clinical conditions

Clinical condition	Relative risk
Silicosis	30 (37,38) [†]
Diabetes mellitus	2.0–4.1 (42–44)
Chronic renal failure/hemodialysis	10.0–25.3 (39–41)
Gastrectomy	2–5 (45–47)
Jejunioileal bypass	27–63 (48–49)
Solid organ transplantation	
Renal	37 (50)
Cardiac	20–74 (51,52)
Carcinoma of head or neck	16 (53)

*Relative to control population; independent of tuberculin-test status.

[†] Numbers in parentheses are reference numbers.



Summary and Conclusion

