

The Epidemiology of Human Tuberculosis in South Dakota and Elsewhere

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Presentation Outline



- I. Review of global TB**
- II. Epidemiology of TB in the United States**
- III. Epidemiology of TB in South Dakota**
- IV. Review of TB cases with suspected or confirmed *Mycobacterium bovis***

Review of Global TB



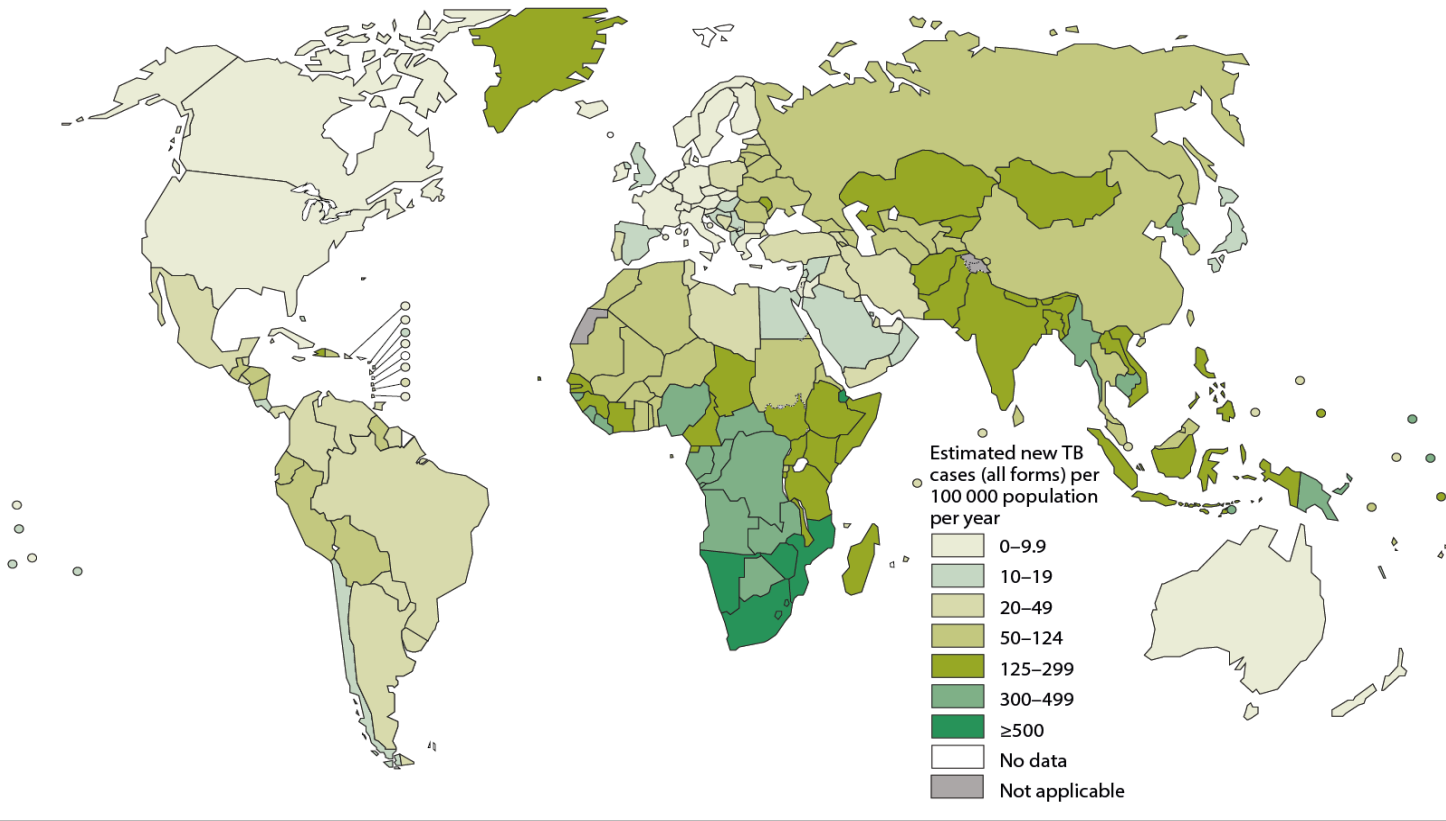
Review of Global TB

- ❖ In 2013, there were ~9 million new TB cases and ~1.5 million deaths (80,000 were children).
- ❖ 1/3 of the world's population is already infected with TB.
- ❖ TB is the leading cause of death for HIV infected patients worldwide.
- ❖ In 2013, there were ~480,000 MDR-TB cases.
- ❖ The global TB mortality rate has dropped 45% since 1990.
- ❖ The global TB prevalence rate has dropped 41% since 1990.

Estimated 2013 Global TB Incidence rates



Estimated TB incidence rates, 2013



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

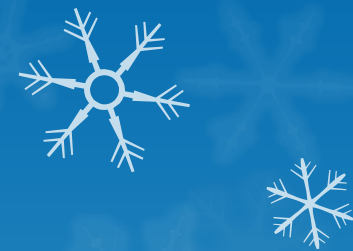
Data Source: *Global Tuberculosis Report 2014*. WHO, 2014.

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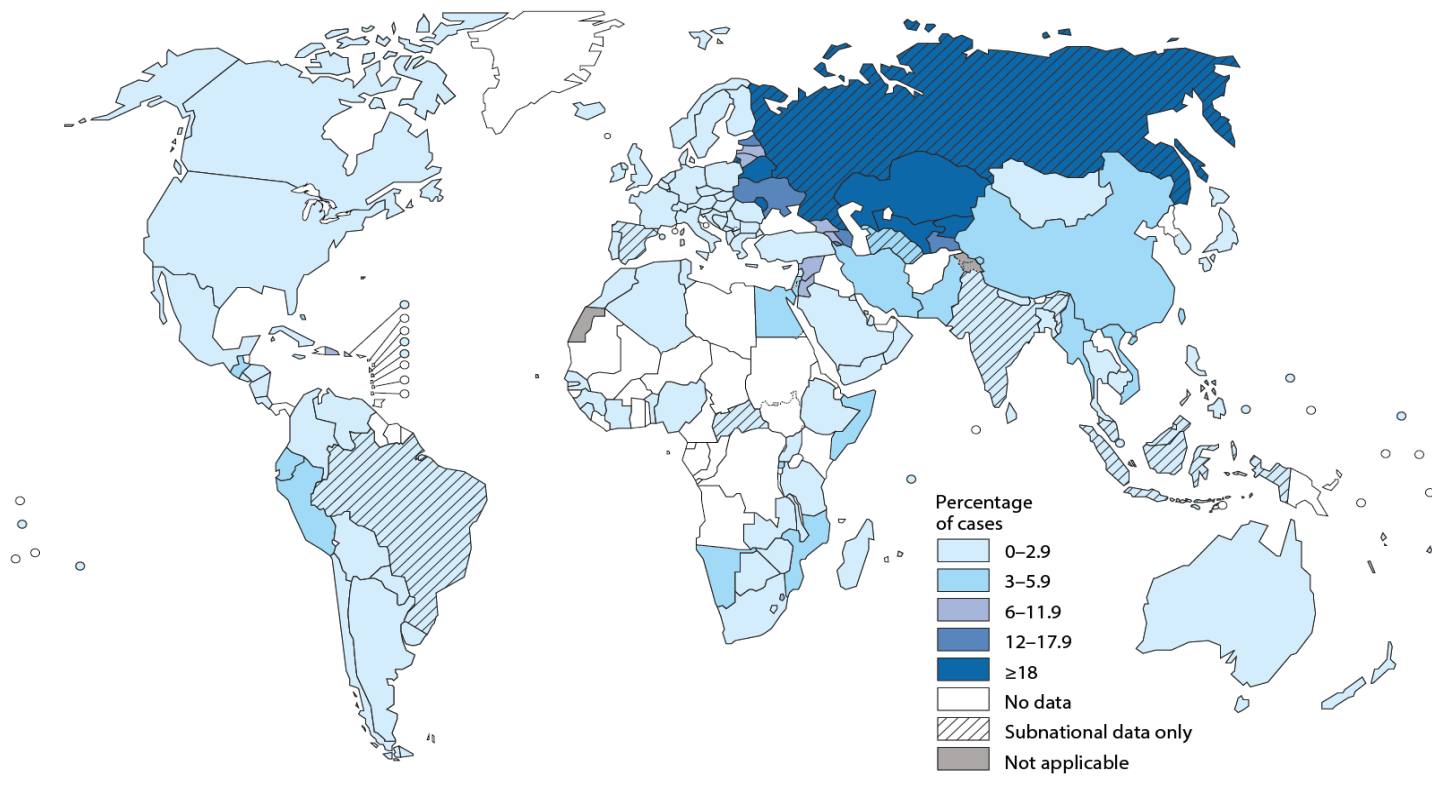


World Health Organization

2014 New Global MDR-TB Cases



Percentage of new TB cases with MDR-TB



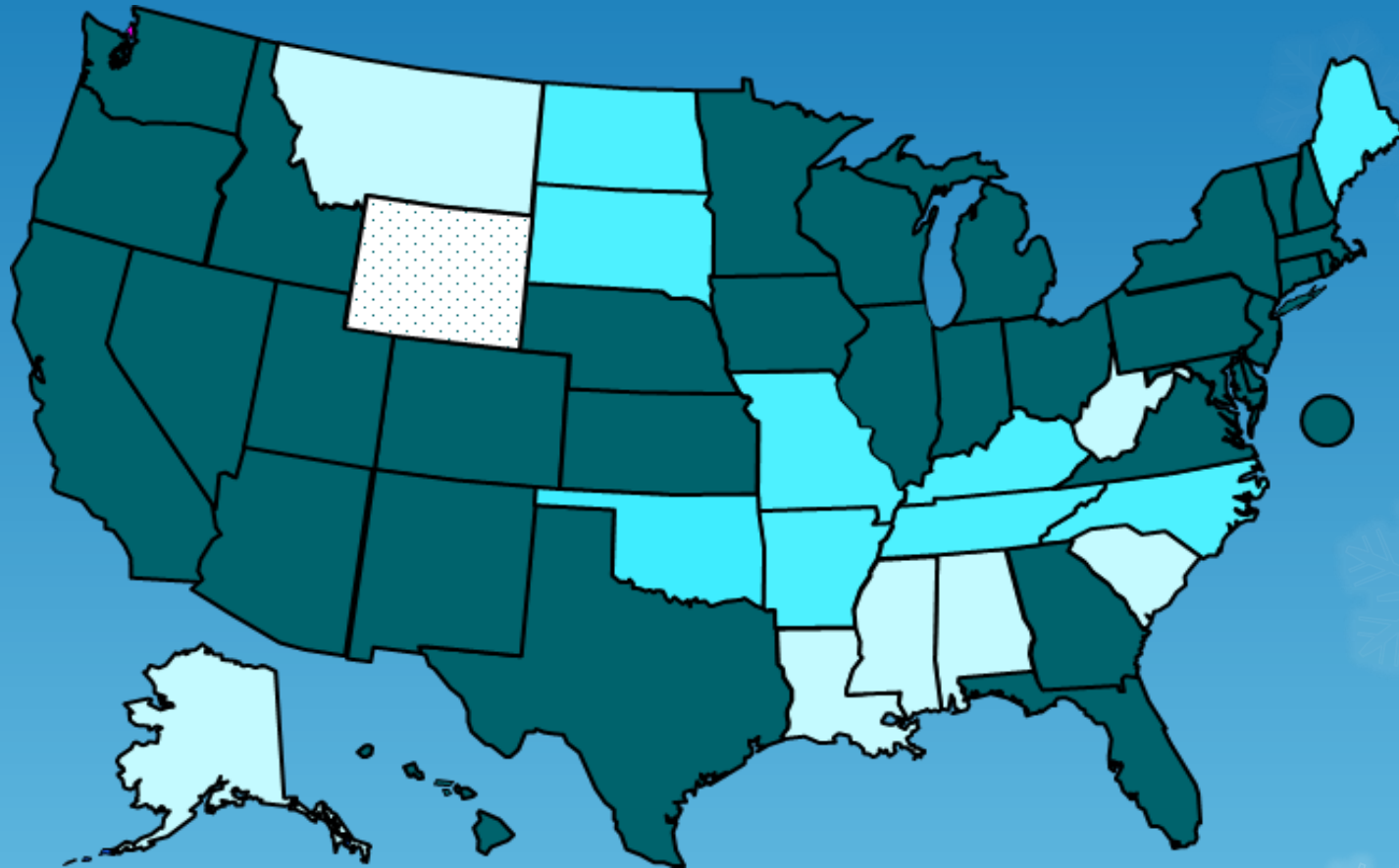
The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: *Global Tuberculosis Report 2014*. WHO, 2014.

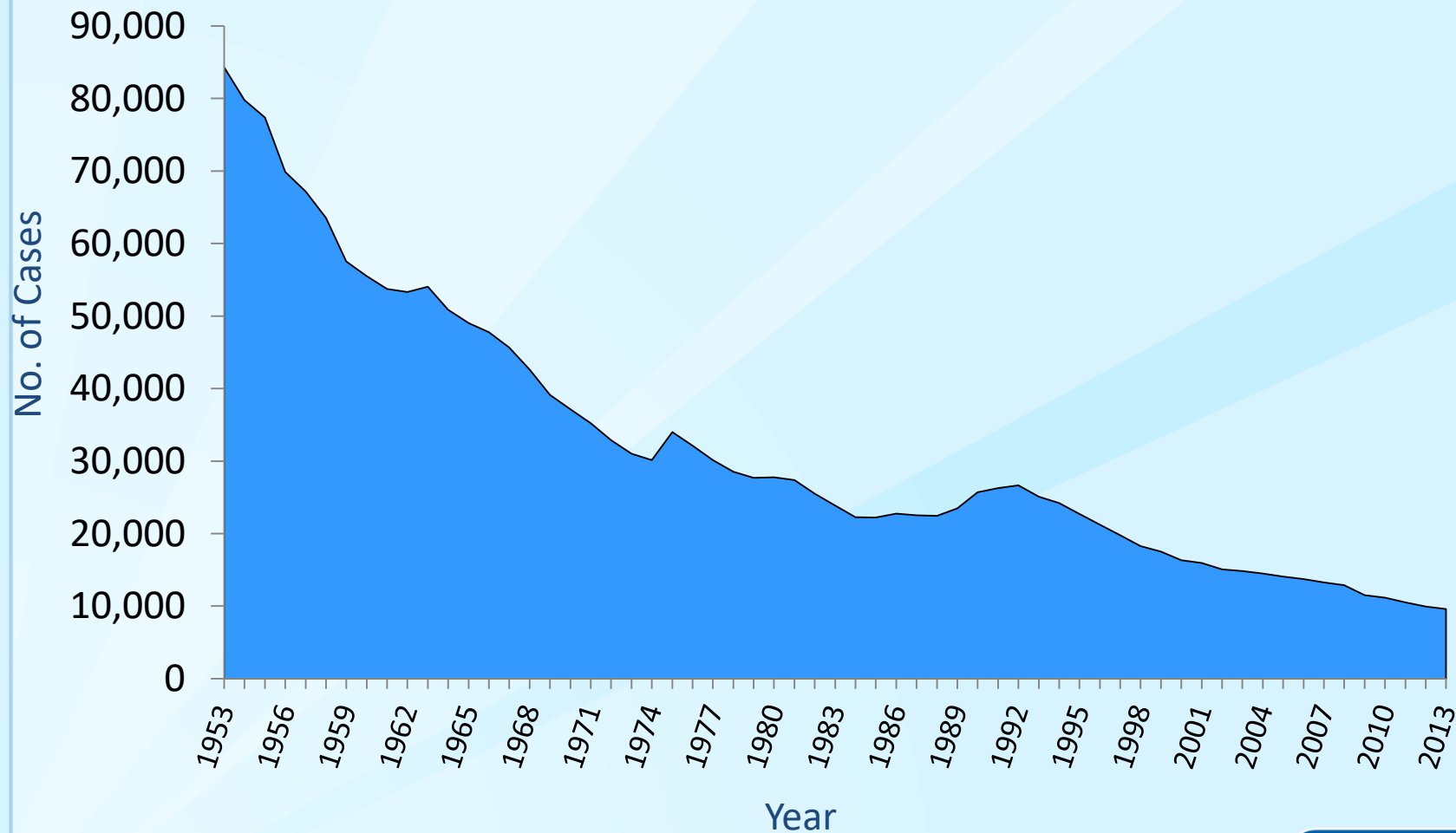
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Epidemiology of TB in the United States



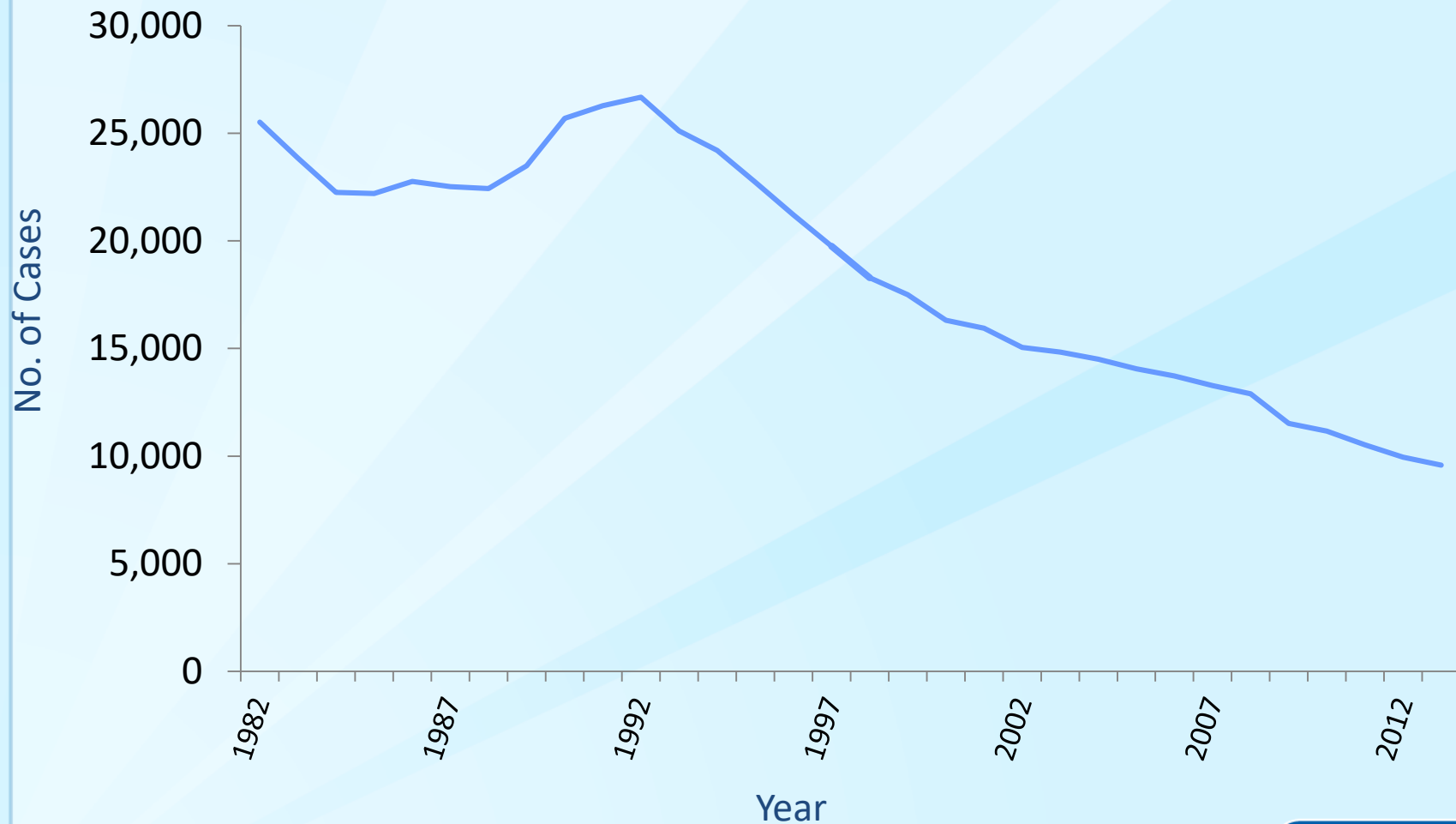
Reported TB Cases United States, 1953–2013*



*Updated as of June 11, 2014.



Reported TB Cases United States, 1982–2013*



*Updated as of June 11, 2014.



TB Morbidity

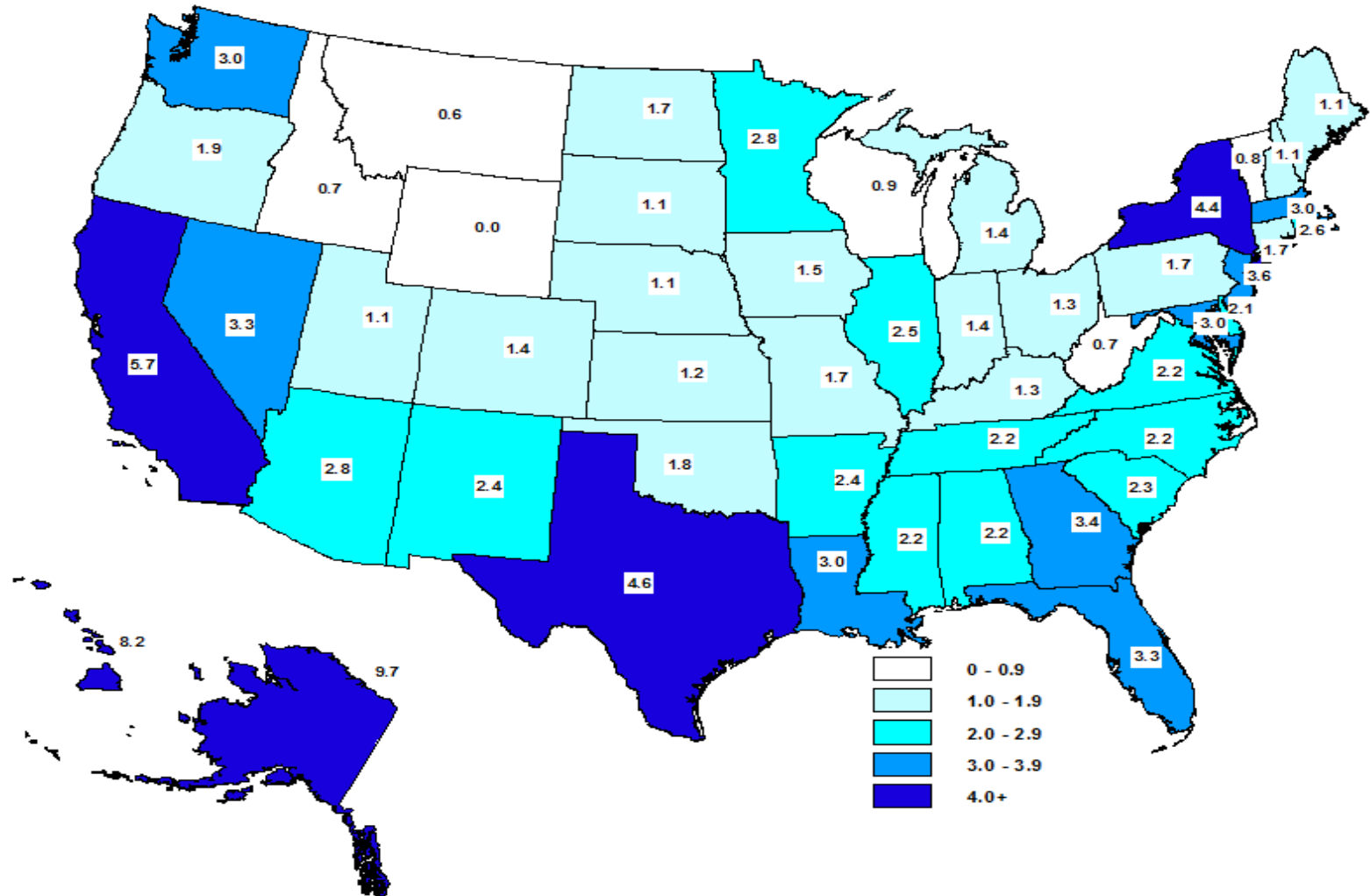
United States, 2008–2013

Year	No.	Rate*
2008	12,893	4.2
2009	11,519	3.8
2010	11,164	3.6
2011	10,509	3.4
2012	9,940	3.2
2013	9,582	3.0

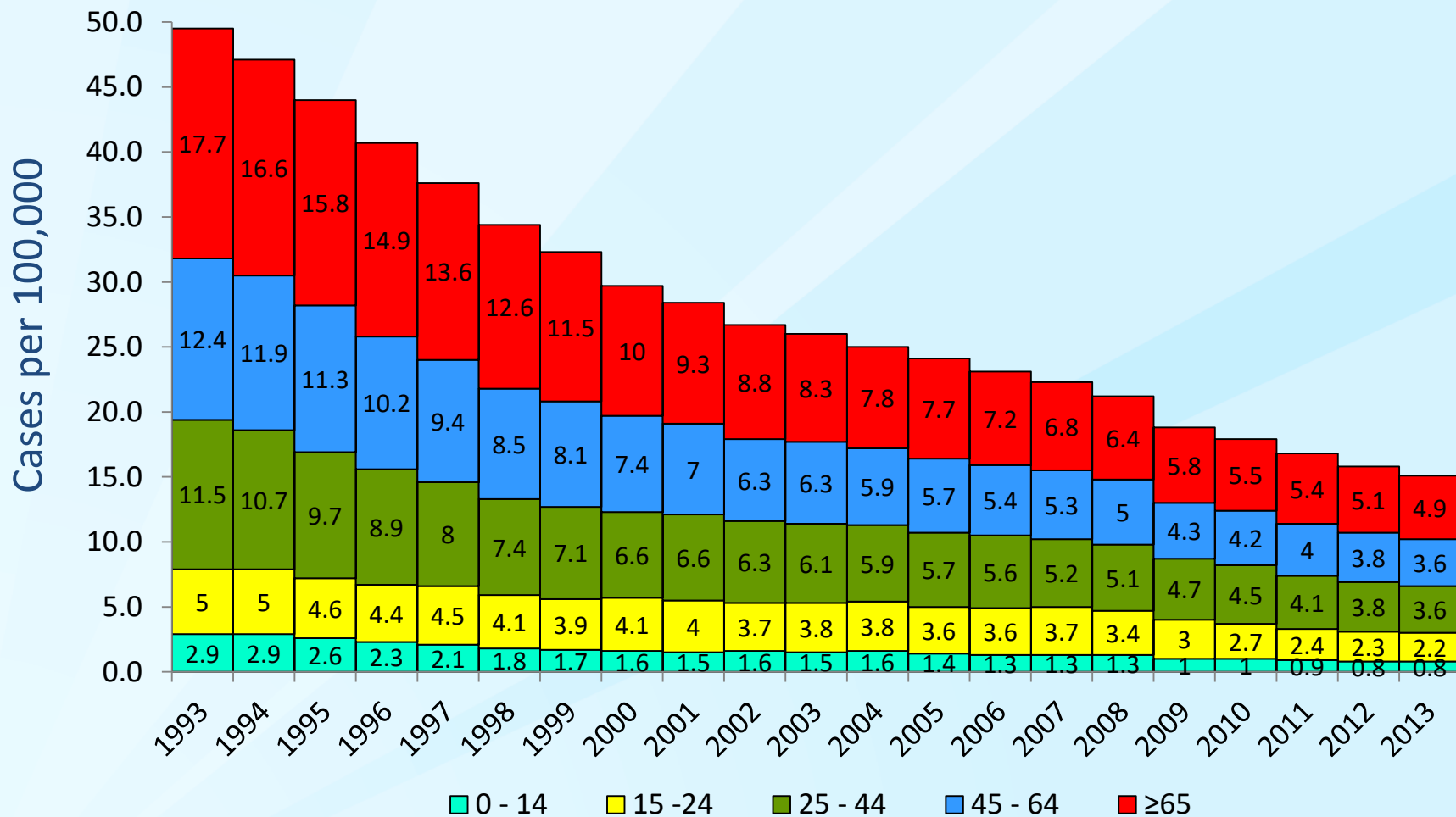
*Cases per 100,000. Updated as of June 11, 2014.



TB Case Rates,* United States, 2013



TB Case Rates* by Age Group United States, 1993–2013

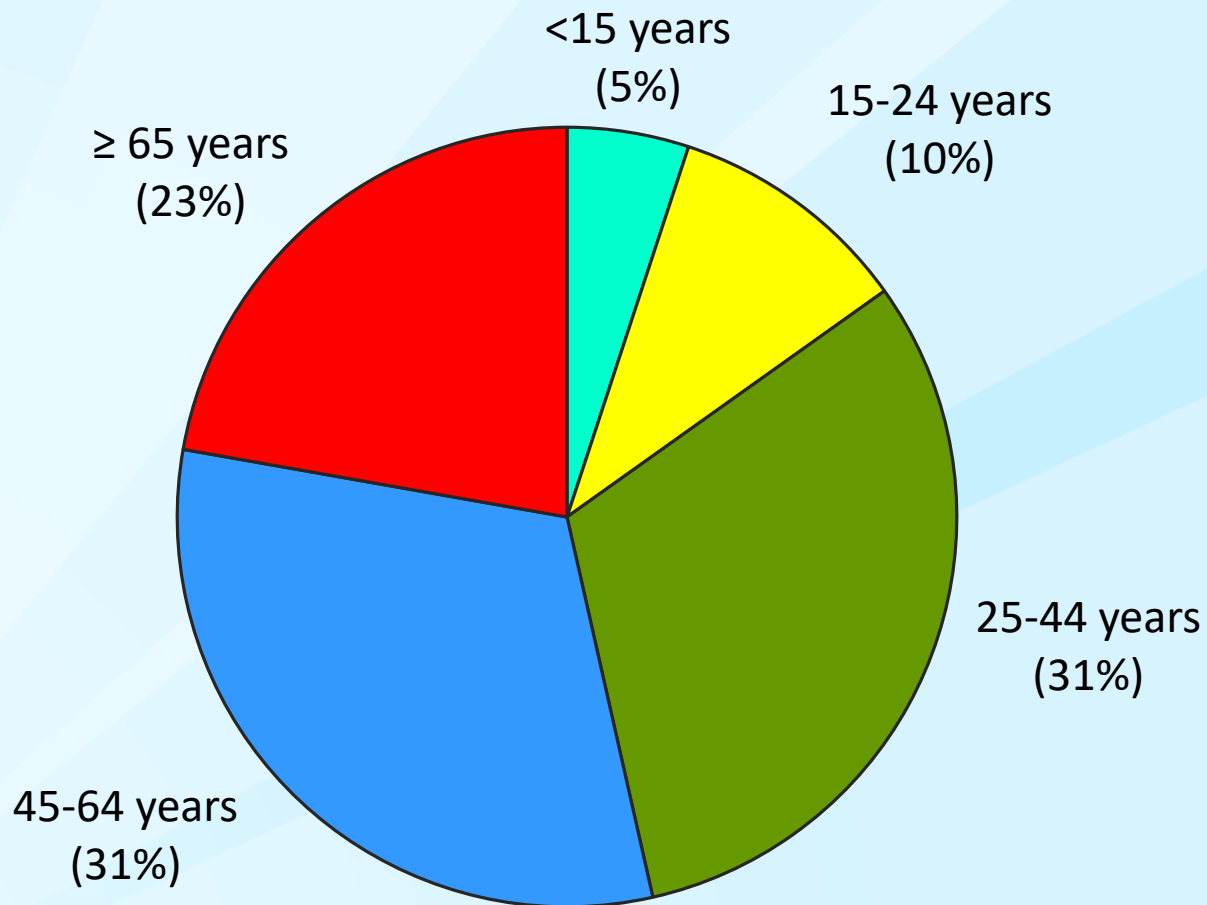


* Updated as of June 11, 2014.

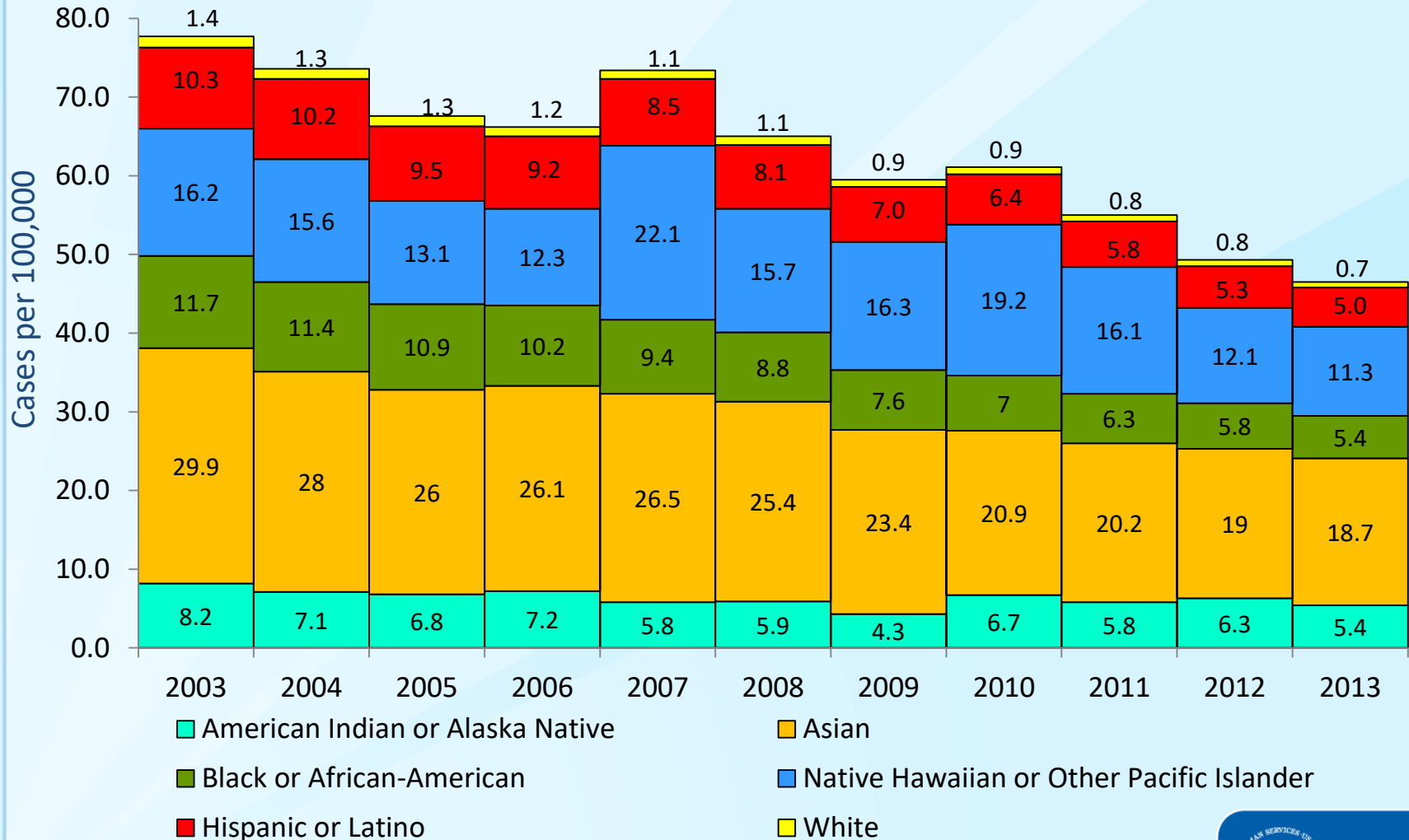
Age Group (years)



Reported TB Cases by Age Group, United States, 2013



TB Case Rates by Race/Ethnicity,* United States, 2003–2013**

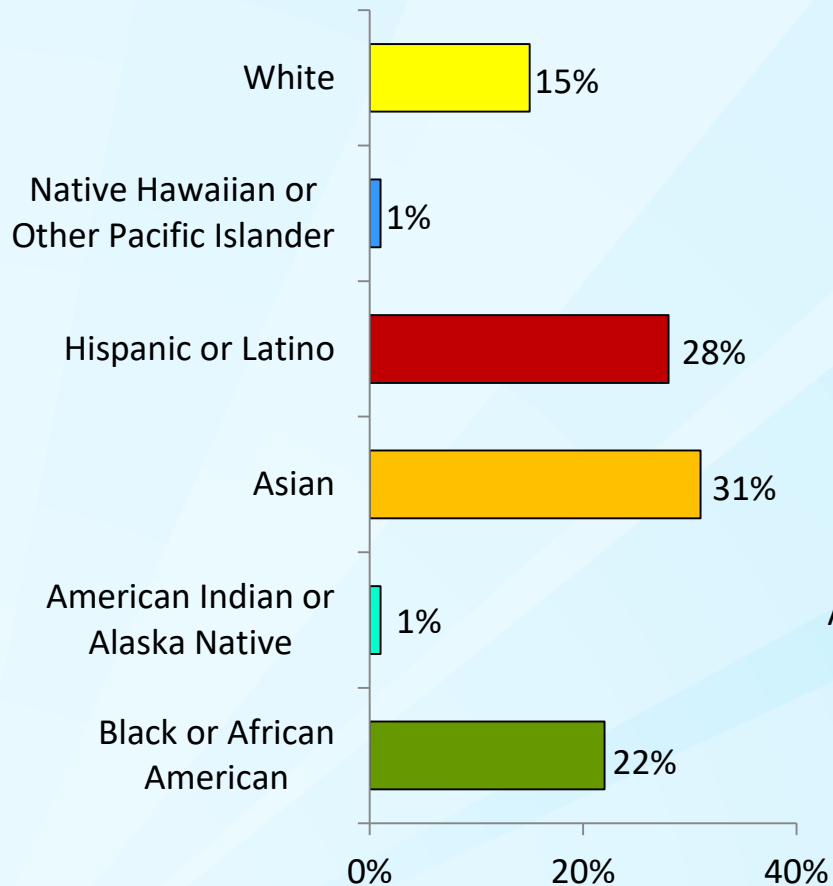


*All races are non-Hispanic. **Updated as of June 11, 2014.

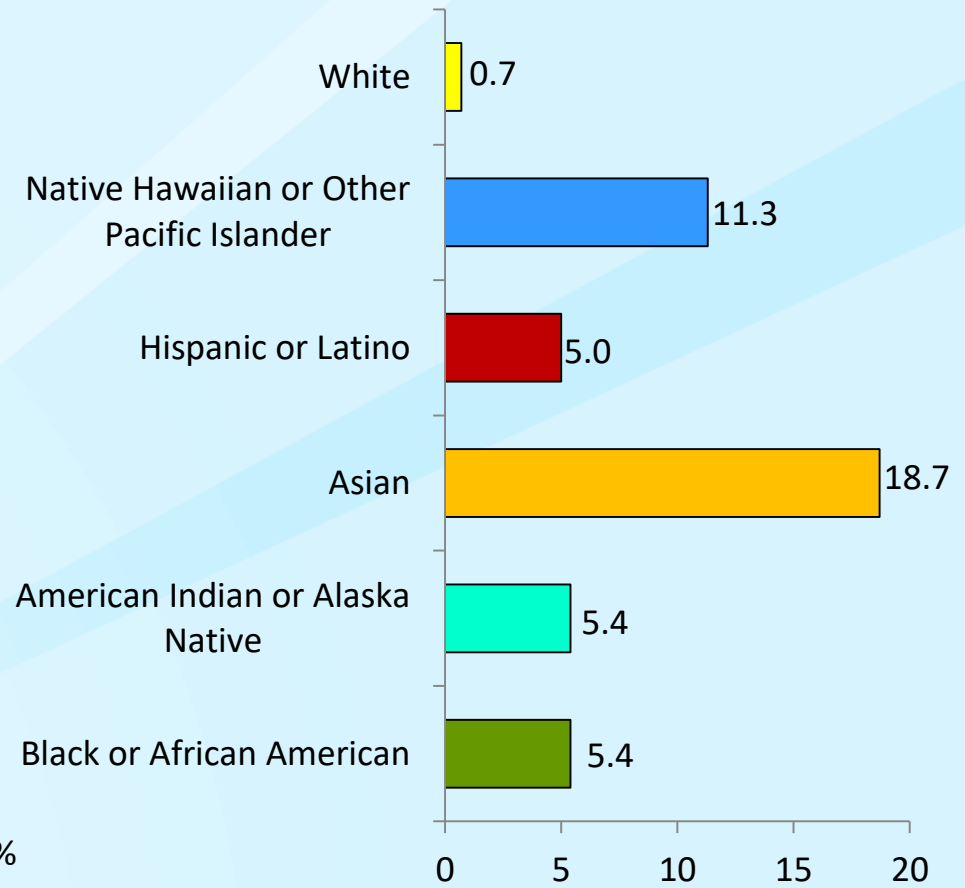


TB Percentage and TB Case Rates per 100,000 by Race/Ethnicity,* United States, 2013

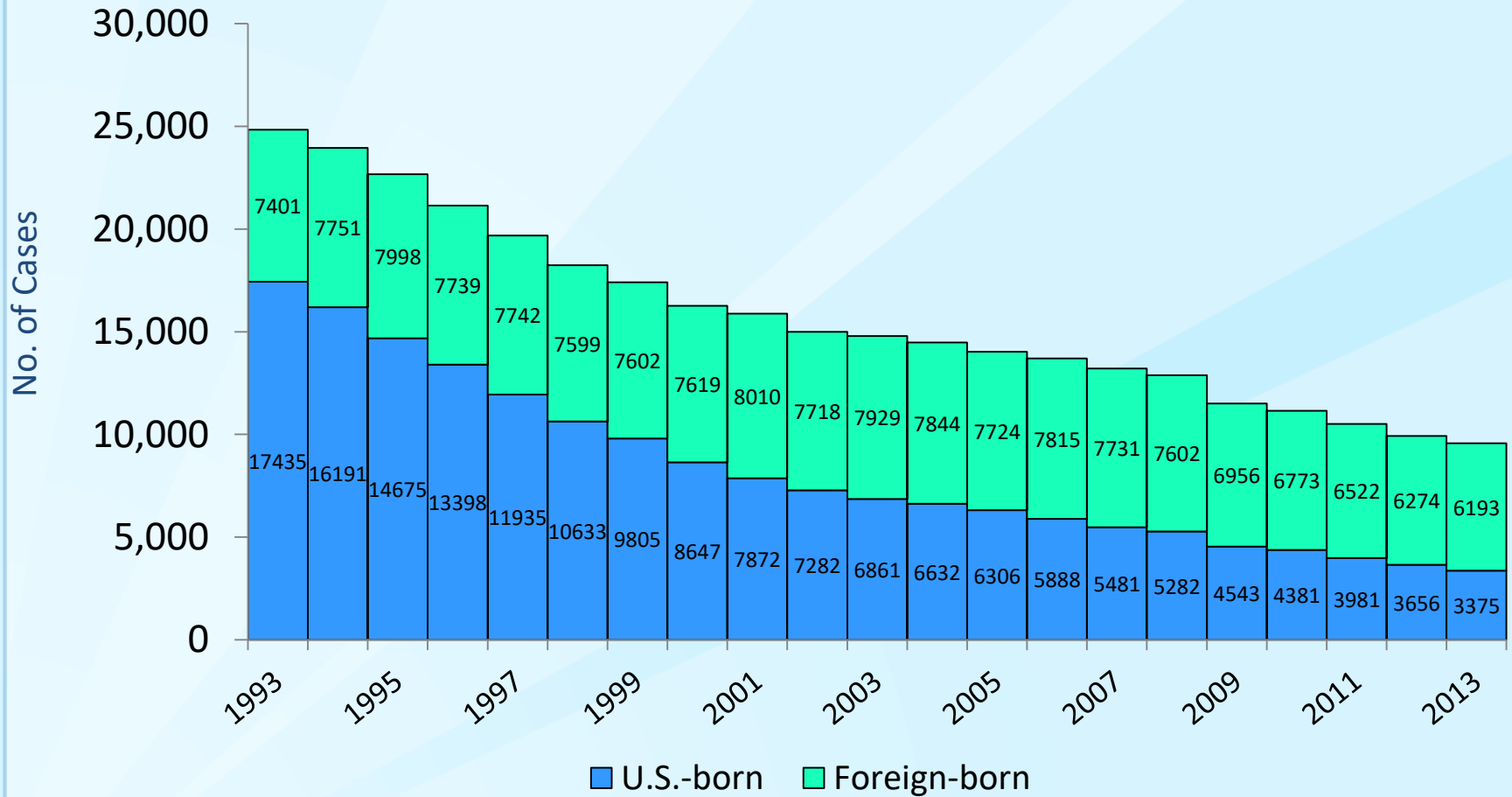
Percentage of Cases



TB Case Rate per 100,000



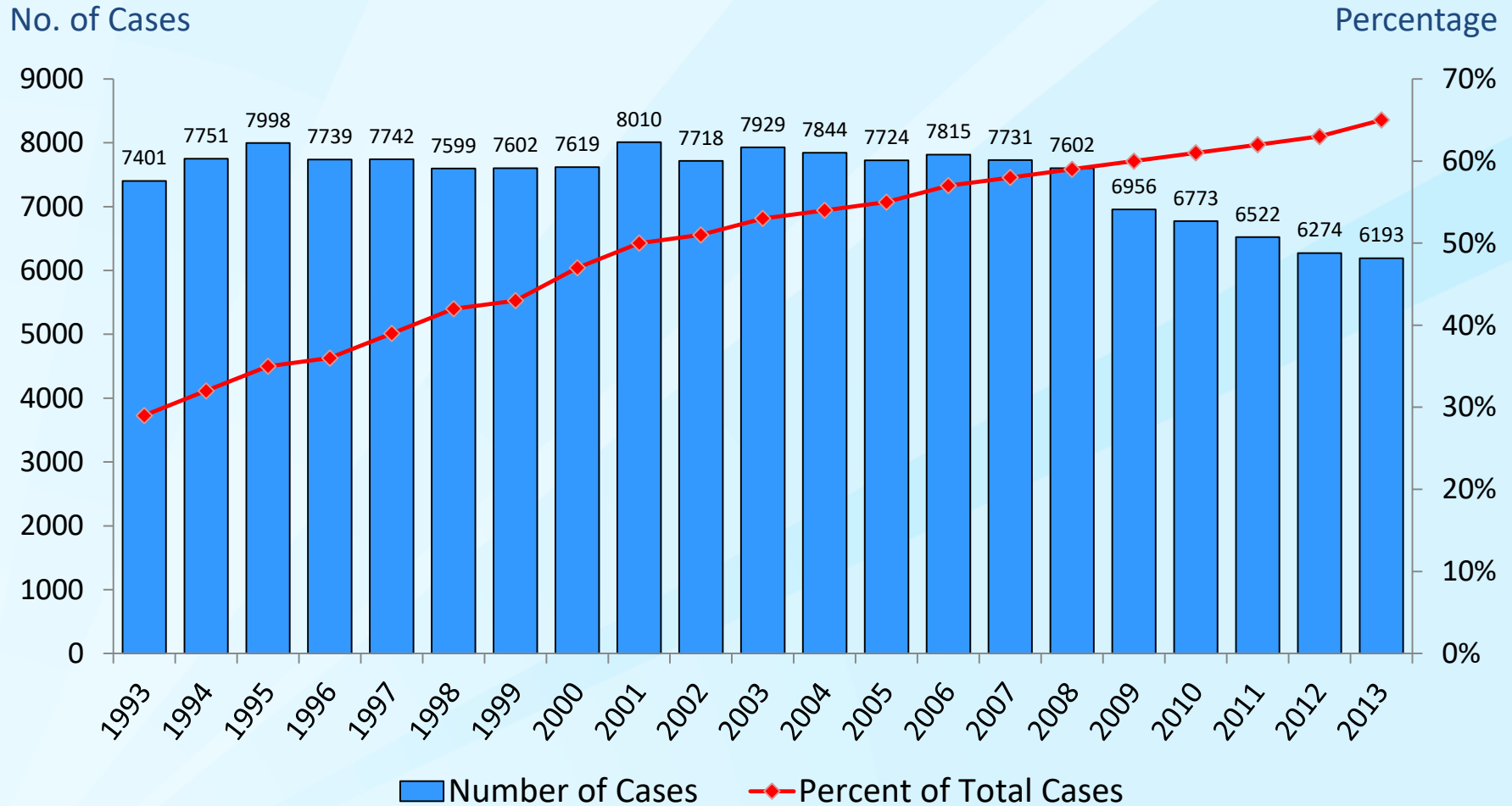
Number of TB Cases in U.S.-born vs. Foreign-born Persons, United States, 1993–2013*



*Updated as of June 11, 2014.



Trends in TB Cases in Foreign-born Persons, United States, 1993 – 2013*

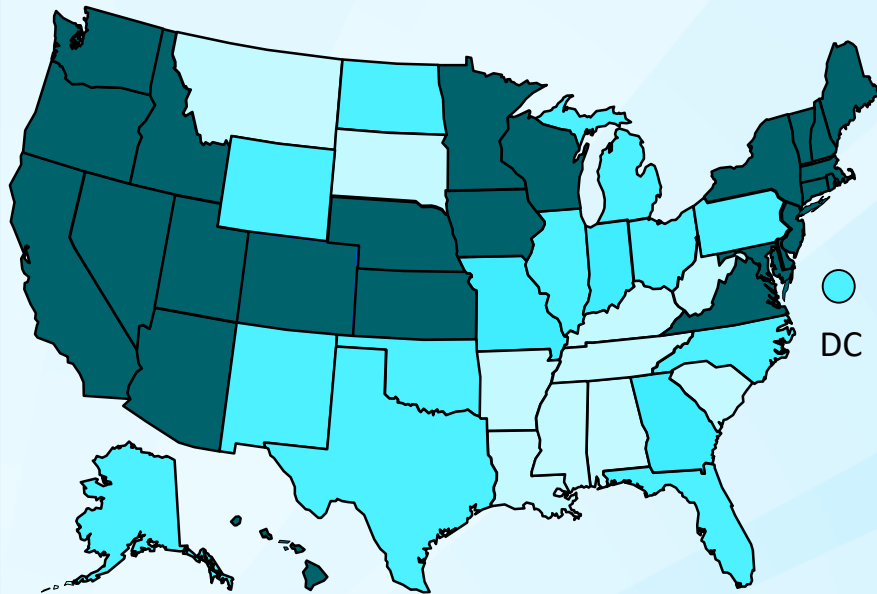


*Updated as of June 11, 2014.

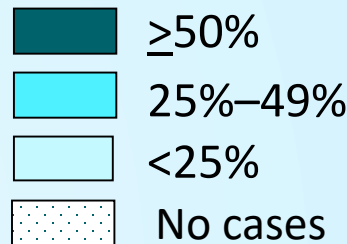
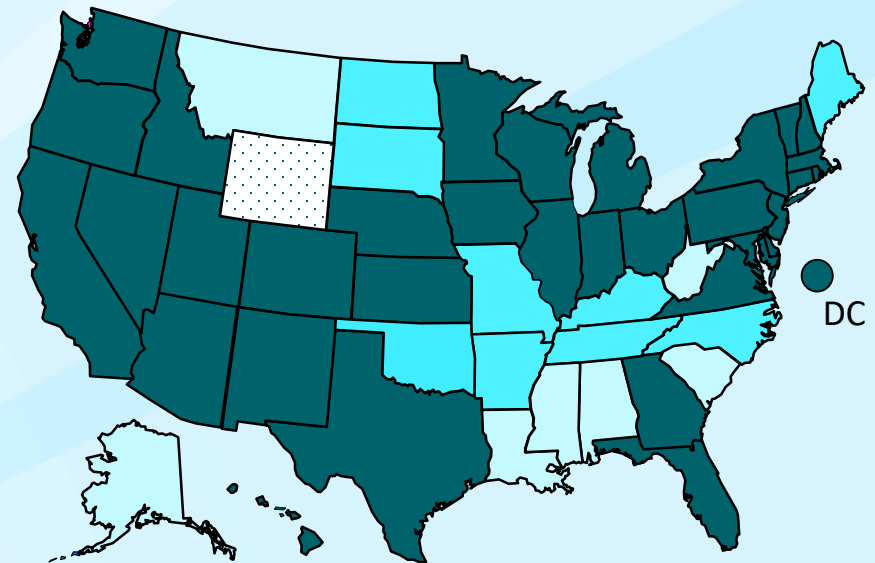


Percentage of TB Cases Among Foreign-born Persons, United States*

2003



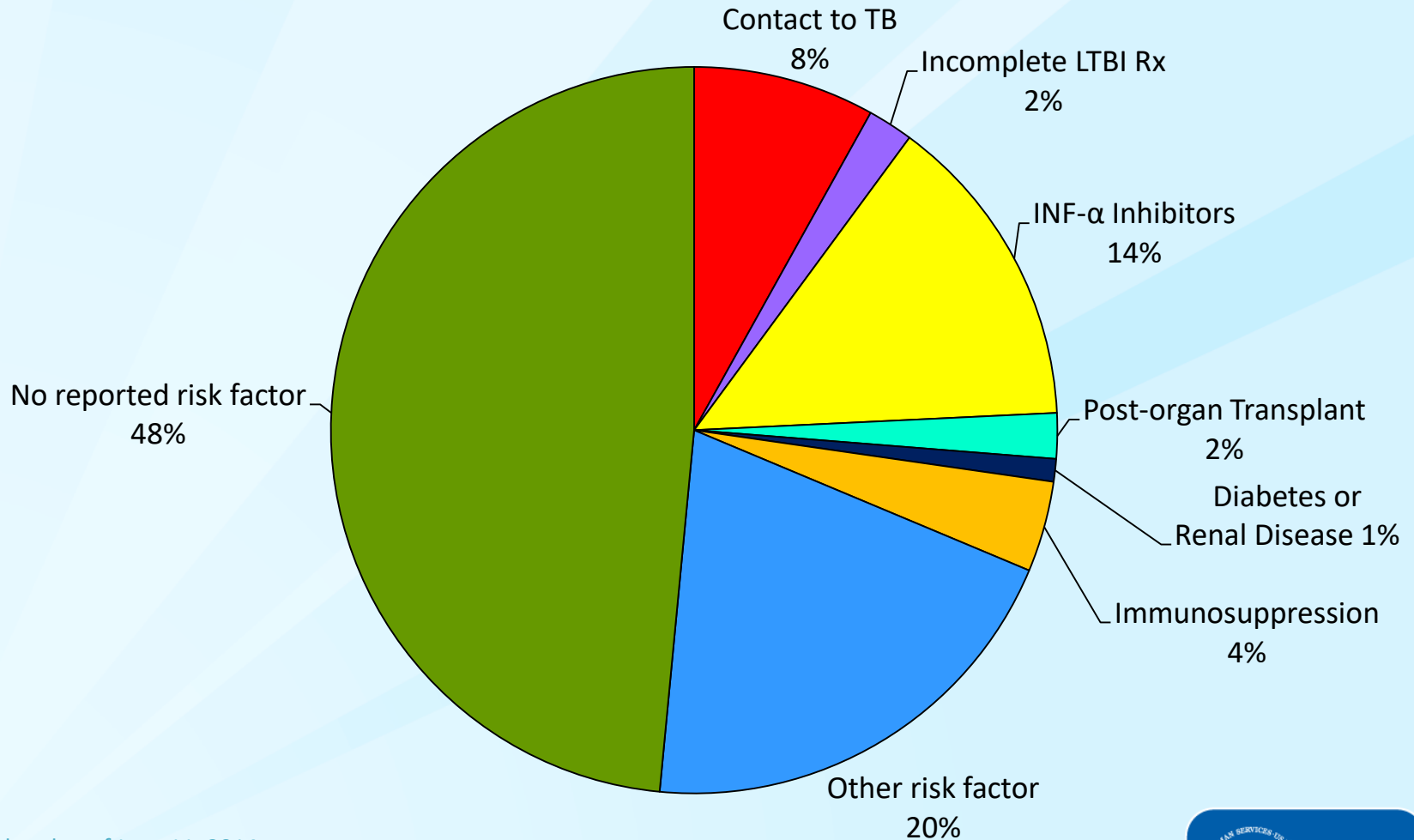
2013



*Updated as of June 11, 2014.



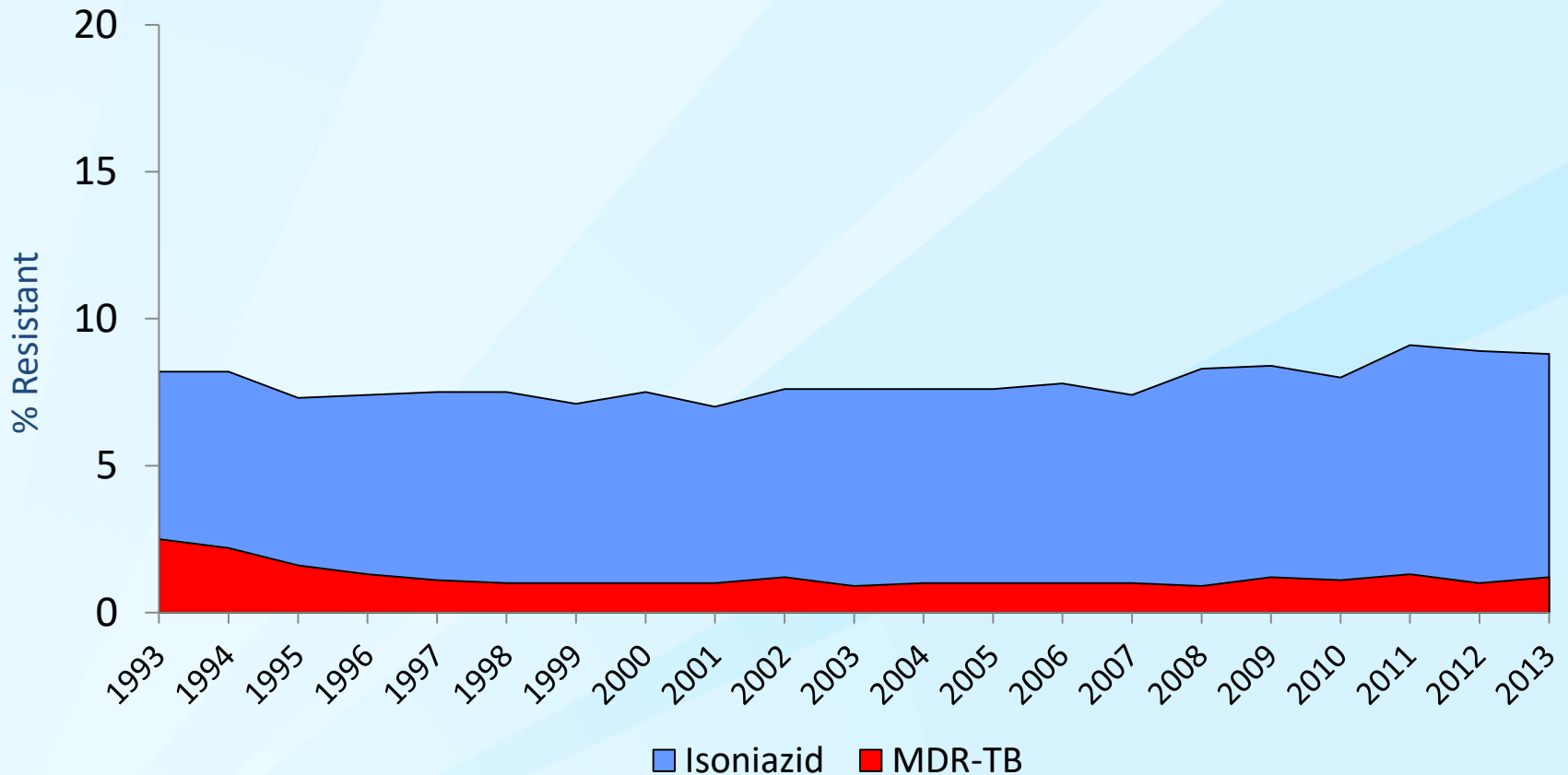
Risk Factors of Reported TB Cases United States, 2013*



*Updated as of June 11, 2014.



Primary Anti-TB Drug Resistance, United States, 1993 – 2013*

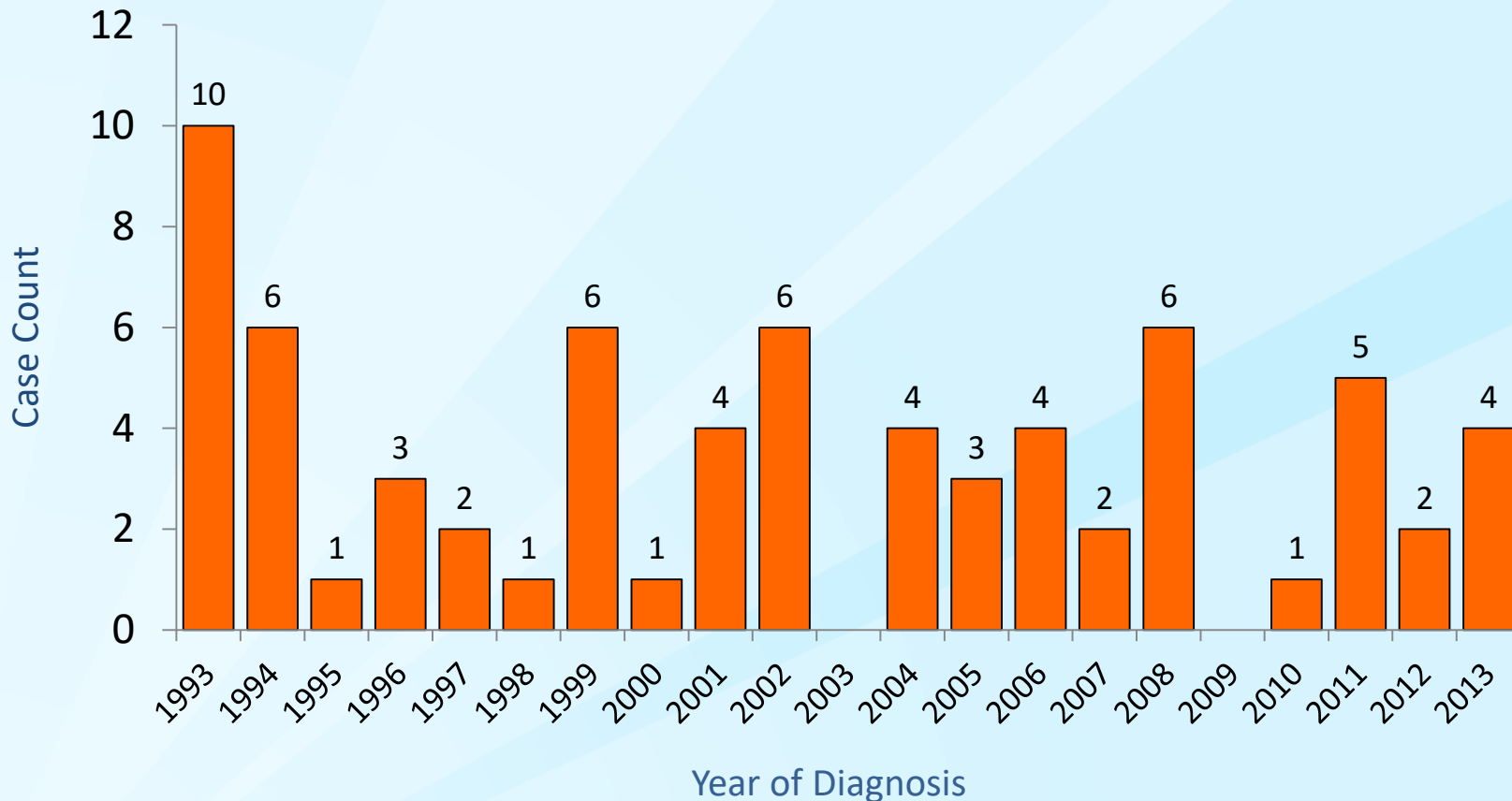


*Updated as of June 11, 2014.

Note: Based on initial isolates from persons with no prior history of TB. Multidrug resistant TB (MDR TB) is defined as resistance to at least isoniazid and rifampin.



XDR TB Case Count Defined on Initial DST* by Year, 1993 – 2013**



* Drug susceptibility test.

** Updated as of June 11, 2014.

Note: Extensively drug-resistant TB (XDR TB) is defined as resistance to isoniazid and rifampin, plus resistance to any fluoroquinolone and at least one of three injectable second-line anti-TB drugs.



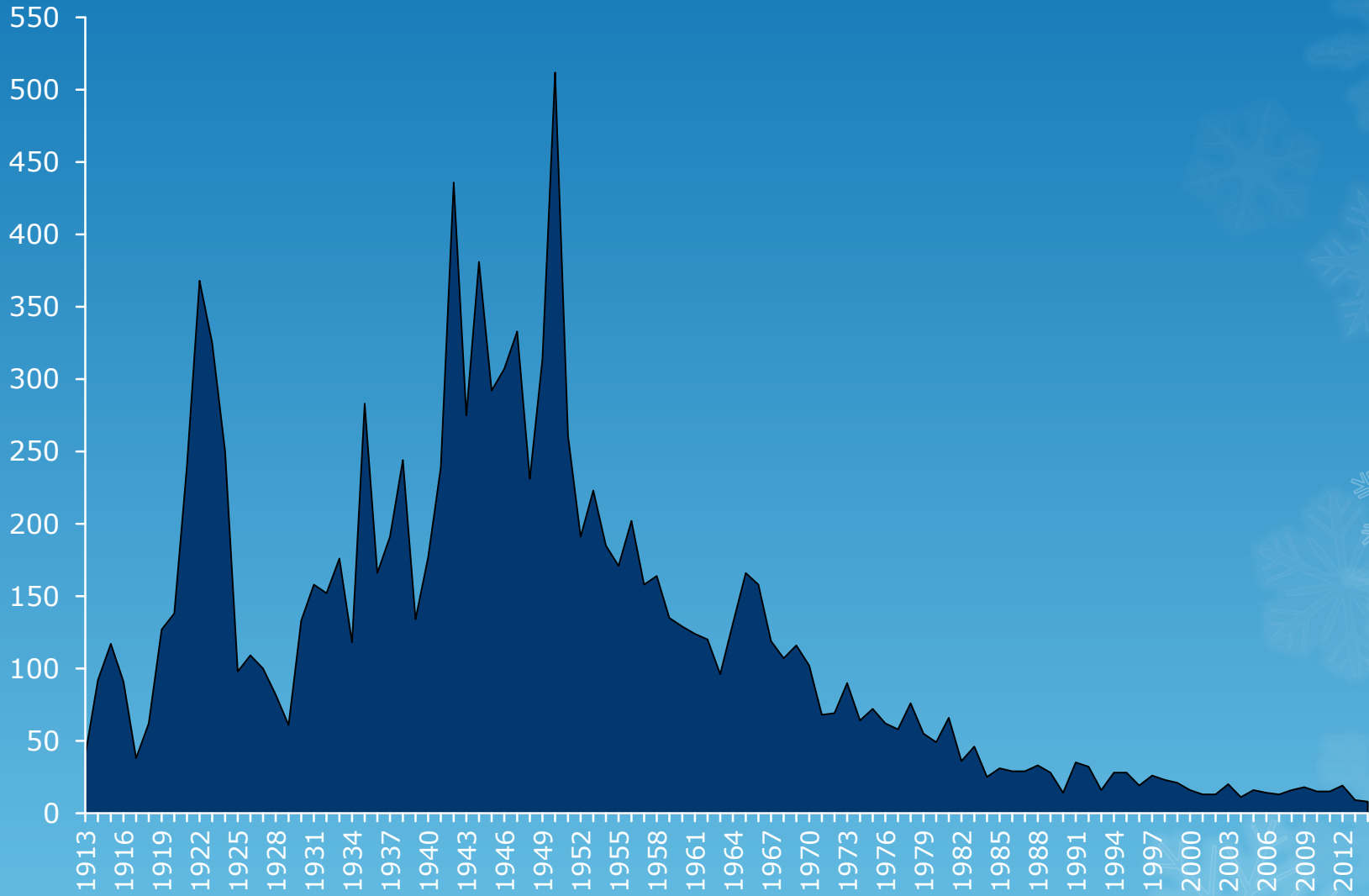
Summary of Epidemiology of TB in the US

- 1) In 2013, the US reported the lowest ever number of TB cases.**
- 2) Since the TB resurgence in 1992, the US has seen consecutive decreases annually for 21 years.**
- 3) TB remains mainly a disease of adults.**
- 4) Drug resistance rates remain low.**
- 5) TB case rates remain highest in foreign-born persons accounting for 65% of all cases.**
- 6) Decreases have been reported across all ages and races but the rate of decline is slowest in foreign-born cases.**
- 7) In 2013, 34 states reported that foreign-born TB case accounted for 50% or more of their cases.**

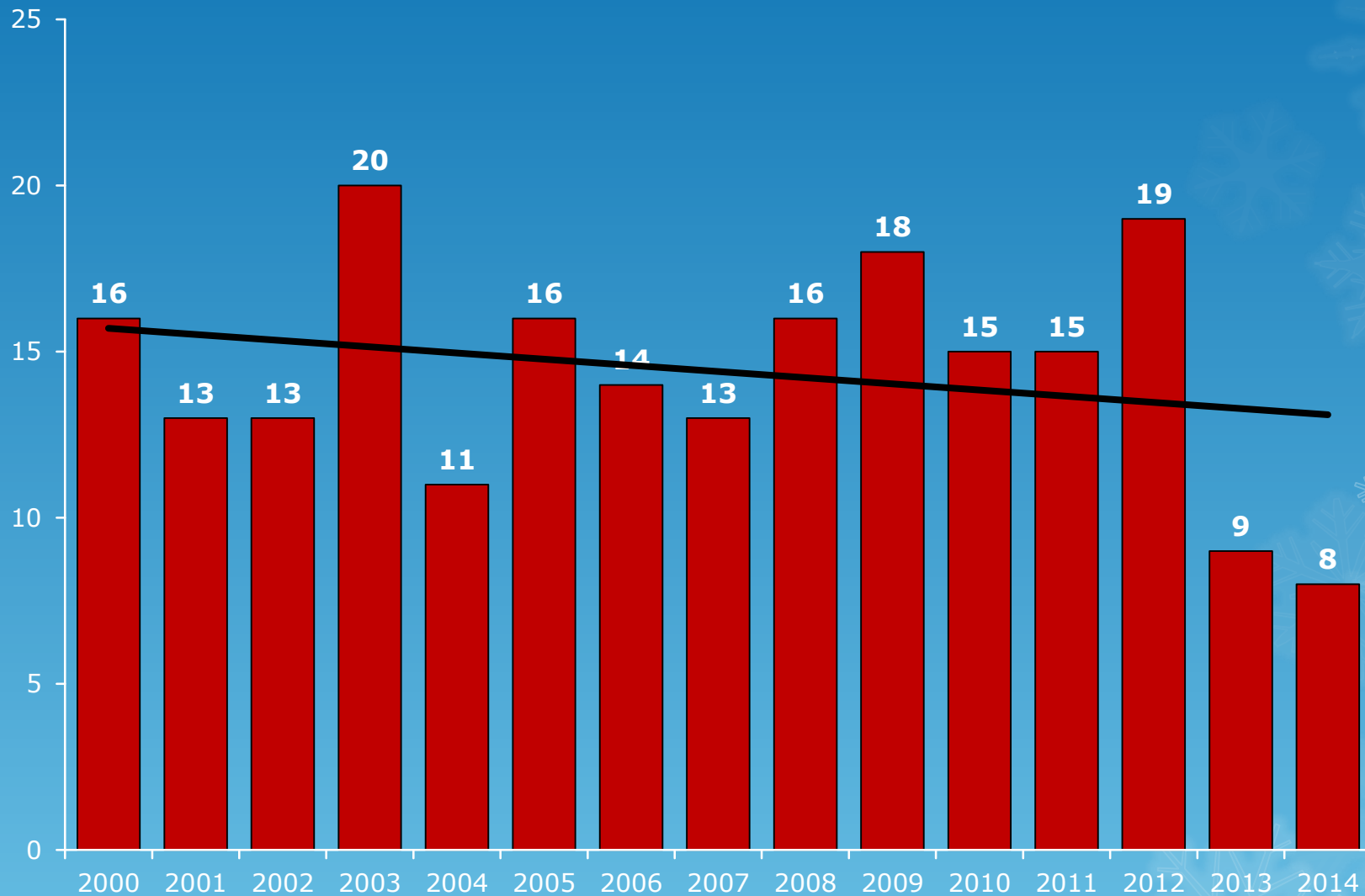
Epidemiology of TB in South Dakota



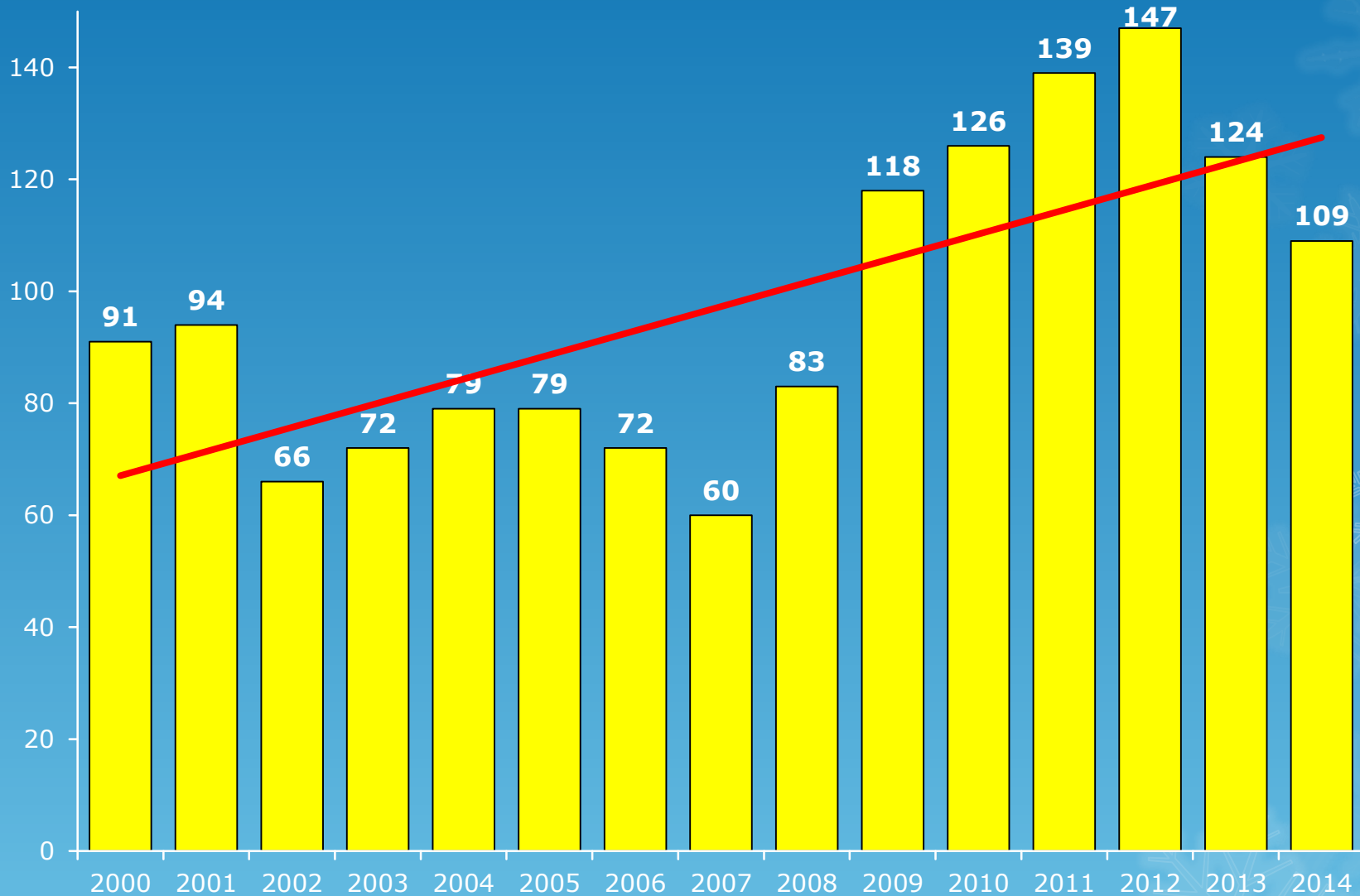
South Dakota TB Cases by Year 1913-2014



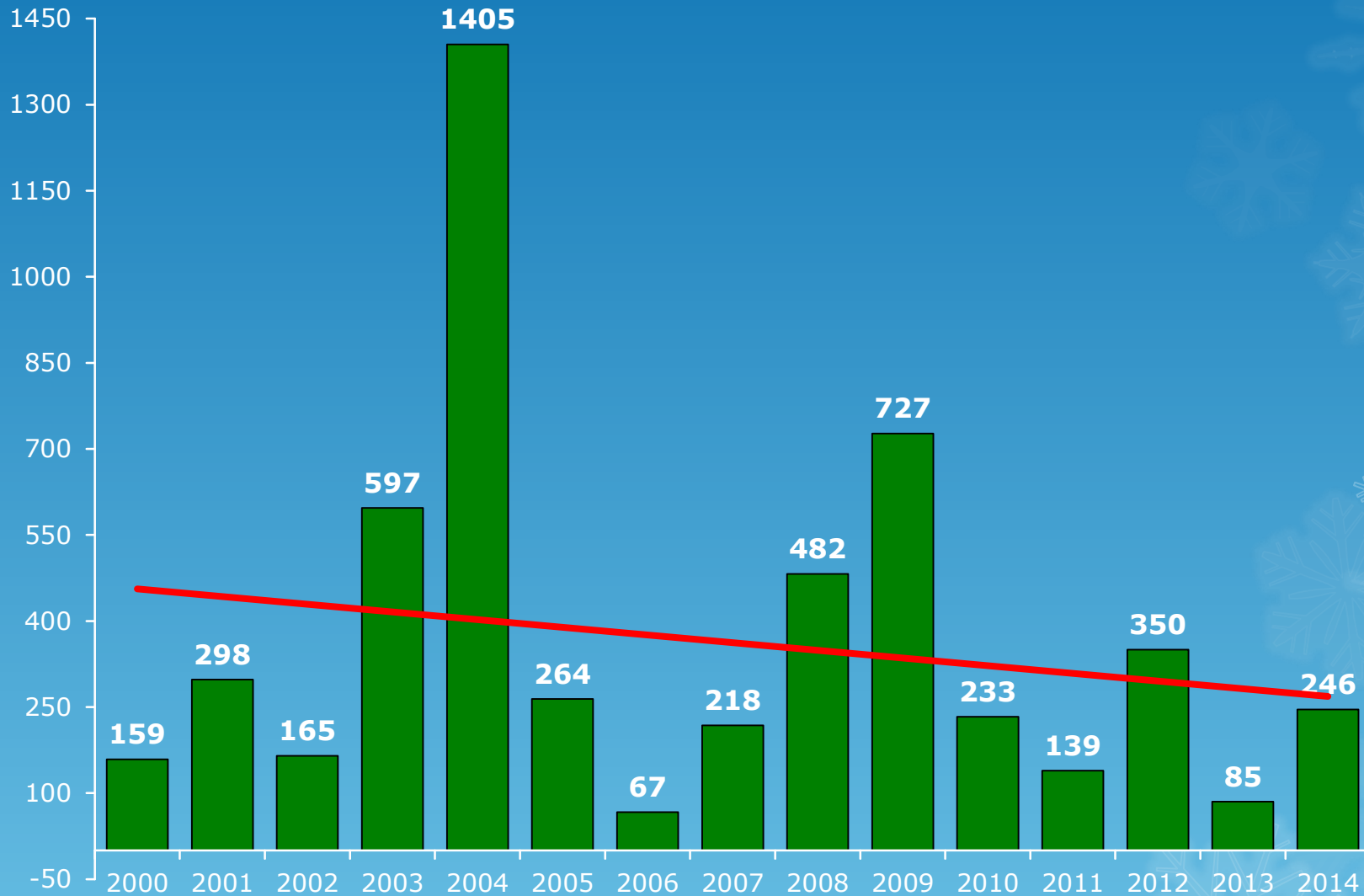
SD TB Cases by Year 2000-2014



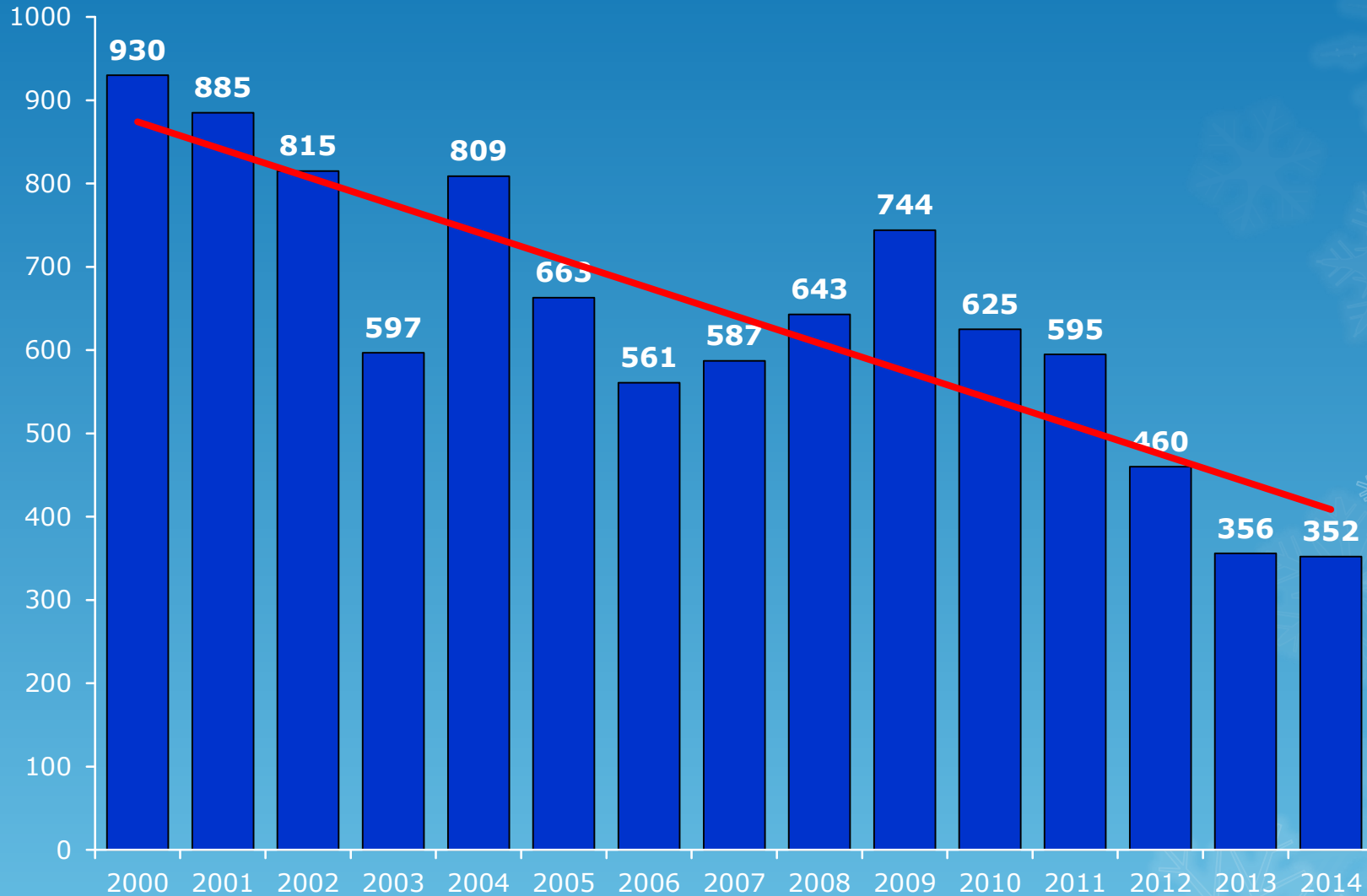
SD TB Suspects by Year 2000-2014



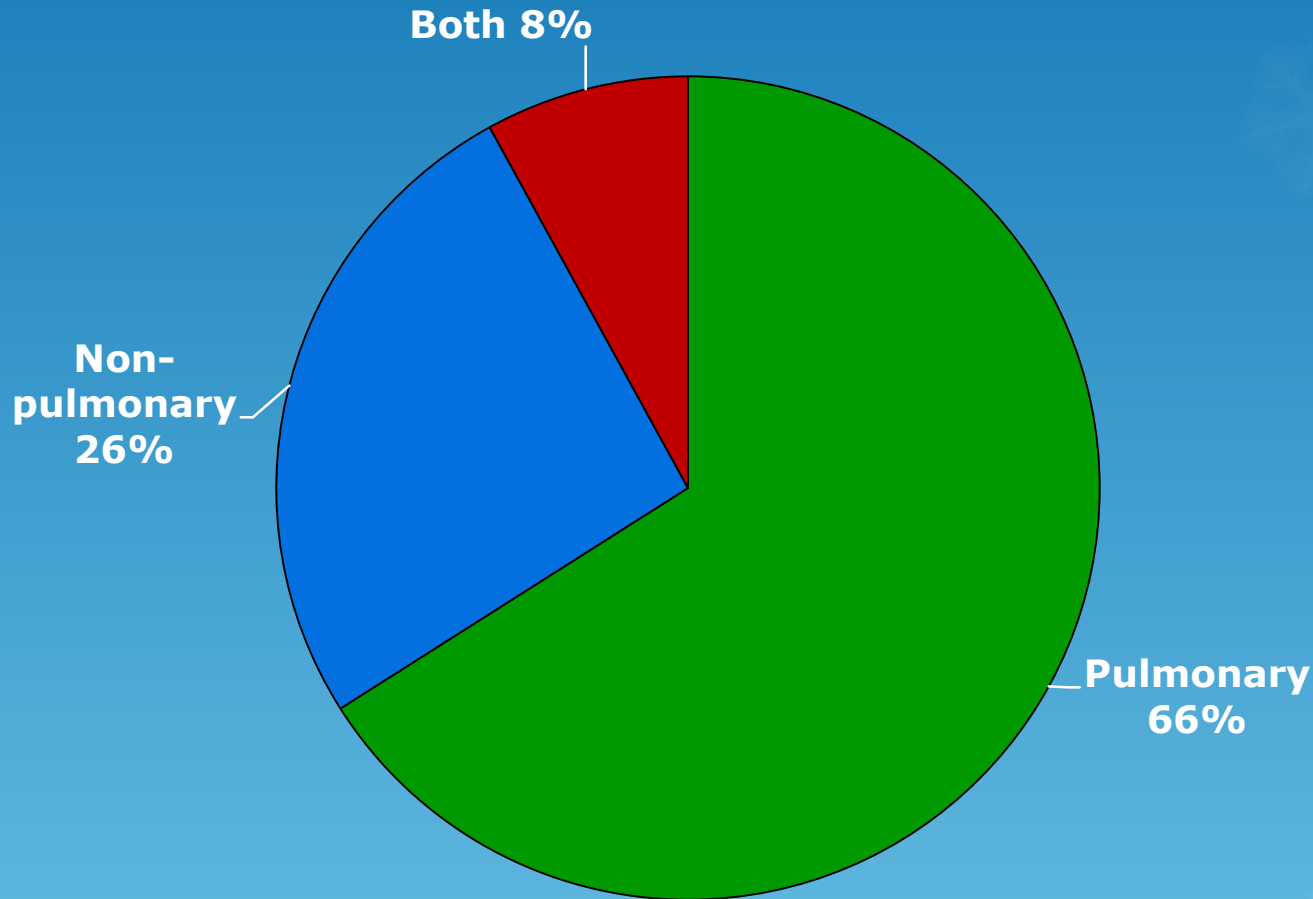
SD TB Contacts by Year 2000-2014



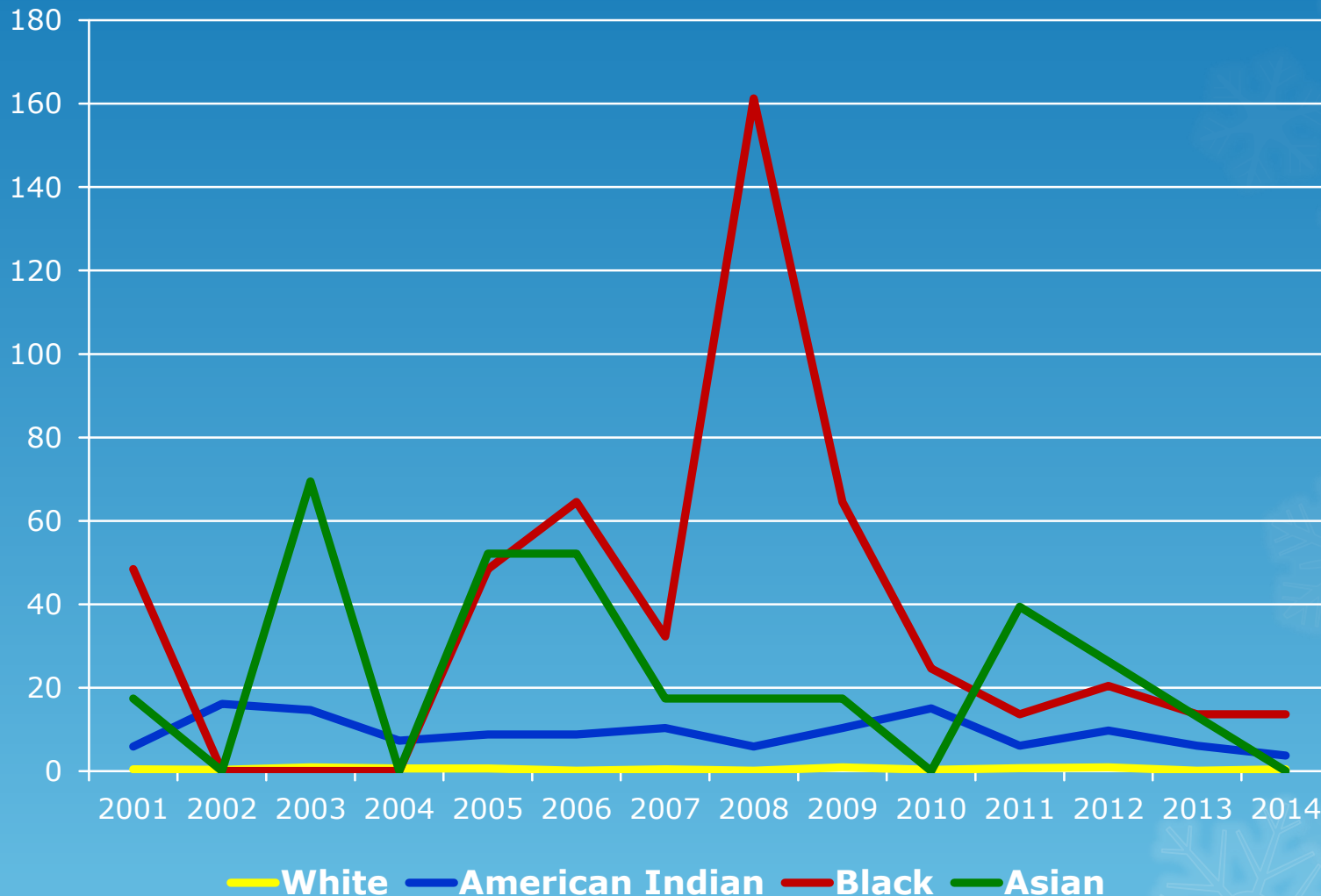
SD Latent TB Infections by Year 2000-2014



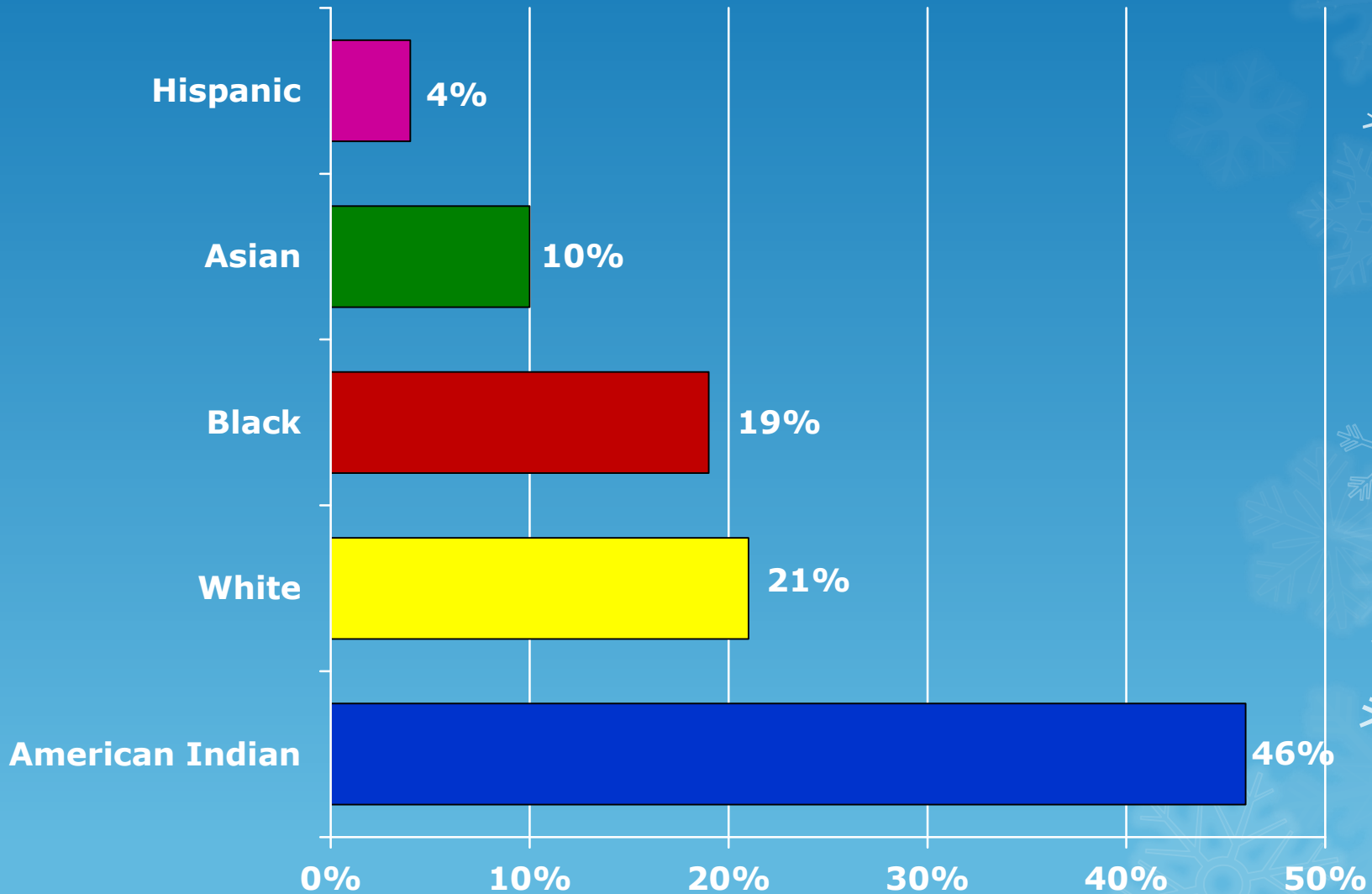
South Dakota TB Cases by Site of Disease, 2001-2014



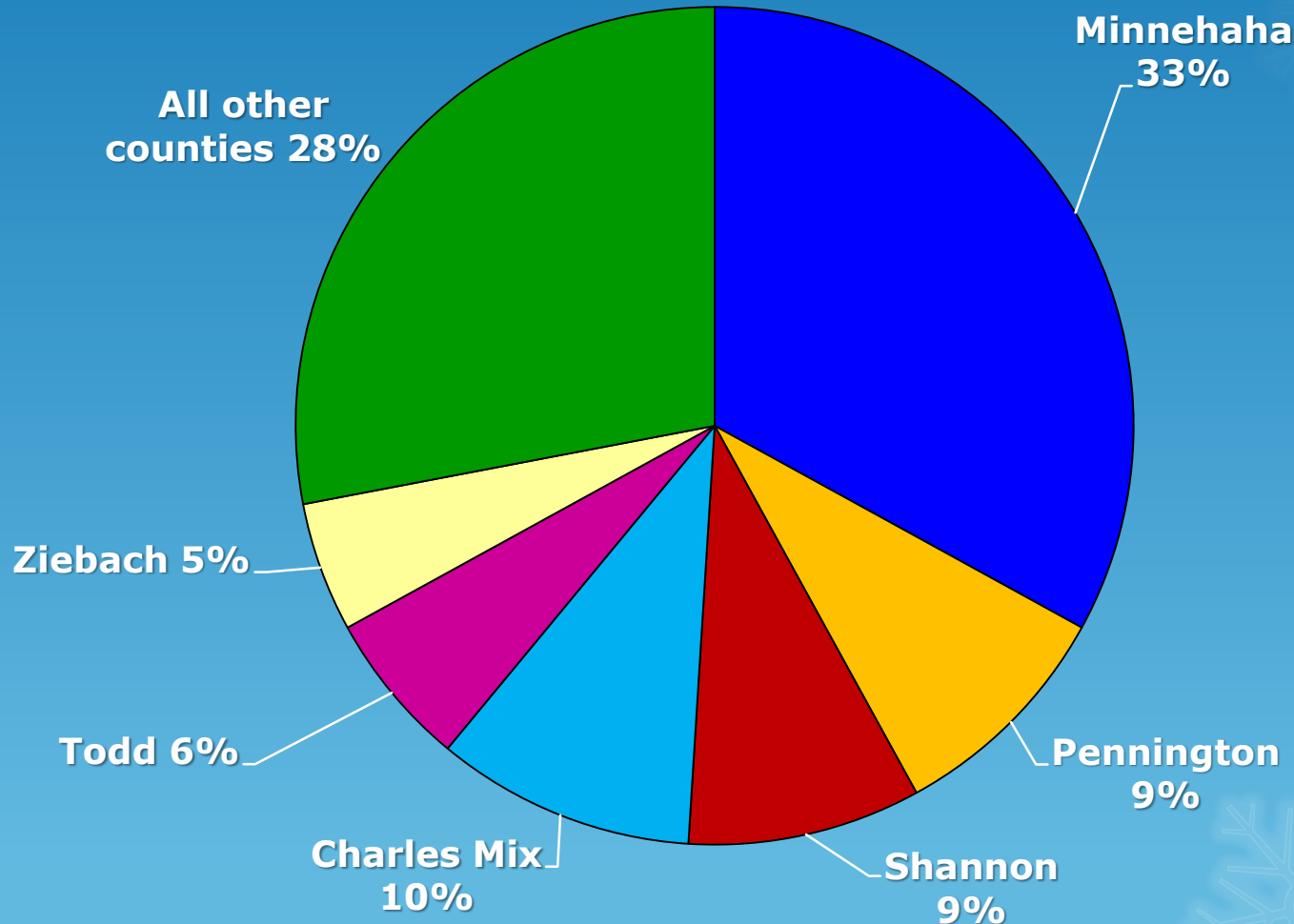
South Dakota TB Case Rates (per 100,000) by Race 2001-2014



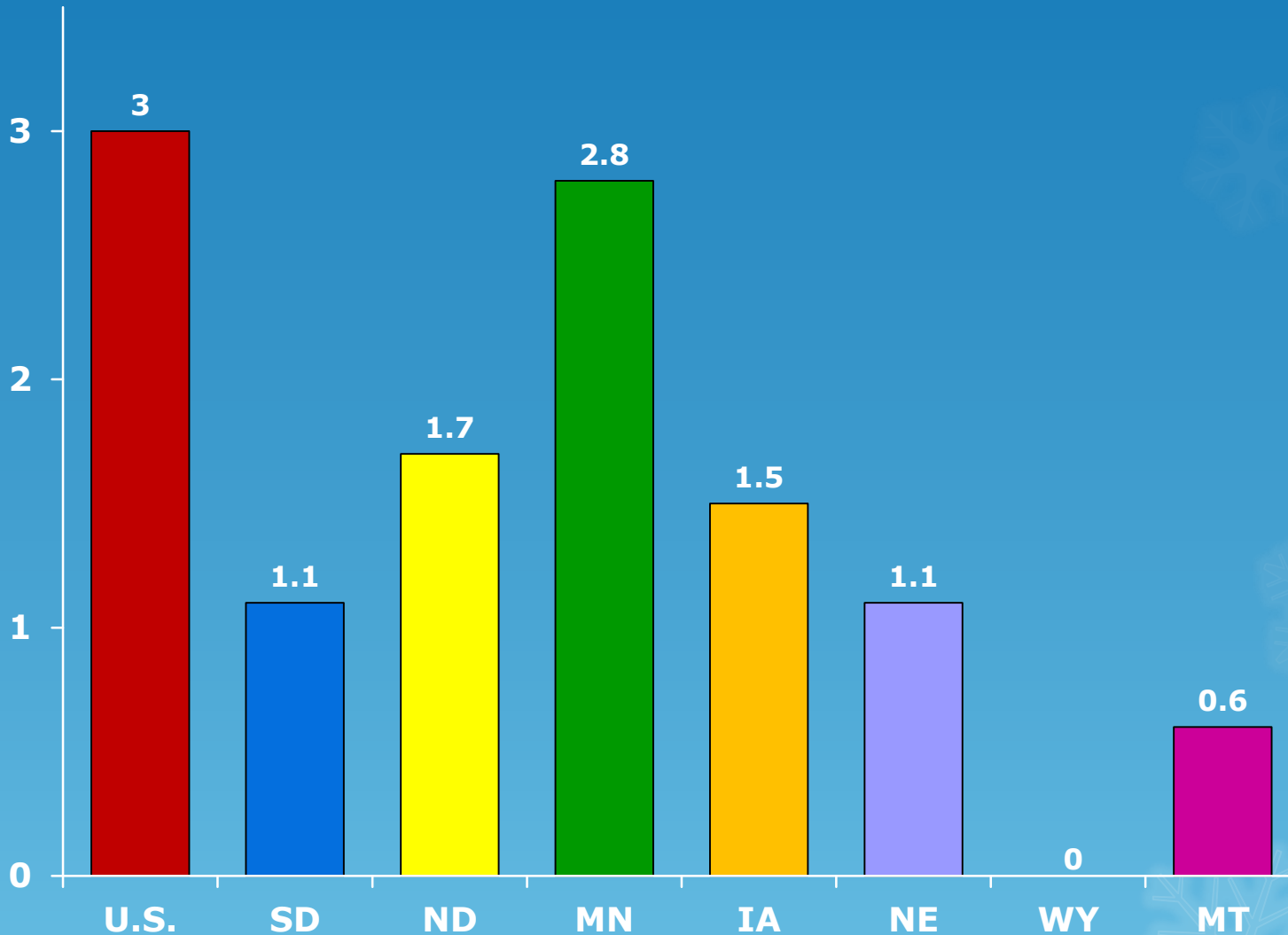
South Dakota TB Cases by Race/Ethnicity, 2001-2014



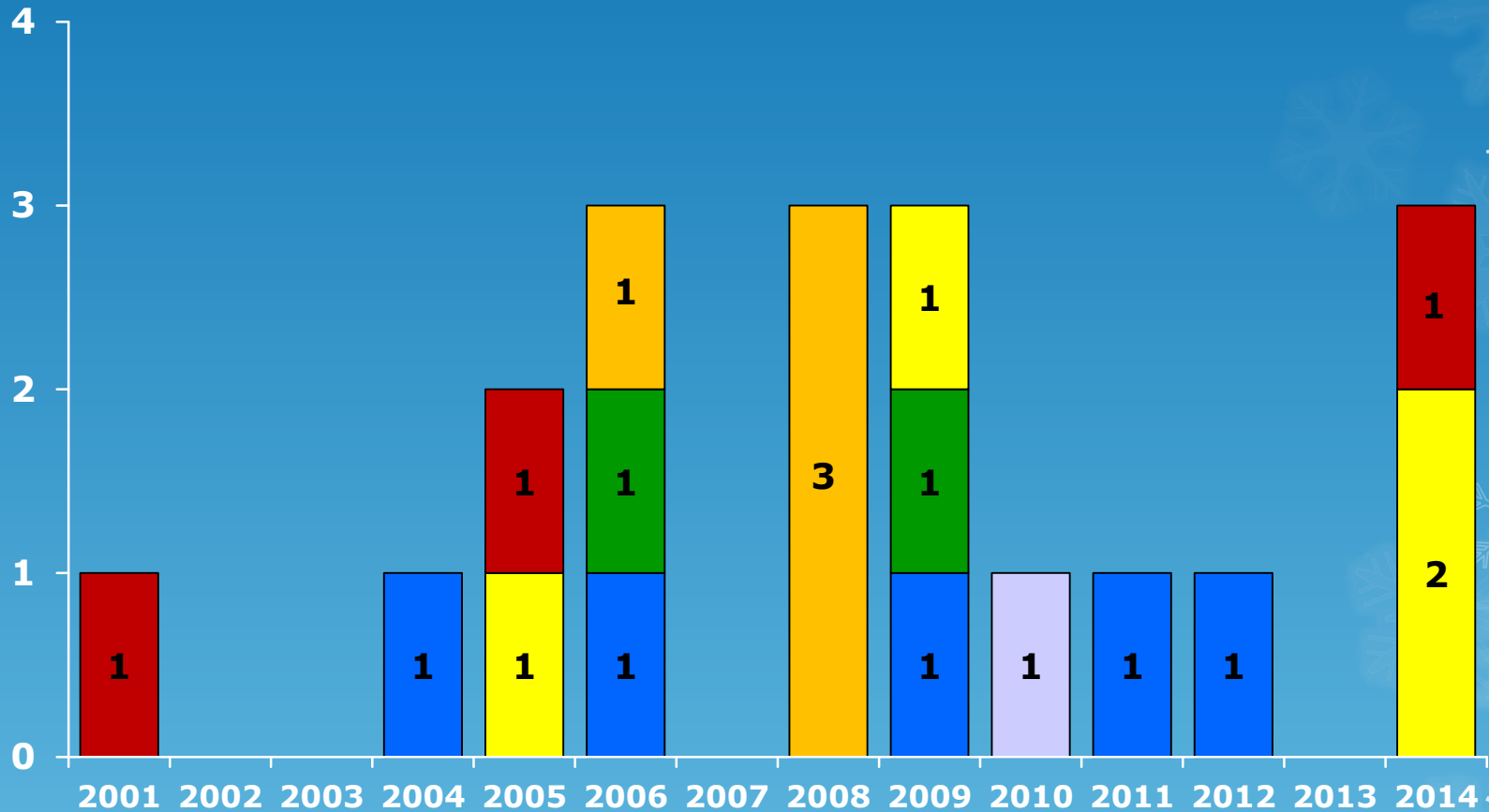
South Dakota TB Cases by County of Residence 2001-2014



TB Case Rates per 100,000 US and Select States, 2013

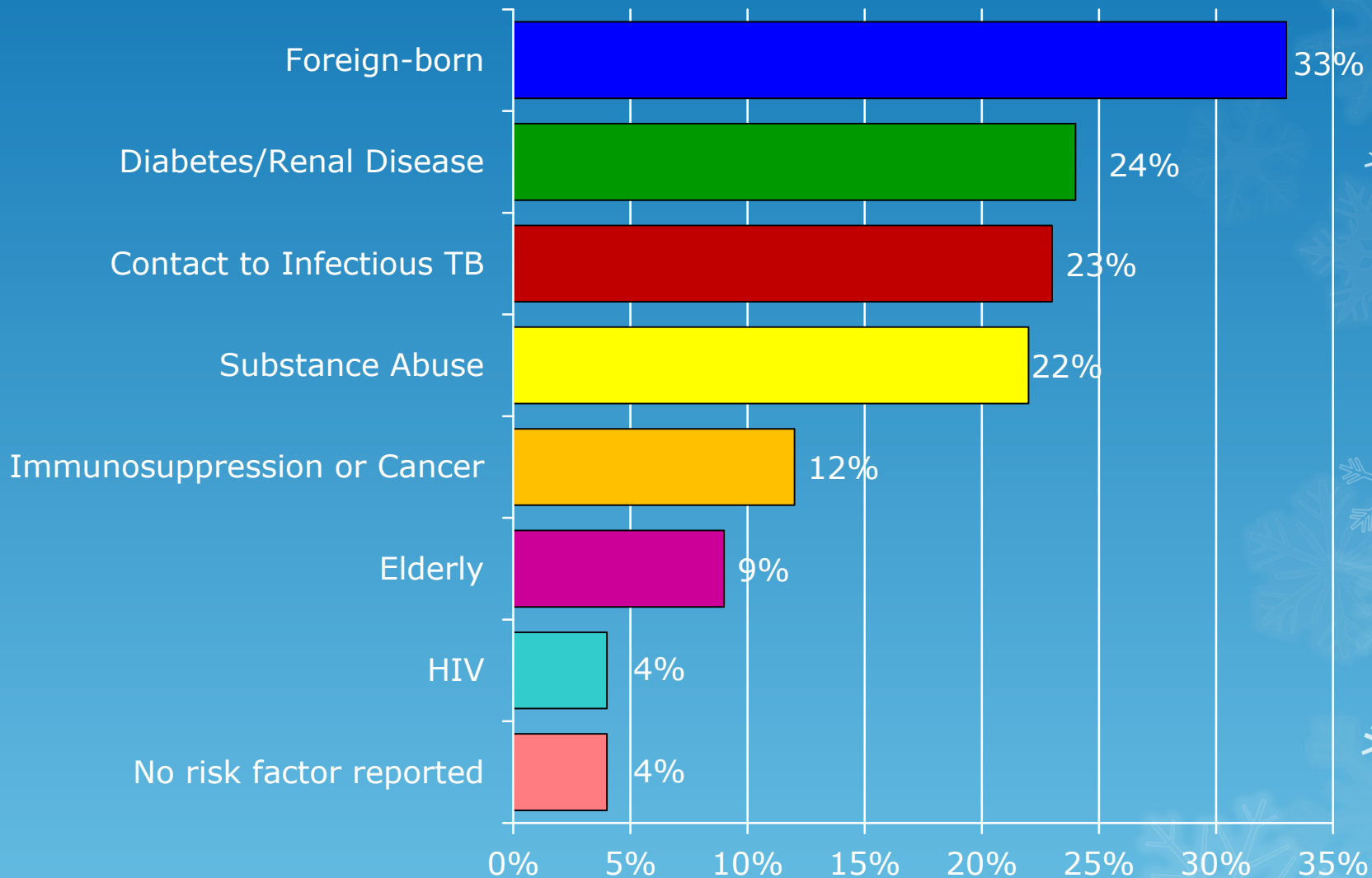


Drug Resistance TB Cases South Dakota, 2001-2014



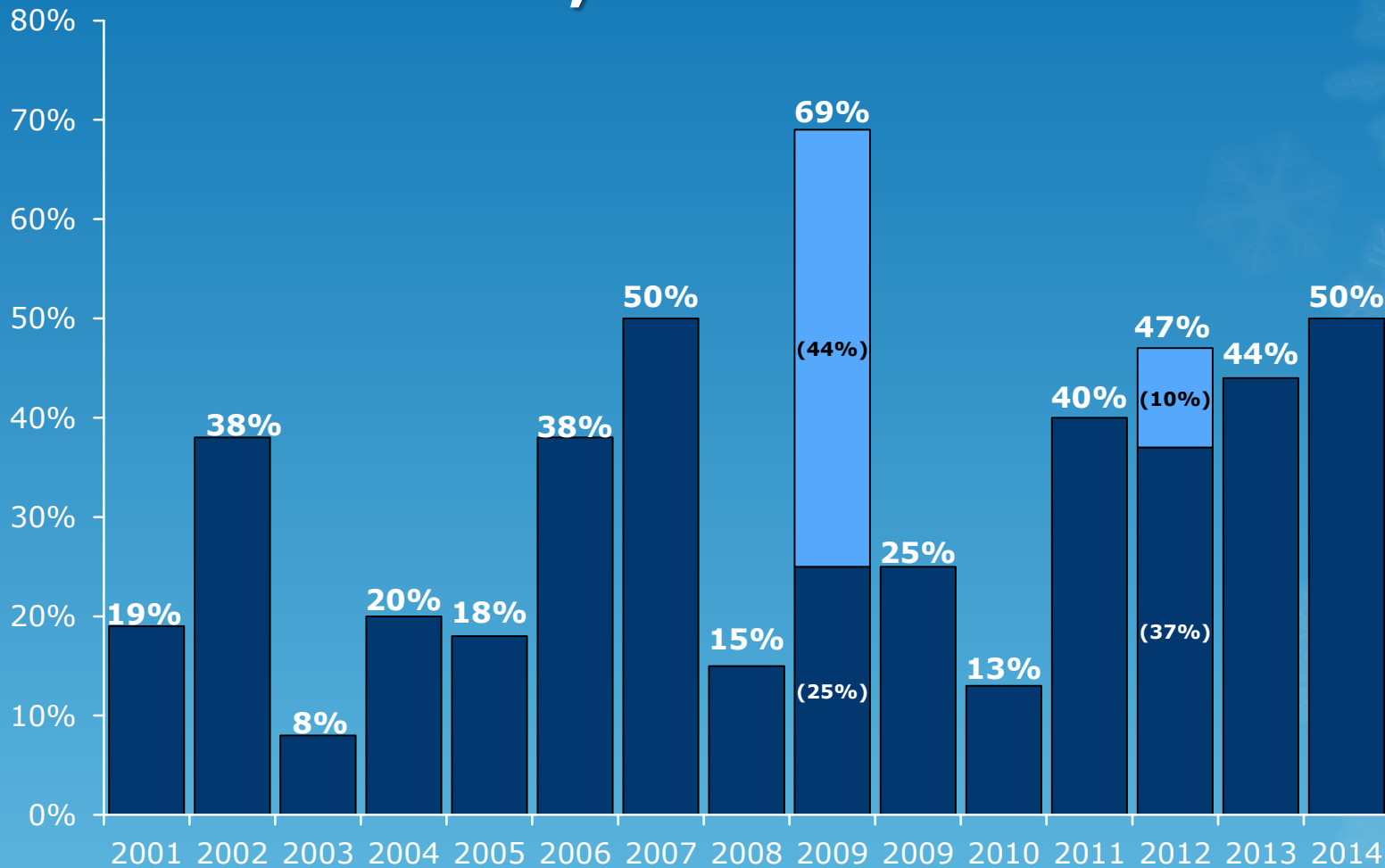
- INH & Streptomycin
- Streptomycin Resistance
- PZA Resistance
- INH & PZA
- Ethambutol Resistance
- INH Resistance

Risk Factors of South Dakota TB Cases, 2001-2014



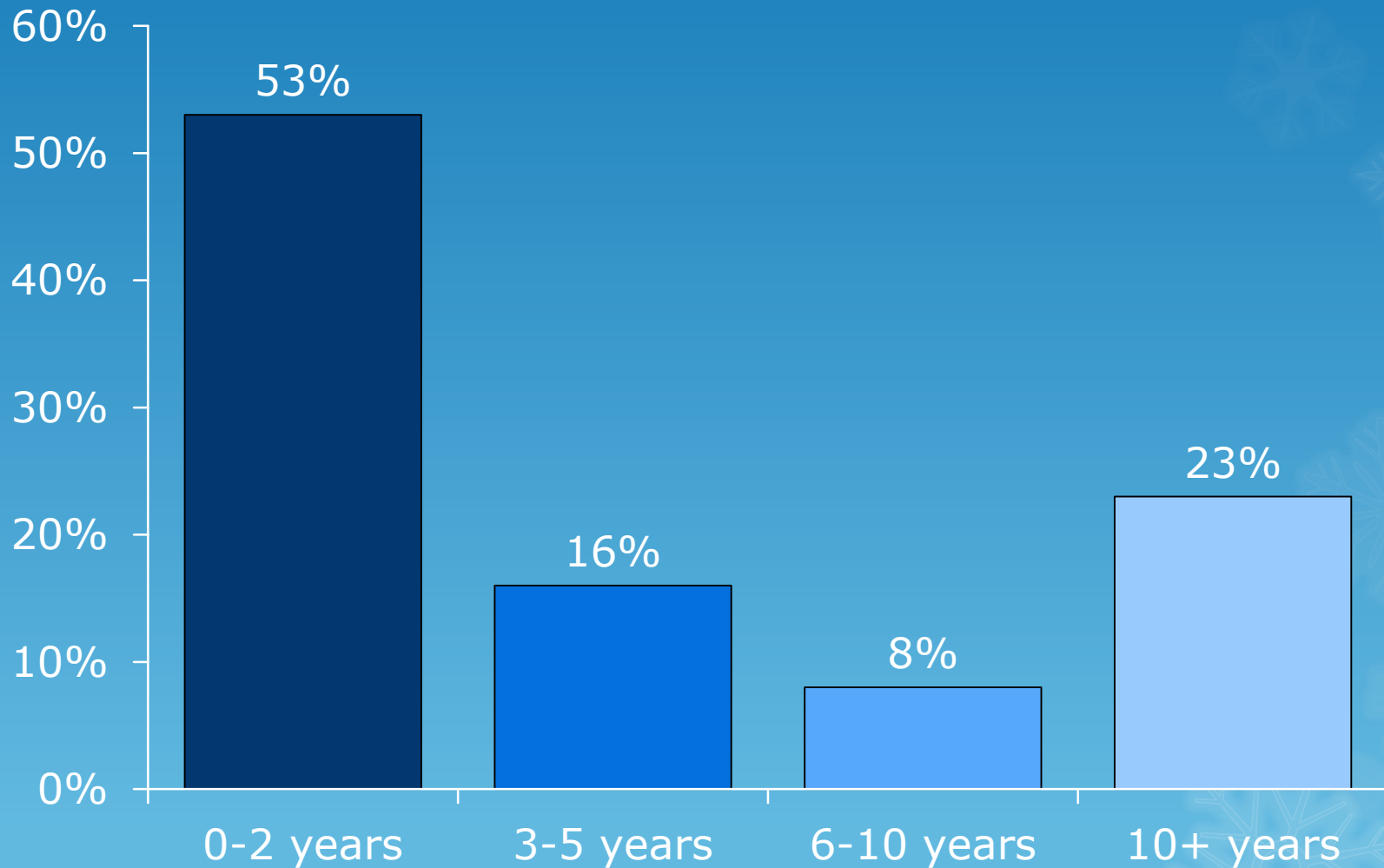
*Some TB patients reported 2 or more risk factors.

South Dakota Foreign-born TB Cases, 2001-2014

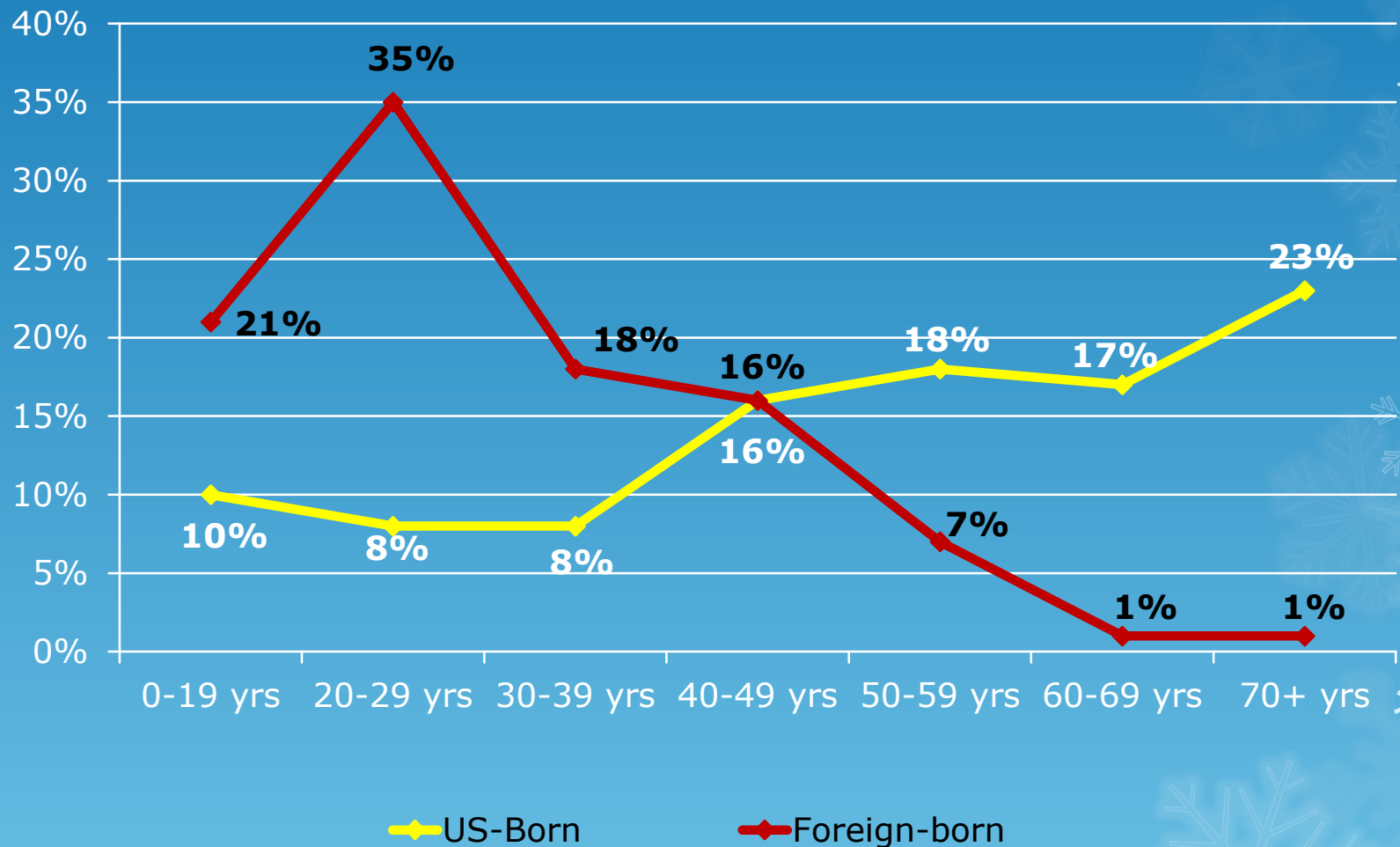


- Second generation TB cases (US-born cases born to foreign-born parents)
- Foreign-born

Number of Years Residence in US Before Diagnosis of TB SD Foreign-born TB, 2001-2014



Age at Diagnosis of US-Born versus Foreign-born TB Cases South Dakota, 2001-2014



Summary of Epidemiology of TB in South Dakota

- 1) In 2014, South Dakota reported the lowest number of TB cases for the 2nd consecutive year.
- 2) The majority of TB cases are reported from Minnehaha, Pennington, Shannon, Todd, Charles Mix and Ziebach counties however an additional 28% of cases are reported from all other counties.
- 3) Drug resistance rates remain low.
- 4) The most common risk factors are diabetes/renal disease, immunosuppression/cancer, substance abuse and contacts to an infectious case.
- 5) In 2014, 50% of the TB cases were reported in foreign-born persons.
- 6) 69% of foreign-born cases develop their disease within 5 years of their arrival in the US.
- 7) Foreign-born TB cases in South Dakota are on average much younger than US-born TB cases.

Review of TB cases with suspected or confirmed *Mycobacterium bovis*

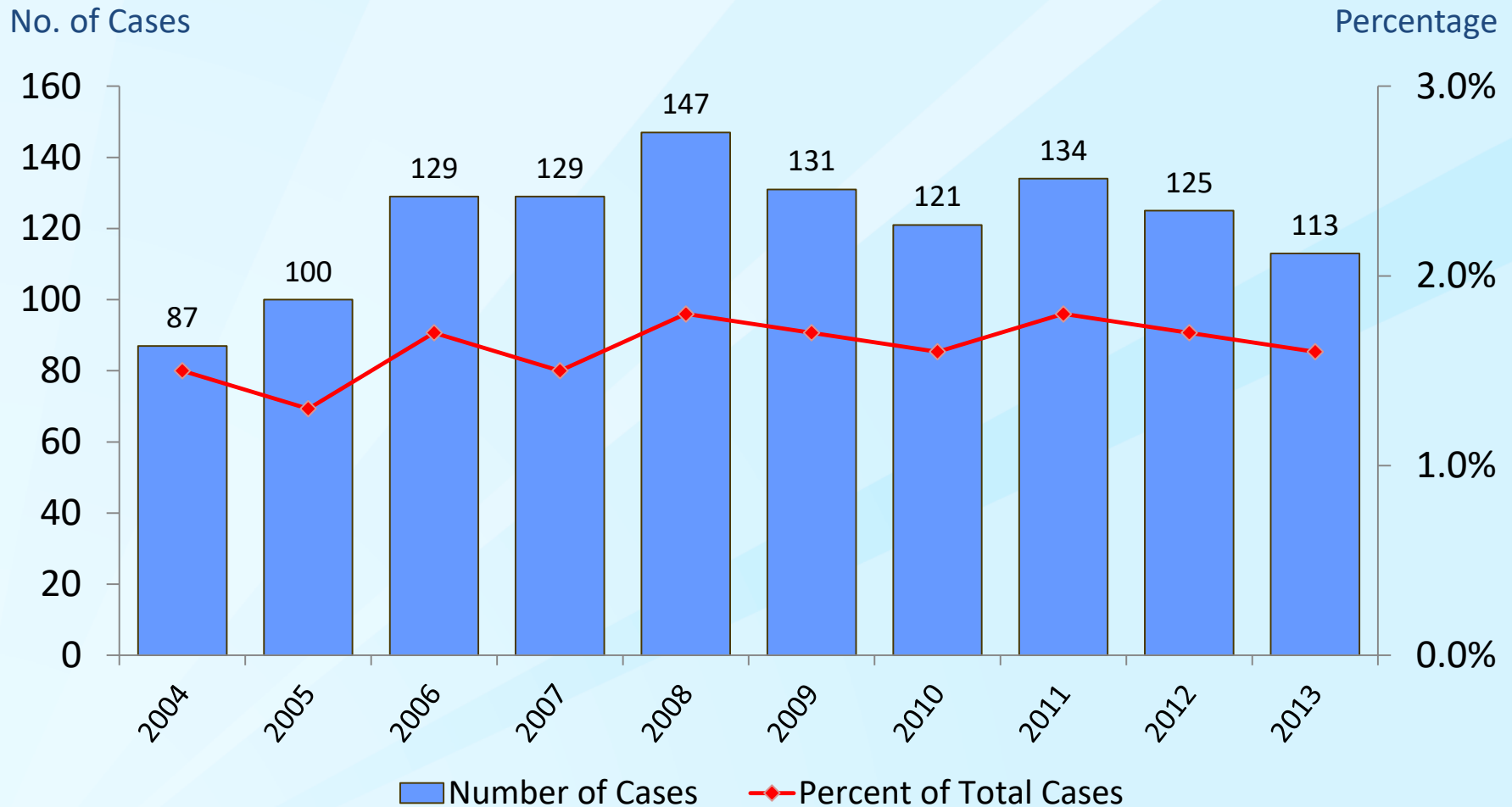


Reasons for *M. bovis* infection in humans

- ❖ Consumption of unpasteurized dairy products (i.e. raw milk, cheese). Considered the most common.
- ❖ Inhalation of airborne bacteria exhaled by infected animals (thought to be rare).
- ❖ Direct contact with a wound (i.e. slaughter of infected animal, hunting).
- ❖ Person-to-person transmission.
- ❖ Disseminated disease from BCG vaccine.

**** *M. bovis* disease in humans is reported as a case of tuberculosis to CDC.**

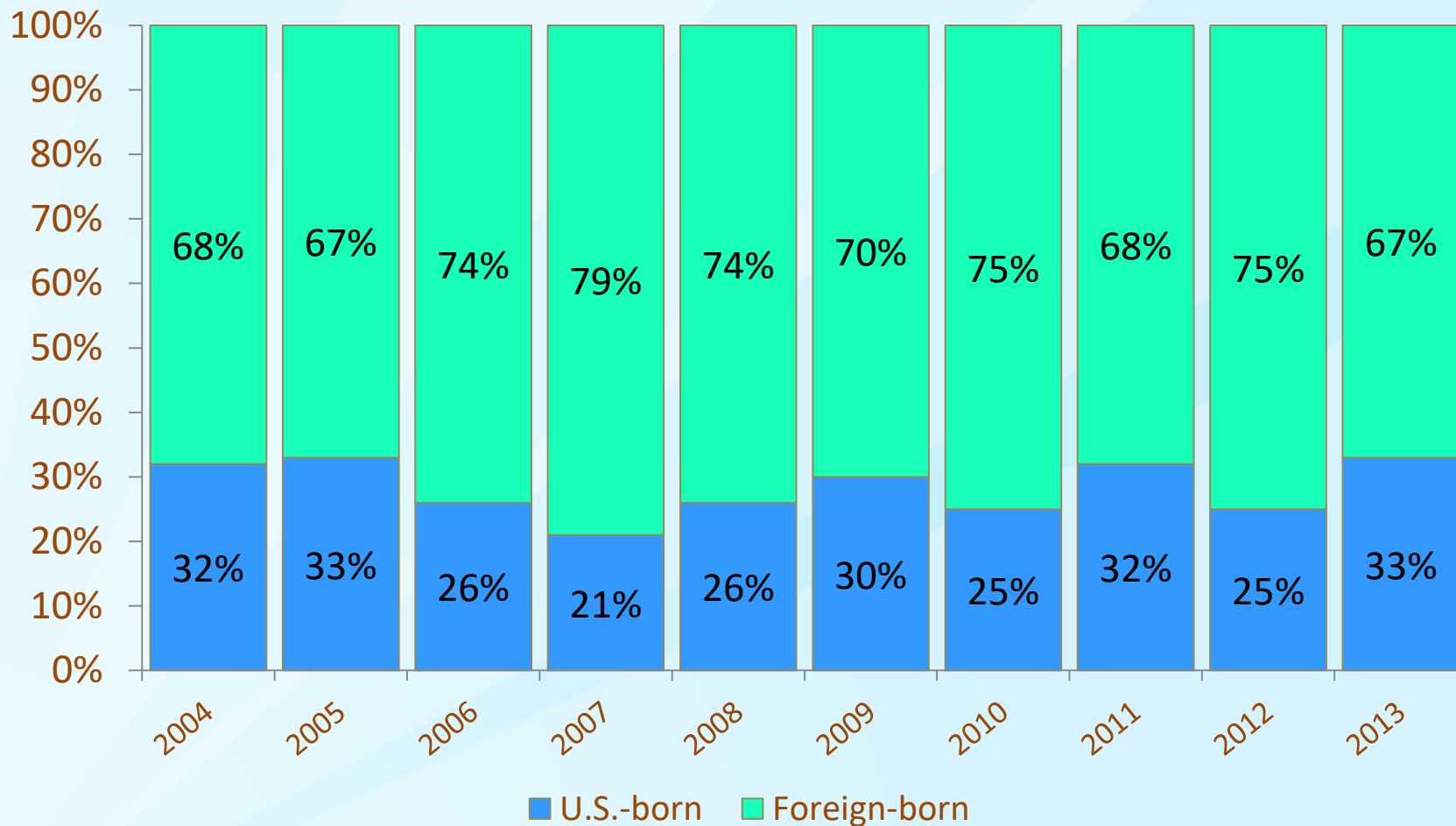
Genotyped TB Cases with *Mycobacterium bovis*, United States, 2004 – 2013*



*Updated as of June 11, 2014.



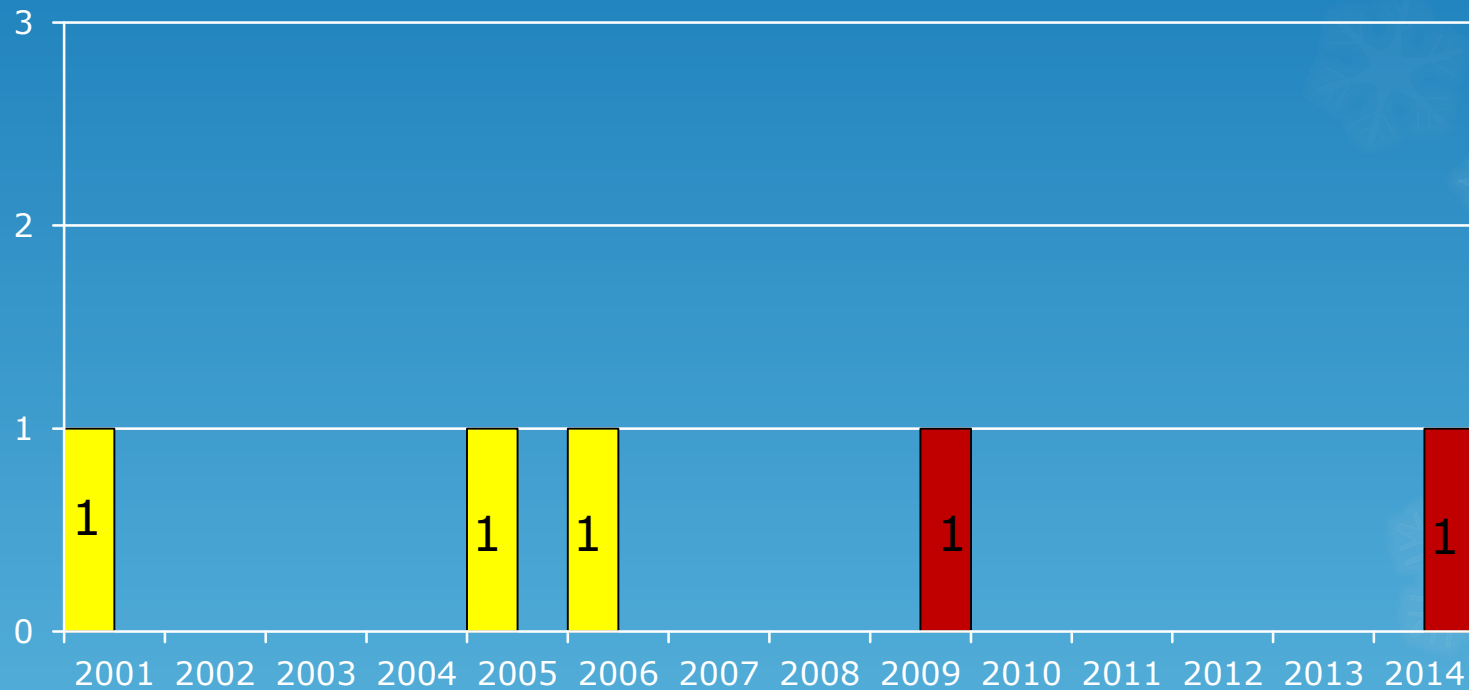
Genotyped TB Cases with *Mycobacterium bovis* by Country of Birth, United States, 2004 – 2013*



*Updated as of June 11, 2014.



Suspected and Confirmed *Mycobacterium bovis* TB Cases South Dakota, 2001-2014



■ Suspected M. bovis ■ Confirmed M. bovis







Review of SD *M. bovis* TB Cases



2001 TB Case

- ❖ 45 y/o American Indian male, US-born
- ❖ Pulmonary disease
- ❖ Resistant to INH & PZA
- ❖ Reported exposure to his sister 28 years before

2005 TB Case

- ❖ 27 y/o black male, foreign-born (Somalia)
 - ❖ Entered US within 1 year of diagnosis
 - ❖ Pulmonary disease
 - ❖ Resistant to INH & PZA
- 
- 
- 
- 
- 
- 

2006 TB Case

- ❖ **35 y/o black male, foreign-born (Ethiopia), HIV+**
- ❖ **Entered the US within 1 year of diagnosis**
- ❖ **Non-pulmonary disease (spinal TB)**
- ❖ **Resistant to PZA**

2009 TB Case

- ❖ **49 y/o white male, US-born**
- ❖ **Pulmonary disease**
- ❖ **Resistant to PZA - Confirmed *M. bovis* by CDC laboratory**
- ❖ **Travel history to Mexico within the last 1-2 years with consumption of unpasteurized cheese**

2014 TB Case

- ❖ **77 y/o white male, reported after death**
- ❖ **Non-pulmonary disease (renal)**
- ❖ **INH & PZA resistant – Confirmed *M. bovis* by SD State Lab**
- ❖ **Bladder cancer patient receiving BCG treatment**
- ❖ **Suspected disseminated *M. bovis* from BCG**



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