

## Tuberculosis in the United States

### National Tuberculosis Surveillance System Highlights from 2008

**Slide 1 (title slide). Tuberculosis in the United States—National Tuberculosis Surveillance System, Highlights from 2008.** This slide set was prepared by the Division of Tuberculosis Elimination, Centers for Disease Control and Prevention (CDC), Department of Health and Human Services (DHHS). It provides trends for the recent past and highlights from data collected through the National Tuberculosis Surveillance System for 2008. Since 1953, through the cooperation of state and local health departments, CDC has collected information on the newly reported cases of tuberculosis (TB) disease in the United States. The data presented here were primarily collected via the expanded TB case report introduced in 1993. Currently, each individual TB case report (Report of Verified Case of Tuberculosis, or RVCT) is submitted electronically to CDC. The data for this slide set are based on updates received by CDC as of May 20, 2009. All case counts and rates for years 1993–2007 have been updated.

**Slide 2. Reported TB Cases, United States, 1982–2008.** The resurgence of TB in the mid-1980s was marked by several years of increasing case counts until its peak in 1992. Case counts began decreasing again in 1993, and 2008 marked the sixteenth year of decline in the total number of TB cases reported in the United States since the peak of the resurgence. From 1992 until 2002, the total number of TB cases decreased 5%–7% annually. From 2002 to 2003, however, the total number of TB cases decreased by only 1.4%. In 2008, a total of 12,904 cases were reported from the 50 states and the District of Columbia. This represents a decline of 2.9% from 2007 and of approximately 50% from 1992.

**Slide 3. TB Morbidity, United States, 2003–2008.** This slide provides the total number of reported U.S. TB cases and the associated TB rates for each of the past 6 years. Rate is defined as cases per 100,000 population. The number of TB cases decreased from 15,056 in 2002 to 12,904 in 2008, and the TB rate also decreased from 5.2 in 2002 to 4.2 in 2008.

**Slide 4. TB Case Rates, United States, 2008.** This map shows TB rates for 2008. Thirty states had a rate of less than or equal to 3.5 TB cases per 100,000, the interim goal for the year 2000 established by the Advisory Council for the Elimination of Tuberculosis. This group of states has remained fairly constant over the last decade; five states (CT, MI, NM, OR, and PA) joined the group in 2000, one state (MO) joined the group in 2001 (also in 1998 for one year only), and one state (KY) joined the group in 2003. In 2008, five more states (AZ, AR, OK, RI and WA) joined the group but one state (MA) left the group. Eleven states and the District of Columbia (DC) reported a rate above the 2008 national average of 4.2 cases per 100,000: AK, CA, FL, GA, HI, LA, MD, NJ, NY, TN and TX. These 11 states and DC accounted for 67% of the national total and experienced substantial overall decreases in cases and rates from 1992 through 2008, with the exception of a slight increase in the number of cases for MA in 2008 compared to 2007.

**Slide 5. TB Case Rates by Age Group, United States, 1993–2008.** This slide shows the last 16 years' declining trend in TB rates by age group. The largest declines occurred in persons 65 years and older (from 17.7 per 100,000 in 1993 to 6.4 in 2008), in adults aged 45 to 64 years (from 12.4 to 5.0), in adults aged 25 to 44 years (from 11.5 to 5.1), and in children under 15 years of age (from 2.9 to 1.3), each group having decreased more than 50%. The rate declined by 32% in those 15 to 24 years of age (from 5.0 to 3.4).

**Slide 6. Reported TB Cases by Age Group, United States, 2008.** This pie chart shows the age distribution of persons reported with TB in 2008. Six percent were children under 15 years of age, 11% were age 15 to 24, 33% were age 25 to 44, 30% were age 45 to 64, and 19% were at least 65 years old.

**Slide 7. TB Case Rates by Age Group and Sex, United States, 2008.** This slide graphs the TB rates in 2008 by age group and sex. It shows that rates tended to increase with age, ranging from a low of less than 2 per 100,000 in children to a high of 9 per 100,000 in men 65 years and older. The rates in men 45 years and older were approximately twice those in same-age women.

**Slide 8. TB Case Rates by Race/Ethnicity, United States, 1993–2008.** This slide shows the declining trend in TB rates by race/ethnicity during the last 16 years. Asians and Pacific Islanders had the highest TB rates, which declined from 44.1 per 100,000 in 1993 to 25.3 in 2008, and had the smallest percentage decline over the time period (43%). Rates declined by at least 57% over the time period in the other racial/ethnic groups: among non-Hispanic blacks or African-Americans, from 28.5 in 1993 to 8.8 in 2008 (69%); among Hispanics, from 19.9 to 8.1 (59%); among American Indians and Alaska Natives, from 13.9 to 6.0 (57%); and among non-Hispanic whites, from 3.6 to 1.1 (69%). Since 2003, the Asian and Pacific Islander race category has included persons who reported race as either 1) Asian only or 2) Native Hawaiian or Other Pacific Islander only. Although these categories were reported separately beginning in 2003, they were merged for this slide to allow for continuity in reporting trends.

Several important factors likely contribute to the disproportionate burden of TB in minorities. In persons who were born in countries where TB is common, TB disease may result from infection acquired in the country of origin. Unequal distribution of TB risk factors, such as HIV infection, may also contribute to increased exposure to TB or to an increased risk of developing TB once infected with *M. tuberculosis*.

**Slide 9. TB Case Rates by Age Group and Race/Ethnicity, United States, 2008.** This slide presents TB rates in 2008 by age group and race/ethnicity. Risk increased with age across racial and ethnic groups, and rates were consistently higher in minority racial and ethnic groups than in non-Hispanic whites with the exception of American Indian or Alaskan Native in the 15-24 year-old age group. Rates were the highest in Asians and Native Hawaiians and Other Pacific Islanders, particularly in adult age groups. The impact of foreign birth is a consideration in interpreting rate variations by race/ethnicity. For example, 95% of cases in the Asian group occurred in foreign-born persons, compared with 76% of cases in Hispanics and 32% of cases in non-Hispanic blacks or African-Americans. Persons reporting two or more races totaled less than 1% of all cases.

**Slide 10. Reported TB Cases by Race/Ethnicity, United States, 2008.** In 2008, 83% of all reported TB cases occurred in racial and ethnic minorities (29% in Hispanics, 26% in Asians, 25% in non-Hispanic blacks or African-Americans, 1% in American Indians or Alaska Natives, and <1% in Native Hawaiians or Other Pacific Islanders), whereas 17% of cases occurred in non-Hispanic whites. Persons reporting two or more races totaled less than 1% of all cases. This is the fifth year that Hispanics have constituted the single largest percentage of TB cases among all racial/ethnic groups and the first year that Asians have surpassed non-Hispanic blacks or African Americans as the second largest percentage of TB cases among all racial/ethnic groups.

**Slide 11. Number of TB Cases in U.S.-born vs. Foreign-born Persons, United States, 1993–2008.** This graph plots the number of U.S.-born vs. foreign-born persons reported with TB each year, from 1993 through 2008. It illustrates the increase in the percentage of cases occurring in foreign-born persons during this period, from 29% in 1993 to 58% in 2008. Overall, the number of cases in foreign-born persons remained virtually level, with approximately 7,000–8,000 cases each year, whereas the number in U.S.-born persons decreased from more than 17,000 in 1993 to less than 5,300 in 2008.

**Slide 12. Trends in TB Cases in Foreign-born Persons, United States, 1988–2008.** This slide shows trends in TB cases in foreign-born persons in the United States from 1988 through 2007. The number of TB cases in foreign-born persons increased from nearly 5,000 in 1988 to 7,000–8,000 each year since 1991. The percentage of TB cases accounted for by foreign-born persons increased from 22% in 1988 to 59% in 2008.

**Slide 13. Reported TB Cases by Origin and Race/Ethnicity, United States, 2008.** Among U.S.-born persons with TB in 2008, 42% were non-Hispanic black or African-American, 33% were non-Hispanic white, 17% were Hispanic or Latino, 3% were Asian, 3% were American Indian or Alaska Native, and 1% were Native Hawaiian or Other Pacific Islander. Among the foreign-born, 43% were Asian, 38% were Hispanic or Latino, 14% were non-Hispanic black or African-American, and 5% were non-Hispanic white. Cases among American Indians or Alaska Natives and among Native Hawaiians or Other Pacific Islanders constituted less

than 1%, respectively, of the cases among the foreign-born and are not shown. Persons reporting two or more races totaled less than 1% of all cases.

**Slide 14. Percentage of TB Cases Among Foreign-born Persons, United States, 1996 and 2008.** The percentage range of the total number of TB cases that occurred in foreign-born persons in each state is highlighted for 1998 and 2008 in these side-by-side maps. The number of states with at least 50% of cases in the foreign-born increased from 12 states in 1998 to 29 states and the District of Columbia in 2008. The number of states with at least 70% of cases in the foreign-born increased from two (HI and MN) in 1998 to fourteen (CA, CO, CT, MA, MD, ME, MN, NH, NJ, NY, OR, RI, VA and WA) in 2008 (not shown on slide).

**Slide 15. TB Case Rates in U.S.-born vs. Foreign-born Persons, United States, 1993–2008.** TB rates in foreign-born persons remain higher than those in the U.S.-born population. From 1993 through 2008, the rates in U.S.-born persons decreased from 7.4 per 100,000 to 2.0, whereas the rates in foreign-born persons decreased from 34.0 per 100,000 to 20.3.

**Slide 16. TB Case Rates in U.S.-born vs. Foreign-born Persons, United States, 1993–2008.** This is the same as Slide 15, but the rates are presented on a logarithmic scale to better illustrate the trend in TB rates among the U.S.-born and foreign-born. The lines show a greater rate of decline among the U.S.-born compared with the foreign-born during this period.

**Slide 17. Countries of Birth of Foreign-born Persons Reported with TB, United States, 2008.** This slide shows the overall distribution of the countries of birth of foreign-born persons reported with TB in 2008, with the top seven highlighted. The list of countries has remained relatively constant since 1986, when information on country of birth was first reported by all areas submitting reports to CDC. The seven top countries accounted for 61% of the total, with Mexico accounting for 23%; the Philippines, 11%; India, 8%; Vietnam, 8%; China, 5%; Guatemala, 3%; and Haiti, 3%. Persons from more than 135 other countries each accounted for 2% or less of the total, but altogether accounted for 38% of foreign-born persons reported with TB.

**Slide 18. Percent of Foreign-born with TB by Time of Residence in U.S. Prior to Diagnosis, 2008.** The length of U.S. residence among foreign-born persons prior to their TB diagnosis in 2008 is shown in these stacked bars. Overall, 16% had been in the United States for less than 1 year, 21% between 1 and 4 years, and 52% for at least 5 years. The distribution is also shown for the top three countries of birth: Mexico, the Philippines, and India. Among persons born in Mexico, 13% had been in the United States for less than 1 year, 18% between 1 and 4 years, and 58% for at least 5 years. Among persons born in the Philippines, 16% had been in the United States for less than 1 year, 15% between 1 and 4 years, and 57% for at least 5 years. Among persons born in India, 20% had been in the United States for less than 1 year, 24% between 1 and 4 years, and 42% for at least 5 years.

**Slide 19. Primary Anti-TB Drug Resistance, United States, 1993–2008.** Primary drug resistance is shown for the past 16 years. The graph starts in 1993, the year in which the individual TB case reports submitted to the national surveillance system began collecting information on initial susceptibility test results for patients with culture-positive TB. Data were available for more than 85% of culture-positive cases for each year. Primary resistance was calculated by using data from persons with no reported prior TB episode. Resistance to at least isoniazid remained between 7.0% and 8.4%. However, resistance to at least isoniazid and rifampin, known as multidrug-resistant TB (MDR TB), decreased from 2.4% in 1993 to 1.1% in 1997, and remained at approximately 1.1% up to and including 2008.

**Slide 20. Primary MDR TB, United States, 1993–2008.** This graph focuses on trends in primary MDR TB (based on initial isolates from persons with no prior history of TB) in the United States from 1993 through 2008. The number of primary MDR TB cases, represented by bars, steadily declined from 407 in 1993 to 115 in 2001. Since then the total number of primary MDR TB cases has fluctuated from 86 to 132 cases, with 86 cases reported for 2008. Primary MDR TB, shown by the line, decreased from 2.5% in 1993 to approximately 1.1% in 1997, and remained approximately at 1.1% up to and including 2008.

**Slide 21. Primary Isoniazid Resistance in U.S.-born vs. Foreign-born Persons, United States, 1993–2008.** This graph shows primary isoniazid resistance in U.S.-born vs. foreign-born persons. Based on initial isolates from persons with no prior history of TB, the percentage of isoniazid resistance was approximately two times higher among foreign-born persons than among U.S.-born persons. In foreign-born persons, the percentage declined from 12.4% in 1993 to 10.3% in 2008. In U.S.-born persons, the percentage decreased from 6.8% in 1993 to 4.9% in 2008.

**Slide 22. Primary MDR TB in U.S.-born vs. Foreign-born Persons, United States, 1993–2008.** This graph highlights primary MDR TB in U.S.-born versus foreign-born persons. The percentage with primary MDR TB has declined among both groups, although the decline in the U.S.-born has been greater. As a result, the proportion of primary MDR TB cases reported in foreign-born persons increased from approximately 25% in 1993 to 77% in 2008 (not shown on slide). Among the U.S.-born, the percentage with primary MDR TB remained between 0.4% and 0.7% from 1998 through 2008 and was 0.6% in 2008. The percentage among foreign-born persons has fluctuated year by year, while averaging approximately 1.4% from 1998 through 2008.

**Slide 23. Extensively Drug Resistant (XDR) TB, as Defined on Initial Drug Susceptibility Testing (DST), United States, 1993–2008.** This graph shows the annual number of counted XDR TB cases as defined on initial DST from 1993–2008, reported as of May 20, 2009. Four XDR TB cases were reported in 2008. The most reported in a single year was 10 in 1993, while there were no cases reported in 2003. There is no apparent trend in the number of cases over time.

**Slide 24. Reporting of HIV Test Results in Persons with TB by Age Group, United States, 1993–2008.** This slide shows the completeness of reporting of HIV test results in persons with TB by age group from 1993 through 2008. The percentage of TB patients for whom test results were reported increased from 30% among all ages in 1993 to 62% in 2008. Among adults aged 25–44 years, the percentage increased from 46% to 72% in 2008. The numerator includes TB patients with positive, negative, or indeterminate HIV test results and persons from California reported with AIDS (HIV test results are not reported to CDC from California or Vermont).

**Slide 25. Estimated HIV Coinfection in Persons Reported with TB, United States, 1993–2008.** This slide provides minimum estimates of HIV coinfection among persons reported with TB from 1993 through 2008. Since the addition of the request for HIV status to the individual TB case report in 1993, incomplete reporting has provided a challenge to calculating reliable estimates. Results from the cross-matching of TB and AIDS registries have been used to supplement reported HIV test results. For all ages, the estimated percentage of HIV coinfection in persons reported with TB decreased from 15% to 6% overall and from 29% to 10% in persons aged 25 to 44 years during this period.

**Slide 26. Mode of Treatment Administration in Persons Reported with TB, United States, 1993–2006.** In 1993, the reporting areas began providing information about mode of treatment administration on the individual TB case report form. Treatment administered as only directly observed therapy (DOT) increased from 21% in 1993 to 57% in 2006, the latest year with available data. There was also an increase in the proportion of patients who received at least some portion of their treatment as DOT (based on combining the percentage of patients who received only DOT and the percentage for whom some portion was self-administered). In 2006, 87% of patients received at least some portion of their treatment as DOT.

**Slide 27. Completion of TB Therapy, United States, 1993–2006.** The reporting areas began providing information on completion of therapy in 1993 through the individual TB case report form. The calculations exclude patients with an initial isolate resistant to rifampin as well as children with meningeal, bone or joint, or miliary disease. Overall completion of therapy has remained at approximately 92% from 1998 through 2006. Completion in 1 year or less increased from 64% in 1993 to 84% in 2006, the latest year with available data. The current DHHS Healthy People 2010 objective is completion of therapy in 1 year or less in 90% of patients. CDC is working with state and local health departments to determine and evaluate reasons for apparently delayed completion of therapy, which may vary by jurisdiction.