

# Executive Commentary

## Highlights of 2012 Report

Since 1953, in cooperation with state and local health departments, the United States national tuberculosis program has collected information on each newly reported case of tuberculosis (TB) disease in the United States. Currently, each individual TB case report (Report of Verified Case of Tuberculosis or RVCT) is submitted electronically. Following are the highlights of the 2012 report.

1. Updated case counts for each year from 1993 through 2011.
2. Case counts: 9,945 TB cases were reported to CDC from the 50 states and the District of Columbia (DC) for 2012, representing a 5.4% decrease from 2011 (Table 1).
  - Seventeen states reported increased case counts from 2011 (Table 30).
  - California, Texas, New York, and Florida accounted for 50% of the national case total (Table 31).
  - Asians exceeded all other racial or ethnic groups with the largest percentage of total cases (30%) (Table 2).
  - Hispanics comprise the second largest racial or ethnic group (28%) (Table 2).
  - Blacks or African Americans born in the United States represented 37% of TB cases in U.S.-born persons (Table 18) and accounted for 13% of the national case total.
  - Asians born outside the United States represented 45% of TB cases in foreign-born persons (Table 19) and accounted for 29% of the national case total.
3. Case rates: In 2012, the TB case rate declined from 3.4 to 3.2 per 100,000 persons, representing a 5.9% decrease from 2011.
  - Ten states and DC reported rates above the national average (Table 30).
  - The TB case rate was 1.4 per 100,000 for U.S.-born persons and 15.9 for foreign-born persons (Table 5).
  - Asians continued to have the highest case rate (18.9 per 100,000 persons) among all racial or ethnic groups (Table 2).
4. Burden among the foreign-born: In 2012, the percentage of cases occurring in foreign-born persons increased to 63% of the national case total. This percentage has risen steadily since 1993. Foreign-born Hispanics and Asians together represented 79% of TB cases in foreign-born persons, and accounted for 50% of the national case total (Table 19).
  - In 31 states,  $\geq 50\%$  of TB cases occurred among foreign-born persons (Table 34).
  - In 8 states,  $\geq 70\%$  of TB cases occurred among foreign-born persons (Table 34).
  - In 3 states,  $\geq 75\%$  of TB cases occurred among foreign-born persons (Table 34).
  - The top five countries of origin of foreign-born persons with TB were Mexico, the Philippines, India, Vietnam, and China (Table 6).
5. Drug resistance: 1.1% of reported cases had primary multidrug resistance, which is defined as no previous history of TB disease and resistance to at least isoniazid and rifampin (Table 9). This percentage has remained stable, fluctuating from 0.9% to 1.3%, over the past decade.
6. HIV status: In 2012, 84% of persons with TB reported HIV test results.
  - The percentage of persons with HIV test results remained relatively stable between 2011 and 2012 at 83–84% among persons of all ages and 91–92% among persons 25–44 years of age (Table 11).
7. Genotype surveillance coverage: In 2012, genotype surveillance coverage was 94%.
  - Genotype surveillance coverage has increased steadily since 2004. Thirty-seven states met or exceeded the national target of 94% genotype surveillance coverage in 2012 (Table 13). Among genotyped cases during 2010–2012, 21% were clustered, suggesting recent transmission (Table 23).

## **Tuberculosis in the United States**

In 2012, the reported number of TB cases (9,945) and case rate (3.2 cases per 100,000) both decreased; these represented declines of 5.4% and 5.9%, respectively, compared to 2011. Since the 1992 TB resurgence peak in the United States, the number of TB cases reported annually has decreased by 63% (Table 1).

TB case rates vary by well-known factors such as age, race and ethnicity, and country of origin. The proportion of total cases occurring in foreign-born persons has been increasing since 1993. In 2012, 63% of TB cases occurred in foreign-born persons. Foreign-born persons have accounted for the majority of TB cases in the United States every year since 2001. Moreover, the case rate among foreign-born persons in 2012 was approximately 11 times higher than among U.S.-born persons (Table 5).

Tuberculosis deaths increased by 7.6%, from 529 deaths in 2009 to 569 deaths in 2010. The number of TB deaths reported annually has decreased by 66% since 1992 (Table 1).

### **Age**

Since 1993, TB case rates have declined annually for almost all age groups. In 2012, TB case rates continued the trend with declines in all age groups. The highest burden of disease continues to be among older adults. In 2012, adults aged 65 years and older had a case rate of 5.1 cases per 100,000, while children aged  $\leq 14$  years had the lowest rate at 0.8 cases per 100,000 (Table 4).

### **Race and Ethnicity**

In 2003, the race and ethnicity category “non-Hispanic, Asian or Pacific Islander” was split into “non-Hispanic Asian” and “non-Hispanic Native Hawaiian or Other Pacific Islander.” In 2012, Asians had the highest TB case rate at 18.9 cases per 100,000, which was a slight decrease from 20.2 in 2011. Native Hawaiians or Other Pacific Islanders had the second-highest TB case rate at 12.3 cases per 100,000, which is a decrease compared to 15.9 cases per 100,000 reported in 2011. Owing to low case numbers among Native Hawaiians or other Pacific Islanders, case rates fluctuate and must be interpreted with caution (Table 2).

Since 1993, TB case rates have declined in almost all racial and ethnic groups: among Hispanic or Latinos, the decline has been from 19.9 to 5.3 cases per 100,000 (-54%); among non-Hispanic blacks or African Americans, from 28.5 to 5.8 cases per 100,000 (-80%); among American Indian or Alaska Natives, from 14.0 to 6.3 cases per 100,000 (-55%); among non-Hispanic whites, from 3.6 to 0.8 cases per 100,000 (-78%); and

among Asians, from 41.2 to 18.9 cases per 100,000 (-54%). In 2012, the TB case rate for Asians remained approximately three times higher than that for Hispanics or blacks or African Americans (Table 2).

### **Origin of Birth**

Since 1993, the TB case rate among U.S.-born persons has declined annually. In 2012, the TB case rate for U.S.-born persons was 1.4 cases per 100,000, representing an 81% decrease from 7.4 cases per 100,000 in 1993. The TB case rate among foreign-born persons also declined during the same interval, though the decline was less substantial. In 2012, the TB case rate among foreign-born persons was 15.9 cases per 100,000, representing a 53% decrease from 34.0 cases per 100,000 in 1993 (Table 5).

The proportion of TB cases among persons born in the United States has also declined annually since 1993. In 2012, 37% of TB cases were among U.S.-born persons compared to 69% in 1993 (Table 5). In 31 states,  $\geq 50\%$  of TB cases occurred among foreign-born persons. In 18 states (Arizona, California, Connecticut, Hawaii, Idaho, Kansas, Maryland, Massachusetts, Minnesota, Nevada, New Hampshire, New Jersey, New York, Oregon, Utah, Vermont, Virginia, Washington),  $\geq 70\%$  of TB cases occurred among foreign-born persons (Table 34).

### **Country of Origin and World Region**

From 2007 through 2012, the top five countries of origin of foreign-born persons with TB were Mexico, the Philippines, India, Vietnam, and China (Table 6). The distribution of TB cases by world region of origin reflects immigration patterns among persons settling in the United States.<sup>1</sup> Of the 6,274 TB cases reported among foreign-born persons in 2012, 42% occurred among persons born in the Americas region, and 23% occurred among persons born in the Western Pacific region (Table 20). From 1993 through 2012, the proportion of cases increased among persons born in the Eastern Mediterranean region (3% in 1993 to 4% in 2012), the Southeast Asia region (6% in 1993 to 15% in 2012), and the Africa region (2% in 1993 and 9% in 2012) (Table 20).

### **Multidrug-resistant Tuberculosis**

From 1993, when the RVCT was expanded to include drug-susceptibility results, the proportion of patients with primary multidrug-resistant (MDR) TB, which is defined as no previous history of TB disease and resistance to at least isoniazid and rifampin, decreased from 3% to 1% by 1998. During 2009 through 2012, the per-

<sup>1</sup> United States Department of Homeland Security. 2010 Yearbook of Immigration Statistics. In: U.S. Department of Homeland Security, Office of Immigration Statistics; 2011.

centage of primary MDR TB cases has remained stable at approximately 1%. Since 1997, the percentage of U.S.-born patients with primary MDR TB has remained below 1%. However, of the total number of reported primary MDR TB cases, the proportion occurring in foreign-born persons increased from 25% (103 of 407) in 1993 to 86% (62 of 72) in 2012 (Table 9).

### **Extensively Drug-resistant Tuberculosis**

CDC has included an updated case count of extensively drug-resistant (XDR) TB cases from 1993 to 2012 in the slide set that accompanies this report. 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 (i.e., amikacin, kanamycin, or capreomycin).<sup>2,3</sup> Two cases were reported as XDR TB in 2012, compared to 6 cases in 2011, 1 case in 2010, 0 cases in 2009, and 5 in 2008. Of the 14 XDR TB cases reported since 2008, 13 were among foreign-born persons.

### **Tuberculosis Therapy**

The proportion of TB patients prescribed an initial treatment regimen including at least isoniazid, rifampin, and pyrazinamide increased from 72% in 1993 to 87% in 2012. The proportion of patients who completed therapy within 1 year increased from 64% in 1993 to 88% in 2010 (the latest year for which complete outcome data are available). The proportion of persons receiving directly observed therapy for at least a portion of the treatment duration also increased from 36% in 1993 to 90% in 2010, the latest year for which complete outcome data are available (Table 10).

### **HIV Status**

Between 2011 and 2012, the proportion of persons with TB who reported HIV test results has remained high at 83–84% for all ages and 91–92% for persons aged 25–44 (Table 11). The percentage of persons with TB who reported HIV test results and who were HIV-positive was 7% in 2012, representing a decline from 8% in 2011 (Table 11). Among persons 25–44 years of age, 12% of persons with TB who reported HIV test results were HIV-positive in 2012, increasing from 11% in 2011 (Table 11). The percentages have declined since 1993, when 49% of persons with TB of all ages with HIV test results reported HIV-positive results; among persons between 25–44 years of age, the percentage

<sup>2</sup> Centers for Disease Control and Prevention. Revised Definition of Extensively Drug-Resistant Tuberculosis. *MMWR Morb Mortal Wkly Rep* 2006;55:1176.

<sup>3</sup> Extensively drug-resistant tuberculosis (XDR-TB): recommendations for prevention and control. *Wkly Epidemiol Rec* 2006;81:430-2.

was 64% in 1993 (Table 11). The American Thoracic Society and the Infectious Diseases Society of America recommend that all TB patients be counseled and tested for HIV.<sup>4</sup>

### **Genotyping**

TB genotyping is a laboratory-based analysis of the genetic material of the bacteria that cause TB disease. In the United States, routine genotyping of isolates from culture-positive TB cases started in 2004 by CDC's National Tuberculosis Genotyping Service (NTGS). TB genotyping surveillance coverage, defined as the proportion of culture-positive TB cases with a genotype result, has increased from 53% in 2004 to 94% in 2012 (Table 13). TB genotype clusters are defined as two or more cases with matching genotypes in the same county during a 3-year time period. Cases that are clustered suggest recent transmission, while unique cases are more likely attributable to reactivation of disease that was acquired in the past. Among genotyped cases during 2010–2012, 21% were clustered (Table 23). During this period, the percentage of clustered cases among U.S.-born persons with TB was 34%, compared to 14% among foreign-born persons with TB (Table 22). In 2012, 1.7% of genotyped cases were due to infections with *Mycobacterium bovis*; most were in foreign-born persons (Table 15).

### **United States Affiliated Pacific Islands (USAPI)**

The USAPI consist of six jurisdictions in the Pacific Ocean: American Samoa, the Commonwealth of the Northern Mariana Islands, Guam, Federated States of Micronesia, Republic of the Marshall Islands, and Republic of Palau. As a result of their affiliations with the United States, the USAPI are among the recipients of U.S. federal government funding, including CDC cooperative agreement funding for domestic TB control program activities. In 2012, the USAPI had 416 reported cases of TB. Among these, 224 (54%) were male, 102 (25%) were aged less than 15 years and 117 (28%) were aged 25–44 years. In addition, 61 (15%) were not born in the USAPI jurisdictions or the United States, and of those, 50 (82%) emigrated from the Republic of the Philippines. Some other data highlights of the 416 reported USAPI cases are that 332 (80%) were diagnosed with pulmonary disease only, 185 (44%) were positive culture for *Mycobacterium tuberculosis*, 4 (1%) had MDR TB, and 150 (36%) were unemployed. Genotype surveillance coverage for USAPI was 79% in 2012.

<sup>4</sup> CDC. Treatment of tuberculosis. American Thoracic Society, CDC, and Infectious Diseases Society of America. *MMWR* 2003;52(No. RR-11).

## Puerto Rico

In 2012, the Commonwealth of Puerto Rico reported 71 TB cases to CDC, a case rate of 1.9 per 100,000 persons. Among those cases, 52 (73%) were male, three (4%) were aged less than 25 years, and 50 (70%) were aged 45 years and older. Of the 71 reported cases, nine were born outside of Puerto Rico, and of those, seven (78%) emigrated from the Dominican Republic. The majority of reported cases (86%) were diagnosed with pulmonary disease only, 87% were positive culture for *Mycobacterium tuberculosis*, 1% had MDR TB, and 35% were unemployed. Genotype surveillance coverage for Puerto Rico was 90% in 2012.

## Summary

Both the absolute number of TB cases and the TB case rate in the United States continued to decrease in 2012. With 9,945 total cases, representing a case rate of 3.2 cases per 100,000 persons, 2012 had the lowest number of reported TB cases since reporting began in 1953. Furthermore, the number of TB cases reported in 2012 and the corresponding case rate decreased by approximately 5–6% from the previous year. However, despite successful declines in TB cases and case rates over the past 60 years, it is unlikely that current TB control and prevention efforts will result in TB elimination (<1 case per 1,000,000 population)<sup>5</sup> in this century.<sup>6</sup>

As TB incidence declines, achieving elimination will depend on both reducing transmission of TB in the United States and controlling the importation of TB through immigration and international travel. Genotyping, a laboratory-based analysis of the genetic material of the bacteria that cause TB disease, is useful for distinguishing between these two sources of future TB cases and can help inform public health interventions. Cases occurring in genotype clusters suggest recent transmission and populations in which clustering is more common may benefit from intensified interventions to reduce transmission. For instance, during 2010–2012, clustering was higher among cases in persons reported as homeless compared to those who were not (44% versus 20%), among persons who drank alcohol excessively compared to those who did not (37% versus 19%), and among those who reported illicit drug use compared to those who did not (39% versus 21% for injecting drug use, 43% versus 19% for non-injecting drug use). Furthermore, among different racial and ethnic groups, American Indians and Alaskan

<sup>5</sup> Ending Neglect: The Elimination of Tuberculosis in the United States. Washington, DC: National Academy Press; 2000.

<sup>6</sup> Hill AN, Becerra JE, Castro KG. Modelling tuberculosis trends in the USA. *Epidemiol Infect* 2012;140(10):1862.

Natives had the highest proportion of clustered cases (49%), while Asians had the lowest (12%). Finally, the proportion of clustered cases was higher among U.S.-born persons than among foreign-born persons (34% versus 14%).

The small proportion of genotypically clustered TB cases in foreign-born persons suggests a large proportion of cases attributable to reactivation of disease acquired in the past. Since 2002, more than half of all TB cases reported in the U.S. have occurred among foreign-born persons. Focusing on LTBI testing and treatment of foreign-born persons would likely be more successful in decreasing TB among this group.<sup>7</sup>

Advancing the decline in TB cases in the United States will require sustained focus on domestic TB control activities and continued support of global TB control initiatives.<sup>8</sup> Improving TB control among groups at high risk for transmission and foreign-born persons is imperative as the United States strives to achieve TB elimination.<sup>9</sup>

<sup>7</sup> Cain KP, Benoit SR, Winston CA, MacKenzie WR. Tuberculosis among foreign-born persons in the United States. *JAMA*. 2008;300(4):405-12.

<sup>8</sup> Centers for Disease Control and Prevention. Trends in tuberculosis – United States 2011. *MMWR Morb Mortal Wkly Rep* 2012;61(11):181-5.

<sup>9</sup> Centers for Disease Control and Prevention. CDC's response to ending neglect: the elimination of tuberculosis in the United States 2002. <http://www.cdc.gov/tb/publications/reportsarticles/iom/iomresponse/default.htm>.