
Slide 1
Epidemiology of Tuberculosis Among Non-U.S.–Born Persons in the United States, 1993–2016*

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Slide 2 – Background: Non-U.S.–Born Persons with TB in the United States

Tuberculosis (TB) is a reportable condition in all United States jurisdictions, and TB cases are reported to the Centers for Disease Control and Prevention (CDC) in a standard format by public health authorities throughout the United States. TB in non-U.S.–born populations is of particular interest because non-U.S.–born persons account for two-thirds of TB cases in the United States. The majority of TB cases among non-U.S.–born persons are estimated to arise not from recent transmission but from reactivation of latent TB infection (LTBI) likely acquired in their birth countries. Achieving the goal of TB elimination will require development of more efficient tools and approaches to the diagnosis and treatment of LTBI. This slide set presents summarized data for TB cases among non-U.S.–born persons for the years 1993 through 2016, updated through June 2017.

In 2016, non-U.S.–born persons accounted for 68.5% (6,351 of 9,272) of reported TB cases, and U.S.-born persons accounted for 31.3% (2,901).

Slide 3 – The National Tuberculosis Surveillance System

Since 1953, through the cooperation of state and local health departments, CDC has collected information on newly reported cases of TB disease in the United States. Sixty jurisdictions currently submit reports (the 50 states, the District of Columbia, New York City, Puerto Rico, and 7 other U.S.-affiliated jurisdictions in the Pacific Ocean and the Caribbean Sea). Public health authorities report cases electronically to the CDC in a standard format, called the Report of Verified Case of TB (RVCT) form. In 1986, all reporting areas began submitting information on TB patients’ countries of birth. Since 1993, CDC has collected additional risk factor, clinical, and laboratory information on each reported case. These reports constitute the National TB Surveillance System (NTSS).

Slide 4 – 2009 TB Case Verification Criteria

Reports of TB are counted according to a set of criteria (the “case definition”) which is specific to the United States. Only incident (or new) cases that are diagnosed in the United States are included, and cases are verified by three levels of certainty, depending on the types of information that are available to healthcare practitioners and public health authorities. The verification of cases is an interactive process between healthcare practitioners and public health authorities and between public health authorities and CDC.
The highest level of certainty is laboratory confirmation, either by culture and identification of *Mycobacterium tuberculosis* or other closely-related species that make up the *M. tuberculosis* complex; identification of *M. tuberculosis* DNA through use of a nucleic acid amplification test (NAAT), or identification of acid-fast bacilli (AFB) in sputum or other biologic samples when culture or NAAT results are not available.

In the absence of laboratory confirmation, a confirmed case is one that

• Meets all criteria of the clinical case definition: positive tuberculin skin test (TST) or interferon gamma release assay (IGRA) blood test; presence of TB signs and symptoms (e.g., cough, fever, night sweats, weight loss); a completed diagnostic evaluation; and treatment with two or more anti-TB drugs; or

• Does not fulfill the criteria for either laboratory-confirmed or clinical case definitions, but is confirmed by the provider, who has decided to proceed with treatment for TB disease.

**Slide 5 – Non-U.S.–Born Persons in the United States**

For surveillance purposes, a non-U.S.–born person is someone who was born outside the 50 states, the District of Columbia, or a U.S. territory* to parents who were not U.S. citizens. A person born abroad to a U.S. citizen is considered U.S.-born. Non-U.S.–born persons may be naturalized U.S. citizens, legal permanent residents, visitors, workers, students, or persons with other visa statuses. The U.S. Census Bureau estimated the 2016 non-U.S.–born population in the United States at 43.1 million\(^1\) (13.5% of the noninstitutionalized population).

*U.S. territories include American Samoa, Guam, Puerto Rico, U.S. Virgin Islands, and Commonwealth of the Northern Mariana Islands


**Slide 6 – Reported TB Cases Among Non-U.S.–Born Persons Compared with All TB Cases, United States, 1993–2016**

While overall numbers of TB cases reported in the United States have declined substantially since 1993, the number of cases among non-U.S.–born persons remained stable before 2009, with approximately 7,400–8,000 cases per year. In 2009, the number of TB cases among non-U.S.–born persons decreased to 6,999 and continued to decline through 2013, when 6,222 cases were recorded. In 2014, the number of cases among non-U.S.–born persons began to increase again; the number peaked at 6,406 in 2015, then declined to 6,351 in 2016.

**Slide 7 – Number and Percentage of TB Cases Among Non-U.S.–Born Persons, United States, 1993–2016**

The percentage of TB cases occurring in non-U.S.–born persons increased from 29.5% in 1993 (7,403 of 25,102) to 68.5% in 2016 (6,351 of 9,272).
TB rates among non-U.S.–born persons remain higher than those among the U.S.-born population. During 1993–2016, the rate among U.S.-born persons decreased from 7.4 cases/100,000 population to 1.1, whereas the rates among non-U.S.–born persons decreased from 34.0 cases/100,000 population to 14.7. The non-U.S.–born/U.S.-born rate ratio was 4.6 in 1993, and 13.4 in 2016.

The chart presents the same data as on Slide 8, but uses a logarithmic scale to better illustrate the trends. The trend lines indicate a greater rate of decrease among U.S.-born compared with non-U.S.– born persons during the study period.

Slide 10 – TB Case Rates Among Non-U.S.–Born Persons, by Reporting Area, 2016
The burden of TB among non-U.S.–born persons in the United States varies by region of the country. In 2016, TB rates among non-U.S.–born persons were generally lower in the Southeast and the mountain states, and generally higher in the Midwest, California, Texas, and Hawaii. NOTE that the distribution of case rates does not necessarily reflect the overall geographic distribution of non-U.S.–born persons in the United States. For example, the TB case rate among non-U.S.–born persons in Maine was higher than the national average of 14.7 per 100,000 in 2016, but the proportion of Maine’s population that was non-U.S.–born (2.7%) was much lower than the national percentage (13.5%).


Slide 11 – Percentage of Non-U.S.–Born Persons Among All TB Cases, by Reporting Area, 1993 and 2016
Since 1993, the proportion of TB cases occurring in non-U.S.–born persons has increased in almost every reporting area; the proportion has remained lower in the Southeastern states (except for Florida).

Genotyping can often help distinguish TB cases that result from recent transmission from those cases that result from reactivation of infection acquired many years in the past. A given TB case is attributed to recent transmission when a plausible source case with the following characteristics is identified in the molecular surveillance data: (1) has the same genotype, (2) has respiratory TB (pulmonary or laryngeal), (3) is at least 10 years old, (4) was diagnosed within two years of the other case, and (5) lived within 10 miles of the other case based on zip codes.

From 2011 to 2016, fewer than 10% of TB cases among non-U.S.–born persons were likely the result of recent transmission. This suggests that more than 90% of TB cases among non-U.S.–born persons are the result of reactivation of LTBI acquired years ago, most probably in the country of origin.

A case of primary multidrug-resistant (MDR) TB is defined as isolation of *M. tuberculosis* complex organisms resistant to at least isoniazid and rifampin in a person with no prior history of TB. The percentage of TB cases that are primary MDR TB has declined among U.S.-born and non-U.S.–born persons since 1993, although the decline in U.S.-born persons has been greater. As a result, the proportion of primary MDR-TB cases diagnosed in non-U.S.–born persons increased from approximately 25% in 1993 to 90% in 2016 (not shown on slide). Among U.S.-born persons with TB, the percentage with primary MDR TB has been less than 1% since 1997 and was 0.4% in 2016. Among non-U.S.–born persons, the percentage with primary MDR TB has remained between 1.2 and 1.8% since 1995; it was 1.5% in 2016.

Slide 14 – Reported TB Cases by Origin and Age Group, United States, 2016

In 2016, the age distribution among non-U.S.–born persons with TB was similar to that of U.S.-born persons for most age groups, with two exceptions:

- Children less than 15 years old accounted for a smaller proportion of TB cases among non-U.S.–born persons compared with U.S.-born persons (2% vs 10%).
- The 25-to-44 age group accounted for approximately one in five TB cases among U.S.-born persons compared with one in three among non-U.S.–born persons.

Slide 15 – Number and Percentage of Pediatric TB Cases by U.S. and Non-U.S. Birth, 1993–2016

In contrast to TB cases overall, where two-thirds of cases are among non-U.S.–born persons, only about one-quarter of pediatric cases (defined as TB disease in persons less than 15 years old) are among non-U.S.–born children, and the fraction has been fairly stable (21–30%) since 1993.


Since 1993, the distribution of TB cases among non-U.S.–born persons in different age groups was relatively stable up until about 2007. After 2007, the number of TB cases declined in the 25–44 years age group and the 15–24 years age group, and TB cases increased in the ≥65 years age group.


TB rates among the youngest age group (0–4) were among the highest of all age groups in the early 1990s, peaking at 58.4 per 100,000 persons in 1995. Since then, rates have declined to 11.9 per 100,000 persons in 2016. The 2016 rate for the youngest age group was midway between the age groups with the highest (persons age ≥65 years) and lowest (children 5 to 14 years old) rates.
Among the youngest children with TB, case rates have been consistently higher among non-U.S.–born children compared with U.S.-born children. Rates vary widely among non-U.S.–born children less than a year old because of small numbers of cases.

*Rates presented on a logarithmic scale. Data is not available before 1994.

TB rates for the 5–9 year age group and the 10–14 year age group among non-U.S.–born children were consistently about 10 times higher than for the same age groups among U.S.-born children.

*Rates presented on a logarithmic scale. Data is not available before 1994.

The distribution of TB cases by race and ethnicity differs greatly between U.S.-born and non-U.S.–born persons. While persons of Asian race/ethnicity accounted for almost half of TB cases among non-U.S.–born persons in 2016, those with Asian race/ethnicity accounted for 5% of TB cases among U.S.-born persons. Almost a third of U.S.-born persons with TB were white, compared with only 5% of non-U.S.–born persons with TB. Blacks/African-Americans accounted for 37% of TB cases among U.S.-born persons, but only 14% of TB cases among non-U.S.–born persons. About one in three non-U.S.–born persons with TB was Hispanic or Latino, compared with one in five U.S.-born persons with TB.

* All races are non-Hispanic; multiple race indicates two or more races reported for a person, but does not include persons of Hispanic/Latino origin
† American Indian/Alaska Native accounted for <1% of cases among non-U.S.–born persons and are not shown.

The distribution of cases by race/ethnicity among non-U.S.–born persons has changed modestly between 1993 and 2016. While Asians accounted for almost half of cases in both time points, the proportion of Hispanics decreased from 39% in 1993 to 31% in 2016, and the proportion of blacks/African-Americans increased from 9% in 1993 to 14% in 2016. Whites accounted for less than 10% of cases in the two time points. Persons reporting two or more races accounted for 1% of all cases in 2016.

* All races are non-Hispanic; multiple race indicates two or more races reported for a person, but does not include persons of Hispanic/Latino origin. American Indian/Alaska Native accounted for <1% of cases among non-U.S.–born persons for 1993 and 2016 and are not shown.
† Native Hawaiian/Pacific Islander and multiple race categories were first reported in 2003.
The top seven countries of birth among non-U.S.–born persons reported with TB have remained relatively constant since 1986, when information regarding country of birth was first reported by all areas submitting reports to CDC. During 2016, the top seven countries accounted for 60% of all cases among non-U.S.–born persons, with Mexico accounting for 19%; the Philippines, 12%; India, 9%; Vietnam, 8%; China, 6%; Guatemala, 3%; and Haiti, 3%. Persons from 136 other countries each accounted for ≤2% of the total, but altogether, accounted for 40% of non-U.S.–born persons reported with TB.

The proportion of TB cases occurring among long-term residents (5 or more years) in the United States has increased steadily since 1993, due primarily to an increase in the proportion of TB cases among persons who have resided in the United States for 10 or more years. This is consistent with the presumption that most TB cases among non-U.S.–born persons are the result of reactivation of remotely acquired infection rather than recent transmission.

NOTE that the length of U.S. residence is counted as the time between first arrival to the United States and date of report of TB to the health department. It is possible that some of these persons traveled outside of the United States after their first arrival and acquired infection more recently.

Among the most common countries of birth for non-U.S.–born persons diagnosed with TB in the United States, the proportion of TB cases among persons in the United States for 5 or more years ranges from greater than 70% for persons born in Mexico to just under 50% for persons from India.

TB rates in the United States for non-U.S.–born persons are lower than rates in their countries of birth; this slide compares the two sets of rates for non-U.S.–born populations with the highest case counts in the United States. For example, the World Health Organization (WHO) reports the estimated TB rate in Mexico was 22 per 100,000 persons in 2016, but for Mexico-born persons in the United States, it was 10 per 100,000 persons, according to CDC data. The WHO rate in the Philippines was 554 per 100,000 persons but only 38 per 100,000 persons among persons born in the Philippines in the United States. Nevertheless, these rates in the United States remain substantially higher than the U.S. overall rate, which in 2016 was 2.9 per 100,000.


The distribution of countries of birth of non-U.S.–born persons with TB reported in the United States reflects three major factors: the country’s rate of TB, the amount of immigration from that country, and the number of persons diagnosed with TB in the United States from that country. The Philippines have both a high rate of TB and a large number of Filipino-born persons living in the United States (1.9 million in 2016). Excluding the Philippines, the top countries with the highest WHO-estimated TB incidence rates were the birth countries for less than 1% of the 6,351 non-U.S.–born persons with TB in the United States in 2016. Among the top 10 countries of birth for non-U.S.–born persons reported with TB, the country that accounted for the largest number of these cases (Mexico) had the lowest WHO estimated TB rate, but the largest number of persons living in the United States (11.6 million in 2016). These data have implications for approaches to targeted LTBI testing and treatment and transnational collaboration for TB control.


For more information, contact CDC
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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.