

Slide 1:

**Tuberculosis in the United States—National Tuberculosis Surveillance System, Highlights from 2020.** This slide set was prepared by the Division of Tuberculosis Elimination, National Center for HIV, Viral Hepatitis, STD, and TB Prevention (NCHHSTP), Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services (HHS). It provides recent trends and highlights of data collected through the National Tuberculosis Surveillance System (NTSS) for 2020. Since 1953, through the cooperation of state and local health departments, CDC has collected information on newly reported cases of tuberculosis (TB) disease in the United States. The data presented here were collected using the revised TB case report introduced in 2009. 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 TB case reports for 1993–2020 received by CDC as of June 14, 2021. All case counts and rates for years 1993–2019 have been updated, and data from 2020 has been added.

Slide 2:

This graph shows the annual number of TB cases in the United States for each year during 1982–2020, and the TB elimination threshold goal of <1 case per 1,000,000 (1 million) population, which is approximately 330 cases per year for the current U.S. population. In 1992, 26,673 cases were reported in the United States, with an incidence rate of 10.4 cases per 100,000 population. TB cases and incidence rates have declined substantially since 1992, but the annual rate of decline has been inadequate to achieve TB elimination goals.

In 2020, 7,174 cases were reported, with an incidence rate of 2.2 cases per 100,000, which is a substantial decline compared with previous years. The causes of the decline and the long-term effect on progress toward TB elimination are under investigation but likely include a combination of factors associated with the COVID-19 pandemic, including TB underdiagnosis and a true decline in cases.

Slide 3:

During 2020, the United States reported the lowest number of TB cases (7,174) and lowest incidence rate (2.2 cases per 100,000 persons) on record. Except for 2015, the U.S. TB case count and incidence rate have declined every year since 1992, but the drop in 2020 was much steeper than previous years. Annual incidence rate decreased (–19.7%) from 2019 to 2020. This is a substantial decline compared with previous years. The causes of the decline and the long-term effect on progress toward TB elimination are under investigation but likely include a combination of factors associated with the COVID-19 pandemic, including TB underdiagnosis and a true decline in cases.

Slide 4:

The incidence rate of TB continues to decline. The annual rate of decline had leveled off prior to 2020 but there was a steep decline in 2020. The annual incidence rate decreased from 2.7 cases per 100,000 in 2019 to 2.2 cases per 100,000 in 2020, a 19.7% decrease. The reasons for the large decline in 2020 are under investigation but might involve a combination of TB underdiagnosis and a true decline in cases during the COVID-19 pandemic.

Slide 5:

The National Vital Statistics System (NVSS) reported 526 TB-related deaths (0.2 deaths per 100,000 persons) where TB was the underlying cause of death for 2019, the most recent year for which data are available. This represents a 3.0% decrease in deaths and a 3.4% decrease in the mortality rate from 2018, above the historical low of 470 deaths (0.1 deaths per 100,000 persons) reported in 2015. *It is important to note that under current NVSS guidance, deaths caused by TB among persons with comorbid HIV infections are classified with HIV as the underlying cause of death, not TB, and are not included here.*

National Vital Statistics System accessed from CDC WONDER as of June 22, 2021:

[https://www.cdc.gov/nchs/nvss/bridged\\_race/data\\_documentation.htm#july2009](https://www.cdc.gov/nchs/nvss/bridged_race/data_documentation.htm#july2009)

Slide 6:

Seven states and the District of Columbia had incidence rates higher than the national rate of 2.2 cases per 100,000 persons in 2020. Alaska had the highest rate (7.9), followed by Hawaii (6.5), California (4.3), New York (including New York City\*, 3.1), Texas (3.0), New Jersey (2.8), District of Columbia (2.7), and Maryland (2.5).

Note: New York City, which is a distinct reporting area, had an incidence rate of 5.4 per 100,000 persons. When New York City is analyzed separately, the remainder of New York state has an incidence rate of 1.5 per 100,000 persons.

Slide 7:

Among U.S. states, slightly more than half (50.3%) of TB cases continue to be reported from 4 states: California (23.8%, n=1,705), Texas (12.3%, n=884), New York state (including New York City, 8.4%, n=606), and Florida (5.7%, n=412). These states are also the most populous states in the United States.

Slide 8:

Metropolitan statistical areas (MSAs) are geographic units of integrated groupings of one or more counties for conducting geographic analyses. They have a relatively high population density at its core and close economic ties throughout the area. Such regions are neither legally incorporated as a city or town would be, nor are they legal administrative divisions like counties or separate entities such as states.

Among MSAs with an estimated population size of at least 500,000, the 10 MSAs with the highest TB incidence rates are presented here: San Jose with the highest incidence rate at 7.8 cases per 100,000 (153 cases) followed by Honolulu at 6.5 cases per 100,000 (63 cases), Stockton at 6.0 cases per 100,000 (46 cases), San Diego at 5.8 cases per 100,000 (192 cases), San Francisco at 5.5 cases per 100,000 (259 cases), Los Angeles at 4.8 cases per 100,000 (633 cases), Houston at 4.2 cases per 100,000 (299 cases), McAllen at 4.1 cases per 100,000 persons (36 cases), New York City at 3.9 cases per 100,000 persons (753 cases) and Bakersfield at 3.7 cases per 100,000 (33 cases).

MSA definition can be found here: <https://www.census.gov/programs-surveys/metro-micro/about.html>

Slide 9:

Among the U.S. territories, incidence rates ranged from 0.8 cases per 100,000 (Puerto Rico, not shown) to 75.2 (Commonwealth of the Northern Mariana Islands). For the three freely associated states, reported incidence rates were 50.0 per 100,000 persons for the Republic of Palau, 73.7 for the Federated States of Micronesia, and 252.5 for the Republic of the Marshall Islands.

Slide 10:

Demographic characteristics of persons with TB remain similar to previous years, with most reported TB cases occurring among non-U.S.-born persons (5,127 cases; 71.5%). The incidence rate among non-U.S.-born persons continues to decrease, with the 2020 rate (11.7 cases per 100,000 persons) representing the lowest rate on record. TB cases among U.S.-born persons decreased in 2020 with 2,018 cases (28.1%) and 0.7 cases per 100,000 persons.

Slide 11:

Incidence rates for U.S.-born persons are shown in the left figure in purple, and incidence rates for non-U.S.-born persons are shown on the right figure in blue. Note that the y-axes for these figures are different.

TB incidence rates have been declining in both groups over the past ten years. In 2020, greater reductions than in prior years were seen for both groups. Declines in incidence rates in 2020 were relatively similar in magnitude (-20% for U.S.-born persons and -18% for non-U.S.-born persons).

Slide 12:

The TB incidence rate among non-U.S.-born persons of 11.7 per 100,000 persons is 16 times the rate of 0.7 per 100,000 U.S.-born persons (using unrounded rates). In 2020, 5,127 (71.5%) cases occurred among non-U.S.-born persons, 2,018 (28.1%) cases among U.S.-born persons, and 29 (0.4%) cases had missing/unknown origin of birth (not shown). The distribution of cases by origin of birth is similar to that of 2019, which was 71.5% and 28.4% for non-U.S.-born and U.S.-born persons, respectively. The percentage of cases among non-U.S.-born persons has gradually increased over time in the past decade, from 62.5% in 2011 to 71.5% in 2020.

Note: Percentages provided in script include unknown/missing data; hence percentages among U.S.-born and non-U.S.-persons do not add up to 100%.

Slide 13:

In 2020, seven countries of birth accounted for approximately 60% of the reported TB cases among non-U.S.-born persons living in the United States.

The most common countries of birth among non-U.S.-born persons with TB disease remained similar to previous years, with Mexico (18.0%) the most frequently reported country of birth, followed by the Philippines (12.5%), India (10.4%), Vietnam (8.2%), China (5.1%), Guatemala (3.3%), and Honduras (2.5%). These countries of birth also have large populations that live in the United States.

Slide 14:

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Note: this slide is a duplicate of the previous slide to provide an alternative visual display of the same data.

Slide 15:

The countries of birth with the highest U.S. incidence rates of TB disease are the Republic of the Marshall Islands (164.2 cases per 100,000 persons, average annual number of cases: 42.6), followed by the Republic of the Congo (120.8 cases per 100,000 persons, average annual number of cases: 37.6), Somalia (81.2 cases per 100,000 persons, average annual number of cases: 80.6), and Myanmar (73.5 cases per 100,000 persons, average annual number of cases: 109.4). These countries of birth are followed by Bhutan (67.6 cases per 100,000 persons, average annual number of cases: 36.2), Nepal (64.4 cases per 100,000 persons, average annual number of cases: 93.8), Guinea (64.0 cases per 100,000 persons, average annual number of cases: 11.0), Federated States of Micronesia (59.5 cases per 100,000 persons, average annual number of cases: 18.8), Ethiopia (52.2 cases per 100,000 persons, average annual number of cases: 138.6), and Eritrea (45.4 cases per 100,000 persons, average annual number of cases: 21.4).

U.S. population estimates by country of birth were used for the denominator and were obtained from the U.S. Census Bureau, American Community Survey (ACS) Public Use Microdata Sample data, 2015–2019, 5-year file.

ACS Public Use Microdata Sample data, 2015–2019, 5-year file available at <https://www.census.gov/programs-surveys/acs/microdata/access.html>

Slide 16:

Almost 10% of TB cases (9.7%) reported among non-U.S.–born persons in 2020 were diagnosed within 1 year of arrival in the United States. This was a decline from 2019 when 13.5% were diagnosed within 1 year of U.S. arrival (not shown). Over 32% of TB cases (32.3%) reported among non-U.S.–born persons in 2020 were diagnosed at least 20 years after U.S. arrival, compared with 30.1% in 2019.

Slide 17:

This slide is similar to the previous slide but broken down by 5-year intervals on the y-axis. Combining <1 and 1-4 years in the United States from the previous slide, almost 28% of TB cases (27.5%) reported among non-U.S.–born persons in 2020 were diagnosed within 5 years of arrival in the United States.

Slide 18:

This slide is similar to the previous slide but breaks down the time in the United States by year. The highest percentage of TB cases among non-U.S.-born persons occurs in those who were diagnosed with TB disease within 1 year of arrival in the United States. The percentage of TB cases by years since initial arrival in the United States gradually decreases. Even though the percentage of TB cases decreases as years since U.S. arrival increases, approximately 1/3 of TB cases among non-U.S.-born persons occurred at least 20 years after arrival in the United States. Notable peaks at 10-year intervals are evident, potentially attributable to “round number bias” in patient self-reports, where patients are more likely to indicate how long they have lived in the United States rounded to the nearest 10<sup>th</sup> year rather than reporting the exact number of years.

Slide 19:

This graph shows overall TB case counts in the past decade by race/ethnicity. The number of TB cases has decreased steadily since 2011 with the exception of a slight increase in 2015, when the number of cases rose from 9,383 in 2014 to 9,536 in 2015. The overall decrease since 2011 was mainly due to decreases seen among White and Black or African American persons. All race/ethnicity groups had a decline in cases in 2020 compared to 2019 except Native Hawaiian or Other Pacific Islander persons (106 cases in 2019 and 115 cases in 2020).

Slide 20:

This 100% stacked bar chart shows percentage distributions over time by race/ethnicity. Despite the decline in overall number of TB cases in 2020, the distribution of race/ethnicity among persons with TB disease has been relatively consistent since 2011.

Slide 21:

In 2020, Asian persons continue to represent the largest percentage of people with TB disease (35.8%), followed by Hispanic or Latino persons (29.7%), Black or African American persons (19.6%), White persons (11.0%), Native Hawaiian or other Pacific Islander persons (1.6%), American Indian or Alaska Native persons (1.1%), and persons who identify with more than one race/ethnicity (0.7%).

Slide 22:

TB incidence rates vary by race/ethnicity groups. In 2020, Native Hawaiian or other Pacific Islander persons had the highest rate (18.7 cases per 100,000 persons), followed by Asian persons (13.3). Rates among Hispanic or Latino persons (3.5), Black or African American persons (3.4), and American Indian or Alaska Native persons (3.2) were essentially similar. Persons who identify with more than one race (0.7) and White persons (0.4) had the lowest rates. Rates for all race/ethnicity groups decreased in 2020 except for Native Hawaiian or other Pacific Islander persons and American Indian or Alaska Native persons.

Slide 23:

Among U.S.-born persons, Black or African American persons and White persons have the highest TB case counts. The number of TB cases reported among U.S.-born persons has declined, but the distribution of race/ethnicity among U.S.-born persons with TB disease has been relatively consistent since 2011.

Slide 24:

In 2020, among U.S.-born persons, Native Hawaiian or other Pacific Islander persons had the highest incidence rate (6.5 cases per 100,000 persons), followed by American Indian or Alaska Native persons (3.6 cases per 100,000 persons). TB rates among U.S.-born Black or African American, Hispanic or Latino, and White persons have declined steadily since 2011. Rates in Asian persons have also declined since 2011 although the percentage declines each year have been more variable compared with Black or African American, Hispanic or Latino, and White persons. The rates among Native Hawaiian or other Pacific Islander persons and American Indian or Alaska Native persons have greater year-to-year variability because of low case counts and varying population sizes. White persons and persons who identify with more than one race continue to have the lowest rates among all race groups.

Slide 25:

Among non-U.S.-born persons, Asian persons and Hispanic or Latino persons have the highest TB counts. Since 2011, the distribution of reported cases of TB disease among non-U.S.-born persons has been relatively consistent across race/ethnicity groups.

Slide 26:

In 2020, among non-U.S.-born persons, Native Hawaiian or other Pacific Islander persons had the highest incidence rate (33.5 cases per 100,000 persons), followed by Asian persons (22.1 cases per 100,000 persons). Rates among non-U.S.-born Black or African American persons, Asian persons and Hispanic or Latino persons have shown continual declines since 2011. The rates among Native Hawaiian or other Pacific Islander persons and persons who identify with more than one race have greater year-to-year variability because of low case counts and varying population sizes. White persons and American Indian or Alaska Native persons have the lowest rates among all race groups of non-U.S.-born persons.

Slide 27:

These figures show TB incidence rates by race/ethnicity among non-U.S.-born persons compared with U.S.-born persons, and the graphs are shown on the log scale. Non-U.S.-born American Indian or Alaska Native persons did not have any reported TB cases in years 2014, 2016, and 2020; therefore, their data are not presented in the non-U.S.-born graph since zeros cannot be displayed on the log scale.

Incidence rates by race/ethnicity are higher among non-U.S.-born persons compared with U.S.-born persons. For each race/ethnicity group, U.S.-born persons had a steeper decline in incidence rates compared with those of non-U.S.-born persons, except for American Indian or Alaska Native persons (data not shown) and Native Hawaiian/Other Pacific Islander persons.

Slide 28:

The distribution of race/ethnicity among persons with TB disease continued to differ markedly by origin of birth. Approximately half of TB cases reported among non-U.S.–born persons occurred among Asian persons (48.1%), followed by Hispanic or Latino persons (32.0%), Black or African American persons (13.1%), and White persons (4.2%). Among U.S.-born persons with TB disease, Black or African American persons represented the largest percentage of cases (36.2%), followed by White persons (28.2%), Hispanic or Latino persons (23.7%), and Asian persons (4.8%).

Slide 29:

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Note: this slide is another representation of the previous slide to provide an alternative visual display of the same data.

Slide 30:

This slide shows incidence rates by race/ethnicity among non-U.S.-born persons compared with U.S.-born persons in 2020. Among non-U.S.–born persons with TB disease, Native Hawaiian or other Pacific Islander persons had the highest rate (33.5) followed by Asian persons (22.1), persons who identify with more than one race (15.6), Black or African American persons (15.5), Hispanic or Latino persons (8.1), and White persons (2.8). In 2020, there were no non-U.S.–born American Indian or Alaska Native persons reported with TB disease.

Among U.S.-born persons with TB disease, Native Hawaiian or other Pacific Islander persons had the highest rate (6.5 per 100,000 persons), followed by American Indian or Alaska Native persons (3.6), Black or African American persons (2.0), Hispanic or Latino persons (1.2), and Asian persons (1.2). Persons who identify with more than one race and White persons had the lowest rates (0.2 and 0.3, respectively).

Slide 31:

Distribution of TB cases by age group in 2020 remains similar to past years with a plurality of cases occurring among persons aged 45–64 years (30.3%), followed closely by persons aged 25–44 years (29.4%) and persons aged ≥65 years (26.2%). In contrast, only 14.0% of reported TB cases occurred among children and young adults aged <25 years.

Slide 32:

In 2020, TB incidence rates by age group did not follow the proportionate distribution. The oldest age group (≥65 years) had the highest rate overall (3.4 cases per 100,000 persons), and the rate generally decreased with

decreasing age. This observation might be attributable to cohorts with increased risk for TB exposure and infection, compared with the present, moving through time into older age groups. However, the youngest group (0–4 years) had a rate approximately twice that of the second youngest group (5–14 years).

Slide 33:

The decline in number of cases among U.S.-born persons by age from 1994 to 2020 is shown in this graph with 16,182 cases reported in 1994 and 2,018 in 2020. Among U.S.-born persons, all age groups experienced declines in cases in 2020 except the 5–14 age group, with 102 cases in 2020 compared with 96 cases in 2019.

Note: population data by age and origin of birth to calculate rates is not available before 1994.

Slide 34:

Since 1994, each age group among U.S.-born persons has experienced a 75% or greater decline in incidence rate, with the ≥65-year-old age group experiencing the biggest decline at more than 93% (-93.2%). From 2019 to 2020, the ≥65-year-old age group also experienced the greatest decline (-25.7%) in incidence rate compared with all other age groups .

Slide 35:

The decline in TB cases overall among non-U.S.–born persons has been less substantial over time than among U.S.-born persons. However, every age group among non-U.S.–born persons has experienced declines since 1994 except for the ≥65-year-old age group, for which case counts have fluctuated over the years but are now higher than in 1994 (1,377 in 1994 compared with 1,410 in 2020). Among non-U.S.–born persons, all age groups experienced declines in cases from 2019 to 2020.

Note: population data by age and origin of birth to calculate rates is not available before 1994.

Slide 36:

Since 1994, each age group among non-U.S.–born persons has experienced a 50% or greater decline in incidence rate, with the 0–4 age group experiencing the biggest decline at more than 89% (-89.5%). Every age group among non-U.S.–born persons experienced a decrease in incidence rate in 2020 as compared to 2019. The decline in rate in 2020 was largest among the ≥65-year-old age group (-25.1%) and smallest among the 15–24 age group (-2.1%).

Slide 37:

This slide examines percentage of TB cases by birth cohort (cases among persons born in the same decade) over time. In 1993, slightly more than half of TB cases were among persons born between the 1940s and 1960s with 14.9% of cases born in the 1940s, 20.8% in the 1950s, and 16.5% in the 1960s; fewer than 9% of cases were born in the 1970s and 1980s. In 2020, the distribution among birth cohorts were more evenly distributed, with 15.8% born in the 1950s, 15.6% in the 1960s, 13.0% in the 1970s, 14.8% in the 1980s, and 14.5% in the 1990s.

Slide 38:

Males continued to represent the majority (60.6%) of persons with TB disease overall, although among children aged  $\leq 14$  years the percentage of females is higher than males.

Slide 39:

Overall, the number of TB cases in all pediatric age groups decreased from 1993 through 2020. The greatest decline (-85.6%) from 1993 to 2020 was among persons age 1–4 years. Persons age 10–14 years were the only age group whose case count did not decrease in 2020, with 88 cases in 2020 compared with 85 cases in 2019.

Slide 40:

TB incidence rates by age group also decreased. Since 1993, rates among children 1–4 years have seen the greatest decline (-85.2%). The highest rate for pediatric cases in 2020 occurred in children  $< 1$  year.

Slide 41:

In 2020, there were 317 cases of TB among children  $\leq 14$  years old. The toddler/preschool group (age 1–4 years) comprised 38% of pediatric TB cases. The next most common group of pediatric TB cases was the adolescent age group, 10–14 years, comprising 28% of pediatric cases. TB disease in this age group presents more like TB disease in adults compared to the other pediatric age groups. Children ages 10–14 years old are more likely to have pulmonary TB and be infectious than younger children.

Slide 42:

In contrast to overall U.S. TB cases, for which over two-thirds of cases were among non-U.S.–born persons, only 63 (19.9%) of 317 pediatric cases were among non-U.S.–born children in 2020, and the fraction has been between 20–30% since 1993.

Slide 43:

The majority (80%) of pediatric TB cases in 2020 occurred among U.S.-born children, but the pediatric TB incidence rate remains higher among non-U.S.–born (3.7 per 100,000 persons) than U.S.-born children (0.4). However, the difference between incidence rates among U.S.-born compared with non-U.S.–born children has declined over time. In 1994, the TB incidence rate was 11 times higher among non-U.S.–born children compared with U.S.-born children; in 2020, the TB incidence rate was 8 times higher.

Note: population data by age and origin of birth to calculate rates is not available before 1994.

Slide 44:

During 2011–2020, over half (60.2%) of pediatric TB cases among U.S.-born persons have been among children with at least one parent/guardian who was born outside the United States. U.S.-born children of non-U.S.–born

parents might be more likely than other children to travel and be exposed to TB disease outside the United States or be exposed to non-U.S.–born persons in the United States who have infectious TB disease.

Slide 45:

In 2020, the majority (153 of 254 cases; 60.2%) of pediatric TB cases among U.S.-born persons continued to be in patients with at least one non-U.S.–born parent/guardian.

Slide 46:

Most U.S. TB cases continued to be verified through positive culture, with other laboratory-confirmation methods (i.e., nucleic acid amplification or smear microscopy) only representing a limited percentage of verified cases. In the absence of laboratory confirmation, cases can also be confirmed by meeting the clinical criteria for a verified TB case or diagnosed by a provider. Since 2009, the number of provider diagnosis cases has declined with the corresponding expansion of the percentage of cases verified by clinical criteria related to the 2009 Report of Verified Case of Tuberculosis revision that included adding the ability to report Interferon-Gamma Release Assays (IGRA) and classifying clinical cases based on a positive IGRA as an alternative to a positive Mantoux tuberculin skin test. However, the percentage verified among clinical criteria has decreased since 2009 as proportionately more cases are verified through laboratory techniques. Cases verified by culture may also be positive on NAA or smear microscopy as culture confirmation supersedes NAA or smear result in the case verification criteria classification.

Slide 47:

In 2020, the majority of U.S. TB cases continued to be verified through positive culture at 79.3% (5,691), with other laboratory-confirmation methods (i.e., nucleic acid amplification or smear microscopy) representing a combined 3.2% (229) of verified cases. In addition, 13.1% (943) were confirmed by clinical criteria and 4.3% (311) by provider diagnosis. Cases verified by culture may also be positive on NAA or smear microscopy as culture confirmation supersedes NAA or smear result in the case verification criteria classification.

Slide 48:

A vast majority of TB cases had pulmonary involvement (78.9%). Among the 21.1% of TB cases with only extrapulmonary involvement, TB of the lymphatic system remained most common (35.3%), followed by TB of the pleura (15.7%) and TB of bones and joints (9.2%). TB meningitis, a particularly serious form of the disease involving the meninges, made up 4.0% of extrapulmonary only cases. “Other” includes all other extrapulmonary sites of disease, e.g., ocular, hepatic.

Slide 49:

Since the early 2000s, the percentage of patients started on the standard initial four-drug regimen of isoniazid, rifampin, pyrazinamide, and ethambutol has remained above 80%. In some cases, e.g., when drug resistance is known or suspected or a clinical contraindication to the standard initial therapy exists, a different four-drug

regimen could be clinically appropriate. The percentage of patients on an initial drug regimen of four or more drugs that is not the standard four-drug regimen has increased from 4.9% in 2004 to 10.7% in 2020. Use of initial regimens with fewer than four drugs has represented <7% of reported cases for the past decade.

Slide 50:

During 2020, 83.3% of all reported TB patients were started on isoniazid, rifampin, pyrazinamide, and ethambutol (HRZE), and an additional 10.7% of patients were started on a different 4-drug regimen. Of the persons who received an initial regimen of less than 4 drugs, the top 5 regimens were 32.2% HRZ, 25.9% HRE, 6.3% HZE, 5.2% HR, and 4.7% RZE.

Slide 51:

Since 1993, the percentage of people with TB disease receiving at least a portion of their medication through Directly Observed Therapy (DOT) has risen from 36% in 1993 to 95% in 2018, the most recent year with full data available.

Slide 52:

During 2018, the most recent year with treatment completion data available, 61.3% of cases were treated exclusively by using DOT, whereas an additional 33.7% of patients received a combination of DOT and self-administered treatment.

Slide 53:

The national goal for treatment completion is that, for patients with newly diagnosed TB disease for whom  $\leq 12$  months of treatment is indicated, 95% complete treatment within 12 months. Although the percentage of eligible patients completing therapy in 1 year has risen since 1993 from 63.4% to 89.1% in 2018, the nation is still short of the 95% goal, and the percentage has been relatively level since 2009.

Slide 54:

Successful therapy completion for people with TB disease is a major performance indicator for TB programs. Among patients during 2018 who were alive at diagnosis and started on TB treatment, 87.4% had completed TB treatment successfully. However, 6.6% of all patients died before completing TB treatment; 1.4% were lost to follow-up before completing treatment; 1.0% refused treatment and 3.3% did not complete treatment for other or unknown reasons. Twenty-five patients (0.3%) had to permanently stop TB treatment because of an adverse treatment event.

Slide 55:

In 2020, 456 isoniazid-resistant TB cases were reported in the United States, a decrease from 643 cases during 2019. The reduction in isoniazid-resistant TB cases from 2019 to 2020 occurred in both U.S.-born and non-U.S.-born persons.

Note: The graph does not display counts of unknown origin of birth.

Slide 56:

The percentage of all MDR cases occurring among persons with no previous history of TB disease (i.e., primary MDR TB) has remained steady for the past several years at approximately 1%. The MDR case count was 56 in 2020 compared with 92 in 2019.

Slide 57:

Coinfection with HIV is a major risk factor for progression of latent TB infection to TB disease. Among 6,970 cases in persons who were alive at diagnosis in 2020, HIV status was known for 89.8% (n=6,256), and 4.8% (n=300) of persons with known HIV status were coinfecting with HIV. Among TB cases diagnosed in persons 25–44 years of age, 94.7% (n=1,976) had known HIV status, and 8.0% (n=158) of these persons were HIV positive. In persons 45–64 years old, 91.9% (n=1,948) had known HIV status, and 5.9% (n=114) were HIV positive. The percentage of HIV coinfection among persons with TB was 4.7% in 2019 compared with 4.8% in 2020.

Slide 58:

Among reported risk factors for TB disease, diabetes mellitus (22.5%) was most commonly reported, followed by having an immunocompromising condition other than HIV (9.2%) and having been a known close contact of a person with infectious TB disease (7.4%). Diabetes mellitus was proportionately more common among non-U.S.–born persons (25.8%), compared with U.S.-born persons (14.3%). However, having been a known contact of a person with infectious TB disease was proportionately more common among U.S.-born persons (15.8%), compared with non-U.S.–born persons (4.2%).

Slide 59:

Among persons who have risk factor information available and are at least 15 years of age, reported use of noninjection drugs was higher (6.9%) than injection drug use (1.1%), as was excess use of alcohol (9.0%). Over four percent (4.3%) occurred among persons who reported experiencing homelessness in the year before their TB diagnostic evaluation, 1.7% of TB cases occurred among residents in a long-term care facility at the time of their TB diagnostic evaluation, and 2.6% of TB cases occurred among residents in a correctional facility at the time of their TB diagnostic evaluation. Persons residing in congregate settings are at higher risk of being infected with TB disease than the general population. These percentage distributions are similar to 2019 data.

Slide 60:

The percentage of cases among persons diagnosed with TB disease while a resident of a correctional facility declined slightly in 2020, from 3.1% (n=265) in 2019 to 2.6% (n=179) in 2020.

Slide 61:

The states with the highest percentage of cases diagnosed among residents of correctional facilities in 2020 were Idaho (20.0%, 1 of 5 cases), Arizona (17.3%, 22 of 127 cases), New Mexico (10.7%, 3 of 28 cases), Texas (8.4%, 69 of 823 cases), and New Hampshire (8.3%, 1 of 12 cases).

Slide 62:

In 2020, among persons at least 15 years of age who have TB disease and were residents of correctional facilities at the time of diagnostic evaluation, 22.9% were in local jails (decreased from 27.7% in 2019), 25.1% in state prisons (increased from 15.5% in 2019), 10.1% in federal prisons (decreased from 14% in 2019), and 39.1% (no change from 2019) in other correctional facilities. In 2020, fewer cases (45; 29.8%) were reported in persons under ICE custody compared with 2019 (119; 44.9%).

Slide 63:

Historically, healthcare personnel, migrant workers, and correctional employees were occupations common among persons with TB disease. In 2020, the percentages were 4%, 1%, and <1% respectively; the largest category of occupations fell into the other category (38%). Unemployed persons comprised 23% of TB cases, and almost 29% were either retired or not seeking employment.

Slide 64:

In 2018, the most recent year for which complete data are available, among persons with TB disease, 801 (8.9%) died: 197 were dead at the time of TB diagnosis and 604 died during treatment. Out of the 9% who died, slightly more than 35% were attributed to TB disease. The percentage who died among persons with TB disease has remained consistent with previous years.

Slide 65:

Conversion of a patient's positive sputum culture to negative is a key indicator of treatment effectiveness. Among 5,087 cases during 2018 with positive sputum cultures, 4,459 (87.7%) had documented sputum culture conversion to negative (0.9% had unknown documentation of sputum culture conversion). Among the 584 (11.5%) cases for which sputum culture conversion was undocumented, the most common reason was that the patient had died (38.5%) before sputum culture conversion; however, a percentage of these cases (6.8%) did not have a known reason reported for not having documented sputum culture conversion.

Slide 66:

This slide shows the increase in genotyping surveillance coverage from 2004 to 2020. In 2004 the percentage of culture confirmed TB cases with at least one genotyped isolate was 52.6%; in 2020 it was 97.5%. The national goal for genotyping surveillance coverage is 100.0%.

Slide 67:

This slide shows the schematic for sequential assignment of unique spoligotypes and initial 12-locus MIRU-VNTR combination or 24-locus MIRU-VNTR combination.

Slide 68:

This slide shows the number of county-based TB genotype clusters by the size of the clusters; a genotype cluster is defined as two or more cases with matching spoligotype and 24-locus MIRU-VNTR (GENType) within a county during the specified 3-year time period. During 2018–2020, there were 860 two-case clusters, 215 three-case clusters, 85 four-case clusters, 41 five-case clusters, 22 six-case clusters, 11 seven-case clusters, 11 eight-case clusters, 8 nine-case clusters, and 27 clusters that were greater or equal to 10 TB cases in size.

Slide 69:

Clusters are classified into alert levels on the basis of a log-likelihood ratio (LLR) calculation; clusters with an LLR of  $5 < \text{LLR} < 10$  are classified as a medium alert level, and clusters with an  $\text{LLR} \geq 10$  are classified as a high alert level. At the individual case level, clustered cases were often part of medium- (23.9%) or high-level alerts (14.6%). At the cluster level, 358 (28.0%) of 1,280 clusters identified nationally were either medium- (n=297) or high-level alerts (n=61).

Slide 70:

Nationally, of 12,242 genotyped cases evaluated for recent transmission and reported during 2019–2020, CDC attributed 1,527 (12.5%) to recent transmission.

Note: 8.4% (n=1,025) were attributed to limited recent transmission and 4.1% (n=502) were attributed to extensive recent transmission. 87.5% (n=10,715) were not attributed to recent transmission.

Slide 71:

CDC has provided national estimates of recent transmission and extensive recent transmission throughout a 2-year period since the publication of *Reported Tuberculosis in the United States, 2016*. The number of cases attributed to both limited and extensive recent transmission have declined, but the relative proportions attributed to both limited and extensive recent transmission in 2019–2020 remained comparable to 2017–2018.

Slide 72:

A greater percentage of genotyped cases were attributed to recent transmission among U.S.-born persons (25.1%, n=836) than among non-U.S.-born persons (7.8%, n=689).

Among U.S.-born persons, 74.9% (n=2,493) were not attributed to recent transmission, and among non-U.S.-born persons, 92.2% (n=8,197) were not attributed to recent transmission.

Slide 73:

Greater percentages of cases attributed to recent transmission were identified among American Indian or Alaska Native persons [2017–2018: n=67 (40%), 2019–2020: n=54 (45%)], Native Hawaiian or other Pacific Islander persons [2017–2018: n=37 (24%), 2019–2020: n=55 (34%)], and non-Hispanic Black or African American persons [2017–2018: n=550 (20%), 2019–2020: n=456 (20%)], compared with national average estimates [50 states and Washington DC; 2017–2018: n=1,712 (12.6%), 2019–2020 n=1,527 (12.5%)].

Slide 74:

Greater percentages of cases attributed to extensive recent transmission were identified among American Indian or Alaska Native persons [2017–2018: n=40 (24%), 2019–2020: n=26 (22%)], Native Hawaiian or other Pacific Islander persons [2017–2018: n=11 (7%), 2019–2020: n=29 (18%)], and non-Hispanic Black or African American persons [2017–2018: n=223 (8%), 2019–2020: n=163 (7%)], compared with national average estimates [50 states and Washington, DC; 2017–2018: n=589 (4.3%), 2019–2020: n=502 (4.1%)].

Slide 75:

For more information, please contact Division of Tuberculosis Elimination at <http://www.cdc.gov/tb/>.