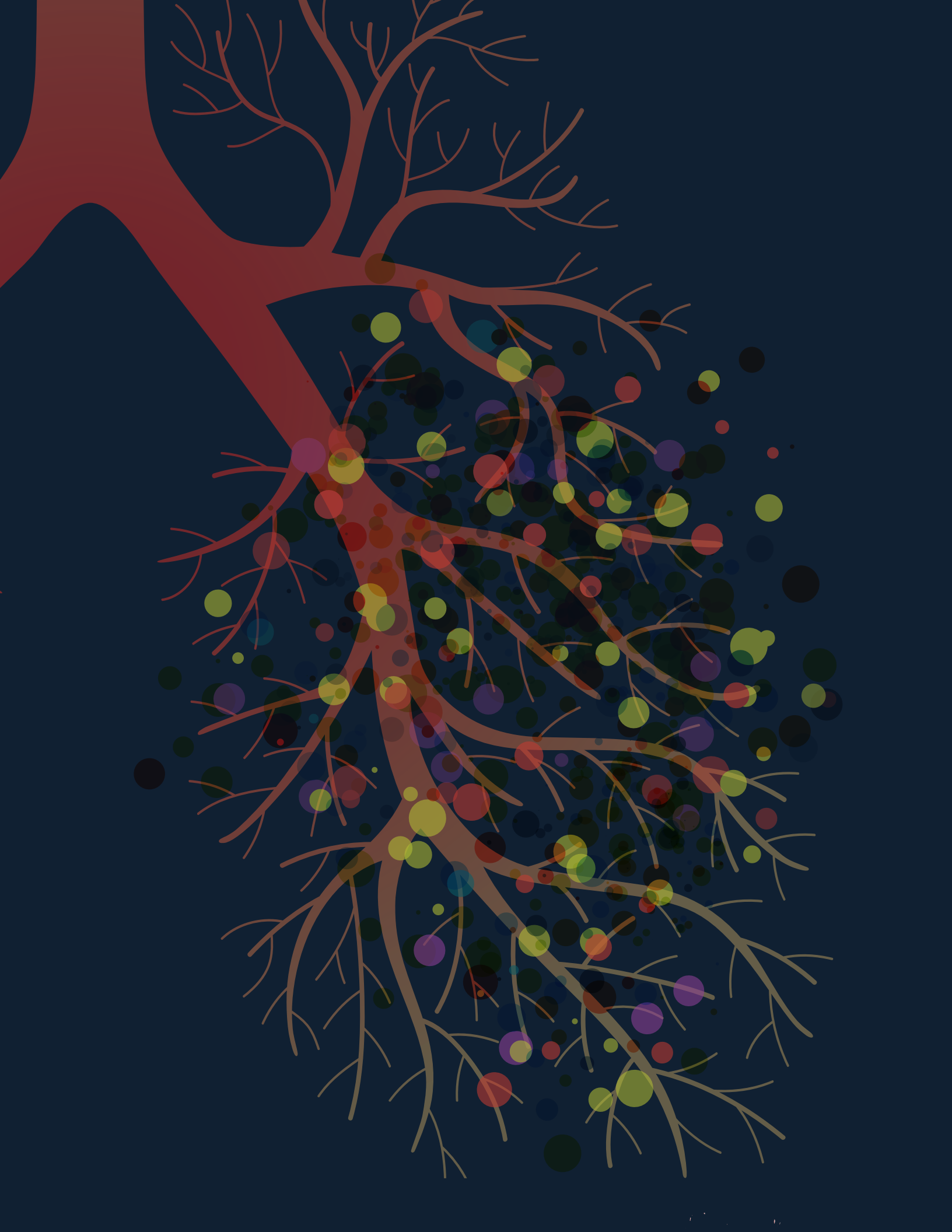


2017 STATE AND CITY TUBERCULOSIS REPORT



**Centers for Disease
Control and Prevention**
National Center for HIV/AIDS,
Viral Hepatitis, STD, and
TB Prevention



2017 STATE AND CITY TUBERCULOSIS REPORT

The Centers for Disease Control and Prevention (CDC) provides funding for tuberculosis control activities in 50 U.S. states and 9 cities (Baltimore, MD; Chicago, IL; District of Columbia; Houston, TX; Los Angeles, CA; New York City, NY; Philadelphia, PA; San Diego, CA; and San Francisco, CA) through the *Tuberculosis Elimination and Laboratory Cooperative Agreement*. Information about each newly reported case of tuberculosis (TB) in the 50 states and 9 cities is submitted to CDC's National TB Surveillance System (NTSS) with a standard form, the Report of Verified Case of TB (RVCT). The initial case report includes a patient's demographic data, occupation, initial drug regimen, and information on HIV status, substance use, homelessness, and residence in correctional or long-term care facilities. Follow-up reports collect drug susceptibility test results for *Mycobacterium tuberculosis* isolates and treatment status, among other items.

CDC also collects information from states and cities about their contact investigation activities: finding and examining persons who have had contact with TB cases, and treating those found to have TB disease or latent TB infection (LTBI). Data for contact investigation are reported by each TB control jurisdiction annually through the Aggregate Reports for Program Evaluation (ARPE).

National TB Indicators are key process and outcome measures for TB control programs in the United States. These indicators are selected by CDC in cooperation with partners in state and local health departments. Data for calculating these indicators are derived from existing surveillance systems such as NTSS and ARPE. CDC publishes TB indicator data to assist in evaluating progress toward achievement of national objectives through monitoring of TB program performance, assessment of needs for education and technical assistance, and identification of areas that need improvement.^{1,2} For the purposes of this report, states and cities were categorized into 3 groups based on the numbers of TB cases reported to NTSS in the relevant year for each indicator (2017 for TB incidence and known HIV status, 2016 for LTBI positive contacts of smear positive cases who started and completed preventive treatment, and 2015 for completion of treatment of newly diagnosed TB cases). The cutoffs for the groups were determined by the numbers of cases that fell within the 33rd and 66th percentiles. City results for Baltimore, MD; Chicago, IL; District of Columbia; Houston, TX; Los Angeles, CA; New York City, NY; Philadelphia, PA; San Diego, CA; and San Francisco, CA are not included in the respective state results (e.g., percentage of known HIV results for Texas are exclusive of known HIV results for Houston).

Incidence³

Elimination of TB is defined as reducing TB disease incidence in the United States to less than 1 case per million persons per year. Therefore, measuring the number of new cases occurring each year remains the best overall indicator of progress toward TB elimination. In 2017, overall TB incidence in the United States was 2.8 TB cases (including U.S.-born and non-U.S.-born persons) per 100,000 persons (28 per million). Overall, TB incidence slightly declined from 2016 to 2017; however, the nation has not yet achieved the 2020 national target of ≤ 1.4 TB cases per 100,000 (Figure 1 and Figure 2).

¹Data in this report are based on the final 2017 dataset from the National TB Surveillance System (NTSS).

²For more information about the National TB Program Objectives and Performance Targets for 2020 please visit: <http://www.cdc.gov/tb/programs/evaluation/indicators/default.htm>.

³Centers for Disease Control and Prevention (CDC). Reported Tuberculosis in the United States, 2017. Atlanta, GA: US Department of Health and Human Services, CDC; 2018.

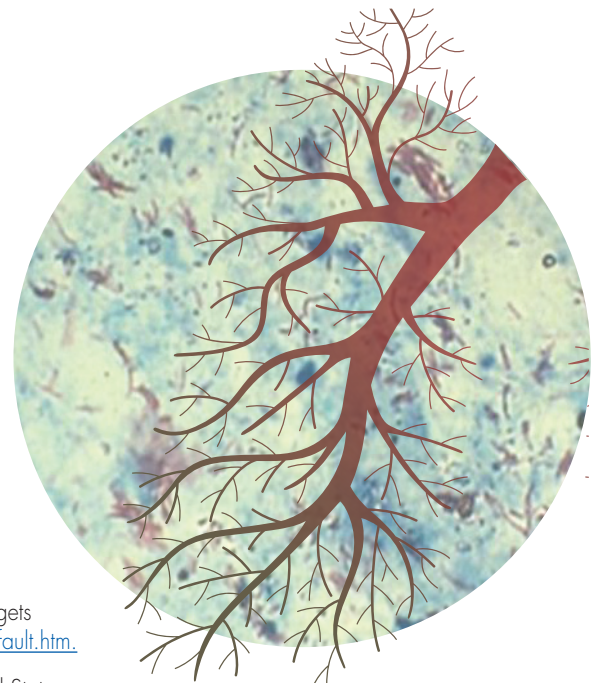
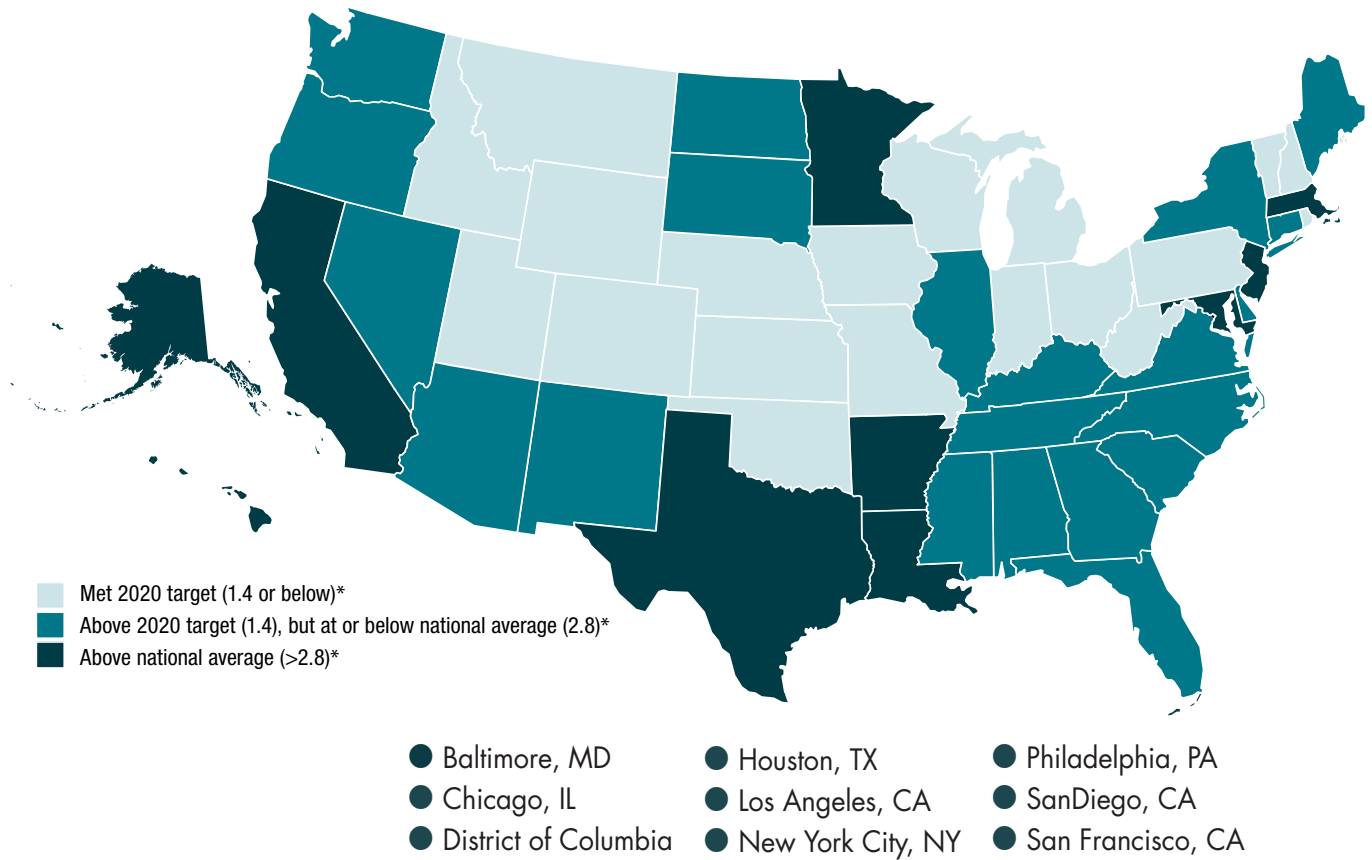


Figure 1. Overall TB Incidence*, United States, 2017



See Appendix, Figure 1 on page 22

Data source: National TB Surveillance System as of June 1, 2018; population data from the U.S. Census Bureau's American Community Survey, 2017.

*Numbers of TB cases per 100,000 persons

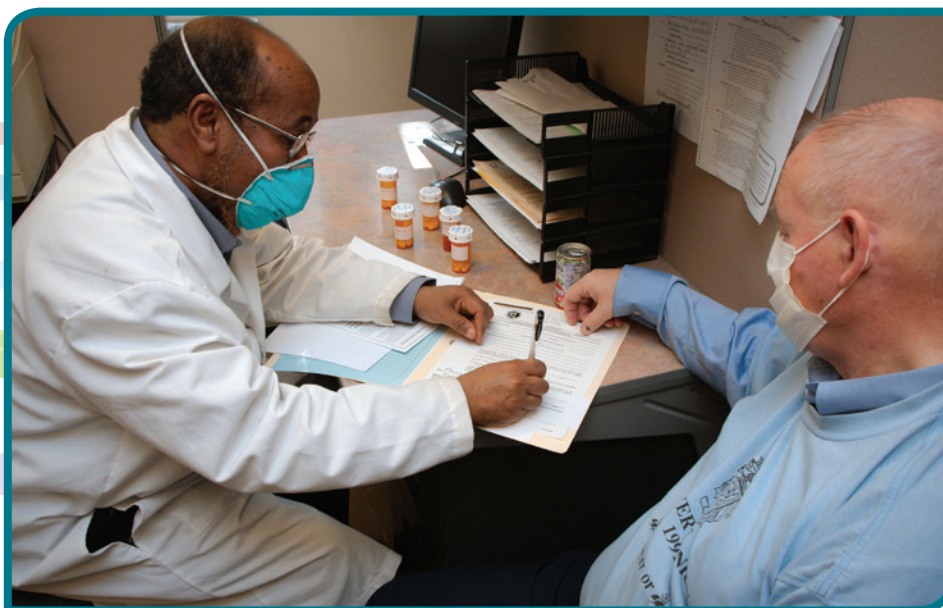


Figure 2. Overall TB Incidence*, United States, 2017

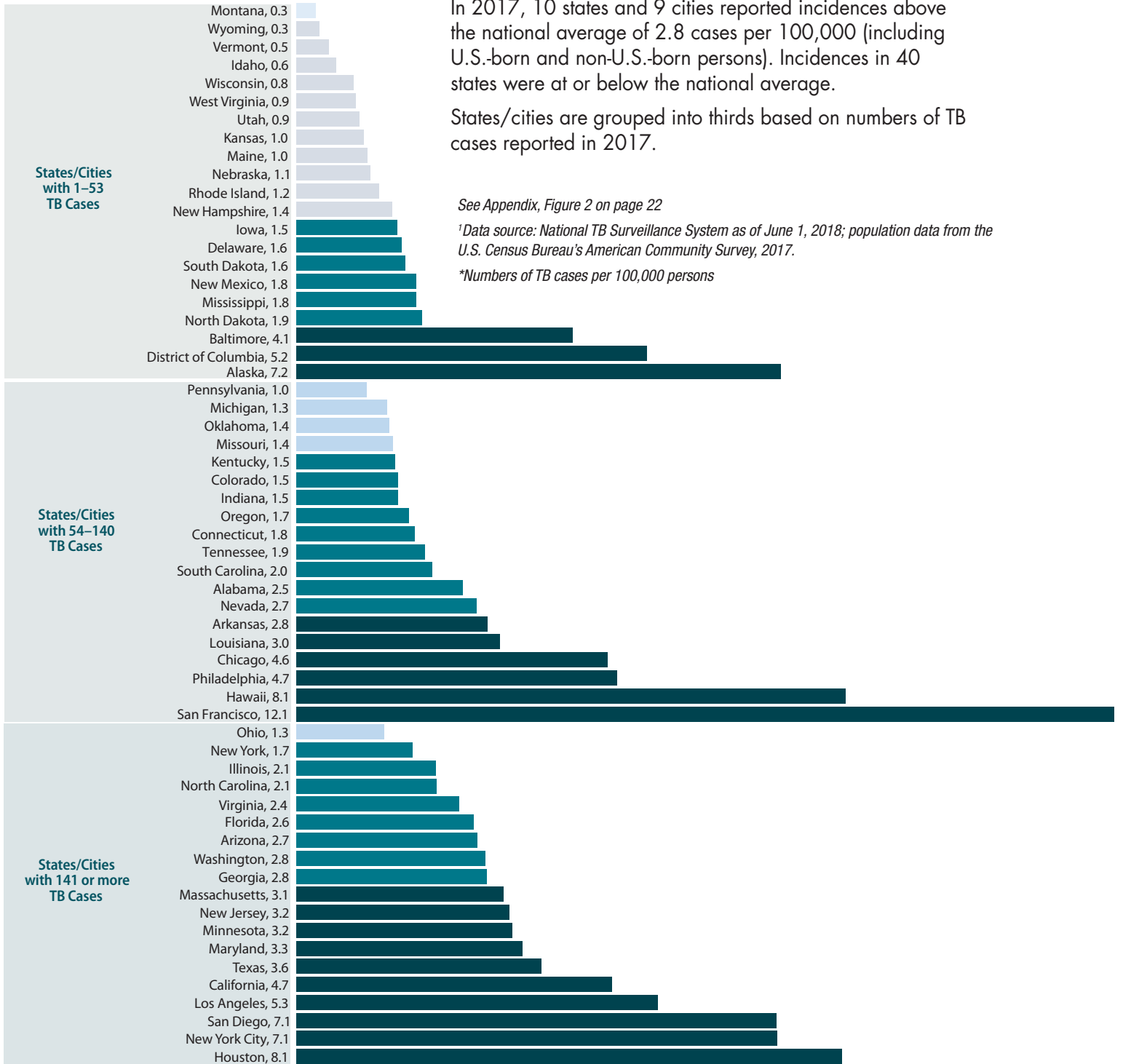
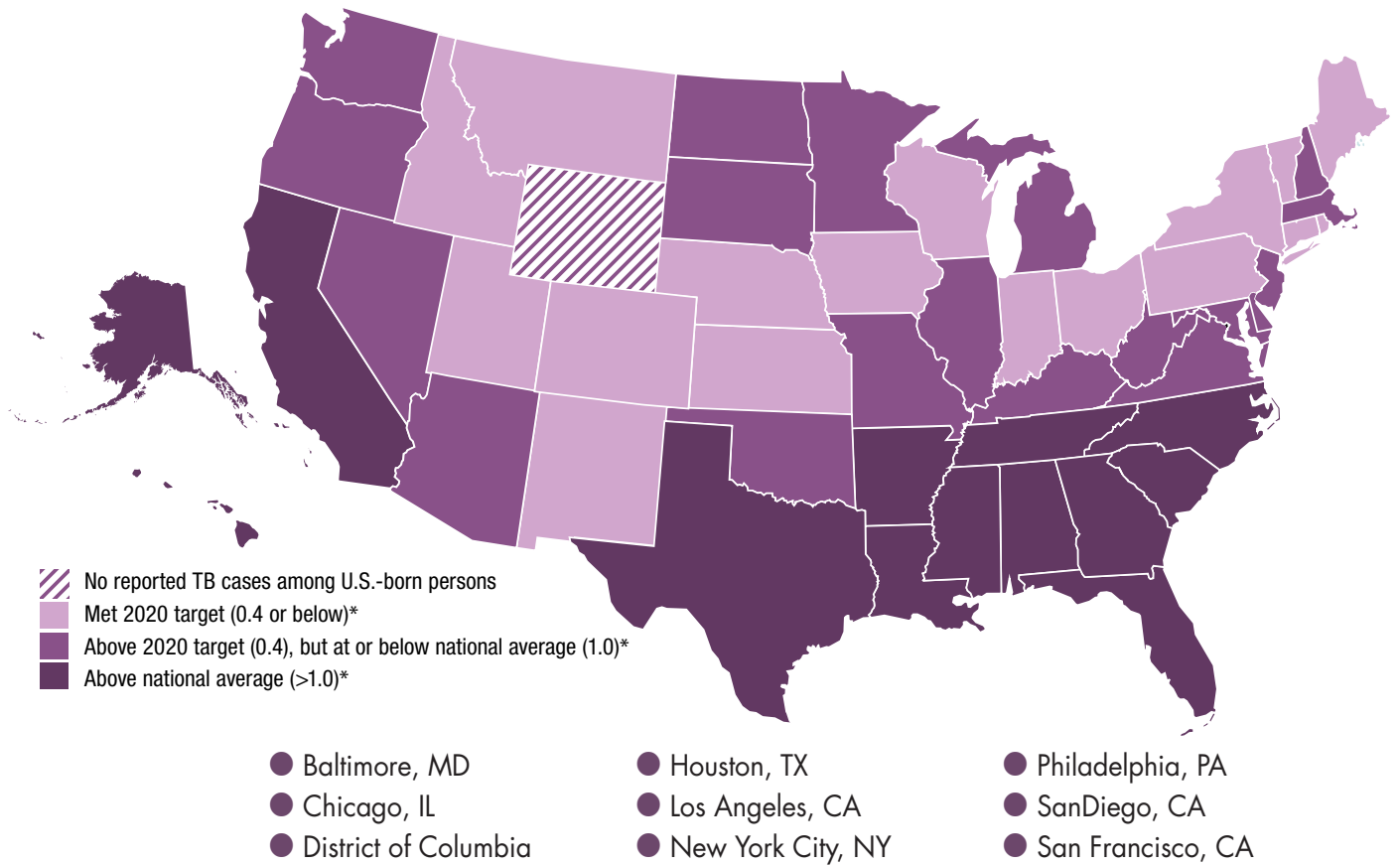


Figure 3. TB Incidence*, U.S.-born Persons, United States, 2017



See Appendix, Figure 3 on page 22

Data source: National TB Surveillance System as of June 1, 2018; population data from the U.S. Census Bureau's American Community Survey, 2017.

*Numbers of TB cases per 100,000 U.S.-born persons



Figure 4. TB Incidence*, U.S.-born Persons, United States, 2017



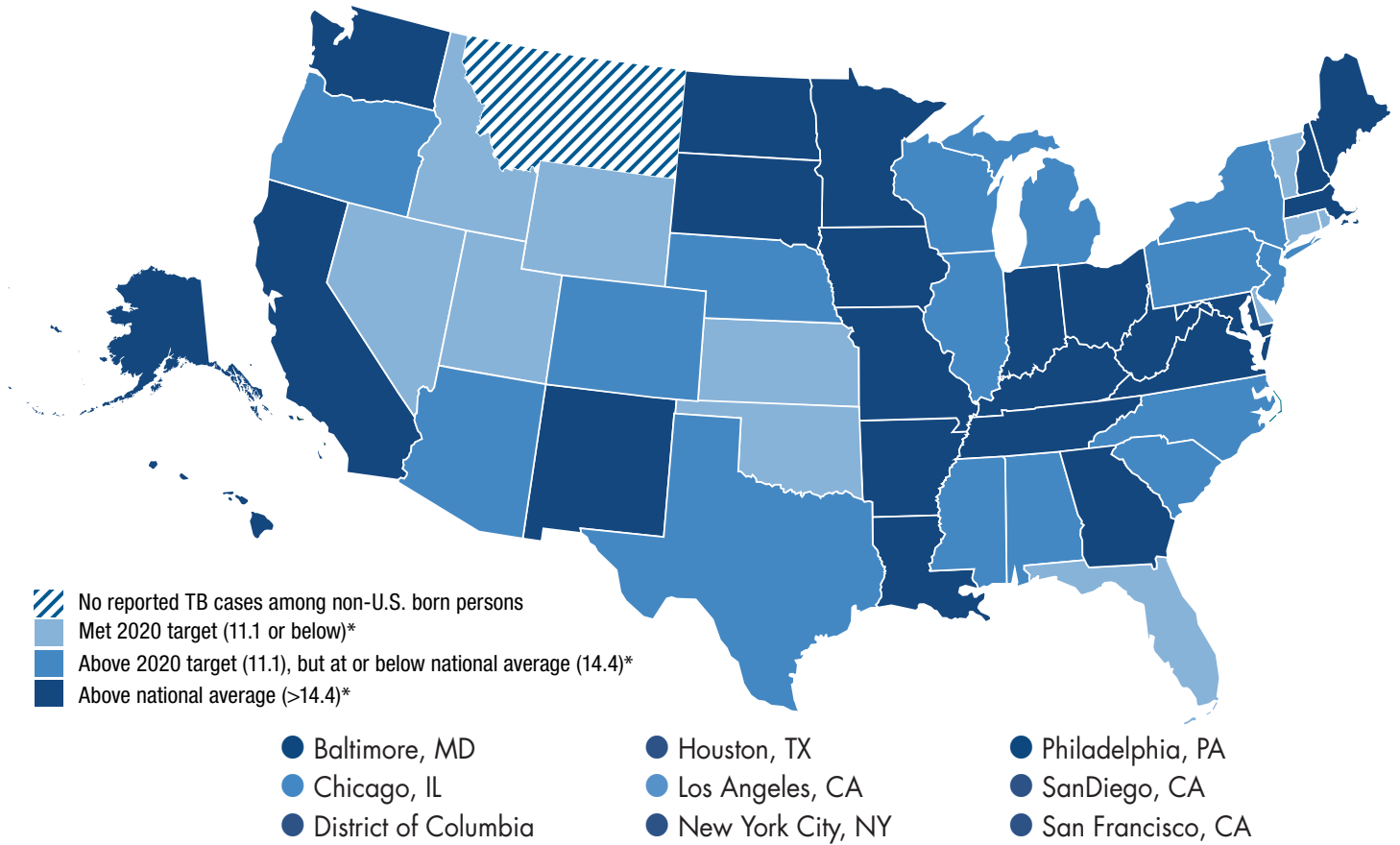
States/cities are grouped into thirds based on numbers of TB cases reported in 2017.

See Appendix, Figure 4 on page 22

Data source: National TB Surveillance System as of June 1, 2018; population data from the U.S. Census Bureau's American Community Survey, 2017.

*Numbers of TB cases per 100,000 U.S.-born persons

Figure 5. TB Incidence*, Non-U.S.-born Persons, United States, 2017



See Appendix, Figure 5 on page 22

Data source: National TB Surveillance System as of June 1, 2018; population data from the U.S. Census Bureau's American Community Survey, 2017.

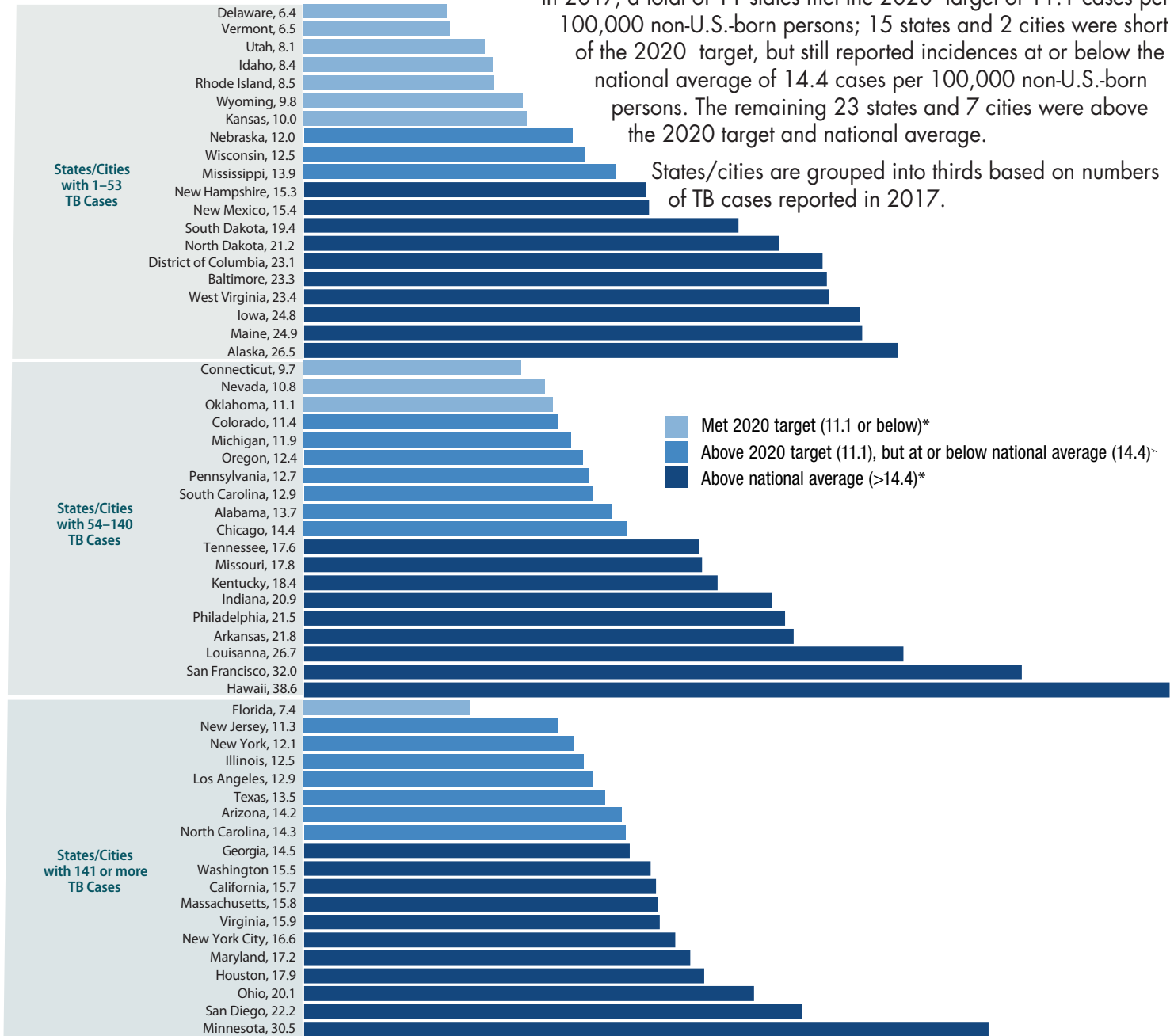
*Numbers of TB cases per 100,000 Non-U.S.-born persons



Figure 6. TB Incidence*, Non-U.S.-born Persons, United States, 2017

In 2017, a total of 11 states met the 2020 target of 11.1 cases per 100,000 non-U.S.-born persons; 15 states and 2 cities were short of the 2020 target, but still reported incidences at or below the national average of 14.4 cases per 100,000 non-U.S.-born persons. The remaining 23 states and 7 cities were above the 2020 target and national average.

States/cities are grouped into thirds based on numbers of TB cases reported in 2017.

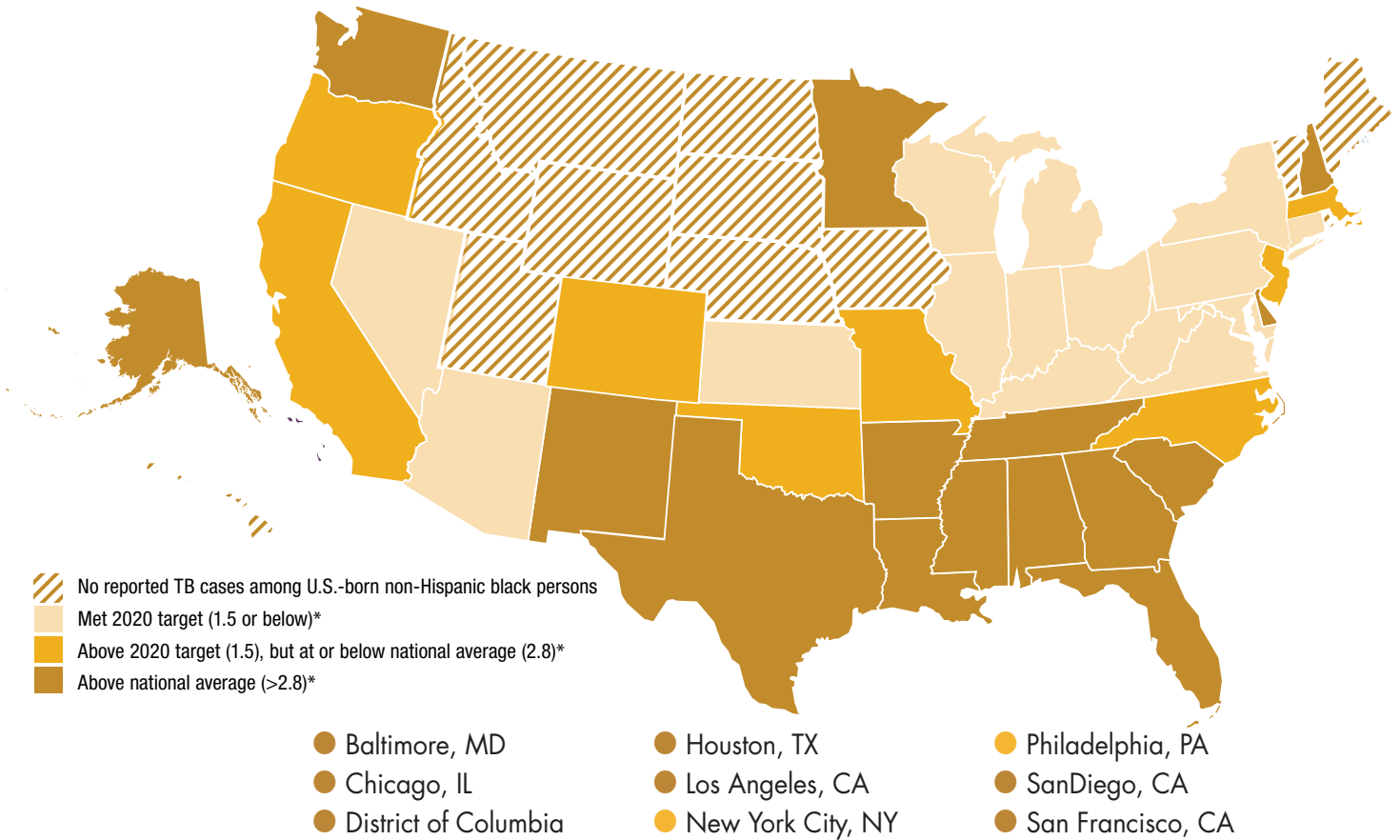


See Appendix, Figure 6 on page 22

Data source: National TB Surveillance System as of June 1, 2018; population data from the U.S. Census Bureau's American Community Survey, 2017.

*Numbers of TB cases per 100,000 non-U.S.-born persons

Figure 7. TB Incidence*, U.S.-born Non-Hispanic Blacks or African Americans, United States, 2017



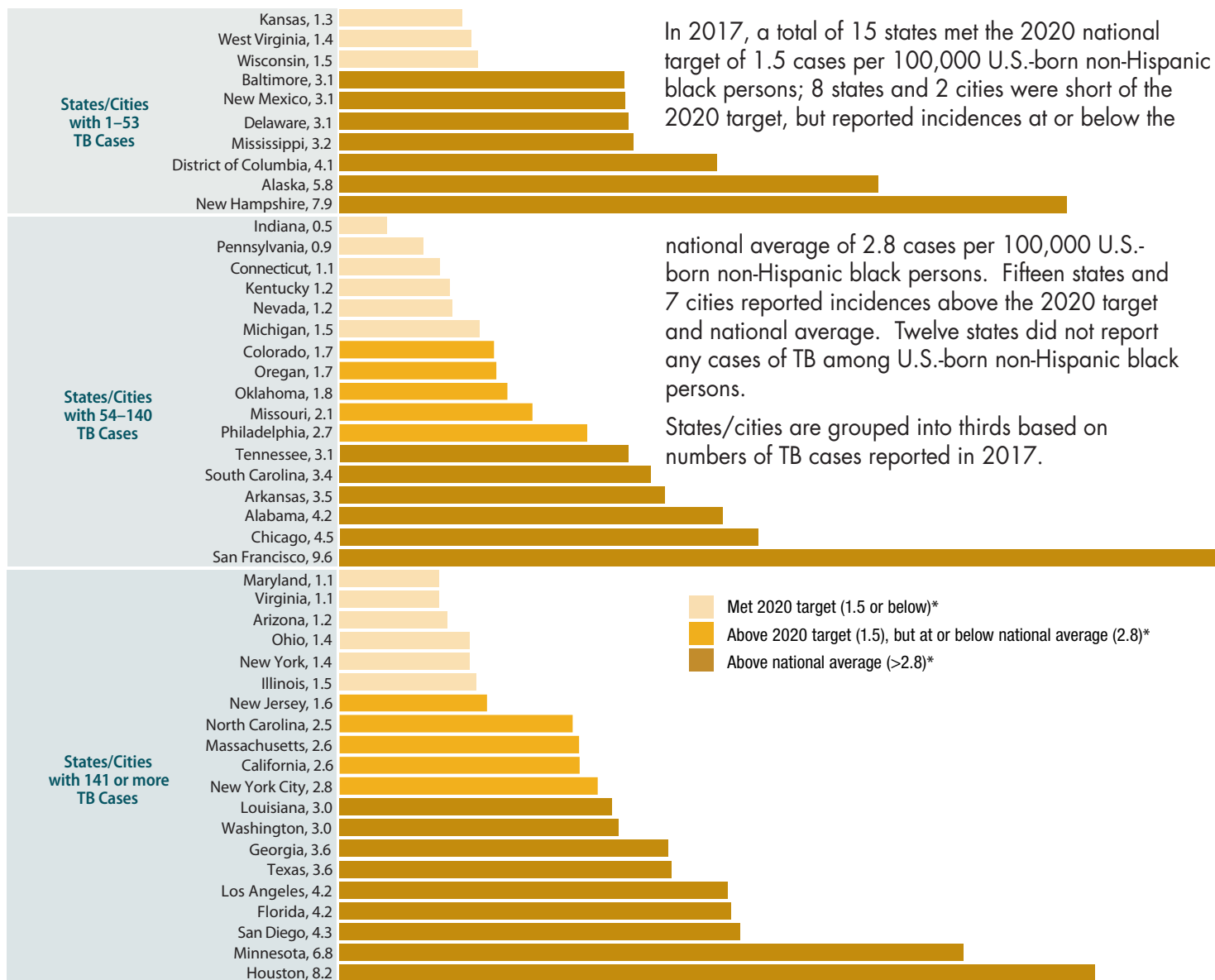
See Appendix, Figure 7 on page 23

Data source: National TB Surveillance System as of June 1, 2018; population data from the U.S. Census Bureau's American Community Survey, 2017.

*Numbers of TB cases per 100,000 U.S.-born non-Hispanic black persons



Figure 8. TB Incidence*, U.S.-born Non-Hispanic Blacks or African Americans, United States, 2017



See Appendix, Figure 8 on page 23

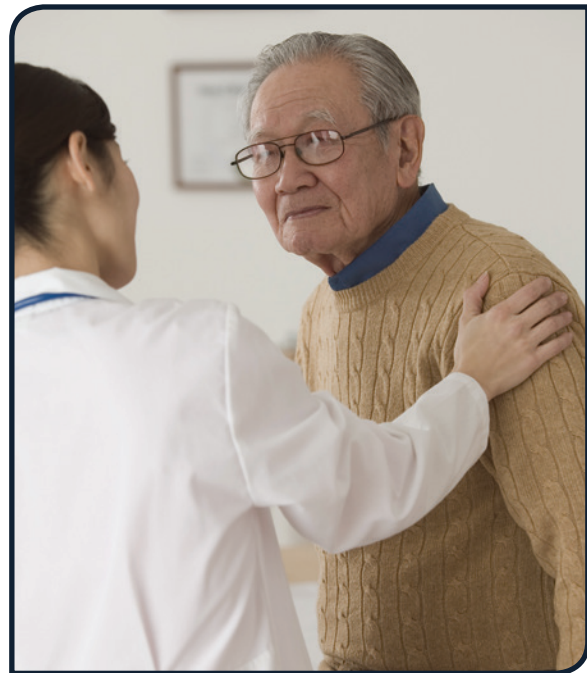
Data source: National TB Surveillance System as of June 1, 2018; population data from the U.S. Census Bureau's American Community Survey, 2017.

*Numbers of TB cases per 100,000 U.S.-born non-Hispanic black persons

Completion of Therapy

Fully treating and, therefore, preventing further spread of *M. tuberculosis* is key to TB control and elimination. If TB drugs are stopped too soon or not taken correctly, a person may develop symptoms again or drug resistance may develop, enabling the further spread of TB. Each patient is unique. There are many reasons why a patient might be unable or unwilling to complete TB treatment such as no longer experiencing symptoms of TB, not fully understanding the treatment regimen, not being willing or able to manage side effects of their treatment regimen, cultural beliefs, language barriers, difficulty getting health care, substance use, or mental health issues. Completion of therapy among persons who have experienced homelessness or been incarcerated can be particularly challenging due to difficulty locating patients for follow up care and treatment, and is particularly important because of the risk of transmission at shelters or in the jail or prison systems. There are several ways to increase treatment completion. These include directly observed therapy (in which patients are observed to ingest each dose of anti-TB medications) and use of incentives and enablers (e.g., gift cards for food or bus fare for transportation to get to and from the health department) to get patients to complete treatment.

TB treatment is complex and can take several months to complete. It can take up to 2 years to have full treatment information reported for each TB patient. As a result, the most recent information available on completion of therapy is from patients identified with TB in 2015. For these patients, 15 states met or exceeded the 2020 national target of 95.0% of TB cases completing a full treatment regimen in 12 months or less; 18 states and three cities were short of the 2020 target, but exceeded the national average (89.5%) (Figure 9 on page 12). Additionally, in 2015 there were 8 states and 5 cities that reported more than 7 TB patients, 15 years of age or older who were homeless in the year prior to diagnosis; 8 of these jurisdictions exceeded the national average of 84.9% completion of therapy among homeless TB patients (Table 1 on page 16). There were 6 states and 2 cities in 2015 that reported 5 or more TB patients, 15 years of age or older who were incarcerated at TB diagnosis; 4 of these jurisdictions exceeded the national average of 86.4% completion of therapy among incarcerated TB patients (Table 2 on page 17).



HIV Status

People living with HIV are more likely than others to become sick with TB if they are exposed and become infected. Untreated LTBI (see below) may quickly progress to TB disease in people living with HIV because the immune system is already weakened. Without treatment, TB disease can progress from sickness to death rapidly. Measuring the number of TB patients who are also tested for HIV and have a known HIV status is not only important in terms of saving lives, but also in interrupting the spread of TB and HIV to others.

In 2017, 35 states and 5 cities performed above the national average (88.9%) and 11 states and 3 cities met the 2020 national target of having HIV status known among at least 98.0% of reported TB cases (Figure 10, page 9).

Treatment for Latent TB Infection

When a person with infectious TB coughs (or sneezes or sings or talks), droplet nuclei containing *M. tuberculosis* are expelled into the air. If another person inhales air containing these droplet nuclei, he or she may become infected. However, not everyone infected with TB bacteria develops symptoms of TB. As a result, two TB-related conditions exist: LTBI and TB disease. Persons with LTBI do not feel sick and do not have any symptoms. They are infected with *M. tuberculosis*, but do not have TB disease. The only sign of LTBI is a positive reaction to a TB skin test or TB blood test. Persons with LTBI are not infectious and cannot spread TB to others. However, at some point in their lives, 5-10% of all people with normal immune systems who have LTBI will become sick with TB disease. As previously described, the chances of progression from LTBI to TB disease are higher for persons with weakened immune systems, such as those infected with HIV. LTBI can be treated to prevent progression to TB disease. Thus, it is important, in terms of accelerating the decline in TB incidence, to measure how many people with LTBI begin and complete treatment.

TB programs work to identify persons who are at high risk for LTBI or at high risk for developing TB disease once infected so that they can offer testing and treatment for LTBI. High-risk persons include known close contacts of someone with infectious TB disease, persons from regions of the world with high TB incidence, and those who work or reside in facilities or institutions with people who are also at high risk for TB. Risk factors for developing TB disease once infected include HIV infection, injection drug use, evidence of prior healed TB disease, diabetes, or low body weight. Infants and children under the age of five years are also at higher risk of getting sick with TB disease once infected.

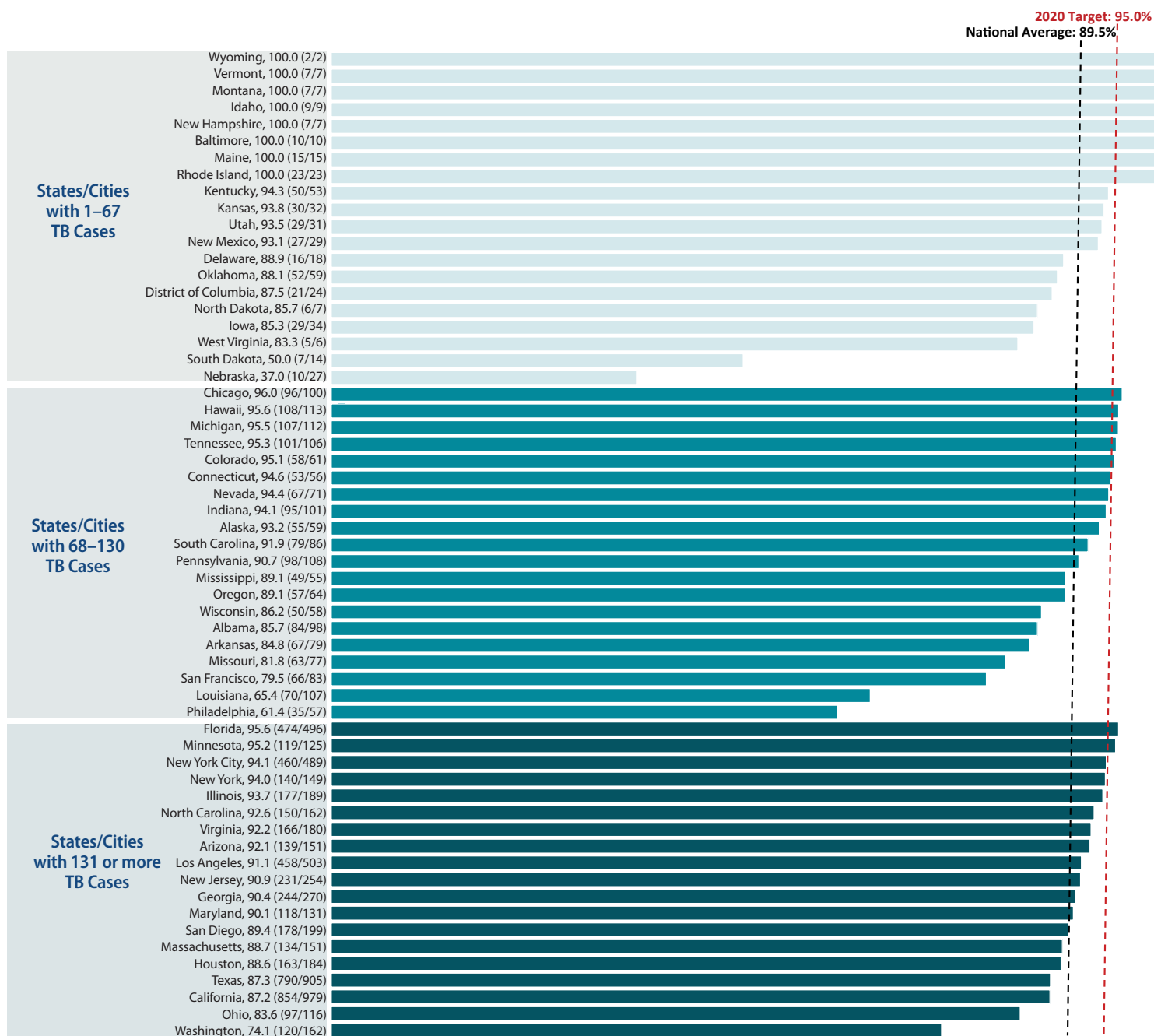


In 2016, the most recent year for which data are available, 11 states met or exceeded the 2020 national target of initiating treatment for 91.0% of people diagnosed with LTBI found during contact investigations; 23 states and 6 cities were short of the 2020 target, but exceeded the national average of 71.5% (Figure 11, page 10).

In 2016, 23 states and 4 cities met or exceeded the 2020 national target of treatment completion for 81.0% of people diagnosed with LTBI through contact investigation who started treatment; 4 states and 2 cities were short of the 2020 target, but met or exceeded the national average of 77.5% (Figure 12, page 11).

For more information about TB disease and TB prevention and control activities in the United States, visit the National TB Controllers Association website at: <http://www.tbcontrollers.org> and the CDC TB website at: <http://www.cdc.gov/tb>. If you need additional state-specific data not available in this report, you can contact your state TB control office: <http://www.cdc.gov/tb/links/tboffices.htm>.

Figure 9. Percentage of Newly Diagnosed TB Cases Completing Treatment ≤12 Months, United States, 2015



Baltimore, DC, DE, IA, ID, KS, ME, MT, ND, NE, NH, NM, RI, SD, UT, VT, WV and WY reported 50 or fewer TB cases in 2015. Due to the small denominator, data should be interpreted with caution.

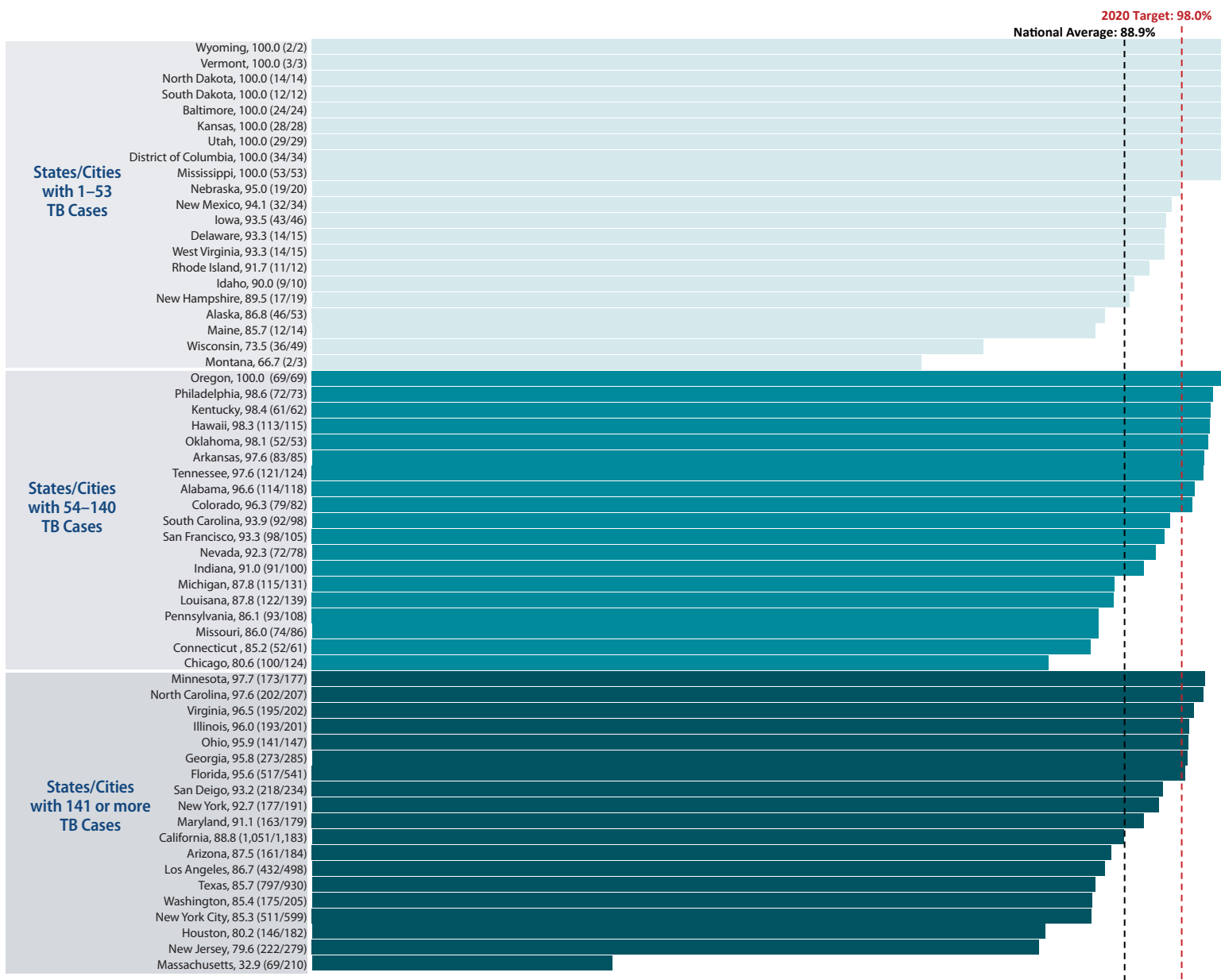
States/cities are grouped into thirds based on numbers of TB cases reported in 2015.

The fraction in each parenthesis reports the number of TB patients who completed treatment within 12 months out of the total number of patients who were eligible to complete treatment within 12 months.

See Appendix, Figure 9 on page 23

Data source: National TB Surveillance System as of June 1, 2018

Figure 10. Percentage of TB Cases with Known HIV Status (Positive or Negative), United States, 2017.



Baltimore, DC, DE, IA, ID, KS, ME, MT, ND, NE, NH, NM, RI, SD, UT, VT, WI, WV and WY reported 50 or fewer TB cases in 2017. Due to the small denominator, data should be interpreted with caution.

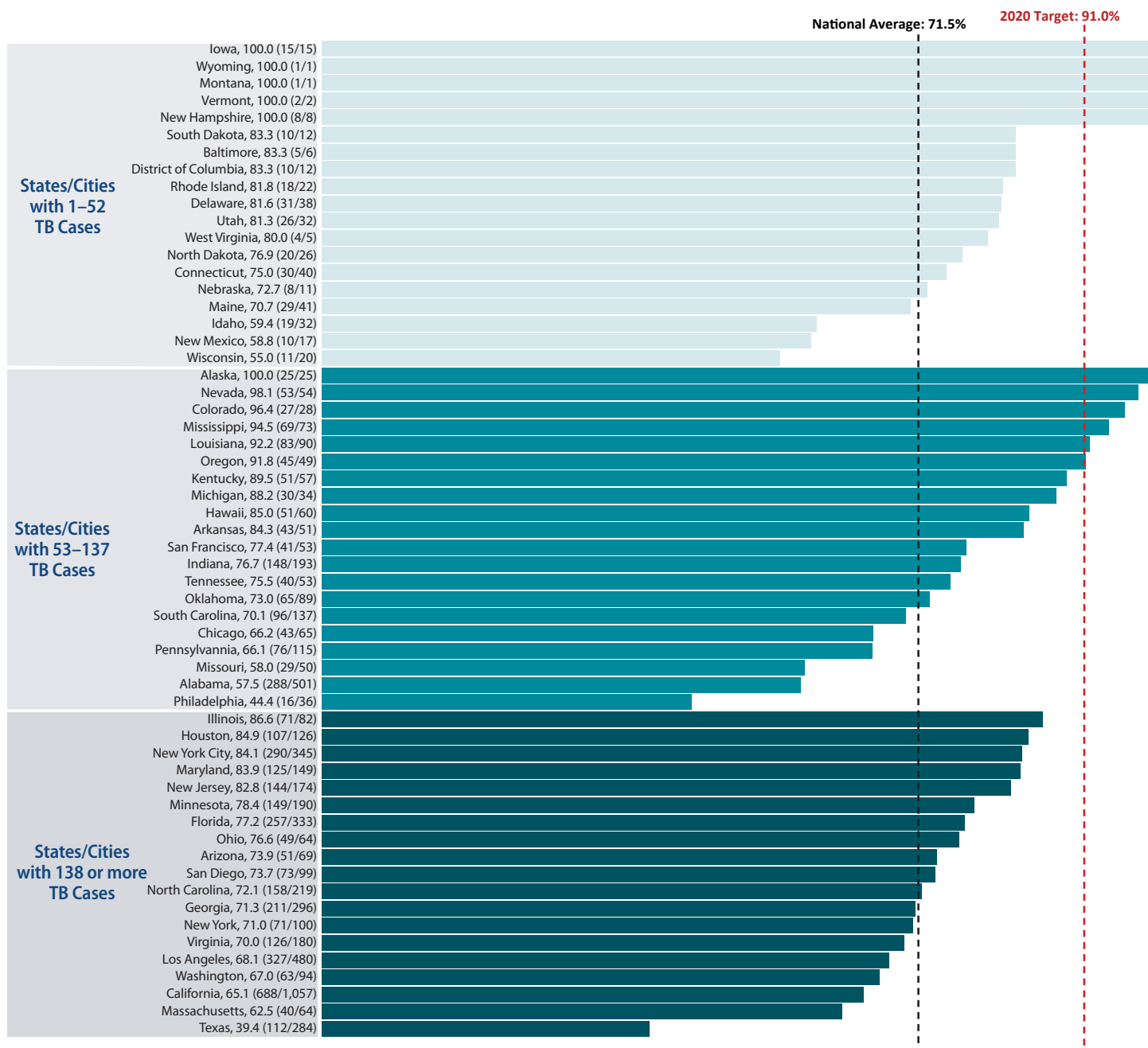
States/cities are grouped into thirds based on numbers of TB cases reported in 2017.

The fraction in each parenthesis reports the number of TB patients with either positive or negative HIV test results out of the total number of TB patients who were alive at diagnosis.

See Appendix, Figure 10 on page 23

Data source: National TB Surveillance System as of June 1, 2018

Figure 11. Percentage of Contacts (to Sputum Acid-Fast Bacilli Smear-Positive TB Patients) Newly Diagnosed with Latent TB Infection Who Began Treatment, United States, 2016



Baltimore, DC, DE, IA, ID, KS, ME, MT, ND, NE, NH, NM, RI, SD, UT, VT, WI, WV and WY reported 50 or fewer TB cases in 2016.

Due to the small denominator, data should be interpreted with caution. Data were unavailable for Kansas.

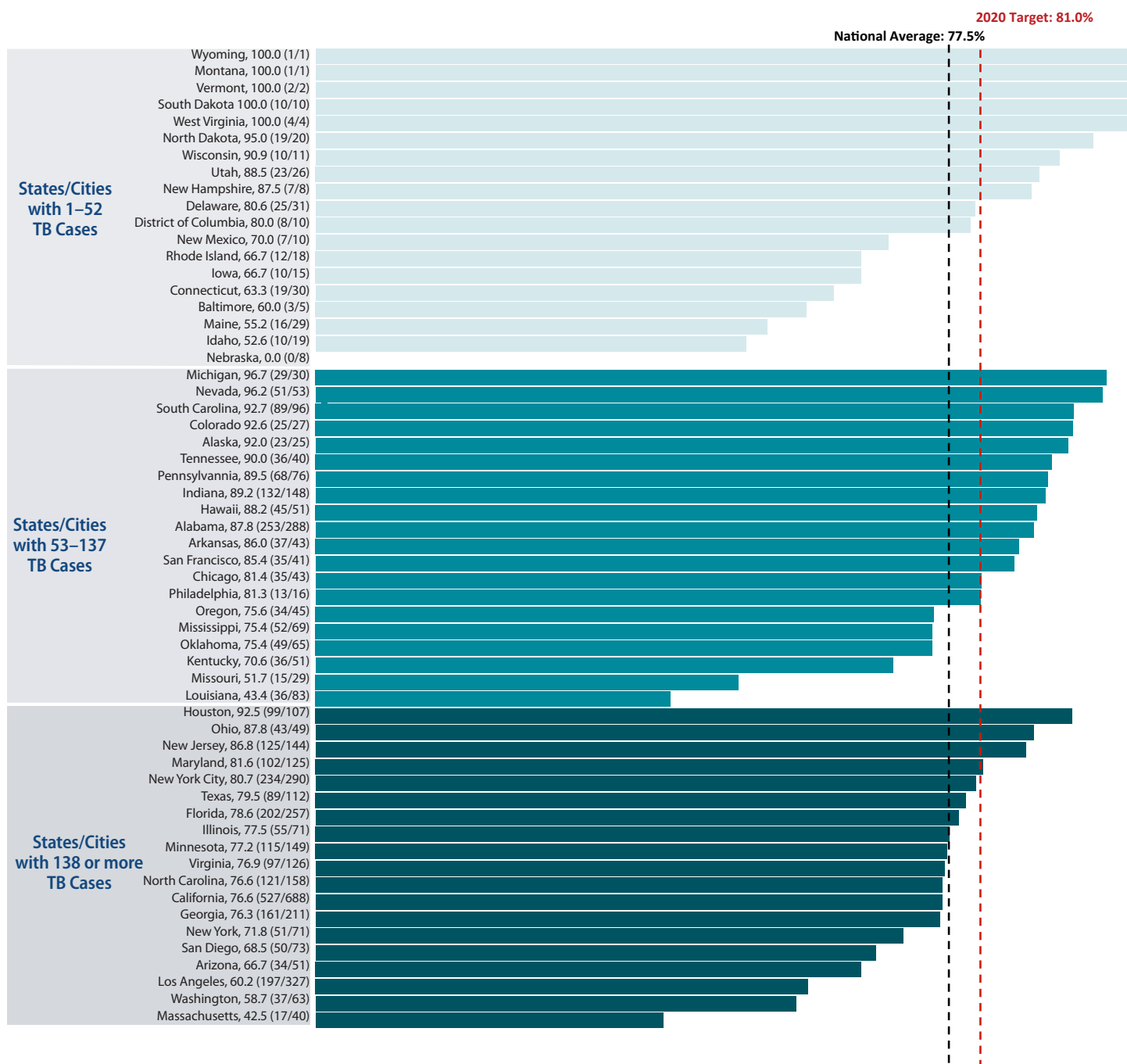
States/cities are grouped into thirds based on numbers of TB cases reported in 2016.

The fraction in each parenthesis reports the number of contacts who started treatment out of those contacts newly diagnosed with TB infection.

See Appendix, Figure 11 on page 24

Data Source: Aggregate Reports for Program Evaluation as of October 25, 2018

Figure 12. Percentage of Contacts (to Sputum Acid-Fast Bacilli Smear-Positive TB Patients) Newly Diagnosed with Latent TB Infection Who Completed Treatment, United States, 2016



Baltimore, DC, DE, IA, ID, KS, ME, MT, ND, NE, NH, NM, RI, SD, UT, VT, WI, WV and WY reported 50 or fewer TB cases in 2016. Data were unavailable for Kansas.

Due to the small denominator, data should be interpreted with caution.

States/cities are grouped into thirds based on numbers of TB cases reported in 2016.

The fraction in each parenthesis reports the number of contacts newly diagnosed with TB infection who completed treatment out of those contacts who started treatment.

See Appendix, Figure 12 on page 24

Data Source: Aggregate Reports for Program Evaluation as of October 25, 2018.

Table 1. Treatment Completion within 12 Months or Less among Newly Diagnosed TB Patients Age ≥ 15 Who were Homeless within the Year Prior to Diagnosis, United States, 2015

States* with 1-3 TB patients age ≥15 who were homeless	Percentage of homeless patients age ≥15 who completed treatment within 12 months [^]	Percentage of all patients who completed treatment within 12 months [†]	States* with 4-7 TB patients age ≥15 who were homeless	Percentage of homeless patients age ≥15 who completed treatment within 12 months [^]	Percentage of all patients who completed treatment within 12 months [†]	States* with 8 or more TB patients age ≥15 who were homeless*	Percentage of homeless patients age ≥15 who completed treatment within 12 months [^]	Percentage of all patients who completed treatment within 12 months [†]
Vermont	100.0	100.0	Kentucky	100.0	94.3	Alaska	100.0	93.2
Baltimore	100.0	100.0	Chicago	100.0	96.0	New Jersey	100.0	90.9
Maine	100.0	100.0	Minnesota	100.0	95.2	Georgia	95.8	90.4
Utah	100.0	93.6	Kansas	100.0	93.8	Florida	95.0	95.6
Wisconsin	100.0	86.2	Nevada	100.0	94.4	Los Angeles	94.9	91.1
Colorado	100.0	95.1	Indiana	100.0	94.1	San Diego	94.1	89.5
Missouri	100.0	81.8	Michigan	100.0	95.5	San Francisco	87.5	79.5
Hawaii	100.0	95.6	Alabama	83.3	85.7	Tennessee	87.5	95.3
Maryland	100.0	90.1	Arizona	83.3	92.1	New York City	81.0	94.1
Virginia	100.0	92.2	Ohio	80.0	83.6	California	80.0	87.2
New Mexico	100.0	93.1	South Carolina	75.0	91.9	North Carolina	77.8	92.6
Arkansas	100.0	84.8	Pennsylvania	75.0	90.7	Houston	73.7	88.6
New York	100.0	94.0	Washington	75.0	74.1	Texas	68.0	87.3
Oklahoma	50.0	88.1	Mississippi	71.4	89.1			
District of Columbia	0.0	87.5	Massachusetts	71.4	88.7			
Philadelphia	0.0	61.4	Illinois	71.4	93.7			
South Dakota	0.0	50.0	Oregon	66.7	89.1			
			Louisiana	66.7	65.4			

*States/cities are grouped into thirds based on numbers of homeless TB cases reported in 2015.

[^]Among those age ≥15 who were eligible to complete treatment within 12 months.

[†]Among all patients of any age who were eligible to complete treatment within 12 months.

Note: CT, DE, IA, ID, MT, NH, NE, ND, RI, WV, WY did not report TB cases among persons age ≥15 experiencing homelessness who were eligible to complete treatment.

Data source: National TB Surveillance System as of June 1, 2018.

Table 2. Treatment Completion within 12 Months or Less among Newly Diagnosed TB Patients Age ≥15 who were Incarcerated at the Time of Diagnosis, United States, 2015

States* with 1-2 TB patients age ≥15 who were incarcerated	Percentage of incarcerated patients age ≥15 who completed treatment within 12 months [^]	Percentage of all patients who completed treatment within 12 months [†]	States* with 3-5 TB patients age ≥15 who were incarcerated	Percentage of incarcerated patients age ≥15 who completed treatment within 12 months [^]	Percentage of all patients who completed treatment within 12 months [†]	States* with 6 or more TB patients age ≥15 who were incarcerated	Percentage of incarcerated patients age ≥15 who completed treatment within 12 months [^]	Percentage of all patients who completed treatment within 12 months [†]
Kansas	100.0	93.8	Kentucky	100.0	94.3	Florida	100.0	95.6
Oregon	100.0	89.1	Georgia	100.0	90.4	San Diego	92.9	89.5
Pennsylvania	100.0	90.7	New Jersey	100.0	90.9	Arizona	88.9	92.1
Michigan	100.0	95.5	Indiana	100.0	94.1	Alabama	87.5	85.7
Ohio	100.0	83.6	New York City	100.0	94.1	Houston	85.7	88.6
Minnesota	100.0	95.2	Los Angeles	100.0	91.1	California	83.3	87.2
Massachusetts	100.0	88.7	Tennessee	75.0	95.3	Oklahoma	80.0	88.1
Texas	100.0	87.3	Washington	66.7	74.1	South Carolina	60.0	91.9
Alaska	100.0	93.2	Illinois	66.7	93.7			
Nevada	100.0	94.4	Louisiana	50.0	65.4			
New York	100.0	94.0						
North Carolina	100.0	92.6						
Mississippi	50.0	89.1						
North Dakota	0.0	85.7						
Philadelphia	0.0	61.4						

*States/cities are grouped into thirds based on numbers of incarcerated TB cases reported in 2015.

[^]Among those age >15 who were eligible to complete treatment within 12 months

[†]Among all patients of any age who were eligible to complete treatment within 12 months.

Note: AR, Baltimore, Chicago, CO, CT, DC, DE, HI, IA, ID, MD, ME, MO, MT, NE, NH, NM, RI, San Francisco, SD, UT, VA, VT, WI, WV, WY did not report TB cases among incarcerated persons age ≥15 who were eligible to complete treatment.

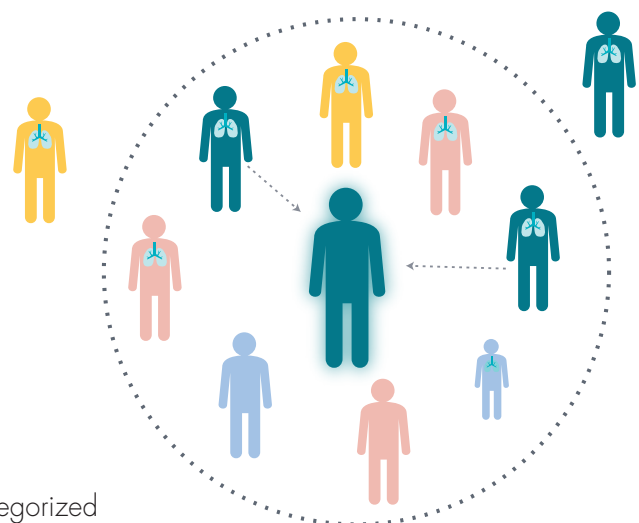
Data source: National TB Surveillance System as of June 1, 2018



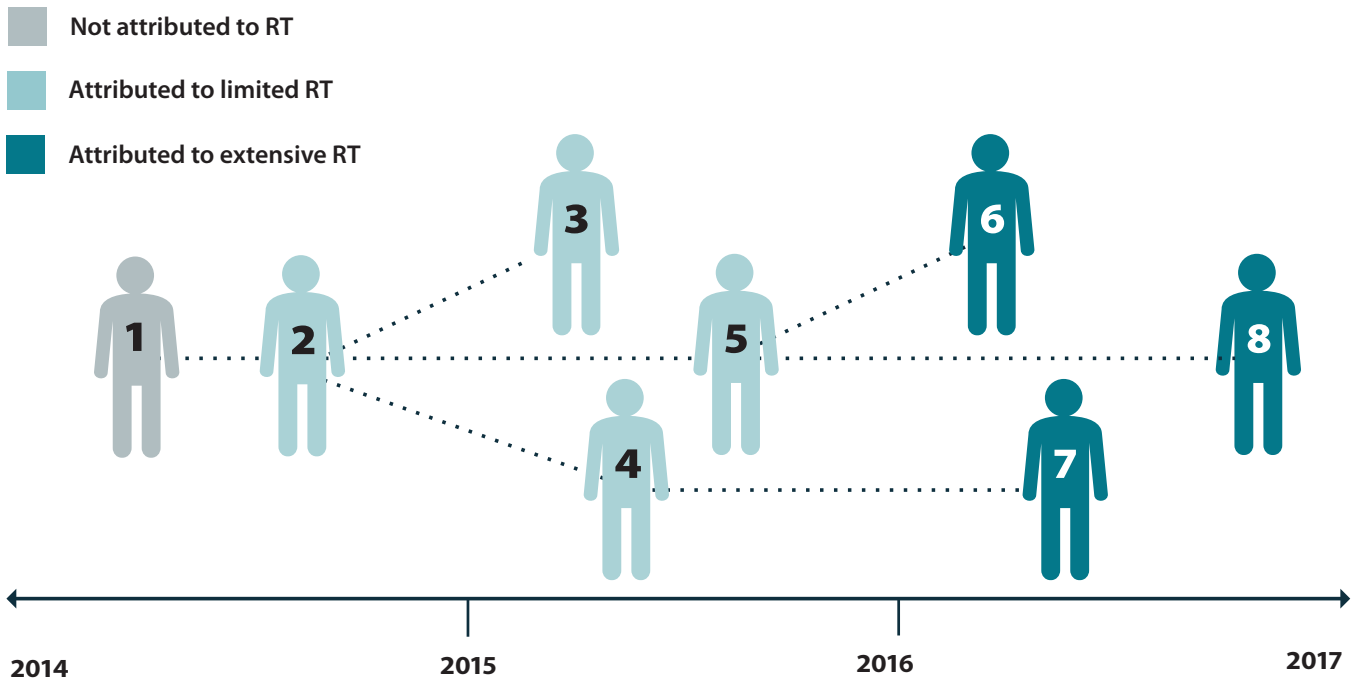
Estimates of Recent Transmission

Control of TB transmission is accomplished through prompt detection and treatment of patients with infectious TB disease, administrative controls designed to reduce exposure to persons with infectious TB, and contact investigations to identify exposed persons at risk for LTBI (i.e., candidates for LTBI testing and treatment). Many clinical, epidemiologic, and social factors can make these activities challenging to implement successfully. National estimates of recent transmission for cases reported during 2016-2017 provide a starting place within programs to understand better the populations affected by recent TB transmission and monitor trends over time in its control. However, findings from local investigation of clusters and outbreaks, using whole-genome sequencing (WGS) results when available, are preferable because estimates of recent transmission rely on surveillance data and are limited by the molecular resolution of genotyping.

Using national molecular surveillance data, CDC attributes a TB case to recent transmission if a plausible source case⁴ can be identified in a person who has the same *M. tuberculosis* genotype, has an infectious form of TB disease, is at least 10 years of age, resides within 10 miles of the given TB case, and was diagnosed within 2 years before the given TB case. For example, the given case in the center of the figure to the right has two plausible source cases (represented with arrows). The plausible source cases have the same genotype (matching colors), are at least 10 years old (larger), have infectious forms of TB (lungs), and are proximal geographically and in time (dotted circle).



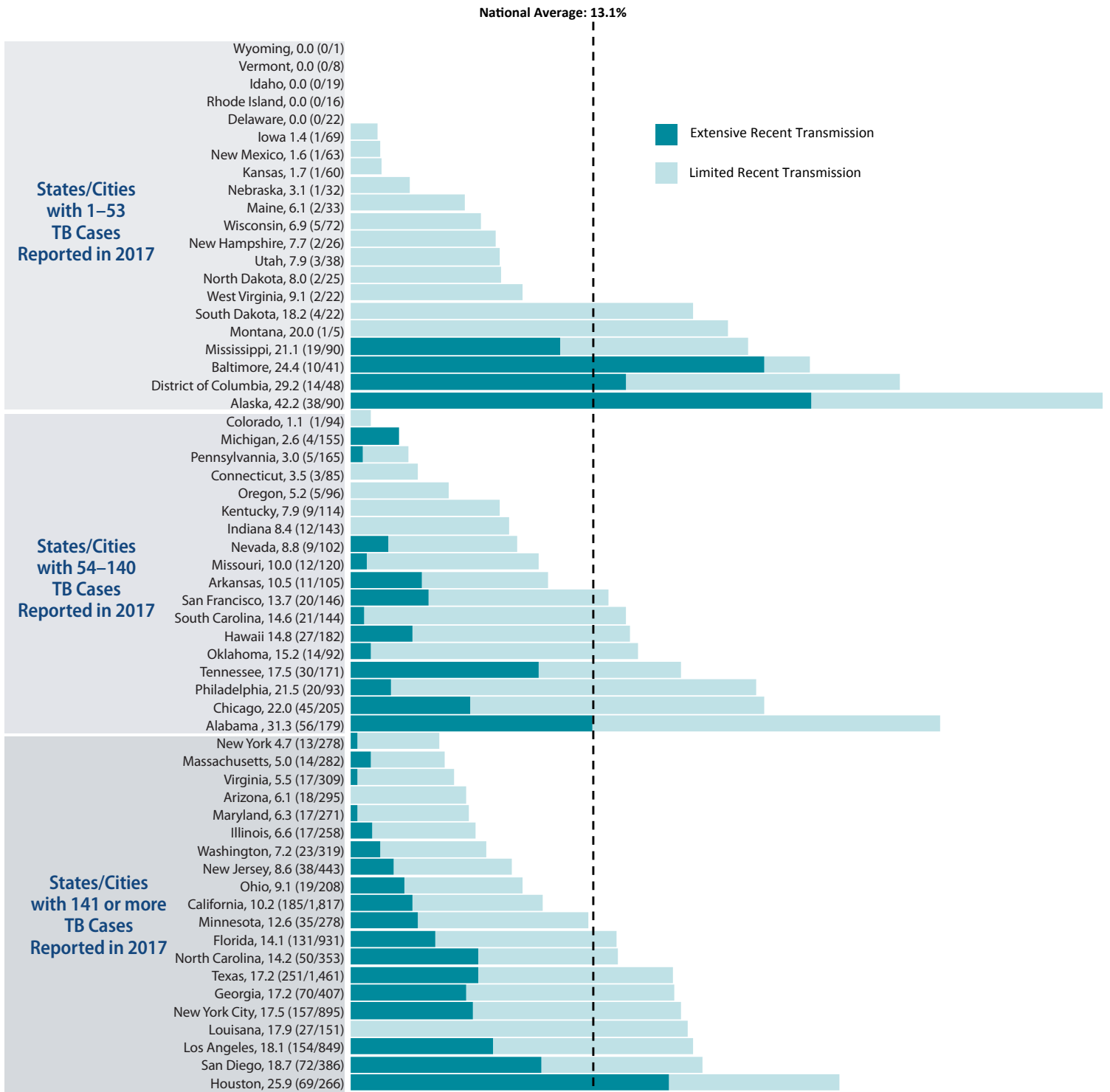
Each TB case attributed to recent transmission is further categorized as attributed to extensive recent transmission if the case belongs to a plausible transmission chain of six or more cases with at least five preceding cases in the chain within the previous three years. Otherwise, the case is categorized as attributed to limited recent transmission. For example, case 1 in the figure below is a plausible source case, but not attributed to recent transmission. Cases 2-5 are attributed to limited recent transmission, and cases 6-8 are attributed to extensive recent transmission.



For 2016-2017, 4 states and 2 cities with 1-53 TB cases reported in 2017 had percentages of TB cases attributed to recent transmission that were above the national estimate (13.1%); these percentages should be interpreted with caution because small denominators can create unstable estimates (Figure 13, page 16). Five states and 3 cities with 54-140 reported cases, and 5 states and 4 cities with 141 or more reported cases, were above 13.1%. The relative amounts of limited and extensive recent transmission varied substantially. Because not only TB incidence but also demographics and molecular epidemiology vary considerably among states, counties, and cities, these data should not be compared across jurisdictions. Additional information on estimates of recent transmission and their limitations can be found in CDC’s “Reported Tuberculosis in the United States, 2017” at: www.cdc.gov/tb/statistics/reports/2017/default.htm.

⁴France AM, Grant J, Kammerer JS, Navin TR. A field-validated approach using surveillance and genotyping data to estimate tuberculosis attributable to recent transmission in the United States. *Am J Epidemiol* 2015; 182: 799-807.

Figure 13. Percentage of TB Cases Attributed to Recent Transmission, United States, 2016-2017*



*This horizontal bar graph shows the percentages of TB cases attributed to recent transmission by individual states and cities in the United States during 2016-2017. The fraction in each parenthesis reports the number of cases attributed to recent transmission out of all genotyped cases that are eligible to be evaluated for recent transmission (i.e., complete data for the plausible-source case method's algorithm). States and cities are categorized into three groups based on numbers of TB cases reported in 2017 and are ordered by increasing percentage of cases attributed to recent transmission. Dark and light bars show qualitatively the relative proportions of genotyped cases that were attributed to extensive and limited recent

transmission, respectively. The total length of the bar represents all recent transmission (i.e., the percentage sums of extensive recent transmission and limited recent transmission equal all recent transmission). During 2016–2017, 13.1% of genotyped cases were attributed to recent transmission in the United States. To understand better the populations affected by recent TB transmission and monitor trends over time in its control, findings from local investigation of clusters and outbreaks, using WGS results when available, are preferable because estimates of recent transmission rely on surveillance data and are limited by the molecular resolution of genotyping. Because not only TB incidence but also demographics and molecular epidemiology vary considerably among states, counties, and cities, these data should not be compared across jurisdictions.

Data source: National TB Surveillance System as of June 1, 2018



Appendices

Figure 1. Overall TB Incidence, United States, 2017. This map shows states and cities color coded into one of 3 categories based on TB incidence: those that were at or below the 2020 target of 1.4 TB cases/100,000 persons (Montana, Wyoming, Vermont, Idaho, Wisconsin, West Virginia, Utah, Kansas, Pennsylvania, Maine, Nebraska, Rhode Island, Ohio, Michigan, Oklahoma, New Hampshire, and Missouri), those that were above the 2020 target of 1.4, but were at or below the national average of 2.8 (Kentucky, Iowa, Colorado, Indiana, Delaware, South Dakota, Oregon, New York, Connecticut, New Mexico, Mississippi, North Dakota, Tennessee, South Carolina, Illinois, North Carolina, Virginia, Alabama, Florida, Nevada, Arizona, Washington, Georgia, and Arkansas) and those that were above the national average of 2.8 (Louisiana, Massachusetts, New Jersey, Minnesota, Maryland, Texas, Baltimore, Chicago, California, Philadelphia, District of Columbia, Los Angeles, San Diego, New York City, Alaska, Houston, Hawaii, and San Francisco).

Figure 2. Overall TB Incidence, United States, 2017. This horizontal bar graph shows individual state and city TB incidence per 100,000 persons. States and cities are categorized into 3 groups based on numbers of TB cases reported in 2017. Within each group states and cities are ordered by increasing incidence and color coded by whether or not they met the 2020 national target (1.4), were between the 2020 target and national average (2.8), or had incidence above the national average. Among states/cities that reported 1-53 TB cases in 2017, incidences ranged from 0.3 in Wyoming to 7.2 in Alaska. Montana, Wyoming, Vermont, Idaho, Wisconsin, West Virginia, Utah, Kansas, Maine, Nebraska, Rhode Island, and New Hampshire had incidences at or below the 2020 target; Iowa, Delaware, South Dakota, New Mexico, Mississippi, North Dakota had incidences that were above the 2020 target, but were at or below the national average; Baltimore, the District of Columbia, and Alaska had incidences that were above the national average. Among states/cities that reported 54-140 TB cases in 2017, incidences ranged from 1.0 in Pennsylvania to 12.1 in San Francisco. Pennsylvania, Michigan, and Oklahoma, and Missouri had incidences at or below the 2020 target; Kentucky, Colorado, Indiana, Oregon, Connecticut, Tennessee, South Carolina, Alabama, Nevada, and Arkansas had incidences that were above the 2020 target, but were at or below the national average; Louisiana, Chicago, Philadelphia, Hawaii, and San Francisco had incidences that were above the national average. Among states/cities that reported 41 or more TB cases in 2017, incidence ranged from 1.3 in Ohio to 8.1 in Houston. Ohio had an incidence at or below the 2020 target; New York, Illinois, North Carolina, Virginia, Florida, Arizona, Washington, and Georgia had incidences that were above the 2020 target, but were at or below the national average; Massachusetts, New Jersey, Minnesota, Maryland, Texas, California, Los Angeles, San Diego, New York City, and Houston had incidences that were above the national average.

Figure 3. TB Incidence, U.S.-born Persons, United States, 2017. This map shows states and cities color coded into one of 3 categories based on TB incidence among U.S.-born persons: those that were at or below the 2020 target of 0.4 TB cases/100,000 U.S.-born persons (Rhode Island, Idaho, Maine, Vermont, Nebraska, Wisconsin, Utah, Iowa, Montana, New York, Pennsylvania, Kansas, New Mexico, Connecticut, Ohio, Colorado, and Indiana), those that were above the 2020 target of 0.4, but were at or below the national average of 1.0 (New Hampshire, Massachusetts, Virginia, West Virginia, Oregon, Michigan, Minnesota, Illinois, Washington, Missouri, Nevada, Maryland, New Jersey, Kentucky, Oklahoma, Arizona, South Dakota, North Dakota, North Carolina, and Delaware) and those that were above the national average of 1.0 (Tennessee, California, Los Angeles, Florida, Hawaii, San Francisco, South Carolina, Georgia, Mississippi, New York City, Texas, Philadelphia, Arkansas, Chicago, Louisiana, District of Columbia, Alabama, Baltimore, San Diego, Houston, and Alaska). Wyoming did not report any TB cases among U.S.-born persons.

Figure 4. TB Incidence, U.S.-born Persons, United States, 2017. This horizontal bar graph shows individual state and city TB incidence per 100,000 U.S.-born persons. States and cities are categorized into 3 groups based on numbers of TB cases reported in 2017. Within each group states and cities are ordered by increasing incidence and color coded by whether or not they met the 2020 national target (0.4), were between the 2020 target and national average (1.0), or had incidence above the national average. Among states/cities that reported 1-53 TB cases in 2017, incidence among U.S.-born persons ranged from 0.1 in Rhode Island to 5.6 in Alaska. Rhode Island, Idaho, Maine, Vermont, Nebraska, Wisconsin, Utah, Iowa, Montana, Kansas, and New Mexico had incidences at or below the 2020 target; New Hampshire, West Virginia, South Dakota, North Dakota, and Delaware had incidences that were above the 2020 target, but were at or below the national average; Mississippi, District of Columbia, Baltimore, and Alaska had incidences that were above the national average. Among states/cities that reported 54-140 TB cases in 2017, incidence among U.S.-born persons ranged from 0.3 in Pennsylvania to 2.0 in Alabama. Pennsylvania, Connecticut, Colorado, and Indiana had incidences at or below the 2020 target; Oregon, Michigan, Missouri, Nevada, Kentucky, Oklahoma, Tennessee, Hawaii, and San Francisco had incidences that were above the 2020 target, but were at or below the national average; South Carolina, Philadelphia, Arkansas, Chicago, and Alabama had incidences that were above the national average. Among states/cities that reported 141 or more TB cases in 2017, incidence among U.S.-born persons ranged from 0.3 in New York to 4.0 in Houston. New York and Ohio had incidences at or below the 2020 target; Massachusetts, Virginia, Minnesota, Illinois, Washington, Maryland, New Jersey, Arizona, and North Carolina had incidences that were above the 2020 target, but were at or below the national average; California, Los Angeles, Florida, Georgia, New York City, Texas, Louisiana, San Diego, and Houston had incidences that were above the national average.

Figure 5. TB Incidence, Non-U.S.-born Persons, United States, 2017. This map shows states and cities color coded into one of 3 categories based on TB incidence among non-U.S.-born persons: those that were at or below the 2020 target of 11.1 TB cases/100,000 non-U.S.-born persons (Delaware, Vermont, Florida, Utah, Idaho, Rhode Island, Connecticut, Wyoming, Kansas, Nevada, and Oklahoma), those that were above the 2020 target of 11.1, but were at or below the national average of 14.4 (New Jersey, Colorado, Michigan, Nebraska, New York, Oregon, Illinois, Wisconsin, Pennsylvania, South Carolina, Los Angeles, Texas, Alabama, Mississippi, Arizona, North Carolina, and Chicago) and those that were above the national average of 14.4 (Georgia, New Hampshire, New Mexico, Washington, California, Massachusetts, Virginia, New York City, Maryland, Tennessee, Missouri, Houston, Kentucky, South Dakota, Ohio, Indiana, North Dakota, Philadelphia, Arkansas, San Diego, District of Columbia, Baltimore, West Virginia, Iowa, Maine, Alaska, Louisiana, Minnesota, San Francisco, and Hawaii). Montana did not report any TB cases among non-U.S.-born persons.

Figure 6. TB Incidence, Non-U.S.-born Persons, United States, 2017. TB Incidence, Non-U.S.-born Persons, United States, 2017. This horizontal bar graph shows individual state and city TB incidence per 100,000 non-U.S.-born persons. States and cities are categorized into 3 groups based on numbers of TB cases reported in 2017. Within each group states and cities are ordered by increasing incidence and color coded by whether or not they met the 2020 national target (11.1),

were between the 2020 target and national average (14.4), or had incidence above the national average. Among states/cities that reported 1-53 TB cases in 2017, incidence among non-U.S.-born persons ranged from 6.4 in Delaware to 26.5 in Alaska. Delaware, Vermont, Utah, Idaho, Rhode Island, Wyoming, and Kansas had incidences at or below the 2020 target; Nebraska, Wisconsin, and Mississippi had incidences that were above the 2020 target, but were at or below the national average; New Hampshire, New Mexico, South Dakota, North Dakota, District of Columbia, Baltimore, West Virginia, Iowa, Maine, and Alaska had incidences that were above the national average. Among states/cities that reported 54-140 TB cases in 2017, incidences among non-U.S.-born persons ranged from 9.7 in Connecticut to 38.6 in Hawaii. Connecticut, Nevada, and Oklahoma had incidences at or below the 2020 target; Colorado, Michigan, Oregon, Pennsylvania, South Carolina, and Alabama had incidences that were above the 2020 target, but were at or below the national average; Chicago, Tennessee, Missouri, Kentucky, Indiana, Philadelphia, Arkansas, Louisiana, San Francisco, and Hawaii had incidences that were above the national average. Among states/cities that reported 141 or more TB cases in 2017, incidence among non-U.S.-born persons ranged from 7.4 in Florida to 30.5 in Minnesota. Florida had an incidence at or below the 2020 target; New Jersey, New York, Illinois, Los Angeles, Texas, Arizona, and North Carolina had incidences that were above the 2020 target, but were at or below the national average; Georgia, Washington, California, Massachusetts, Virginia, New York City, Maryland, Houston, Ohio, San Diego, and Minnesota had incidences that were above the national average.

Figure 7. TB Incidence, U.S.-born Non-Hispanic Blacks or African Americans, United States, 2017. This map shows states and cities color coded into one of 3 categories based on TB incidence among U.S.-born non-Hispanic black or African American persons: those that were at or below the 2020 target of 1.5 TB cases/100,000 U.S.-born non-Hispanic black or African American persons (Indiana, Pennsylvania, Maryland, Virginia, Connecticut, Arizona, Kentucky, Nevada, Kansas, Ohio, New York, West Virginia, Illinois, Wisconsin, and Michigan), those that were above the 2020 target of 1.5, but were at or below the national average of 2.8 (New Jersey, Colorado, Oregon, Oklahoma, Missouri, North Carolina, Massachusetts, California, Philadelphia, and New York City), and those that were above the national average of 2.8 (Louisiana, Washington, Baltimore, New Mexico, Tennessee, Delaware, Mississippi, South Carolina, Arkansas, Georgia, Texas, District of Columbia, Alabama, Los Angeles, Florida, San Diego, Chicago, Alaska, Minnesota, New Hampshire, Houston, and San Francisco). Montana, Vermont, Idaho, Rhode Island, Maine, North Dakota, South Dakota, Nebraska, Utah, Iowa, Hawaii, and Wyoming did not report any TB cases among U.S.-born non-Hispanic black or African American persons.

Figure 8. TB Incidence, U.S.-born Non-Hispanic Blacks or African Americans, United States, 2017. This horizontal bar graph shows individual state and city TB incidence per 100,000 U.S.-born non-Hispanic black or African American persons. States and cities are categorized into 3 groups based on numbers of TB cases reported in 2017. Within each group states and cities are ordered by increasing incidence and color coded by whether or not they met the 2020 national target (1.5), were between the 2020 target and national average (2.8), or had incidence above the national average. Among states/cities that reported 1-53 TB cases in 2017, incidence ranged from 1.3 in Kansas to 7.9 in New Hampshire. Kansas, West Virginia, and Wisconsin had incidences at or below the 2020 target; no states or cities had incidences that were above the 2020 target, but were at or below the national average; Baltimore, New Mexico, Delaware, Mississippi, District of Columbia, Alaska, and New Hampshire had incidences that were above the national average. Among states/cities that reported 54-140 TB cases in 2017, incidence among U.S.-born non-Hispanic black or African American persons ranged from 0.5 in Indiana to 9.6 in San Francisco. Indiana, Pennsylvania, Connecticut, Kentucky, Nevada, and Michigan had incidences at or below the 2020 target; Colorado, Oregon, Oklahoma, Missouri, and Philadelphia had incidences that were above the 2020 target, but were at or below the national average; Tennessee, South Carolina, Arkansas, Alabama, Chicago, and San Francisco had incidences that were above the national average. Among states/cities that reported 141 or more TB cases in 2017, incidence among U.S.-born non-Hispanic black or African American persons ranged from 1.1 in Maryland to 8.2 in Houston. Maryland, Virginia, Arizona, Ohio, New York, and Illinois had incidences at or below the 2020 target; New Jersey, North Carolina, Massachusetts, California, and New York City had incidences that were above the 2020 target, but were at or below the national average; Louisiana, Washington, Georgia, Texas, Los Angeles, Florida, San Diego, Minnesota, and Houston had incidences that were above the national average.

Figure 9. Percentage of Newly Diagnosed TB Cases Completing Treatment ≤ 12 Months, United States, 2015. This horizontal bar graph shows percentages for treatment completion by individual state and city. States and cities are categorized into 3 groups based on numbers of TB cases reported in 2015. Within each group states and cities are ordered by decreasing percentage of TB cases who completed treatment within 12 months. Vertical lines show the 2020 national target (95.0%) and the national average (89.5%). Among states/cities that reported 1-67 TB cases in 2015, percentages ranged from 100 in Wyoming, Vermont, Montana, Idaho, New Hampshire, Baltimore, Maine, and Rhode Island to 37.0 in Nebraska. The states and cities that achieved 100% were above the 2020 target; Kentucky, Kansas, Utah, and New Mexico had percentages that were below the 2020 target but were at or above the national average; Delaware, Oklahoma, District of Columbia, North Dakota, Iowa, West Virginia, South Dakota, and Nebraska had percentages that were below the national average. Among states/cities that reported 68-130 TB cases in 2015, percentages ranged from 96.0 in Chicago to 61.4 in Philadelphia. Chicago, Hawaii, Michigan, Tennessee, and Colorado had percentages at or above the 2020 target; Connecticut, Nevada, Indiana, Alaska, South Carolina, and Pennsylvania had percentages that were below the 2020 target but were at or above the national average; Mississippi, Oregon, Wisconsin, Alabama, Arkansas, Missouri, San Francisco, Louisiana, and Philadelphia had percentages that were below the national average. Among states/cities that reported 131 or more TB cases in 2015, percentages ranged from 95.6 in Florida to 74.1 in Washington. Florida and Minnesota had percentages at or above the 2020 target; New York City, New York, Illinois, North Carolina, Virginia, Arizona, Los Angeles, New Jersey, Georgia, and Maryland had percentages that were below the 2020 target but were at or above the national average; San Diego, Massachusetts, Houston, Texas, California, Ohio, and Washington had percentages that were below the national average.

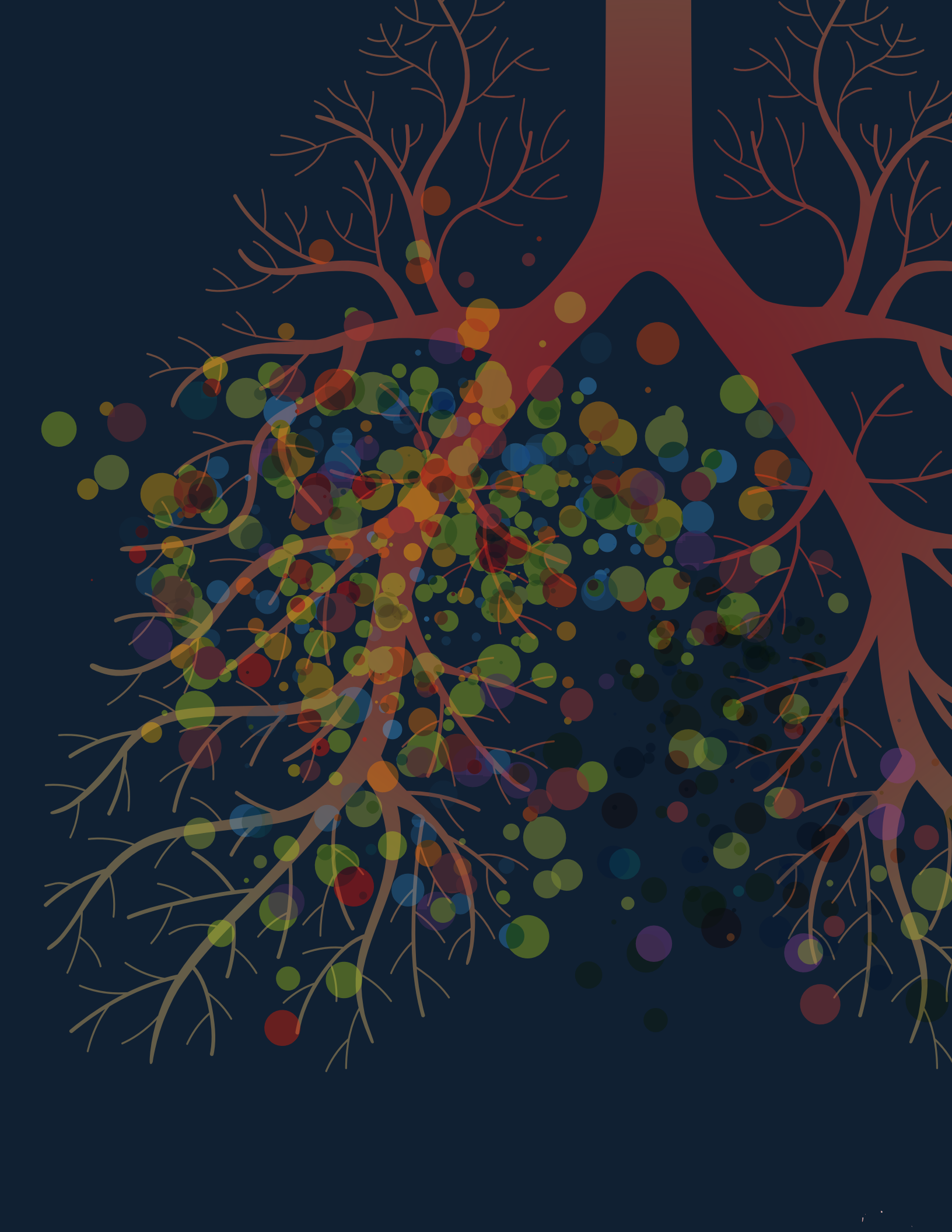
Figure 10. Percentage of TB Cases with Known HIV Status (Positive or Negative), United States, 2017. This horizontal bar graph shows percentages of TB cases with HIV status reported by individual state and city. States and cities are categorized into 3 groups based on numbers of TB cases reported in 2017. Within each group states and cities are ordered by decreasing percentage of TB cases who had HIV status reported. Vertical lines show the 2020 national target (98.0%) and the national average (88.9%). Among states/cities that reported 1-53 TB cases in 2017, percentages ranged from 100 in Wyoming, Vermont, North Dakota, South Dakota, Baltimore, Kansas, Utah, the District of Columbia, and Mississippi to 66.7 in Montana. The states and cities that achieved 100% were above the 2020 target; Nebraska, New Mexico, Iowa, Delaware, West Virginia, Rhode Island, Idaho, and New Hampshire had percentages that

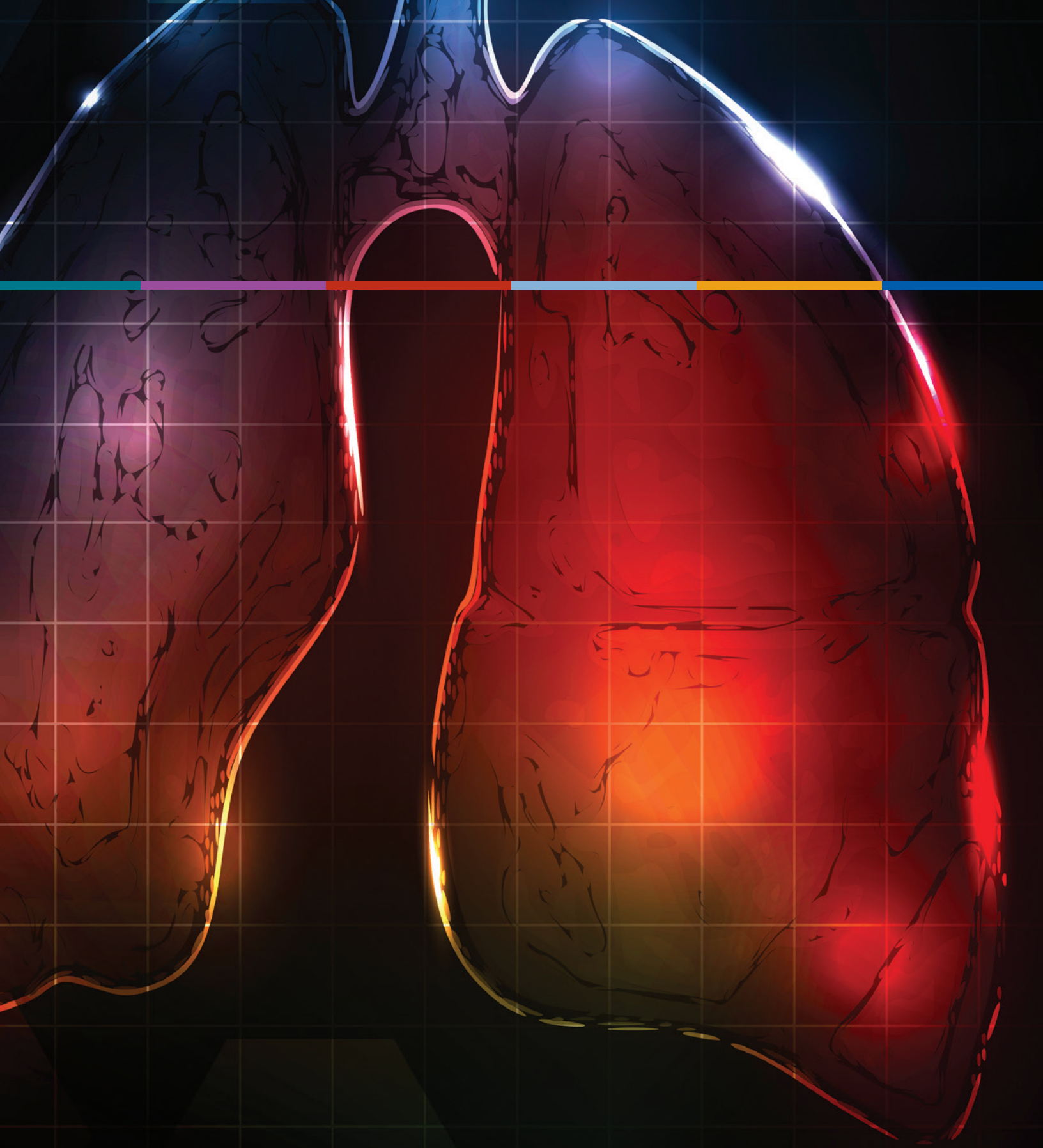
were below the 2020 target but were at or above the national average; Alaska, Maine, Wisconsin, and Montana had percentages that were below the national average. Among states/cities that reported 54-140 TB cases in 2017, percentages ranged from 100 in Oregon to 80.6 in Chicago. Oregon, Philadelphia, Kentucky, Hawaii, and Oklahoma had percentages at or above the 2020 target; Arkansas, Tennessee, Alabama, Colorado, South Carolina, San Francisco, Nevada, and Indiana had percentages that were below the 2020 target but were at or above the national average; Michigan, Louisiana, Pennsylvania, Missouri, Connecticut, and Chicago had percentages that were below the national average. Among states/cities that reported 141 or more TB cases in 2017, percentages ranged from 97.7 in Minnesota to 32.9 in Massachusetts. All states and cities in this category (Minnesota, North Carolina, Virginia, Illinois, Ohio, Georgia, Florida, San Diego, New York, Maryland, California, Arizona, Los Angeles, Texas, Washington, New York City, Houston, New Jersey, and Massachusetts) were below both the 2020 target and the national average.

Figure 11. Percentage of Contacts (to Sputum Acid-Fast Bacilli Smear-Positive TB Patients) Newly Diagnosed with Latent TB Infection Who Began Treatment, United States, 2016. This horizontal bar graph shows percentages of contacts to smear-positive TB cases who were diagnosed with and started treatment for LTBI. States and cities are categorized into 3 groups based on numbers of TB cases reported in 2016. Within each group states and cities are ordered by decreasing percentage of contacts with LTBI who started treatment. Vertical lines show the 2020 national target (91.0%) and the national average (71.5%). Among states/cities that reported 1-52 TB cases in 2016, percentages ranged from 100 in Iowa, Wyoming, Montana, Vermont, and New Hampshire to 55.0 in Wisconsin. The states that achieved 100% were above the 2020 target; South Dakota, Baltimore, District of Columbia, Rhode Island, Delaware, Utah, West Virginia, North Dakota, Connecticut, and Nebraska had percentages that were below the 2020 target but were at or above the national average; Maine, Idaho, New Mexico, and Wisconsin had percentages that were below the national average. Among states/cities that reported 53-137 TB cases in 2016, percentages ranged from 100 in Alaska to 44.4 in Philadelphia. Alaska, Nevada, Colorado, Mississippi, Louisiana, and Oregon had percentages at or above the 2020 target; Kentucky, Michigan, Hawaii, Arkansas, San Francisco, Indiana, Tennessee, and Oklahoma had percentages that were below the 2020 target but were at or above the national average; South Carolina, Chicago, Pennsylvania, Missouri, Alabama, and Philadelphia had percentages that were below the national average. Among states/cities that reported 138 or more TB cases in 2016, percentages ranged from 86.6 in Illinois to 39.4 in Texas. There were no states/cities with percentages at or above the 2020 target; Illinois, Houston, New York City, Maryland, New Jersey, Minnesota, Florida, Ohio, Arizona, San Diego, and North Carolina had percentages that were below the 2020 target but were at or above the national average; Georgia, New York, Virginia, Los Angeles, Washington, California, Massachusetts, and Texas had percentages that were below the national average.

Figure 12. Percentage of Contacts (to Sputum Acid-Fast Bacilli Smear-Positive TB Patients) Newly Diagnosed with Latent TB Infection Who Completed Treatment, United States, 2016. This horizontal bar graph shows percentages of contacts to smear-positive TB cases who completed treatment for LTBI. States and cities are categorized into 3 groups based on numbers of TB cases reported in 2016. Within each group states and cities are ordered by decreasing percentage of contacts with LTBI who completed treatment out of those who started treatment. Vertical lines show the 2020 national target (81.0%) and the national average (77.5%). Among states/cities that reported 1-53 TB cases in 2016, percentages ranged from 100 in Wyoming, Montana, Vermont, South Dakota, and West Virginia to 0 in Nebraska. In addition to the states that achieved 100%, North Dakota, Wisconsin, Utah, and New Hampshire had percentages at or above the 2020 target; Delaware and the District of Columbia had percentages that were below the 2020 target but were at or above the national average; New Mexico, Rhode Island, Iowa, Connecticut, Baltimore, Maine, Idaho, and Nebraska had percentages that were below the national average. Among states/cities that reported 53-137 TB cases in 2016, percentages ranged from 96.7 in Michigan to 43.4 in Louisiana. Michigan, Nevada, South Carolina, Colorado, Alaska, Tennessee, Pennsylvania, Indiana, Hawaii, Alabama, Arkansas, San Francisco, Chicago, and Philadelphia had percentages at or above the 2020 target; no states or cities had percentages that were below the 2020 target but were at or above the national average; Oregon, Mississippi, Oklahoma, Kentucky, Missouri, and Louisiana had percentages that were below the national average. Among states/cities that reported 138 or more TB cases in 2016, percentages ranged from 92.5 in Houston to 42.5 in Massachusetts. Houston, Ohio, New Jersey, and Maryland had percentages at or above the 2020 target; New York City, Texas, Florida, and Illinois had percentages that were below the 2020 target but were at or above the national average; Minnesota, Virginia, North Carolina, California, Georgia, New York, San Diego, Arizona, Los Angeles, Washington, and Massachusetts had percentages that were below the national average.

Figure 13. Percentage of TB Cases Attributed to Recent Transmission, United States, 2016-2017. This horizontal bar graph shows the percentages of TB cases attributed to recent transmission by individual states and cities in the United States during 2016-2017. The fraction in each parenthesis reports the number of cases attributed to recent transmission out of all genotyped cases that are eligible to be evaluated for recent transmission (i.e., complete data for the plausible-source case method's algorithm). States and cities are categorized into three groups based on numbers of TB cases reported in 2017 and are ordered by increasing percentage of cases attributed to recent transmission. Dark and light bars show qualitatively the relative proportions of genotyped cases that were attributed to extensive and limited recent transmission, respectively. The total length of the bar represents all recent transmission (i.e., the percentage sums of extensive recent transmission and limited recent transmission equal all recent transmission). During 2016-2017, 13.1% of genotyped cases were attributed to recent transmission in the United States. Among states/cities that reported at least one case but not more than 53 cases in 2017, the percentage of all recent transmission ranged from 0% to 42.2% (Wyoming, Vermont, Idaho, Rhode Island, Delaware, Iowa, New Mexico, Kansas, Nebraska, Maine, Wisconsin, New Hampshire, Utah, North Dakota, West Virginia, South Dakota, Montana, Mississippi, Baltimore, District of Columbia, and Alaska). Among states/cities that reported at least 54 cases but not more than 140 in 2017, the percentage of all recent transmission ranged from 1.1% to 31.3% (Colorado, Michigan, Pennsylvania, Connecticut, Oregon, Kentucky, Indiana, Nevada, Missouri, Arkansas, San Francisco, South Carolina, Hawaii, Oklahoma, Tennessee, Philadelphia, Chicago, and Alabama). Among states/cities that reported 141 or more cases in 2017, the percentage of all recent transmission ranged from 4.7% to 25.9% (New York, Massachusetts, Virginia, Arizona, Maryland, Illinois, Washington, New Jersey, Ohio, California, Minnesota, Florida, North Carolina, Texas, Georgia, New York City, Louisiana, Los Angeles, San Diego, and Houston). A vertical line shows the percentage of all recent transmission nationally during 2016-2017 (13.1%). To understand better the populations affected by recent TB transmission and monitor trends over time in its control, findings from local investigation of clusters and outbreaks, using WGS results when available, are preferable because estimates of recent transmission rely on surveillance data and are limited by the molecular resolution of genotyping. Because not only TB incidence but also demographics and molecular epidemiology vary considerably among states, counties, and cities, these data should not be compared across jurisdictions.





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