The Mission of the Virginia Department of Health is to protect the health and promote the well-being of all people in Virginia.

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The Division of Tuberculosis and Newcomer Health works to assist local health districts with identification and appropriate treatment of all individuals with suspected and confirmed tuberculosis disease.

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Together we can end tuberculosis

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The Division of Tuberculosis and Newcomer Health acknowledges and appreciates the public health nurses, outreach workers, and other staff who provide direct services to patients and who provide the information and data summarized in this report. Without their dedication, the goal of TB elimination would be impossibly far away.
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Tuberculosis Reporting Requirement

Healthcare providers and laboratories are required to report to the Virginia Department of Health:

1. All patients with confirmed TB disease
2. Anyone suspected of having TB disease
3. Children younger than 4 years of age with a positive test for TB infection

Reports should be made to your local health department immediately for patients with suspected or confirmed active TB and within three days for children younger than 4 years of age with a positive test for TB infection.

Reporting is required by state law (Sections 32.1-36 and 32.1-37 of the Code of Virginia and 12 VAC 5-90-80 and 12 VAC 5-90-90 of the Board of Health Regulations for Disease Reporting and Control).

If active TB disease is suspected, reporting should never be delayed pending identification of M. tuberculosis with a nucleic acid amplification (NAA) test or positive culture.

To locate contact information for your local health department, please refer to the following resource:
http://www.vdh.virginia.gov/local-health-districts/

For additional information on the Virginia Reportable Disease List, please refer to the following resource:
TUBERCULOSIS IN VIRGINIA, 2017

Virginia has seen a 14% increase in the number of TB cases since 2013

204 Cases of verified TB
2.4 TB rate per 100,000 people

COUNTRY OF BIRTH

- Number of countries represented among patients with TB disease: 41
- Born in the United States: 17%
- Non-U.S.-born: 83%

MOST COMMON COUNTRIES OF BIRTH AMONG PATIENTS

- United States - 35
- India - 21
- Vietnam - 11
- Philippines - 22
- Ethiopia - 19

TIME IN THE U.S.

- Median number of years in the U.S. at time of diagnosis among Non-U.S.-born patients: 9.7

DEMOGRAPHIC CHARACTERISTICS

- 56% of TB cases occurred among males
- 43% of TB cases among the U.S.-born occurred among non-Hispanic Black Virginians
- 41% of TB cases among non-U.S.-born occurred among non-Hispanic Asian patients

CLINICAL CHARACTERISTICS

- Proportion of TB cases among patients known to be HIV-infected: 1.5%
- Proportion of TB cases among patients known to have diabetes: 16.2%
- Proportion of TB cases with a pulmonary site of disease: 75%

Cases of verified TB: 204
Number of countries represented among patients with TB disease: 41
Median number of years in the U.S. at time of diagnosis among Non-U.S.-born patients: 9.7
Proportion of TB cases among patients known to be HIV-infected: 1.5%
Proportion of TB cases among patients known to have diabetes: 16.2%
Proportion of TB cases with a pulmonary site of disease: 75%
In 2017, Virginia reported 204 cases of tuberculosis (TB), a 0.5% increase from the 203 cases reported in 2016. Nationally, the CDC reported 9,093 TB cases for 2017, a 1.8% decrease from 2016. Virginia ranked 12th in the United States by number of cases and 20th by rate, with a rate of 2.4 per 100,000 population in 2017. Virginia's TB case rate has stayed below the national rate, but has seen a slight increase in recent years from the state's lowest rate in 2013 of 2.2 per 100,000. Overall, Virginia's rate has trended down over the past twenty years with the exception of several years of significant increase in the early 1990s attributed to multiple factors including decreases in public health infrastructure and impacts of the HIV/AIDS epidemic.

**Figure 1:** Tuberculosis rates, Virginia and the United States, 1987-2017

**Figure 2:** Tuberculosis cases, Virginia, 1987-2017
In 2017, Virginia TB cases ranged in age from one to 90 years. Consistent with previous years, the highest percentage of cases was identified in the 25-44 year age group. Seventy-six cases were identified in this age group in 2017, the same as in 2016. The highest rate of TB was identified in the 65 year and older group with a rate of 3.5 cases per 100,000 population. Nine pediatric cases (age <15) were reported in 2017, an increase in one case (12.5%) from 2016. There was a 15% decrease in cases in the 45 to 64 year age group from 66 cases in 2016 to 56 cases in 2017 while there was an 18% increase in the oldest age group of those cases age 65 and older. There was a 20% increase in cases among young adults age 15-24, although this only represents an increase of three cases from 2016. In 2017, 56% of Virginia's TB cases were male and 44% were female.
Birth in The United States

In 2017, 169 or 83% of Virginia's TB cases were reported among non-U.S.-born persons. Rates among non-U.S.-born persons are significantly higher than among U.S.-born persons*. In 2016, the most recent year for which Virginia population estimates are available for these populations**, the U.S.-born rate was 0.52 cases per 100,000 persons while the rate among the non-U.S.-born was 16.73 cases per 100,000 persons.

In 2017, TB cases identified in Virginia represented people born in 40 countries other than the United States. The Philippines, India, Ethiopia, Vietnam and Guatemala represented countries of origin with the most cases in 2017. When averaged over the past five years, India, the Philippines, Ethiopia, Vietnam and South Korea have represented the most cases. One or more cases over the past five years has represented 75 countries of origin including the United States.

Figure 5: Non-U.S.-born and U.S.-born* Tuberculosis Cases, Virginia, 2013-2017

Figure 6: Top Five Countries of Birth of Tuberculosis Cases, Virginia, 2017

*U.S.-born is defined as someone born in 1 of the 50 states or the District of Columbia or someone born outside of the U.S. to at least one parent who was a U.S. citizen.

**U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates
Figure 7: Race and Ethnicity of U.S.-born TB Cases, Virginia, 2013-2017

Figure 8: Race and Ethnicity of Non-U.S.-born TB Cases, Virginia, 2013-2017

2017
- Proportion of U.S.-born TB cases in Virginia among non-Hispanic Blacks: 43%
- Proportion of U.S.-born TB cases in Virginia among non-Hispanic Whites: 35%
- Proportion of U.S.-born TB cases in Virginia among Hispanics: 11%
- Proportion of U.S.-born TB cases in Virginia among Asians: 11%

2017
- Proportion of non-U.S.-born TB cases in Virginia among Asians: 52%
- Proportion of non-U.S.-born TB cases in Virginia among Hispanics: 23%
- Proportion of non-U.S.-born TB cases in Virginia among non-Hispanic Blacks: 18%
- Proportion of non-U.S.-born TB cases in Virginia among non-Hispanic Whites: 7%
In 2017, the Northern and Northwest regions of Virginia saw an increase in cases while the Central, Eastern and Southwest regions saw a slight decrease in cases. The Northern region reported 66% (134) of Virginia's TB cases in 2017. This region has accounted for a minimum of 57% of the state's cases over the past five years. The Eastern region reported 27 cases in 2017, 13% of the state's total cases. The Central Region reported 20 cases (10%) and the Northwest region reported 18 cases (9%). The Southwest region reported the fewest cases with only five cases in 2017, a decrease of 61% from the 13 cases reported by this region in 2016.

The Northern region has reported TB rates higher than the state and national average over the past five years. All other regions have been below the state and national averages during this time period.
Selected Risk Factors

Several risk factors are associated with TB, including occupational risk, congregate living, co-infection with HIV, homelessness, substance use and diabetes. Diabetes is consistently the most frequently observed risk factor among TB cases in Virginia. In 2017, 33 cases (16%) with diabetes were reported. In 2017, 10 healthcare workers were reported with TB, five long-term care residents, two persons in prison/jail, and six persons who were currently or had in the past year experienced homelessness. Excessive consumption of alcohol was reported among six cases, with two cases reporting the use of injection drugs and six cases reporting the use of non-injection drugs.

Table 1: Selected Risk Factors of Tuberculosis Cases, Virginia, 2013-2017

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Cases</th>
<th>Occupation</th>
<th>Type of Residence</th>
<th>Co-Morbidity</th>
<th>Substance Use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Health Care</td>
<td>Long-term Care</td>
<td>Diabetes</td>
<td>Alcohol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Migrant</td>
<td>Resident</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>2013</td>
<td>179</td>
<td>6 3.4</td>
<td>0 0.0</td>
<td>10 5.7</td>
<td>14 7.8</td>
</tr>
<tr>
<td>2014</td>
<td>190</td>
<td>6 3.1</td>
<td>1 0.5</td>
<td>15 7.9</td>
<td>15 7.9</td>
</tr>
<tr>
<td>2015</td>
<td>212</td>
<td>7 3.3</td>
<td>0 0.0</td>
<td>18 8.5</td>
<td>18 8.5</td>
</tr>
<tr>
<td>2016</td>
<td>203</td>
<td>7 3.4</td>
<td>0 0.0</td>
<td>17 8.4</td>
<td>17 8.4</td>
</tr>
<tr>
<td>2017</td>
<td>204</td>
<td>10 4.9</td>
<td>0 0.0</td>
<td>20 9.8</td>
<td>20 9.8</td>
</tr>
</tbody>
</table>

Proportion of 2017 TB cases among patients known to be HIV-infected: 1.5%
Proportion of 2017 TB cases among patients known to have diabetes: 16.2%
Clinical Characteristics

Figure 12: Tuberculosis cases by disease site, Virginia, 2017

- Number of cases with an extrapulmonary site of disease: 50
- Number of cases with a pulmonary and an extrapulmonary site of disease: 26
- Number of cases with only a pulmonary site of disease: 128

Proportion of TB cases with a pulmonary site of disease: 75%

Figure 13: Tuberculosis cases by confirmation method, Virginia, 2017*

- Proportion of TB cases evaluated primarily for TB symptoms: 74%
- Proportion of TB cases evaluated primarily due to an abnormal chest radiograph: 15%
- Proportion of TB cases evaluated primarily due to an incidental lab result: 6%

*Refer to Appendix I for surveillance case definitions.
**Culture-positive cases include those with a positive nucleic acid amplification test when a standard culture was not available (4 for 2017).
Drug Resistance

Drug resistance poses challenges to TB prevention and care efforts. Treatment for drug-resistant TB is expensive, takes longer, has the potential for life-threatening side effects, and can significantly disrupt life. In 2017, drug-susceptibility tests were performed on 149 culture positive specimens. Eleven patients had resistance to one of the four firstline TB drugs. Four additional patients diagnosed in Virginia in 2017 had multidrug-resistant (MDR)TB, defined as a TB strain resistant to the two most effective drugs in the TB treatment regimen: isoniazid and rifampin. No patients in Virginia had extensively drug-resistant (XDR) TB. XDR TB is defined as resistance to isoniazid and rifampin as well as resistance to a second-line injectable drug and a fluoroquinolone. The CDC estimates that the cost of treatment for MDR TB, including productivity loss during treatment, drugs, diagnostics, case management, social work, housing, transportation and hospitalization is more than six times that of susceptible TB. MDR TB can take 20-26 months to complete treatment compared to the six to nine months for susceptible TB.

Figure 14: Drug Resistance of Tuberculosis Cases, Virginia, 2013-2017

*Firstline drug resistance is defined as resistance to any of the primary TB drugs: rifampin, isoniazid, pyrazidamine and ethambutol

**MDR TB is defined as resistance to at least isoniazid and rifampin
In 2016, the most recent year for which complete data is available, 18 Virginia TB cases passed away. Four cases were deceased at the time of diagnosis and 14 cases died during TB treatment. Five of these deaths were related to TB disease.

*2016 is the most recent year with complete data available for treatment completion and mortality.*
In 2016, the most recent year for which contact investigation data is available, 1,620 contacts to acid-fast bacilli culture positive cases were identified. Of these contacts, 1,374 were completely evaluated. These evaluations uncovered eight cases of TB disease and 220 infections with latent tuberculosis (LTBI). Of the 220 persons identified with LTBI, 156 people began treatment and 119 people completed treatment. Contact investigations were conducted in many different locations including household settings, businesses, places of worship, schools and factories. The evaluation of contacts of active TB cases is essential to halting further transmission and preventing additional cases of TB disease.

Figure 17: Contact evaluation outcomes, Virginia, 2016

Genotyping can also assist with contact investigations, confirming connections between cases, and providing additional information when laboratory contamination is suspected or when a person is experiencing a second episode of TB which may be recurrence or a new infection. Genotype results identify whether TB strains are genetically related. The Virginia Department of Health requires that an isolate be forwarded for all culture-positive TB patients to the Division of Consolidated Laboratory Services for genetic testing coordinated by the CDC. In 2017, 99.3% of Virginia’s culture-positive TB cases had an isolate submitted for genotyping.
Appendix I - Tuberculosis 2009 Case Definition

CSTE Position Statement(s)09-ID-65

Clinical Description

A chronic bacterial infection caused by *Mycobacterium tuberculosis*, usually characterized pathologically by the formation of granulomas. The most common site of infection is the lung, but other organs may be involved.

Clinical Criteria

A case that meets all the following criteria:

- A positive tuberculin skin test or positive interferon gamma release assay for *M. tuberculosis*
- Other signs and symptoms compatible with tuberculosis (TB) (e.g., abnormal chest radiograph, abnormal chest computerized tomography scan or other chest imaging study, or clinical evidence of current disease)
- Treatment with two or more anti-TB medications
- A completed diagnostic evaluation

Laboratory Criteria for Diagnosis

- Isolation of *M. tuberculosis* from a clinical specimen,* OR
- Demonstration of *M. tuberculosis* complex from a clinical specimen by nucleic acid amplification test,** OR
- Demonstration of acid-fast bacilli in a clinical specimen when a culture has not been or cannot be obtained or is falsely negative or contaminated.

Case Classification

Confirmed

A case that meets the clinical case definition or is laboratory confirmed

Comments

A case should not be counted twice within any consecutive 12-month period. However, a case occurring in a patient who had previously had verified TB disease should be reported and counted again if more than 12 months have elapsed since the patient completed therapy. A case should also be reported and counted again if the patient was lost to supervision for greater than 12 months and TB disease can be verified again. Mycobacterial diseases other than those caused by *M. tuberculosis* complex should not be counted in tuberculosis morbidity statistics unless there is concurrent tuberculosis.

*Use of rapid identification techniques for *M. tuberculosis* (e.g., DNA probes and mycolic acid high-pressure liquid chromatography performed on a culture from a clinical specimen) are acceptable under this criterion.

** Nucleic acid amplification (NAA) tests must be accompanied by culture for mycobacteria species for clinical purposes. A culture isolate of *M. tuberculosis* complex is required for complete drug susceptibility testing and also genotyping. However, for surveillance purposes, CDC will accept results obtained from NAA tests approved by the Food and Drug Administration (FDA) and used according to the approved product labeling on the package insert, or a test produced and validated in accordance with applicable FDA and Clinical Laboratory Improvement Amendments (CLIA) regulations.
### Appendix II - Additional Data Tables

#### Table 2: Count and Rate of Tuberculosis Cases, Virginia and the United States, 2006-2017

<table>
<thead>
<tr>
<th></th>
<th>Virginia</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>Rate</td>
</tr>
<tr>
<td>2006</td>
<td>332</td>
<td>4.30</td>
</tr>
<tr>
<td>2007</td>
<td>309</td>
<td>4.00</td>
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<td>2008</td>
<td>292</td>
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</tr>
<tr>
<td>2009</td>
<td>271</td>
<td>3.40</td>
</tr>
<tr>
<td>2010</td>
<td>268</td>
<td>3.30</td>
</tr>
<tr>
<td>2011</td>
<td>221</td>
<td>2.70</td>
</tr>
<tr>
<td>2012</td>
<td>235</td>
<td>2.50</td>
</tr>
<tr>
<td>2013</td>
<td>179</td>
<td>2.20</td>
</tr>
<tr>
<td>2014</td>
<td>198</td>
<td>2.40</td>
</tr>
<tr>
<td>2015</td>
<td>212</td>
<td>2.50</td>
</tr>
<tr>
<td>2016</td>
<td>203</td>
<td>2.40</td>
</tr>
<tr>
<td>2017</td>
<td>204</td>
<td>2.40</td>
</tr>
</tbody>
</table>

#### Table 3: Tuberculosis Cases and Rate per 100,000 by Health Region, Virginia, 2013-2017

<table>
<thead>
<tr>
<th>Region</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>Rate</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Central</td>
<td>25</td>
<td>16.20</td>
<td>2.1</td>
<td>17</td>
<td>8.59</td>
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<tr>
<td>Eastern</td>
<td>22</td>
<td>12.29</td>
<td>1.2</td>
<td>25</td>
<td>12.63</td>
</tr>
<tr>
<td>Northern</td>
<td>107</td>
<td>59.78</td>
<td>4.5</td>
<td>113</td>
<td>57.07</td>
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<tr>
<td>Northwest</td>
<td>12</td>
<td>6.70</td>
<td>0.9</td>
<td>23</td>
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<td>Southwest</td>
<td>9</td>
<td>5.03</td>
<td>0.7</td>
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<td>10.10</td>
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</table>

#### Table 4: Tuberculosis Cases by Race/Ethnicity and Place of Birth, Virginia, 2013-2017

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-U.S.-Born</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian/Pacific Islander, Not Hispanic</td>
<td>0</td>
<td>73</td>
<td>4</td>
<td>76</td>
<td>3</td>
</tr>
<tr>
<td>Black, Not Hispanic</td>
<td>15</td>
<td>42</td>
<td>21</td>
<td>28</td>
<td>23</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1</td>
<td>27</td>
<td>3</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>Multi-Race, Not Hispanic</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>White, Not Hispanic</td>
<td>15</td>
<td>6</td>
<td>23</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>148</td>
<td>51</td>
<td>147</td>
<td>45</td>
</tr>
</tbody>
</table>

Appendix III - Technical Notes


If you have additional data requests regarding Virginia's Division of Tuberculosis and Newcomer Health, please contact Laura Young at laura.r.young@vdh.virginia.gov.