The Epidemiology of Tuberculosis in Minnesota, 2011 – 2015

Minnesota Department of Health
Tuberculosis Prevention and Control Program
(651) 201-5414

Tuberculosis surveillance data for Minnesota are available at: www.health.state.mn.us/tb
## Tuberculosis Morbidity and Mortality, Minnesota, 2011-2015

<table>
<thead>
<tr>
<th>Year</th>
<th>No. Cases (Rate)*</th>
<th>No. Deaths** (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>137 (2.6)</td>
<td>9 (7%)</td>
</tr>
<tr>
<td>2012</td>
<td>162 (3.0)</td>
<td>4 (2%)</td>
</tr>
<tr>
<td>2013</td>
<td>151 (2.8)</td>
<td>2 (1%)</td>
</tr>
<tr>
<td>2014</td>
<td>147 (2.7)</td>
<td>3 (2%)</td>
</tr>
<tr>
<td>2015</td>
<td>150 (2.7)</td>
<td>2 (1%)</td>
</tr>
</tbody>
</table>

* Cases per 100,000 population. Rates calculated using state population estimates from the U.S. Census Bureau.

**Represents only deaths due to TB disease or TB drug-induced toxicity
Tuberculosis Incidence Rates per 100,000 Population, United States and Minnesota, 2000-2015

Healthy People 2010 and 2020 objective
Percentage of Non U.S.-Born Tuberculosis Cases, United States and Minnesota, 2006-2015

Year of Diagnosis

Percentage of Cases

Ave: 81%

Ave: 62%
Number of Cases and Incidence of Tuberculosis by Location of Residence, Minnesota, 2011-2015

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hennepin County</td>
<td>59 (5.0)</td>
<td>71 (6.1)</td>
<td>51 (4.3)</td>
<td>51 (4.3)</td>
<td>57 (4.7)</td>
</tr>
<tr>
<td>Ramsey County</td>
<td>31 (6.0)</td>
<td>39 (7.6)</td>
<td>39 (7.5)</td>
<td>26 (4.9)</td>
<td>29 (5.4)</td>
</tr>
<tr>
<td>Suburban Twin Cities Metro†</td>
<td>12 (0.7)</td>
<td>27 (2.2)</td>
<td>20 (1.6)</td>
<td>24 (2.0)</td>
<td>25 (2.0)</td>
</tr>
<tr>
<td>Olmsted County</td>
<td>9 (6.2)</td>
<td>3 (2.1)</td>
<td>10 (6.8)</td>
<td>16 (10.7)</td>
<td>12 (8.0)</td>
</tr>
<tr>
<td>Other counties</td>
<td>26 (1.1)</td>
<td>22 (1.0)</td>
<td>31 (1.3)</td>
<td>30 (1.3)</td>
<td>27 (1.2)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>137 (2.6)</strong></td>
<td><strong>162 (3.0)</strong></td>
<td><strong>151 (2.8)</strong></td>
<td><strong>147 (2.7)</strong></td>
<td><strong>150 (2.7)</strong></td>
</tr>
</tbody>
</table>

* Rate per 100,000 population. Rates were calculated using population estimates from U.S. Census Bureau data.

† Anoka, Carver, Dakota, Scott, and Washington counties
Tuberculosis Disease: Minnesota, 2015

Hennepin: 57
Ramsey: 29
Suburban metro: 25
Greater MN: 39
Total: 150

Anishinaabe reservation or Dakota community
Hennepin: 289
Ramsey: 164
Suburban metro: 108
Greater MN: 186
Total: 747

Anishinaabe reservation or Dakota community
Tuberculosis Cases by Age Group and Place of Birth, Minnesota, 2011-2015

<table>
<thead>
<tr>
<th>Place of Birth</th>
<th>Percentage of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non U.S.-Born</td>
<td></td>
</tr>
<tr>
<td>U.S.-Born</td>
<td></td>
</tr>
</tbody>
</table>

- < 5 yrs
- 5 - 14 yrs
- 15 - 24 yrs
- 25 - 44 yrs
- 45 - 64 yrs
- >= 65 yrs
Tuberculosis Cases by Sex at Birth and Place of Birth, Minnesota, 2011-2015

- Non U.S.-Born
  - Male: 52%
  - Female: 48%

- U.S.-Born
  - Male: 62%
  - Female: 38%

- Total
  - Male: 54%
  - Female: 46%

N = 747

MDH
Number of Cases and Incidence of TB by Race/Ethnicity, Minnesota, 2011-2015

* Race categories do not include persons of Hispanic/Latino origin.
† Rate per 100,000 population. Calculated using population estimates from the U.S. Census Bureau.
# Tuberculosis Cases by Race/Ethnicity and Place of Birth, Minnesota, 2011-2015

*Trace categories do not include persons of Hispanic/Latino origin.†Includes U.S.-born children of non U.S.-born parents*

<table>
<thead>
<tr>
<th>Race / Ethnicity*</th>
<th>Non U.S.-Born Cases</th>
<th>U.S.-Born Cases†</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. (%)</td>
<td>No. (%)</td>
</tr>
<tr>
<td>White</td>
<td>17 (3)</td>
<td>58 (43)</td>
</tr>
<tr>
<td>Black</td>
<td>328 (54)</td>
<td>33 (24)</td>
</tr>
<tr>
<td>Asian</td>
<td>212 (35)</td>
<td>12 (9)</td>
</tr>
<tr>
<td>American Indian / Alaska Native</td>
<td>0</td>
<td>17 (13)</td>
</tr>
<tr>
<td>Native Hawaiian / Pacific Islander</td>
<td>1 (&lt;1)</td>
<td>0</td>
</tr>
<tr>
<td>Multi-racial</td>
<td>0</td>
<td>1 (&lt;1)</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>54 (9)</td>
<td>14 (10)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>612 (100)</strong></td>
<td><strong>135 (100)</strong></td>
</tr>
</tbody>
</table>
African/African-American Tuberculosis Cases by Place of Birth, Minnesota, 2011-2015

- Somalia: 47%
- Ethiopia: 22%
- US: 9%
- Kenya: 7%
- Liberia: 6%
- Other: 9%

N = 361
Tuberculosis Cases by HIV Status and Place of Birth, Minnesota, 2011-2015

<table>
<thead>
<tr>
<th>HIV Status</th>
<th>Non U.S.-Born Cases No. (%)</th>
<th>U.S.-Born Cases No. (%)</th>
<th>Total No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>558 (91)</td>
<td>119 (88)</td>
<td>677 (91)</td>
</tr>
<tr>
<td>Positive</td>
<td>24 (4)</td>
<td>2 (1)</td>
<td>26 (3)</td>
</tr>
<tr>
<td>Refused</td>
<td>3 (&lt;1)</td>
<td>2 (1)</td>
<td>5 (&lt;1)</td>
</tr>
<tr>
<td>Not Offered</td>
<td>27 (4)</td>
<td>12 (9)</td>
<td>39 (5)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>612 (100)</strong></td>
<td><strong>135 (100)</strong></td>
<td><strong>747 (100)</strong></td>
</tr>
</tbody>
</table>
TB-HIV Co-infected Cases:
United States and Minnesota, 2006-2015

No. of TB-HIV cases in MN:
2006 – 8
2007 – 12
2008 – 11
2009 – 7
2010 – 6
2011 – 3
2012 – 6
2013 – 4
2014 – 4
2015 – 9

No. of eligible cases* | Percent of eligible cases with HIV result
--- | ---
2006 | 84.5%
2007 | 88.5%
2008 | 84.4%
2009 | 90.9%
2010 | 96.2%
2011 | 97.5%
2012 | 98%
2013 | 94.6%
2014 | 91.9%
2015 | 91.9%

* Alive at diagnosis

National objective on HIV testing expanded to all TB patients
Tuberculosis Cases by Risk Category* and Place of Birth, Minnesota, 2011-2015

* Risk categories are not mutually exclusive
** Conditions or therapies risk for progression to active TB disease, not HIV
† Alcohol abuse and/or illicit drug use

**[Diagram showing percentages of cases by risk category and place of birth for 2011-2015 in Minnesota.](link)"
### Tuberculosis Cases With Other Medical Conditions* by Type of Condition, Minnesota, 2011-2015

<table>
<thead>
<tr>
<th>Medical conditions**</th>
<th>Cases (N=747) No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>85 (11)</td>
</tr>
<tr>
<td>Immunosuppressive condition or immunosuppressive therapy***</td>
<td>65 (9)</td>
</tr>
<tr>
<td>End stage renal disease</td>
<td>19 (3)</td>
</tr>
<tr>
<td>Weight loss/undernutrition/malabsorption</td>
<td>8 (1)</td>
</tr>
<tr>
<td>Other: silicosis, hematologic disease</td>
<td>7 (&lt;1)</td>
</tr>
</tbody>
</table>

*Conditions or therapies that increase risk for progression from latent TB infection to active TB disease, not including HIV/AIDS

**Patients could have > 1 medical condition

***Includes TNF-α antagonist therapy and post-organ transplantation
## Tuberculosis Cases by School/Daycare Attendance at Time of Diagnosis, Minnesota, 2011-2015

<table>
<thead>
<tr>
<th>School/Setting</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preschool</td>
<td>2 (&lt;1)</td>
</tr>
<tr>
<td>Elementary</td>
<td>39 (5)</td>
</tr>
<tr>
<td>Secondary</td>
<td>32 (4)</td>
</tr>
<tr>
<td>Post-secondary</td>
<td>51 (7)</td>
</tr>
<tr>
<td>Other*</td>
<td>44 (6)</td>
</tr>
<tr>
<td>None</td>
<td>578 (77)</td>
</tr>
<tr>
<td>Unknown</td>
<td>1 (&lt;1)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>747 (100)</strong></td>
</tr>
</tbody>
</table>

*Includes: adult or child daycare, ESL/ELL, and other schools*
Non U.S.-Born Tuberculosis Cases by Region of Birth and Year of Diagnosis, Minnesota, 2011-2015

* “Other” includes: Eastern Europe, North Africa/Middle East, and Western Europe
Non U.S.-Born Tuberculosis Cases by Region of Birth and Year of Diagnosis, Minnesota, 2011-2015

* “Other” includes: Eastern Europe, North Africa/Middle East, and Western Europe
Non U.S.-Born Tuberculosis Cases by Country of Birth, Minnesota, 2011-2015

- Somalia: 28%
- Ethiopia: 13%
- Laos: 8%
- Viet Nam: 6%
- Mexico: 5%
- India: 5%
- Kenya: 4%
- Other: 31%

N = 612

Refugee 48%
Immigrant 29%
Other* 19%
Unknown 4%

* "Other" includes visitors, tourists, students, those arriving on employment visas

N = 612
Non U.S.-Born Tuberculosis Cases by Interval Between Arrival in U.S. and Diagnosis of Tuberculosis, Minnesota, 2011-2015

- <1 year: 18%
- 1-2 years: 15%
- 3-5 years: 16%
- 6-9 years: 15%
- 10+ years: 36%
- Unknown: <1%

N = 612
Non U.S.-Born Tuberculosis Cases by Interval Between Arrival in U.S. and Diagnosis of Tuberculosis by Year, Minnesota, 2006-2015

- % of non U.S.-born cases
- N = 108 129

Technical instructions for overseas exams revised
“TB Class” Notifications* Among Refugees/Immigrants Diagnosed with TB Within One Year After Arrival to U.S., Minnesota, 2011-2015

- No TB Class: 31%
- Class B1: 19%
- Class B2: 9%
- Unknown: 41%

N = 80

* Per results of pre-immigration screening performed overseas
Tuberculosis Cases by Site of Disease, Minnesota, 2011-2015

- Pulmonary: 53%
- Extrapulmonary: 36%
- Both: 12%

N = 747
Tuberculosis Cases by Site of Disease and Place of Birth, Minnesota, 2011-2015

* Includes cases with or without concurrent pulmonary disease

- **Non U.S.-Born**
  - Pulmonary only: 49%
  - Extrapulmonary*: 51%

- **U.S.-Born**
  - Pulmonary only: 71%
  - Extrapulmonary*: 29%
Extrapulmonary* Tuberculosis Cases by Site of Disease, Minnesota, 2011-2015

<table>
<thead>
<tr>
<th>Site of disease**</th>
<th>Cases (N=353) No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lymphatic</td>
<td>190 (54)</td>
</tr>
<tr>
<td>Musculoskeletal</td>
<td>65 (18)</td>
</tr>
<tr>
<td>Pleural</td>
<td>36 (10)</td>
</tr>
<tr>
<td>Peritoneal</td>
<td>18 (5)</td>
</tr>
<tr>
<td>Genitourinary</td>
<td>15 (4)</td>
</tr>
<tr>
<td>Brain</td>
<td>11 (3)</td>
</tr>
<tr>
<td>Meningeal</td>
<td>9 (3)</td>
</tr>
<tr>
<td>Other</td>
<td>36 (10)</td>
</tr>
</tbody>
</table>

* Includes TB cases with or without concurrent pulmonary disease

** Patients may have multiple extrapulmonary sites of disease
Tuberculosis Cases with Pulmonary Involvement by Chest Imaging* Result, Minnesota, 2011-2015

- Abnormal, not consistent with TB: 1%
- Normal: <1%
- Abnormal, cavitary TB: 31%
- Abnormal, non-cavitary TB: 68%

* From initial chest x-ray or chest CT scan

N = 480
Tuberculosis Cases with Pulmonary Involvement by Initial Sputum AFB Smear Result, Minnesota, 2011-2015

- Positive: 37%
- Negative: 50%
- Not done*: 13%

*51% of pulmonary cases without sputum smear results were under 15 years of age

N = 480
Tuberculosis Cases by Mycobacterial Culture Result, Minnesota, 2011-2015

- Positive for *M. tbc*: 75%
- Negative: 21%
- Not done: 4%

N = 747
Tuberculosis Cases by Case Verification Criteria*, Minnesota, 2011-2015

- Lab-confirmed: 77%
- Clinical case definition: 20%
- Provider diagnosis: 3%

*N = 747

*Based on the public health surveillance definition for TB

## Tuberculosis Cases by Drug Susceptibility Patterns and Year, Minnesota, 2011-2015

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases With Susceptibility Results*</th>
<th>Any Drug Resistance† No. (%)</th>
<th>INH-Resistant** No. (%)</th>
<th>MDR-TB‡ No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>101</td>
<td>22 (22)</td>
<td>12 (12)</td>
<td>3 (3)</td>
</tr>
<tr>
<td>2012</td>
<td>124</td>
<td>23 (19)</td>
<td>12 (10)</td>
<td>1 (&lt;1)</td>
</tr>
<tr>
<td>2013</td>
<td>113</td>
<td>26 (23)</td>
<td>13 (12)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>2014</td>
<td>105</td>
<td>25 (24)</td>
<td>19 (18)</td>
<td>1 (1)</td>
</tr>
<tr>
<td>2015</td>
<td>115</td>
<td>23 (20)</td>
<td>9 (8)</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>558</strong></td>
<td><strong>119 (21)</strong></td>
<td><strong>65 (12)</strong></td>
<td><strong>5 (0.9)</strong></td>
</tr>
</tbody>
</table>

* Culture-confirmed cases with drug susceptibility results available

† Resistance to at least one first-line anti-TB drug [i.e., isoniazid (INH), rifampin (RIF), pyrazinamide (PZA), or ethambutol (EMB)]

** INH-resistant cases may also be resistant to other drugs

‡ Multi-drug resistant TB, defined as resistance to at least INH and rifampin
**Tuberculosis Cases by Drug Susceptibility Patterns and Place of Birth, MN, 2011-2015**

<table>
<thead>
<tr>
<th>Place of birth</th>
<th>Cases With Susceptibility Results*</th>
<th>Any Drug Resistance† No. (%)</th>
<th>INH-Resistant** No. (%)</th>
<th>MDR-TB‡ No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non U.S.-Born Cases</td>
<td>473</td>
<td>107 (23)</td>
<td>57 (12)</td>
<td>4 (0.8)</td>
</tr>
<tr>
<td>U.S.-Born Cases</td>
<td>85</td>
<td>12 (14)</td>
<td>8 (9)</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Total</td>
<td>558</td>
<td>119 (21)</td>
<td>65 (12)</td>
<td>5 (0.9)</td>
</tr>
</tbody>
</table>

* Culture-confirmed cases with drug susceptibility results available
† Resistance to at least one first-line anti-TB drug [i.e., isoniazid (INH), rifampin, pyrazinamide (PZA), or ethambutol]
** INH-resistant cases may also be resistant to other drugs
‡ Multi-drug resistant TB, defined as resistance to at least INH and rifampin
Tuberculosis Cases by Method of Case Identification, Minnesota, 2011-2015

N = 747

- TB symptoms: 81%
- Other: 19%

Other includes:
- TB contact investigations: 4%
- Incidental chest x-ray: 3%
- Other targeted testing: 3%
- Refugee health exam (domestic): 3%
- Overseas TB class follow-up: 2%
- Incidental lab result: 1%
- Other*: 3%

* “Other” includes: other immigration exam – 1.3%, and employment screening (including health care worker screening) – 1.6%
Tuberculosis Cases by Mode of Treatment Administration, Minnesota, 2011-2015

Some portion of treatment as DOT* | Completely self-administered

* DOT = Directly Observed Therapy
Tuberculosis Cases by Mode of Treatment Administration and Type of Health Care Provider, Minnesota, 2011-2015

* DOT = Directly Observed Therapy

N=735 started on treatment
Completion and Length of Therapy Among Tuberculosis Cases, Minnesota, 2010-2014

<table>
<thead>
<tr>
<th>Year</th>
<th>Started Treatment*</th>
<th>Completed Within 12 mos.** No. (%)</th>
<th>Completed Overall** No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>116</td>
<td>105 (91)</td>
<td>115 (99)</td>
</tr>
<tr>
<td>2011</td>
<td>101</td>
<td>96 (95)</td>
<td>97 (96)</td>
</tr>
<tr>
<td>2012</td>
<td>133</td>
<td>127 (95)</td>
<td>130 (98)</td>
</tr>
<tr>
<td>2013</td>
<td>125</td>
<td>118 (94)</td>
<td>123 (98)</td>
</tr>
<tr>
<td>2014</td>
<td>122</td>
<td>113 (93)</td>
<td>119 (98)</td>
</tr>
<tr>
<td>Total</td>
<td>597</td>
<td>559 (94)</td>
<td>584 (98)</td>
</tr>
</tbody>
</table>

* Patients for whom < 12 months of therapy is indicated. This excludes: patients with rifampin resistance, meningeal TB, TB in bone or skeletal system, TB in CNS, children 14 years of age or younger with disseminated TB, patients who died or moved out of US within 366 days of starting treatment.

** Treatment completion data as of 1/3/2017
Tuberculosis Cases by Type(s) of Provider*, Minnesota, 2011-2015

* Some patients are managed by multiple providers throughout disease course.