

# TUBERCULOSIS IN NEW YORK STATE

2016

Annual Statistical Report  
Bureau of Tuberculosis Control



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# EXECUTIVE SUMMARY

## Executive Summary

### MORBIDITY & MORTALITY

- From 2015 to 2016, tuberculosis (TB) morbidity increased in New York State. The 2016 total of 768 cases (565 cases in New York City, 203 cases in the remainder of New York State) represents a 0.4 percent increase from the 765 cases reported in 2015. The nation as a whole experienced a 2.7 percent decrease in morbidity. Since the most recent peak epidemic in 1992 with 4,574 cases, there was an 83.2 percent decrease in New York State compared to a national decline of 64.2 percent.
- In New York State (exclusive of New York City), the number of TB cases increased 8.0 percent from 188 cases in 2015 to 203 cases in 2016. The number of TB cases in New York City decreased by 2.1 percent from 577 cases in 2015 to 565 cases in 2016. In 2016, the nation as a whole reported 9,287 cases, down 2.7 percent from the 9,546 cases reported in 2015.
- New York State ranked fifth nationally for TB morbidity with an incidence rate of 4.0 per 100,000 population in 2016. This rate is influenced by New York City, which had a TB case rate of 6.9 per 100,000. In contrast, New York State (exclusive of New York City) reported an incidence rate of 1.8 per 100,000.

### GEOGRAPHIC DISTRIBUTION

- Three counties – Nassau, Suffolk and Westchester – reported 49.3 percent of the TB cases in New York State (exclusive of New York City) in 2016.

### RACE-ETHNICITY

- In 2016, Asians continued to have one of the highest incidence rates of TB statewide (23.3 per 100,000). White, non-Hispanics had the lowest incidence rate of 0.6 per 100,000.

### FOREIGN-BORN

- Statewide, the proportion of foreign-born cases increased from 81.0 (N=620) in 2015 to 82.8 in 2016 (N=636). People born in China comprised the greatest number of foreign-born TB cases (N=114) in New York City while those born in India comprised the greatest number of TB cases (N=14) in the remainder of the state.

### DRUG SUSCEPTIBILITY

- Among individuals with drug susceptibilities reported in 2016, 10 cases from New York City had multidrug-resistant TB (MDR TB), which was twice the number identified in 2015 (N=5). There were no MDR TB cases reported in New York State (exclusive of New York City) for 2016, a slight decline from the one case reported in 2015.

### TB IN THE PRISONS

- Since 1991, the number of TB cases among the New York State Department of Corrections and Community Supervision (DOCCS) inmate population had been continually declining, and in 2011 and 2012 no new cases were reported. However, in 2013, three new DOCCS cases were reported and in 2014, one new case was reported. In 2015 and 2016, there were no new DOCCS cases reported.

# TUBERCULOSIS CASES AND RATES

**Table 1. Tuberculosis Cases and Rates,\* New York State, 1960-2016**

Year	New York State (Exclusive of New York City)		New York City		New York State (Total)	
	No.	Rate	No.	Rate	No.	Rate
1960	2,376	26.4	4,699	60.4	7,075	42.2
1961	2,052	22.3	4,360	56.3	6,412	37.8
1962	2,005	21.4	4,437	56.7	6,442	37.5
1963	1,865	19.6	4,891	61.7	6,756	38.7
1964	1,715	17.8	4,207	52.7	5,922	33.6
1965	1,627	16.6	4,242	53.0	5,869	33.0
1966	1,633	16.5	3,663	45.7	5,296	29.5
1967	1,527	15.2	3,542	44.4	5,069	28.1
1968	1,475	14.5	3,224	40.5	4,699	25.9
1969	1,384	13.5	2,951	37.4	4,335	23.9
1970	1,275	12.3	2,590	32.8	3,865	21.2
1971	1,180	11.3	2,572	32.5	3,752	20.4
1972	1,176	11.2	2,275	29.0	3,451	18.8
1973	1,009	9.6	2,101	27.4	3,110	17.1
1974**	844	8.1	2,022	26.6	2,866	15.9
1975	1,041	9.9	2,893	38.6	3,934	21.8
1976	916	8.7	2,156	29.0	3,072	17.1
1977	829	7.9	1,605	22.0	2,434	13.6
1978	753	7.1	1,307	18.2	2,060	11.6
1979	699	6.6	1,530	21.5	2,229	12.6
1980	780	7.4	1,514	21.4	2,294	13.1
1981	641	6.1	1,582	22.4	2,223	12.7
1982	674	6.4	1,594	22.5	2,268	12.9
1983	658	6.2	1,651	23.1	2,309	13.1
1984	616	5.8	1,630	22.6	2,246	12.7
1985	638	6.0	1,843	25.5	2,481	13.9
1986	615	5.8	2,223	30.6	2,838	15.9
1987	615	5.8	2,197	30.1	2,812	15.7
1988	688	6.5	2,317	31.8	3,005	16.8
1989	657	6.2	2,545	34.8	3,202	17.8
1990	656	6.1	3,520	48.1	4,176	23.2
1991	748	7.0	3,673	50.2	4,421	24.6
1992	763	7.2	3,811	52.0	4,574	25.4
1993	717	6.7	3,235	44.2	3,952	22.0
1994	641	6.0	2,995	40.9	3,636	20.2
1995	621	5.8	2,445	33.4	3,066	17.0
1996	535	5.0	2,053	28.0	2,588	14.4
1997	535	5.0	1,730	23.6	2,265	12.6
1998	442	4.1	1,558	21.3	2,000	11.1
1999	377	3.5	1,460	19.9	1,837	10.2
2000	412	3.8	1,332	16.6	1,744	9.2
2001	415	3.8	1,261	15.7	1,676	8.8
2002	350	3.2	1,084	13.5	1,434	7.6
2003	340	3.1	1,140	14.2	1,480	7.8
2004	324	3.0	1,039	13.0	1,363	7.2
2005	305	2.8	984	12.3	1,289	6.8
2006	317	2.9	954	11.9	1,271	6.7
2007	261	2.4	914	11.4	1,175	6.2
2008	305	2.8	895	11.2	1,200	6.3
2009	246	2.2	760	9.5	1,006	5.3
2010	243	2.2	711	8.7	954	4.9
2011	221	2.0	689	8.4	910	4.7
2012	215	1.9	651	8.0	866	4.5
2013	217	1.9	656	8.0	873	4.5
2014	202	1.8	585	7.2	787	4.1
2015	188	1.7	577	7.1	765	3.9
2016	203	1.8	565	6.9	768	4.0

\*Rate calculations are based on United States decennial Census data; per 100,000 population

\*\*Figures after 1974 reflect a nationally revised case definition that includes reactivated cases

Source: New York State Department of Health Bureau of Tuberculosis Control



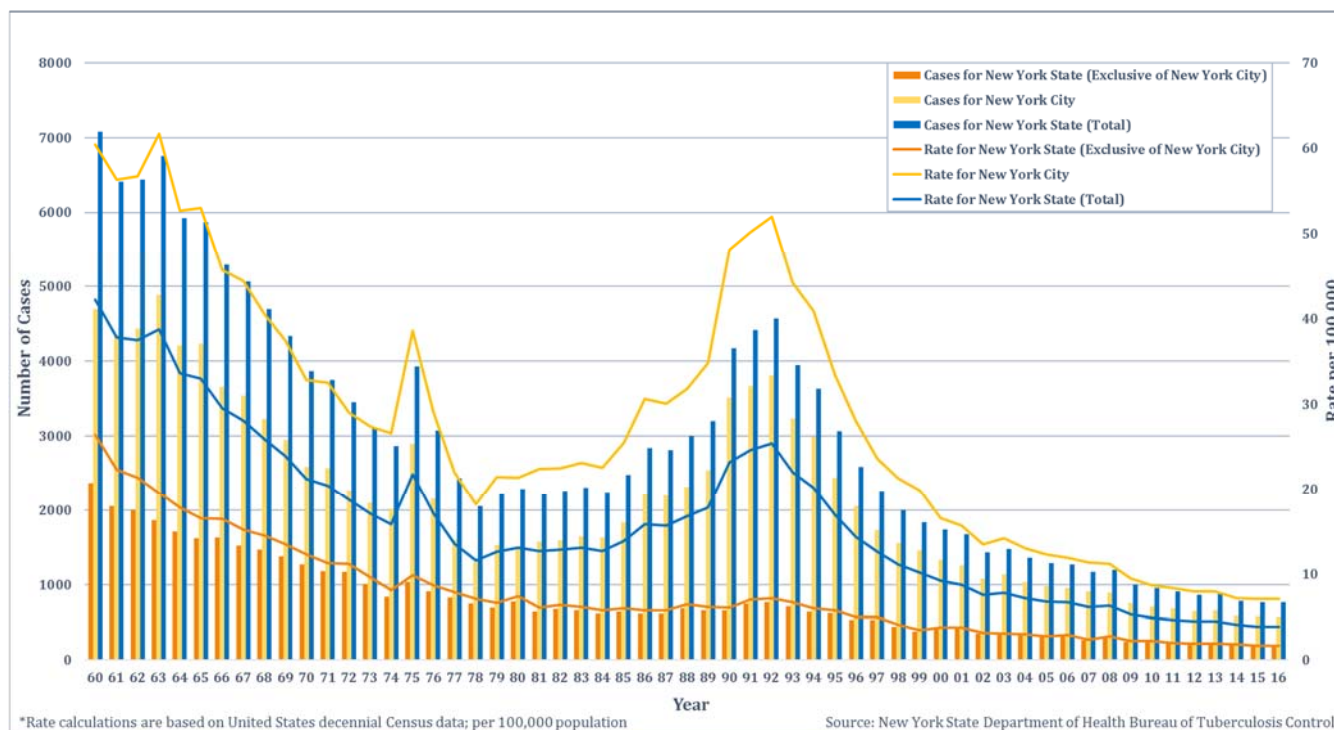
# TUBERCULOSIS CASES AND RATES

From 2015 to 2016, TB cases and rates increased statewide. In 2016, a total of 768 cases were reported in New York State, representing a 0.4 percent increase from the 765 cases reported in 2015 and an 89.1 percent decrease from the 7,075 cases reported in 1960. Nearly three-quarters of the state's TB morbidity is concentrated in New York City.

In 2016, New York City reported 73.6 percent (N=565/768) of the total cases despite having only 42 percent of the state population. The rest of the state reported 203 cases, which was an 8.0 percent increase compared to the 188 reported in 2015.

The rate of TB in New York State is greatly influenced by the high morbidity in New York City. Outside of New York City, the rate in 2016 was 1.8 per 100,000 population, but New York City reported a rate of 6.9 per 100,000, resulting in an overall rate of 4.0 per 100,000 population for the whole state.

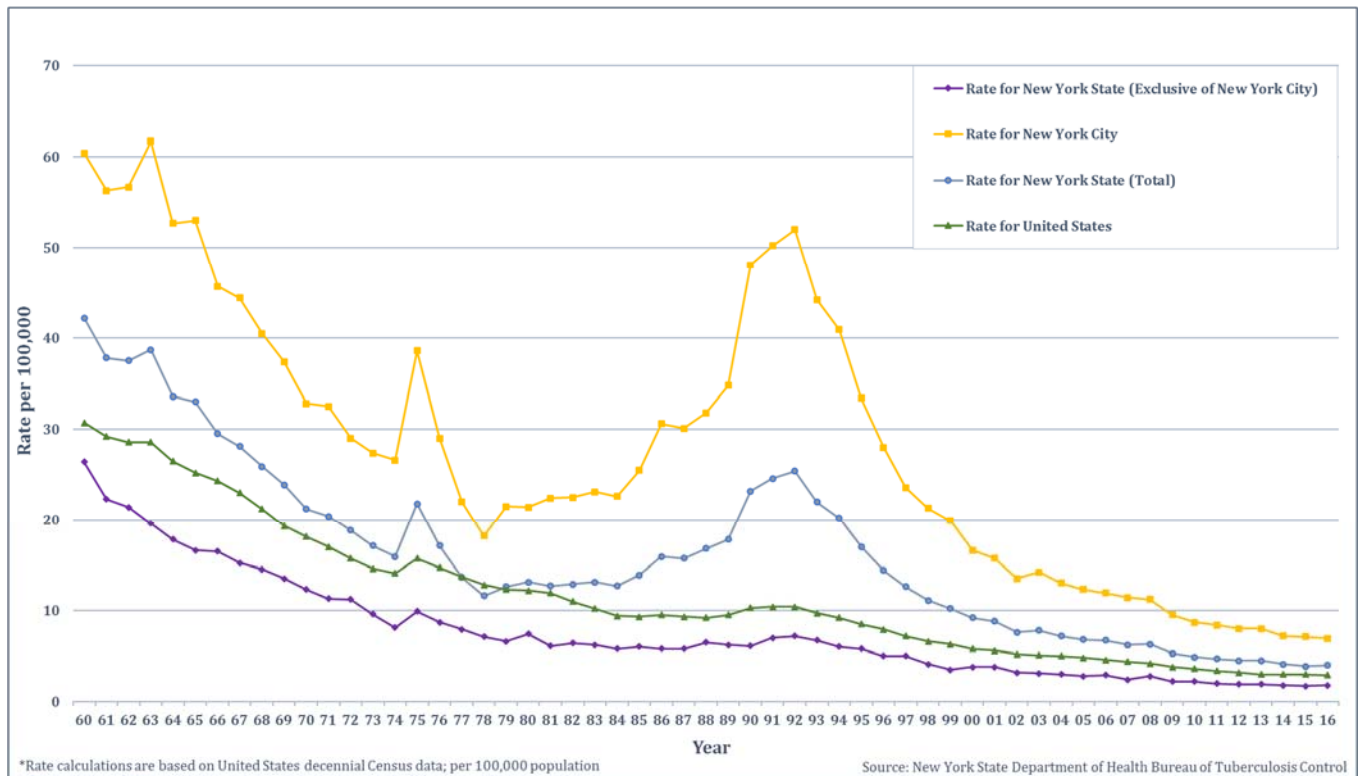
**Figure 1. Tuberculosis Cases and Rates,\* New York State, 1960-2016**



Over the last 50 years, there have been two peaks in TB morbidity where the number and rate of TB substantially increased. The peak in 1975 can be explained by a change in the case definition to include reactivated TB cases. The increase that began in the mid-1980s and extended through the early 1990s was driven mainly by the resurgence of TB cases in New York City. This rise was largely due to two factors. One was the HIV/AIDS epidemic that started in the early 1980s. The other was the reduction of TB control resources combined with the rise in high risk populations such as foreign-born and homeless.

# TUBERCULOSIS CASES AND RATES

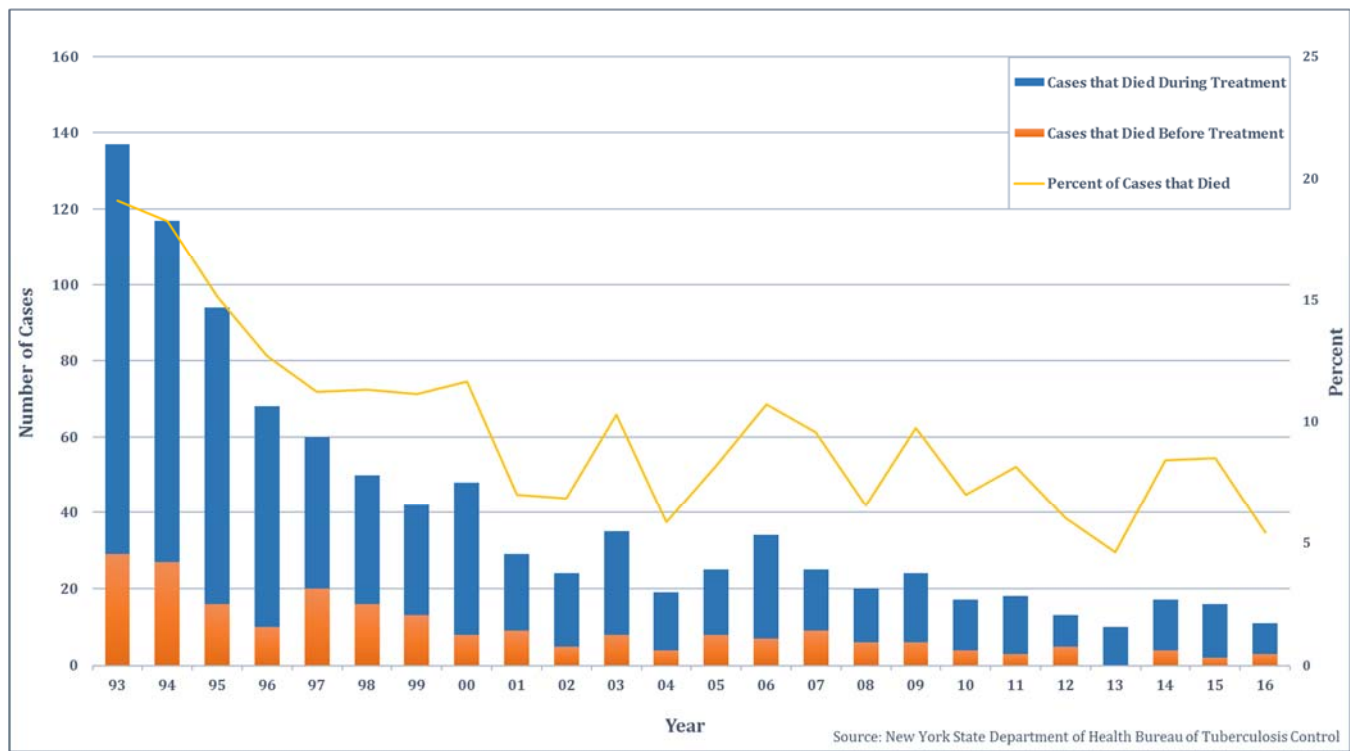
Figure 2. Tuberculosis Case Rates,\* New York State and the United States, 1960-2016



Historically, TB case rates in New York State (exclusive of New York City) have been lower than the national average, while case rates in New York City have exceeded national rates. In 2016, the national case rate was 2.9 per 100,000 population and ranged from 0.2 to 8.3 per 100,000 population across all the states. New York State ranked third based on the number of cases (N=768) and fifth based on incidence rate (4.0 per 100,000 population), but these rankings were largely influenced by New York City which, by itself, would have ranked fourth nationally based on number of cases (N=565) and third based on incidence rate (6.9 per 100,000 population).

# TUBERCULOSIS CASES AND RATES

**Figure 3. Number and Percent of Deaths Among Tuberculosis Cases, New York State (Exclusive of New York City), 1993-2016**



The number and percent of deaths among TB cases in New York State (exclusive of New York City) decreased considerably following the last epidemic that peaked in the early 1990s. This drop in mortality slowed by 1997 and has varied each year since 2000. The deaths portrayed in Figure 3 were not all TB-related.

Among the reported TB cases in New York State (exclusive of New York City), there were 11 total deaths in 2016. The cause of death was TB-related for three of these cases. All three had other comorbidities, including HIV, diabetes, COPD, end-stage renal disease and cancer.

# GEOGRAPHIC DISTRIBUTION

**Table 2. Tuberculosis Cases and Rates\* by County, New York State, 2012-2016**

County	2012		2013		2014		2015		2016	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Albany	6	2.0	5	1.6	7	2.3	2	0.7	2	0.7
Allegany	0	---	0	---	0	---	0	---	0	---
Broome	5	2.5	1	0.5	0	---	3	1.5	3	1.5
Cattaraugus	0	---	0	---	0	---	0	---	0	---
Cayuga	0	---	1	1.2	2	2.5	4	5.0	1	1.2
Chautauqua	0	---	0	---	0	---	0	---	0	---
Chemung	1	1.1	1	1.1	0	---	0	---	2	2.3
Chenango	0	---	0	---	0	---	0	---	0	---
Clinton	2	2.4	1	1.2	0	---	2	2.4	0	---
Columbia	2	3.2	0	---	2	3.2	3	4.8	0	---
Cortland	1	2.0	0	---	0	---	0	---	0	---
Delaware	0	---	0	---	0	---	0	---	1	2.1
Dutchess	4	1.3	4	1.3	7	2.4	5	1.7	1	0.3
Erie	19	2.1	21	2.3	16	1.7	13	1.4	13	1.4
Essex	0	---	0	---	1	2.5	0	---	0	---
Franklin	0	---	0	---	0	---	0	---	0	---
Fulton	0	---	1	1.8	0	---	0	---	0	---
Genesee	0	---	0	---	0	---	0	---	2	3.3
Greene	0	---	3	6.1	0	---	0	---	1	2.0
Hamilton	0	---	0	---	0	---	0	---	0	---
Herkimer	0	---	1	1.5	0	---	0	---	0	---
Jefferson	0	---	2	1.7	1	0.9	2	1.7	0	---
Lewis	0	---	0	---	0	---	0	---	1	3.7
Livingston	0	---	2	3.1	0	---	0	---	1	1.5
Madison	0	---	0	---	0	---	0	---	0	---
Monroe	14	1.9	22	3.0	20	2.7	17	2.3	24	3.2
Montgomery	0	---	0	---	0	---	0	---	1	2.0
Nassau	36	2.7	40	3.0	33	2.5	40	3.0	38	2.8
Niagara	2	0.9	3	1.4	3	1.4	4	1.8	2	0.9
Oneida	5	2.1	8	3.4	3	1.3	5	2.1	8	3.4
Onondaga	11	2.4	9	1.9	10	2.1	10	2.1	17	3.6
Ontario	0	---	0	---	0	---	2	1.9	0	---
Orange	6	1.6	9	2.4	8	2.1	2	0.5	7	1.9
Orleans	0	---	0	---	0	---	0	---	0	---
Oswego	3	2.5	0	---	1	0.8	0	---	1	0.8
Otsego	0	---	0	---	0	---	1	1.6	0	---
Putnam	0	---	0	---	2	2.0	0	---	0	---
Rensselaer	3	1.9	1	0.6	2	1.3	0	---	2	1.3
Rockland	11	3.5	15	4.8	11	3.5	8	2.6	4	1.3
Saratoga	1	0.5	2	0.9	1	0.5	1	0.5	1	0.5
Schenectady	3	1.9	3	1.9	3	1.9	3	1.9	2	1.3
Schoharie	0	---	0	---	0	---	0	---	0	---
Schuyler	0	---	0	---	0	---	0	---	0	---
Seneca	2	5.7	0	---	0	---	0	---	0	---
St. Lawrence	1	0.9	1	0.9	0	---	1	---	0	---
Steuben	0	---	1	1.0	0	---	0	---	0	---
Suffolk	33	2.2	22	1.5	35	2.3	24	1.6	34	2.3
Sullivan	0	---	1	1.3	1	1.3	0	---	1	1.3
Tioga	0	---	0	---	0	---	0	---	0	---
Tompkins	4	3.9	1	1.0	4	3.9	2	2.0	2	2.0
Ulster	3	1.6	4	2.2	0	---	0	---	1	0.5
Warren	0	---	0	---	0	---	0	---	1	1.5
Washington	0	---	1	1.6	1	1.6	0	---	0	---
Wayne	0	---	1	1.1	1	1.1	0	---	1	1.1
Westchester	35	3.7	30	3.2	27	2.8	34	3.6	28	3.0
Wyoming	0	---	0	---	0	---	0	---	0	---
Yates	2	7.9	0	---	0	---	0	---	0	---
<b>New York State Total (Exclusive of New York City)</b>	<b>215</b>	<b>1.9</b>	<b>217</b>	<b>1.9</b>	<b>202</b>	<b>1.8</b>	<b>188</b>	<b>1.7</b>	<b>203</b>	<b>1.8</b>
Bronx	101	7.3	91	6.6	99	7.1	87	6.3	82	5.9
Kings	190	7.6	197	7.9	192	7.7	171	6.9	166	6.6
New York	93	5.9	102	6.4	72	4.5	88	5.4	67	4.2
Queens	244	10.9	242	10.8	212	9.5	218	9.8	240	10.8
Richmond	23	4.9	24	5.1	10	2.1	13	3.0	10	2.1
<b>New York City Total</b>	<b>651</b>	<b>8.0</b>	<b>656</b>	<b>8.0</b>	<b>585</b>	<b>7.2</b>	<b>577</b>	<b>7.1</b>	<b>565</b>	<b>6.9</b>
<b>STATE TOTAL</b>	<b>866</b>	<b>4.5</b>	<b>873</b>	<b>4.5</b>	<b>787</b>	<b>4.1</b>	<b>765</b>	<b>3.9</b>	<b>768</b>	<b>4.0</b>

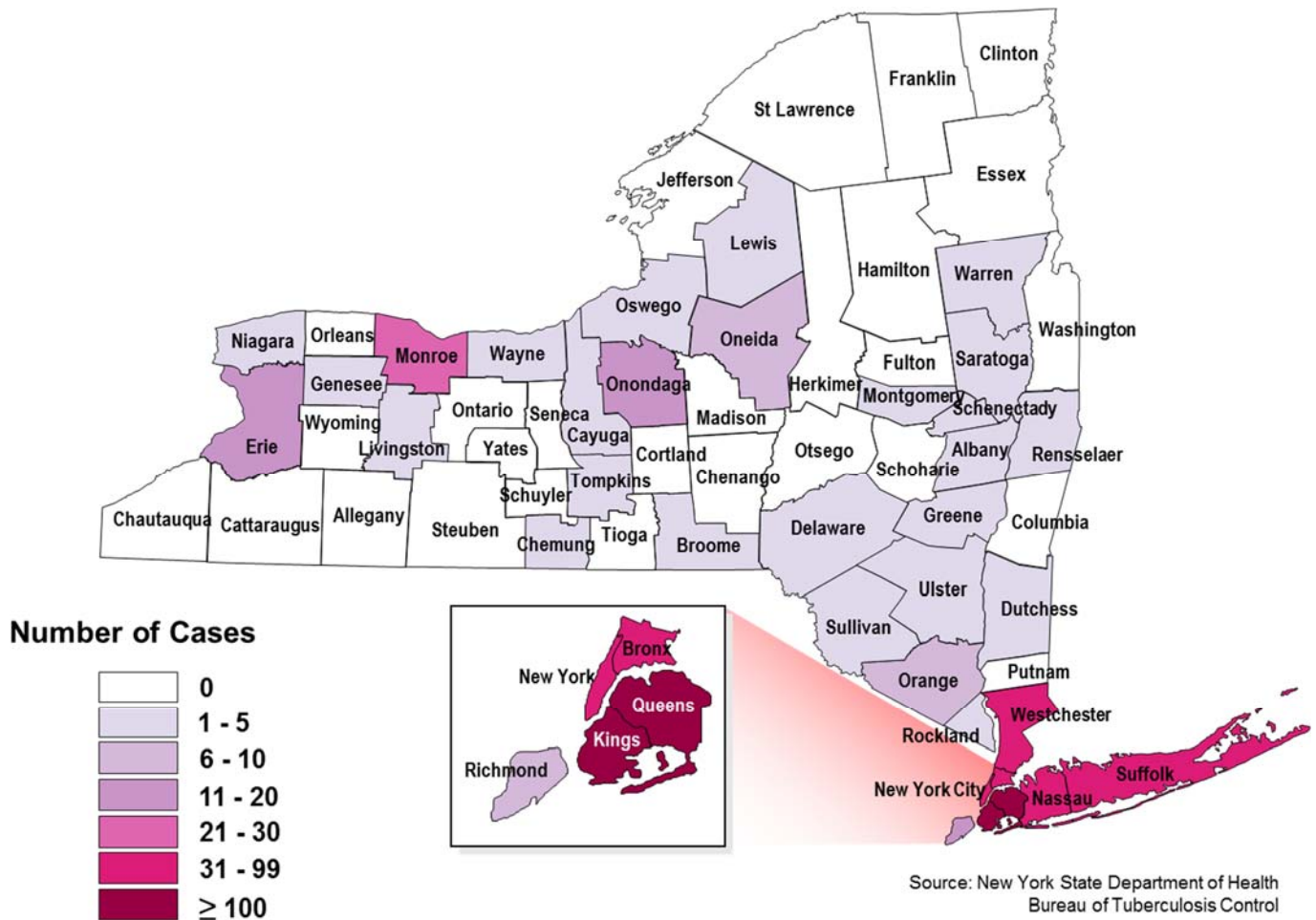
\*Rate calculations are based on 2010 United States Census data; per 100,000 population

Source: New York State Department of Health Bureau of Tuberculosis Control

# GEOGRAPHIC DISTRIBUTION

TB morbidity is not evenly distributed across NYS and varies greatly between counties. In 2016, all five boroughs of New York City and 30 (52.6%) of the 57 upstate counties reported at least one TB case. Higher numbers of cases were seen in the metropolitan areas. Nearly half of all TB morbidity reported for NYS (exclusive of New York City) was concentrated in Nassau, Suffolk and Westchester counties (49.3%, N=100/203).

Figure 4. Distribution of Tuberculosis Cases in New York State, 2016



# DEMOGRAPHIC CHARACTERISTICS

**Table 3. Tuberculosis Cases and Rates\* by Gender, Age,\*\* and Race/Ethnicity, New York State, 2016**

Demographic Characteristics		New York State (Exclusive of New York City)		New York City		New York State (Total)	
		No.	Rate	No.	Rate	No.	Rate
<b>Gender</b>	Male	122	2.2	345	8.9	467	5.0
	Female	81	1.4	220	5.1	301	3.0
<b>Age Group</b>	Under 5 years	7	1.1	7	1.4	14	1.2
	5-9	2	0.3	2	0.4	4	0.3
	10-14	1	0.1	2	0.4	3	0.2
	15-19	12	1.4	21	3.9	33	2.4
	20-24	18	2.3	41	6.4	59	4.2
	25-34	33	2.6	104	7.5	137	5.2
	35-44	31	2.1	87	7.5	118	4.5
	45-54	26	1.5	82	7.4	108	3.8
	55-64	32	2.3	94	10.6	126	5.5
65+	41	2.5	125	12.6	166	6.3	
<b>Race/Ethnicity</b>	White, non-Hispanic	38	0.4	50	1.8	88	0.8
	Black, non-Hispanic	42	4.6	109	5.9	151	5.4
	Hispanic	50	4.6	124	5.3	174	5.1
	Asian	68	18.0	259	25.2	327	23.3
	American Indian	1	2.7	1	5.7	2	3.7
	Multiple Races	0	---	12	8.1	12	3.7
	Other/Unknown	4	16.8	10	17.3	14	17.2
<b>TOTAL CASES</b>		<b>203</b>	<b>1.8</b>	<b>565</b>	<b>6.9</b>	<b>768</b>	<b>4.0</b>

\*Rate calculations are based on 2010 United States Census data; per 100,000 population

\*\*Age calculations are based on date of birth and report date

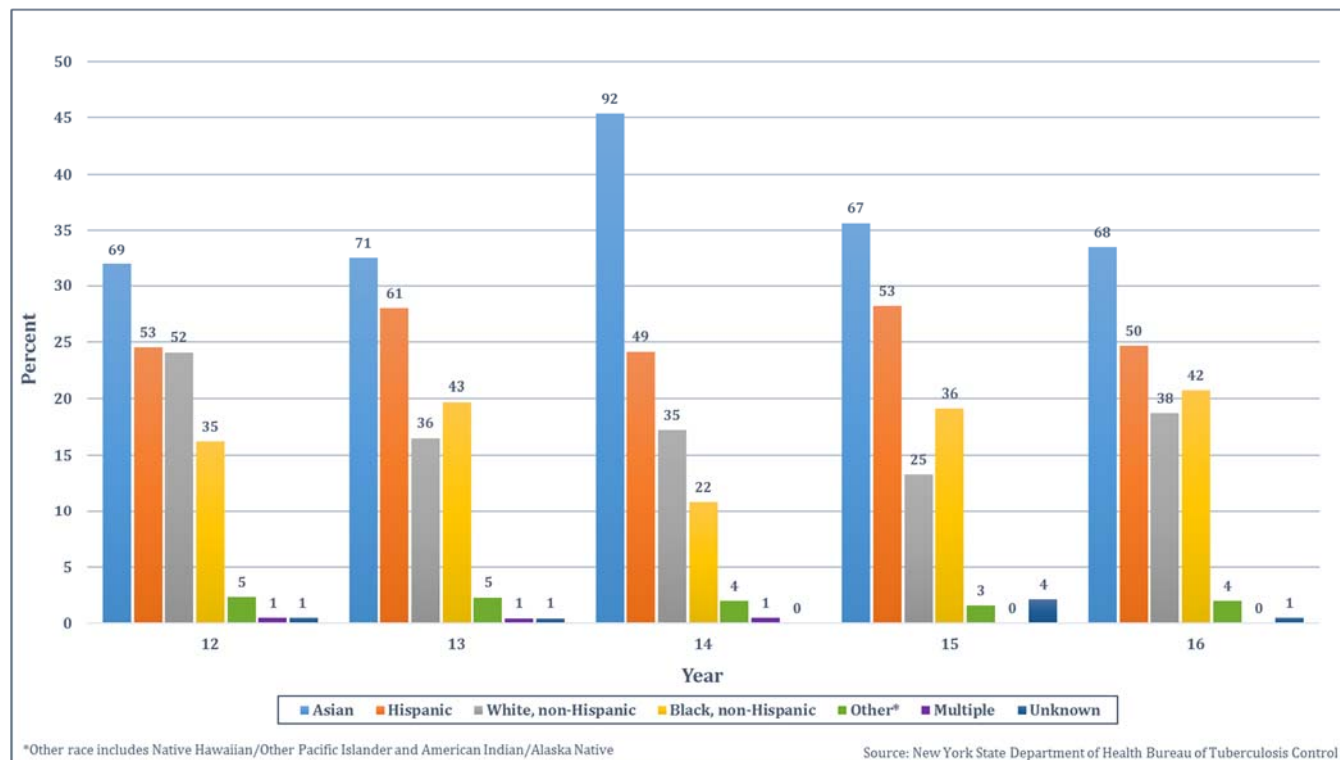
Source: New York State Department of Health  
Bureau of Tuberculosis Control

Statewide, in 2016, the lowest incidence rates of TB were seen among the high risk pediatric population (<15 years old), with those in the 10-14 year old age group representing only three cases for a rate of 0.2 per 100,000. In New York State (exclusive of New York City), the highest incidence rate was seen among those 25-34 years old (2.6 per 100,000), whereas in New York City, the highest rate was seen among those 65 years and older (12.6 per 100,000).

In 2016, Asians continued to have the highest incidence rate in New York State (23.3 per 100,000). For Hispanic and black, non-Hispanic cases, the incidence rates were comparable across the state (4.6 and 4.6 per 100,000 for New York State (exclusive of New York City); 5.3 and 5.9 per 100,000 for New York City).

# DEMOGRAPHIC CHARACTERISTICS

**Figure 5. Number and Percent of Tuberculosis Cases by Race/Ethnicity, New York State (Exclusive of New York City), 2012-2016**



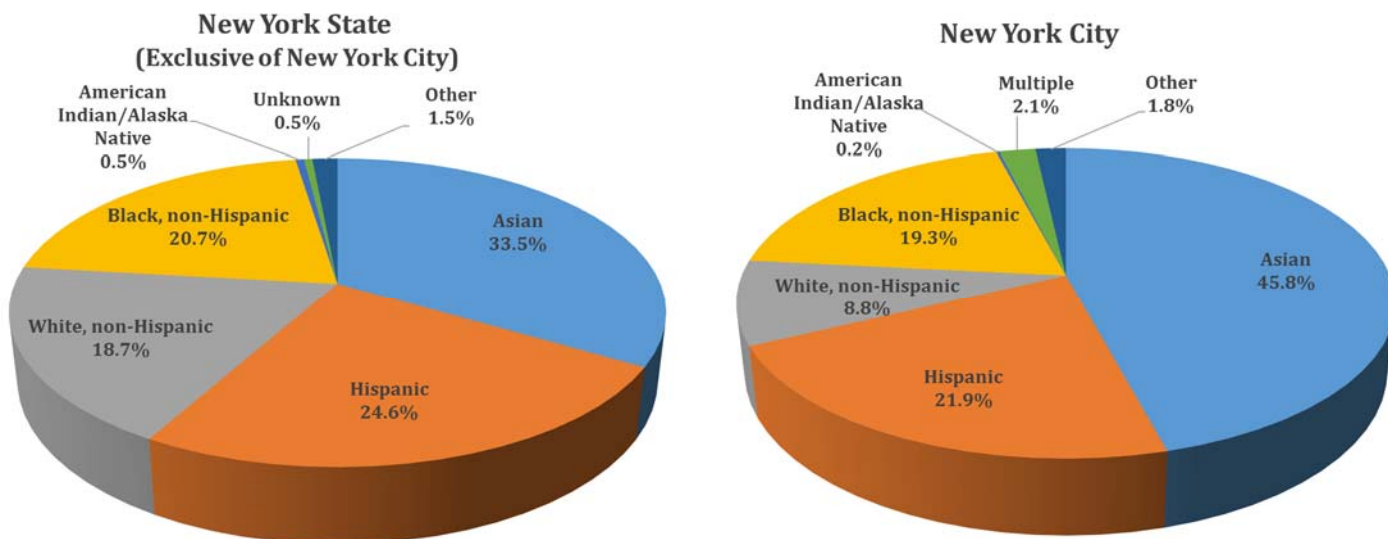
Over the last five years, the majority of TB cases reported in New York State (exclusive of New York City) have been of Asian and Hispanic descent. Since 2012, Asians have continued to represent a larger percentage of reported cases than any other racial/ethnic group, especially in 2014 when the percentage of Asian cases dramatically increased to 45.5 percent (N=92/202).

In 2016, although the majority of TB cases in New York State (exclusive of New York City) continued to be Asian or Hispanic, the number of white, non-Hispanic cases increased by 52.0 percent in 2016 compared to 2015 (N=38 and N=25, respectively). In addition, the proportion of black, non-Hispanic cases reached the highest it has been in five years (20.7%, N=42/203).



# DEMOGRAPHIC CHARACTERISTICS

Figure 6. Race/Ethnicity of Tuberculosis Cases, New York State, 2016



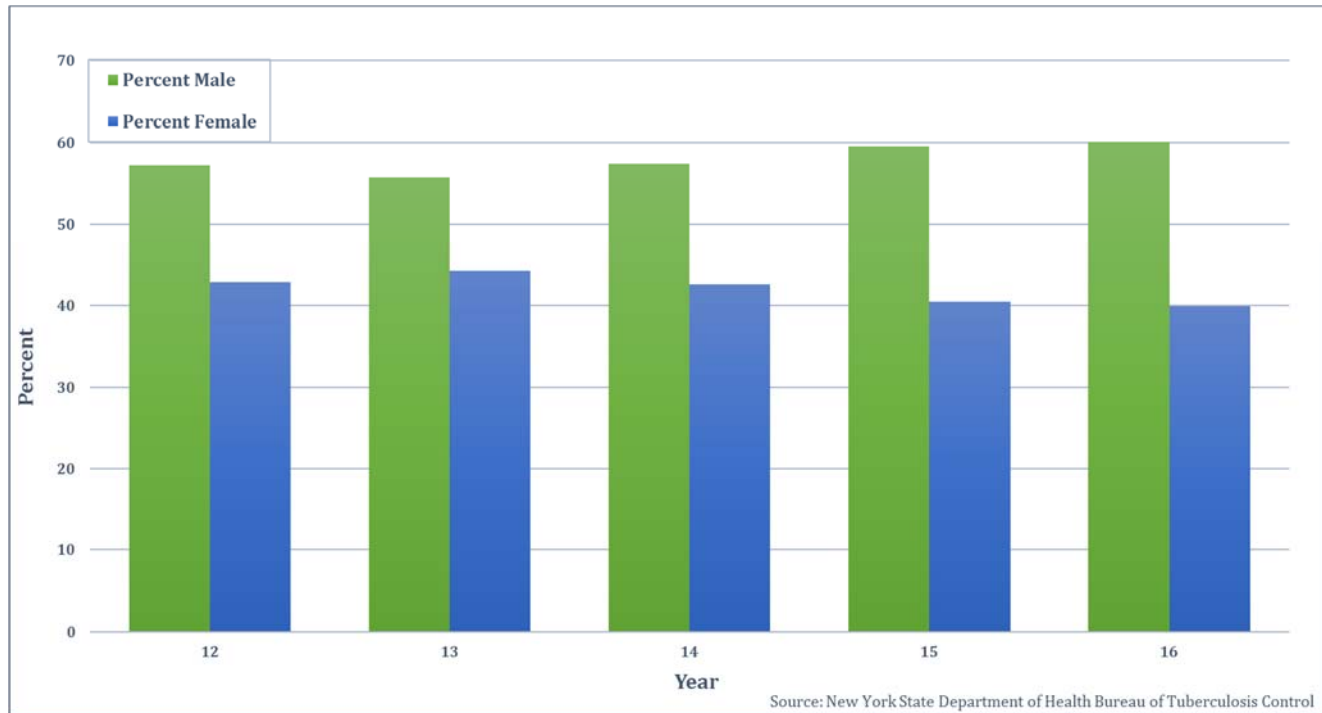
Source: New York State Department of Health Bureau of Tuberculosis Control

In New York City, 45.8 percent (N=259/565) of reported cases in 2016 were Asian, whereas in New York State (exclusive of New York City) Asians represented 33.5 percent (N=68/203) of cases. The proportion of white, non-Hispanic cases in New York State (exclusive of New York City) was more than double that seen in New York City (18.7% and 8.8%, respectively).



# DEMOGRAPHIC CHARACTERISTICS

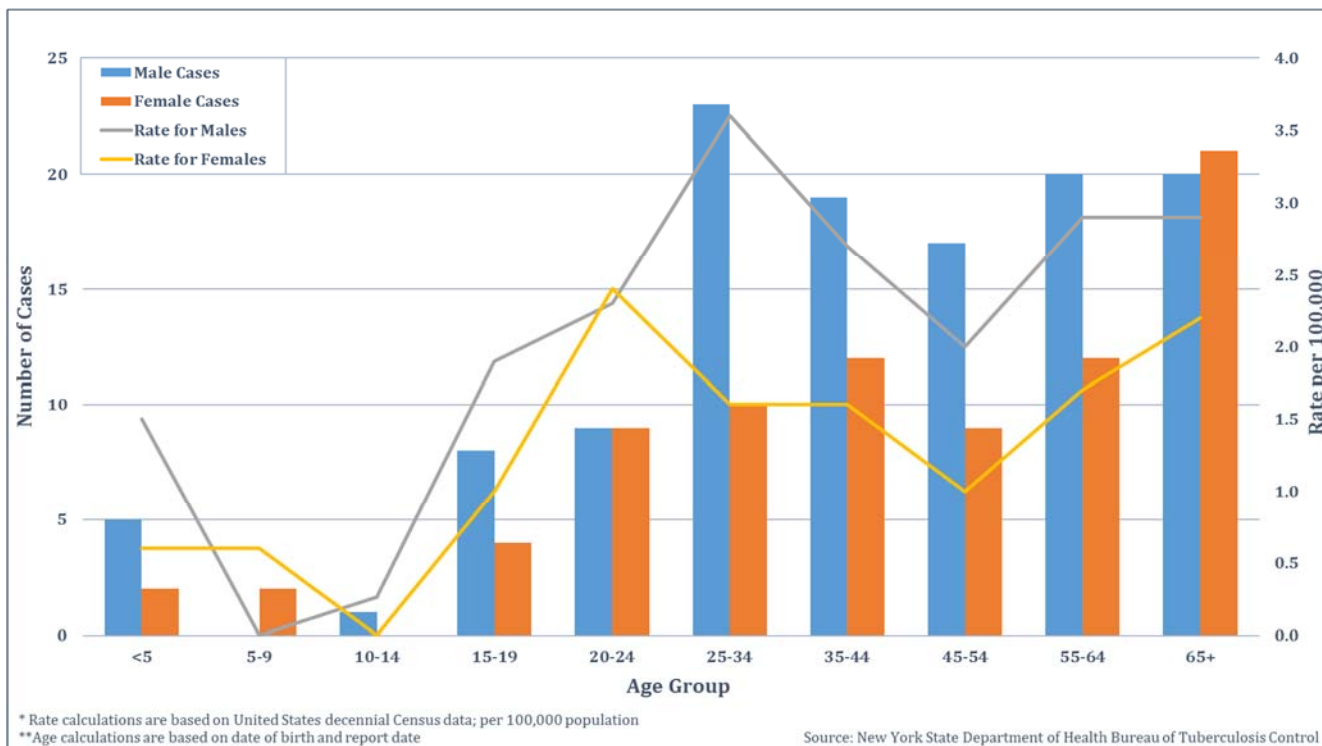
**Figure 7. Percent of Tuberculosis Cases by Gender, New York State (Exclusive of New York City), 2012-2016**



Over the last five years, males have consistently comprised a higher proportion of TB cases compared to females in New York State (exclusive of New York City). In 2016, 60.1 percent (N=122/203) of reported cases were male and 39.9 percent (N=81/203) were female.

# DEMOGRAPHIC CHARACTERISTICS

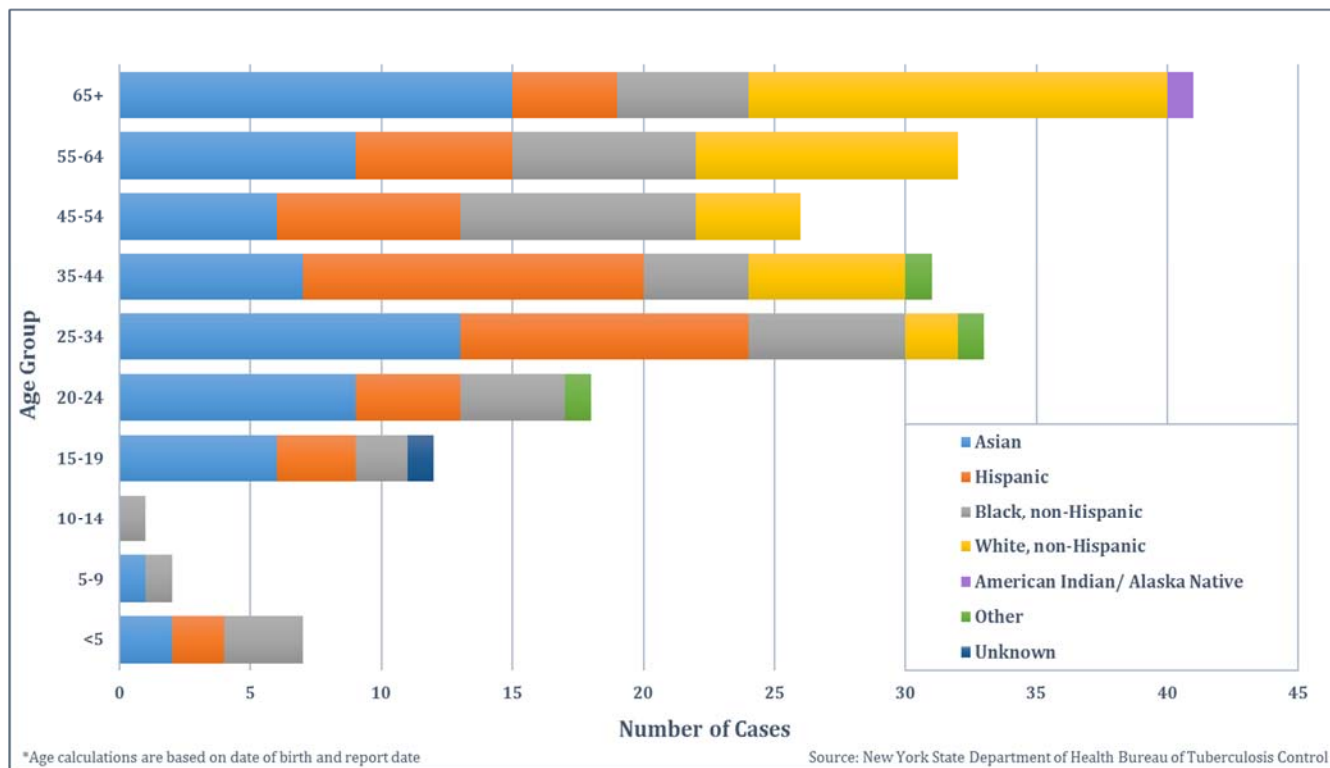
**Figure 8. Tuberculosis Cases and Rates\* by Age\*\* and Gender, New York State (Exclusive of New York City), 2016**



In 2016, the difference in TB morbidity between males and females in New York State (exclusive of New York City) varied depending on age. The largest gender gap in TB morbidity was seen among cases 25-34 years old where the case rate for males was 2.3 times that of females (3.6 per 100,000 for males; 1.6 per 100,000 for females). Among cases 65 years of age and older, the number of females surpassed the number of males, but the incidence rate for males was still 1.3 times that of females (2.9 per 100,000 and 2.2 per 100,000, respectively).

# DEMOGRAPHIC CHARACTERISTICS

**Figure 9. Tuberculosis Cases by Age\* and Race/Ethnicity, New York State (Exclusive of New York City), 2016**

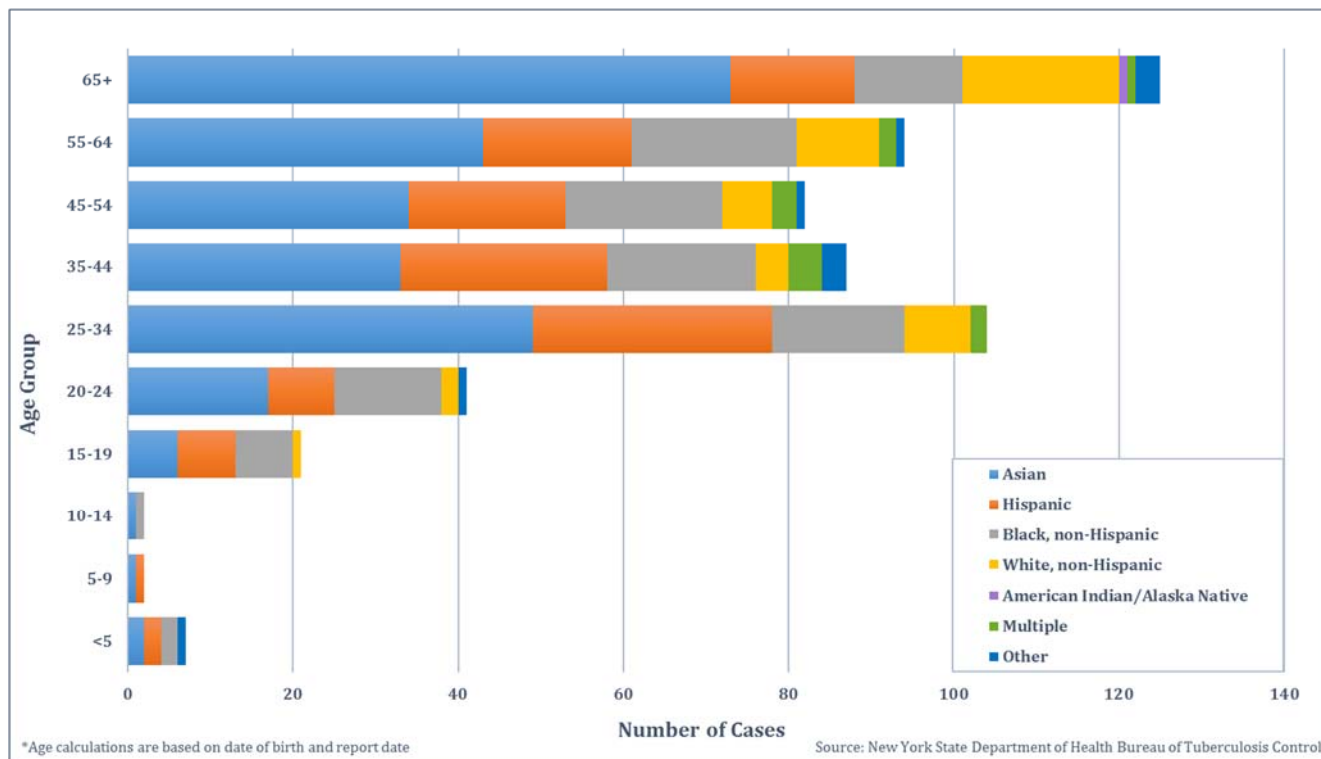


In 2016, 41 (20.2%) cases in New York State (exclusive of New York City) were 65 years of age and older. Sixteen (39.0%) of these cases were white, non-Hispanic and 15 (36.6%) were Asian.

The second largest number of TB cases reported in 2016 for New York State (exclusive of New York City) was seen in the 25-34 year age group (N=33). Thirteen (39.4%) of these cases were Asian and 11 (33.3%) were Hispanic.

# DEMOGRAPHIC CHARACTERISTICS

Figure 10. Tuberculosis Cases by Age\* and Race/Ethnicity, New York City, 2016

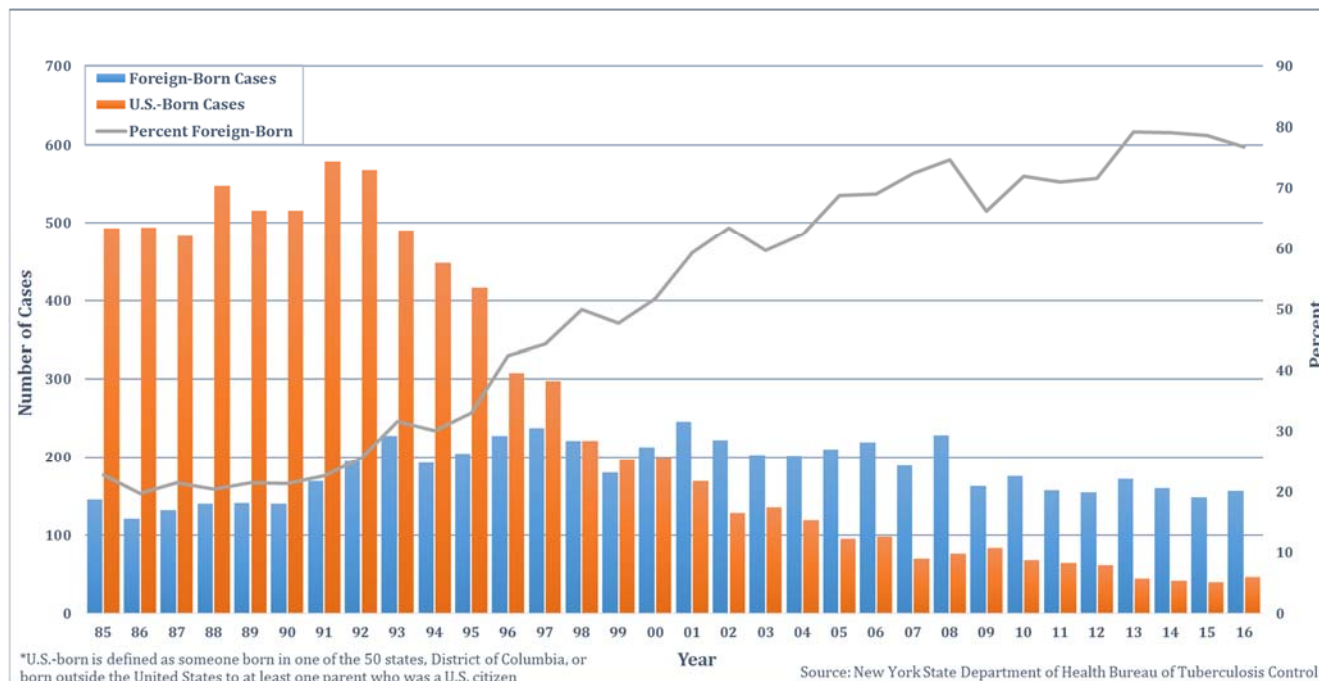


In New York City, the largest number of TB cases reported in 2016 was seen in the 65 years of age and older group (N=125). Among these 125 cases, 73 (58.4%) were Asian and 19 (15.2%) were white, non-Hispanic.

Similar to the remainder of the state in 2016, the second largest number of TB cases in New York City was identified in the 25-34 year age group (N=104). Forty-nine (47.1%) cases in this age group were Asian and 29 (27.9%) were Hispanic.

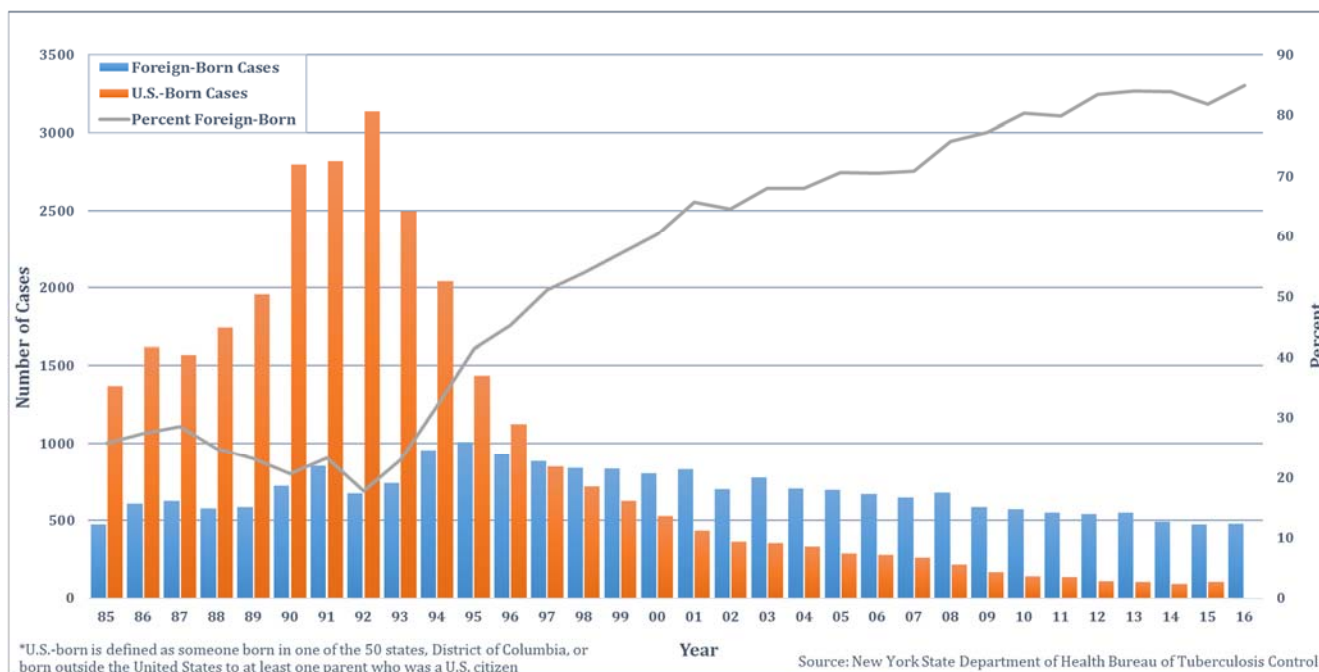
# TUBERCULOSIS IN THE FOREIGN-BORN

**Figure 11a. Number and Percent of Tuberculosis Cases by U.S.-Born\* and Foreign-Born Status, New York State (Exclusive of New York City), 1985-2016**



In 2016, there were 156 foreign-born cases in New York State (exclusive of New York City), an increase from the 148 reported in 2015. Despite this increase, the foreign-born percentage declined slightly, from 78.7 percent in 2015 to 76.8 percent in 2016. In New York City, the number of foreign-born TB cases increased from 472 in 2015 to 480 in 2016. The proportion of foreign-born cases also increased, from 81.8 percent in 2015 to 85.0 percent in 2016.

**Figure 11b. Number and Percent of Tuberculosis Cases by U.S.-Born\* and Foreign-Born Status, New York City, 1985-2016**



# TUBERCULOSIS IN THE FOREIGN-BORN

**Table 4. Tuberculosis Cases by Country of Origin,\* New York State, 2016**

<b>Country</b>	<b>New York State (Exclusive of New York City)</b>	<b>New York City</b>	<b>New York State (Total)</b>
United States	48	78	126
China	4	114	118
Mexico	7	34	41
Philippines	10	30	40
India	14	21	35
Haiti	8	22	30
Ecuador	8	21	29
Bangladesh	3	26	29
Dominican Republic	3	22	25
Korea, South	7	12	19
Burma	6	10	16
Pakistan	6	9	15
Guyana	0	15	15
Nepal	4	10	14
Guatemala	8	5	13
Honduras	6	6	12
Peru	4	6	10
El Salvador	7	2	9
Puerto Rico**	0	7	7
Jamaica	1	6	7
Hong Kong	1	6	7
Colombia	1	5	6
Vietnam	3	3	6
Nigeria	3	3	6
Thailand	2	3	5
Other Countries	39	89	128
<b>TOTAL CASES</b>	<b>203</b>	<b>565</b>	<b>768</b>

\*Only countries representing ≥5 TB cases are named

\*\*Puerto Rico and other U.S. Territories are considered separately for the purpose of this table

Source: New York State Department of Health  
Bureau of Tuberculosis Control

In 2016, there were 82 different countries represented by the 768 TB cases reported in New York State, 25 of which were represented by at least five cases. Similar to previous years, the most common country of origin for foreign-born TB cases reported by New York State (exclusive of New York City) was India (N=14) and for New York City, the most common country was China (N=114).

# TUBERCULOSIS IN THE FOREIGN-BORN

**Table 5. Number and Percent of Tuberculosis Cases by U.S. and Foreign-Born Status, New York State (Exclusive of New York City), 2016**

County	Total Number	U.S.-Born Number	Foreign-Born Number	Foreign-Born Percent
Albany	2	0	2	100.0
Allegany	0	0	0	0.0
Broome	3	0	3	100.0
Cattaraugus	0	0	0	0.0
Cayuga	1	1	0	0.0
Chautauqua	0	0	0	0.0
Chemung	2	1	1	50.0
Chenango	0	0	0	0.0
Clinton	0	0	0	0.0
Columbia	0	0	0	0.0
Cortland	0	0	0	0.0
Delaware	1	0	1	100.0
Dutchess	1	1	0	0.0
Erie	13	6	7	53.8
Essex	0	0	0	0.0
Franklin	0	0	0	0.0
Fulton	0	0	0	0.0
Genesee	2	1	1	50.0
Greene	1	0	1	100.0
Hamilton	0	0	0	0.0
Herkimer	0	0	0	0.0
Jefferson	0	0	0	0.0
Lewis	1	1	0	0.0
Livingston	1	0	1	100.0
Madison	0	0	0	0.0
Monroe	24	11	13	54.2
Montgomery	1	1	0	0.0
Nassau	38	6	32	84.2
Niagara	2	1	1	50.0
Oneida	8	0	8	100.0
Onondaga	17	0	17	100.0
Ontario	0	0	0	0.0
Orange	7	1	6	85.7
Orleans	0	0	0	0.0
Oswego	1	1	0	0.0
Otsego	0	0	0	0.0
Putnam	0	0	0	0.0
Rensselaer	2	1	1	50.0
Rockland	4	0	4	100.0
St. Lawrence	0	0	0	0.0
Saratoga	1	1	0	0.0
Schenectady	2	0	2	100.0
Schoharie	0	0	0	0.0
Schuyler	0	0	0	0.0
Seneca	0	0	0	0.0
Steuben	0	0	0	0.0
Suffolk	34	5	29	85.3
Sullivan	1	1	0	0.0
Tioga	0	0	0	0.0
Tompkins	2	0	2	100.0
Ulster	1	1	0	0.0
Warren	1	1	0	0.0
Washington	0	0	0	0.0
Wayne	1	1	0	0.0
Westchester	28	4	24	85.7
Wyoming	0	0	0	0.0
Yates	0	0	0	0.0
<b>TOTAL CASES</b>	<b>203</b>	<b>47</b>	<b>156</b>	<b>76.8</b>

In 2016, there were 156 foreign-born TB cases reported in New York State (exclusive of New York City). Over half (54.5%, N= 85/156) of these cases were identified in Nassau, Suffolk and Westchester alone. Among other counties that reported at least five foreign-born cases, Onondaga and Oneida reported the highest foreign-born percentage (100.0%) while Erie reported the lowest percentage (53.8%). In the remaining counties with foreign-born cases, the number and percentage varied.

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

Source: New York State Department of Health Bureau of Tuberculosis Control

# TUBERCULOSIS IN THE FOREIGN-BORN

**Table 6. Length of Time Foreign-Born Tuberculosis Cases were in the United States Prior to Diagnosis, New York State (Exclusive of New York City), 2016**

<b>Length of Time in the United States (Years)</b>	<b>No.</b>	<b>%</b>
<b>&lt;1</b>	22	14.1
<b>1-5</b>	47	30.1
<b>6-10</b>	16	10.3
<b>11-20</b>	34	21.8
<b>21-30</b>	20	12.8
<b>31-40</b>	9	5.8
<b>41-50</b>	4	2.6
<b>51-60</b>	1	0.6
<b>61-70</b>	1	0.6
<b>Unknown</b>	2	1.3

Source: New York State Department of Health  
Bureau of Tuberculosis Control

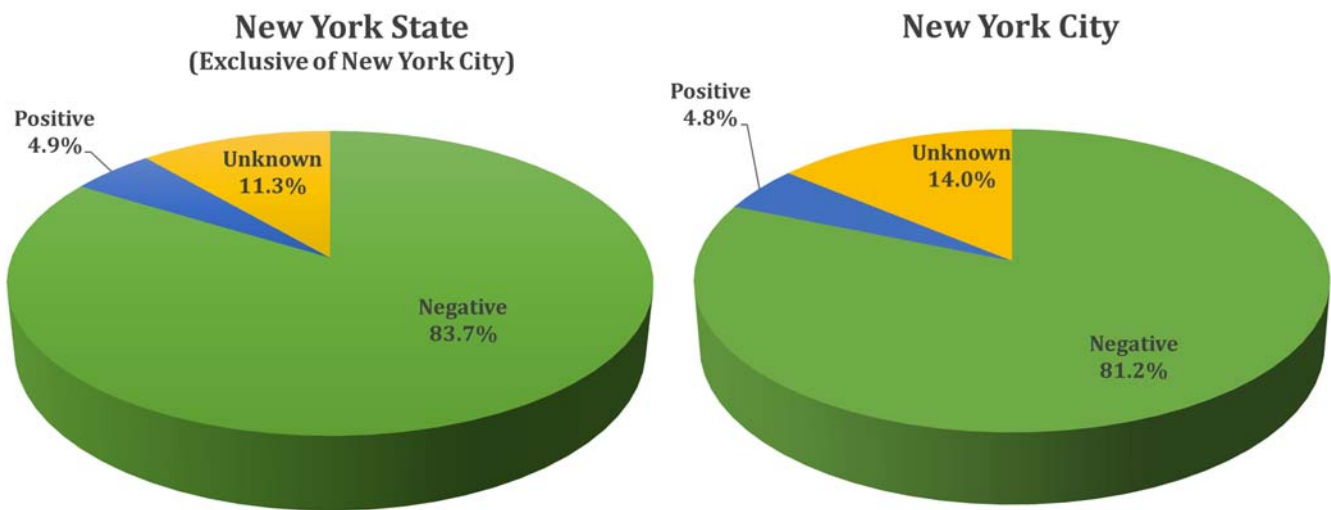
In 2016, 44.2 percent (N=69/156) of foreign-born TB cases in New York State (exclusive of New York City) were diagnosed within five years of entering the U.S. Forty-seven (68.1%) of these 69 cases entered the U.S. within two years prior to diagnosis.



# HIV CO-INFECTION

Knowledge of HIV status is essential for the proper management of patients with TB. HIV infection impairs the immune system leaving individuals at greater risk for becoming infected with TB and developing active disease.

Figure 12. HIV Status for Tuberculosis Cases, New York State, 2016

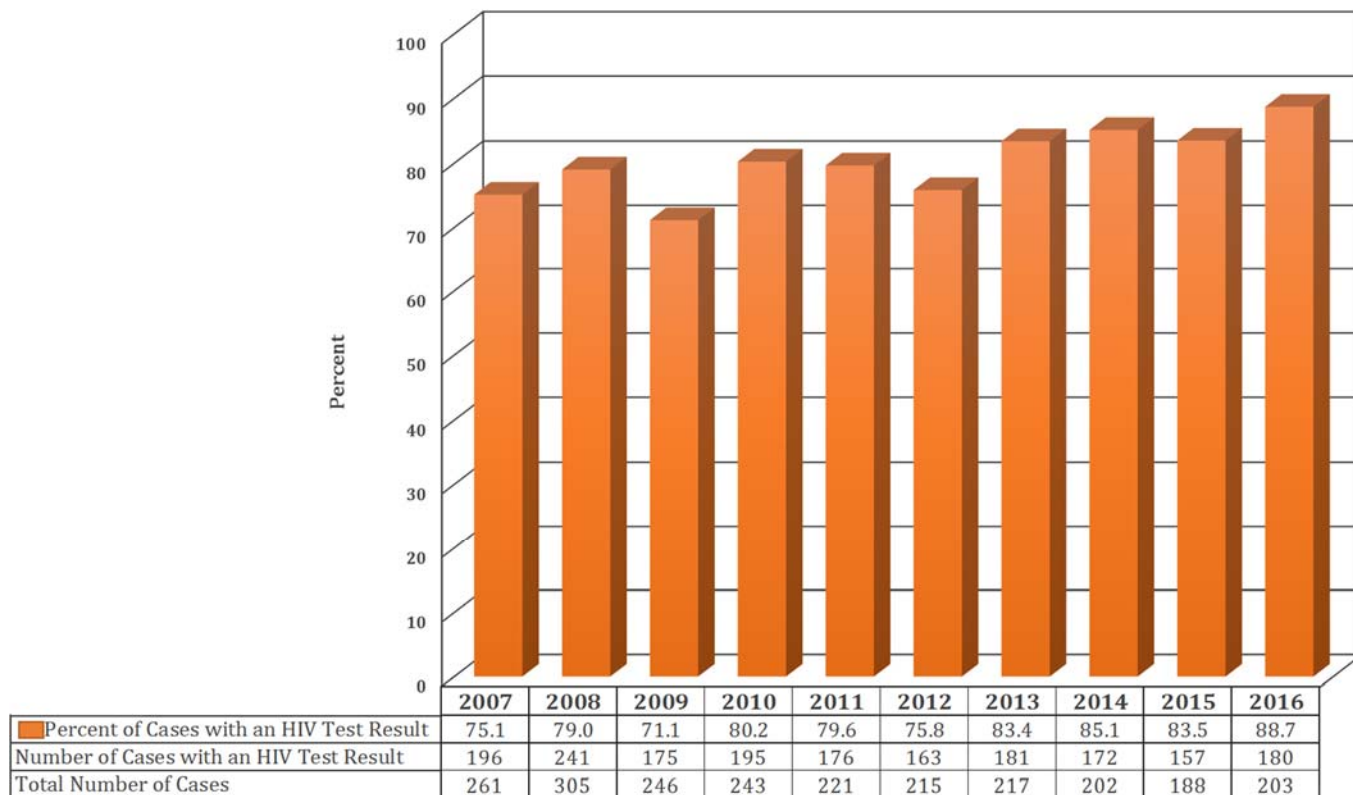


Source: New York State Department of Health Bureau of Tuberculosis Control

Eighty-nine percent (N=180/203) of TB cases in New York State (exclusive of New York City) and 86.0 percent (N=486/565) of cases in New York City had a known HIV status in 2016. The co-infection rate for TB cases in New York State (exclusive of New York City) and New York City were nearly identical (4.9% and 4.8%, respectively). Individuals missing HIV testing information and those who were not offered or had refused testing were considered to have an unknown status.

# HIV CO-INFECTION

**Figure 13. Number and Percent of Tuberculosis Cases Who Have Been Tested for HIV, New York State (Exclusive of New York City), 2007-2016**



Source: New York State Department of Health Bureau of Tuberculosis Control

In New York State (exclusive of New York City), the proportion of TB cases with a known HIV status has generally increased over the last 10 years. In 2016, 88.7 percent (N=180/203) of TB cases had a documented HIV result, which was 5.2 percent higher than the 83.5 percent seen in 2015.

In 2016, 57.1 percent (N=4/7) of TB cases under five years old had a known HIV status in New York State (exclusive of New York City).

# HIV CO-INFECTION

**Table 7a. HIV Status for Tuberculosis Cases, New York State (Exclusive of New York City), 2012-2016**

HIV Test	2012		2013		2014		2015		2016	
	No.	%	No.	%	No.	%	No.	%	No.	%
Negative	157	73.0	167	77.0	166	82.2	152	80.9	170	83.7
Positive	6	2.8	14	6.5	6	3.0	5	2.7	10	4.9
Refused	25	11.6	19	8.8	19	9.4	12	6.4	7	3.4
Not Offered	23	10.7	13	6.0	7	3.5	15	8.0	12	5.9
Missing/Unknown	4	1.9	4	1.8	4	2.0	4	2.1	4	2.0
<b>TOTAL CASES</b>	<b>215</b>		<b>217</b>		<b>202</b>		<b>188</b>		<b>203</b>	

Source: New York State Department of Health  
Bureau of Tuberculosis Control

In 2016, 11.3 percent (N=23/203) of TB cases in New York State (excluding New York City) had an unknown HIV status (refused, not offered or missing/unknown), which was the lowest percentage in the last five years. Of the 19 cases who refused or weren't offered testing in 2016, 11 (57.9%) were over 65 years old.

**Table 7b. HIV Status for Tuberculosis Cases by Gender, New York State (Exclusive of New York City), 2016**

HIV Test	Male		Female		Total	
	No.	%	No.	%	No.	%
Negative	102	83.6	68	84.0	170	83.7
Positive	8	6.6	2	2.5	10	4.9
Refused	2	1.6	5	6.2	7	3.4
Not Offered	8	6.6	4	4.9	12	5.9
Missing/Unknown	2	1.6	2	2.5	4	2.0
<b>TOTAL CASES</b>	<b>122</b>		<b>81</b>		<b>203</b>	

Source: New York State Department of Health  
Bureau of Tuberculosis Control

In New York State (exclusive of New York City), the proportion of TB cases with a known HIV status was greater among males compared to females in 2016 (90.2% and 86.5%, respectively). Additionally, 80.0 percent (N=8/10) of cases with HIV co-infection were male. The percentage of females who refused testing was nearly four times greater than the percentage of males who refused (6.2% and 1.6%, respectively).

# REASONS FOR EVALUATION

**Table 8a. Primary Reason for Evaluation of Tuberculosis Cases, New York State (Exclusive of New York City), 2012-2016**

Primary Reason for Evaluation	2012		2013		2014		2015		2016	
	No.	%	No.	%	No.	%	No.	%	No.	%
<b>TB Symptoms</b>	110	51.2	111	51.2	116	57.4	91	48.4	93	45.8
<b>Abnormal Chest Radiograph</b>	54	25.1	48	22.1	42	20.8	41	21.8	45	22.2
<b>Incidental Lab Result</b>	35	16.3	35	16.1	23	11.4	35	18.6	42	20.7
<b>Contact Investigation</b>	4	1.9	6	2.8	9	4.5	14	7.4	6	3.0
<b>Targeted Testing</b>	2	0.9	1	0.5	4	2.0	4	2.1	7	3.4
<b>Immigration Medical Exam</b>	3	1.4	6	2.8	3	1.5	0	0.0	1	0.5
<b>Employment/Administrative</b>	1	0.5	2	0.9	1	0.5	0	0.0	2	1.0
<b>Health Care Worker</b>	1	0.5	0	0.0	1	0.5	0	0.0	1	0.5
<b>Unknown</b>	5	2.3	8	3.7	3	1.5	3	1.6	6	3.0
<b>TOTAL CASES</b>	<b>215</b>		<b>217</b>		<b>202</b>		<b>188</b>		<b>203</b>	

Source: New York State Department of Health  
Bureau of Tuberculosis Control

In 2016, 45.8 percent (N=93/203) of TB cases in New York State (exclusive of New York City) were evaluated because of TB symptoms. The second most common reason for evaluation was an abnormal chest radiograph (22.2%, N=45/203) followed by an incidental lab result (20.7%, N=42/203). Over the past five years, these have continued to be the three most frequently reported reasons for evaluation.

**Table 8b. Primary Reason for Evaluation of Tuberculosis Cases by U.S.-born\* and Foreign-Born Status, New York State (Exclusive of New York City), 2016**

Primary Reason for Evaluation	U.S.-Born		Foreign-Born		Total	
	No.	%	No.	%	No.	%
<b>TB Symptoms</b>	22	46.8	71	45.5	93	45.8
<b>Abnormal Chest Radiograph</b>	10	21.3	35	22.4	45	22.2
<b>Incidental Lab Result</b>	7	14.9	35	22.4	42	20.7
<b>Contact Investigation</b>	3	6.4	3	1.9	6	3.0
<b>Targeted Testing</b>	2	4.3	5	3.2	7	3.4
<b>Immigration Medical Exam</b>	0	0.0	1	0.6	1	0.5
<b>Employment/Administrative Testing</b>	1	2.1	1	0.6	2	1.0
<b>Health Care Worker</b>	0	0.0	1	0.6	1	0.5
<b>Unknown</b>	2	4.3	4	2.6	6	3.0
<b>TOTAL CASES</b>	<b>47</b>		<b>156</b>		<b>203</b>	

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

Source: New York State Department of Health  
Bureau of Tuberculosis Control

The proportion of cases that underwent evaluation due to TB symptoms was similar for U.S.-born and foreign-born cases in New York State (exclusive of New York City) (46.8% and 45.5%, respectively). Six percent (N=3/47) of U.S.-born cases were evaluated because they had been in contact with another infectious TB case compared to 1.9 percent (N=3/156) of foreign-born cases.

# RISK FACTORS

Aside from the commonly collected risk factors, such as HIV status, drug/alcohol usage, occupation and country of birth, there are additional medical and exposure risk factors that are associated with TB. Medical risk factors are conditions that weaken an individual's immune defenses against TB and may complicate the management of the disease. Exposure risk factors are those that place an individual at increased risk of TB transmission.

**Table 9a. Additional Risk Factors\* Among Tuberculosis Cases, New York State (Exclusive of New York City), 2012-2016**

Additional Risk Factors		2012		2013		2014		2015		2016	
		No.	%	No.	%	No.	%	No.	%	No.	%
Medical Risk	Diabetes Mellitus	23	10.7	25	11.5	30	14.9	34	18.1	36	17.7
	Immunosuppression (not HIV/AIDS)	15	7.0	9	4.1	11	5.4	6	3.2	11	5.4
	Incomplete LTBI Therapy	13	6.0	9	4.1	8	4.0	8	4.3	4	2.0
	End-Stage Renal Disease	3	1.4	4	1.8	6	3.0	3	1.6	4	2.0
	Post-Organ Transplantation	1	0.5	0	0.0	4	2.0	3	1.6	1	0.5
	TNF- $\alpha$ Antagonist Therapy	2	0.9	2	0.9	1	0.5	1	0.5	4	2.0
Exposure Risk**	Contact of Infectious TB Patient	8	3.7	13	6.0	17	8.4	20	10.6	10	4.9
	Contact of MDR-TB Patient	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Missed Contact	0	0.0	0	0.0	0	0.0	1	0.5	0	0.0
Other Risk	Other Factors	24	11.2	16	7.4	28	13.9	26	13.8	34	16.7
None	No Additional Factors	131	60.9	146	67.3	117	57.9	100	53.2	116	57.1
<b>TOTAL CASES</b>		<b>215</b>		<b>217</b>		<b>202</b>		<b>188</b>		<b>203</b>	

\*Categories are not mutually exclusive

\*\*Within the last 2 years

LTBI = Latent Tuberculosis Infection

Source: New York State Department of Health  
Bureau of Tuberculosis Control

Although most TB cases in New York State (exclusive of New York City) didn't have additional risk factors, between 33 and 47 percent of those diagnosed in the last five years had at least one. Among these cases, diabetes continues to be the most commonly reported risk factor. In 2016, 17.7 percent (N=36/203) of cases in New York State (exclusive of New York City) had diabetes, which was seven percent higher than in 2012 (10.7%). Additionally, the proportion of cases who had been in recent contact with an infectious TB patient was 5.7 percent lower in 2016 compared to 2015 (4.9% and 10.6%, respectively).

**Table 9b. Additional Risk Factors\* Among Tuberculosis Cases by Gender, New York State (Exclusive of New York City), 2016**

Additional Risk Factors		Male		Female		Total	
		No.	%	No.	%	No.	%
Medical Risk	Diabetes Mellitus	21	17.2	15	18.5	36	17.7
	Immunosuppression (not HIV/AIDS)	5	4.1	6	7.4	11	5.4
	Incomplete LTBI Therapy	2	1.6	2	2.5	4	2.0
	End-Stage Renal Disease	4	3.3	0	0.0	4	2.0
	Post-Organ Transplantation	1	0.8	0	0.0	1	0.5
	TNF- $\alpha$ Antagonist Therapy	1	0.8	3	3.7	4	2.0
Exposure Risk**	Contact of Infectious TB Patient	4	3.3	6	7.4	10	4.9
	Contact of MDR-TB Patient	0	0.0	0	0.0	0	0.0
	Missed Contact	0	0.0	0	0.0	0	0.0
Other Risk	Other Factors	15	12.3	19	23.5	34	16.7
None	No Additional Factors	75	61.5	41	50.6	116	57.1
<b>TOTAL CASES</b>		<b>122</b>		<b>81</b>		<b>203</b>	

\*Categories are not mutually exclusive

\*\*Within the last 2 years

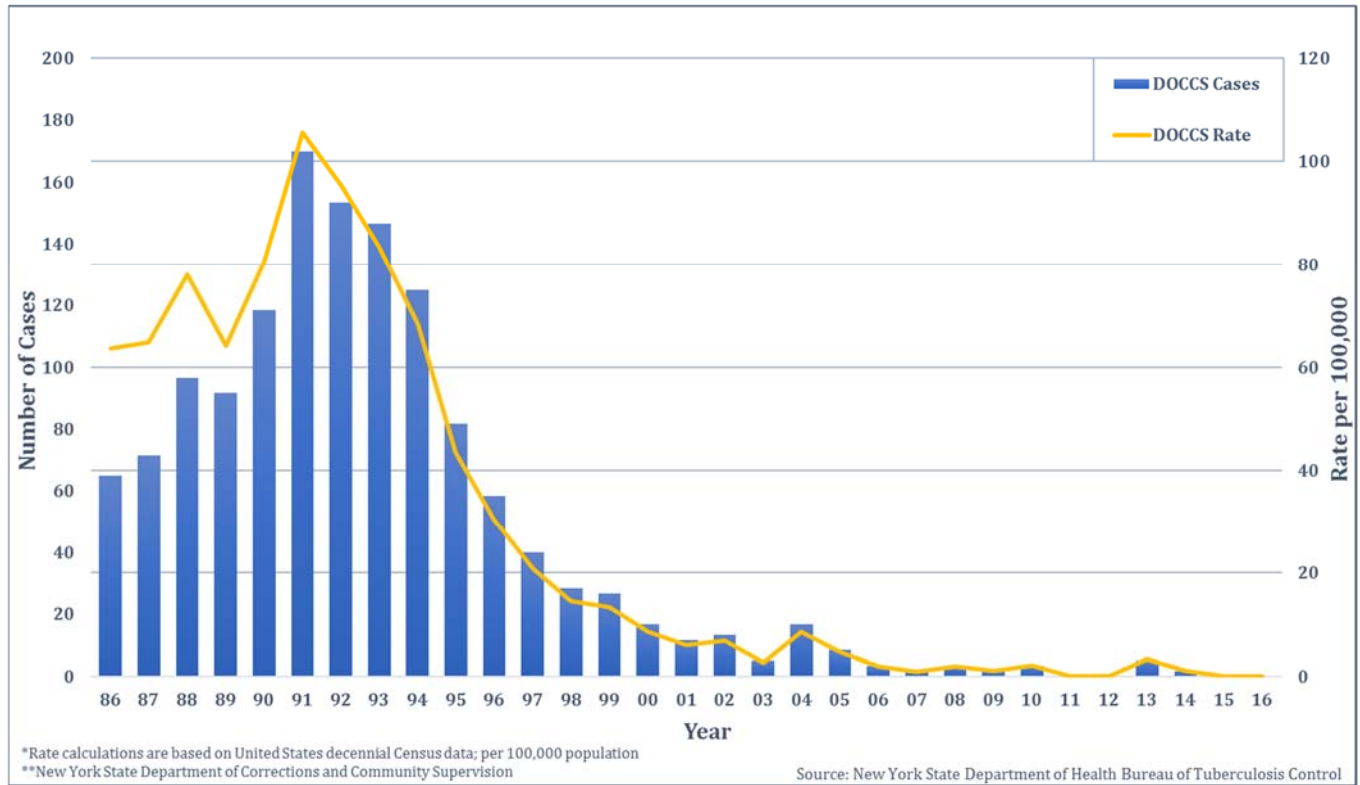
LTBI = Latent Tuberculosis Infection

Source: New York State Department of Health  
Bureau of Tuberculosis Control

In 2016, 49.4 percent of female TB cases in New York State (exclusive of New York City) had at least one additional risk factor compared to 38.5 percent of male cases. Over seven percent of female cases had been in contact with an infectious TB patient compared to 3.3 percent of male cases.

# RISK FACTORS

**Figure 14. Tuberculosis Cases and Rates\* Among DOCCS\*\* Inmates, New York State (Exclusive of New York City), 1986-2016**



During the late 1980s and early 1990s, a substantial proportion of TB cases reported by New York State (exclusive of New York City) were in the New York State Department of Corrections and Community Supervision (DOCCS) inmate population. Among the DOCCS inmate population, there has been a notable decline in cases since 1991 when 102 new cases (176 per 100,000 inmates) were reported. In 2011 and 2012 there were no new cases reported, but in 2013 there were three new cases (5.5 per 100,000 inmates) and in 2014 there was one new case (1.8 per 100,000 inmates). In 2015 and 2016 there were no new TB cases reported among the DOCCS inmate population.

# RISK FACTORS

There is an increased risk of TB transmission for residents and staff of congregate settings (e.g., correctional facilities and long-term care facilities) due to the close proximity and prolonged contact with others. Residents of congregate settings may also have significant comorbidities that amplify this risk even further.

**Table 10. High-Risk Congregate Setting at the Time of Diagnosis for Tuberculosis Cases, New York State (Exclusive of New York City), 2012-2016**

Congregate Setting at Time of TB Diagnosis		2012		2013		2014		2015		2016	
		No.	%	No.	%	No.	%	No.	%	No.	%
<b>Correctional Facility</b>	Juvenile Facility	0	0.0	0	0.0	1	0.5	0	0.0	1	0.5
	Local Jail	0	0.0	0	0.0	1	0.5	1	0.5	0	0.0
	State Prison	0	0.0	3	1.4	1	0.5	0	0.0	0	0.0
	Federal Prison	0	0.0	0	0.0	0	0.0	0	0.0	1	0.5
	Other Facility	0	0.0	0	0.0	0	0.0	1	0.5	0	0.0
<b>Long-Term Care Facility</b>	Alcohol/Drug Treatment	0	0.0	0	0.0	1	0.5	0	0.0	0	0.0
	Hospital-Based	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Mental Health Residence	0	0.0	1	0.5	0	0.0	0	0.0	0	0.0
	Nursing Home	3	1.4	2	0.9	1	0.5	2	1.1	4	2.0
	Residential	1	0.5	0	0.0	0	0.0	0	0.0	2	1.0
	Other Long-Term Care	1	0.5	2	0.9	0	0.0	0	0.0	0	0.0
	Unknown	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
<b>TOTAL CASES</b>		<b>215</b>		<b>217</b>		<b>202</b>		<b>188</b>		<b>203</b>	

Source: New York State Department of Health Bureau of Tuberculosis Control

The number and percentage of cases diagnosed while residing in a congregate setting varied over the last five years in New York State (exclusive of New York City), but was highest in 2016 (3.9%, N=8/203) and lowest in 2015 (2.1%, N=4/188). In 2016, 75 percent (N=6/8) of cases diagnosed in a congregate setting were identified in a long-term care facility, most of which were in a nursing home (N=4).

**Table 11. Homelessness Among Tuberculosis Cases Within the Past Year, New York State (Exclusive of New York City), 2012-2016**

The homeless population is at increased risk of acquiring or transmitting TB to others as homelessness is often accompanied by other risk factors associated with TB, such as substance abuse, HIV infection, and inadequate medical care. A person is considered to be homeless if they don't have a fixed, regular nighttime residence. These individuals may live on the streets, alternate between many temporary residences, or reside in privately or publicly supervised shelters.

Year	Homeless Cases	
	No.	%
<b>2012</b>	1	0.5
<b>2013</b>	5	2.3
<b>2014</b>	2	1.0
<b>2015</b>	5	2.7
<b>2016</b>	5	2.5

From 2012 to 2016, an average of 1.8 percent (N=18/1,025) of TB cases in New York State (exclusive of New York City) were homeless within the 12 months prior to diagnosis. In 2016, 2.5 percent (N=5/203) of TB cases were homeless, which was similar to the previous year (2.7%, N=5/188).

Source: New York State Department of Health Bureau of Tuberculosis Control

# RISK FACTORS

Substance abuse weakens the immune system which can leave people more infectious or at greater risk of becoming infected and developing active TB. Also, the drugs used to treat TB can be toxic to the liver so substance abuse, such as excess alcohol use, can increase the damaging effects of treatment.

**Table 12. Substance Abuse\* Among Tuberculosis Cases Within the Past Year, New York State (Exclusive of New York City), 2012-2016**

Substance Abuse	2012		2013		2014		2015		2016	
	No.	%	No.	%	No.	%	No.	%	No.	%
Injection Drug Use	0	0.0	2	0.9	1	0.5	0	0.0	0	0.0
Non-Injection Drug Use	5	2.3	6	2.8	3	1.5	2	1.1	8	3.9
Excess Alcohol Use	10	4.7	22	10.1	13	6.4	15	8.0	14	6.9
<b>TOTAL CASES</b>	<b>215</b>		<b>217</b>		<b>202</b>		<b>188</b>		<b>203</b>	

\*Categories are not mutually exclusive

Source: New York State Department of Health  
Bureau of Tuberculosis Control

In New York State (exclusive of New York City), excess alcohol use has been the most commonly reported form of substance abuse among TB cases over the last five years. There were 14 cases (6.9%) in 2016 who reported alcohol abuse, four (28.6%) of which also reported non-injection drug use.



# DRUG RESISTANCE

The first-line drugs used for treating TB disease are isoniazid (INH), rifampin (RIF), pyrazinamide (PZA), ethambutol (EMB), and less commonly streptomycin (SM), but there are other second-line drugs that can be used when necessary. Most TB strains are susceptible to all first-line drugs, but resistance to one or more can occur, which could complicate the management of the disease. MDR TB is caused by a TB strain that is resistant to at least INH and RIF. Extensively drug resistant TB (XDR TB) is MDR TB with additional resistance to second-line drugs, such as any fluoroquinolone (levofloxacin, moxifloxacin, and ofloxacin) and at least one of the injectable drugs (amikacin, kanamycin, and capreomycin). Drug susceptibility testing is performed whenever possible to identify any drug resistance.

**Table 13a. Drug Susceptibility Results for Culture-Confirmed Tuberculosis Cases, New York State (Exclusive of New York City), 2012-2016**

First-Line Drug Susceptibility Results		2012		2013		2014		2015		2016	
		No.	%	No.	%	No.	%	No.	%	No.	%
Positive Culture		161	---	157	---	164	---	150	---	150	---
Susceptibility Test Reported		158	98.1	157	100.0	163	99.4	150	100.0	148	98.7
Susceptibility Test Results	Susceptible to all first-line drugs	133	84.2	134	85.4	139	85.3	123	82.0	125	84.5
	INH and RIF resistant (MDR TB)	3	1.9	2	1.3	2*	1.2	1	0.7	0	0.0
	INH resistance only	11	7.0	6	3.8	11	6.7	11	7.3	8	5.4
	RIF resistance only	0	0.0	1	0.6	0	0.0	0	0.0	0	0.0
	Resistance other than INH and RIF	11	7.0	14	8.9	11	6.7	15	10.0	15	10.1

\*1 case had extensively drug resistant TB (XDR TB)  
INH = Isoniazid; RIF = Rifampin; MDR TB = Multidrug-resistant TB

Source: New York State Department of Health  
Bureau of Tuberculosis Control

Over the last five years, there have been 782 culture-confirmed TB cases in New York State (exclusive of New York City). Drug susceptibility results have been reported for 99.2 percent (N=776/782) of these cases, most (84.3%, N=654) of which have been susceptible to all first-line TB drugs. Despite this high level of susceptibility, there were 122 cases with first-line drug resistance between 2012 and 2016, eight of which had MDR TB.

In 2016, drug susceptibility results were reported for 98.7 percent (N=148/150) of culture-confirmed cases in New York State (exclusive of New York City). Seven percent (N=3/41) of U.S.-born cases had first-line resistance compared to 19.6 percent (N=21/107) of foreign-born cases.

**Table 13b. Drug Susceptibility Results for Culture-Confirmed Tuberculosis Cases by U.S.-Born\* and Foreign-Born Status, New York State (Exclusive of New York City), 2014-2016**

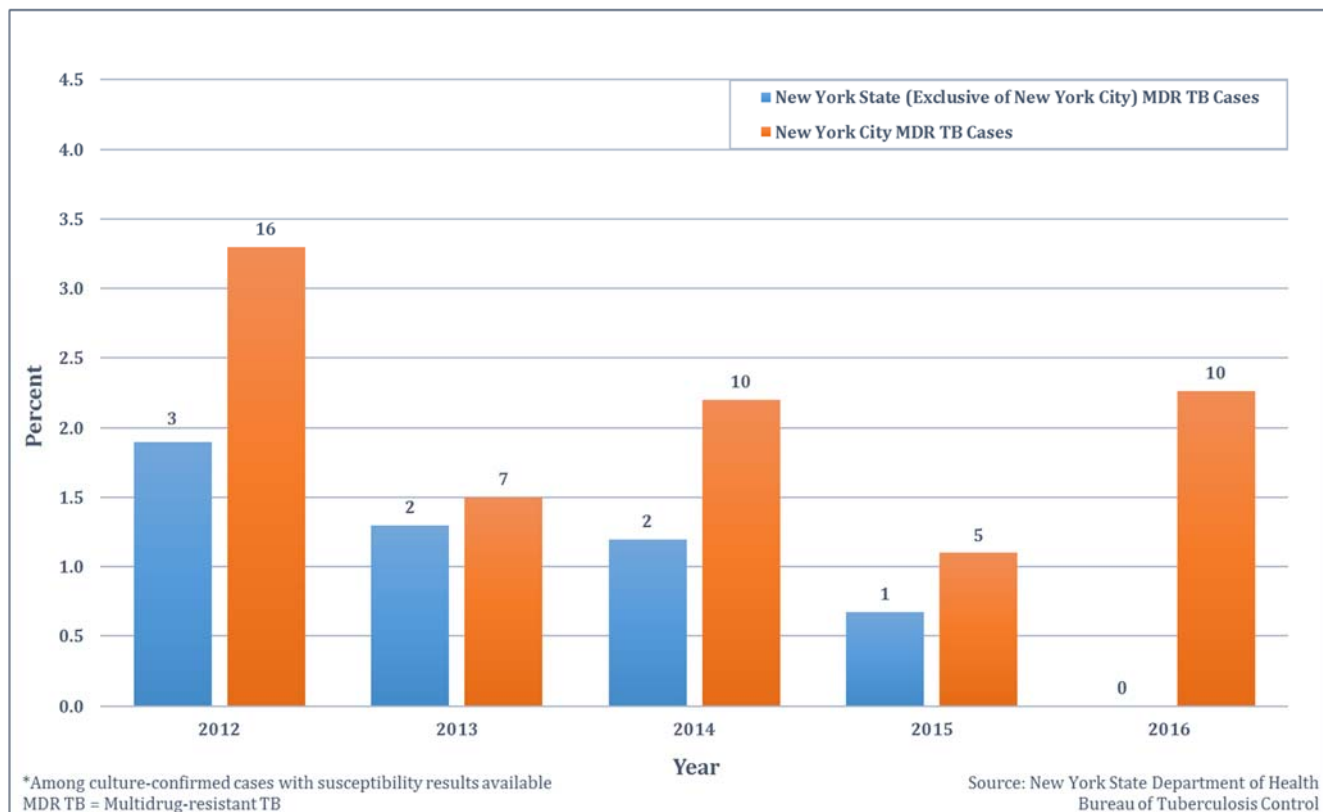
First-Line Drug Susceptibility Results		2014				2015				2016			
		U.S.-Born		Foreign-Born		U.S.-Born		Foreign-Born		U.S.-Born		Foreign-Born	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Positive Culture		34	---	130	---	26	---	124	---	42	---	108	---
Susceptibility Test Reported		33	97.1	130	100.0	26	100.0	124	100.0	41	97.6	107	99.1
Susceptibility Test Results	Susceptible to all first-line drugs	29	87.9	110	84.6	21	80.8	102	82.3	38	92.7	87	81.3
	INH and RIF resistance (MDR TB)	0	0.0	2**	1.5	0	0.0	1	0.8	0	0.0	0	0.0
	INH resistance only	2	6.1	9	6.9	2	7.7	9	7.3	1	2.4	7	6.5
	RIF resistance only	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Resistance other than INH and RIF	2	6.1	9	6.9	3	11.5	12	9.7	2	4.9	13	12.1

\*U.S.-born is defined as someone born in one of the 50 states, District of Columbia, or born outside the United States to at least one parent who was a U.S. citizen  
\*\*1 case had extensively drug resistant TB (XDR TB)  
INH = Isoniazid; RIF = Rifampin; MDR TB = Multidrug-resistant TB

Source: New York State Department of Health  
Bureau of Tuberculosis Control

# DRUG RESISTANCE

Figure 15. Number and Percent of Multidrug-Resistant Tuberculosis Cases,\* New York State, 2012-2016



Over the last five years, there were six times as many MDR TB cases in New York City compared to the remainder of the state (N=48 and N=8, respectively). In 2016, no MDR TB cases were reported for New York State (exclusive of New York City), whereas in New York City there were 10 (2.3%) MDR TB cases reported.

# GENOTYPING

**Table 14. Tuberculosis Genotyping Summary for Tuberculosis Cases, New York State (Exclusive of New York City), 2012-2016**

Genotyping		2012		2013		2014		2015		2016	
		No.	%	No.	%	No.	%	No.	%	No.	%
<b>Initial Positive Cultures</b>		<b>163</b>	---	<b>161</b>	---	<b>170</b>	---	<b>157</b>	---	<b>154</b>	---
<b>False Positives</b>	<b>Total False Positives</b>	<b>2</b>	---	<b>3</b>	---	<b>3</b>	---	<b>7</b>	---	<b>4</b>	---
	Control strain	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Contamination	1	0.6	0	0.0	0	0.0	6	3.1	0	0.0
	M. bovis BCG	1	0.6	3	1.9	3	1.8	1	0.6	4	2.5
<b>True Positives</b>	<b>Total True Positives</b>	<b>161</b>	---	<b>158</b>	---	<b>167</b>	---	<b>150</b>	---	<b>150</b>	---
	Isolates Available	155	---	158	---	162	---	150	---	149	---
	Complete Genotype*	142	91.6	128	81.0	154	95.1	146	97.3	147	98.7
	Partial Genotype	154	99.4	151	95.6	160	98.8	149	99.3	147	98.7
	No Result	1	0.6	6	3.8	2	1.2	0	0.0	2	1.3

\*Complete genotype means having both a spoligotype and MIRU result  
MIRU = mycobacterial interspersed repetitive unit

Source: New York State Department of Health  
Bureau of Tuberculosis Control

New York State requires that all initial positive cultures be submitted for genotyping. Beginning in 2004, real time spoligotyping and subsequent restriction fragment length polymorphism (RFLP) testing were performed at the Department's Wadsworth Center for Laboratories and Research, but as of 2009 RFLP was discontinued. In addition, the CDC-sponsored National Tuberculosis Genotyping regional lab in Michigan has performed mycobacterial interspersed repetitive unit (MIRU) and spoligotyping, both of which are needed for a genotype to be considered complete.

In 2016, 99.3 percent (N=149/150) of isolates in New York State (exclusive of New York City) were available for genotyping. Of these 149 isolates, 98.7 percent (N=147) had a complete genotype (spoligotype and MIRU result). An additional two isolates only had a spoligotype or a MIRU result available, so 100.0 percent of cases had at least some genotype information available.

# SITE OF DISEASE

The primary site of disease for most TB cases is pulmonary, but extrapulmonary involvement also occurs. TB is spread from person to person through airborne transmission, so cases with pulmonary involvement have the greatest potential to infect others.

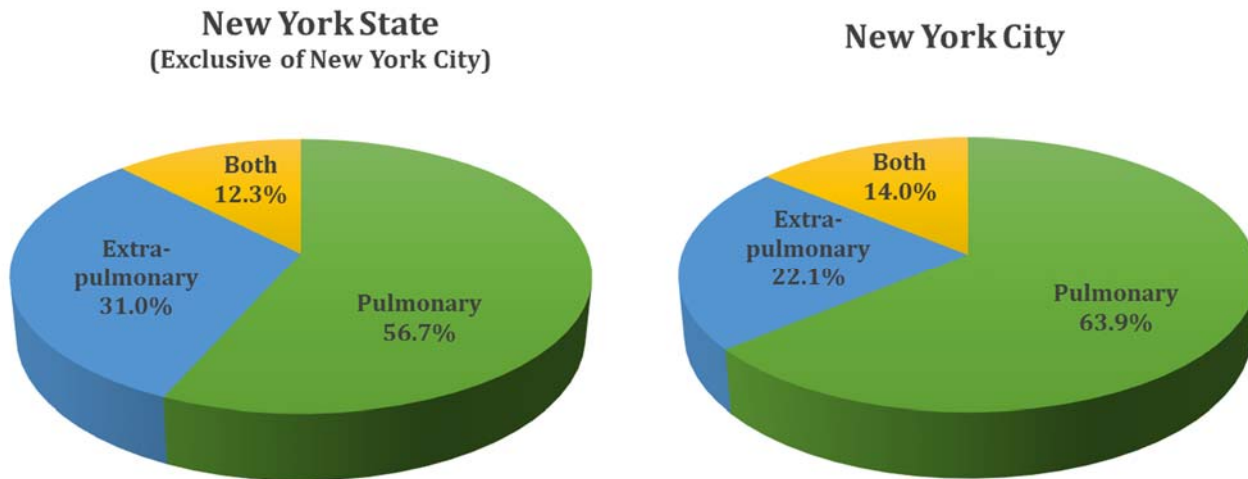
**Table 15. Primary Site of Disease for Tuberculosis Cases, New York State (Exclusive of New York City), 2012-2016**

Primary Site of Disease	2012		2013		2014		2015		2016	
	No.	%	No.	%	No.	%	No.	%	No.	%
Pulmonary	126	58.6	119	54.8	129	63.9	124	66.0	115	56.7
Extrapulmonary	65	30.2	67	30.9	45	22.3	37	19.7	63	31.0
Both	24	11.2	31	14.3	28	13.9	27	14.4	25	12.3
<b>TOTAL CASES</b>	<b>215</b>		<b>217</b>		<b>202</b>		<b>188</b>		<b>203</b>	

Source: New York State Department of Health Bureau of Tuberculosis Control

In the last five years, the proportion of TB cases with pulmonary disease ranged from 69 to 80 percent in New York State (exclusive of New York City). The highest proportion of cases with pulmonary TB was observed in 2015 (80.4%) and the lowest was seen in 2016 (69.0%).

**Figure 16. Primary Site of Disease for Tuberculosis Cases, New York State, 2016**



Source: New York State Department of Health Bureau of Tuberculosis Control

In 2016, 77.9 percent (N=440/565) of TB cases in New York City had pulmonary disease compared to 69.0 percent (N=140/203) of cases in the rest of the state. Among these 580 pulmonary cases throughout the state, 104 also had disease in one or more extra-pulmonary sites.

# SITE OF DISEASE

**Table 16. Extra-Pulmonary Sites of Disease\* for Tuberculosis Cases, New York State, 2016**

<b>Extra-Pulmonary Site of Disease</b>	<b>New York State (Exclusive of New York City)</b>	<b>New York City</b>	<b>New York State (Total)</b>
Lymphatic	33	67	100
Pleural	18	51	69
Bone/Joint	9	35	44
Peritoneal	7	18	25
Meningeal	4	10	17
Genitourinary	7	10	17
Laryngeal	0	2	2
Other	16	47	63

\*Categories are not mutually exclusive

Source: New York State Department of Health  
Bureau of Tuberculosis Control

There were 292 cases in New York State with at least one extra-pulmonary site of disease in 2016. Among these cases, the most common sites of disease were lymphatic (N=100), pleural (N=69) and bone/joint (N=44).

# COMPLETION OF THERAPY

**Table 17a. Treatment Status for Tuberculosis Cases,\* New York State (Exclusive of New York City), 2011-2015**

Treatment Status	2011		2012		2013		2014		2015	
	No.	%	No.	%	No.	%	No.	%	No.	%
<b>Complete</b>	197	90.4	189	90.9	195	91.1	174	87.9	161	87.5
<b>Died</b>	15	6.9	8	3.8	10	4.7	13	6.6	14	7.6
<b>Uncooperative/Refused</b>	2	0.9	0	0.0	3	1.4	3	1.5	2	1.1
<b>Lost</b>	0	0.0	1	0.5	1	0.5	2	1.0	0	0.0
<b>Adverse Treatment Event</b>	1	0.5	2	1.0	2	0.9	0	0.0	1	0.5
<b>Other</b>	3	1.4	8	3.8	3	1.4	6	3.0	6	3.3
<b>TOTAL CASES</b>	<b>218</b>		<b>208</b>		<b>214</b>		<b>198</b>		<b>184</b>	

\*Excludes patients found not to have TB, those who were reported at death and those who never started treatment

Source: New York State Department of Health  
Bureau of Tuberculosis Control

In New York State (exclusive of New York City), the average treatment completion rate for TB cases who were alive at diagnosis and started treatment between 2011 and 2015 (the most recent year for which completion information is available) was 89.6 percent (N=916/1,022). The highest completion percentage of 91.1 percent (N=195/214) was seen for cases reported in 2013, followed by 90.9 percent (N=189/208) for those reported in 2012.

**Table 17b. Treatment Status for Tuberculosis Cases\* Reported in 2015, New York State (Exclusive of New York City)**

Treatment Status	Non-MDR		MDR		Total	
	No.	%	No.	%	No.	%
<b>Complete</b>	160	87.4	1	100.0	161	87.5
<b>Died</b>	14	7.7	0	0.0	14	7.6
<b>Uncooperative/Refused</b>	2	1.1	0	0.0	2	1.1
<b>Adverse Treatment Event</b>	1	0.5	0	0.0	1	0.5
<b>Other</b>	6	3.3	0	0.0	6	3.3
<b>TOTAL CASES</b>	<b>183</b>		<b>1</b>		<b>184</b>	

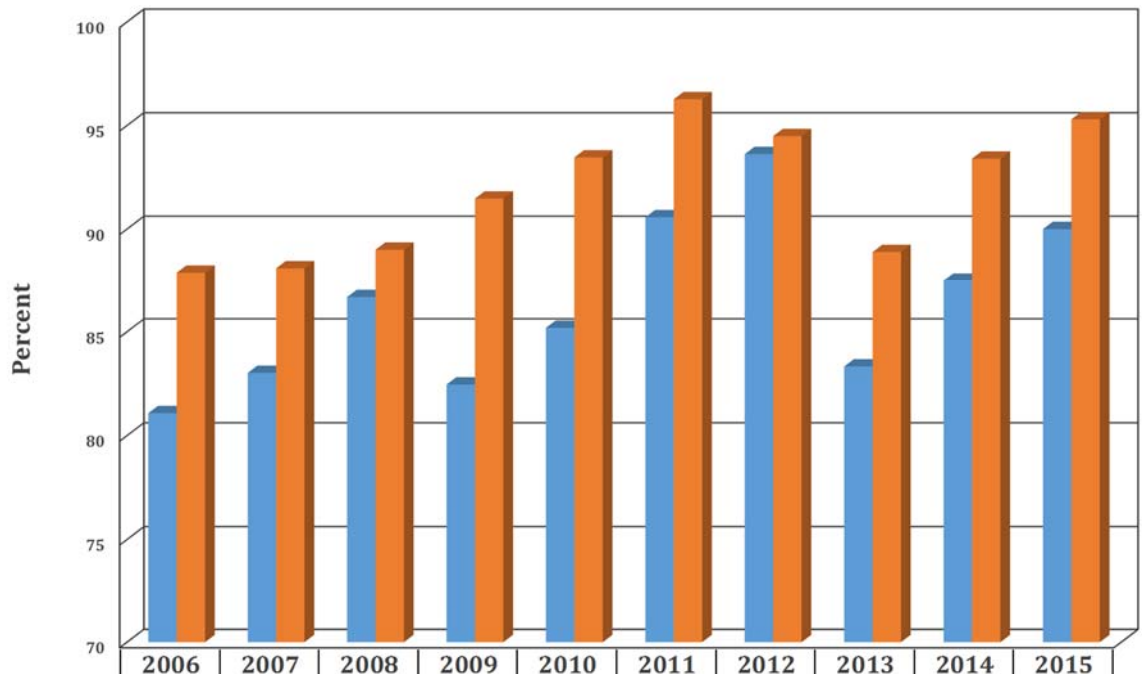
\*Excludes patients found not to have TB, those who were reported at death and those who never started treatment  
MDR TB = Multidrug-resistant TB

Source: New York State Department of Health  
Bureau of Tuberculosis Control

For the 184 TB cases in New York State (exclusive of New York City) who were alive at diagnosis and who started treatment in 2015, 87.5 percent (N=161/184) completed therapy. This includes the one MDR TB case reported in 2015.

# COMPLETION OF THERAPY

**Figure 17. Percent of Tuberculosis Cases Who Completed Treatment Within 12 Months,\* by U.S.-Born\*\* and Foreign-Born Status, New York State (Exclusive of New York City), 2006-2015**



■ Percent of U.S.-Born Cases	81.1	83.0	86.7	82.5	85.2	90.6	93.6	83.3	87.5	90.0
■ Percent of Foreign-Born Cases	87.9	88.1	89.0	91.5	93.5	96.3	94.5	88.9	93.4	95.3
Total	86.0	86.9	88.5	88.7	91.3	94.7	94.3	87.8	92.3	94.3

\*Among those eligible to complete within 12 months

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

Source: New York State Department of Health  
Bureau of Tuberculosis Control

For 2015 (the most recent year for which complete information is available), 94.3 percent (N=148/157) of patients in New York State (exclusive of New York City) eligible<sup>^</sup> to complete treatment within 12 months, did so. A larger percentage of foreign-born cases completed therapy within 12 months compared to U.S.-born cases in 2014 (95.3% and 90.0%, respectively). An additional 3.2 percent (N=5/157) of patients completed treatment in more than 12 months for an overall completion rate of 97.5 percent.

<sup>^</sup>Patients with rifampin resistance, those with meningeal TB, and children under 15 who have disseminated TB (miliary TB or evidence of miliary TB on chest radiograph, or a positive blood culture) are ineligible to complete within 12 months so they are excluded. Those who were never started on treatment, were dead at diagnosis, or who died while on treatment are also excluded. Effective January 2009, the CDC revised the definition of who is eligible to complete treatment to also exclude patients who moved out of the country while on treatment.

# CONTACTS TO INFECTIOUS TUBERCULOSIS CASES

People who come in close contact with an infectious TB case for a prolonged period of time are at high risk of becoming infected. Since TB is spread person to person by breathing in airborne particles from another infected individual, pulmonary TB cases who are exhibiting symptoms, such as coughing, are most likely to transmit TB to others. For newly diagnosed cases, investigations are conducted to identify close contacts who may have been infected. Once contacts are identified, they are notified of their exposure and efforts are made to get each individual evaluated. Upon evaluation, if a contact has a positive tuberculin skin test (TST) or a positive Interferon-Gamma Release Assay, further evaluation is done to determine if the infection is active TB disease or LTBI. Treatment options for either condition are then discussed. Individuals who have been recently infected have a greater risk of their infection developing into active TB disease so it is important for LTBI patients to complete treatment.

**Table 18. Number and Percent of Infectious Tuberculosis Cases with Contacts Identified, New York State (Exclusive of New York City), 2006-2015**

Year	Total Infectious Cases	Infectious Cases with Contacts Identified	
		No.	%
2006	97	92	94.8
2007	78	76	97.4
2008	92	90	97.8
2009	66	65	98.5
2010	73	72	98.6
2011	80	78	97.5
2012	75	75	100.0
2013	63	62	98.4
2014	72	72	100.0
2015	72	72	100.0

Source: New York State Department of Health  
Bureau of Tuberculosis Control

In 2015 (the most recent year for which complete information is available), 100.0 percent (N=72/72) of infectious TB cases in New York State (exclusive of New York City) had contacts identified. This exceeds the state objective of 97.0 percent and meets the national objective of 100.0 percent for 2015.

**Table 19. Number and Percent of Contacts to Infectious Tuberculosis Cases Evaluated for Latent Tuberculosis Infection, New York State (Exclusive of New York City), 2006-2015**

Year	Total Contacts Identified	Contacts Evaluated	
		No.	%
2006	2,970	2,506	84.4
2007	4,050	3,322	82.0
2008	3,549	2,647	74.6
2009	1,768	1,447	81.8
2010	2,253	2,027	89.9
2011	3,662	3,049	83.3
2012	1,851	1,587	85.7
2013	1,462	1,215	83.1
2014	1,843	1,571	85.2
2015	1,922	1,431	74.5

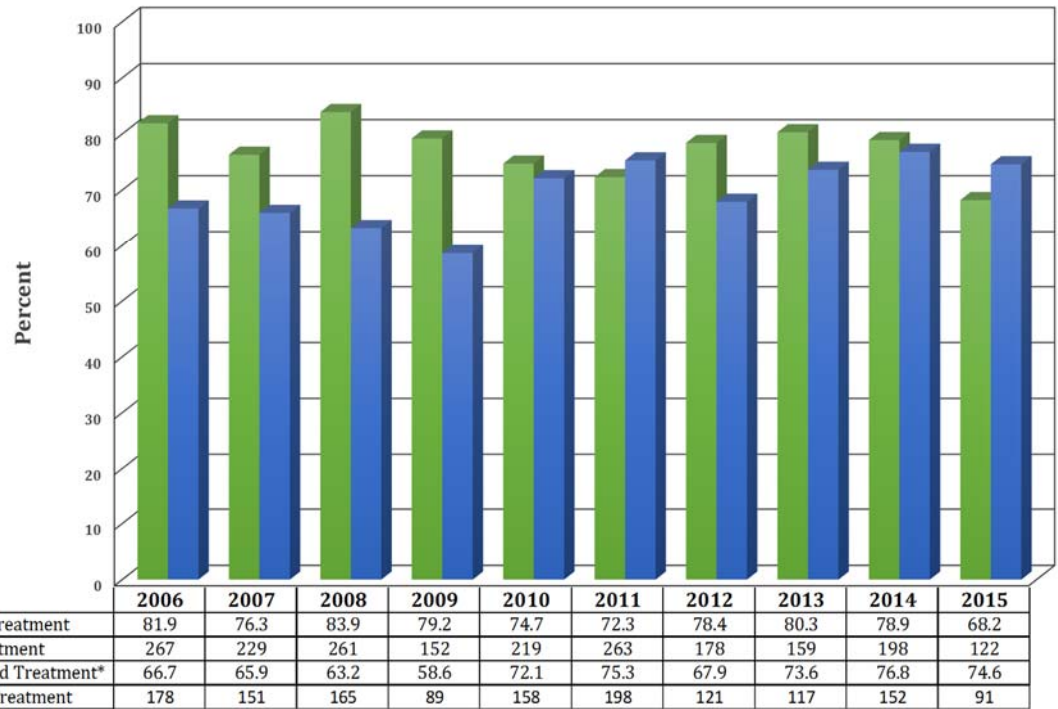
Source: New York State Department of Health  
Bureau of Tuberculosis Control

Seventy-five percent (N=1,431/1,922) of contacts to infectious cases in New York State (exclusive of New York City) were evaluated for LTBI in 2015 (the most recent year for which complete information is available). This was the lowest evaluation percentage over the last 10 years. Many contacts identified during two large investigations in a jail and a healthcare facility were no longer at those facilities and could not be located. In addition, the majority of contacts identified during another large investigation in a close-knit community center refused evaluation.



# CONTACTS TO INFECTIOUS TUBERCULOSIS CASES

**Figure 18. Number and Percent of Contacts to Infectious Tuberculosis Cases Placed on Treatment for Latent Tuberculosis Infection and Completed, New York State (Exclusive of New York City), 2006-2015**



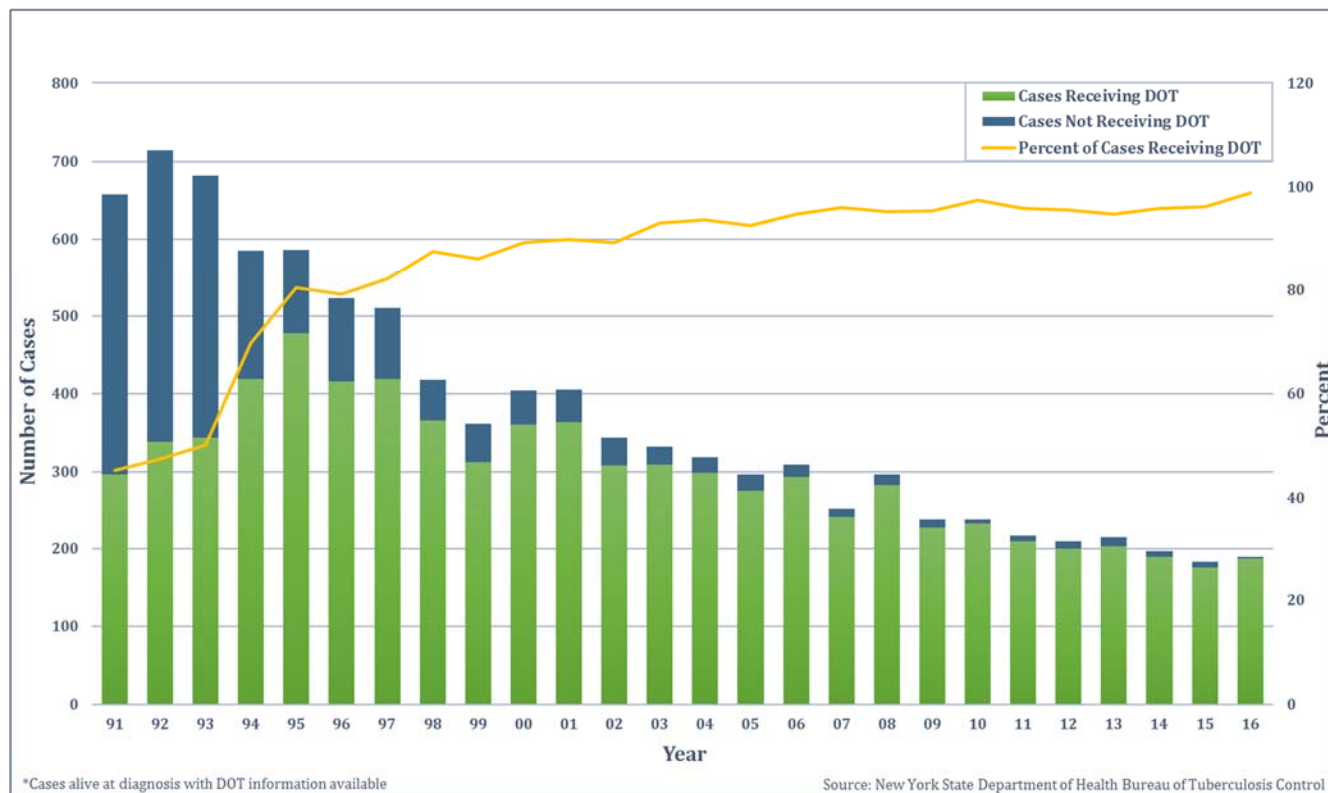
\*Among those who started treatment

Source: New York State Department of Health Bureau of Tuberculosis Control

Among the contacts to infectious cases in New York State (exclusive of New York City) who were evaluated in 2015 (the most recent year for which complete information is available), 12.5 percent (N=179/1,431) were diagnosed with LTBI. Sixty-eight percent (N=122/179) of these contacts were started on a treatment regimen and 74.6 percent (N=91/122) of those who started treatment completed the prescribed regimen.

# DIRECTLY OBSERVED THERAPY

**Figure 21. Number and Percent of Tuberculosis Cases\* Receiving Any Directly Observed Therapy, New York State (Exclusive of New York City), 1991-2016**



In New York State (exclusive of New York City) the proportion of cases receiving directly observed therapy (DOT) has been increasing since the early 1990s when it was first actively promoted by the New York State Department of Health, local health units, and others. In 1991, 45.2 percent (N=297/657) of TB cases on treatment received at least part of their therapy as DOT. Since then, the proportion of cases receiving a portion of their treatment as DOT has more than doubled to 98.9 percent (N=187/189) in 2016.

# CONTACT INFORMATION

## New York State Department of Health Bureau of Tuberculosis Control

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**For more information:**

[www.health.ny.gov/diseases/communicable/tuberculosis](http://www.health.ny.gov/diseases/communicable/tuberculosis)

## New York City Department of Health and Mental Hygiene Bureau of Tuberculosis Control

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Bureau of Tuberculosis Control  
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**For more information:**

[www1.nyc.gov/site/doh/health/health-topics/tuberculosis.page](http://www1.nyc.gov/site/doh/health/health-topics/tuberculosis.page)