TUBERCULOSIS IN NEW YORK STATE

2018

Annual Statistical Report

Bureau of Tuberculosis Control

NEW YORK STATE | Department of Health

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Executive Summary

MORBIDITY & MORTALITY

- From 2017 to 2018, tuberculosis (TB) morbidity decreased in New York State. The 2018 total of 750 cases (559 cases in New York City, 191 cases in the remainder of New York State) represents a 6.9 percent decrease from the 806 cases reported in 2017. The nation as a whole experienced a 0.7 percent decrease in morbidity. Since the most recent peak epidemic in 1992 with 4,574 cases, there was an 83.6 percent decrease in New York State compared to a national decline of 66.2 percent.
- In New York State (exclusive of New York City), the number of TB cases decreased 1.0 percent from 193 cases in 2017 to 191 cases in 2018. The number of TB cases in New York City decreased by 8.8 percent from 613 cases in 2017 to 559 cases in 2018. In 2018, the nation as a whole reported 9,025 cases, down 0.7 percent from the 9,088 cases reported in 2017.
- New York State ranked fifth nationally for TB morbidity with an incidence rate of 3.9 per 100,000 population in 2018. This rate is influenced by New York City, which had a TB case rate of 6.8 per 100,000. In contrast, New York State (exclusive of New York City) reported an incidence rate of 1.7 per 100,000.

GEOGRAPHIC DISTRIBUTION

- Three counties – Nassau, Suffolk and Westchester – reported 53.4 percent of the TB cases in New York State (exclusive of New York City) in 2018.

RACE-ETHNICITY

- In 2018, Asians continued to have one of the highest incidence rates of TB statewide (23.5 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 decreased from 85.9 (N=692) in 2017 to 82.4 in 2018 (N=618). People born in China comprised the greatest number of foreign-born TB cases (N=112) in New York City while those born in India comprised the greatest number of foreign-born TB cases (N=22) in the remainder of the state.

DRUG SUSCEPTIBILITY

- Among individuals with drug susceptibilities reported in 2018, 12 cases from New York City had multidrug-resistant TB (MDR TB), which was a 14.0 percent decrease in number compared to 2017 (N=14). In New York State (exclusive of New York City) there were two MDR TB cases reported in 2018, which was the same number reported in 2017.

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. In 2015 and 2016, there were no new DOCCS cases reported, but in 2017 one new case was reported. In 2018, no new DOCCS cases were reported.

Table 1. Tuberculosis Cases and Rates,* New York State, 1960-2018

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
2017	193	1.7	613	7.5	806	4.2
2018	191	1.7	559	6.8	750	3.9

*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 2017 to 2018, TB cases and rates decreased statewide. In 2018, a total of 750 cases were reported in New York State, representing a 6.9 percent decrease from the 806 cases reported in 2017 and an 89.4 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 2018, New York City reported 74.5 percent (N=559/750) of the total cases despite having only 42 percent of the state population. The rest of the state reported 191 cases, which was a 1.0 percent decrease compared to the 193 reported in 2017.

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 2018 was 1.7 per 100,000 population, but New York City reported a rate of 6.8 per 100,000, resulting in an overall rate of 3.9 per 100,000 population for the whole state.

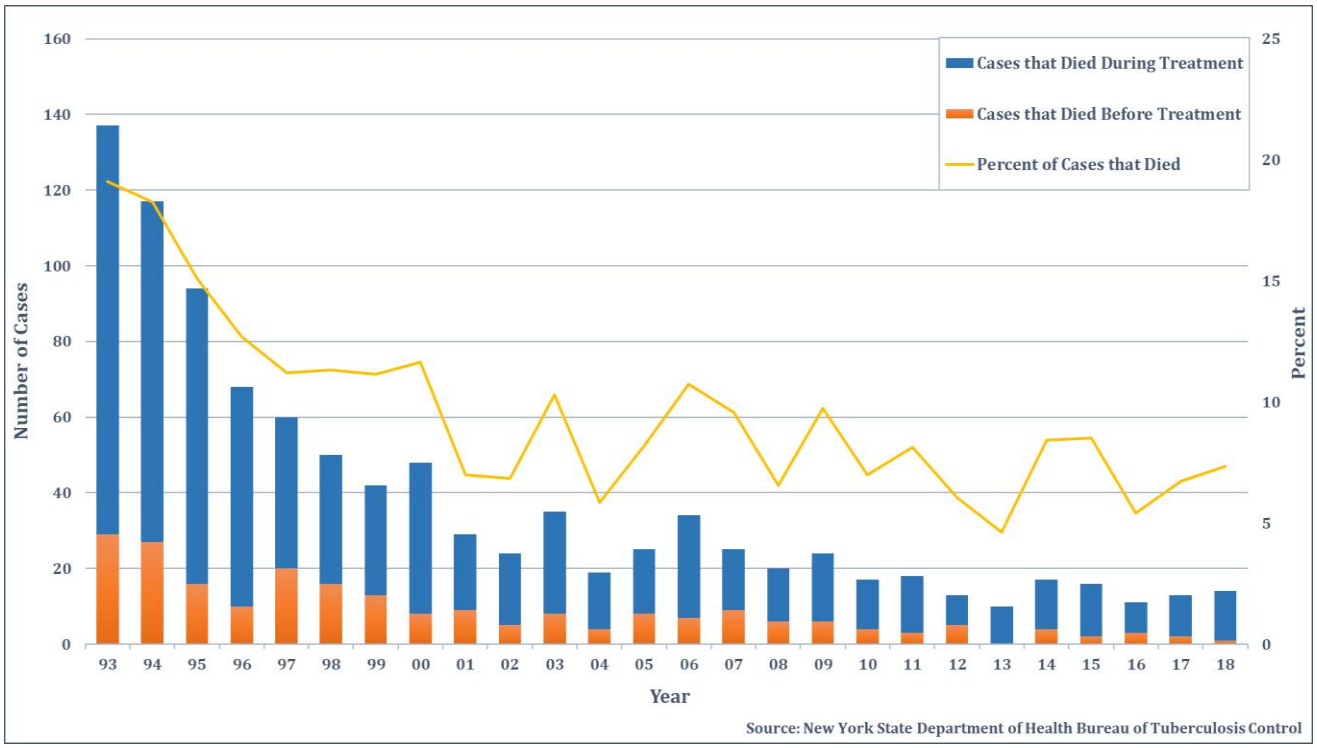
Figure 1. Tuberculosis Cases and Rates,* New York State, 1960-2018

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.

Figure 2. Tuberculosis Case Rates,* New York State and the United States, 1960-2018

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 2018, the national case rate was 2.8 per 100,000 population and ranged from 0.2 to 8.4 per 100,000 population across all the states. New York State ranked third based on the number of cases (N=750) and fifth based on incidence rate (3.9 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=559) and third based on incidence rate (6.8 per 100,000 population).

Figure 3. Number and Percent of Deaths Among Tuberculosis Cases, New York State (Exclusive of New York City), 1993-2018



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 14 total deaths in 2018. The cause of death was known to be TB-related for four (28.6%) of these cases. Of these four, three (75%) were over 65 years of age, had other comorbidities (e.g., diabetes, end-stage renal disease) and died while in the hospital or a rehabilitation facility.

GEOGRAPHIC DISTRIBUTION

Table 2. Tuberculosis Cases and Rates* by County, New York State, 2014-2018

County	2014		2015		2016		2017		2018	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Albany	7	2.3	2	0.7	2	0.7	8	2.6	4	1.3
Allegany	0	---	0	---	0	---	0	---	0	---
Broome	0	---	3	1.5	3	1.5	2	1.0	4	2.0
Cattaraugus	0	---	0	---	0	---	1	1.2	0	---
Cayuga	2	2.5	4	5.0	1	1.2	1	1.2	2	2.5
Chautauqua	0	---	0	---	0	---	1	0.7	0	---
Chemung	0	---	0	---	2	2.3	0	---	1	1.1
Chenango	0	---	0	---	0	---	0	---	0	---
Clinton	0	---	2	2.4	0	---	0	---	1	1.2
Columbia	2	3.2	3	4.8	0	---	3	4.8	0	---
Cortland	0	---	0	---	0	---	0	---	0	---
Delaware	0	---	0	---	1	2.1	0	---	0	---
Dutchess	7	2.4	5	1.7	1	0.3	4	1.3	3	1.0
Erie	16	1.7	13	1.4	13	1.4	5	0.5	13	1.4
Essex	1	2.5	0	---	0	---	0	---	0	---
Franklin	0	---	0	---	0	---	0	---	0	---
Fulton	0	---	0	---	0	---	1	1.8	0	---
Genesee	0	---	0	---	2	3.3	1	1.7	2	3.3
Greene	0	---	0	---	1	2.0	0	---	0	---
Hamilton	0	---	0	---	0	---	0	---	0	---
Herkimer	0	---	0	---	0	---	0	---	0	---
Jefferson	1	0.9	2	1.7	0	---	1	0.9	0	---
Lewis	0	---	0	---	1	3.7	0	---	0	---
Livingston	0	---	0	---	1	1.5	0	---	1	1.5
Madison	0	---	0	---	0	---	0	---	0	---
Monroe	20	2.7	17	2.3	24	3.2	14	1.9	16	2.1
Montgomery	0	---	0	---	1	2.0	0	---	0	---
Nassau	33	2.5	40	3.0	38	2.8	40	3.0	43	3.2
Niagara	3	1.4	4	1.8	2	0.9	1	0.5	1	0.5
Oneida	3	1.3	5	2.1	8	3.4	9	3.8	4	1.7
Onondaga	10	2.1	10	2.1	17	3.6	6	1.3	6	1.3
Ontario	0	---	2	1.9	0	---	0	---	1	0.9
Orange	8	2.1	2	0.5	7	1.9	9	2.4	7	1.9
Orleans	0	---	0	---	0	---	0	---	2	4.7
Oswego	1	0.8	0	---	1	0.8	0	---	0	---
Otsego	0	---	1	1.6	0	---	0	---	1	1.6
Putnam	2	2.0	0	---	0	---	1	1.0	1	1.0
Rensselaer	2	1.3	0	---	2	1.3	1	0.6	1	0.6
Rockland	11	3.5	8	2.6	4	1.3	14	4.5	11	3.5
Saratoga	1	0.5	1	0.5	1	0.5	0	---	0	---
Schenectady	3	1.9	3	1.9	2	1.3	0	---	0	---
Schoharie	0	---	0	---	0	---	0	---	0	---
Schuyler	0	---	0	---	0	---	0	---	0	---
Seneca	0	---	0	---	0	---	0	---	0	---
St. Lawrence	0	---	1	---	0	---	1	0.9	0	---
Steuben	0	---	0	---	0	---	0	---	0	---
Suffolk	35	2.3	24	1.6	34	2.3	34	2.3	24	1.6
Sullivan	1	1.3	0	---	1	1.3	2	2.6	2	2.6
Tioga	0	---	0	---	0	---	0	---	1	2.0
Tompkins	4	3.9	2	2.0	2	2.0	2	2.0	3	3.0
Ulster	0	---	0	---	1	0.5	0	---	1	0.5
Warren	0	---	0	---	1	1.5	0	---	0	---
Washington	1	1.6	0	---	0	---	0	---	0	---
Wayne	1	1.1	0	---	1	1.1	0	---	0	---
Westchester	27	2.8	34	3.6	28	3.0	31	3.3	35	3.7
Wyoming	0	---	0	---	0	---	0	---	0	---
Yates	0	---	0	---	0	---	0	---	0	---
New York State Total (Exclusive of New York City)	**202**	**1.8**	**188**	**1.7**	**203**	**1.8**	**193**	**1.7**	**191**	**1.7**
Bronx	99	7.1	87	6.3	82	5.9	106	7.7	81	5.8
Kings	192	7.7	171	6.9	166	6.6	184	7.3	173	6.9
New York	72	4.5	88	5.4	67	4.2	64	4.0	82	5.2
Queens	212	9.5	218	9.8	240	10.8	247	11.1	204	9.1
Richmond	10	2.1	13	3.0	10	2.1	12	2.6	19	4.1
New York City Total	**585**	**7.2**	**577**	**7.1**	**565**	**6.9**	**613**	**7.5**	**559**	**6.8**
STATE TOTAL	**787**	**4.1**	**765**	**3.9**	**768**	**4.0**	**806**	**4.2**	**750**	**3.9**

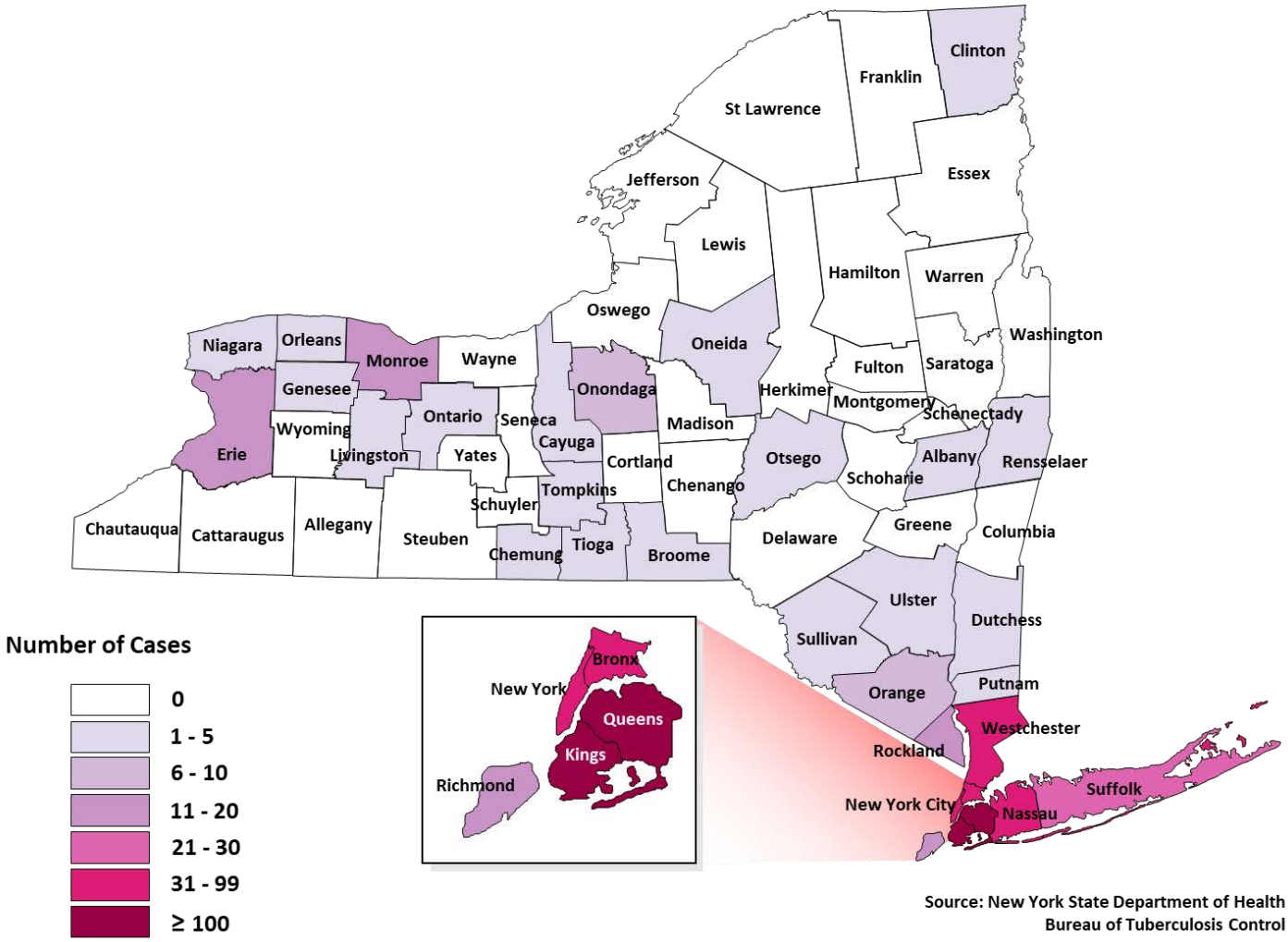
*Rate calculations are based on 2010 United States Census data; per 100,000 population

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 2018, all five boroughs of New York City and 27 (47.4%) of the 57 upstate counties reported at least one TB case. Higher numbers of cases were seen in the metropolitan areas. More than half of all TB morbidity reported for NYS (exclusive of New York City) was concentrated in Nassau, Suffolk and Westchester counties (53.4%, N=102/191).

Figure 4. Distribution of Tuberculosis Cases in New York State, 2018



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

DEMOGRAPHIC CHARACTERISTICS

Table 3. Tuberculosis Cases and Rates* by Gender, Age, and Race/Ethnicity, New York State, 2018**

Demographic Characteristics		New York State (Exclusive of New York City)		New York City		New York State (Total)	
		No.	Rate	No.	Rate	No.	Rate
Gender	Male	123	2.1	343	8.8	466	5.0
	Female	68	1.3	216	5.0	284	2.8
Age Group	Under 5 years	3	0.5	4	0.8	7	0.6
	5-9	3	0.4	0	---	3	0.3
	10-14	0	---	5	1.1	5	0.4
	15-19	5	0.6	20	3.7	25	1.8
	20-24	16	2.1	37	5.8	53	3.8
	25-34	34	2.7	93	6.7	127	4.8
	35-44	29	2.0	76	6.6	105	4.0
	45-54	32	1.8	69	6.2	101	3.5
	55-64	31	2.2	91	10.2	122	5.3
	65+	38	2.3	164	16.5	202	7.7
Race/Ethnicity	White, non-Hispanic	27	0.3	36	1.3	63	0.6
	Black, non-Hispanic	30	3.3	98	5.3	128	4.6
	Hispanic	61	5.6	137	5.9	198	5.8
	Asian	69	18.3	262	25.5	331	23.5
	American Indian	0	---	1	5.7	1	1.9
	Pacific Islander	1	39.6	0	---	1	18.8
	Multiple Races	0	---	8	5.4	8	2.5
	Other/Unknown	3	12.6	17	29.4	20	24.5
TOTAL CASES		**191**	**1.7**	**559**	**6.8**	**750**	**3.9**

*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

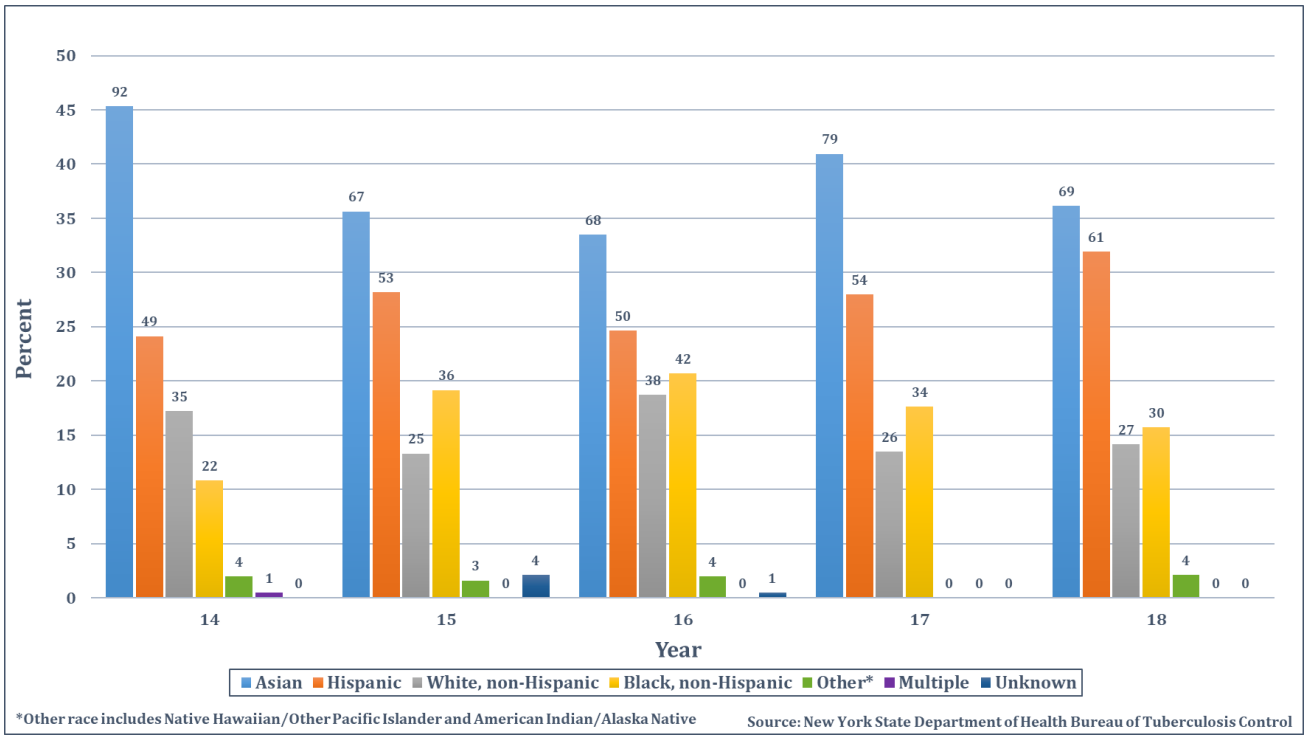
Source: New York State Department of Health
Bureau of Tuberculosis Control

Statewide, in 2018, the lowest incidence rates of TB were seen among the high risk pediatric population (<15 years old), with those in the 5-9 year old age group representing only three cases for a rate of 0.3 per 100,000. The highest rate was seen among those 65 years and older (7.7 per 100,000).

White, non-Hispanics continued to have the lowest incidence rate in New York State (0.6 per 100,000), while Asians continued to have the highest rate (23.5 per 100,000). The rate for white, non-Hispanics in New York City was over four times greater than in the rest of the state (1.3 per 100,000 and 0.3 per 100,000, respectively).

DEMOGRAPHIC CHARACTERISTICS

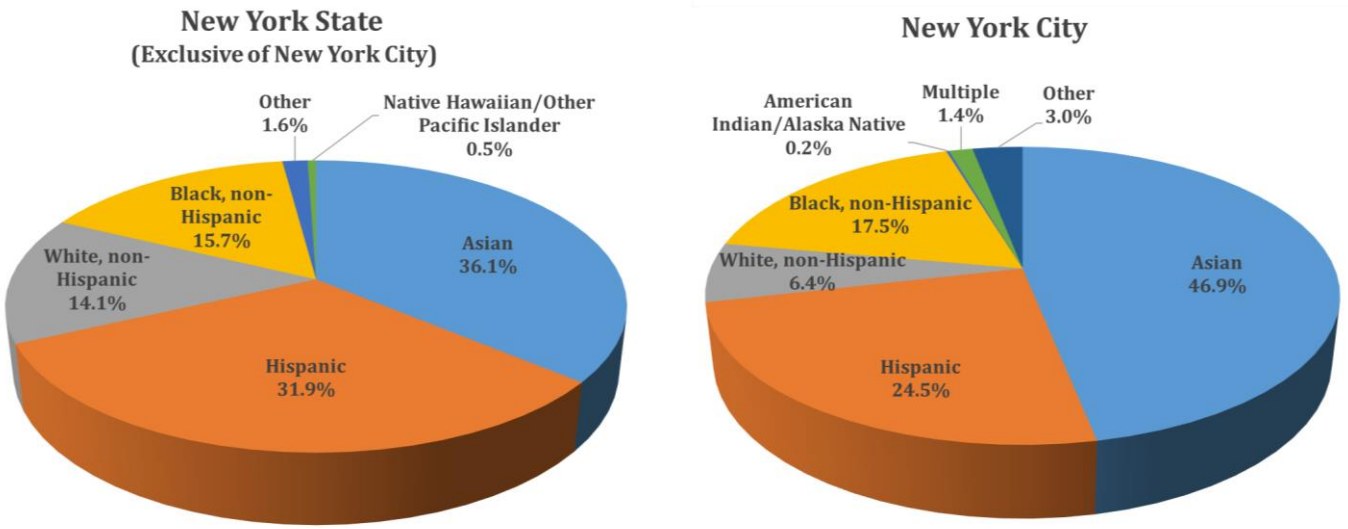
Figure 5. Number and Percent of Tuberculosis Cases by Race/Ethnicity, New York State (Exclusive of New York City), 2014-2018



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 2014, Asians have continued to represent a larger percentage of reported cases than any other racial/ethnic group.

In 2018, most of the TB cases in New York State (exclusive of New York City) continued to be Asian or Hispanic (N=69 and N=61, respectively). Although there has been variability over the last five years, the proportion of Asian cases seen in 2018 was 9.2 percent lower than that seen in 2014 (36.1% and 45.3%, respectively), whereas the proportion of Hispanic cases in 2018 was 7.8 percent higher than in 2014 (31.9% and 24.1%, respectively).

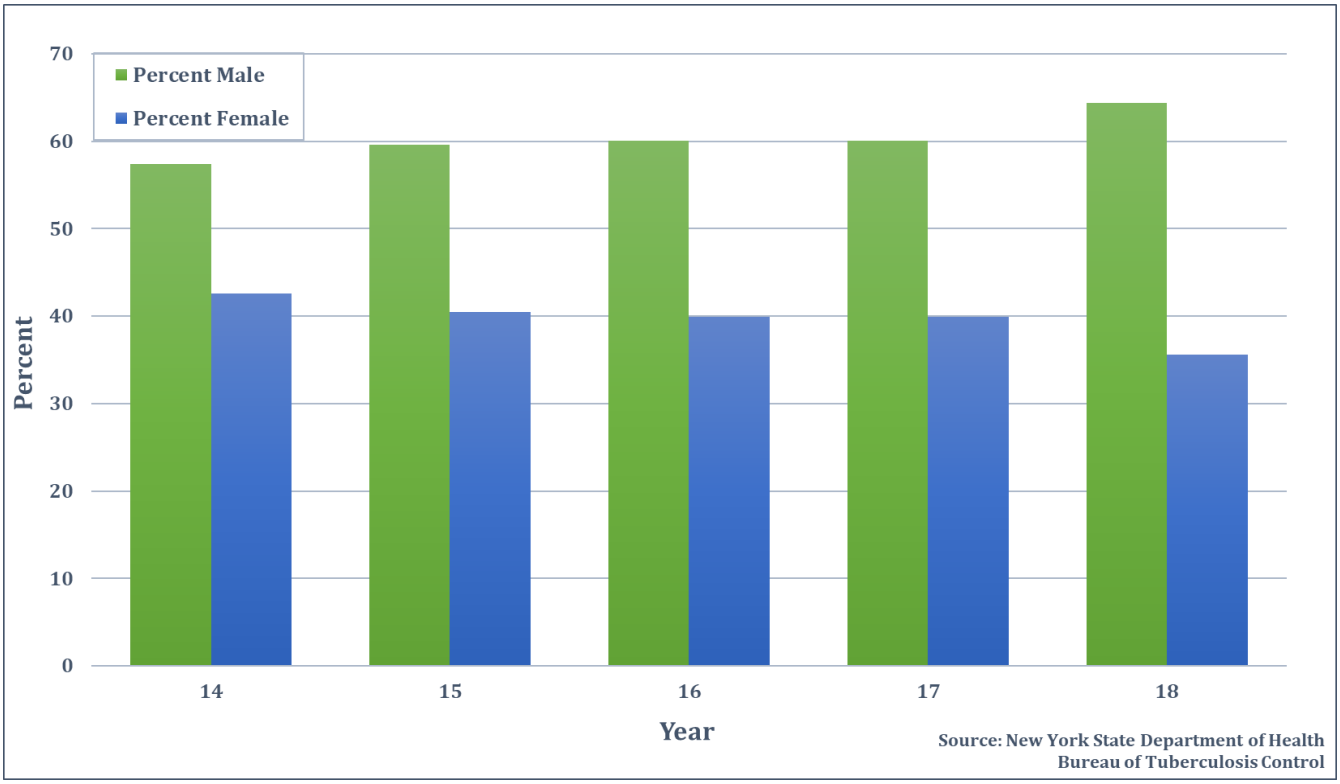
Figure 6. Race/Ethnicity of Tuberculosis Cases, New York State, 2018



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

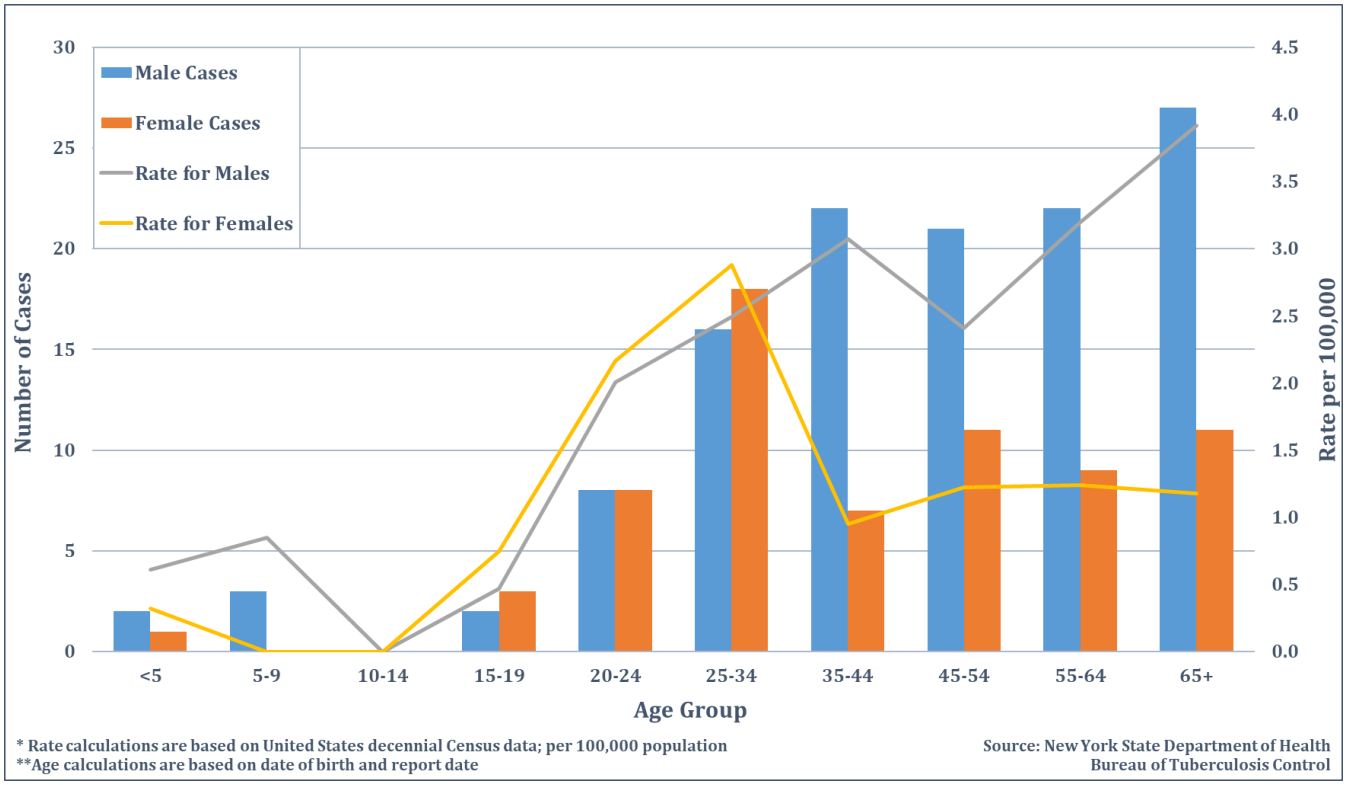
In 2018, the proportion of white, non-Hispanic cases in New York State (exclusive of New York City) was over twice that seen in New York City (14.1% and 6.4%, respectively), whereas the proportion of Asian cases was nearly 11 percent greater in New York City compared to the rest of the state (46.9% and 36.1%, respectively).

Figure 7. Percent of Tuberculosis Cases by Gender, New York State (Exclusive of New York City), 2014-2018



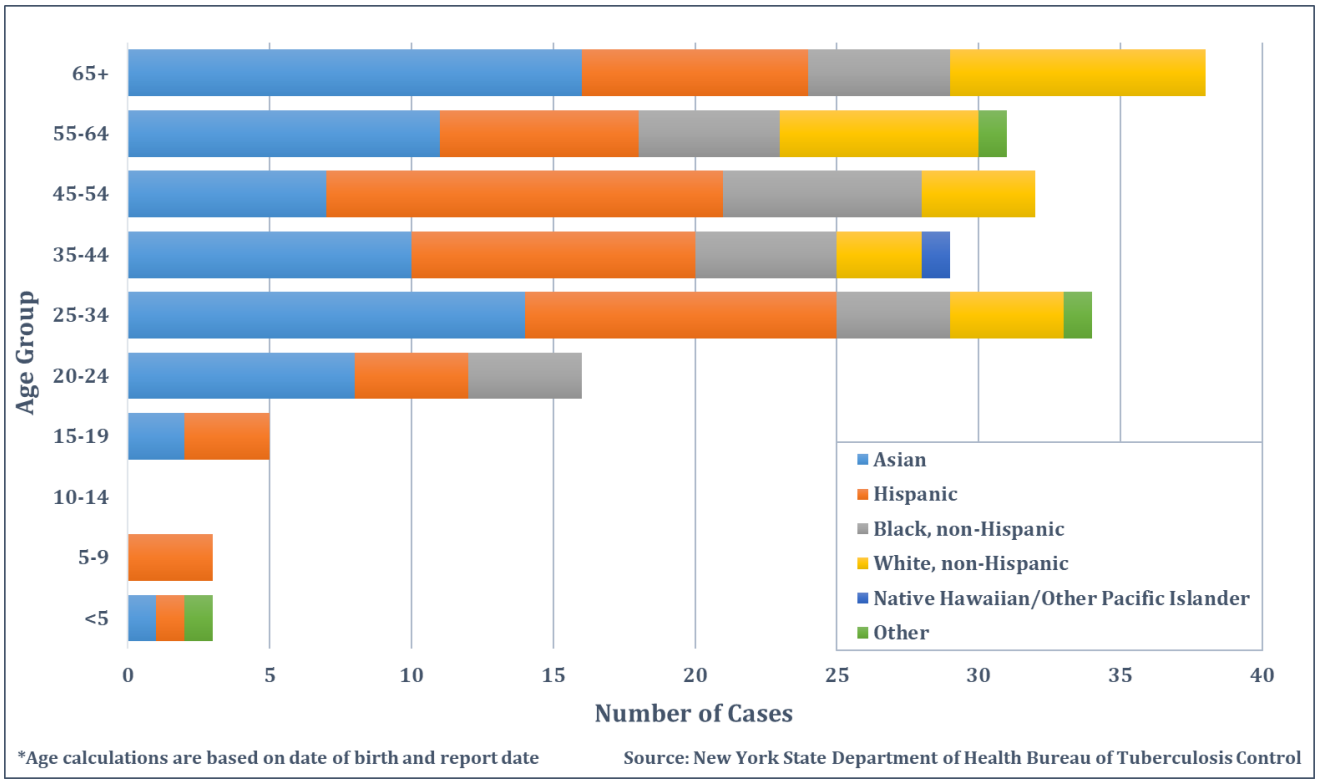
Over the last five years, males have consistently comprised a higher proportion of TB cases compared to females in New York State (exclusive of New York City). In 2018, 64.4 percent (N=123/191) of reported cases were male and 35.6 percent (N=68/191) were female, representing the largest gender disparity seen in the last five years.

Figure 8. Tuberculosis Cases and Rates* by Age and Gender, New York State (Exclusive of New York City), 2018**



In 2018, the difference in TB morbidity between males and females in New York State (exclusive of New York City) varied depending on age. The number of cases and rate were similar for males and females between the ages of 15 and 34 years old, but in the older age groups the number and rate for males consistently exceeded that of females. The largest gender gap in TB morbidity was seen among cases 65 years of age and older, where the case rate for males was over three times that of females (3.9 per 100,000 for males; 1.2 per 100,000 for females).

Figure 9. Tuberculosis Cases by Age* and Race/Ethnicity, New York State (Exclusive of New York City), 2018



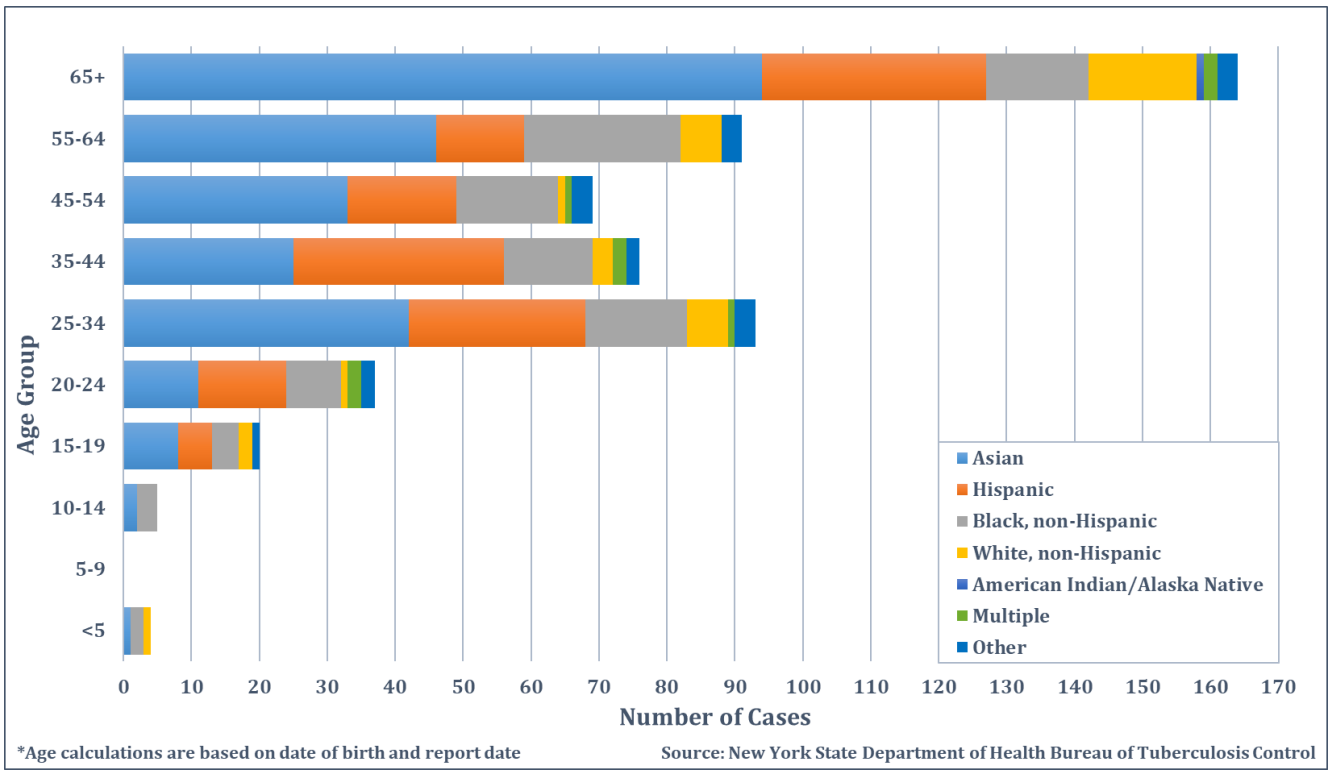
*Age calculations are based on date of birth and report date

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

In 2018, 38 (19.9%) cases in New York State (exclusive of New York City) were 65 years of age and older. Sixteen (42.1%) of these cases were Asian and nine (23.7%) were white, non-Hispanic.

The second largest number of TB cases reported in 2018 for New York State (exclusive of New York City) was seen in the 25-34 year age group (N=34). Fourteen (41.2%) of these cases were Asian and 11 (32.4%) were Hispanic.

Figure 10. Tuberculosis Cases by Age* and Race/Ethnicity, New York City, 2018

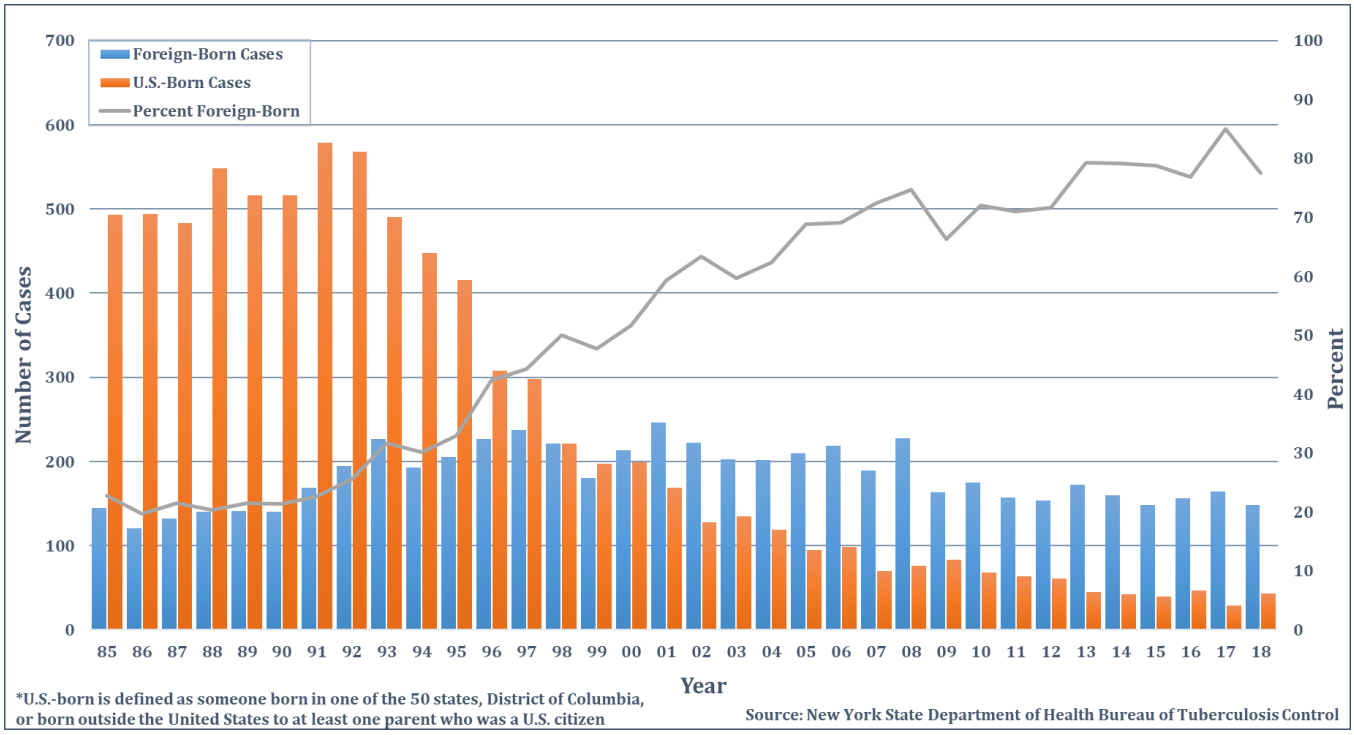


In New York City, the largest number of TB cases reported in 2018 was seen in the 65 years of age and older group (N=164). Among these 164 cases, 94 (57.3%) were Asian and 33 (20.1%) were Hispanic.

Similar to the remainder of the state in 2018, the second largest number of TB cases in New York City was identified in the 25-34 year age group (N=93). Forty-two (45.2%) cases in this age group were Asian and 26 (28.0%) were Hispanic.

TUBERCULOSIS IN FOREIGN-BORN

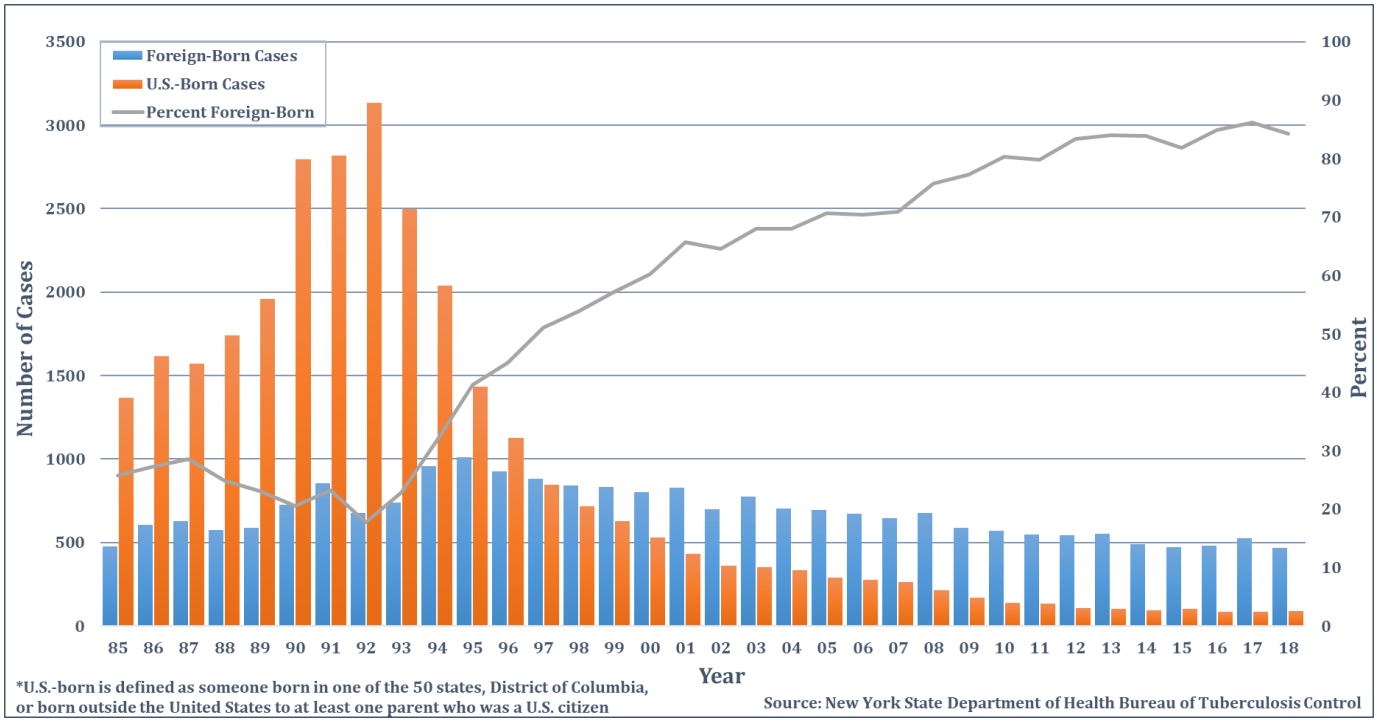
Figure 11. Number and Percent of Tuberculosis Cases by U.S.-Born* and Foreign-Born Status, New York State (Exclusive of New York City), 1985-2018



In 2018, there were 148 foreign-born cases in New York State (exclusive of New York City), a 9.8 percent decrease from the 164 reported in 2017. The foreign-born percentage also decreased from 85.0 percent in 2017 to 77.5 percent in 2018.

TUBERCULOSIS IN FOREIGN-BORN

Figure 12. Number and Percent of Tuberculosis Cases by U.S.-Born* and Foreign-Born Status, New York City, 1985-2018



In New York City, the number of foreign-born TB cases decreased from 528 in 2017 to 470 in 2018. The proportion of foreign-born cases also decreased, from 86.1 percent in 2017 to 84.2 percent in 2018.

Table 4. Tuberculosis Cases by Country of Origin,* New York State, 2018

Country	New York State (Exclusive of New York City)	New York City	New York State (Total)
China	5	112	117
United States	42	74	116
India	22	27	49
Ecuador	10	29	39
Mexico	7	29	36
Philippines	7	27	34
Bangladesh	4	26	30
Dominican Republic	4	21	25
Pakistan	6	15	21
Guyana	1	16	17
Haiti	6	11	17
Nepal	2	14	16
Puerto Rico**	1	14	15
Guatemala	5	8	13
Korea, South	2	11	13
Honduras	7	5	12
Vietnam	9	3	12
Burma	1	10	11
El Salvador	10	1	11
Peru	5	5	10
Colombia	3	6	9
Jamaica	1	8	9
Afghanistan	3	2	5
Bhutan	4	1	5
Hong Kong	0	5	5
Italy	2	3	5
Nigeria	1	4	5
Other Countries	21	71	92
Unknown	0	1	1
TOTAL CASES	**191**	**559**	**750**

*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 2018, there were 77 different countries represented by the 750 TB cases reported in New York State, 26 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=22) and for New York City, the most common country was China (N=112).

TUBERCULOSIS IN FOREIGN-BORN

Table 5. Number and Percent of Tuberculosis Cases by U.S.-Born* and Foreign-Born Status, New York State (Exclusive of New York City), 2018

County	Total Number	U.S.-Born Number	Foreign-Born Number	Foreign-Born Percent
Albany	4	0	4	100.0
Allegany	0	0	0	0.0
Broome	4	1	3	75.0
Cattaraugus	0	0	0	0.0
Cayuga	2	1	1	50.0
Chautauqua	0	0	0	0.0
Chemung	1	0	1	100.0
Chenango	0	0	0	0.0
Clinton	1	1	0	0.0
Columbia	0	0	0	0.0
Cortland	0	0	0	0.0
Delaware	0	0	0	0.0
Dutchess	3	0	3	100.0
Erie	13	3	10	76.9
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	0	0	0	0.0
Hamilton	0	0	0	0.0
Herkimer	0	0	0	0.0
Jefferson	0	0	0	0.0
Lewis	0	0	0	0.0
Livingston	1	1	0	0.0
Madison	0	0	0	0.0
Monroe	16	6	10	62.5
Montgomery	0	0	0	0.0
Nassau	43	5	38	88.4
Niagara	1	0	1	100.0
Oneida	4	2	2	50.0
Onondaga	6	2	4	66.7
Ontario	1	1	0	0.0
Orange	7	4	3	42.9
Orleans	2	0	2	100.0
Oswego	0	0	0	0.0
Otsego	1	0	1	100.0
Putnam	1	0	1	100.0
Rensselaer	1	0	1	100.0
Rockland	11	2	9	81.8
St. Lawrence	0	0	0	0.0
Saratoga	0	0	0	0.0
Schenectady	0	0	0	0.0
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	24	7	17	70.8
Sullivan	2	1	1	50.0
Tioga	1	0	1	100.0
Tompkins	3	0	3	100.0
Ulster	1	1	0	0.0
Warren	0	0	0	0.0
Washington	0	0	0	0.0
Wayne	0	0	0	0.0
Westchester	35	4	31	88.6
Wyoming	0	0	0	0.0
Yates	0	0	0	0.0
TOTAL CASES	**191**	**43**	**148**	**77.5**

*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

In 2018, there were 148 foreign-born TB cases reported in New York State (exclusive of New York City). Over half (58.1%, N= 86/148) of these cases were identified in Nassau, Suffolk and Westchester alone. Among the other counties that reported at least four foreign-born cases, Albany reported the highest foreign-born percentage (100.0%) while Monroe reported the lowest percentage (62.5%). In the remaining counties with foreign-born cases, the number and percentage varied.

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), 2018

Length of Time in the U.S. (Years)	No.	%
<1	18	12.2
1-5	50	33.8
6-10	13	8.8
11-15	19	12.8
16-20	13	8.8
21-30	12	8.1
31-40	14	9.5
41-50	6	4.1
51-60	1	0.7
61-70	1	0.7
Unknown	1	0.7

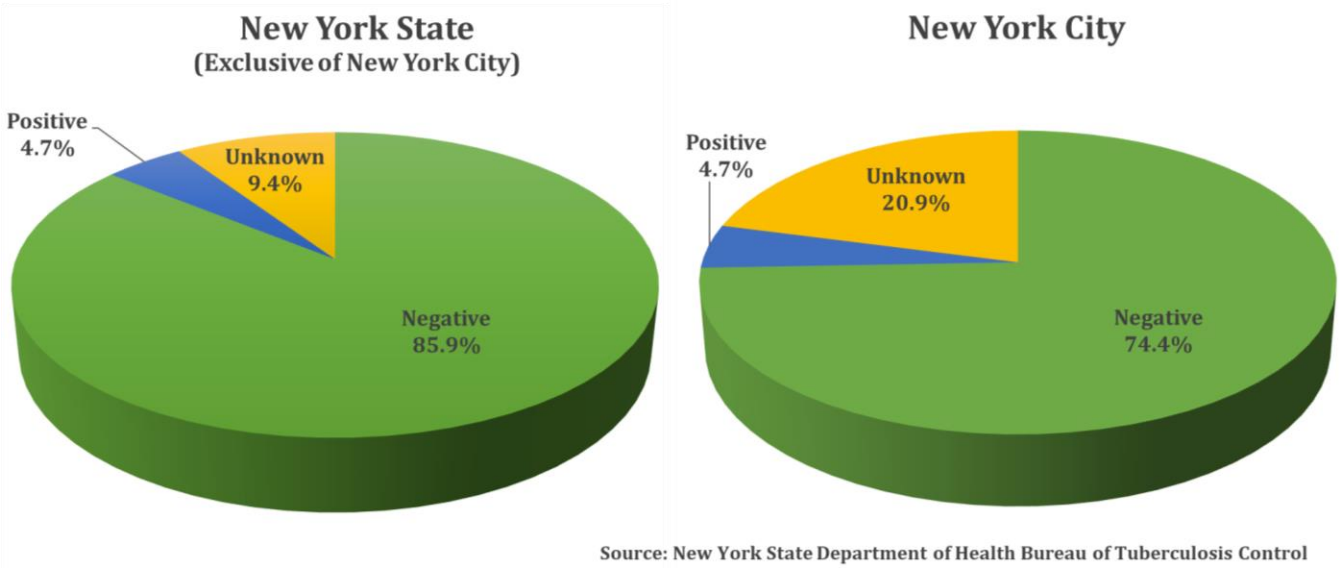
Source: New York State Department of Health
Bureau of Tuberculosis Control

In 2018, 46.3 percent (N=69/149) of foreign-born TB cases in New York State (exclusive of New York City) were diagnosed within five years of entering the U.S. Nineteen (27.5%) of these 69 cases entered the U.S. within one year prior to diagnosis.

HIV CO-INFECTION

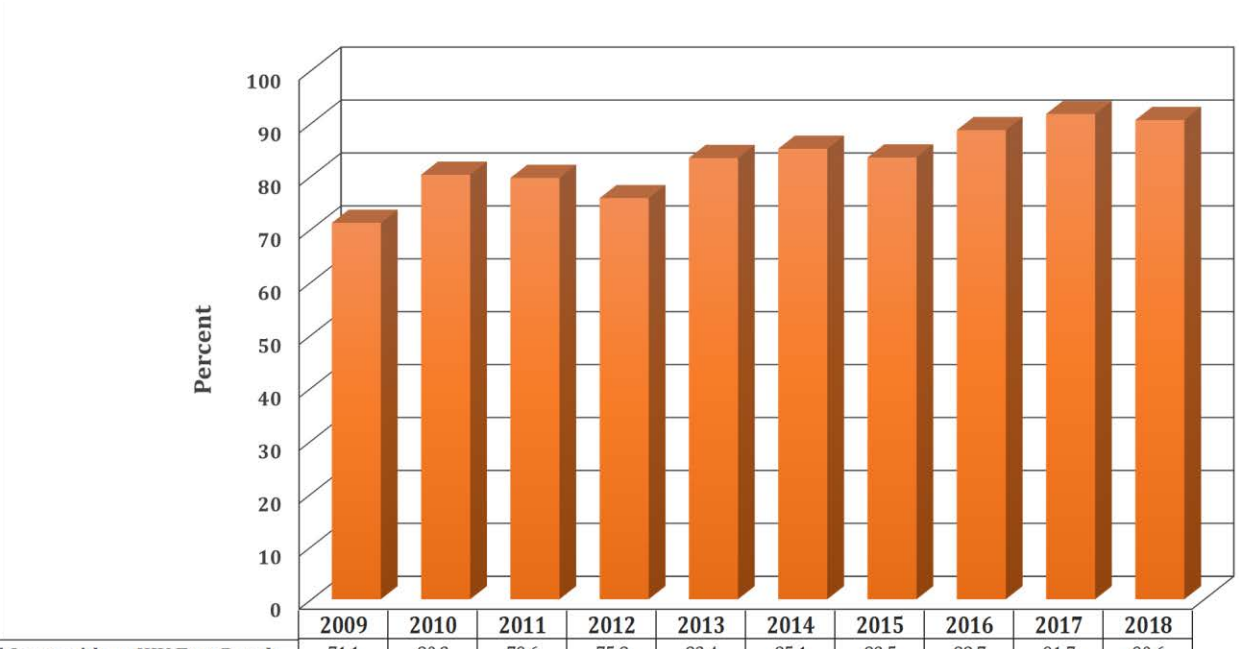
Knowledge of HIV status is essential for the proper management of patients with TB. HIV infection impairs the immune system leaving individuals at greater risk for becoming infected with TB and developing active disease.

Figure 13. HIV Status for Tuberculosis Cases, New York State, 2018



Ninety-one percent (N=173/191) of TB cases in New York State (exclusive of New York City) and 79.1 percent (N=442/559) of cases in New York City had a known HIV status in 2018. The co-infection rate for TB cases in New York State (exclusive of New York City) was the same as that seen in New York City (4.7%). Individuals missing HIV testing information and those who were not offered or had refused testing were considered to have an unknown status.

Figure 14. Number and Percent of Tuberculosis Cases Who Have Been Tested for HIV, New York State (Exclusive of New York City), 2009-2018



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Percent of Cases with an HIV Test Result	71.1	80.2	79.6	75.8	83.4	85.1	83.5	88.7	91.7	90.6
Number of Cases with an HIV Test Result	175	195	176	163	181	172	157	180	177	173
Total Number of Cases	246	243	221	215	217	202	188	203	193	191

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 decade. In 2018, 90.6 percent (N=173/191) of TB cases had a documented HIV result, which was the second highest percentage seen in at least 10 years.

TB cases under five years old and those between 5-9 years old had the lowest proportion of known HIV results (33.3%, N=1/3 and 66.7%, N=2/3, respectively), while those in the 20-24 and 25-34 year age groups had the highest proportion of known HIV results (100.0%, N=16/16 and 97.1%, N=33/34, respectively).

HIV CO-INFECTION

Table 7a. HIV Status for Tuberculosis Cases, New York State (Exclusive of New York City), 2014-2018

HIV Test	2014		2015		2016		2017		2018	
	No.	%	No.	%	No.	%	No.	%	No.	%
Negative	166	82.2	152	80.9	170	83.7	171	88.6	164	85.9
Positive	6	3.0	5	2.7	10	4.9	6	3.1	9	4.7
Refused	19	9.4	12	6.4	7	3.4	9	4.7	11	5.8
Not Offered	7	3.5	15	8.0	12	5.9	6	3.1	5	2.6
Missing/Unknown	4	2.0	4	2.1	4	2.0	1	0.5	2	1.0
TOTAL CASES	202		188		203		193		191	

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

In 2018, 9.4 percent (N=18/191) 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 second lowest percentage in the last five years. Among these 18 cases, 61.1 percent (N=11) refused testing. Of these 11 cases, six (54.5%) were over 55 years old.

Table 7b. HIV Status for Tuberculosis Cases by Gender, New York State (Exclusive of New York City), 2018

HIV Test	Male		Female		Total	
	No.	%	No.	%	No.	%
Negative	108	87.8	56	82.4	164	85.9
Positive	6	4.9	3	4.4	9	4.7
Refused	6	4.9	5	7.4	11	5.8
Not Offered	2	1.6	3	4.4	5	2.6
Missing/Unknown	1	0.8	1	1.5	2	1.0
TOTAL CASES	123		68		191	

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 2018 (92.7% and 86.8%, respectively). Of the nine cases with HIV co-infection, 66.7 percent (N=6/9) were male.

REASONS FOR EVALUATION

Table 8a. Primary Reason for Evaluation of Tuberculosis Cases, New York State (Exclusive of New York City), 2014-2018

Primary Reason for Evaluation	2014		2015		2016		2017		2018	
	No.	%	No.	%	No.	%	No.	%	No.	%
TB Symptoms	116	57.4	91	48.4	93	45.8	92	47.7	90	47.1
Abnormal Chest Radiograph	42	20.8	41	21.8	45	22.2	44	22.8	50	26.2
Incidental Lab Result	23	11.4	35	18.6	42	20.7	37	19.2	30	15.7
Contact Investigation	9	4.5	14	7.4	6	3.0	3	1.6	5	2.6
Targeted Testing	4	2.0	4	2.1	7	3.4	4	2.1	4	2.1
Immigration Medical Exam	3	1.5	0	0.0	1	0.5	7	3.6	1	0.5
Employment/Administrative	1	0.5	0	0.0	2	1.0	1	0.5	0	0.0
Health Care Worker	1	0.5	0	0.0	1	0.5	0	0.0	3	1.6
Unknown	3	1.5	3	1.6	6	3.0	5	2.6	8	4.2
TOTAL CASES	202		188		203		193		191	

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

In 2018, 47.1 percent (N=90/191) 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 (26.2%, N=50/191) followed by an incidental lab result (15.7%, N=30/191). 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), 2018

Primary Reason for Evaluation	U.S.-Born		Foreign-Born		Total	
	No.	%	No.	%	No.	%
TB Symptoms	12	28.6	78	52.3	90	47.1
Abnormal Chest Radiograph	20	47.6	30	20.1	50	26.2
Incidental Lab Result	5	11.9	25	16.8	30	15.7
Contact Investigation	3	7.1	2	1.3	5	2.6
Targeted Testing	0	0.0	4	2.7	4	2.1
Immigration Medical Exam	0	0.0	1	0.7	1	0.5
Employment/Administrative Testing	0	0.0	0	0.0	0	0.0
Health Care Worker	1	2.4	2	1.3	3	1.6
Unknown	1	2.4	7	4.7	8	4.2
TOTAL CASES	42		149		191	

*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

Overall, the primary reason for evaluation was more diverse for foreign-born cases compared to U.S.-born cases in New York State (exclusive of New York City). The proportion of U.S.-born cases that underwent evaluation due to an abnormal chest radiograph was over two times larger than for foreign-born cases (47.6% and 20.1%, respectively).

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), 2014-2018

Additional Risk Factors		2014		2015		2016		2017		2018	
		No.	%	No.	%	No.	%	No.	%	No.	%
Medical Risk	Diabetes Mellitus	30	14.9	34	18.1	36	17.7	33	17.1	38	19.9
	Immunosuppression (not HIV/AIDS)	11	5.4	6	3.2	11	5.4	9	4.7	13	6.8
	Incomplete LTBI Therapy	8	4.0	8	4.3	4	2.0	5	2.6	3	1.6
	End-Stage Renal Disease	6	3.0	3	1.6	4	2.0	5	2.6	9	4.7
	Post-OrganTransplantation	4	2.0	3	1.6	1	0.5	1	0.5	2	1.0
	TNF-α Antagonist Therapy	1	0.5	1	0.5	4	2.0	2	1.0	3	1.6
Exposure Risk**	Contact of Infectious TB Patient	17	8.4	20	10.6	10	4.9	8	4.1	9	4.7
	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	1	0.5	0	0.0	1	0.5	1	0.5
Other Risk	Other Factors	28	13.9	26	13.8	34	16.7	25	13.0	20	10.5
None	No Additional Factors	117	57.9	100	53.2	116	57.1	117	60.6	107	56.0
TOTAL CASES		202		188		203		193		191	

*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 39 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 2018, 19.9 percent (N=38/191) of cases in New York State (exclusive of New York City) had diabetes, the highest proportion seen in at least five years.

Table 9b. Additional Risk Factors* Among Tuberculosis Cases by Gender, New York State (Exclusive of New York City), 2018

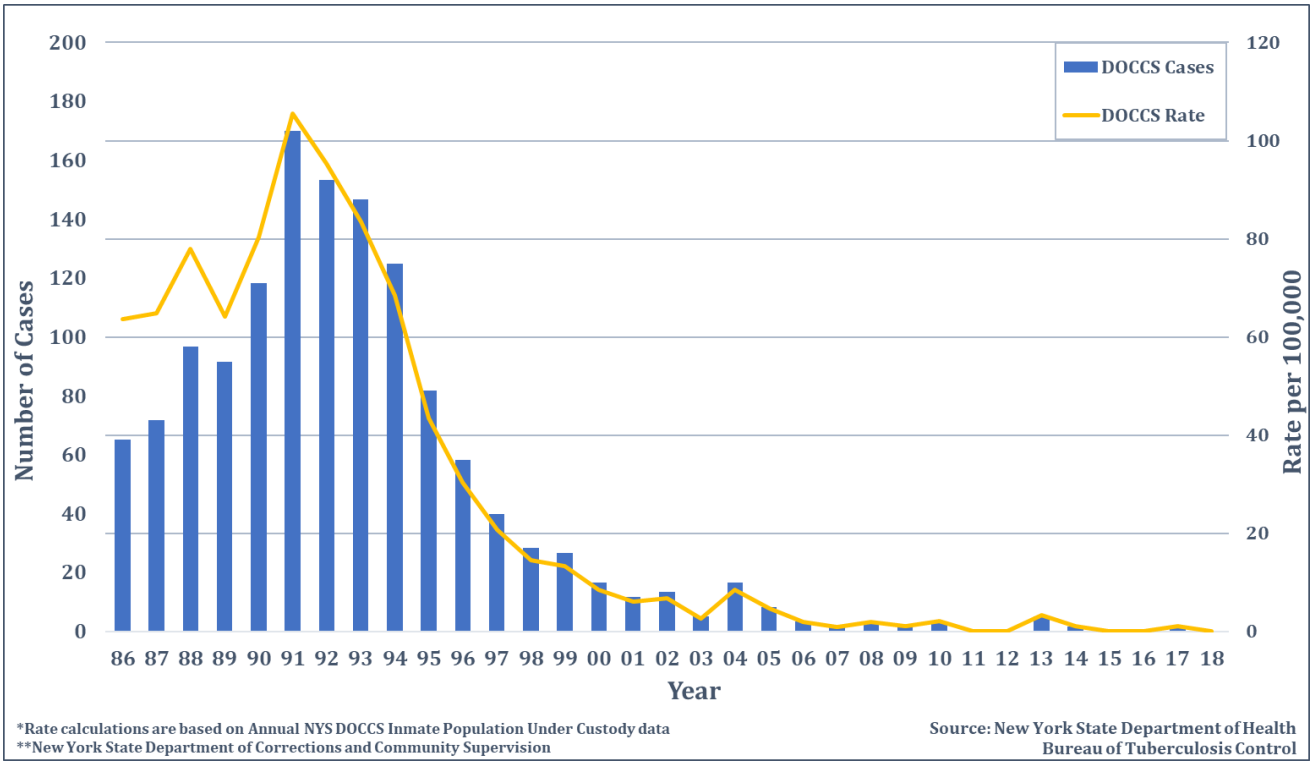
Additional Risk Factors		Male		Female		Total	
		No.	%	No.	%	No.	%
Medical Risk	Diabetes Mellitus	27	22.0	11	16.2	38	19.9
	Immunosuppression (not HIV/AIDS)	10	8.1	3	4.4	13	6.8
	Incomplete LTBI Therapy	3	2.4	0	0.0	3	1.6
	End-Stage Renal Disease	8	6.5	1	1.5	9	4.7
	Post-OrganTransplantation	1	0.8	1	1.5	2	1.0
	TNF-α Antagonist Therapy	3	2.4	0	0.0	3	1.6
Exposure Risk**	Contact of Infectious TB Patient	6	4.9	3	4.4	9	4.7
	Contact of MDR-TB Patient	0	0.0	0	0.0	0	0.0
	Missed Contact	1	0.8	0	0.0	1	0.5
Other Risk	Other Factors	14	11.4	6	8.8	20	10.5
None	No Additonal Factors	63	51.2	44	64.7	107	56.0
TOTAL CASES		123		68		191	

*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 2018, 48.8 rcent of male TB cases New York State cclusive of New York y) had at least one ditional risk factor mpared to 35.3 percent female cases. The oportion of cases with munosuppression (not V/AIDS) was nearly two nes larger for males mpared to females 1% and 4.4%, respectively).

Figure 15. Tuberculosis Cases and Rates* Among DOCCS Inmates, New York State (Exclusive of New York City), 1986-2018**



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 2018, no new TB cases were 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), 2014-2018

Congregate Setting at Time of TB Diagnosis		2014		2015		2016		2017		2018	
		No.	%	No.	%	No.	%	No.	%	No.	%
Correctional Facility	Juvenile Facility	1	0.5	0	0.0	1	0.5	0	0.0	0	0.0
	Local Jail	1	0.5	1	0.5	0	0.0	0	0.0	1	0.5
	State Prison	1	0.5	0	0.0	0	0.0	1	0.5	0	0.0
	Federal Prison	0	0.0	0	0.0	1	0.5	0	0.0	0	0.0
	Other Facility	0	0.0	1	0.5	0	0.0	0	0.0	0	0.0
Long-Term Care Facility	Alcohol/Drug Treatment	1	0.5	0	0.0	0	0.0	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	0	0.0	0	0.0	0	0.0	0	0.0
	Nursing Home	1	0.5	2	1.1	4	2.0	3	1.6	2	1.0
	Residential	0	0.0	0	0.0	2	1.0	0	0.0	0	0.0
	Other Long-Term Care	0	0.0	0	0.0	0	0.0	1	0.5	0	0.0
	Unknown	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
TOTAL CASES		202		188		203		193		191	

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 2018 (1.6%, N=3/191). In 2018, 66.7 percent (N=2/3) of cases diagnosed in a congregate setting were identified in a long-term care facility, all of which were in a nursing home.

Table 11. Homelessness Among Tuberculosis Cases Within the Past Year, New York State (Exclusive of New York City), 2014-2018

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.	%
2014	2	1.0
2015	5	2.7
2016	5	2.5
2017	7	3.6
2018	5	2.6

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

From 2014 to 2018, an average of 2.5 percent (N=24/977) of TB cases in New York State (exclusive of New York City) were homeless within the 12 months prior to diagnosis. In 2018, 2.6 percent (N=5/191) of TB cases were homeless.

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), 2014-2018

Substance Abuse	2014		2015		2016		2017		2018	
	No.	%	No.	%	No.	%	No.	%	No.	%
Injection Drug Use	1	0.5	0	0.0	0	0.0	2	1.0	1	0.5
Non-Injection Drug Use	3	1.5	2	1.1	8	3.9	6	3.1	10	5.2
Excess Alcohol Use	13	6.4	15	8.0	14	6.9	17	8.8	19	9.9
TOTAL CASES	**202**		**188**		**203**		**193**		**191**	

*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 19 cases (9.9%) in 2018 who reported alcohol abuse. Among these 19, five (26.3%) also reported non-injection drug use and one (5.3%) reported both injection and 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 (DST) is performed whenever possible to identify any drug resistance.

Table 13. Phenotypic Drug Susceptibility Results for Culture-Confirmed Tuberculosis Cases, New York State (Exclusive of New York City), 2013-2017

First-Line Drug Susceptibility Results		2014		2015		2016		2017		2018	
		No.	%	No.	%	No.	%	No.	%	No.	%
Positive Culture		**164**	**---**	**150**	**---**	**150**	**---**	**142**	**---**	**151**	**---**
Susceptibility Test Reported		**163**	**99.4**	**150**	**100.0**	**148**	**98.7**	**138**	**97.2**	**130**	**86.1**
Susceptibility Test Results	Susceptible to all first-line drugs	139	85.3	123	82.0	125	84.5	120	87.0	104	80.0
	INH and RIF resistant (MDR TB)	2*	1.2	1	0.7	0	0.0	2	1.4	2	1.5
	INH resistant, RIF susceptible	11	6.7	16	10.7	12	8.1	7	5.1	13	10.0
	RIF resistant, INH susceptible	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Resistance other than INH and RIF	11	6.7	10	6.7	11	7.4	9	6.5	11	8.5

*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 757 culture-confirmed TB cases in New York State (exclusive of New York City). Phenotypic DST results have been reported for 96.3 percent (N=729/757) of these cases, most (83.8%, N=611) of which have been susceptible to all first-line TB drugs.

Since March 2016, in addition to phenotypic DST, New York State Wadsworth Center for Laboratories and Research has been performing Whole Genome Sequencing (WGS) on the first isolate for each TB case. Toward the end of 2018, Wadsworth Laboratories changed their protocol to focus primarily on WGS and perform phenotypic DST only when genetic mutations suggestive of resistance were identified. As a result of this change, only 86.1 percent (N=130/151) of cases had phenotypic DST results. The remaining 21 culture-confirmed cases (13.9%) without phenotypic DST results had molecular DST results by WGS that indicated susceptibility to all first line drugs.

Table 14. Molecular Drug Susceptibility Testing Method and Mutations in the Gene Targets* Associated with Resistance to Select Tuberculosis Drugs for Culture-Confirmed Tuberculosis Cases, New York State (Exclusive of New York City), 2018

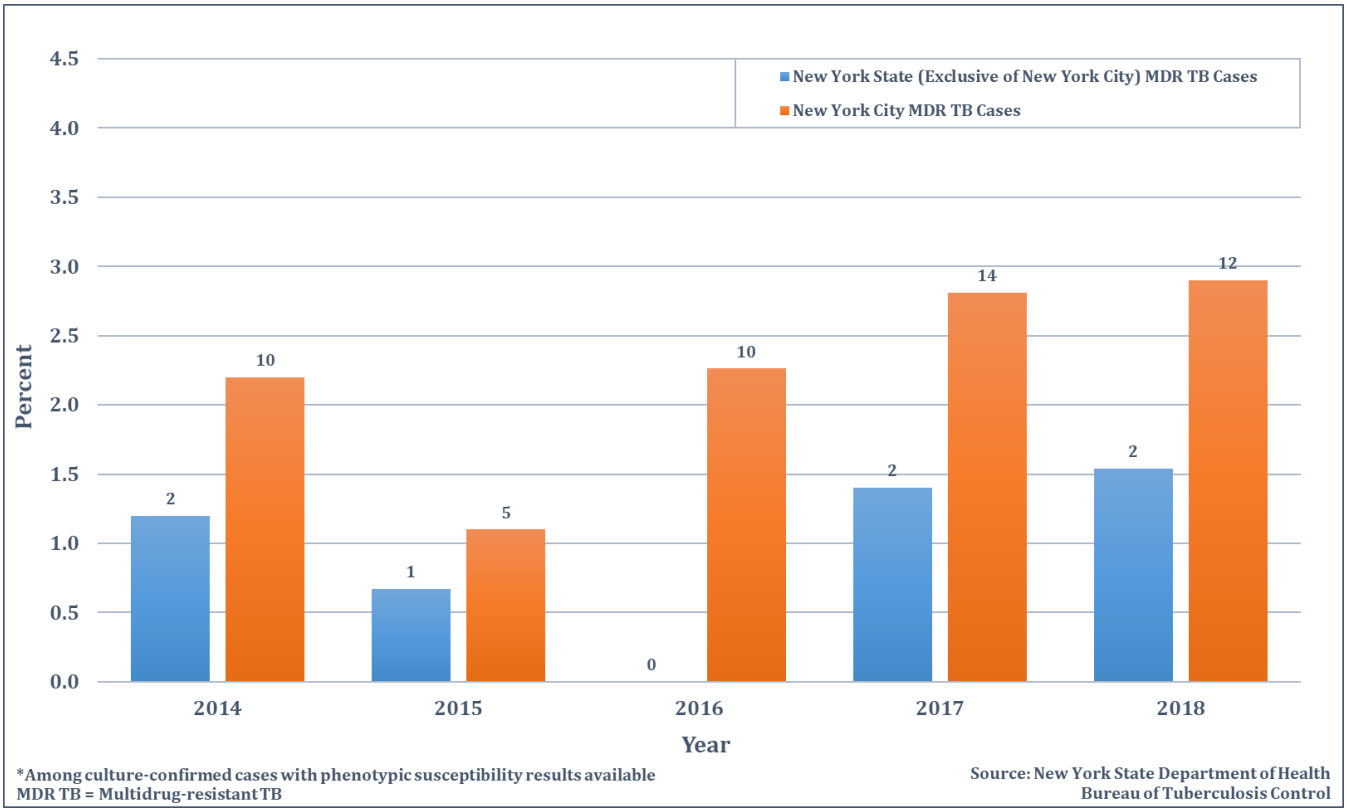
Drug	Gene Target	Whole Genome Sequencing			Pyrosequencing			GeneXpert		
		No. Cases with Test Done	No. Mutations	%	No. Cases with Test Done	No. Mutations	%	No. Cases with Test Done	No. Mutations	%
Rifampin	rpoB	150	3	2.0	44	2	4.5	25	2	8.0
Isoniazid	katG	150	7	4.7	46	3	6.5	---	---	---
	inhA	150	0	0.0	47	3	6.4	---	---	---
	oxyR-ahpC promoter region	150	0	0.0	---	---	---	---	---	---
	mabA-inhA promoter region	150	4	2.7	---	---	---	---	---	---
	mabA	150	0	0.0	---	---	---	---	---	---
Pyrazinamide	pncA	150	3	2.0	---	---	---	---	---	---
	pncA promoter region	150	0	0.0	---	---	---	---	---	---
Ethambutol	embB	150	1	0.7	---	---	---	---	---	---
	embC-embA promoter region	60	1	1.7	---	---	---	---	---	---
Streptomycin	rpsL	150	5	3.3	---	---	---	---	---	---
	rrs 512, 513, 516, 906	150	0	0.0	---	---	---	---	---	---
Fluoroquinolones	gyrA	150	2	1.3	11	0	0.0	---	---	---
	gyrB	150	1	0.7	11	1	9.1	---	---	---
Injectables	rrs 1400	150	0	0.0	---	---	---	---	---	---

*Categories are not mutually exclusive

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

In 2018, 99.3 percent (N=150/151) of culture-confirmed cases in New York State (exclusive of New York City) had at least one type of molecular DST performed. Among the 150 cases with WGS results, there were 24 high-confidence mutations identified that were predictive of resistance to first-line drugs. Another three mutations were identified for the fluoroquinolones and injectable drugs, which are second line drugs.

Figure 16. Number and Percent of Multidrug-Resistant Tuberculosis Cases,* New York State, 2014-2018



Over the last five years, there were almost seven times as many MDR TB cases in New York City compared to the remainder of the state (N=51 and N=7, respectively). Since 2015, the proportion of cases with MDR TB has continued to increase in New York City. The same trend can be seen for the rest of the state since 2016. In 2018, two (1.5%) MDR TB cases were reported for New York State (exclusive of New York City), whereas in New York City there were 12 (2.9%) MDR TB cases reported.

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GENOTYPING

Table 15. Tuberculosis Genotyping Summary for Tuberculosis Cases, New York State (Exclusive of New York City), 2014-2018

Genotyping		2014		2015		2016		2017		2018	
		No.	%	No.	%	No.	%	No.	%	No.	%
Initial Positive Cultures		**170**	**---**	**157**	**---**	**154**	**---**	**146**	**---**	**157**	**---**
False Positives	**Total False Positives**	**3**	**---**	**7**	**---**	**4**	**---**	**4**	**---**	**4**	**---**
	Control strain	0	0.0	0	0.0	0	0.0	1	0.0	0	0.0
	Contamination	0	0.0	6	3.1	0	0.0	0	0.0	1	0.6
	M. bovis BCG	3	1.8	1	0.6	4	2.6	3	2.1	3	2.1
True Positives	**Total True Positives**	**167**	**---**	**150**	**---**	**150**	**---**	**142**	**---**	**153**	**---**
	Isolates Available	162	---	150	---	149	---	141	---	151	---
	Complete Genotype*	154	95.1	146	97.3	147	98.7	136	96.5	151	100.0
	Partial Genotype	160	98.8	149	99.3	147	98.7	138	97.9	151	100.0
	No Result	2	1.2	0	0.0	2	1.3	3	2.1	0	0.0

*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 2018, 98.7 percent (N=151/153) of isolates in New York State (exclusive of New York City) were available for genotyping. Of these 151 isolates, 100.0 percent (N=151) had a complete genotype (spoligotype and MIRU result).

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.

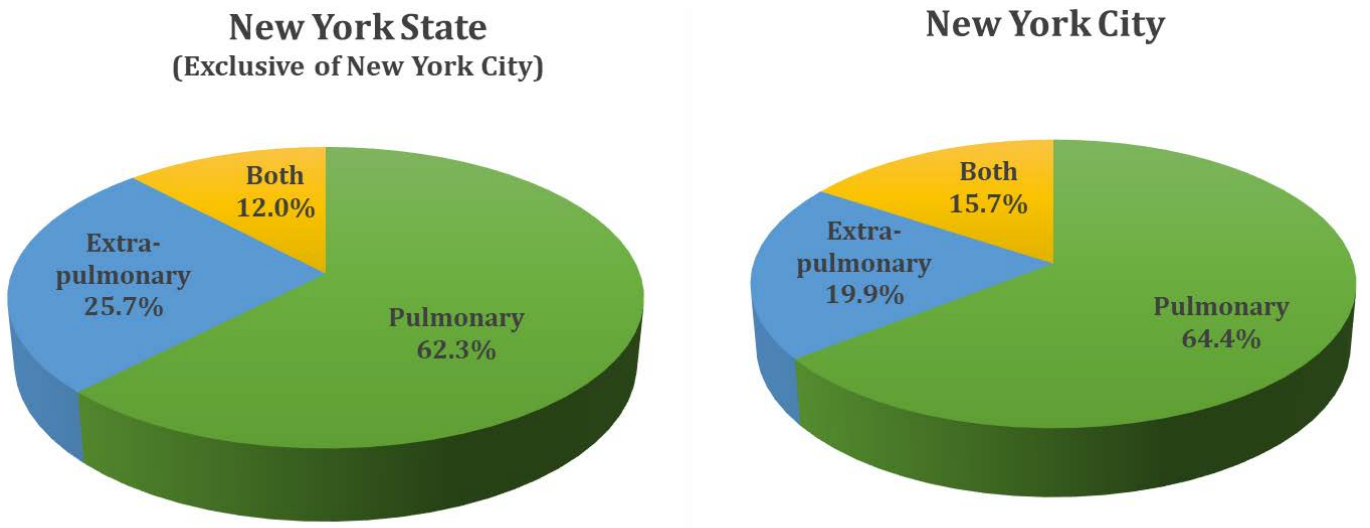
Table 16. Primary Site of Disease for Tuberculosis Cases, New York State (Exclusive of New York City), 2014-2018

Primary Site of Disease	2014		2015		2016		2017		2018	
	No.	%	No.	%	No.	%	No.	%	No.	%
Pulmonary	129	63.9	124	66.0	115	56.7	122	63.2	119	62.3
Extrapulmonary	45	22.3	37	19.7	63	31.0	48	24.9	49	25.7
Both	28	13.9	27	14.4	25	12.3	23	11.9	23	12.0
TOTAL CASES	202		188		203		193		191	

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 17. Primary Site of Disease for Tuberculosis Cases, New York State, 2018



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

Eighty percent (N=447/559) of TB cases in New York City had pulmonary disease compared to 74.3 percent (N=142/191) of cases in the rest of the state. Among these 589 pulmonary cases throughout the state, 104 also had disease in one or more extra-pulmonary sites.

SITE OF DISEASE

Table 17. Extra-Pulmonary Sites of Disease* for Tuberculosis Cases, New York State, 2018

Extra-Pulmonary Site of Disease	New York State (Exclusive of New York City)	New York City	New York State (Total)
Lymphatic	28	84	112
Pleural	13	55	68
Bone/Joint	8	25	33
Genitourinary	4	11	15
Peritoneal	5	8	13
Meningeal	5	5	10
Laryngeal	1	0	1
Other	19	38	57

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

There were 265 cases in New York State with at least one extra-pulmonary site of disease in 2018. Among these cases, the most common sites of disease were lymphatic (N=112), pleural (N=68) and bone/joint (N=33).

COMPLETION OF THERAPY

Table 18. Treatment Status for Tuberculosis Cases,* New York State (Exclusive of New York City), 2013-2017

Treatment Status	2013		2014		2015		2016		2017	
	No.	%	No.	%	No.	%	No.	%	No.	%
Complete	195	91.1	174	87.9	161	87.5	185	93.0	176	92.1
Died	10	4.7	13	6.6	14	7.6	8	4.0	11	5.8
Uncooperative/Refused	3	1.4	3	1.5	2	1.1	1	0.5	1	0.5
Lost	1	0.5	2	1.0	0	0.0	1	0.5	0	0.0
Adverse Treatment Event	2	0.9	0	0.0	1	0.5	0	0.0	0	0.0
Other	3	1.4	6	3.0	6	3.3	4	2.0	3	1.6
TOTAL CASES	214		198		184		199		191	

*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 2013 and 2017 (the most recent year for which completion information is available) was 90.1 percent (N=904/986). The completion rate for 2017 was 92.1 percent.

Table 19. Treatment Status for Tuberculosis Cases* Reported in 2017, New York State (Exclusive of New York City)

Treatment Status	Non-MDR TB		MDR TB		Total	
	No.	%	No.	%	No.	%
Complete	175	92.6	1	50.0	176	92.1
Died	10	5.3	1	50.0	11	5.8
Uncooperative/Refused	1	0.5	0	0.0	1	0.5
Lost	0	0.0	0	0.0	0	0.0
Adverse Treatment Event	0	0.0	0	0.0	0	0.0
Other	3	1.6	0	0.0	3	1.6
TOTAL CASES	189		2		191	

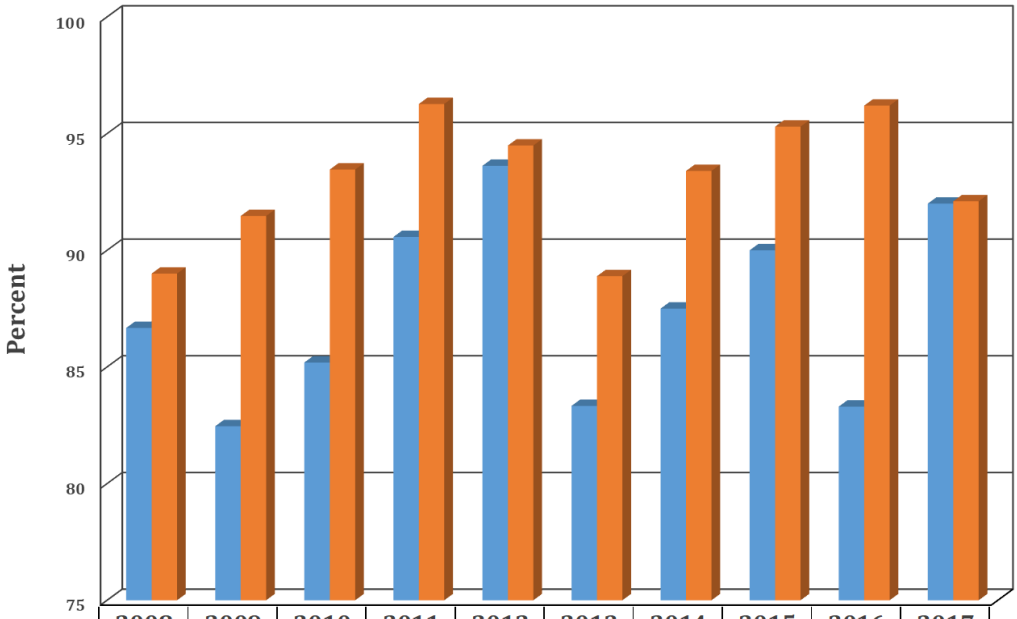
*Excludes patients found not to have TB, those who were reported at death and those who never started treatment
MDR TB = Multidrug-resistant TB

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

For the 191 TB cases in New York State (exclusive of New York City) who were alive at diagnosis and who started treatment in 2017, 92.1 percent (N=176/191) completed treatment. Among the two MDR TB cases, one had multiple comorbidities and died from causes unrelated to TB disease or TB treatment.

COMPLETION OF THERAPY

Figure 18. 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), 2008-2017**



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Percent of U.S.-Born Cases	86.7	82.5	85.2	90.6	93.6	83.3	87.5	90.0	83.3	92.0
Percent of Foreign-Born Cases	89.0	91.5	93.5	96.3	94.5	88.9	93.4	95.3	96.2	92.1
Total	88.5	88.7	91.3	94.7	94.3	87.8	92.3	94.3	93.1	92.1

*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 2017 (the most recent year for which complete information is available), 92.1 percent (N=152/165) of patients in New York State (exclusive of New York City) eligible^ to complete treatment within 12 months, did so. An additional 6.7 percent (N=11/165) of cases completed treatment in more than 12 months for an overall completion rate of 98.8 percent (N=163/165).

In contrast to prior years, the completion rates for U.S.-born and foreign-born cases were very similar (92.0% and 92.1%, respectively).

^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 20. Number and Percent of Infectious Tuberculosis Cases with Contacts Identified, New York State (Exclusive of New York City), 2008-2017

Year	Total Infectious Cases	Infectious Cases with Contacts Identified	
		No.	%
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
2016	50	49	98.0
2017	54	53	98.1

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

In 2017 (the most recent year for which complete information is available), 98.1 percent (N=53/54) of infectious TB cases in New York State (exclusive of New York City) had contacts identified. This met the state objective of 98.0 percent for 2017.

Table21. Number and Percent of Contacts to Infectious Tuberculosis Cases Evaluated for Latent Tuberculosis Infection, New York State (Exclusive of New York City), 2008-2017

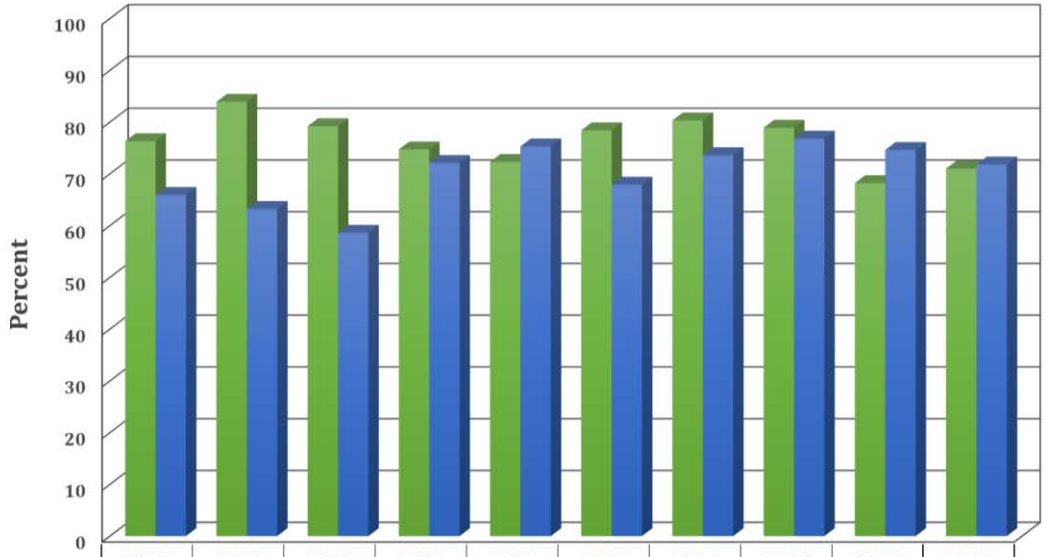
Year	Total Contacts Identified	Contacts Evaluated	
		No.	%
2008	3,549	2,647	74.6
2009	1,768	1,447	81.8
2010	2,253	2,027	89.9
2011	3,662	3,049	83.3
2012	1,851	1,587	85.7
2013	1,462	1,215	83.1
2014	1,843	1,571	85.2
2015	1,922	1,431	74.5
2016	933	725	77.7
2017	1,714	1,417	82.7

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

Eighty-three percent (N=1,417/1,714) of contacts to infectious cases in New York State (exclusive of New York City) were evaluated for LTBI in 2017 (the most recent year for which complete information is available). This was a five percent increase from the previous year (82.7% and 77.7%, respectively).

CONTACTS TO INFECTIOUS TUBERCULOSIS CASES

Figure 19. 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), 2008-2017



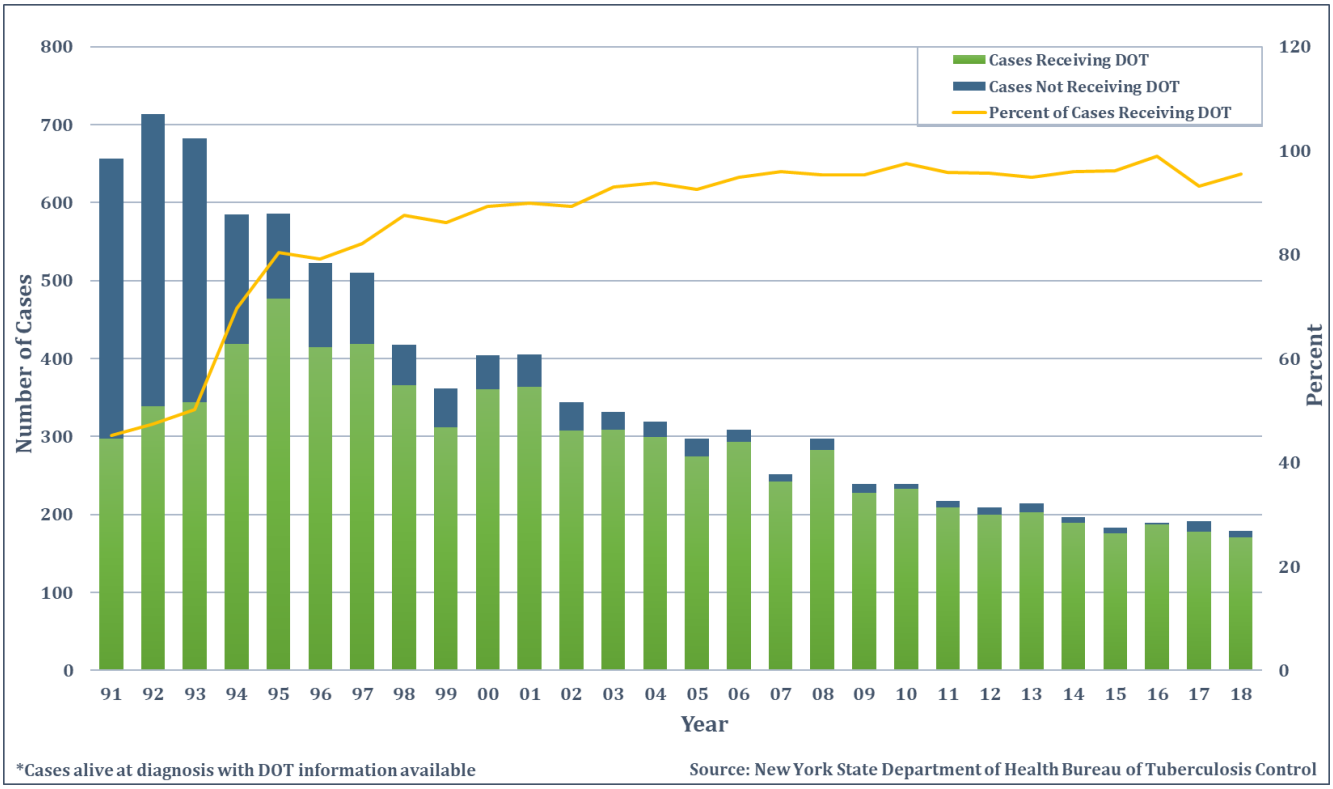
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Percent of Contacts who Started Treatment	83.9	79.2	74.7	72.3	78.4	80.3	78.9	68.2	71.0	70.2
Number of Contacts who Started Treatment	261	152	219	263	178	159	198	122	71	80
Percent of Contacts who Completed Treatment	63.2	58.6	72.1	75.3	67.9	73.6	76.8	74.6	71.8	72.5
Number of Contacts who Completed Treatment	165	89	158	198	121	117	152	91	51	58

*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 2017 (the most recent year for which complete information is available), eight percent (N=114/1,417) were diagnosed with LTBI. Seventy percent (N=80/114) of these contacts were started on a treatment regimen and 72.5 percent (N=58/80) of those who started treatment completed the prescribed regimen.

Figure 20. Number and Percent of Tuberculosis Cases* Receiving Any Directly Observed Therapy, New York State (Exclusive of New York City), 1991-2018



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. By 2003, the proportion of cases receiving a portion of their treatment as DOT more than doubled and by 2016 it reached the highest at 98.9 percent (N=187/189). In 2017 this percentage dropped to 93.2 percent (N=178/191), but increased to 95.5 percent (N=171/179) in 2018.

CONTACT INFORMATION

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