TUBERCULOSIS IN NEW YORK STATE

2017

Annual Statistical Report

Bureau of Tuberculosis Control

NEW YORK STATE | Department of Health

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TABLE OF CONTENTS

Table of Contents

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LIST OF FIGURES

LIST OF TABLES

Executive Summary

MORBIDITY & MORTALITY

- From 2016 to 2017, tuberculosis (TB) morbidity increased in New York State. The 2017 total of 806 cases (613 cases in New York City, 193 cases in the remainder of New York State) represents a 4.9 percent increase from the 768 cases reported in 2016. The nation as a whole experienced a 1.8 percent decrease in morbidity. Since the most recent peak epidemic in 1992 with 4,574 cases, there was an 82.4 percent decrease in New York State compared to a national decline of 65.9 percent.
- In New York State (exclusive of New York City), the number of TB cases decreased 4.9 percent from 203 cases in 2016 to 193 cases in 2017. The number of TB cases in New York City increased by 8.5 percent from 565 cases in 2016 to 613 cases in 2017. In 2017, the nation as a whole reported 9,093 cases, down 2.1 percent from the 9,287 cases reported in 2016.
- New York State ranked fifth nationally for TB morbidity with an incidence rate of 4.2 per 100,000 population in 2017. This rate is influenced by New York City, which had a TB case rate of 7.5 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 54.4 percent of the TB cases in New York State (exclusive of New York City) in 2017.

RACE-ETHNICITY

- In 2017, Asians continued to have one of the highest incidence rates of TB statewide (24.5 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 increased from 82.8 (N=636) in 2016 to 85.9 in 2016 (N=692). People born in China comprised the greatest number of foreign-born TB cases (N=110) in New York City while those born in India comprised the greatest number of TB cases (N=17) in the remainder of the state.

DRUG SUSCEPTIBILITY

- Among individuals with drug susceptibilities reported in 2017, 14 cases from New York City had multidrug-resistant TB (MDR TB), which was a 40.0 percent increase from the number identified in 2016 (N=10). In New York State (exclusive of New York City) there were no MDR TB cases reported in 2016, but two MDR TB cases were 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.

Table 1. Tuberculosis Cases and Rates,* New York State, 1960-2017

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

*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

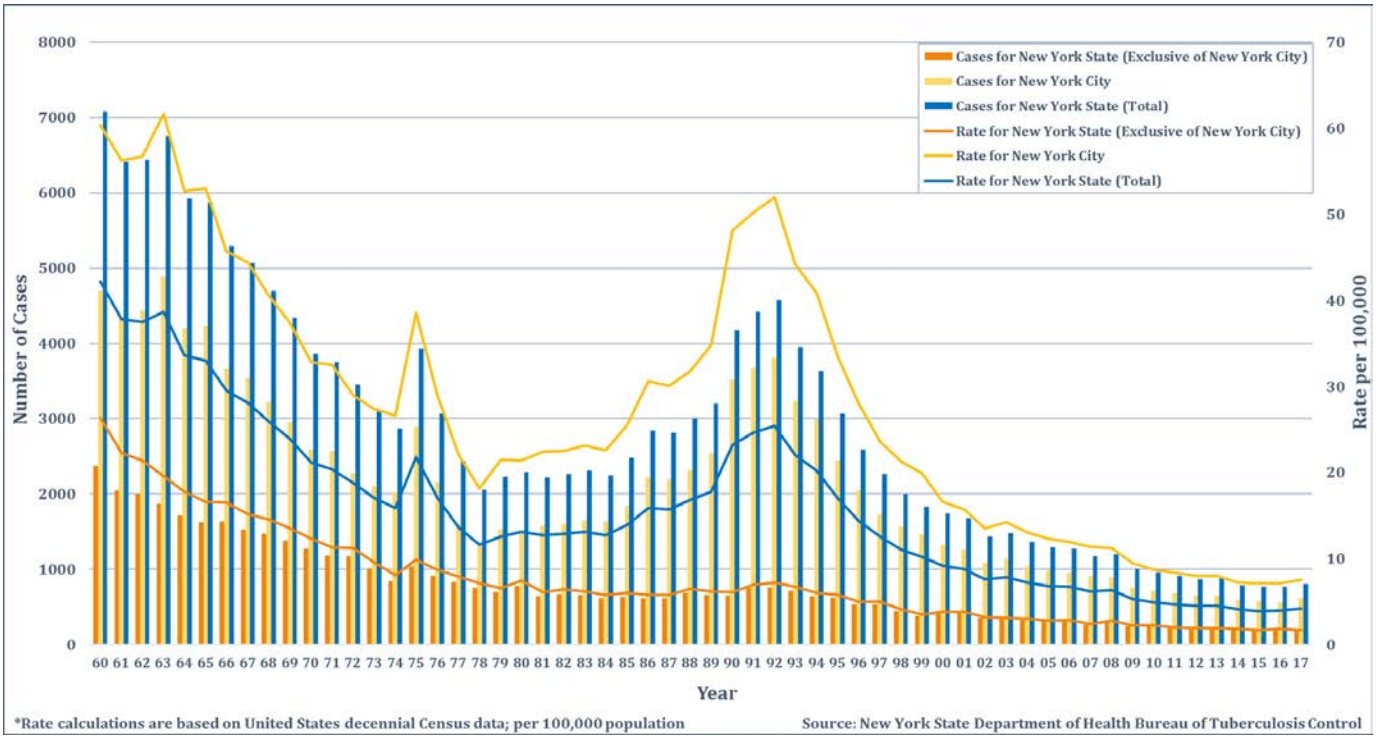
TUBERCULOSIS CASES AND RATES

From 2016 to 2017, TB cases and rates increased statewide. In 2017, a total of 806 cases were reported in New York State, representing a 4.9 percent increase from the 768 cases reported in 2016 and an 88.6 percent decrease from the 7,075 cases reported in 1960. Over three-quarters of the state's TB morbidity is concentrated in New York City.

In 2017, New York City reported 76.1 percent (N=613/806) of the total cases despite having only 42 percent of the state population. The rest of the state reported 193 cases, which was a 4.9 percent decrease compared to the 203 reported in 2016.

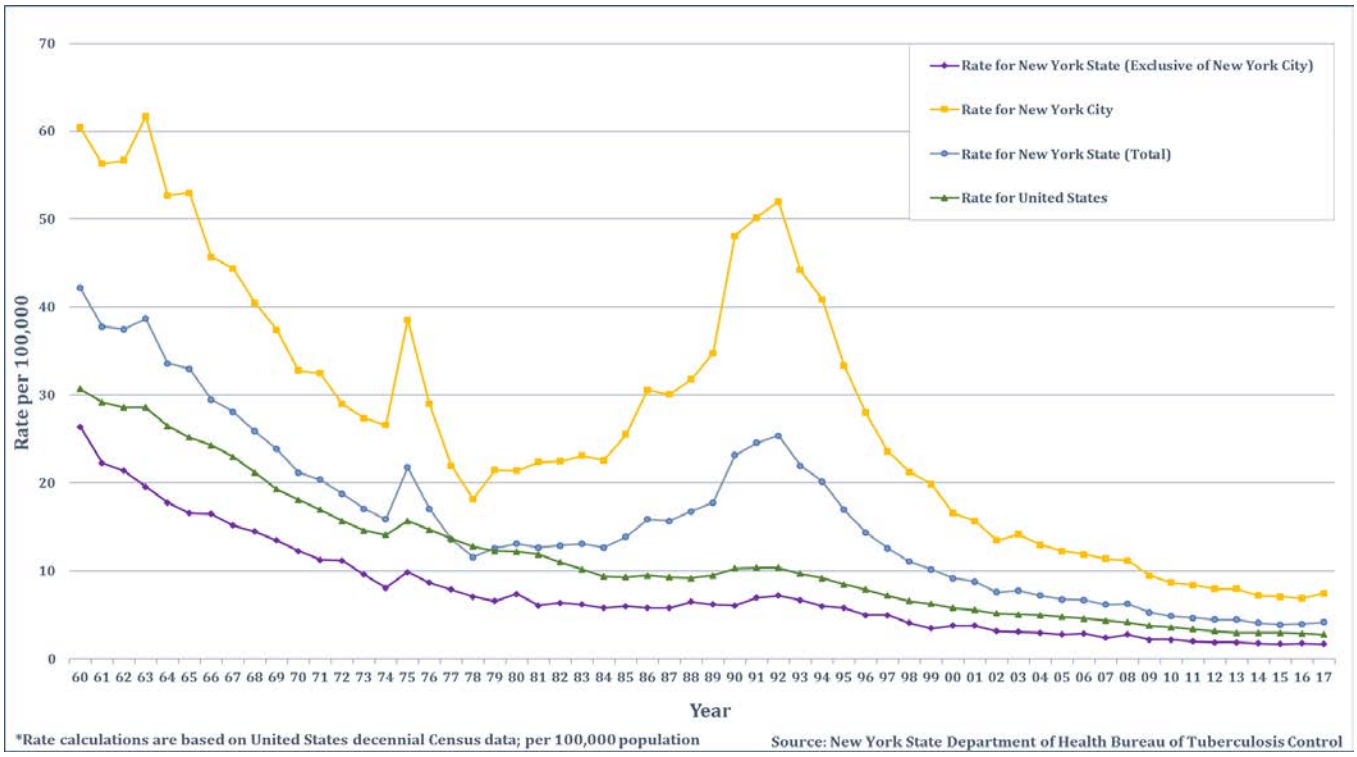
The rate of TB in New York State is greatly influenced by the high morbidity in New York City. Outside of New York City, the rate in 2017 was 1.7 per 100,000 population, but New York City reported a rate of 7.5 per 100,000, resulting in an overall rate of 4.2 per 100,000 population for the whole state.

Figure 1. Tuberculosis Cases and Rates,* New York State, 1960-2017



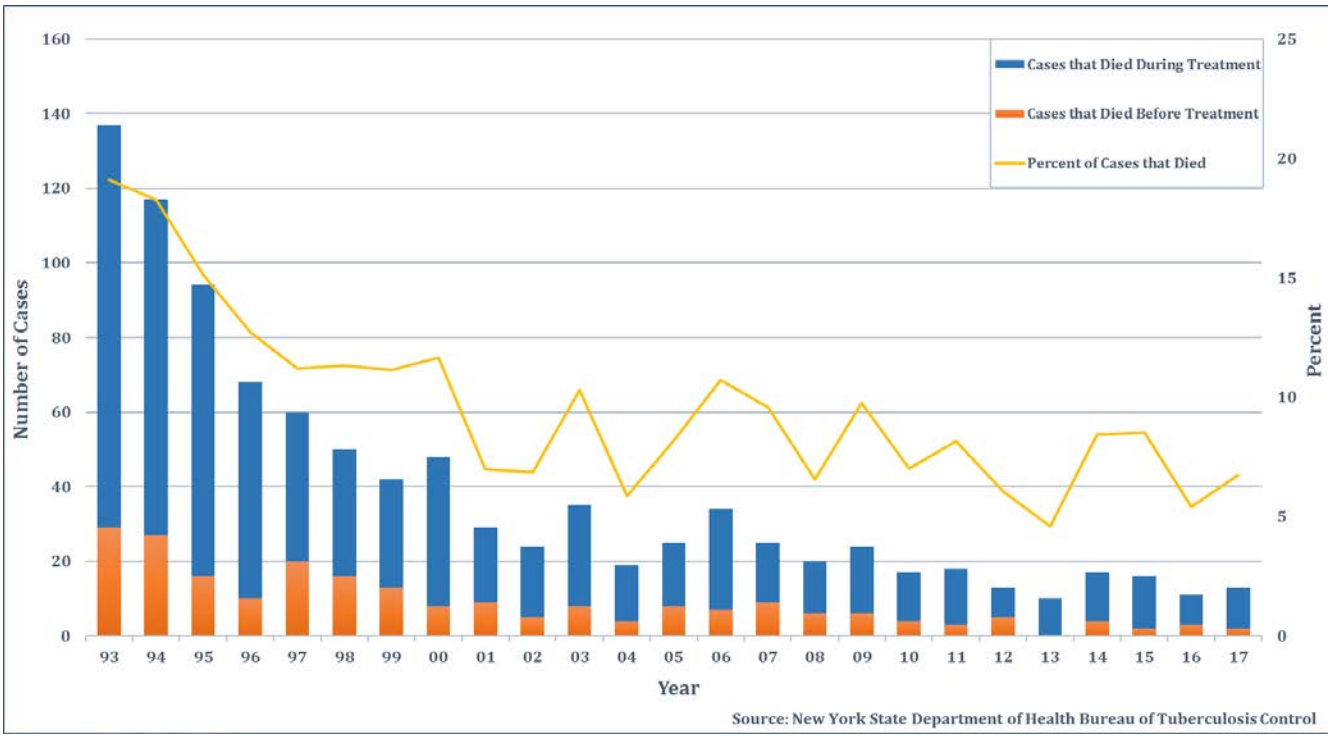
Over the last 50 years, there have been two peaks in TB morbidity where the number and rate of TB substantially increased. The peak in 1975 can be explained by a change in the case definition to include reactivated TB cases. The increase that began in the mid-1980s and extended through the early 1990s 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, 1960-2017



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 2017, the national case rate was 2.8 per 100,000 population and ranged from 0.3 to 8.1 per 100,000 population across all the states. New York State ranked third based on the number of cases (N=806) and fifth based on incidence rate (4.2 per 100,000 population), but these rankings were largely influenced by New York City which, by itself, would have ranked third nationally based on number of cases (N=613) and second based on incidence rate (7.5 per 100,000 population).

Figure 3. Number and Percent of Deaths Among Tuberculosis Cases, New York State (Exclusive of New York City), 1993-2017



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 13 total deaths in 2017. The cause of death was TB-related for five (38.5%) of these cases. Four cases who died were older than 75 years of age and of these four, three had other comorbidities (e.g., diabetes) and died while in the hospital.

GEOGRAPHIC DISTRIBUTION

Table 2. Tuberculosis Cases and Rates* by County, New York State, 2013-2017

County	2013		2014		2015		2016		2017	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Albany	5	1.6	7	2.3	2	0.7	2	0.7	8	2.6
Allegany	0	---	0	---	0	---	0	---	0	---
Broome	1	0.5	0	---	3	1.5	3	1.5	2	1.0
Cattaraugus	0	---	0	---	0	---	0	---	1	1.2
Cayuga	1	1.2	2	2.5	4	5.0	1	1.2	1	1.2
Chautauqua	0	---	0	---	0	---	0	---	1	0.7
Chemung	1	1.1	0	---	0	---	2	2.3	0	---
Chenango	0	---	0	---	0	---	0	---	0	---
Clinton	1	1.2	0	---	2	2.4	0	---	0	---
Columbia	0	---	2	3.2	3	4.8	0	---	3	4.8
Cortland	0	---	0	---	0	---	0	---	0	---
Delaware	0	---	0	---	0	---	1	2.1	0	---
Dutchess	4	1.3	7	2.4	5	1.7	1	0.3	4	1.3
Erie	21	2.3	16	1.7	13	1.4	13	1.4	5	0.5
Essex	0	---	1	2.5	0	---	0	---	0	---
Franklin	0	---	0	---	0	---	0	---	0	---
Fulton	1	1.8	0	---	0	---	0	---	1	1.8
Genesee	0	---	0	---	0	---	2	3.3	1	1.7
Greene	3	6.1	0	---	0	---	1	2.0	0	---
Hamilton	0	---	0	---	0	---	0	---	0	---
Herkimer	1	1.5	0	---	0	---	0	---	0	---
Jefferson	2	1.7	1	0.9	2	1.7	0	---	1	0.9
Lewis	0	---	0	---	0	---	1	3.7	0	---
Livingston	2	3.1	0	---	0	---	1	1.5	0	---
Madison	0	---	0	---	0	---	0	---	0	---
Monroe	22	3.0	20	2.7	17	2.3	24	3.2	14	1.9
Montgomery	0	---	0	---	0	---	1	2.0	0	---
Nassau	40	3.0	33	2.5	40	3.0	38	2.8	40	3.0
Niagara	3	1.4	3	1.4	4	1.8	2	0.9	1	0.5
Oneida	8	3.4	3	1.3	5	2.1	8	3.4	9	3.8
Onondaga	9	1.9	10	2.1	10	2.1	17	3.6	6	1.3
Ontario	0	---	0	---	2	1.9	0	---	0	---
Orange	9	2.4	8	2.1	2	0.5	7	1.9	9	2.4
Orleans	0	---	0	---	0	---	0	---	0	---
Oswego	0	---	1	0.8	0	---	1	0.8	0	---
Otsego	0	---	0	---	1	1.6	0	---	0	---
Putnam	0	---	2	2.0	0	---	0	---	1	1.0
Rensselaer	1	0.6	2	1.3	0	---	2	1.3	1	0.6
Rockland	15	4.8	11	3.5	8	2.6	4	1.3	14	4.5
Saratoga	2	0.9	1	0.5	1	0.5	1	0.5	0	---
Schenectady	3	1.9	3	1.9	3	1.9	2	1.3	0	---
Schoharie	0	---	0	---	0	---	0	---	0	---
Schuyler	0	---	0	---	0	---	0	---	0	---
Seneca	0	---	0	---	0	---	0	---	0	---
St. Lawrence	1	0.9	0	---	1	---	0	---	1	0.9
Steuben	1	1.0	0	---	0	---	0	---	0	---
Suffolk	22	1.5	35	2.3	24	1.6	34	2.3	34	2.3
Sullivan	1	1.3	1	1.3	0	---	1	1.3	2	2.6
Tioga	0	---	0	---	0	---	0	---	0	---
Tompkins	1	1.0	4	3.9	2	2.0	2	2.0	2	2.0
Ulster	4	2.2	0	---	0	---	1	0.5	0	---
Warren	0	---	0	---	0	---	1	1.5	0	---
Washington	1	1.6	1	1.6	0	---	0	---	0	---
Wayne	1	1.1	1	1.1	0	---	1	1.1	0	---
Westchester	30	3.2	27	2.8	34	3.6	28	3.0	31	3.3
Wyoming	0	---	0	---	0	---	0	---	0	---
Yates	0	---	0	---	0	---	0	---	0	---
New York State Total (Exclusive of New York City)	**217**	**1.9**	**202**	**1.8**	**188**	**1.7**	**203**	**1.8**	**193**	**1.7**
Bronx	91	6.6	99	7.1	87	6.3	82	5.9	106	7.7
Kings	197	7.9	192	7.7	171	6.9	166	6.6	184	7.3
New York	102	6.4	72	4.5	88	5.4	67	4.2	64	4.0
Queens	242	10.8	212	9.5	218	9.8	240	10.8	247	11.1
Richmond	24	5.1	10	2.1	13	3.0	10	2.1	12	2.6
New York City Total	**656**	**8.0**	**585**	**7.2**	**577**	**7.1**	**565**	**6.9**	**613**	**7.5**
STATE TOTAL	**873**	**4.5**	**787**	**4.1**	**765**	**3.9**	**768**	**4.0**	**806**	**4.2**

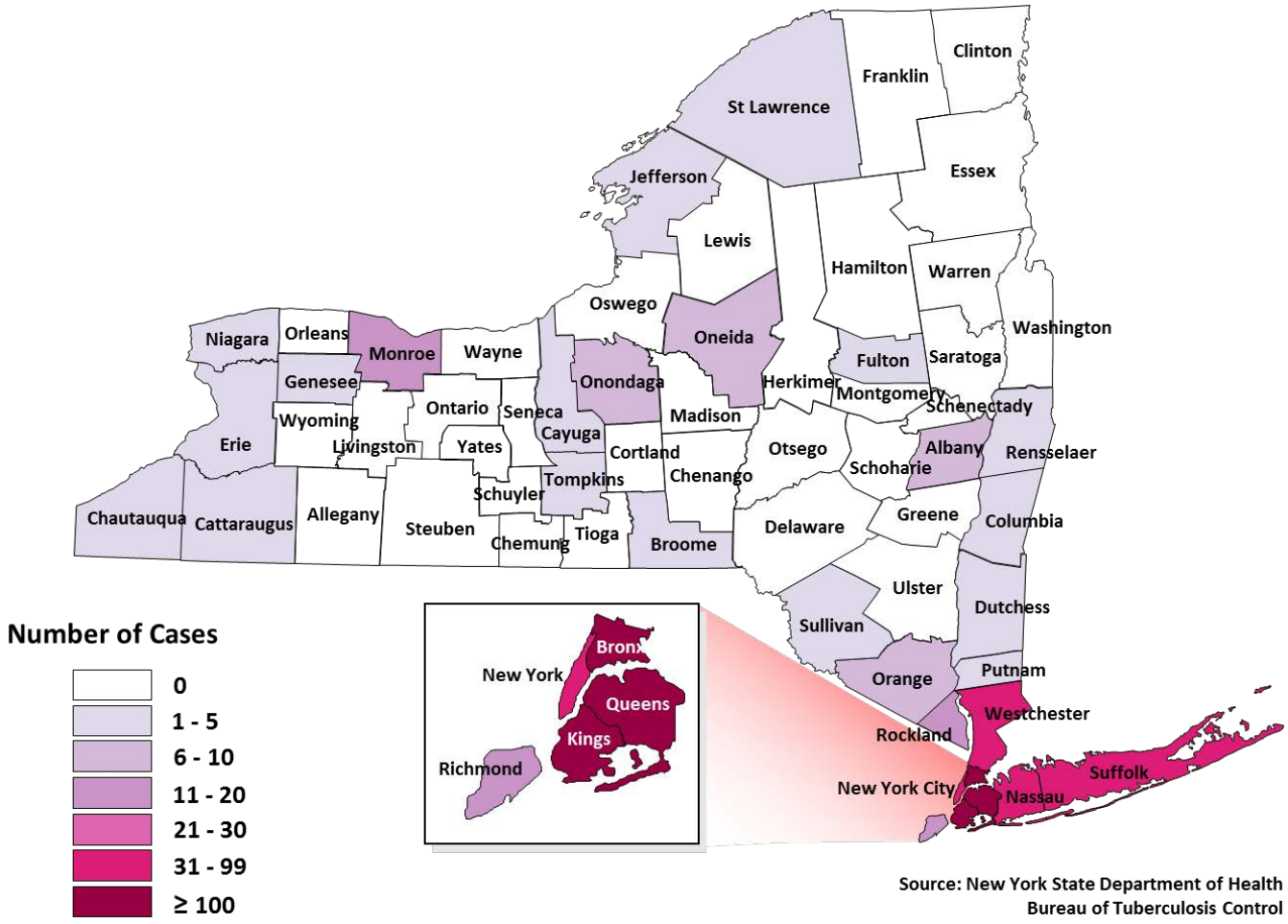
*Rate calculations are based on 2010 United States Census data; per 100,000 population

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 2017, all five boroughs of New York City and 25 (43.9%) 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 (54.4%, N=105/193).

Figure 4. Distribution of Tuberculosis Cases in New York State, 2017



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, 2017**

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	116	2.1	389	10.0	505	5.4
	Female	77	1.3	224	5.2	301	3.0
Age Group	Under 5 years	4	0.6	10	1.9	14	1.2
	5-9	2	0.3	3	0.6	5	0.4
	10-14	2	0.3	2	0.4	4	0.3
	15-19	6	0.7	16	3.0	22	1.6
	20-24	12	1.6	42	6.5	54	3.8
	25-34	36	2.8	120	8.6	156	5.9
	35-44	22	1.5	80	6.9	102	3.9
	45-54	25	1.4	89	8.0	114	4.0
	55-64	31	2.2	101	11.3	132	5.7
	65+	53	3.3	150	15.1	203	7.8
Race/Ethnicity	White, non-Hispanic	26	0.3	47	1.7	73	0.6
	Black, non-Hispanic	34	3.7	116	6.2	150	5.4
	Hispanic	54	5.0	159	6.8	213	6.2
	Asian	79	20.9	265	25.8	344	24.5
	Multiple Races	0	---	10	6.7	10	3.1
	Other/Unknown	0	0.0	16	27.7	16	19.6
TOTAL		**193**	**1.7**	**613**	**7.5**	**806**	**4.2**

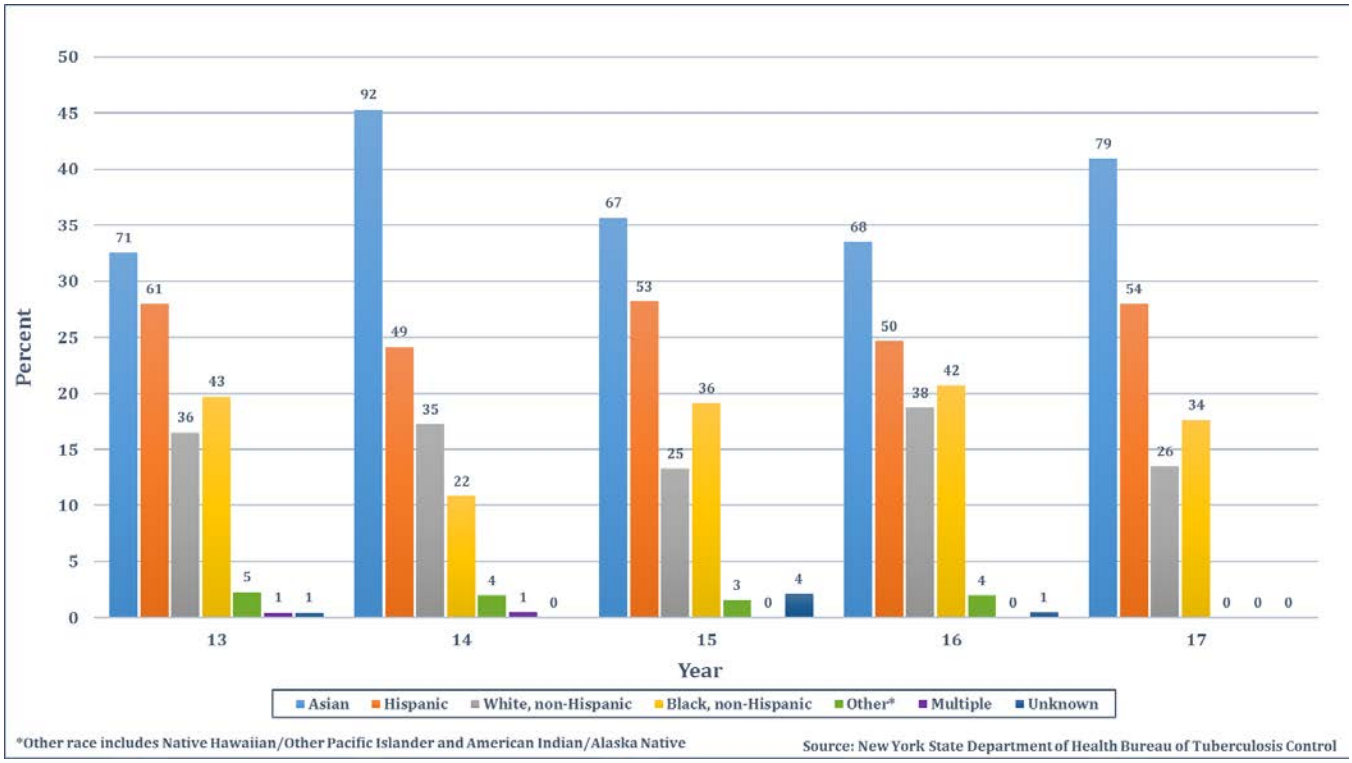
*Rate calculations are based on 2010 United States Census data; per 100,000 population
**Age calculations are based on date of birth and report date

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

Statewide, in 2017, 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 four cases for a rate of 0.3 per 100,000. The highest rate was seen among those 65 years and older (7.8 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 (24.5 per 100,000). The rate for white, non-Hispanics in New York City was nearly five times greater than in the rest of the state (1.7 per 100,000 and 0.3 per 100,000, respectively).

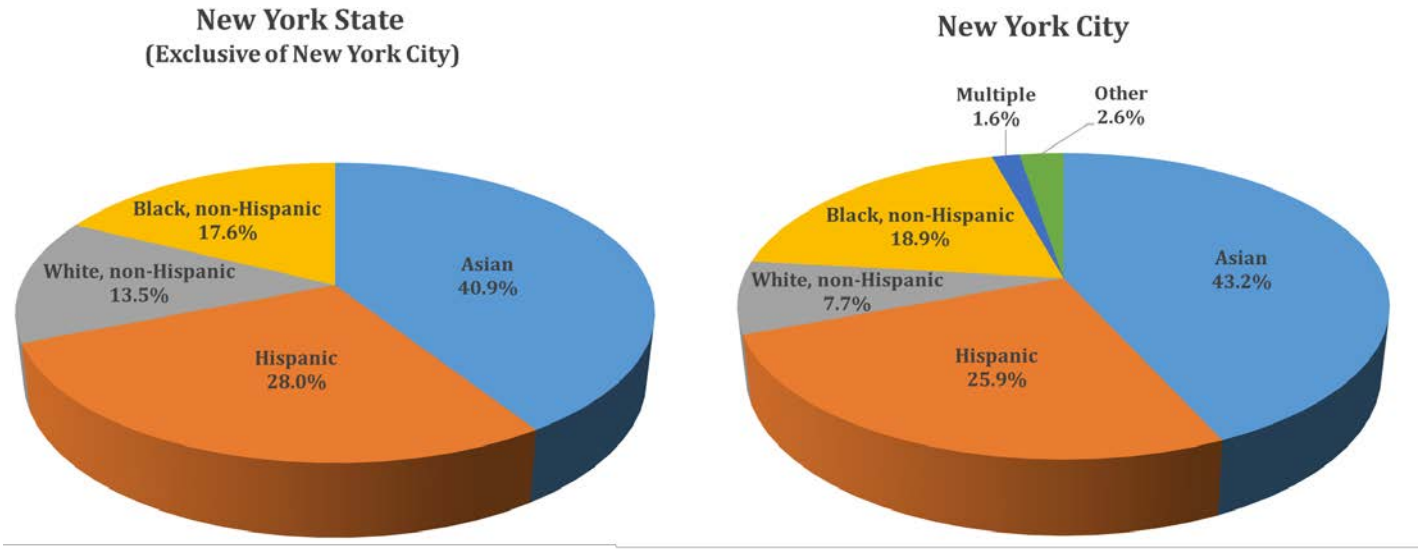
Figure 5. Number and Percent of Tuberculosis Cases by Race/Ethnicity, New York State (Exclusive of New York City), 2013-2017



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 2013, 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 2017, most of the TB cases in New York State (exclusive of New York City) continued to be Asian or Hispanic (N=79 and N=54, respectively). The number of white, non-Hispanic cases decreased by 31.6 percent compared to 2016 (N=26 and N=38, respectively). The number of black, non-Hispanic cases also decreased by 19.0 percent, from 42 in 2016 to 34 in 2017.

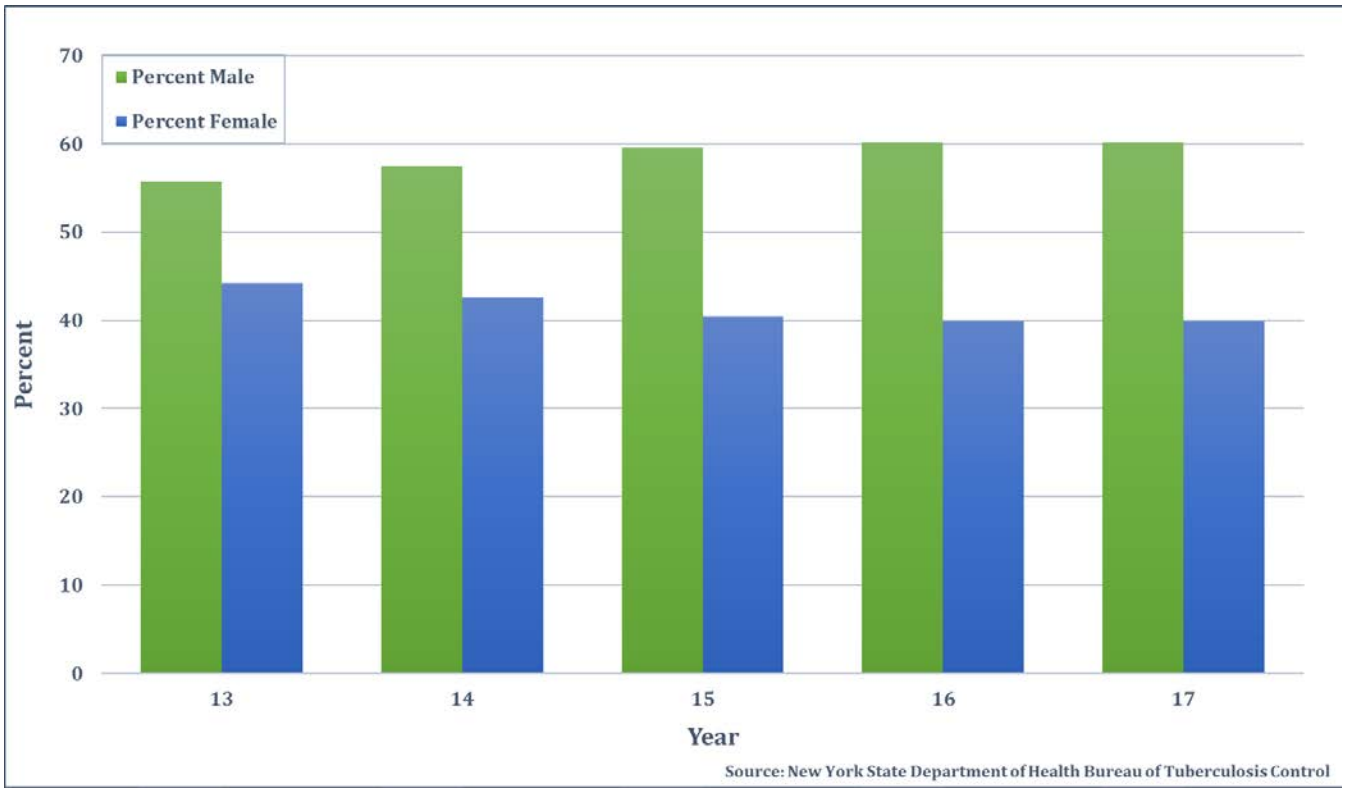
Figure 6. Race/Ethnicity of Tuberculosis Cases, New York State, 2017



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

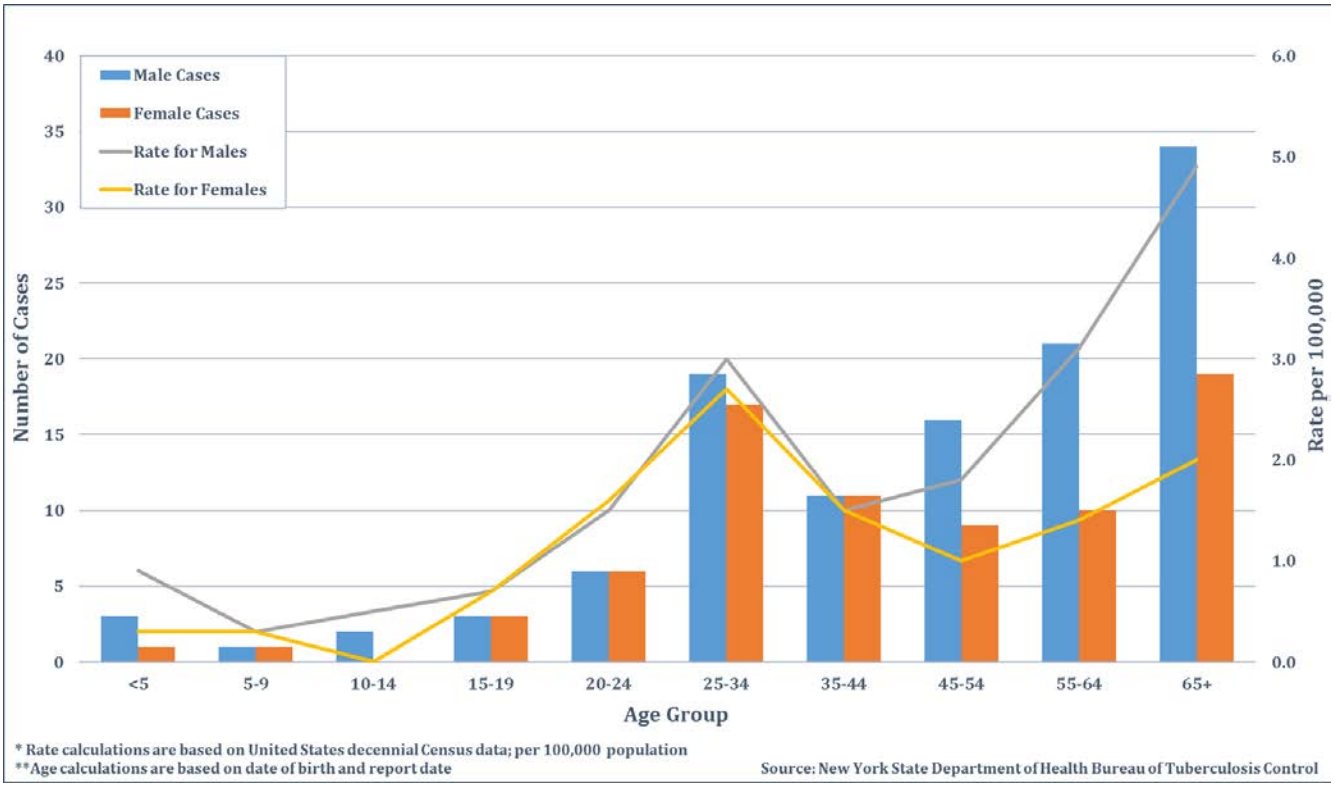
In 2017, the proportion of white, non-Hispanic cases in New York State (exclusive of New York City) was almost double that seen in New York City (13.5% and 7.7%, respectively). In addition, the percentage of Hispanic cases was two percent larger in New York State (exclusive of New York City) compared to New York City (28.0% and 25.9%, respectively).

Figure 7. Percent of Tuberculosis Cases by Gender, New York State (Exclusive of New York City), 2013-2017



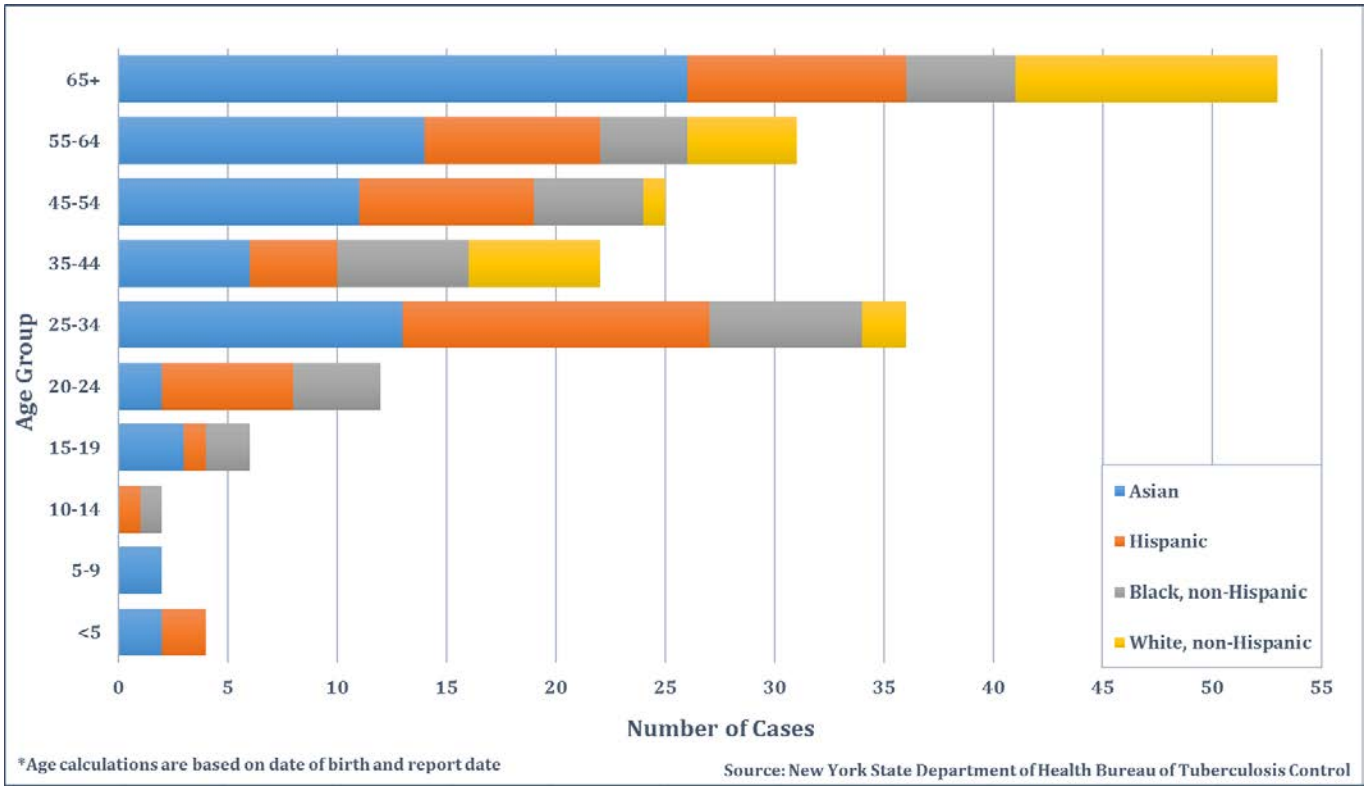
Over the last five years, males have consistently comprised a higher proportion of TB cases compared to females in New York State (exclusive of New York City). In 2017, 60.1 percent (N=116/193) of reported cases were male and 39.9 percent (N=77/193) were female.

Figure 8. Tuberculosis Cases and Rates* by Age and Gender, New York State (Exclusive of New York City), 2017**



In 2017, 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 under 45 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 2.5 times that of females (4.9 per 100,000 for males; 2.0 per 100,000 for females).

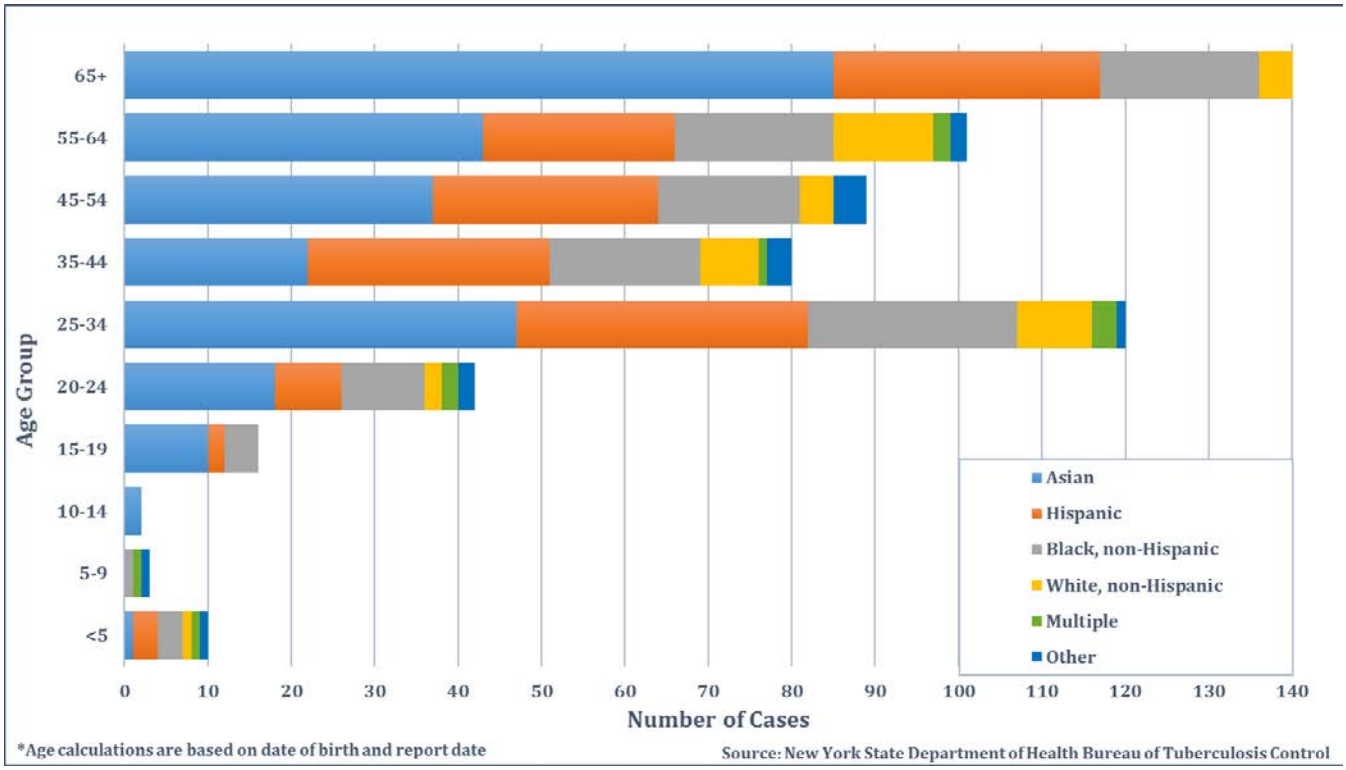
Figure 9. Tuberculosis Cases by Age* and Race/Ethnicity, New York State (Exclusive of New York City), 2017



In 2017, 53 (27.5%) cases in New York State (exclusive of New York City) were 65 years of age and older. Twenty-six (49.0%) of these cases were Asian and 12 (22.6%) were white, non-Hispanic.

The second largest number of TB cases reported in 2017 for New York State (exclusive of New York City) was seen in the 25-34 year age group (N=36). Fourteen (38.9%) of these cases were Hispanic and 13 (36.1%) were Asian.

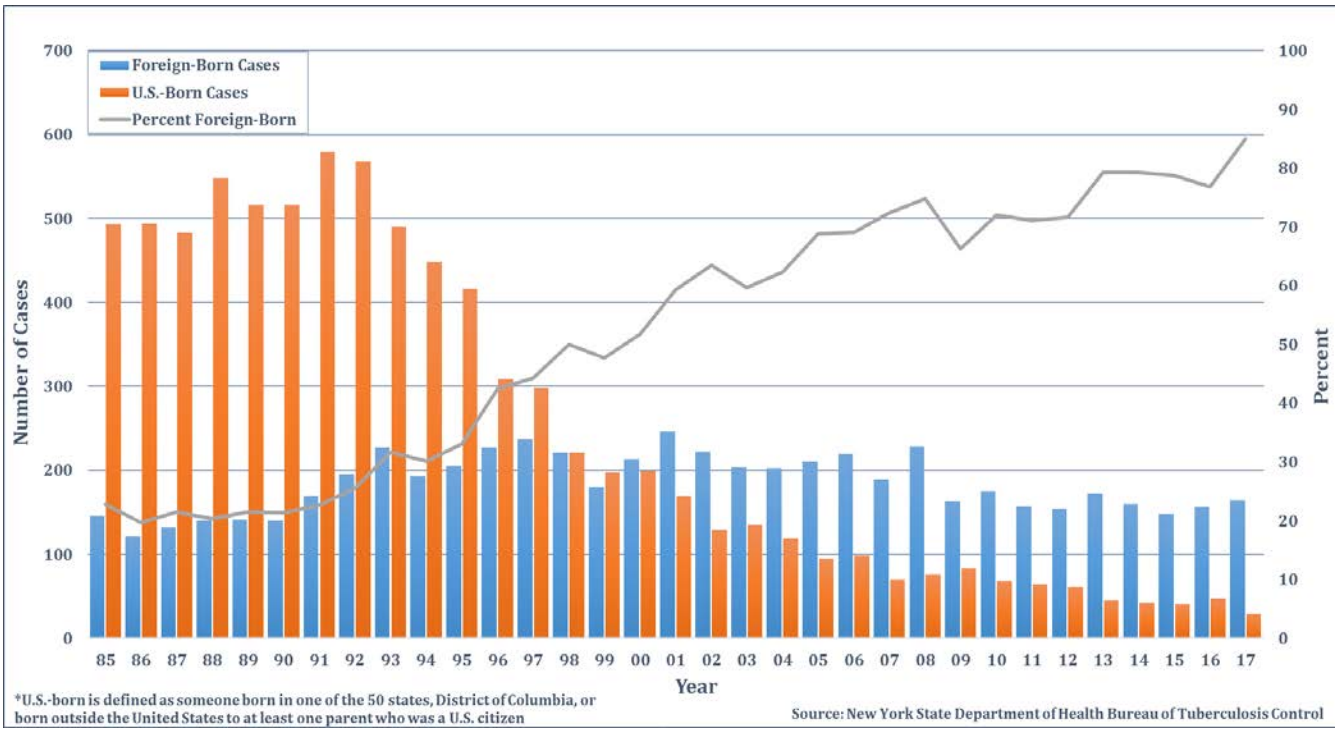
Figure 10. Tuberculosis Cases by Age* and Race/Ethnicity, New York City, 2017



In New York City, the largest number of TB cases reported in 2017 was seen in the 65 years of age and older group (N=150). Among these 150 cases, 85 (56.7%) were Asian and 32 (21.3%) were Hispanic.

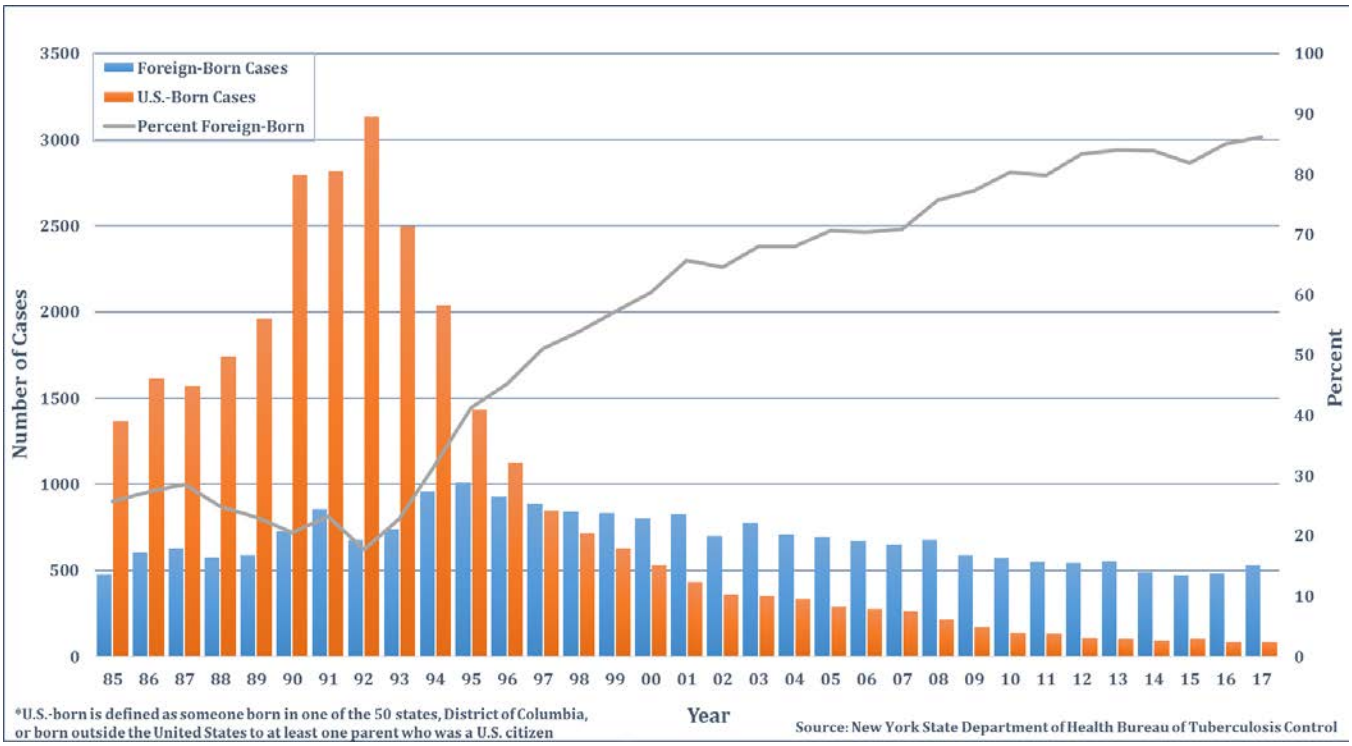
Similar to the remainder of the state in 2017, the second largest number of TB cases in New York City was identified in the 25-34 year age group (N=120). Forty-seven (39.2%) cases in this age group were Asian and 35 (29.2%) were Hispanic.

Figure 11. Number and Percent of Tuberculosis Cases by U.S.-Born* and Foreign-Born Status, New York State (Exclusive of New York City), 1985-2017



In 2017, there were 164 foreign-born cases in New York State (exclusive of New York City), a 5.1 percent increase from the 156 reported in 2016. The foreign-born percentage also increased from 76.8 percent in 2016 to 85.0 percent in 2017, which was the highest percentage ever recorded.

Figure 12. Number and Percent of Tuberculosis Cases by U.S.-Born* and Foreign-Born Status, New York City, 1985-2017



In New York City, the number of foreign-born TB cases increased from 480 in 2016 to 528 in 2017. The proportion of foreign-born cases also increased, from 85.0 percent in 2016 to 86.1 percent in 2017. Similar to the rest of the state, this was the highest foreign-born percentage ever recorded for New York City.

Table 4. Tuberculosis Cases by Country of Origin,* New York State, 2017

Country	New York State (Exclusive of New York City)	New York City	New York State (Total)
United States	29	73	126
China	8	110	118
India	17	38	55
Ecuador	15	36	51
Mexico	5	42	47
Philippines	11	25	36
Dominican Republic	3	31	34
Bangladesh	3	27	30
Haiti	10	19	29
Pakistan	7	13	20
Nepal	7	10	17
Nigeria	1	15	16
Guyana	2	14	16
Burma	8	8	16
Guatemala	9	6	15
Korea, South	3	10	13
Puerto Rico**	1	10	11
Colombia	3	7	10
Yemen	1	7	8
Peru	4	4	8
Vietnam	3	4	7
Honduras	4	3	7
Sierra Leone	2	4	6
Hong Kong	0	5	5
Senegal	0	5	5
Indonesia	1	4	5
Other Countries	36	83	119
TOTAL CASES	**193**	**613**	**806**

*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 2017, there were 77 different countries represented by the 806 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=17) and for New York City, the most common country was China (N=110).

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), 2017

County	Total Number	U.S.-Born Number	Foreign-Number	Foreign-Percent
Albany	8	1	7	87.5
Allegany	0	0	0	0.0
Broome	2	0	2	100.0
Cattaraugus	1	0	1	100.0
Cayuga	1	0	1	100.0
Chautauqua	1	1	0	0.0
Chemung	0	0	0	0.0
Chenango	0	0	0	0.0
Clinton	0	0	0	0.0
Columbia	3	0	3	100.0
Cortland	0	0	0	0.0
Delaware	0	0	0	0.0
Dutchess	4	2	2	50.0
Erie	5	2	3	60.0
Essex	0	0	0	0.0
Franklin	0	0	0	0.0
Fulton	1	1	0	0.0
Genesee	1	0	1	100.0
Greene	0	0	0	0.0
Hamilton	0	0	0	0.0
Herkimer	0	0	0	0.0
Jefferson	1	1	0	0.0
Lewis	0	0	0	0.0
Livingston	0	0	0	0.0
Madison	0	0	0	0.0
Monroe	14	3	11	78.6
Montgomery	0	0	0	0.0
Nassau	40	6	34	85.0
Niagara	1	0	1	100.0
Oneida	9	2	7	77.8
Onondaga	6	0	6	100.0
Ontario	0	0	0	0.0
Orange	9	2	7	77.8
Orleans	0	0	0	0.0
Oswego	0	0	0	0.0
Otsego	0	0	0	0.0
Putnam	1	0	1	100.0
Rensselaer	1	0	1	100.0
Rockland	14	2	12	85.7
St. Lawrence	1	0	1	100.0
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	34	5	29	85.3
Sullivan	2	0	2	100.0
Tioga	0	0	0	0.0
Tompkins	2	0	2	100.0
Ulster	0	0	0	0.0
Warren	0	0	0	0.0
Washington	0	0	0	0.0
Wayne	0	0	0	0.0
Westchester	31	1	30	96.8
Wyoming	0	0	0	0.0
Yates	0	0	0	0.0
TOTAL CASES	**193**	**29**	**164**	**85.0**

*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 2017, there were 164 foreign-born TB cases reported in New York State (exclusive of New York City). Over half (56.7%, N= 93/164) of these cases were identified in Nassau, Suffolk and Westchester alone. Among the other counties that reported at least five foreign-born cases, Onondaga reported the highest foreign-born percentage (100.0%) while Oneida and Orange reported the lowest percentage (77.8%). 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), 2017

Length of Time in the United States (Years)	No.	%
<1	15	9.1
1-5	56	34.1
6-10	26	15.9
11-20	23	14.0
21-30	21	12.8
31-40	9	5.5
41-50	8	4.9
51-60	1	0.6
61-70	1	0.6
71+	1	0.6
Unknown	3	1.8

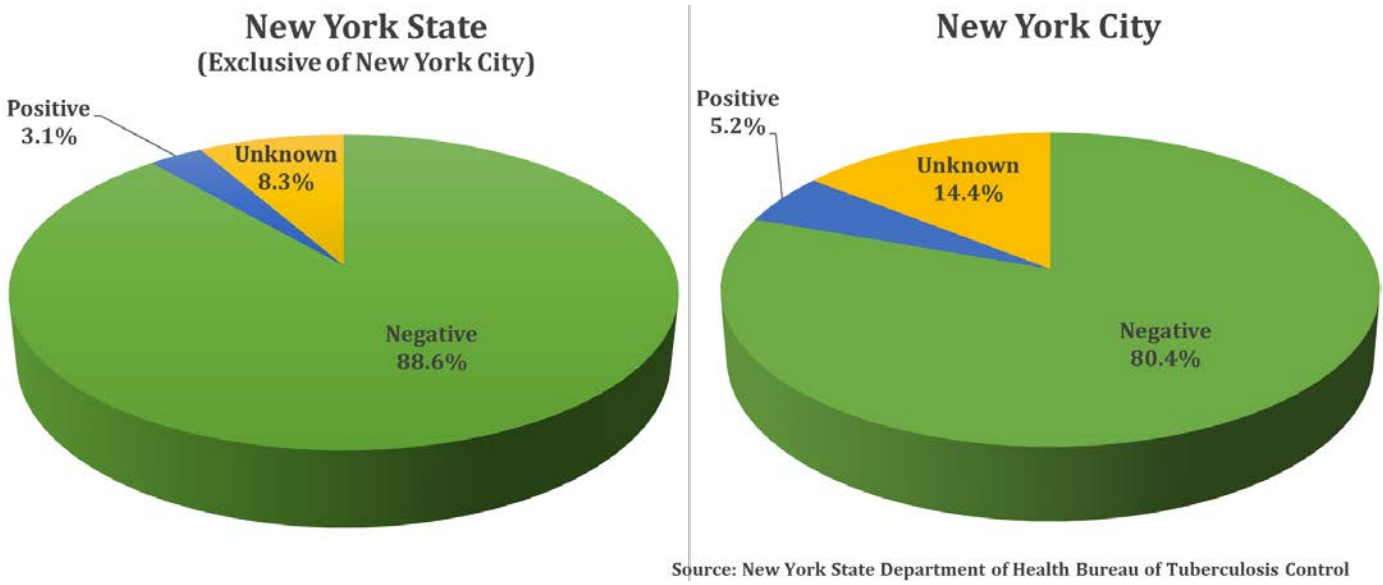
Source: New York State Department of Health
Bureau of Tuberculosis Control

In 2017, 43.3 percent (N=71/164) of foreign-born TB cases in New York State (exclusive of New York City) were diagnosed within five years of entering the U.S. Thirty-three (46.5%) of these 71 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.

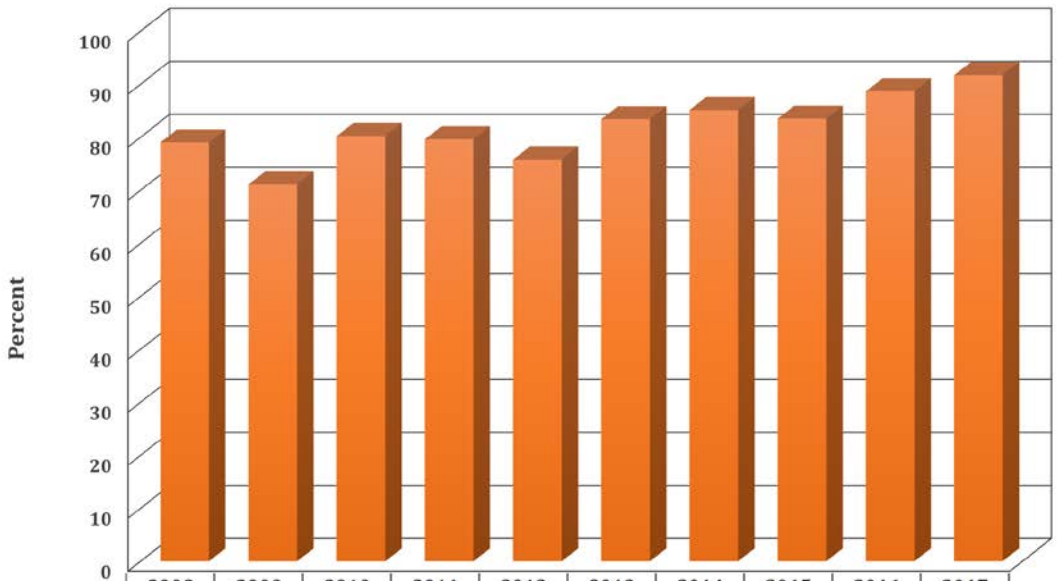
Figure 13. HIV Status for Tuberculosis Cases, New York State, 2017



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

Ninety-two percent (N=177/193) of TB cases in New York State (exclusive of New York City) and 85.6 percent (N=525/613) of cases in New York City had a known HIV status in 2017. The co-infection rate for TB cases in New York State (exclusive of New York City) was 2.1 percent lower than the rate for cases in New York City (3.1% and 5.2%, respectively). 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), 2008-2017



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Percent of Cases with an HIV Test Result	79.0	71.1	80.2	79.6	75.8	83.4	85.1	83.5	88.7	91.7
Number of Cases with an HIV Test Result	241	175	195	176	163	181	172	157	180	177
Total Number of Cases	305	246	243	221	215	217	202	188	203	193

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 2017, 91.7 percent (N=177/193) of TB cases had a documented HIV result, which was the highest percentage seen in at least 10 years.

TB cases under five years old and those between 10-14 years old had the lowest proportion of known HIV results (50.0%, N=2/4 and N=1/2, respectively), while those between 25-34 years old had the highest proportion of known HIV results (97.2%, N=35/36).

HIV CO-INFECTION

Table 7a. HIV Status for Tuberculosis Cases, New York State (Exclusive of New York City), 2013-2017

HIV Test	2013		2014		2015		2016		2017	
	No.	%	No.	%	No.	%	No.	%	No.	%
Negative	167	77.0	166	82.2	152	80.9	170	83.7	171	88.6
Positive	14	6.5	6	3.0	5	2.7	10	4.9	6	3.1
Refused	19	8.8	19	9.4	12	6.4	7	3.4	9	4.7
Not Offered	13	6.0	7	3.5	15	8.0	12	5.9	5	2.6
Missing/Unknown	4	1.8	4	2.0	4	2.1	4	2.0	2	1.0
TOTAL CASES	217		202		188		203		193	

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

In 2017, 8.3 percent (N=16/193) 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 these 16 cases, six (37.5%) were over 65 years old.

Table 7b. HIV Status for Tuberculosis Cases by Gender, New York State (Exclusive of New York City), 2017

HIV Test	Male		Female		Total	
	No.	%	No.	%	No.	%
Negative	100	86.2	71	92.2	171	88.6
Positive	5	4.3	1	1.3	6	3.1
Refused	7	6.0	2	2.6	9	4.7
Not Offered	3	2.6	2	2.6	5	2.6
Missing/Unknown	1	0.9	1	1.3	2	1.0
TOTAL CASES	116		77		193	

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 females compared to males in 2017 (93.5% and 90.5%, respectively). Despite having a lower proportion of documented HIV results, 83.3 percent (N=5/6) of cases with HIV co-infection were male. Among those without a known status, a larger percentage of males refused testing compared to females (63.6%, N=7/11 and 40.0%, N=2/5, respectively).

REASONS FOR EVALUATION

Table 8a. Primary Reason for Evaluation of Tuberculosis Cases, New York State (Exclusive of New York City), 2013-2017

Primary Reason for Evaluation	2013		2014		2015		2016		2017	
	No.	%	No.	%	No.	%	No.	%	No.	%
TB Symptoms	111	51.2	116	57.4	91	48.4	93	45.8	92	47.7
Abnormal Chest Radiograph	48	22.1	42	20.8	41	21.8	45	22.2	44	22.8
Incidental Lab Result	35	16.1	23	11.4	35	18.6	42	20.7	37	19.2
Contact Investigation	6	2.8	9	4.5	14	7.4	6	3.0	3	1.6
Targeted Testing	1	0.5	4	2.0	4	2.1	7	3.4	4	2.1
Immigration Medical Exam	6	2.8	3	1.5	0	0.0	1	0.5	7	3.6
Employment/Administrative	2	0.9	1	0.5	0	0.0	2	1.0	1	0.5
Health Care Worker	0	0.0	1	0.5	0	0.0	1	0.5	0	0.0
Unknown	8	3.7	3	1.5	3	1.6	6	3.0	5	2.6
TOTAL CASES	217		202		188		203		193	

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

In 2017, 47.7 percent (N=92/193) 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 (22.8%, N=44/193) followed by an incidental lab result (19.2%, N=37/193). 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), 2017

Primary Reason for Evaluation	U.S.-Born		Foreign-Born		Total	
	No.	%	No.	%	No.	%
TB Symptoms	15	51.7	77	47.0	92	47.7
Abnormal Chest Radiograph	7	24.1	37	22.6	44	22.8
Incidental Lab Result	6	20.7	31	18.9	37	19.2
Contact Investigation	1	3.4	2	1.2	3	1.6
Targeted Testing	0	0.0	4	2.4	4	2.1
Immigration Medical Exam	0	0.0	7	4.3	7	3.6
Employment/Administrative Testing	0	0.0	1	0.6	1	0.5
Health Care Worker	0	0.0	0	0.0	0	0.0
Unknown	0	0.0	5	3.0	5	2.6
TOTAL CASES	29		164		193	

*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 cases that underwent evaluation due to TB symptoms was larger for U.S.-born cases compared to foreign-born cases (51.7% and 47.0%, 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), 2013-2017

Additional Risk Factors		2013		2014		2015		2016		2017	
		No.	%	No.	%	No.	%	No.	%	No.	%
Medical Risk	Diabetes Mellitus	25	11.5	30	14.9	34	18.1	36	17.7	33	17.1
	Immunosuppression (not HIV/AIDS)	9	4.1	11	5.4	6	3.2	11	5.4	9	4.7
	Incomplete LTBI Therapy	9	4.1	8	4.0	8	4.3	4	2.0	5	2.6
	End-Stage Renal Disease	4	1.8	6	3.0	3	1.6	4	2.0	5	2.6
	Post-OrganTransplantation	0	0.0	4	2.0	3	1.6	1	0.5	1	0.5
	TNF-α Antagonist Therapy	2	0.9	1	0.5	1	0.5	4	2.0	2	1.0
Exposure Risk**	Contact of Infectious TB Patient	13	6.0	17	8.4	20	10.6	10	4.9	8	4.1
	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	1	0.5	0	0.0	1	0.5
Other Risk	Other Factors	16	7.4	28	13.9	26	13.8	34	16.7	25	13.0
None	No Additional Factors	146	67.3	117	57.9	100	53.2	116	57.1	117	60.6
TOTAL CASES		217		202		188		203		193	

*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 2017, 17.1 percent (N=33/193) of cases in New York State (exclusive of New York City) had diabetes. The proportion of cases who had been in recent contact with an infectious TB patient was the lowest seen in at least five years (4.1%).

Table 9b. Additional Risk Factors* Among Tuberculosis Cases by Gender, New York State (Exclusive of New York City), 2017

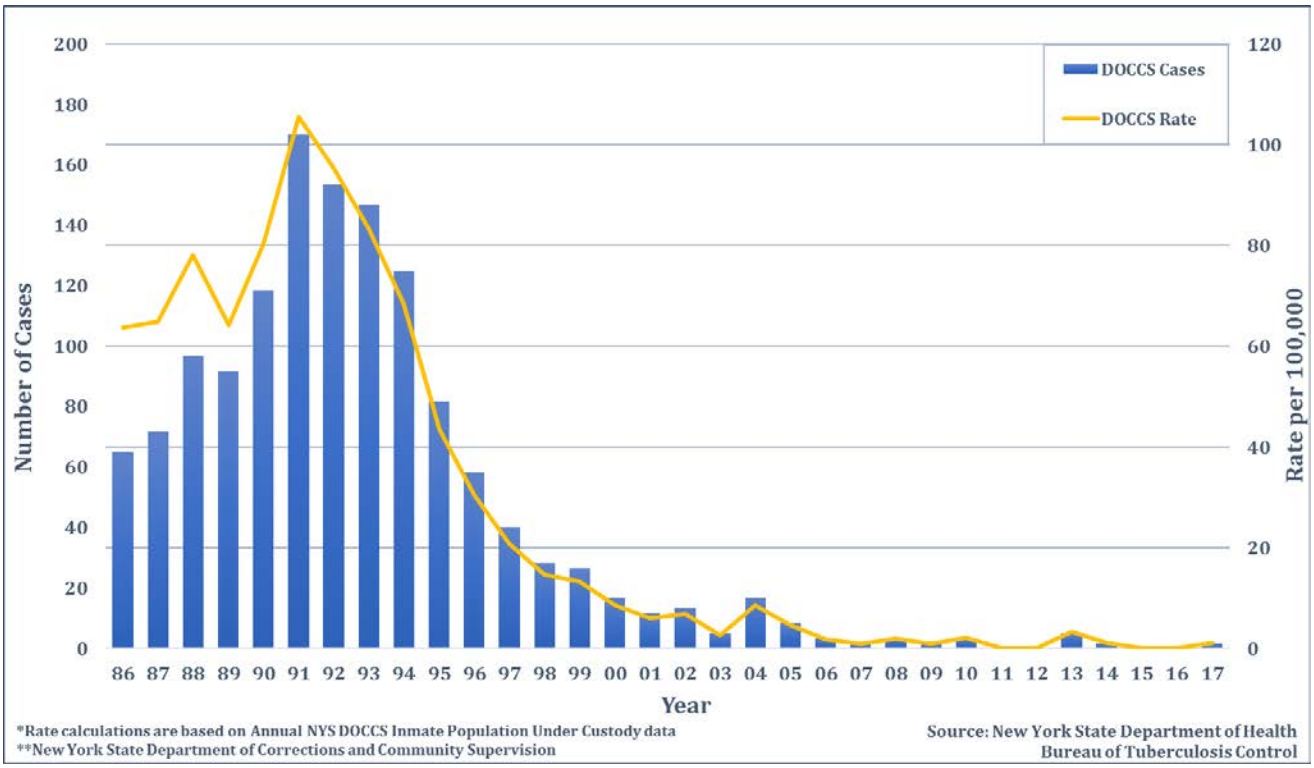
Additional Risk Factors		Male		Female		Total	
		No.	%	No.	%	No.	%
Medical Risk	Diabetes Mellitus	23	19.8	10	13.0	33	17.1
	Immunosuppression (not HIV/AIDS)	5	4.3	4	5.2	9	4.7
	Incomplete LTBI Therapy	4	3.4	1	1.3	5	2.6
	End-Stage Renal Disease	3	2.6	2	2.6	5	2.6
	Post-OrganTransplantation	1	0.9	0	0.0	1	0.5
	TNF-α Antagonist Therapy	1	0.9	1	1.3	2	1.0
Exposure Risk**	Contact of Infectious TB Patient	5	4.3	3	3.9	8	4.1
	Contact of MDR-TB Patient	0	0.0	0	0.0	0	0.0
	Missed Contact	1	0.9	0	0.0	1	0.5
Other Risk	Other Factors	16	13.8	9	11.7	25	13.0
None	No Additonal Factors	67	57.8	50	64.9	117	60.6
TOTAL CASES		116		77		193	

*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 2017, 42.2 percent of male TB cases in New York State (exclusive of New York City) had at least one additional risk factor compared to 35.1 percent of female cases. The proportion of cases with a history of incomplete LTBI therapy was nearly three times larger for males compared to females (3.4% and 1.3%, respectively).

Figure 15. Tuberculosis Cases and Rates* Among DOCCS Inmates, New York State (Exclusive of New York City), 1986-2017**



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 2015 and 2016 there were no new TB cases reported among the DOCCS inmate population, but in 2017 one new case was reported.

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), 2013-2017

Congregate Setting at Time of TB Diagnosis		2013		2014		2015		2016		2017	
		No.	%	No.	%	No.	%	No.	%	No.	%
Correctional Facility	Juvenile Facility	0	0.0	1	0.5	0	0.0	1	0.5	0	0.0
	Local Jail	0	0.0	1	0.5	1	0.5	0	0.0	0	0.0
	State Prison	3	1.4	1	0.5	0	0.0	0	0.0	1	0.5
	Federal Prison	0	0.0	0	0.0	0	0.0	1	0.5	0	0.0
	Other Facility	0	0.0	0	0.0	1	0.5	0	0.0	0	0.0
Long-Term Care Facility	Alcohol/Drug Treatment	0	0.0	1	0.5	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	1	0.5	0	0.0	0	0.0	0	0.0	0	0.0
	Nursing Home	2	0.9	1	0.5	2	1.1	4	2.0	3	1.6
	Residential	0	0.0	0	0.0	0	0.0	2	1.0	0	0.0
	Other Long-Term Care	2	0.9	0	0.0	0	0.0	0	0.0	1	0.5
	Unknown	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
TOTAL CASES		217		202		188		203		193	

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 2017, 80.0 percent (N=4/5) of cases diagnosed in a congregate setting were identified in a long-term care facility, most of which were in a nursing home (N=3).

Table 11. Homelessness Among Tuberculosis Cases Within the Past Year, New York State (Exclusive of New York City), 2013-2017

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.	%
2013	5	2.3
2014	2	1.0
2015	5	2.7
2016	5	2.5
2017	7	3.6

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

From 2013 to 2017, an average of 2.4 percent (N=24/1,003) of TB cases in New York State (exclusive of New York City) were homeless within the 12 months prior to diagnosis. In 2017, 3.6 percent (N=7/193) of TB cases were homeless, which was the highest percentage seen in the last five years.

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), 2013-2017

Substance Abuse	2013		2014		2015		2016		2017	
	No.	%	No.	%	No.	%	No.	%	No.	%
Injection Drug Use	2	0.9	1	0.5	0	0.0	0	0.0	2	1.0
Non-Injection Drug Use	6	2.8	3	1.5	2	1.1	8	3.9	6	3.1
Excess Alcohol Use	22	10.1	13	6.4	15	8.0	14	6.9	17	8.8
TOTAL CASES	**217**		**202**		**188**		**203**		**193**	

*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 17 cases (8.8%) in 2017 who reported alcohol abuse, two (11.8%) of which also reported injection or 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		2013		2014		2015		2016		2017	
		No.	%	No.	%	No.	%	No.	%	No.	%
Positive Culture		**157**	**---**	**164**	**---**	**150**	**---**	**150**	**---**	**142**	**---**
Susceptibility Test Reported		**157**	**100.0**	**163**	**99.4**	**150**	**100.0**	**148**	**98.7**	**138**	**97.2**
Susceptibility Test Results	Susceptible to all first-line drugs	134	85.4	139	85.3	123	82.0	125	84.5	120	87.0
	INH and RIF resistant (MDR TB)	2	1.3	2*	1.2	1	0.7	0	0.0	2	1.4
	INH resistant, RIF susceptible	6	3.8	11	6.7	16	10.7	12	8.1	7	5.1
	RIF resistant, INH susceptible	1	0.6	0	0.0	0	0.0	0	0.0	0	0.0
	Resistance other than INH and RIF	14	8.9	11	6.7	10	6.7	11	7.4	9	6.5

*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 763 culture-confirmed TB cases in New York State (exclusive of New York City). Drug susceptibility results have been reported for 99.1 percent (N=756/763) of these cases, most (84.8%, N=641) of which have been susceptible to all first-line TB drugs. Despite this high level of susceptibility, there were 115 cases with first-line drug resistance between 2013 and 2017, seven (6.1%) of which had MDR TB.

In 2017, drug susceptibility results were reported for 97.2 percent (N=138/142) of culture-confirmed cases in New York State (exclusive of New York City). All 18 cases with first-line drug resistance were foreign-born, including the two MDR TB 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		2015				2016				2017			
		U.S.-Born		Foreign-Born		U.S.-Born		Foreign-Born		U.S.-Born		Foreign-Born	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Positive Culture		**26**	**---**	**124**	**---**	**42**	**---**	**108**	**---**	**17**	**---**	**125**	**---**
Susceptibility Test Reported		**26**	**100.0**	**124**	**100.0**	**41**	**97.6**	**107**	**99.1**	**15**	**88.2**	**123**	**98.4**
Susceptibility Test Results	Susceptible to all first-line drugs	21	80.8	102	82.3	38	92.7	87	81.3	15	100.0	105	85.4
	INH and RIF resistant (MDR TB)	0	0.0	1	0.8	0	0.0	0	0.0	0	0.0	2	1.6
	INH resistant, RIF susceptible	3	11.5	13	10.5	2	4.9	10	9.3	0	0.0	7	5.7
	RIF resistant, INH susceptible	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	7.7	8	6.5	1	2.4	10	9.3	0	0.0	9	7.3

*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
INH = Isoniazid; RIF = Rifampin; MDR TB = Multidrug-resistant TB

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

Figure 16. Number and Percent of Multidrug-Resistant Tuberculosis Cases,* New York State, 2013-2017

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=46 and N=7, respectively). In 2017, two (1.4%) MDR TB cases were reported for New York State (exclusive of New York City), whereas in New York City there were 14 (2.8%) MDR TB cases reported.

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GENOTYPING

Table 14. Tuberculosis Genotyping Summary for Tuberculosis Cases, New York State (Exclusive of New York City), 2013-2017

Genotyping		2013		2014		2015		2016		2017	
		No.	%	No.	%	No.	%	No.	%	No.	%
Initial Positive Cultures		**161**	**---**	**170**	**---**	**157**	**---**	**154**	**---**	**146**	**---**
False Positives	**Total False Positives**	**3**	**---**	**3**	**---**	**7**	**---**	**4**	**---**	**4**	**---**
	Control strain	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0
	Contamination	0	0.0	0	0.0	6	3.1	0	0.0	0	0.0
	M. bovis BCG	3	1.9	3	1.8	1	0.6	4	2.6	3	2.1
True Positives	**Total True Positives**	**158**	**---**	**167**	**---**	**150**	**---**	**150**	**---**	**142**	**---**
	Isolates Available	158	---	162	---	150	---	149	---	141	---
	Complete Genotype*	128	81.0	154	95.1	146	97.3	147	98.7	136	96.5
	Partial Genotype	151	95.6	160	98.8	149	99.3	147	98.7	138	97.9
	No Result	6	3.8	2	1.2	0	0.0	2	1.3	3	2.1

*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 2017, 99.3 percent (N=141/142) of isolates in New York State (exclusive of New York City) were available for genotyping. Of these 141 isolates, 96.5 percent (N=136) had a complete genotype (spoligotype and MIRU result). An additional two isolates only had a spoligotype or a MIRU result available, so 97.9 percent (N=138) of cases had at least some genotype information available.

Since March 2016, New York State Wadsworth Laboratories has been performing Whole Genome Sequencing (WGS) on the first isolate for each TB case. Among the 141 isolates available in 2017 for New York State (exclusive of New York City), WGS was performed on 137 (97.2%).

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.

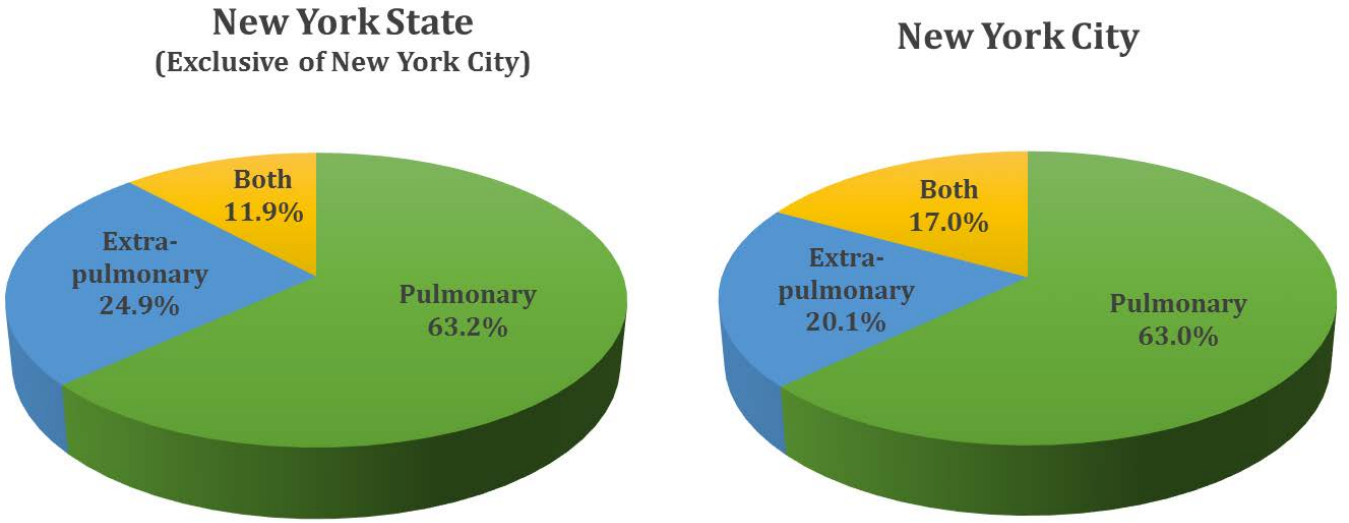
Table 15. Primary Site of Disease for Tuberculosis Cases, New York State (Exclusive of New York City), 2013-2017

Primary Site of Disease	2013		2014		2015		2016		2017	
	No.	%	No.	%	No.	%	No.	%	No.	%
Pulmonary	119	54.8	129	63.9	124	66.0	115	56.7	122	63.2
Extrapulmonary	67	30.9	45	22.3	37	19.7	63	31.0	48	24.9
Both	31	14.3	28	13.9	27	14.4	25	12.3	23	11.9
TOTAL CASES	217		202		188		203		193	

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, 2017



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

Eighty percent (N=490/613) of TB cases in New York City had pulmonary disease compared to 75.1 percent (N=145/193) of cases in the rest of the state. Among these 635 pulmonary cases throughout the state, 127 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, 2017

Extra-Pulmonary Site of Disease	New York State (Exclusive of New York City)	New York City	New York State (Total)
Lymphatic	32	91	123
Pleural	17	58	75
Bone/Joint	8	25	33
Peritoneal	3	18	21
Meningeal	5	14	19
Genitourinary	3	11	14
Laryngeal	0	3	3
Other/Not Stated	12	60	72

*Categories are not mutually exclusive

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

There were 298 cases in New York State with at least one extra-pulmonary site of disease in 2017. Among these cases, the most common sites of disease were lymphatic (N=123), pleural (N=75) and bone/joint (N=33).

COMPLETION OF THERAPY

Table 17a. Treatment Status for Tuberculosis Cases,* New York State (Exclusive of New York City), 2012-2016

Treatment Status	2012		2013		2014		2015		2016	
	No.	%	No.	%	No.	%	No.	%	No.	%
Complete	189	90.9	195	91.1	174	87.9	161	87.5	185	93.0
Died	8	3.8	10	4.7	13	6.6	14	7.6	8	4.0
Uncooperative/Refused	0	0.0	3	1.4	3	1.5	2	1.1	1	0.5
Lost	1	0.5	1	0.5	2	1.0	0	0.0	1	0.5
Adverse Treatment Event	2	1.0	2	0.9	0	0.0	1	0.5	0	0.0
Other	8	3.8	3	1.4	6	3.0	6	3.3	4	2.0
TOTAL CASES	208		214		198		184		199	

*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 2012 and 2016 (the most recent year for which completion information is available) was 90.1 percent (N=904/1,003). The completion rate for 2016 was 93.0 percent, the highest seen in the last five years.

Table 17b. Treatment Status for Tuberculosis Cases* Reported in 2016 by U.S.-Born and Foreign-Born Status, New York State (Exclusive of New York City)**

Treatment Status	U.S.-Born		Foreign-Born		Total	
	No.	%	No.	%	No.	%
Complete	43	95.6	142	92.2	185	93.0
Died	2	4.4	6	3.9	8	4.0
Uncooperative/Refused	0	0.0	1	0.6	1	0.5
Lost	0	0.0	1	0.6	1	0.5
Adverse Treatment Event	0	0.0	0	0.0	0	0.0
Other	0	0.0	4	2.6	4	2.0
TOTAL CASES	45		154		199	

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

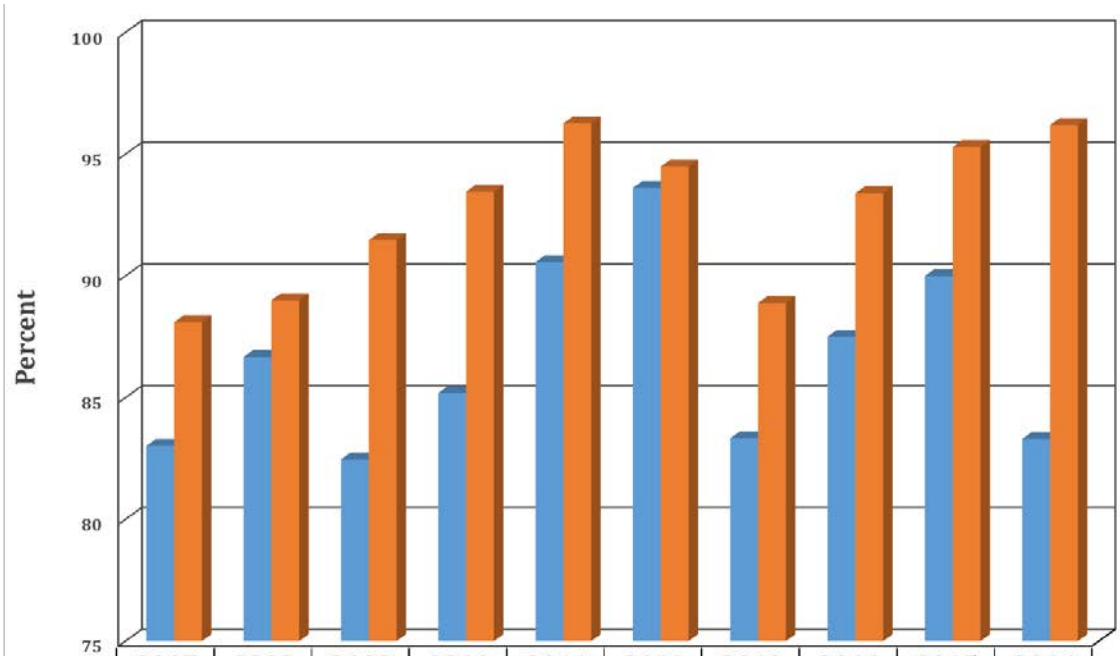
Source: New York State Department of Health Bureau of Tuberculosis Control

**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

The treatment completion rate for U.S.-born TB cases in New York State (exclusive of New York City) was 3.4 percent greater than for foreign-born cases (95.6% and 92.2%, respectively). Among the U.S.-born cases that died, 50.0 percent (N=1/2) were TB-related, whereas for foreign-born cases, 66.7 percent (N=4/6) were TB-related.

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), 2007-2016**



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Percent of U.S.-Born Cases	83.0	86.7	82.5	85.2	90.6	93.6	83.3	87.5	90.0	83.3
Percent of Foreign-Born Cases	88.1	89.0	91.5	93.5	96.3	94.5	88.9	93.4	95.3	96.2
Total	86.9	88.5	88.7	91.3	94.7	94.3	87.8	92.3	94.3	93.1

*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 2016 (the most recent year for which complete information is available), 93.1 percent (N=161/173) of patients in New York State (exclusive of New York City) eligible^ to complete treatment within 12 months, did so. Nearly 13 percent more foreign-born cases completed therapy within 12 months compared to U.S.-born cases in 2016 (96.2% and 83.3%, respectively). An additional 6.9 percent (N=12/173) of patients completed treatment in more than 12 months for an overall completion rate of 100.0 percent.

^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), 2007-2016

Year	Total Infectious Cases	Infectious Cases with Contacts Identified	
		No.	%
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
2016	50	49	98.0

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

In 2016 (the most recent year for which complete information is available), 98.0 percent (N=49/50) of infectious TB cases in New York State (exclusive of New York City) had contacts identified. This exceeds the state objective of 97.5 percent for 2016.

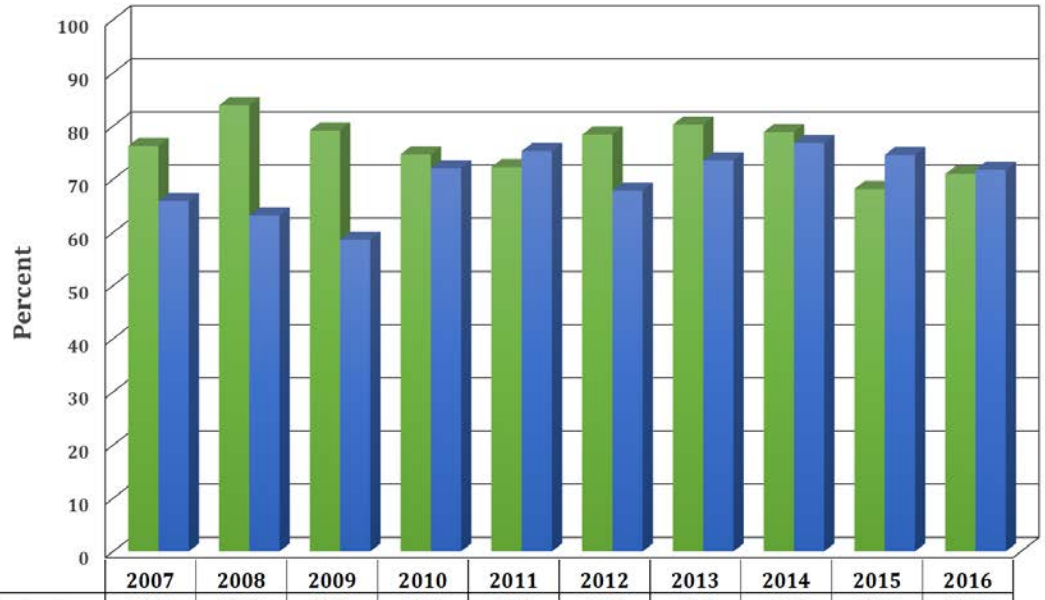
Table 19. Number and Percent of Contacts to Infectious Tuberculosis Cases Evaluated for Latent Tuberculosis Infection, New York State (Exclusive of New York City), 2007-2016

Year	Total Contacts Identified	Contacts Evaluated	
		No.	%
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
2016	933	725	77.7

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

Seventy-eight percent (N=725/933) of contacts to infectious cases in New York State (exclusive of New York City) were evaluated for LTBI in 2016 (the most recent year for which complete information is available). This was a 3.2 percent increase from the previous year (77.7% and 74.5%, respectively).

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), 2007-2016



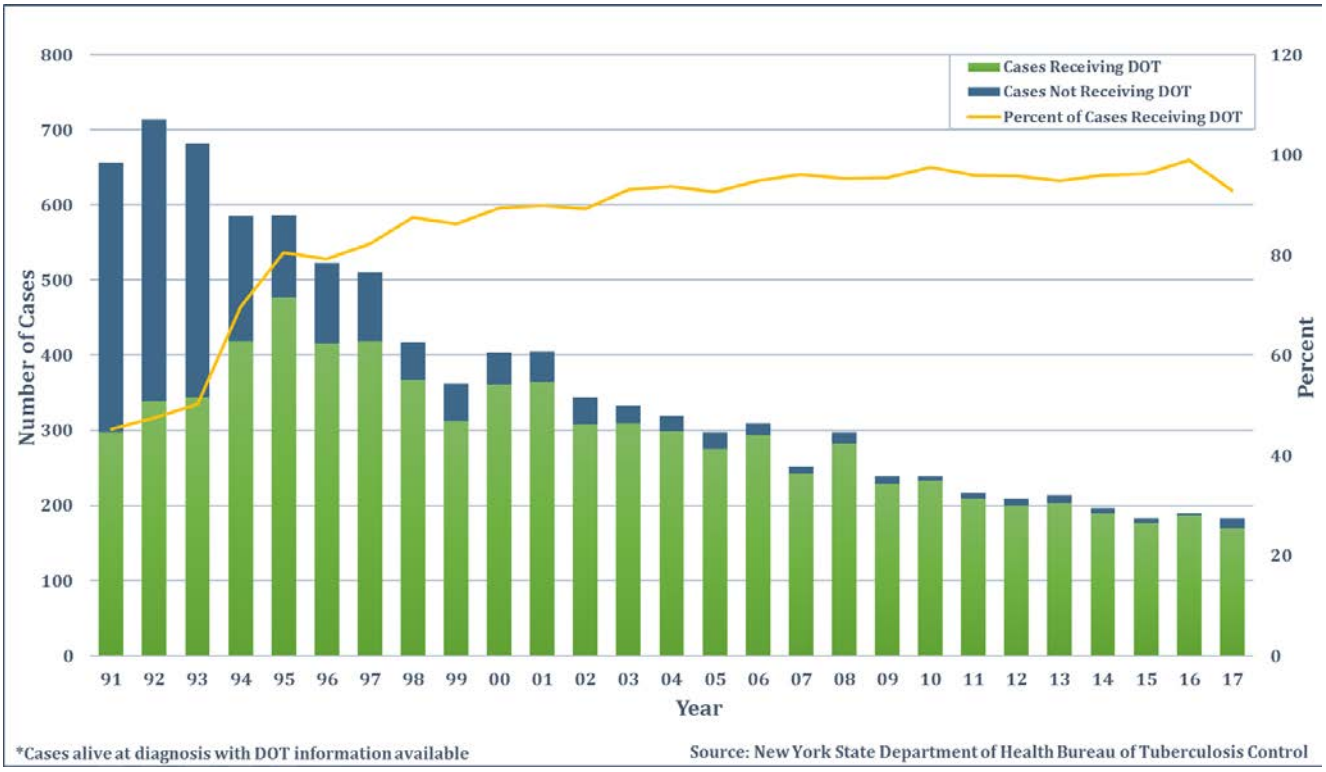
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Percent of Contacts who Started Treatment	76.3	83.9	79.2	74.7	72.3	78.4	80.3	78.9	68.2	71.0
Number of Contacts who Started Treatment	229	261	152	219	263	178	159	198	122	71
Percent of Contacts who Completed Treatment	65.9	63.2	58.6	72.1	75.3	67.9	73.6	76.8	74.6	71.8
Number of Contacts who Completed Treatment	151	165	89	158	198	121	117	152	91	51

*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 2016 (the most recent year for which complete information is available), 13.8 percent (N=100/725) were diagnosed with LTBI. Seventy-one percent (N=71/100) of these contacts were started on a treatment regimen and 71.8 percent (N=51/71) 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), 1991-2017



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 92.9 percent (N=170/183).

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www1.nyc.gov/site/doh/health/health-topics/tuberculosis.page