

TUBERCULOSIS IN NEW YORK STATE

2015

Annual Statistical Report
Bureau of Tuberculosis Control



This page intentionally left blank

TABLE OF CONTENTS

Table of Contents

List of Figures	3
List of Tables.....	4
Executive Summary	5
Tuberculosis Cases and Rates	6
Geographic Distribution.....	10
Demographic Characteristics	12
Tuberculosis in the Foreign-Born	19
HIV Co-Infection	23
Reasons for Evaluation.....	26
Risk Factors.....	27
Drug Resistance.....	31
Genotyping	33
Site of Disease	34
Completion of Therapy.....	36
Contacts to Infectious Tuberculosis Cases	38
Directly Observed Therapy	40
Contact Information.....	41

This page intentionally left blank

LIST OF FIGURES

Figure 1. Tuberculosis Cases and Rates, New York State, 1960-2015

Figure 2. Tuberculosis Case Rates, New York State and the United States, 1960-2015

Figure 3. Number and Percent of Deaths among Tuberculosis Cases, New York State (Exclusive of New York City), 1993-2015

Figure 4. Distribution of Tuberculosis Cases, New York State, 2015

Figure 5. Number and Percent of Tuberculosis Cases by Race/Ethnicity, New York State (Exclusive of New York City), 2011-2015

Figure 6. Race/Ethnicity of Tuberculosis Cases, New York State, 2015

Figure 7. Percent of Tuberculosis Cases by Gender, New York State (Exclusive of New York City), 2011-2015

Figure 8. Tuberculosis Cases and Rates by Age and Gender, New York State (Exclusive of New York City), 2015

Figure 9. Tuberculosis Cases by Age and Race/Ethnicity, New York State (Exclusive of New York City), 2015

Figure 10. Tuberculosis Cases by Age and Race/Ethnicity, New York City, 2015

Figure 11a. Number and Percent of Tuberculosis Cases by U.S.-Born and Foreign-Born Status, New York State (Exclusive of New York City), 1985-2015

Figure 11b. Number and Percent of Tuberculosis Cases by U.S.-Born and Foreign-Born Status, New York City, 1985-2015

Figure 12. HIV Status for Tuberculosis Cases, New York State, 2015

Figure 13. Number and Percent of Tuberculosis Cases Who Have Been Tested for HIV, New York State (Exclusive of New York City), 2006-2015

Figure 14. Tuberculosis Cases and Rates among DOCCS Inmates, New York State (Exclusive of New York City), 1986-2015

Figure 15. Number and Percent of Multidrug-Resistant Tuberculosis Cases, New York State, 2011-2015

Figure 16. Primary Site of Disease for Tuberculosis Cases, New York State, 2015

Figure 17. Percent of Tuberculosis Cases Who Completed Treatment within 12 Months, by U.S.-Born and Foreign-Born Status, New York State (Exclusive of New York City), 2005-2014

Figure 18. Number and Percent of Contacts to Infectious Tuberculosis Cases Placed on Treatment for Latent Tuberculosis Infection and Completed, New York State (Exclusive of New York City), 2005-2014

Figure 19. Number and Percent of Tuberculosis Cases Receiving Any Directly Observed Therapy, New York State (Exclusive of New York City), 1991-2015

LIST OF TABLES

Table 1. Tuberculosis Cases and Rates, New York State, 1960-2015

Table 2. Tuberculosis Cases and Rates by County, New York State, 2011-2015

Table 3. Tuberculosis Cases and Rates by Gender, Age and Race/Ethnicity, New York State, 2015

Table 4. Tuberculosis Cases by Country of Origin, New York State, 2015

Table 5. Number and Percent of Tuberculosis Cases by U.S.-Born and Foreign-Born Status, New York State (Exclusive of New York City), 2015

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), 2015

Table 7a. HIV Status for Tuberculosis Cases, New York State (Exclusive of New York City), 2011-2015

Table 7b. HIV Status for Tuberculosis Cases by Gender, New York State (Exclusive of New York City), 2015

Table 8a. Primary Reason for Evaluation of Tuberculosis Cases, New York State (Exclusive of New York City), 2011-2015

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), 2015

Table 9a. Additional Risk Factors Among Tuberculosis Cases, New York State (Exclusive of New York City), 2011-2015

Table 9b. Additional Risk Factors Among Tuberculosis Cases by Gender, New York State (Exclusive of New York City), 2015

Table 10. High-Risk Congregate Setting at the Time of Diagnosis for Tuberculosis Cases, New York State (Exclusive of New York City), 2011-2015

Table 11. Homelessness Among Tuberculosis Cases Within the Past Year, New York State (Exclusive of New York City), 2011-2015

Table 12. Substance Abuse Among Tuberculosis Cases Within the Past Year, New York State (Exclusive of New York City), 2011-2015

Table 13a. Drug Susceptibility Results for Culture-Confirmed Tuberculosis Cases, New York State (Exclusive of New York City), 2011-2015

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), 2013-2015

Table 14. Tuberculosis Genotyping Summary for Tuberculosis Cases, New York State (Exclusive of New York City), 2011-2015

Table 15. Primary Site of Disease for Tuberculosis Cases, New York State (Exclusive of New York City), 2011-2015

Table 16. Extra-Pulmonary Sites of Disease for Tuberculosis Cases, New York State, 2015

Table 17a. Treatment Status for Tuberculosis Cases, New York State (Exclusive of New York City), 2010-2014

Table 17b. Treatment Status for Tuberculosis Cases Reported in 2014, New York State (Exclusive of New York City)

Table 18. Number and Percent of Infectious Tuberculosis Cases with Contacts Identified, New York State (Exclusive of New York City), 2005-2014

Table 19. Number and Percent of Contacts to Infectious Tuberculosis Cases Evaluated for Latent Tuberculosis Infection, New York State (Exclusive of New York City), 2005-2014

EXECUTIVE SUMMARY

Executive Summary

MORBIDITY & MORTALITY

- From 2014 to 2015, tuberculosis (TB) morbidity decreased in New York State. The 2015 total of 765 cases (577 cases in New York City, 188 cases in the remainder of New York State) represents a 2.8 percent decrease from the 787 cases reported in 2014. The nation as a whole experienced a 1.6 percent increase in morbidity. Since the most recent peak epidemic in 1992 with 4,574 cases, there was an 83.3 percent decrease in New York State compared to a national decline of 64.2 percent.
- In New York State (exclusive of New York City), the number of TB cases decreased 6.9 percent from 202 cases in 2014 to 188 cases in 2015. The number of TB cases in New York City decreased by 1.4 percent from 585 cases in 2014 to 577 cases in 2015. In 2015, the nation as a whole reported 9,557 cases, up 1.6 percent from the 9,406 cases reported in 2014.
- New York State ranked sixth nationally for TB morbidity with an incidence rate of 3.9 per 100,000 population in 2015. This rate is influenced by New York City, which had a TB case rate of 7.1 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 52.1 percent of the TB cases in New York State (exclusive of New York City) in 2015.

RACE-ETHNICITY

- In 2015, Asians continued to have one of the highest incidence rates of TB statewide (23.8 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 declined from 82.7 (N=651) in 2014 to 81.0 in 2015 (N=620). People born in China comprised the greatest number of foreign-born TB cases (N=126) in New York City while those born in India comprised the greatest number of TB cases (N=15) in the remainder of the state.

DRUG SUSCEPTIBILITY

- Among individuals with drug susceptibilities reported in 2015, the number of multidrug-resistant (MDR TB) cases in New York City was five, a 44.4 percent decrease from the nine cases seen in 2014. In New York State (exclusive of New York City), the number of MDR TB cases declined from two in 2014 to one in 2015.

TB IN THE PRISONS

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

TUBERCULOSIS CASES AND RATES

Table 1. Tuberculosis Cases and Rates,* New York State, 1960-2015

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

*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

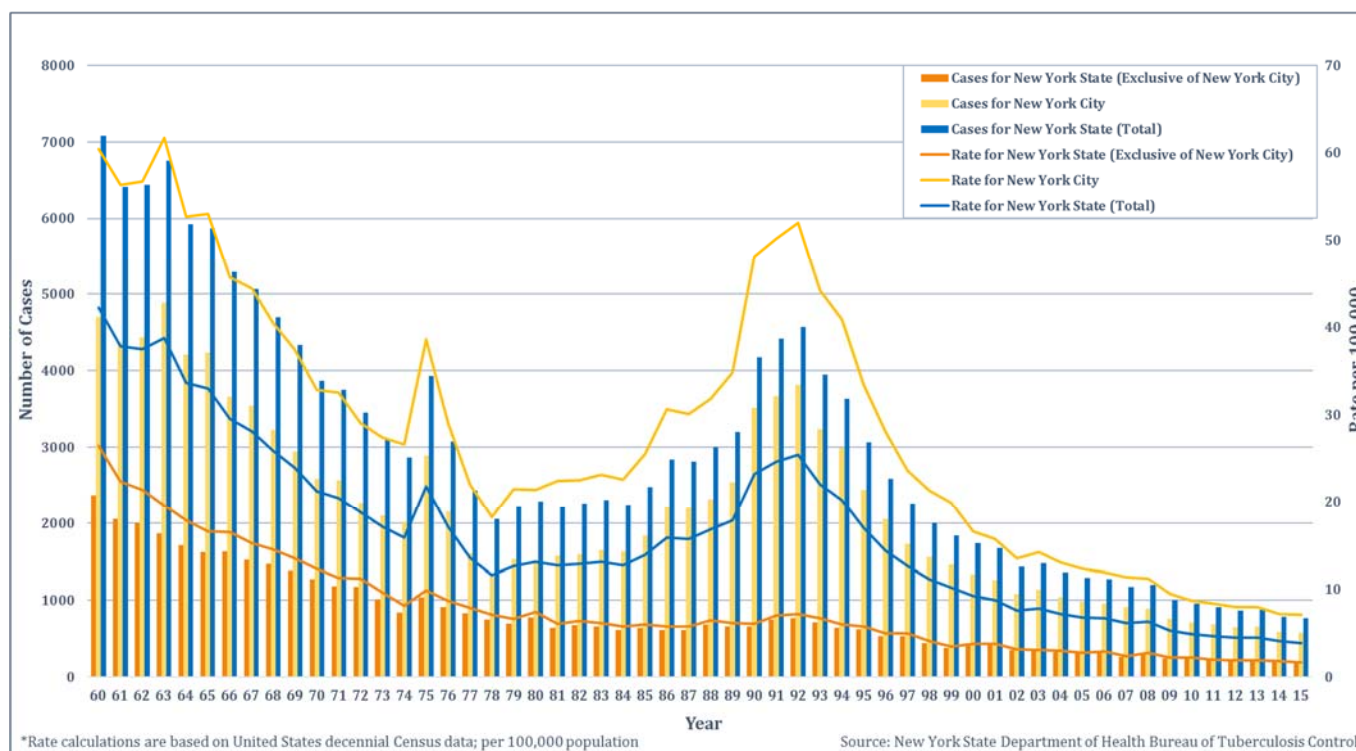
TUBERCULOSIS CASES AND RATES

From 2014 to 2015, TB cases and rates continued to decline statewide. In 2015, a total of 765 cases were reported in New York State, representing a 2.8 percent decrease from the 787 cases reported in 2014 and an 89.2 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 2015, New York City reported 75.4 percent (N=577) of the total cases despite having only 42 percent of the state population. The rest of the state reported 188 cases, which was a 6.9 percent decrease compared to the 202 reported in 2014.

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 2015 was 1.7 per 100,000 population, but New York City reported a rate of 7.1 per 100,000, resulting in an overall rate of 3.9 per 100,000 population for the whole state.

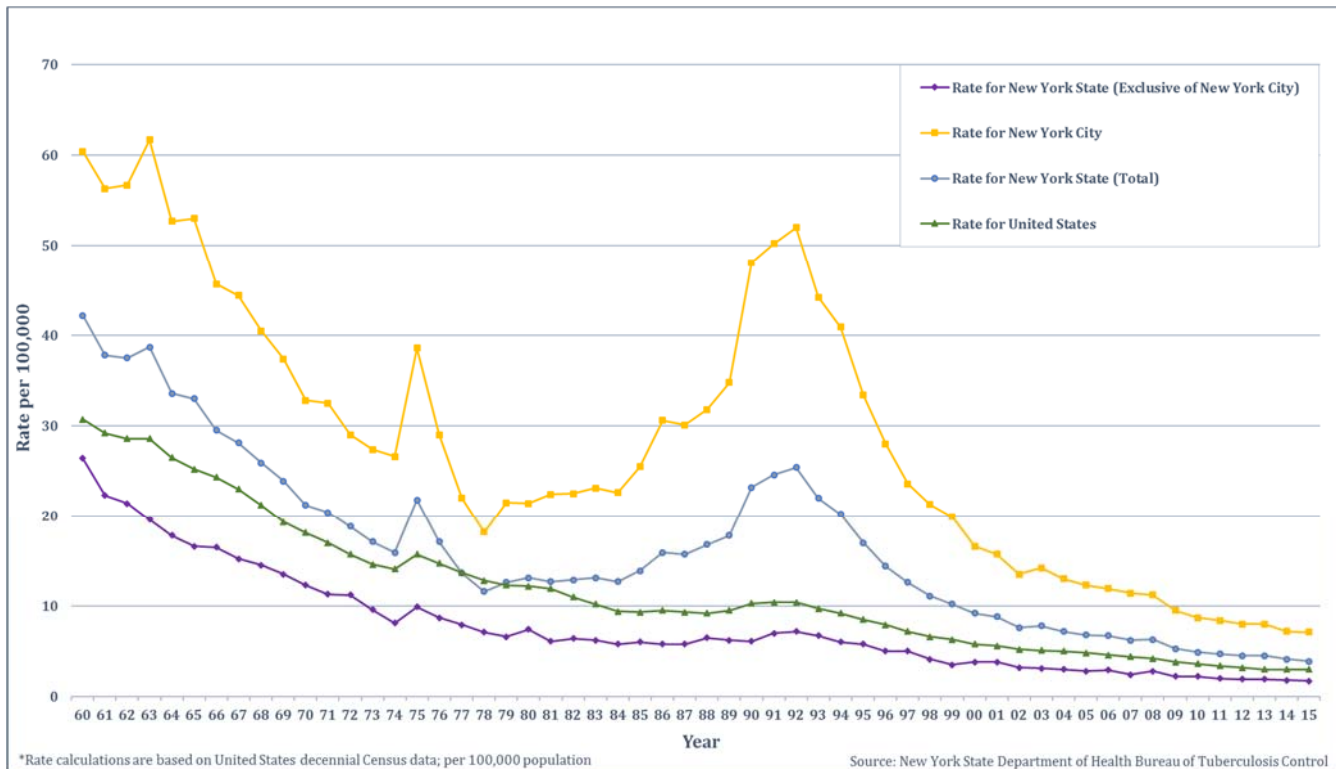
Figure 1. Tuberculosis Cases and Rates,* New York State, 1960-2015



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

TUBERCULOSIS CASES AND RATES

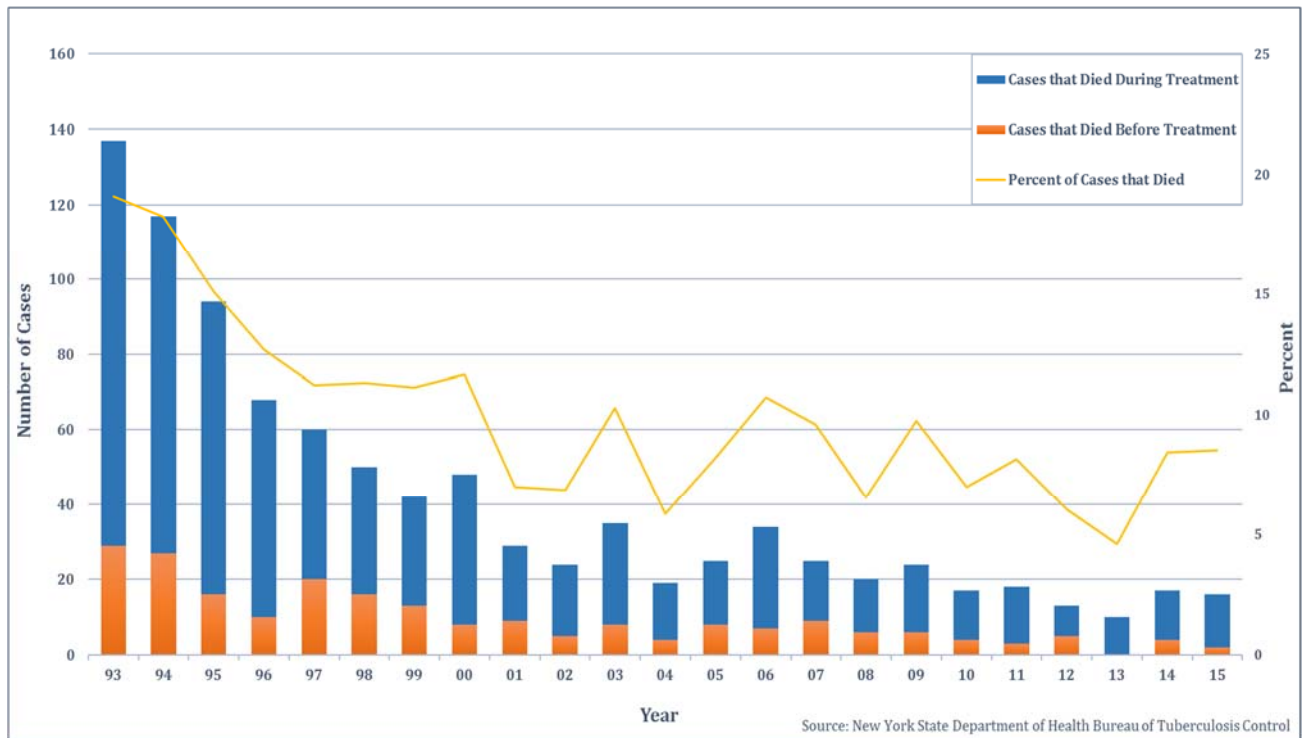
Figure 2. Tuberculosis Case Rates,* New York State and the United States, 1960-2015



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 2015, the national case rate was 3.0 per 100,000 population and ranged from 0.5 to 9.1 per 100,000 population across all the states. New York State ranked third based on the number of cases (N=765) and sixth 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=577) and third based on incidence rate (7.1 per 100,000 population).

TUBERCULOSIS CASES AND RATES

Figure 3. Number and Percent of Deaths Among Tuberculosis Cases, New York State (Exclusive of New York City), 1993-2015



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 16 total deaths in 2015. The cause of death was TB-related for six of these cases, four of which were over 89 years old with other comorbidities, such as diabetes and immunosuppression (other than HIV/AIDS).

GEOGRAPHIC DISTRIBUTION

Table 2. Tuberculosis Cases and Rates* by County, New York State, 2011-2015

County	2011		2012		2013		2014		2015	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Albany	8	2.6	6	2.0	5	1.6	7	2.3	2	0.7
Allegany	0	---	0	---	0	---	0	---	0	---
Broome	1	0.5	5	2.5	1	0.5	0	---	3	1.5
Cattaraugus	0	---	0	---	0	---	0	---	0	---
Cayuga	1	1.2	0	---	1	1.2	2	2.5	4	5.0
Chautauqua	0	---	0	---	0	---	0	---	0	---
Chemung	0	---	1	1.1	1	1.1	0	---	0	---
Chenango	0	---	0	---	0	---	0	---	0	---
Clinton	0	---	2	2.4	1	1.2	0	---	2	2.4
Columbia	0	---	2	3.2	0	---	2	3.2	3	4.8
Cortland	0	---	1	2.0	0	---	0	---	0	---
Delaware	1	2.1	0	---	0	---	0	---	0	---
Dutchess	3	1.0	4	1.3	4	1.3	7	2.4	5	1.7
Erie	14	1.5	19	2.1	21	2.3	16	1.7	13	1.4
Essex	0	---	0	---	0	---	1	2.5	0	---
Franklin	0	---	0	---	0	---	0	---	0	---
Fulton	0	---	0	---	1	1.8	0	---	0	---
Genesee	2	3.3	0	---	0	---	0	---	0	---
Greene	0	---	0	---	3	6.1	0	---	0	---
Hamilton	0	---	0	---	0	---	0	---	0	---
Herkimer	0	---	0	---	1	1.5	0	---	0	---
Jefferson	1	0.9	0	---	2	1.7	1	0.9	2	1.7
Lewis	0	---	0	---	0	---	0	---	0	---
Livingston	0	---	0	---	2	3.1	0	---	0	---
Madison	0	---	0	---	0	---	0	---	0	---
Monroe	19	2.6	14	1.9	22	3.0	20	2.7	17	2.3
Montgomery	0	---	0	---	0	---	0	---	0	---
Nassau	33	2.5	36	2.7	40	3.0	33	2.5	40	3.0
Niagara	1	0.5	2	0.9	3	1.4	3	1.4	4	1.8
Oneida	8	3.4	5	2.1	8	3.4	3	1.3	5	2.1
Onondaga	8	1.7	11	2.4	9	1.9	10	2.1	10	2.1
Ontario	3	2.8	0	---	0	---	0	---	2	1.9
Orange	9	2.4	6	1.6	9	2.4	8	2.1	2	0.5
Orleans	1	2.3	0	---	0	---	0	---	0	---
Oswego	0	---	3	2.5	0	---	1	0.8	0	---
Otsego	0	---	0	---	0	---	0	---	1	1.6
Putnam	4	4.0	0	---	0	---	2	2.0	0	---
Rensselaer	2	1.3	3	1.9	1	0.6	2	1.3	0	---
Rockland	10	3.2	11	3.5	15	4.8	11	3.5	8	2.6
Saratoga	0	---	1	0.5	2	0.9	1	0.5	1	0.5
Schenectady	3	1.9	3	1.9	3	1.9	3	1.9	3	1.9
Schoharie	0	---	0	---	0	---	0	---	0	---
Schuyler	0	---	0	---	0	---	0	---	0	---
Seneca	0	---	2	5.7	0	---	0	---	0	---
St. Lawrence	0	---	1	0.9	1	0.9	0	---	1	---
Steuben	0	---	0	---	1	1.0	0	---	0	---
Suffolk	43	2.9	33	2.2	22	1.5	35	2.3	24	1.6
Sullivan	1	1.3	0	---	1	1.3	1	1.3	0	---
Tioga	0	---	0	---	0	---	0	---	0	---
Tompkins	3	3.0	4	3.9	1	1.0	4	3.9	2	2.0
Ulster	1	0.5	3	1.6	4	2.2	0	---	0	---
Warren	0	---	0	---	0	---	0	---	0	---
Washington	0	---	0	---	1	1.6	1	1.6	0	---
Wayne	3	3.2	0	---	1	1.1	1	1.1	0	---
Westchester	38	4.0	35	3.7	30	3.2	27	2.8	34	3.6
Wyoming	0	---	0	---	0	---	0	---	0	---
Yates	0	---	2	7.9	0	---	0	---	0	---
New York State Total (Exclusive of New York City)	221	2.0	215	1.9	217	1.9	202	1.8	188	1.7
Bronx	102	7.4	101	7.3	91	6.6	99	7.1	87	6.3
Kings	214	8.5	190	7.6	197	7.9	192	7.7	171	6.9
New York	109	6.9	93	5.9	102	6.4	72	4.5	88	5.4
Queens	250	11.2	244	10.9	242	10.8	212	9.5	218	9.8
Richmond	14	3.0	23	4.9	24	5.1	10	2.1	13	3.0
New York City Total	689	8.4	651	8.0	656	8.0	585	7.2	577	7.1
STATE TOTAL	910	4.7	866	4.5	873	4.5	787	4.1	765	3.9

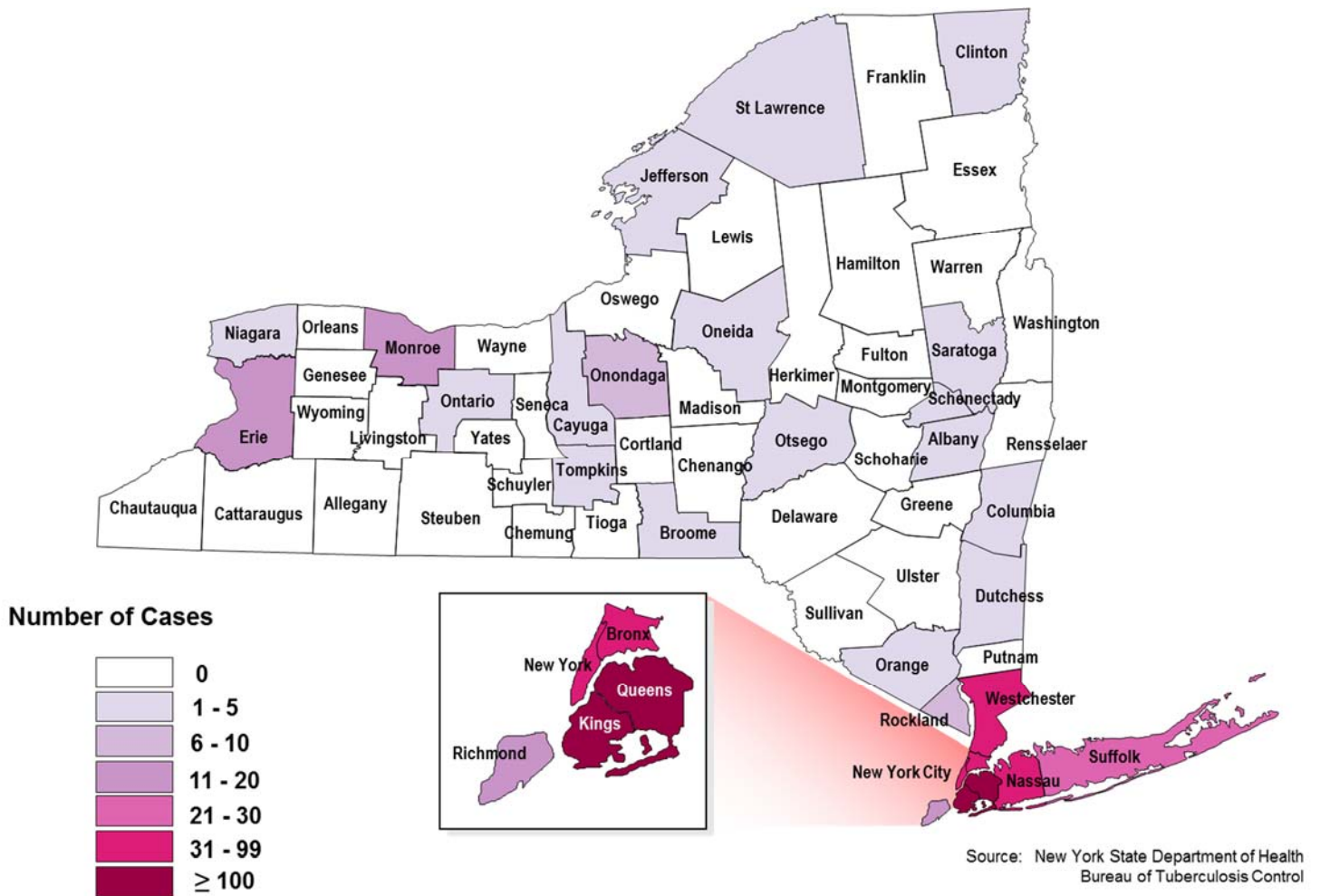
*Rate calculations are based on 2010 United States Census data; per 100,000 population

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 2015, all five boroughs of New York City and 23 (40.4%) of the 57 upstate counties reported at least one TB case. Higher numbers of cases were seen in the metropolitan areas. As in previous years, over half of all TB morbidity reported for NYS (exclusive of New York City) was concentrated in Nassau, Suffolk and Westchester counties (52.1%, N=98/188).

Figure 4. Distribution of Tuberculosis Cases in New York State, 2015



DEMOGRAPHIC CHARACTERISTICS

Table 3. Tuberculosis Cases and Rates* by Gender, Age, and Race/Ethnicity, New York State, 2015**

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	112	2.0	341	8.8	453	4.8
	Female	76	1.3	236	5.5	312	3.1
Age Group	Under 5 years	10	1.6	8	1.5	18	1.6
	5-9	3	0.4	6	1.3	9	0.8
	10-14	3	0.4	3	0.6	6	0.5
	15-19	8	1.0	19	3.5	27	2.0
	20-24	15	2.0	41	6.4	56	4.0
	25-34	32	2.5	102	7.3	134	5.0
	35-44	22	1.5	92	8.0	114	4.4
	45-54	20	1.1	94	8.5	114	4.0
	55-64	27	1.9	89	10.0	116	5.0
65+	48	3.0	123	12.4	171	6.5	
Race/Ethnicity	White, non-Hispanic	25	0.3	39	1.4	64	0.6
	Black, non-Hispanic	36	3.9	121	6.5	157	5.6
	Hispanic	53	4.9	141	6.0	194	5.7
	Asian	67	17.7	266	25.9	333	23.7
	American Indian	0	0	1	5.7	1	1.9
	Multiple Races	0	0	5	3.4	5	1.5
	Other/Unknown	7	29.4	4	6.9	11	13.5
TOTAL CASES		188	1.7	577	7.1	765	3.9

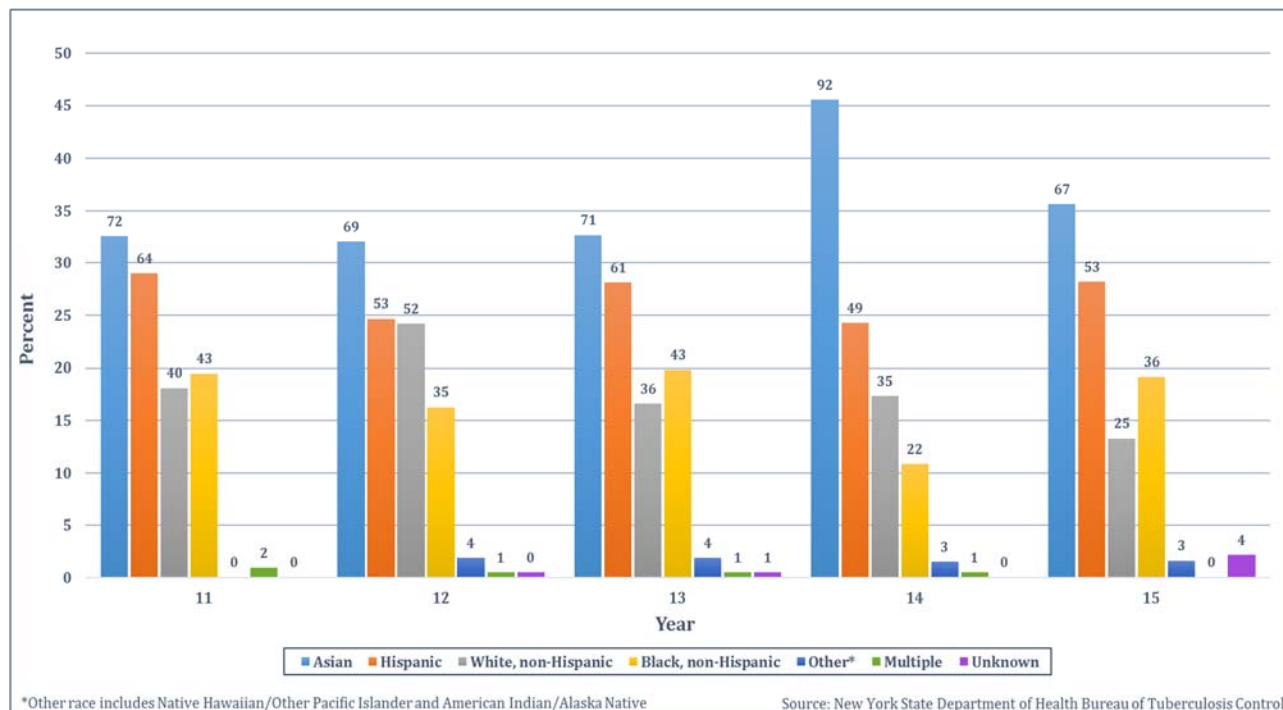
*Rate calculations are based on 2010 United States Census data; per 100,000 population Source: New York State Department of Health
 **Age calculations are based on date of birth and report date Bureau of Tuberculosis Control

TB cases in the 65 years and older age group had the highest incidence rate in New York City, as well as the rest of the state (12.4 per 100,000 and 3.0 per 100,000, respectively). Statewide, the lowest rates were seen among the high risk pediatric population (<15 years old), with those in the 10-14 year old age group representing only six cases for a rate of 0.5 per 100,000. Over half of the TB cases under five years old were located in New York State (exclusive of New York City).

In 2015, the highest incidence rate for TB was seen among Asians in New York State (23.7 per 100,000). For Hispanic and black, non-Hispanic cases, the incidence rates were comparable across the state (4.9 and 3.9 per 100,000 for New York State (exclusive of New York City); 6.0 and 6.5 per 100,000 for New York City).

DEMOGRAPHIC CHARACTERISTICS

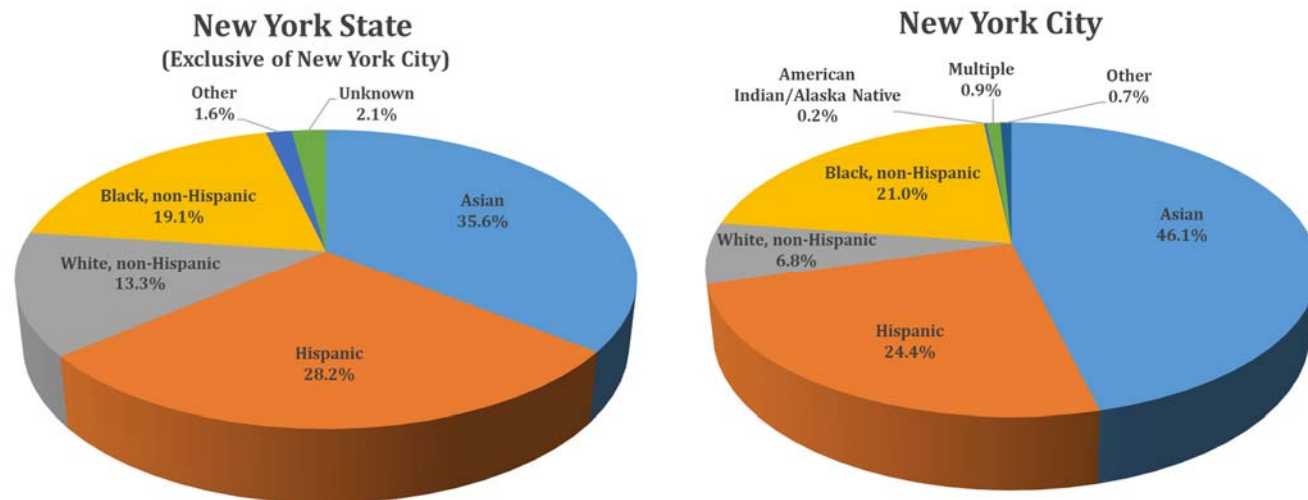
Figure 5. Number and Percent of Tuberculosis Cases by Race/Ethnicity, New York State (Exclusive of New York City), 2011-2015



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 2011, 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 2015, this percentage dropped to 35.6 percent (N=67/188). The greatest increase in proportion between 2014 and 2015 was seen among black, non-Hispanics (10.9% and 19.2%, respectively), followed by Hispanics (24.3% and 28.2%, respectively).

DEMOGRAPHIC CHARACTERISTICS

Figure 6. Race/Ethnicity of Tuberculosis Cases, New York State, 2015

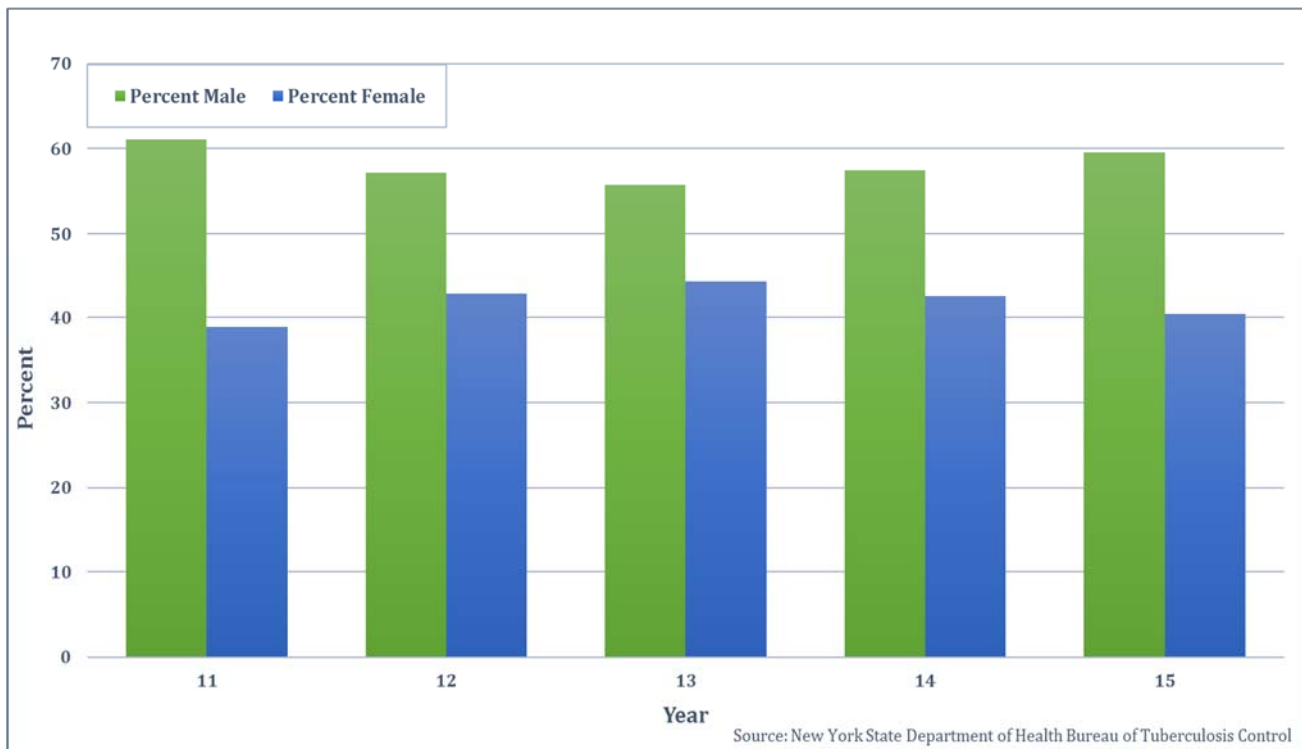


Source: New York State Department of Health Bureau of Tuberculosis Control

In New York City, 46.1 percent (N=266/577) of reported cases in 2015 were Asian, whereas in New York State (exclusive of New York City) Asians represented 35.6 percent (N=67/188) of cases. The proportion of white, non-Hispanic cases in New York State (exclusive of New York City) was nearly double that seen in New York City (13.3% and 6.8%, respectively).

DEMOGRAPHIC CHARACTERISTICS

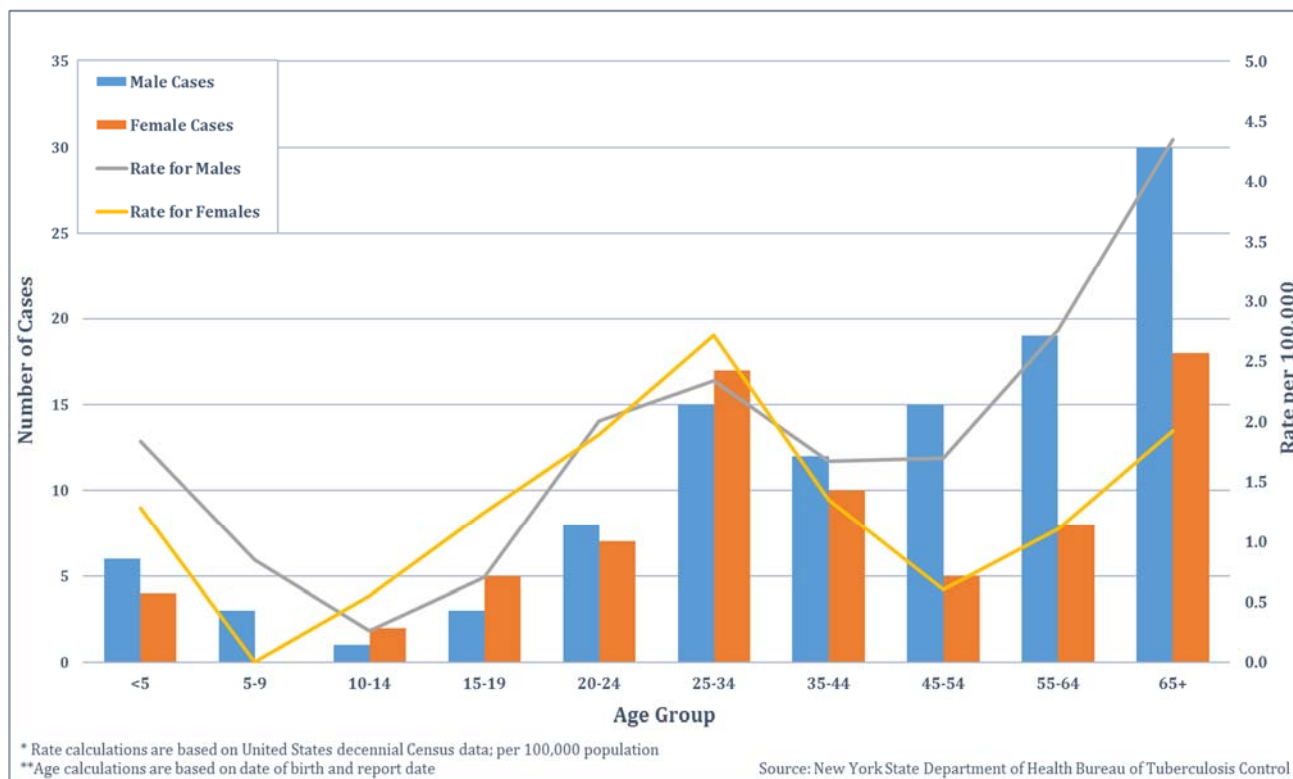
Figure 7. Percent of Tuberculosis Cases by Gender, New York State (Exclusive of New York City), 2011-2015



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 2015, 59.6 percent (N=112/188) of reported cases were male.

DEMOGRAPHIC CHARACTERISTICS

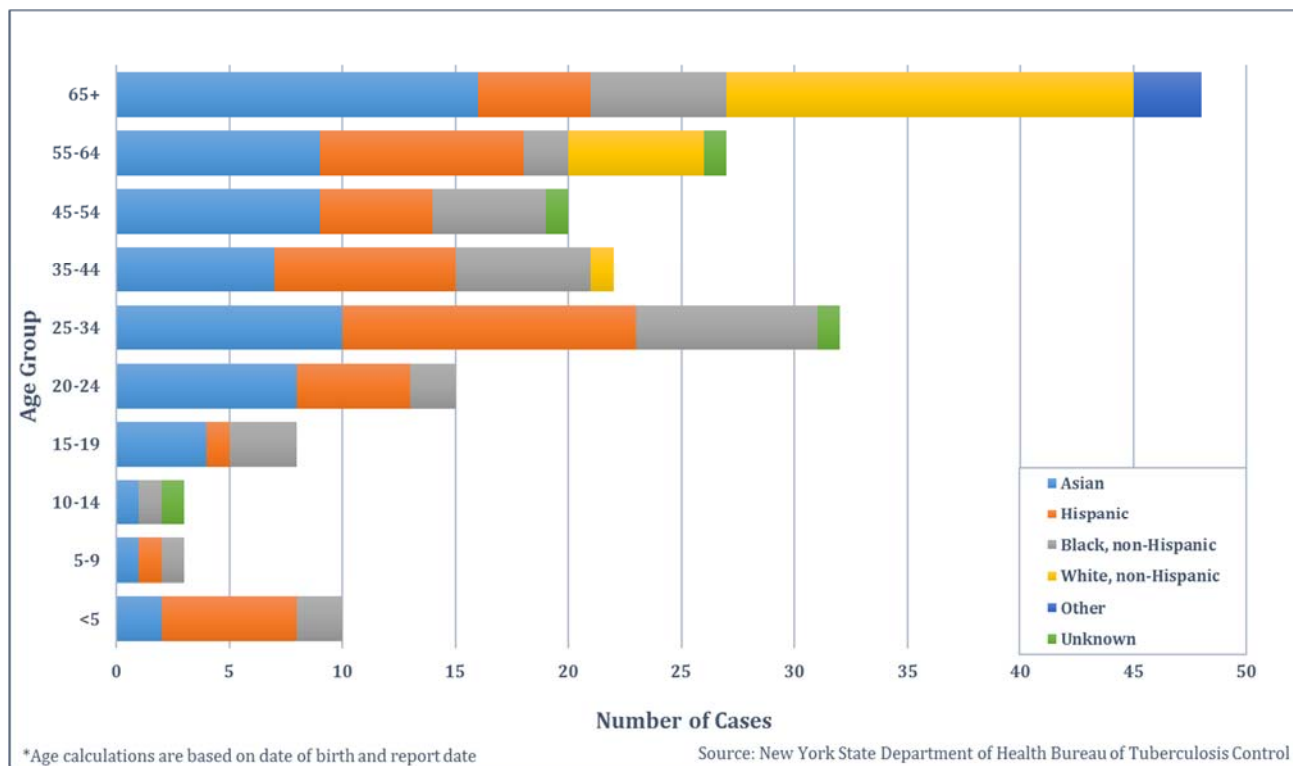
Figure 8. Tuberculosis Cases and Rates* by Age and Gender, New York State (Exclusive of New York City), 2015**



In 2015, the difference in TB morbidity between males and females in New York State (exclusive of New York City) varied depending on age. For cases 45 years of age or older, the number and rate for males greatly exceeded that of females. The largest gender gap in TB morbidity was seen among cases 55-64 years old where the case rate for males was 2.5 times that of females (2.8 per 100,000 for males; 1.1 per 100,000 for females).

DEMOGRAPHIC CHARACTERISTICS

Figure 9. Tuberculosis Cases by Age* and Race/Ethnicity, New York State (Exclusive of New York City), 2015



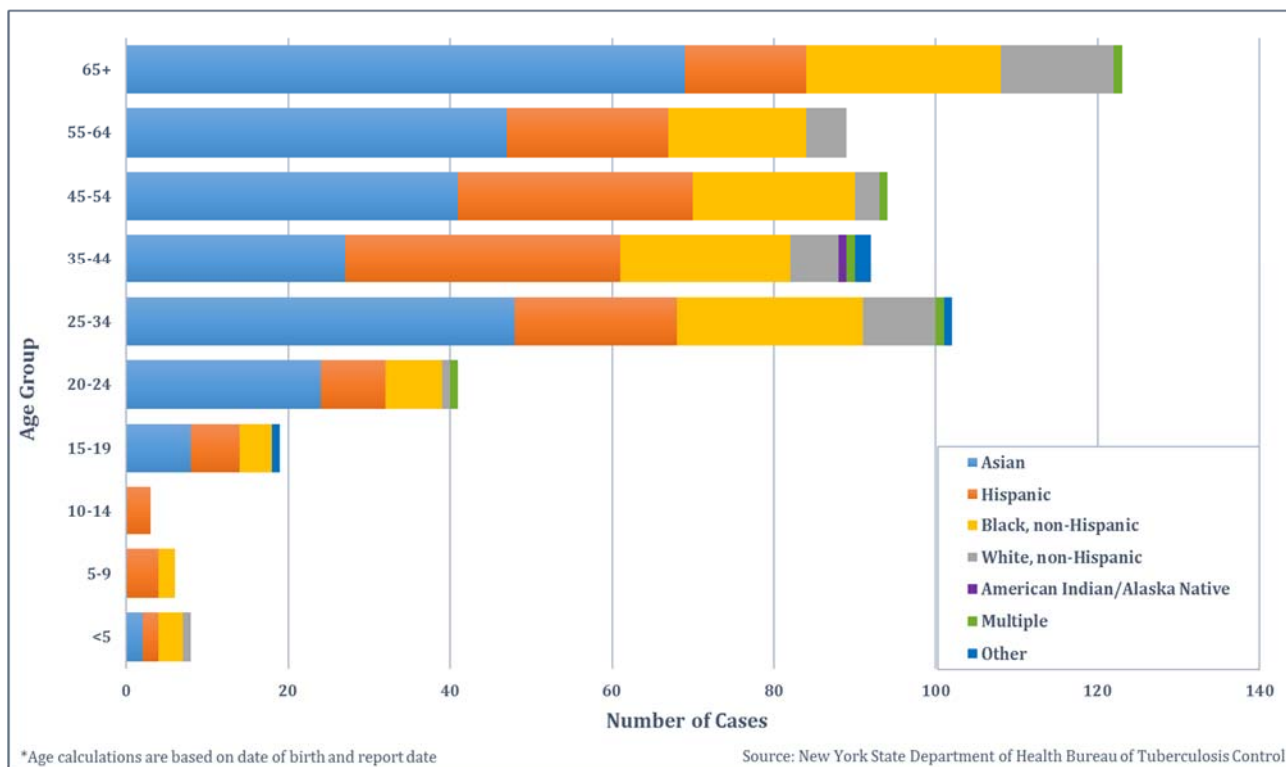
In 2015, slightly over a quarter of reported cases in New York State (exclusive of New York City) were 65 years of age and older (25.5%, N=48/188). Among the 48 cases in this age group, 18 (37.5%) were white, non-Hispanic and 16 (33.3%) were Asian.

The second largest number of TB cases reported in 2015 for New York State (exclusive of New York City) was seen in the 25-34 year age group (N=32). Forty-one percent (N=13/32) of these cases were Hispanic and 31.3 percent (N=10/32) were Asian.

In contrast to the broader age distribution of nearly every other race and ethnicity, all of the white, non-Hispanic TB cases were at least 35 years of age, with 72.0 percent (N=18/25) being 65 years of age or older.

DEMOGRAPHIC CHARACTERISTICS

Figure 10. Tuberculosis Cases by Age* and Race/Ethnicity, New York City, 2015

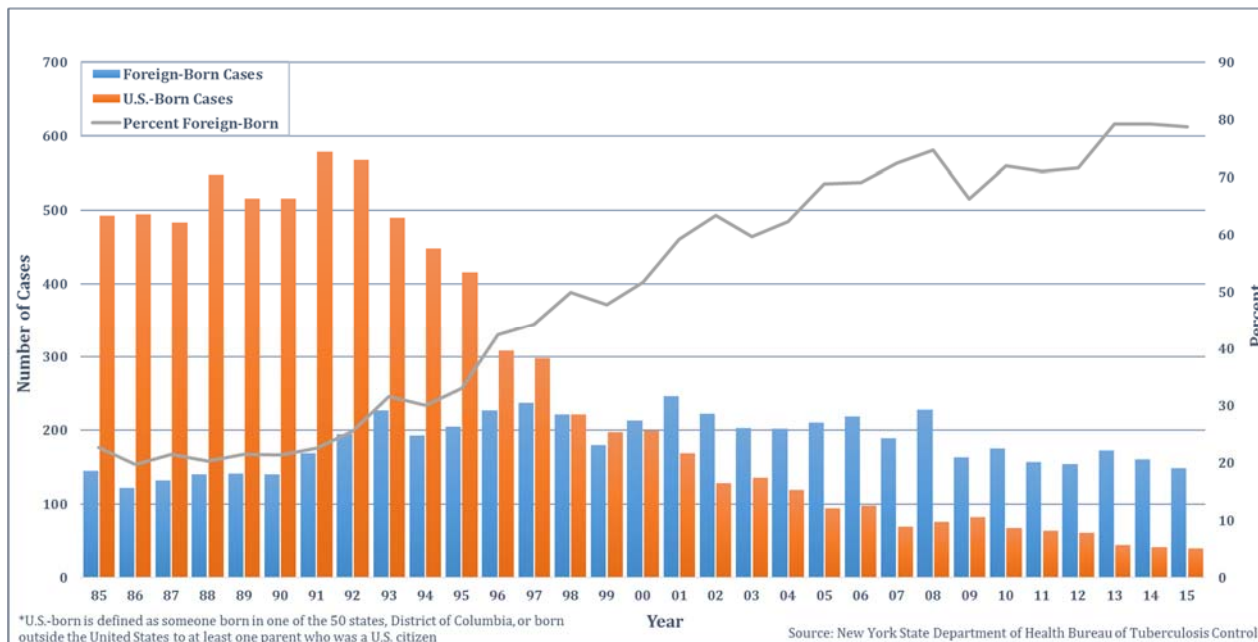


In New York City, the largest number of TB cases reported in 2015 was seen in the 65 years of age and older group (N=123). Among these 123 cases, 69 (56.1%) were Asian and 24 (19.5%) were black, non-Hispanic.

Similar to the remainder of the state in 2015, the second largest number of TB cases in New York City was identified in the 25-34 year age group (N=102). Forty-eight (47.1%) cases in this age group were Asian and 23 (22.5%) were black, non-Hispanic.

TUBERCULOSIS IN THE FOREIGN-BORN

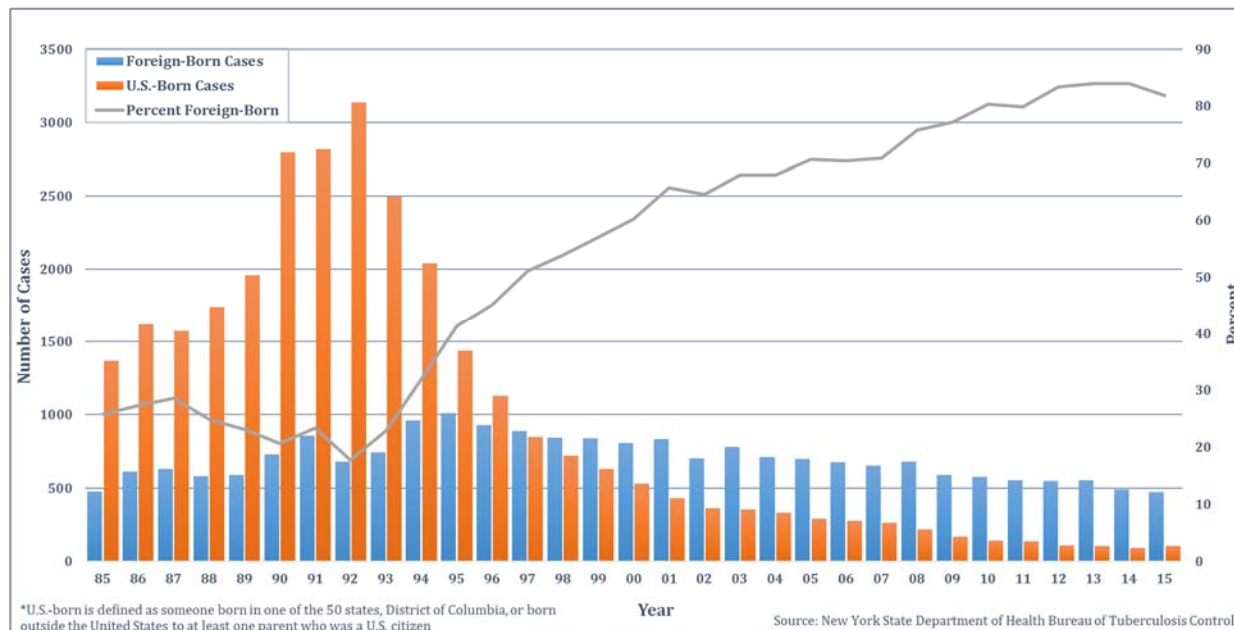
Figure 11a. Number and Percent of Tuberculosis Cases by U.S.-Born* and Foreign-Born Status, New York State (Exclusive of New York City), 1985-2015



In 2015, there were 148 foreign-born cases in New York State (exclusive of New York City), a decrease from the 160 reported in 2014. The foreign-born percentage also declined slightly, from 79.2 percent in 2014 to 78.7 percent in 2015.

In New York City, the number of foreign-born TB cases decreased from 491 in 2014 to 472 in 2015. The proportion of foreign-born cases in 2015 was 81.8 percent, two percent lower than the 83.9 percent seen in 2014.

Figure 11b. Number and Percent of Tuberculosis Cases by U.S.-Born* and Foreign-Born Status, New York City, 1985-2015



TUBERCULOSIS IN THE FOREIGN-BORN

Table 4. Tuberculosis Cases by Country of Origin,* New York State, 2015

Country	New York State (Exclusive of New York City)	New York City	New York State (Total)
United States	40	97	137
China	8	126	134
Mexico	9	36	45
India	15	22	37
Philippines	9	28	37
Ecuador	9	22	31
Haiti	6	22	28
Bangladesh	1	26	27
Dominican Republic	1	24	25
Pakistan	5	14	19
Guyana	2	17	19
Nepal	4	10	14
Burma	9	5	14
Honduras	8	5	13
Colombia	3	9	12
Korea, South	4	7	11
Peru	3	5	8
El Salvador	7	1	8
Puerto Rico**	0	7	7
Guatemala	4	3	7
Jamaica	1	6	7
Thailand	3	4	7
Vietnam	5	1	6
Nigeria	2	4	6
Hong Kong	0	5	5
Other Countries	30	71	101
TOTAL CASES	188	577	765

*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 2015, there were 87 different countries represented by the 765 TB cases reported in New York State, 25 of which were represented by at least five cases. Similar to previous years, the most common country of origin for foreign-born TB cases reported by New York State (exclusive of New York City) was India (N=15) and for New York City, the most common country was China (N=126).

TUBERCULOSIS IN THE 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), 2015

County	Total Number	U.S.-Born Number	Foreign-Born Number	Foreign-Born Percent
Albany	2	0	2	100.0
Allegany	0	0	0	0.0
Broome	3	0	3	100.0
Cattaraugus	0	0	0	0.0
Cayuga	4	2	2	50.0
Chautauqua	0	0	0	0.0
Chemung	0	0	0	0.0
Chenango	0	0	0	0.0
Clinton	2	0	2	100.0
Columbia	3	2	1	33.3
Cortland	0	0	0	0.0
Delaware	0	0	0	0.0
Dutchess	5	3	2	40.0
Erie	13	2	11	84.6
Essex	0	0	0	0.0
Franklin	0	0	0	0.0
Fulton	0	0	0	0.0
Genesee	0	0	0	0.0
Greene	0	0	0	0.0
Hamilton	0	0	0	0.0
Herkimer	0	0	0	0.0
Jefferson	2	1	1	50.0
Lewis	0	0	0	0.0
Livingston	0	0	0	0.0
Madison	0	0	0	0.0
Monroe	17	6	11	64.7
Montgomery	0	0	0	0.0
Nassau	40	6	34	85.0
Niagara	4	3	1	25.0
Oneida	5	0	5	100.0
Onondaga	10	2	8	80.0
Ontario	2	0	2	100.0
Orange	2	0	2	100.0
Orleans	0	0	0	0.0
Oswego	0	0	0	0.0
Otsego	1	0	1	100.0
Putnam	0	0	0	0.0
Rensselaer	0	0	0	0.0
Rockland	8	0	8	100.0
St. Lawrence	1	0	1	100.0
Saratoga	1	0	1	100.0
Schenectady	3	1	2	66.7
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	0	0	0	0.0
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	34	5	29	85.3
Wyoming	0	0	0	0.0
Yates	0	0	0	0.0
TOTAL CASES	188	40	148	78.7

In 2015, there were 148 foreign-born TB cases reported in New York State (exclusive of New York City). Over half (54.1%, N= 80/148) of these cases were identified in Nassau, Suffolk and Westchester alone. Among other counties that reported at least five foreign-born cases, Oneida and Rockland reported the highest foreign-born percentage (100.0%) while Monroe reported the lowest percentage (64.7%). In the remaining counties with foreign-born cases, the number and percentage varied.

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

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

TUBERCULOSIS IN THE FOREIGN-BORN

Table 6. Length of Time Foreign-Born Tuberculosis Cases were in the United States Prior to Diagnosis, New York State (Exclusive of New York City), 2015

Length of Time in the United States (Years)	No.	%
<1	17	11.5
1-5	47	31.8
6-10	19	12.8
11-20	28	18.9
21-30	22	14.9
31-40	8	5.4
41-50	2	1.4
51-60	3	2.0
Unknown	2	1.4

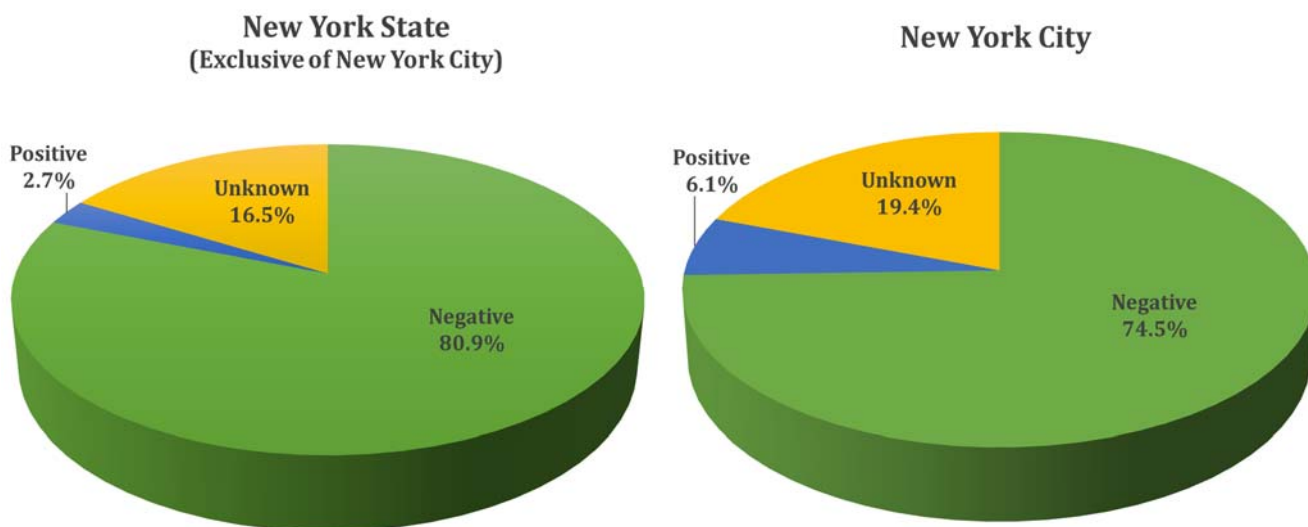
Source: New York State Department of Health
Bureau of Tuberculosis Control

In New York State (exclusive of New York City), 43.2 percent (N=64/148) of foreign-born TB cases were diagnosed within five years of entering the U.S. Over half (64.1%, N=41) of these 64 cases had entered the U.S. within two years prior to diagnosis. The number of newly diagnosed cases is considerably lower among foreign-born who have been in the U.S. for more than five years.

HIV CO-INFECTION

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

Figure 12. HIV Status for Tuberculosis Cases, New York State, 2015

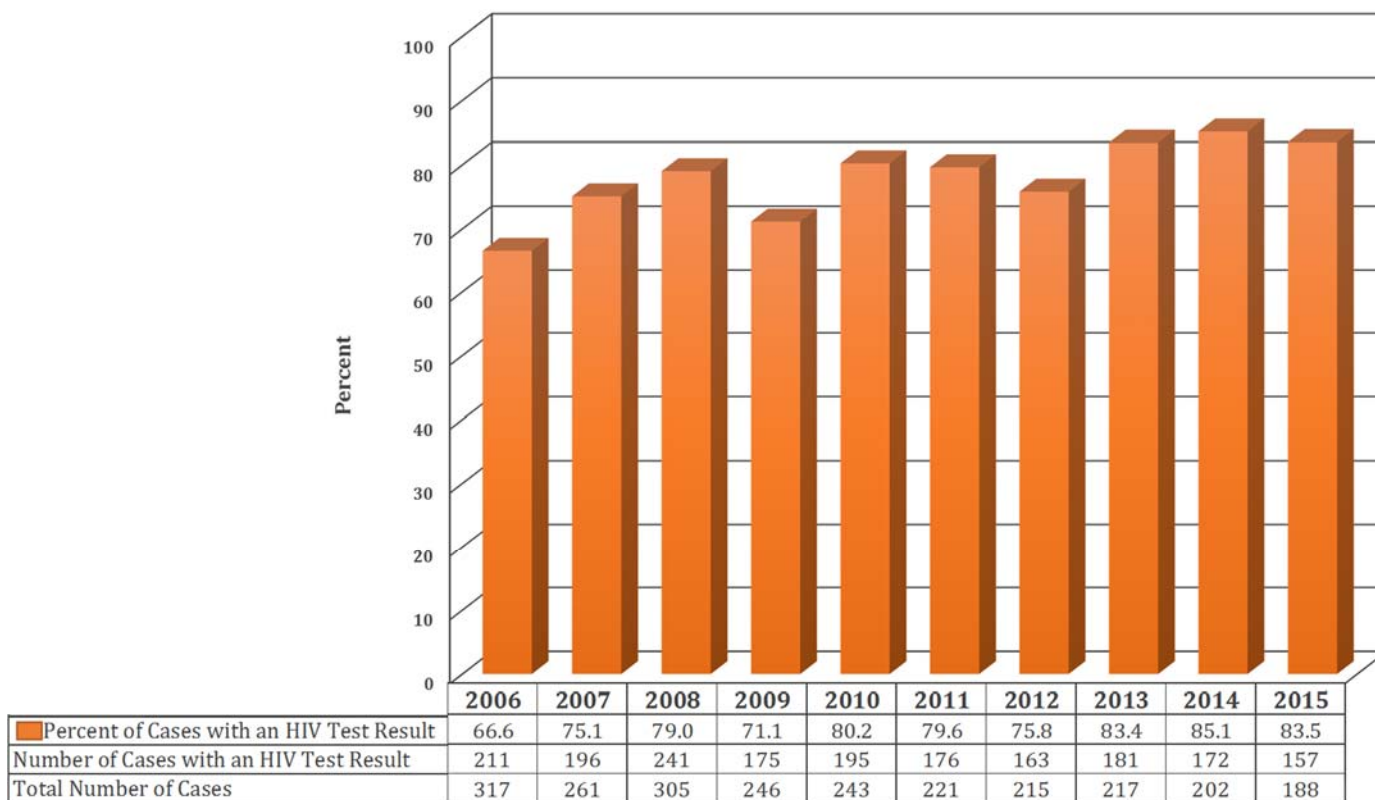


Source: New York State Department of Health Bureau of Tuberculosis Control

Eighty-four percent (N=157/188) of TB cases in New York State (exclusive of New York City) and 80.6 percent (N=465/577) of cases in New York City had a known HIV status in 2015. The co-infection rate for TB cases in New York State (exclusive of New York City) was 2.7 percent (N=5/188), which was less than half of that seen in New York City (6.1%, N=35/577). Individuals missing HIV testing information and those who were not offered or had refused testing were considered to have an unknown status.

HIV CO-INFECTION

Figure 13. Number and Percent of Tuberculosis Cases Who Have Been Tested for HIV, New York State (Exclusive of New York City), 2006-2015



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

In New York State (exclusive of New York City), the proportion of TB cases with a known HIV status has generally increased over the last 10 years. In 2015, 83.5 percent (N=157/188) of TB cases had a documented HIV result, which was 1.6 percent lower than the 85.1 percent (N=172/202) seen in 2014, but 16.9 percent higher than that seen in 2006 (66.6%, N=211/317).

In 2015, 40.0 percent (N=4/10) of TB cases under five years old had a known HIV status in New York State (exclusive of New York City). The proportion of cases with a known HIV status was also relatively low in the 65 years and older age group (60.4%, N=29/48).

HIV CO-INFECTION

Table 7a. HIV Status for Tuberculosis Cases, New York State (Exclusive of New York City), 2011-2015

HIV Test	2011		2012		2013		2014		2015	
	No.	%	No.	%	No.	%	No.	%	No.	%
Negative	166	75.1	157	73.0	167	77.0	166	82.2	152	80.9
Positive	10	4.5	6	2.8	14	6.5	6	3.0	5	2.7
Refused	23	10.4	25	11.6	19	8.8	19	9.4	12	6.4
Not Offered	20	9.0	23	10.7	13	6.0	7	3.5	15	8.0
Missing/Unknown	2	0.9	4	1.9	4	1.8	4	2.0	4	2.1
TOTAL CASES	221		215		217		202		188	

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

In 2015, 16.5 percent (N=31/188) of TB cases in New York State (excluding New York City) had an unknown HIV status (refused, not offered or missing/unknown). The percentage of cases that refused an HIV test in 2015 (6.4%) was the lowest seen in the last five years, but the percentage not offered an HIV test was more than double that seen in 2014 (8.0% and 3.5%, respectively). Of the 15 cases not offered testing, seven (46.7%) were under 10 years old and the other eight (53.3%) were over 65 years old.

Table 7b. HIV Status for Tuberculosis Cases by Gender, New York State (Exclusive of New York City), 2015

HIV Test	Male		Female		Total	
	No.	%	No.	%	No.	%
Negative	86	77.5	66	85.7	152	80.9
Positive	5	4.5	0	0.0	5	2.7
Refused	9	8.1	3	3.9	12	6.4
Not Offered	11	9.9	4	5.2	15	8.0
Missing/Unknown	1	0.9	3	3.9	4	2.1
TOTAL CASES	112		76		188	

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 similar among males and females in 2015 (82.0% and 85.7%, respectively), although the five TB cases with HIV co-infection were all male. Among cases who did not have a known HIV status, 10 were female (13.2%) and 21 were male (18.8%). The percentage of males who refused testing was more than double that of females (8.1% and 3.9%, respectively).

REASONS FOR EVALUATION

Table 8a. Primary Reason for Evaluation of Tuberculosis Cases, New York State (Exclusive of New York City), 2011-2015

Primary Reason for Evaluation	2011		2012		2013		2014		2015	
	No.	%	No.	%	No.	%	No.	%	No.	%
TB Symptoms	116	52.5	110	51.2	111	51.2	116	57.4	91	48.4
Abnormal Chest Radiograph	54	24.4	54	25.1	48	22.1	42	20.8	41	21.8
Incidental Lab Result	28	12.7	35	16.3	35	16.1	23	11.4	35	18.6
Contact Investigation	10	4.5	4	1.9	6	2.8	9	4.5	14	7.4
Targeted Testing	5	2.3	2	0.9	1	0.5	4	2.0	4	2.1
Immigration Medical Exam	4	1.8	3	1.4	6	2.8	3	1.5	0	0.0
Employment/Administrative	0	0.0	1	0.5	2	0.9	1	0.5	0	0.0
Health Care Worker	0	0.0	1	0.5	0	0.0	1	0.5	0	0.0
Unknown	4	1.8	5	2.3	8	3.7	3	1.5	3	1.6
TOTAL CASES	221		215		217		202		188	

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

In 2015, 48.4 percent (N=91/188) 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 (21.8%, N=41/188) followed by an incidental lab result (18.6%, N=35/188). 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), 2015

Primary Reason for Evaluation	U.S.-Born		Foreign-Born		Total	
	No.	%	No.	%	No.	%
TB Symptoms	11	27.5	80	54.1	91	48.4
Abnormal Chest Radiograph	7	17.5	34	23.0	41	21.8
Incidental Lab Result	9	22.5	25	16.9	34	18.1
Contact Investigation	12	30.0	2	1.4	14	7.4
Targeted Testing	0	0.0	4	2.7	4	2.1
Immigration Medical Exam	0	0.0	0	0.0	0	0.0
Employment/Administrative Testing	0	0.0	0	0.0	0	0.0
Health Care Worker	0	0.0	0	0.0	0	0.0
Unknown	1	2.5	3	2.0	4	2.1
TOTAL CASES	40		148		188	

*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

Fifty-four percent (N=80/148) of foreign-born cases in New York State (exclusive of New York City) underwent TB evaluation due to TB symptoms compared to 27.5 percent (N=11/40) of U.S.-born cases in 2015. Almost one third (30%, N=12/40) of U.S.-born cases were evaluated because they had been in contact with another infectious TB case. This was the least common reason for evaluation among foreign-born cases (1.4%, N=2/148).

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), 2011-2015

Additional Risk Factors		2011		2012		2013		2014		2015	
		No.	%	No.	%	No.	%	No.	%	No.	%
Medical Risk	Diabetes Mellitus	23	10.4	23	10.7	25	11.5	30	14.9	34	18.1
	Immunosuppression (not HIV/AIDS)	18	8.1	15	7.0	9	4.1	11	5.4	6	3.2
	Incomplete LTBI Therapy	13	5.9	13	6.0	9	4.1	8	4.0	8	4.3
	End-Stage Renal Disease	4	1.8	3	1.4	4	1.8	6	3.0	3	1.6
	Post-Organ Transplantation	2	0.9	1	0.5	0	0.0	4	2.0	3	1.6
	TNF- α Antagonist Therapy	0	0.0	2	0.9	2	0.9	1	0.5	1	0.5
Exposure Risk**	Contact of Infectious TB Patient	12	5.4	8	3.7	13	6.0	17	8.4	20	10.6
	Contact of MDR-TB Patient	1	0.5	0	0.0	0	0.0	0	0.0	0	0.0
	Missed Contact	1	0.5	0	0.0	0	0.0	0	0.0	1	0.5
Other Risk	Other Factors	12	5.4	24	11.2	16	7.4	28	13.9	26	13.8
None	No Additional Factors	144	65.2	131	60.9	146	67.3	117	57.9	100	53.2
TOTAL CASES		221		215		217		202		188	

*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, most factors were medical risk factors, with diabetes, immunosuppression (not HIV/AIDS) and incomplete latent tuberculosis infection (LTBI) therapy being most common.

The proportion of TB cases in New York State (exclusive of New York City) with diabetes has continued to rise over the last five years. In 2015, 18.1 percent (N=34/188) of cases had diabetes, which was almost an eight percent increase from the 10.4 percent seen in 2011. Additionally, the proportion of cases in 2015 that were evaluated due to recent contact with an infectious TB patient was nearly double that seen in 2011 (10.6% and 5.4%, respectively).

Table 9b. Additional Risk Factors* Among Tuberculosis Cases by Gender, New York State (Exclusive of New York City), 2015

Additional Risk Factors		Male		Female		Total	
		No.	%	No.	%	No.	%
Medical Risk	Diabetes Mellitus	26	23.2	8	10.5	34	18.1
	Immunosuppression (not HIV/AIDS)	4	3.6	2	2.6	6	3.2
	Incomplete LTBI Therapy	5	4.5	3	3.9	8	4.3
	End-Stage Renal Disease	3	2.7	0	0.0	3	1.6
	Post-Organ Transplantation	2	1.8	1	1.3	3	1.6
	TNF- α Antagonist Therapy	1	0.9	0	0.0	1	0.5
Exposure Risk**	Contact of Infectious TB Patient	10	8.9	9	11.8	19	10.1
	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	19	17.0	10	13.2	26	13.8
None	No Additional Factors	55	49.1	45	59.2	100	53.2
TOTAL CASES		112		76		188	

*Categories are not mutually exclusive

**Within the last 2 years

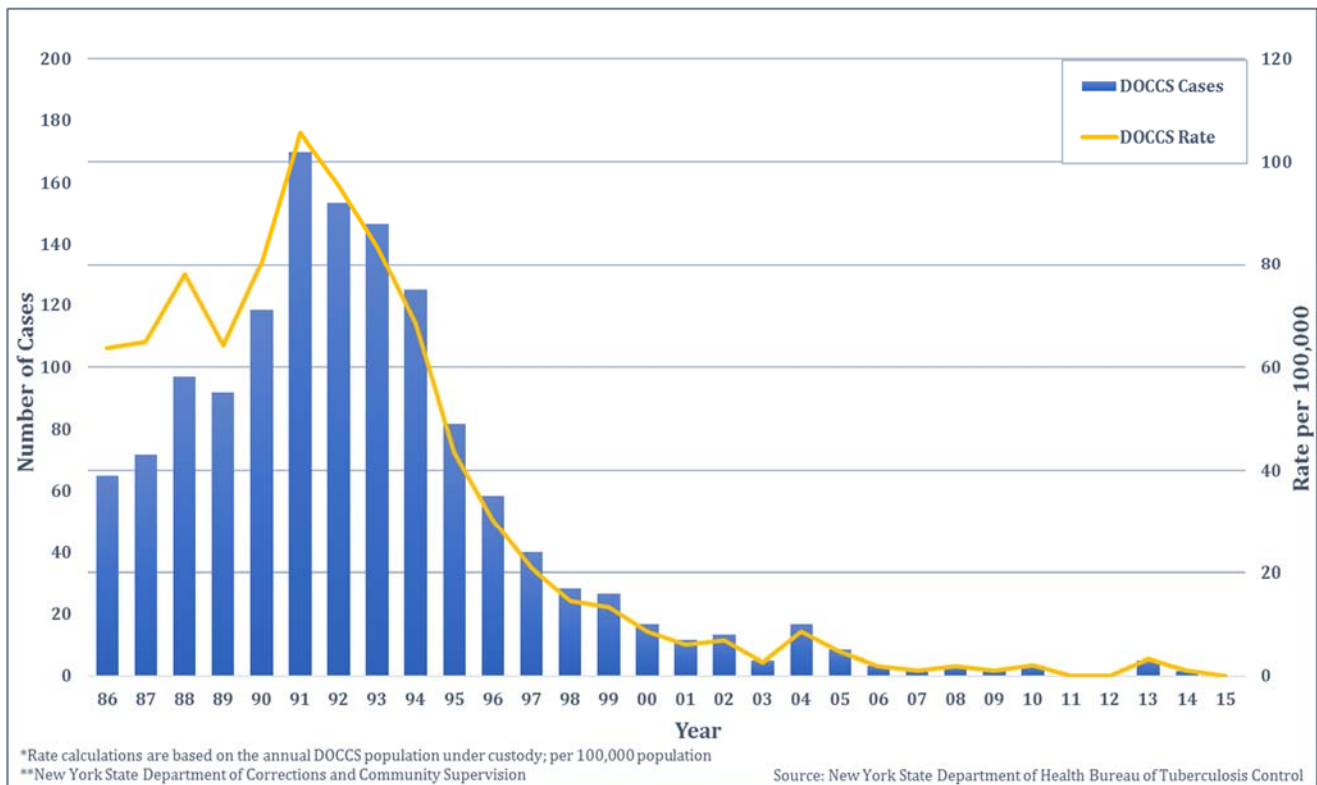
LTBI = Latent Tuberculosis Infection

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

In 2015, 50.9 percent of male TB cases in New York State (exclusive of New York City) had at least one additional risk factor compared to 41.8 percent of female cases. Diabetes was more common among males than females (23.2%, N=26, for males; 10.5%, N=8 for females).

RISK FACTORS

Figure 14. Tuberculosis Cases and Rates* Among DOCCS Inmates, New York State (Exclusive of New York City), 1986-2015**



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

RISK FACTORS

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

Table 10. High-Risk Congregate Setting at the Time of Diagnosis for Tuberculosis Cases, New York State (Exclusive of New York City), 2011-2015

Congregate Setting at Time of TB Diagnosis		2011		2012		2013		2014		2015	
		No.	%	No.	%	No.	%	No.	%	No.	%
Correctional Facility	Juvenile Facility	0	0.0	0	0.0	0	0.0	1	0.5	0	0.0
	Local Jail	3	1.4	0	0.0	0	0.0	1	0.5	1	0.5
	State Prison	0	0.0	0	0.0	3	1.4	1	0.5	0	0.0
	Federal Prison	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Other Facility	2	0.9	0	0.0	0	0.0	0	0.0	1	0.5
Long-Term Care Facility	Alcohol/Drug Treatment	0	0.0	0	0.0	0	0.0	1	0.5	0	0.0
	Hospital-Based	1	0.5	0	0.0	0	0.0	0	0.0	0	0.0
	Mental Health Residence	0	0.0	0	0.0	1	0.5	0	0.0	0	0.0
	Nursing Home	2	0.9	3	1.4	2	0.9	1	0.5	2	1.1
	Residential	0	0.0	1	0.5	0	0.0	0	0.0	0	0.0
	Other Long-Term Care	1	0.5	1	0.5	2	0.9	0	0.0	0	0.0
	Unknown	1	0.5	0	0.0	0	0.0	0	0.0	0	0.0
TOTAL CASES		221		215		217		202		188	

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 2011 (6.2%, N=10) and lowest in 2012 (2.3%, N=5). In 2015, four (2.1%) cases were identified in a congregate setting. Two cases were in a correctional facility and two were in a long-term care facility.

Table 11. Homelessness Among Tuberculosis Cases Within the Past Year, New York State (Exclusive of New York City), 2011-2015

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.	%
2011	3	1.4
2012	1	0.5
2013	5	2.3
2014	2	1.0
2015	5	2.7

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

From 2011 to 2015, an average of 1.6 percent (N=16/1,043) of TB cases in New York State (exclusive of New York City) were homeless within the 12 months prior to diagnosis. In 2015, 2.7 percent (N=5/188) of TB cases were homeless, which was the highest proportion identified 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), 2011-2015

Substance Abuse	2011		2012		2013		2014		2015	
	No.	%	No.	%	No.	%	No.	%	No.	%
Injection Drug Use	1	0.5	0	0.0	2	0.9	1	0.5	0	0.0
Non-Injection Drug Use	7	3.2	5	2.3	6	2.8	3	1.5	2	1.1
Excess Alcohol Use	20	9.0	10	4.7	22	10.1	13	6.4	15	8.0
TOTAL CASES	221		215		217		202		188	

*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 15 cases (8.0%) in 2015 who reported alcohol abuse, two of which also reported non-injection drug use.

DRUG RESISTANCE

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

Table 13a. Drug Susceptibility Results for Culture-Confirmed Tuberculosis Cases, New York State (Exclusive of New York City), 2011-2015

First-Line Drug Susceptibility Results		2011		2012		2013		2014		2015	
		No.	%	No.	%	No.	%	No.	%	No.	%
Positive Culture		172		161		157		164		150	
Susceptibility Test Reported		169	98.3	158	98.1	157	100.0	163	99.4	150	100.0
Susceptibility Test Results	Susceptible to all first-line drugs	136	80.5	133	84.2	134	85.4	139	85.3	123	82.0
	INH and RIF resistant (MDR TB)	6	3.6	3	1.9	2	1.3	2*	1.2	1	0.7
	INH resistance only	12	7.1	11	7.0	6	3.8	11	6.7	11	7.3
	RIF resistance only	1	0.6	0	0.0	1	0.6	0	0.0	0	0.0
	Resistance other than INH and RIF	14	8.3	11	7.0	14	8.9	11	6.7	15	10.0

*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 804 culture-confirmed TB cases in New York State (exclusive of New York City). Drug susceptibility results have been reported for 99.1 percent (N=797/804) of these cases, most (83.4%, N=665) of which have been susceptible to all first-line TB drugs. Despite this high level of susceptibility, there were 132 cases with first-line drug resistance between 2011 and 2015, 14 of which had MDR TB.

In 2015, drug susceptibility results were reported for all culture-confirmed cases in New York State (exclusive of New York City). In prior years, the proportion of cases with drug resistance has been greater among foreign-born compared to U.S.-born, but in 2015, 17.7 percent (N=22/124) of foreign-born cases had first-line resistance compared to 19.2 percent (N=5/26) of U.S.-born cases.

Table 13b. Drug Susceptibility Results for Culture-Confirmed Tuberculosis Cases by U.S.-Born* and Foreign-Born Status, New York State (Exclusive of New York City), 2013-2015

First-Line Drug Susceptibility Results		2013				2014				2015			
		U.S.-Born		Foreign-Born		U.S.-Born		Foreign-Born		U.S.-Born		Foreign-Born	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Positive Culture		30		127		34		130		26		124	
Susceptibility Test Reported		30	100.0	127	100.0	33	97.1	130	100.0	26	100.0	124	100.0
Susceptibility Test Results	Susceptible to all first-line drugs	28	93.3	106	83.5	29	87.9	110	84.6	21	80.8	102	82.3
	INH and RIF resistance (MDR TB)	0	0.0	2	1.6	0	0.0	2**	1.5	0	0.0	1	0.8
	INH resistance only	0	0.0	6	4.7	2	6.1	9	6.9	2	7.7	9	7.3
	RIF resistance only	0	0.0	1	0.8	0	0.0	0	0.0	0	0.0	0	0.0
	Resistance other than INH and RIF	2	6.7	12	9.4	2	6.1	9	6.9	3	11.5	12	9.7

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

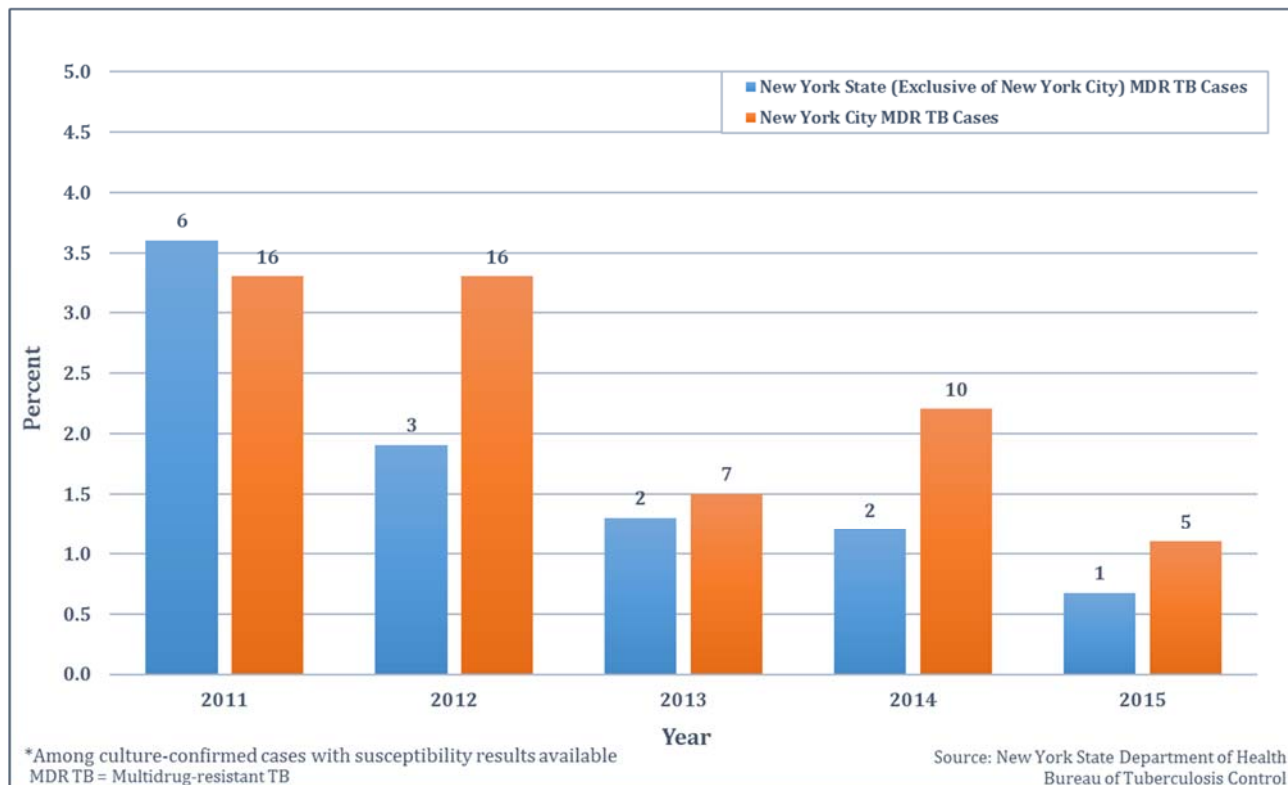
**1 case had extensively drug resistant TB (XDR TB)

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

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

DRUG RESISTANCE

Figure 15. Number and Percent of Multidrug-Resistant Tuberculosis Cases,*
New York State, 2011-2015



Over the last five years, there were nearly four times as many MDR TB cases in New York City compared to the remainder of the state (N=54 and N=14, respectively). Despite this large difference in number, the proportion of MDR TB cases was comparable.

GENOTYPING

Table 14. Tuberculosis Genotyping Summary for Tuberculosis Cases, New York State (Exclusive of New York City), 2011-2015

Genotyping		2011		2012		2013		2014		2015	
		No.	%	No.	%	No.	%	No.	%	No.	%
Initial Positive Cultures		177	---	163	---	161	---	170	---	157	---
False Positives	Total False Positives	5	---	2	---	3	---	3	---	7	---
	Control strain	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Contamination	2	1.1	1	0.6	0	0.0	0	0.0	6	3.1
	M. bovis BCG	3	1.7	1	0.6	3	1.9	3	1.8	1	0.6
True Positives	Total True Positives	172	---	161	---	158	---	167	---	150	---
	Isolates Available	172	---	155	---	158	---	162	---	150	---
	Complete Genotype*	155	90.1	142	91.6	128	81.0	154	95.1	146	97.3
	Partial Genotype	167	97.1	154	99.4	151	95.6	160	98.8	149	99.3
	No Result	5	2.9	1	0.6	6	3.8	2	1.2	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 2015, 100.0 percent (N=150/150) of isolates in New York State (exclusive of New York City) were available for genotyping. Of these 150 isolates, 97.3 percent (N=146) had a complete genotype (spoligotype and MIRU result). An additional three isolates only had a spoligotype or a MIRU result available, so 99.3 percent of cases had at least some genotype information available.

SITE OF DISEASE

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

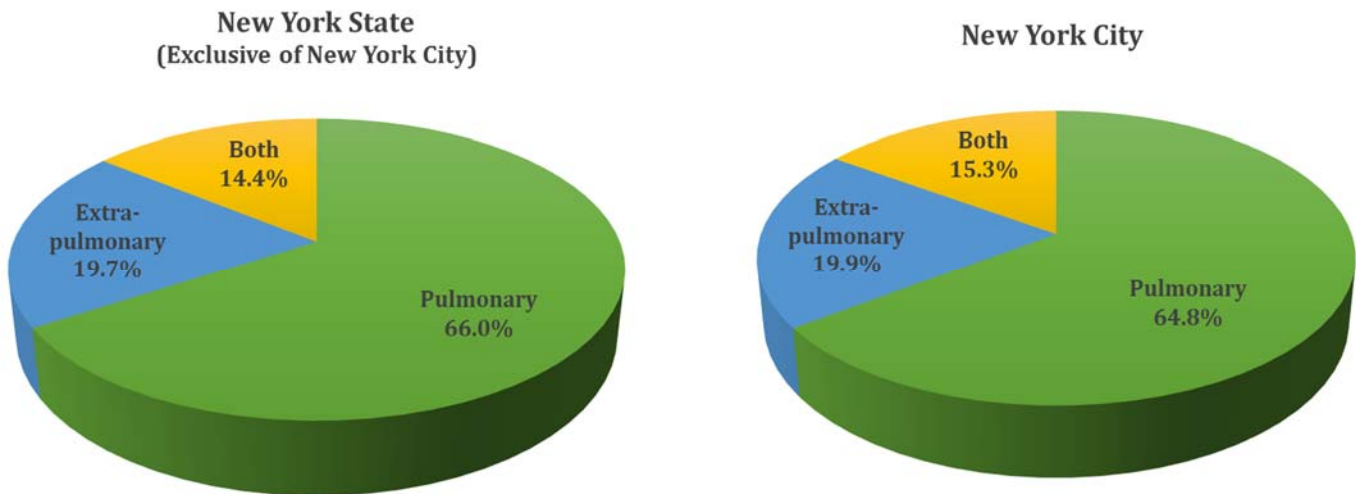
Table 15. Primary Site of Disease for Tuberculosis Cases, New York State (Exclusive of New York City), 2011-2015

Primary Site of Disease	2011		2012		2013		2014		2015	
	No.	%	No.	%	No.	%	No.	%	No.	%
Pulmonary	141	63.8	126	58.6	119	54.8	129	63.9	124	66.0
Extrapulmonary	54	24.4	65	30.2	67	30.9	45	22.3	37	19.7
Both	26	11.8	24	11.2	31	14.3	28	13.9	27	14.4
TOTAL CASES	221		215		217		202		188	

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 lowest proportion of cases with pulmonary TB was observed in 2013 (69.1%) and the highest was seen in 2015 (80.4%).

Figure 16. Primary Site of Disease for Tuberculosis Cases, New York State, 2015



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

For New York State as a whole, 613 (80.1%) TB cases were reported with pulmonary disease in 2015. Among these 613 pulmonary cases, 115 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, 2015

Extra-Pulmonary Site of Disease	New York State (Exclusive of New York City)	New York City	New York State (Total)
Lymphatic	24	85	109
Pleural	14	66	80
Bone/Joint	6	24	30
Meningeal	3	11	17
Peritoneal	3	12	15
Genitourinary	5	8	13
Laryngeal	0	2	2
Other	14	48	62

*Categories are not mutually exclusive

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

There were 267 cases in New York State with at least one extra-pulmonary site of disease in 2015. Among these cases, the most common sites of disease were lymphatic (N=109), pleural (N=80) and bone/joint (N=30).

COMPLETION OF THERAPY

Table 17a. Treatment Status for Tuberculosis Cases,* New York State (Exclusive of New York City), 2010-2014

Treatment Status	2010		2011		2012		2013		2014	
	No.	%	No.	%	No.	%	No.	%	No.	%
Complete	221	92.5	197	90.4	189	90.9	195	91.1	174	87.9
Died	13	5.4	15	6.9	8	3.8	10	4.7	13	6.6
Uncooperative/Refused	0	0.0	2	0.9	0	0.0	3	1.4	3	1.5
Lost	1	0.4	0	0.0	1	0.5	1	0.5	2	1.0
Adverse Treatment Event	1	0.4	1	0.5	2	1.0	2	0.9	0	0.0
Other	3	1.3	3	1.4	8	3.8	3	1.4	6	3.0
TOTAL CASES	239		218		208		214		198	

*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 2010 and 2014 (the most recent year for which completion information is available) was 90.6 percent (N=976/1,077). The highest completion percentage of 92.5 percent (N=221/239) was seen in 2010, followed by 91.1 percent (N=195/214) in 2013.

Table 17b. Treatment Status for Tuberculosis Cases* Reported in 2014, New York State (Exclusive of New York City)

Treatment Status	Non-MDR		MDR		Total	
	No.	%	No.	%	No.	%
Complete	173	88.3	1	50.0	174	87.9
Died	13	6.6	0	0.0	13	6.6
Uncooperative/Refused	3	1.5	0	0.0	3	1.5
Lost	2	1.0	0	0.0	2	1.0
Adverse Treatment Event	0	0.0	0	0.0	0	0.0
Other	5	2.6	1	50.0	6	3.0
TOTAL CASES	196		2		198	

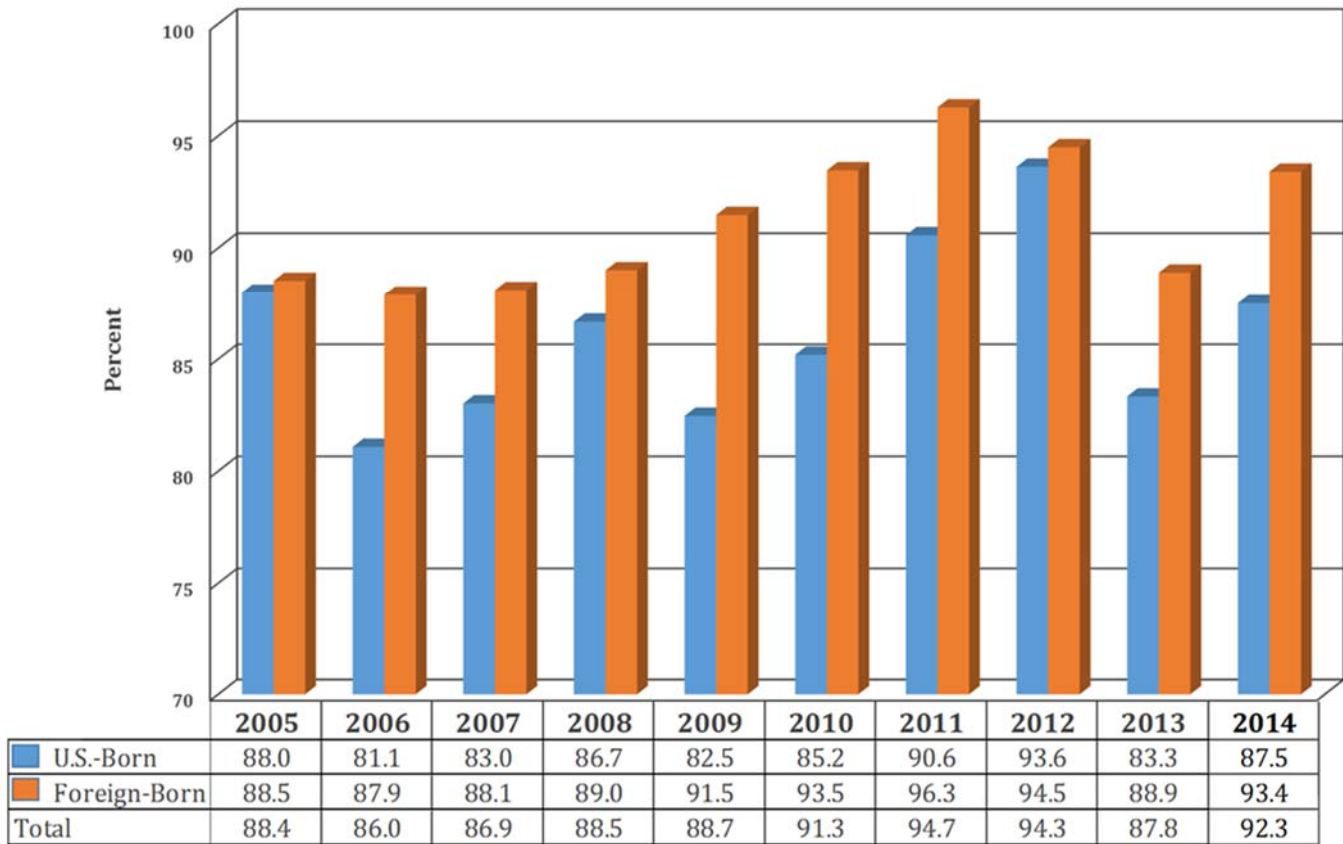
*Excludes patients found not to have TB, those who were reported at death and those who never started treatment
MDR TB = Multidrug-resistant TB

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

Among the two MDR TB cases reported in New York State (exclusive of New York City) in 2014, one completed treatment and the other moved out of the country before finishing treatment.

COMPLETION OF THERAPY

Figure 17. Percent of Tuberculosis Cases Who Completed Treatment Within 12 Months,* by U.S.-Born and Foreign-Born Status, New York State (Exclusive of New York City), 2005-2014**



*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 2014 (the most recent year for which complete information is available), 92.3 percent (N=156/169) of patients in New York State (exclusive of New York City) eligible[^] to complete treatment within 12 months, did so. A larger percentage of foreign-born cases completed therapy within 12 months compared to U.S.-born cases in 2014 (93.4% and 87.5%, respectively). An additional 5.3 percent (N=9/169) of patients completed treatment in more than 12 months for an overall completion rate of 97.6 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), 2005-2014

Year	Total Infectious Cases	Infectious Cases with Contacts Identified	
		No.	%
2005	104	103	99.0
2006	97	92	94.8
2007	78	76	97.4
2008	92	90	97.8
2009	66	65	98.5
2010	73	72	98.6
2011	80	78	97.5
2012	75	75	100.0
2013	63	62	98.4
2014	72	72	100.0

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

In 2014 (the most recent year for which complete information is available), 100.0 percent (N=72/72) of infectious TB cases in New York State (exclusive of New York City) had contacts identified. This exceeds the state objective of 97.0 percent and meets the national objective of 100.0 percent for 2014.

Table 19. Number and Percent of Contacts to Infectious Tuberculosis Cases Evaluated for Latent Tuberculosis Infection, New York State (Exclusive of New York City), 2005-2014

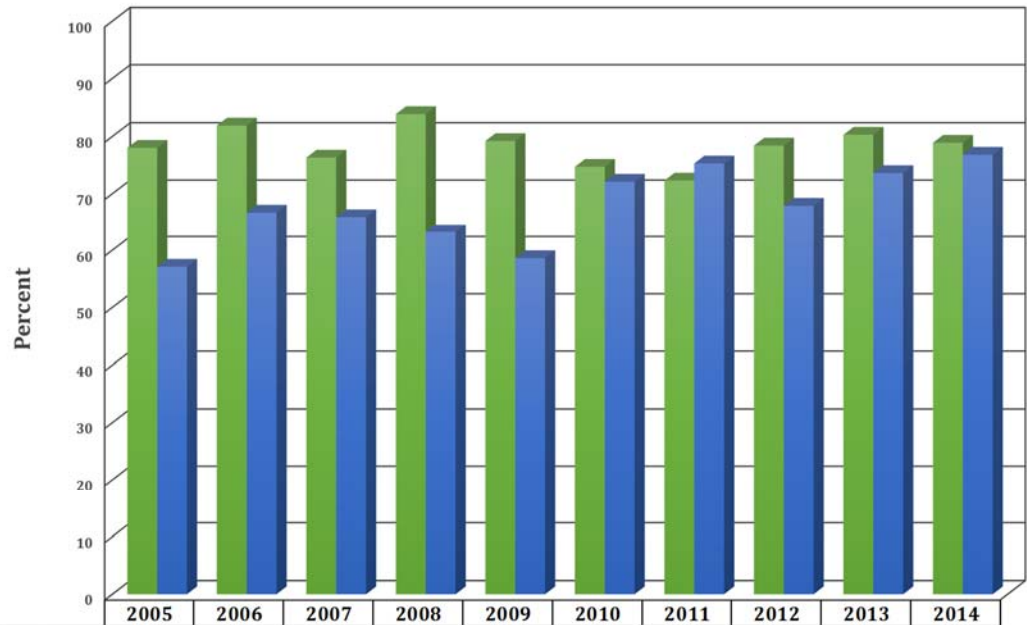
Year	Total Contacts Identified	Contacts Evaluated	
		No.	%
2005	1,865	1,665	89.3
2006	2,970	2,506	84.4
2007	4,050	3,322	82.0
2008	3,549	2,647	74.6
2009	1,768	1,447	81.8
2010	2,253	2,027	89.9
2011	3,662	3,049	83.3
2012	1,851	1,587	85.7
2013	1,462	1,215	83.1
2014	1,843	1,571	85.2

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

Eighty-five percent (N=1,571/1,843) of contacts to infectious cases in New York State (exclusive of New York City) were evaluated for LTBI in 2014 (the most recent year for which complete information is available). This is an increase of 2.1 percent compared to the 83.1 percent who were evaluated in 2013. Common reasons for not evaluating contacts include the inability to locate the individual and the contact refusing evaluation.

CONTACTS TO INFECTIOUS TUBERCULOSIS CASES

Figure 18. Number and Percent of Contacts to Infectious Tuberculosis Cases Placed on Treatment for Latent Tuberculosis Infection and Completed, New York State (Exclusive of New York City), 2005-2014



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
■ Percent of Contacts who Started Treatment	78.0	81.9	76.3	83.9	79.2	74.7	72.3	78.4	80.3	78.9
■ Number of Contacts who Started Treatment	252	267	229	261	152	219	263	178	159	198
■ Percent of Contacts who Completed Treatment*	57.1	66.7	65.9	63.2	58.6	72.1	75.3	67.9	73.6	76.8
■ Number of Contacts who Completed Treatment	144	178	151	165	89	158	198	121	117	152

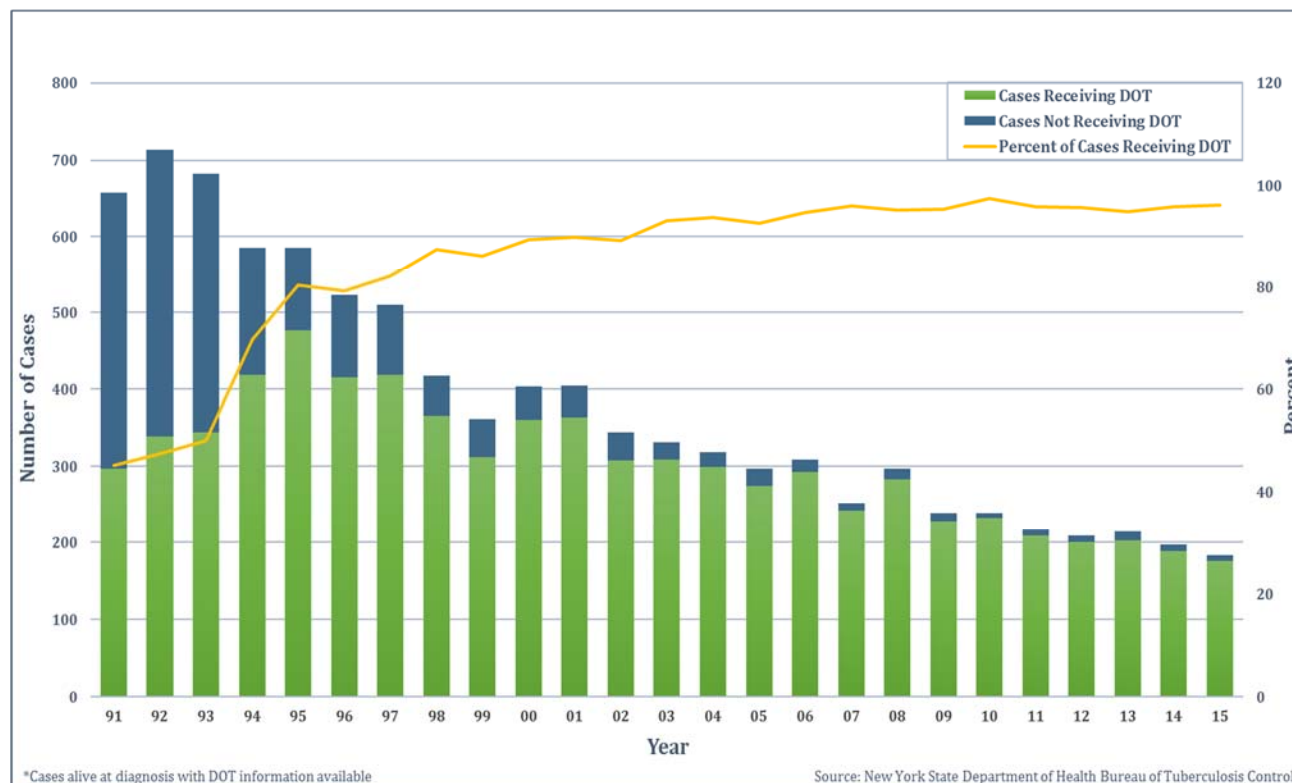
*Among those who started treatment

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 2014 (the most recent year for which complete information is available), 16.0 percent (N=251/1,571) were diagnosed with LTBI. Seventy-nine percent (N=198/251) of these contacts were started on a treatment regimen and 76.8 percent (N=152/198) of those who started treatment completed the prescribed regimen.

DIRECTLY OBSERVED THERAPY

Figure 21. Number and Percent of Tuberculosis Cases* Receiving Any Directly Observed Therapy, New York State (Exclusive of New York City), 1991-2015



In New York State (exclusive of New York City) the proportion of cases receiving directly observed therapy (DOT) has been increasing since the early 1990s when it was first actively promoted by the New York State Department of Health, local health units, and others. In 1991, 45.2 percent (N=297/657) of TB cases on treatment received at least part of their therapy as DOT. Since then, the proportion of cases receiving a portion of their treatment as DOT has more than doubled to 96.2 percent (N=176/183) in 2015.

CONTACT INFORMATION

New York State Department of Health Bureau of Tuberculosis Control

New York State Department of Health
Bureau of Tuberculosis Control
Empire State Plaza
Corning Tower, Room 565
Albany, NY 12237

Tel (518) 474-7000

Main Fax (518) 473-6164

Confidential Fax (518) 408-1941

Email tbcontrol@health.ny.gov

For more information:

www.health.ny.gov/diseases/communicable/tuberculosis

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

New York City Department of Health & Mental Hygiene
Bureau of Tuberculosis Control
42-09 28th Street, CN 72B
Long Island City, NY 11101

Tel (844) 713-0559 (TB Hotline)

Fax (844) 713-0557/0558

For more information:

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