2005 TB ANNUAL SUMMARY

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

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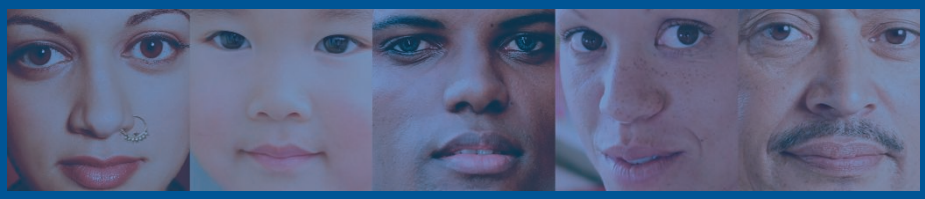

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Mission Statement

New York City Department of Health and Mental Hygiene

Bureau of Tuberculosis Control

The mission of the Bureau of Tuberculosis Control (BTBC) is to prevent the spread of tuberculosis (TB) and eliminate it as a public health problem in New York City.

The goals of the Bureau of TB Control are:

1. To identify all individuals with suspected or confirmed TB disease and ensure their appropriate treatment, ideally on a regimen of directly observed therapy.
2. To ensure that individuals who are at high risk for progression from latent infection to active disease (e.g., contacts of active cases, immunocompromised individuals, recent immigrants from areas where TB is widespread) receive treatment for latent TB infection and do not develop disease.

The Bureau achieves its goals through direct patient care, education, surveillance, and outreach. Its mandated activities include the following:

1. Ensuring that suspected and confirmed cases of TB identified in all facilities in New York City are reported to the Bureau and documented in the computerized, confidential TB Registry.
2. Conducting intensive case interviews and maintaining an effective outreach program so that TB cases remain under medical supervision until completion of a full course of treatment and identified contacts receive appropriate medical care.
3. Monitoring and documenting the treatment status of all patients with active TB.
4. Setting standards and guidelines, and providing consultation on the prevention, diagnosis, and treatment of latent TB infection and disease in New York City.
5. Operating clinical sites throughout New York City that provide state-of-the-art care for persons with suspected or confirmed TB disease and their close contacts, at no cost to the patient.
6. Ensuring care for persons who have or are suspected of having active TB disease, in accordance with New York State Public Health Law §2202, Article 22, Title 1, at no cost to the patient.
7. Collaborating with community-based organizations and health and social agencies in New York City and New York State to improve case-finding and the prevention and control of TB through education, outreach, and targeted screening in communities at high risk for TB.

New York City Department of Health and Mental Hygiene

Bureau of Tuberculosis Control

2005 TB Annual Summary

December 2006

New York City Department of Health and Mental Hygiene

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Suggested citation:

TB Annual Summary: 2005. New York: New York City Department of Health and Mental Hygiene, 2006.

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Executive Summary

In 2005, New York City (NYC) recorded 984 confirmed tuberculosis (TB) cases, the lowest number since TB became reportable in 1897. This marks the first time in the City's history that there were fewer than 1,000 cases confirmed in a year, and reflects a 74% decline since 1992. This number, however, represents a case rate of 12.3/100,000, still much higher than both the national average of 4.8/100,000 and the Healthy People 2010 objective of 1.0 case/100,000. Through the consistent efforts of the New York City Department of Health and Mental Hygiene's (NYC DOHMH). Bureau of Tuberculosis Control (BTBC), great progress has been made in controlling the transmission of TB and multidrug-resistant (TB-MDR) through increasing TB treatment completion, providing excellent patient education and care, and ultimately reducing the number of new TB cases.

Tuberculosis in 2005: Trends and Profile

- While the City saw a decrease in the number of confirmed TB cases among NYC residents, the number of patients initially reported with suspected TB, and later found not to have TB, increased. This clearly indicates that a decrease in reporting was not the reason for the reduction in cases. The decrease in TB continues in all groups where TB was most prevalent in 1992: patients born in the United States (US), adults, non-Hispanic black and Hispanic patients, and persons with HIV infection.
- Non-Hispanic blacks, Hispanics, and Asians comprised approximately one-third each of TB cases and had a case rate much higher (15.5/100,000, 12.9/100,000, and 36.4/100,000, respectively) than non-Hispanic whites (3.2/100,000).
- Non-US-born persons represent a continually growing proportion of TB cases—more than 70% in 2005, compared to fewer than 20% in 1992.
- In 2005, there were 24 patients with multidrug-resistant TB (MDR-TB, resistant to at least isoniazid and rifampin). This constitutes a 94.6% decline since 1992.
- About half of all NYC TB patients were acid-fast bacilli (AFB) smear positive and about half of patients with pulmonary TB were smear positive as well; 75.7% were culture positive and the majority (77.4%) had pulmonary disease. Of patients confirmed with AFB smear-positive pulmonary TB who received nucleic acid amplification tests, 93% were NAA positive, however, only 73.9% of these patients were tested.
- The majority of patients (73.4%) received treatment under Directly Observed Therapy (DOT) programs, while 94.4% of MDR-TB patients and 82.5% of pulmonary smear-positive patients received treatment via DOT.

Tuberculosis Control Activities, 2005

The Bureau continues to work in all phases of disease detection, treatment, and prevention. Main activities include surveillance and monitoring of reporting delays; clinical care and case management; contact investigations and outbreak control; provider, patient, and public education; and collaboration with other bureaus and agencies.

Key Accomplishments, 2005

- **Controlled the transmission of TB and MDR-TB**
  - A continued decrease in cases, to a historic low of 984.
  - The BTBC investigated an outbreak of 5 MDR-TB cases caused by "strain W" linked to a facility for HIV-infected persons. Extensive case finding activities included TB skin testing, chest X-ray, medical evaluation, and sputum induction.
  - The Bureau evaluated a total of 240 patients, involved in exposure in 332 congregate sites, for eligibility for an expanded contact investigation (ECI). After patient and site evaluation, the ECI unit conducted epidemiologic investigations at 23 sites, involving 26 cases.
- **Maintained a high level of epidemiologic research activity**
  - BTBC staff presented 11 studies at national and international conferences and co-authored 15 peer-reviewed articles.
- **Initiated a number of program evaluation activities**
  - Completed the human resources training plan and implemented all 2005 components.
  - Developed a program evaluation plan for identifying problems with contact investigation practices.
  - Evaluated the targeted testing and treatment of latent tuberculosis infection (LTBI) activities.
  - Improved the understanding of how cohort review helps to better manage TB cases and their contacts.
- **Improved patient care services offered in BTBC Chest Centers**
  - Increased HIV rapid testing availability in 7 chest centers: 61.8% of HIV tests were done using rapid tests.
  - HIV counseling and testing increased in 2005: 3,638 persons were counseled and 3,550 were tested, compared to 2,996 counseled and 2,542 tested for the same period in 2004.
- **Increased use of technology to improve delivery of services**
  - Enhanced the current TB registry by adding a new table to capture detailed DOT data, thus eliminating the need for a separate DOT database.
  - Explored several venues for new TB Registry software.
  - Improved and streamlined the vacancy-reporting process and spending tracking systems.
- **Improved the documentation of BTBC Procedures and Guidelines**
  - Printed and distributed a new Staff Handbook, consolidating several protocols; updated the "TB and the Law" document; and created new protocols for the TB Hotline, Network Epidemiology, Expanded Screening Unit, and Molecular Epidemiology.
  - Updated "Guidelines for Antiretroviral Drugs and Treatment of Tuberculosis" and "Guidelines for Testing and Treatment of Latent TB Infection."
- **Educated patients and providers about key topics related to tuberculosis in New York City**
  - Offered numerous educational activities, including: 30 medical grand rounds and lectures; the annual TB Medical Seminar (attended by 189 providers); and 2 TST certification training sessions (attended by 40 individuals).
  - Mailed the TB reporting requirements to all relevant residency and fellowship programs in New York City, and to all providers listed in the NYC Immunization Registry database.
- **Improved the timeliness of reporting of patients with confirmed or suspected TB**
  - Decreased reporting delays from 32.6% in 2004 to 22.8% in 2005, as a result of improved review and follow-up.
  - Evaluated the process for reviewing patients suspected of TB, identified barriers, and removed these barriers.

Challenges

Despite important accomplishments, many challenges remain, including:

- A TB rate that remains far above the Healthy People 2010 Objective.
- TB is decreasing at a far slower pace in non-US-born persons than among US-born individuals. The continuous flow of immigrants to NYC from countries with a high prevalence of tuberculosis makes TB control a challenge.
- NAA tests are still not performed for all patients evaluated for TB who have an AFB smear-positive respiratory specimen.
- Of patients identified with latent TB infection (LTBI) in 2004, only 44.4% have completed treatment, while 64.4% of TB patients' contacts diagnosed in 2004 and started on LTBI treatment have finished treatment. The length and potential adverse effects of LTBI treatment make completion difficult to achieve.
- TB transmission continues in certain high-risk settings, such as residences for homeless individuals and HIV-infected persons.
- Extreme drug-resistant TB (XDR-TB) which is resistant to isoniazid, rifampin, and at least 3 separate classes of second-line drugs, may pose new challenges for TB control.

Initiatives for Tuberculosis Control, 2006

The following initiatives will address the remaining challenges in TB control in New York City:

- **Use data to improve program decision-making:** Analyze TB Registry and chest center data, and use molecular epidemiology to identify ongoing transmission and clusters, and to implement strategies to curb transmission.
- **Continue to provide state-of-the-art services and to improve core agency functions:**
  - **Reduce the burden of TB in New York City** by improving treatment completion for LTBI by implementing targeted education campaigns in high TB risk areas, including West Queens, East Flatbush, Bedford Stuyvesant-Crown Heights, Flushing, and Union Square-Lower East Side; and increasing the rate of contact tracking for smear-positive patients.
  - **Increase the use of NAA tests** for the rapid diagnosis of TB.
  - **Enhance services at TB chest centers** by providing more same-day services for chest X-ray and medical evaluations, and by implementing the use of QuantiFERON®-TB Gold, a blood-based test for TB infection.
  - **Continue to control drug-resistant TB** by investigating the use of second-line anti-TB drugs for the prevention of TB among contacts of patients with infectious MDR- and XDR-TB.
- **Expand automation:** Develop and implement a new TB Registry; identify a vendor for Electronic Medical Records system in TB clinics; and develop and implement an Automated Inventory System.

Trends and Profile

Overview

In 2005, 984 patients were confirmed to have TB in New York City, a decrease of 74% since 1992 and of 5% since 2004. This is the lowest number of TB cases ever reported since TB became reportable in New York City in January, 1897.

Similarly, the rate of TB declined from 51.1 per 100,000 in 1992 to 12.3 per 100,000 in 2005. This rate, however, is 2.5 times the national average of 4.8 per 100,000 in 2005 **(Table 1, Figure 1)**. As in prior years, the number of non-US-born persons with TB remains high–690 (70%) in 2005 compared to 676 (17.8%) in 1992, a slight decrease from 2004 **(Figure 2)**. The TB rate was 24.0/100,000 in non-US-born persons, compared to 5.6/100,000 in US-born individuals. A significant decline was seen among HIV-infected persons as well, from one-third of TB cases occurring among HIV-infected persons in 1992 to 15.3% in 2005 **(Table 2)**.

The high rate of TB among non-US-born persons in NYC reflects both immigration patterns to NYC and TB rates in the patients' country of birth. The World Health Organization (WHO) reports that the estimated rates of TB in 2004 in countries where most non-US-born NYC TB patients are born were 101/100,000 for China, 91/100,000 for the Dominican Republic, 131/100,000 for Ecuador, 306/100,000 for Haiti, and 32/100,000 for Mexico. The highest TB rates can be found, however, in Africa, where many countries' TB rates top 600/100,000.*

*Global tuberculosis control: surveillance, planning, financing. WHO report 2006. Geneva, World Health Organization – www.who.int/entity/tb/publications

Patient Characteristics

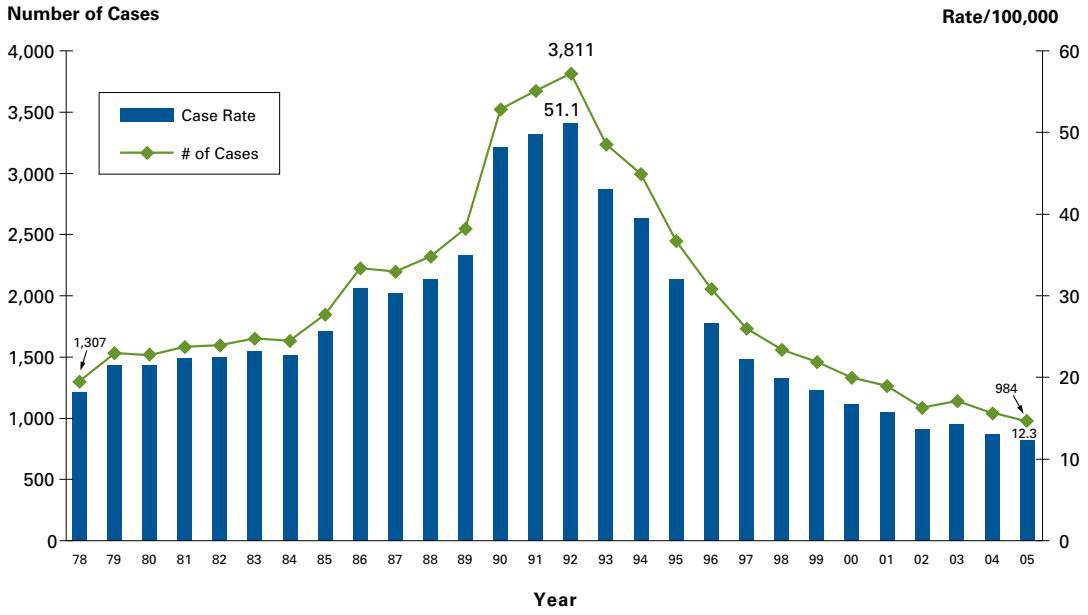
Demographic and Social Characteristics

In the early 1990s, the main groups affected by TB included adults aged 20-64 years, men, non-US-born blacks, Hispanics, US-born persons, HIV-infected individuals, and persons in high-risk settings such as health care facilities, correctional institutions, and homeless facilities. Although major decreases have been observed in these groups, the highest rates of TB in NYC in 2005 remain among adults, men, and non-white persons. Most NYC TB cases are black non-Hispanics, Hispanics, and Asians, who have case rates much higher than white non-Hispanics **(Tables 3, 4)**.

- **Age and sex.** Since 1992, the rate of TB declined 4- to 5-fold among persons aged 20–44 and 45–64 years, dropping from 75.5 and 62.6/100,000 to 14.2/100,000 and 16.1/100,000, respectively, in 2005 **(Figure 3)**. Table 4 shows that US-born and non-US-born TB patients had a different age distribution: while more than half (52.8%) of non-US-born patients were aged 20–44 years, 32.5% of US-born patients were in this age group; more US-born patients were children compared to non-US-born patients, while an equal number was aged greater than 65 years **(Table 4)**. The age breakdown was selected based on the grouping commonly used in New York City. About two-thirds of US-born and non-US-born patients were males.
- **Race/ethnicity.** The TB rate decreased the most among non-Hispanic blacks, from 110.6/100,000 in 1992 to 15.5/100,000 in 2005, a 7-fold decrease; and among Hispanics, from 55.2/100,000 in 1992 to 12.9/100,000, a 4-fold decrease. By contrast, the rate decreased less among Asians, who had the highest TB case rate in 2005—36.3/100,000—more than double the rate among black-non-Hispanics and Hispanics **(Figure 4, Table 3)**.
- **Social characteristics.** Of TB patients confirmed in 2005, 69 (7%) were homeless; 23 (2.3%) were residents of correctional facilities; 11 (1.1%) were residents of long-term-care

Figure 1

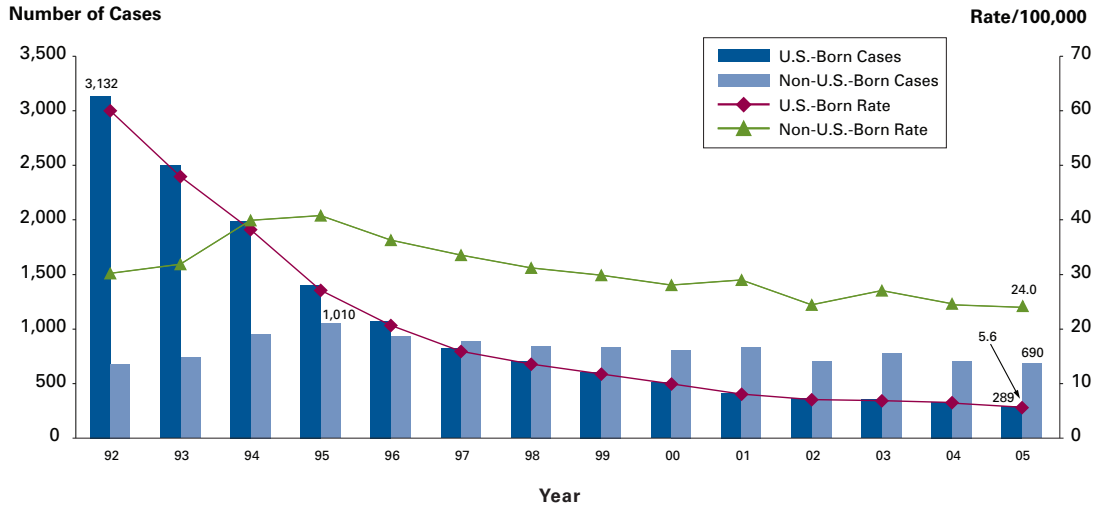
Tuberculosis Cases and Rates[1]
New York City, 1978-2005



[1]Rates based on official census data and intercensal estimates prior to 2000. Rates since 2000 are based on 2000 census data.

Figure 2

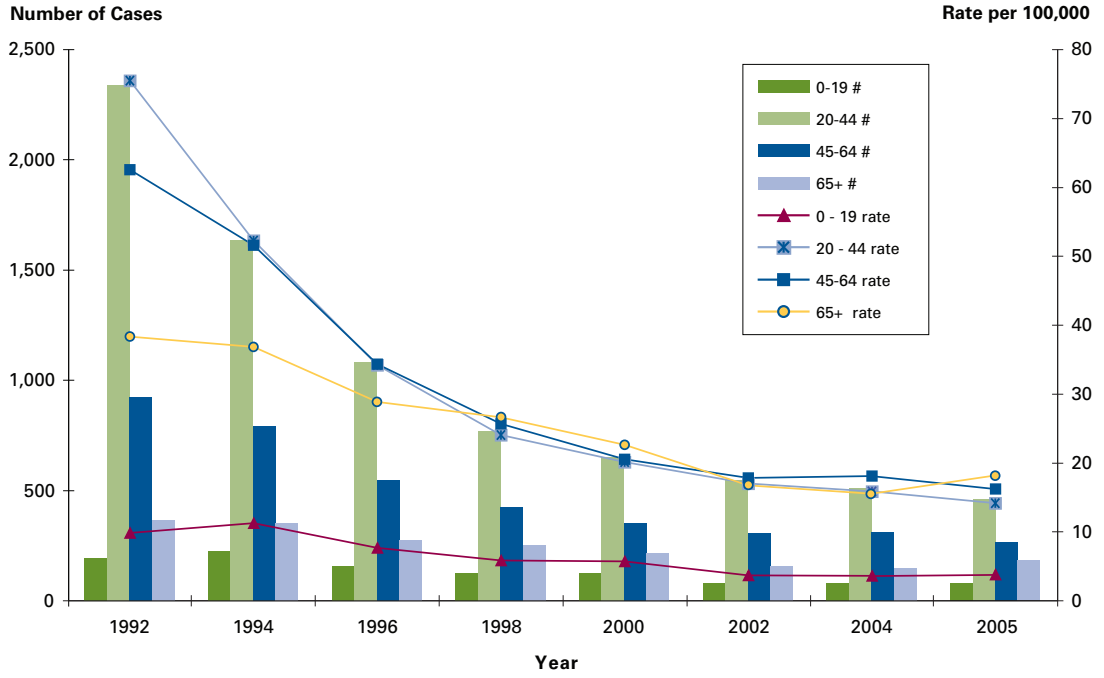
US-Born[1] and Non-US-Born Cases and Case Rates[2]
New York City, 1992-2005



[1] Puerto Rico and U.S. Virgin Islands are included as U.S.-born.
[2] Rates are based on official census data and intercensal estimates prior to 2000. Rates since 2000 are based on 2000 census data.

Figure 3

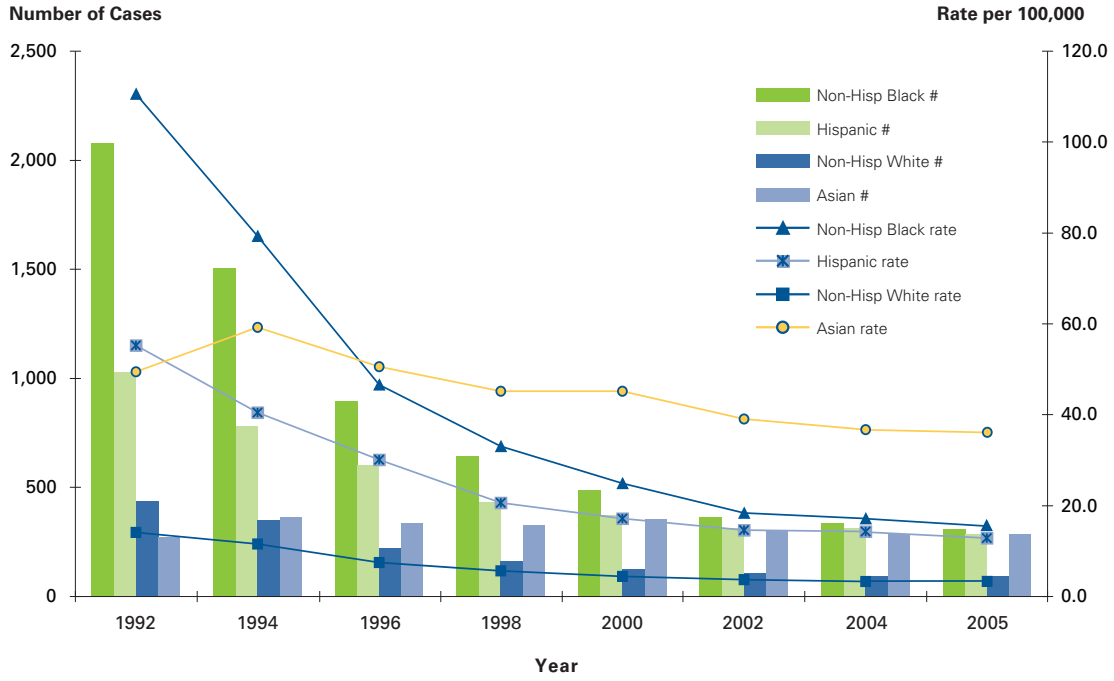
Tuberculosis Cases and Rates[1] by Age Group
New York City, 1992-2005



[1] Rates are based on official census data and intercensal estimates prior to 2000. Rates since 2000 are based on 2000 census data.

Figure 4

Tuberculosis Cases and Rates[1] by Race/Ethnicity
New York City, 1992-2005



[1] Rates are based on official census data and intercensal estimates prior to 2000. Rates since 2000 are based on 2000 census data.

facilities; 146 (14.8%) abused alcohol; and 112 (11.4%) used illegal drugs **(Table 4)**. These represent a large reduction compared to 1992 when there were 625 (16.4%) homeless patients and to 1995 (the first year that this information became available for most cases) when 77 (3.1%) correctional facilities residents, 39 (1.6%) long-term-care facilities residents, 208 (8.5%) patients who abused alcohol, and 280 (11.5%) patients who used illegal drugs were reported with tuberculosis. (See 1992 and 1995 TB Annual Summaries at: www.nyc.gov/html/doh/html/tb/tb-reports.shtml). More US-born TB patients were homeless at the time of diagnosis or during treatment (17.6%), compared to non-US-born patients (2.5%); similarly, US-born patients had a higher proportion of drug and alcohol use, 38.8% overall, compared to 10.4% for non-US-born patients **(Table 4)**.

Neighborhoods and Country of Birth

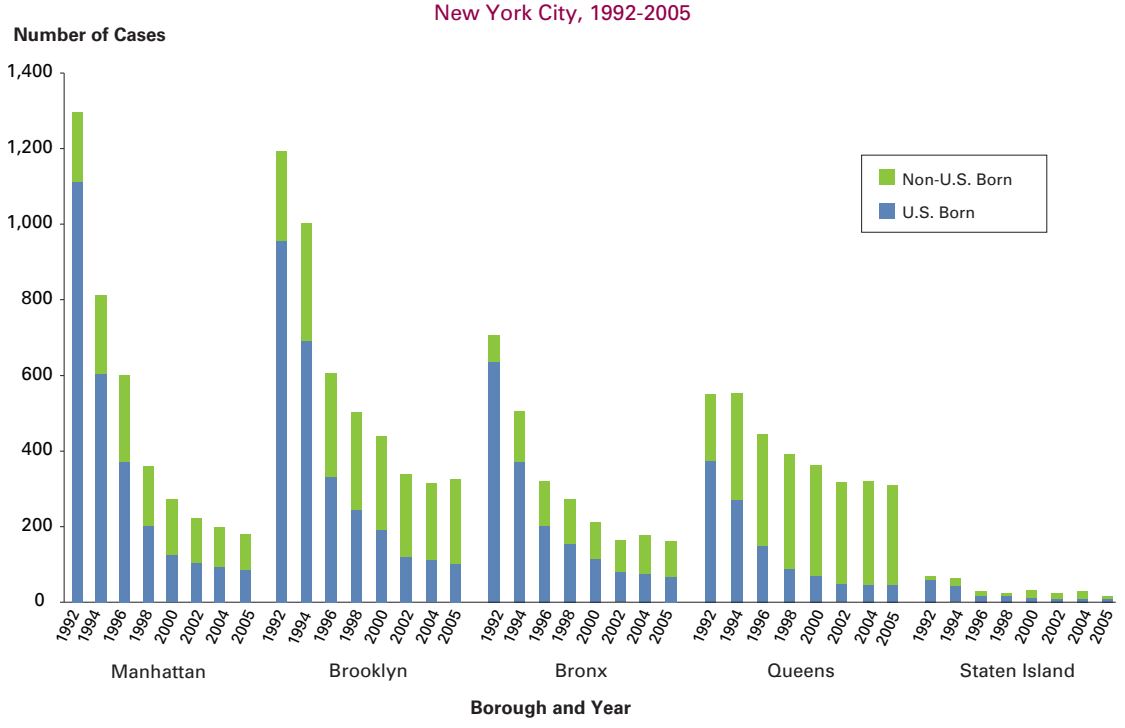
- **Neighborhoods.** The decreasing trend in TB cases continued in most NYC neighborhoods in 2005 compared to 2004. Of NYC's boroughs, The Bronx, Manhattan, Queens, and Staten Island experienced a decrease in TB cases and rates while TB increased slightly in Brooklyn **(Figure 5, Table 5)**. Brooklyn and Queens carry the burden of TB in NYC, while Manhattan and The Bronx have about half as many cases. The TB rate, however, is similar in these 4 boroughs, varying around 12-13/100,000 **(Tables 4 and 5)**.

- Neighborhoods most affected by TB in the early 1990s that show rates higher than the city average—including High Bridge-Morrisania, Crotona-Tremont, Central Harlem, East Harlem, Chelsea-Clinton, Union Square-Lower East Side, Bedford-Stuyvesant/Crown Heights, Williamsburg/Bushwick, East New York, and others **(Table 5)**—have experienced large decreases in TB rates.

Many, however, are now experiencing stabilization or slight increases in rates. All of these neighborhoods, except East New York, still have TB rates higher than the City average; 4 neighborhoods still had TB rates of more than 20/100,000 in 2005–Sunset Park (29.9), Williamsburg-Bushwick (23.2), Central Harlem (23.2), and West Queens (22.4) **(Table 5, Figure 6)**.

Figure 5

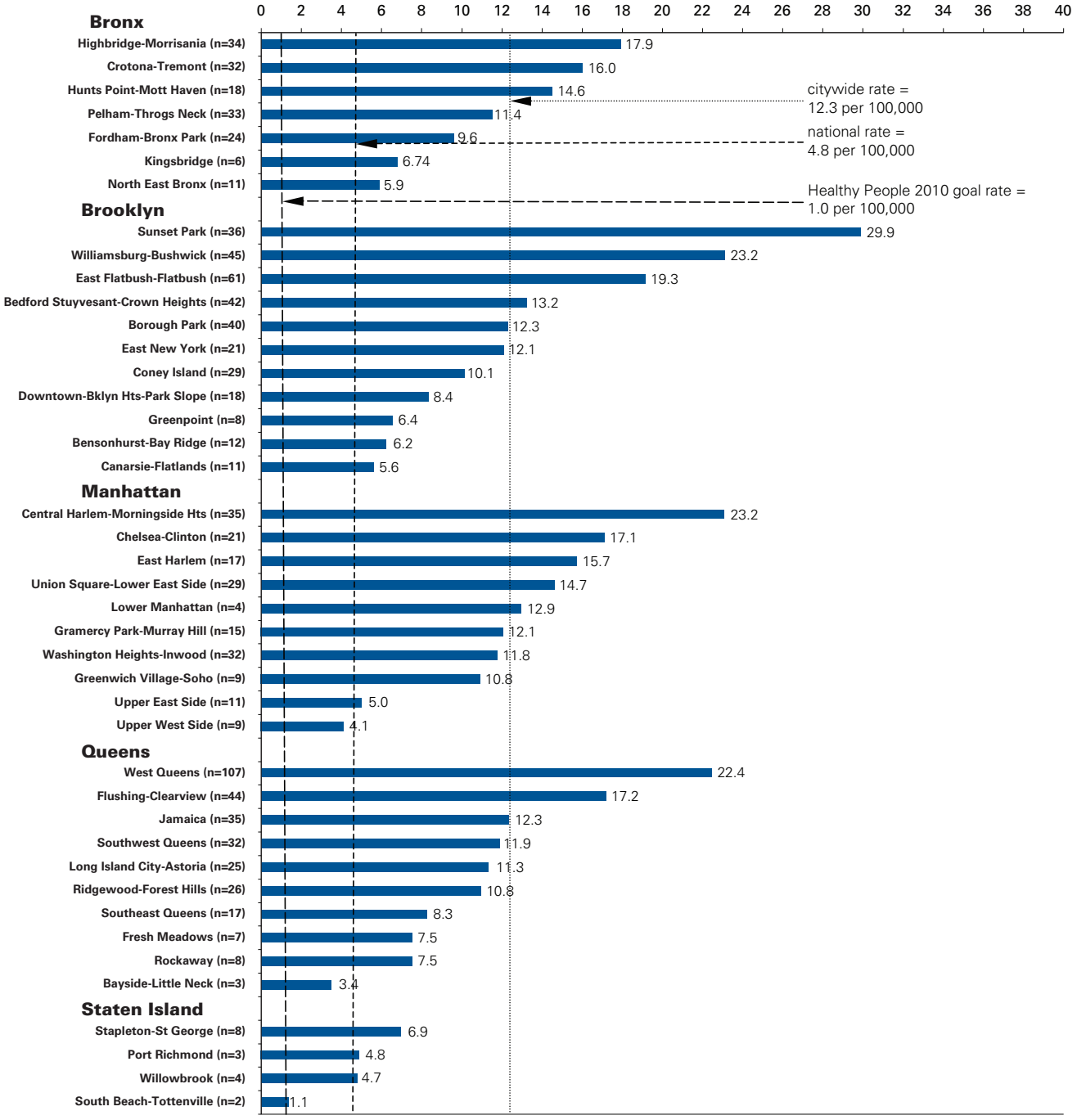
Tuberculosis Cases by Borough and Area of Birth[1]
New York City, 1992-2005



[1] Puerto Rico and U.S. Virgin Island are included as U.S.-born.

Figure 6

Rates of Tuberculosis by United Hospital Fund Neighborhood[1]
New York City, 2005



[1]Rate per 100,000 population, based on 2000 Census. Caution should be used in interpreting case rates for neighborhoods with a small number of cases.

- Sunset Park is unique in that it has not experienced the remarkable decrease that the rest of the City has seen since 1992, and has even seen an increase in TB in recent years. In fact, in 2005 it was the neighborhood with the highest TB rate in New York City. Sunset Park had a higher proportion (compared to the city as a whole) of TB patients who were non-US-born (83.3%) aged 20-44 years (55.6%), male (75%), Hispanic (47.2%), and Asian (36.1%). Most residents of Sunset Park with TB were born in China, Ecuador, Mexico, or Vietnam.
- **Country of birth.** The number of TB cases among US-born individuals decreased from 3,132 in 1992 to 289 in 2005, a 91% decrease **(Figure 2)**, while the number of cases among non-US-born persons has changed little. There has been an increase in TB cases among persons from China, Ecuador, India, and Mexico, and a decrease among cases from Haiti.
    - China was the main country of birth for TB patients in 2005, with 104 (15% of non-US-born TB cases); followed by Ecuador (67, 9.7%), which has become the second most common country of origin for TB patients in NYC; Haiti (48, 7%); India (40, 5.8%); Mexico (40, 5.8%); the Dominican Republic (36, 5.2%); the Philippines (23, 3.3%); Pakistan (20, 2.9%); and South Korea (20, 2.9%) **(Table 6)**.
    - Overall, more than half (57.1%) of non-US-born patients had been in the US for more than 5 years before being diagnosed with TB **(Table 4)**.
    - In 2005, the rate of TB among NYC patients born in the Caribbean and Latin America was 19.8/100,000; 45.2/100,000 for Asia-born patients; 64.4/100,000 for those from Africa; while patients born in Europe and the Middle East had lower rates: 5.5/100,000 and 12.4/100,000, respectively **(Table 6A)**. The rate of TB varied widely, however, for individual countries **(Table 6B)**.
        - Compared to the rate of TB in their country of birth, most non-US-born groups have lower TB rates in New York City—as much as 10 times less—than in their native-country. However, the TB rates were higher in New York City than in their country of birth, for individuals from Mexico, South Korea, and Nepal. The much higher TB rates among Nepalese in NYC may be due to the fact that most of the Nepalese (approximately 80%) are of Tibetan origin. These individuals are recent immigrants with an extremely high rate of TB in their country of origin. In addition, it is possible that under-counting of individuals from Nepal in the 2000 census occurred. Further exploration of this phenomenon is underway to enable the Bureau to better quantify the size of the community and to perform targeted outreach.
        - Individuals from China, the Dominican Republic, Honduras, Guyana, Haiti, and South Korea have been in the United States on average more than 7 years before diagnosis. The median time in the United States for patients from Nepal, who had a very high TB rate, was only 1.6 years.
        - The TB rate for non-US-born persons in the US is likely related to several factors, including the socioeconomic background of persons who emigrate, the time of arrival of these various groups of immigrants, access to care; and other factors. The TB rate for non-US-born persons in NYC also depends on the population, which is derived from the census and may under-represent immigrants to varying degrees.

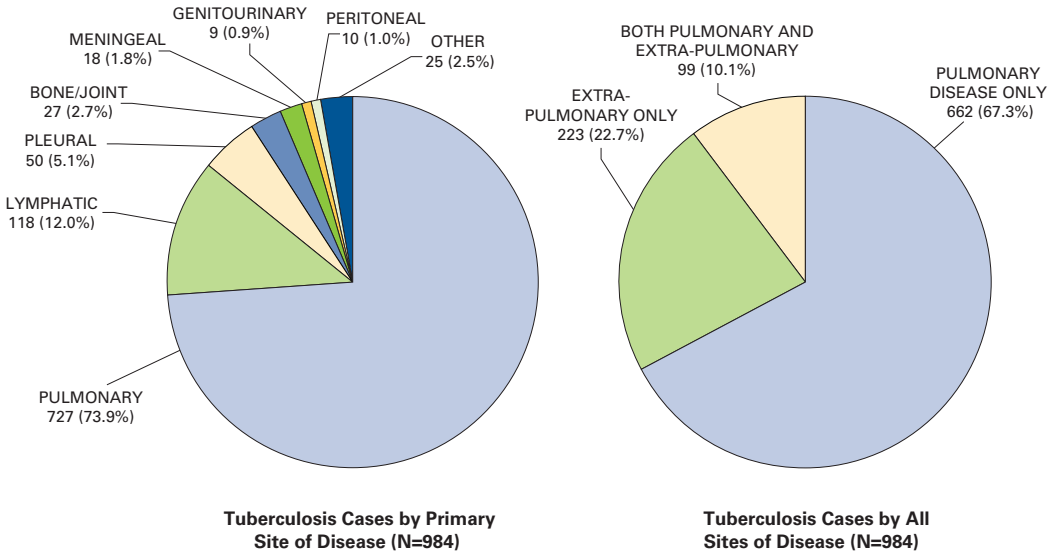
Clinical Characteristics

- **Diagnosis and site of disease.** The number of patients with sputum smear-positive TB and with culture-positive TB declined 80% and 78% respectively, from 1,856 (48.7%) and 3,442 (more than 90%) in 1982 to 373 (37.9%) and 745 (75.7%) in 2005. The proportion of TB cases that had pulmonary TB decreased from 86.1% in 1992 to 77.4% in 2005. This is perhaps due to a higher suspicion of extra-pulmonary TB at present **(Table 1, 4)**. In 2005, 67.3% had pulmonary TB alone. An additional 10.1% had both pulmonary and extra-pulmonary TB, and 22.7% had extra-pulmonary disease alone **(Table 4, Figure 7)**.

Of all patients evaluated for pulmonary TB in 2005 who were AFB smear-positive, 64.3% had an

Figure 7

Tuberculosis Cases by Site of Disease
New York City, 2005



Tuberculosis Cases by Primary Site of Disease (N=984)

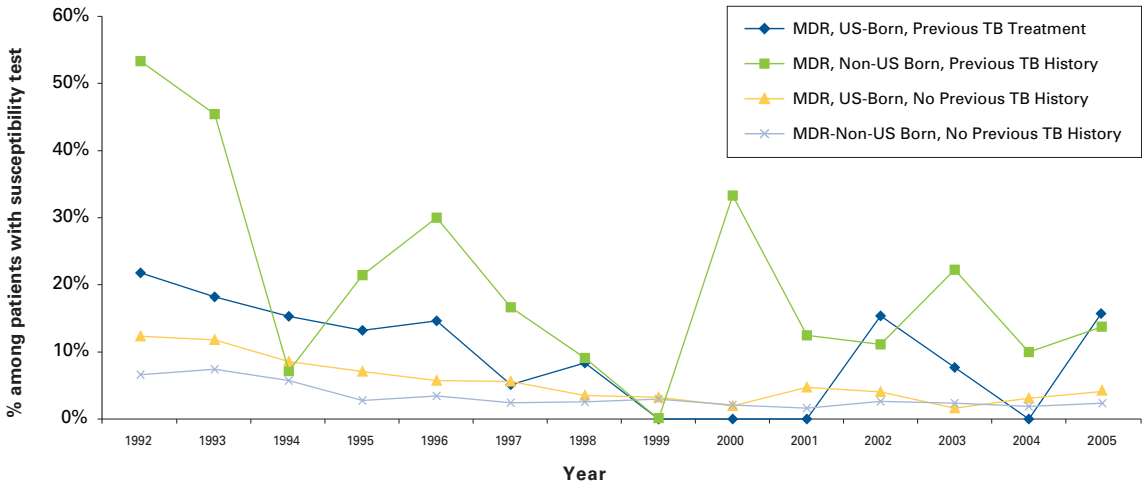
Tuberculosis Cases by All Sites of Disease (N=984)

NAA test done. Of those, 49.3% were NAA positive. Of AFB smear-positive confirmed pulmonary TB cases, 73.9% had an NAA test done and 93.5% were NAA positive **(Table 7)**.

- **Drug resistance.** Since 1992, the number of patients with MDR-TB decreased from 441 (14.2% of patients with susceptibility testing done) to 24 (3.3%) in 2005, a 94.6% decline. The decrease in ODR-TB (Other-Drug-Resistant TB) was 78%, from 442 (14.3%) to 98 (13.3%) in 2005. The proportion of patients with INH resistance remained relatively unchanged, fluctuating from 5.6% in 1992 and 4.2% in 1993 to 6.0% in 2004, and now to 4.2% in 2005. The absolute number of patients with INH resistance decreased markedly, however, from 174 in 1992 to 31 in 2005.
  - Patients with a history of prior anti-TB treatment had higher rates of MDR-TB, although numbers are small and fluctuate yearly **(Figure 8A)**. A history of prior anti-TB treatment does not seem to influence the rate of ODR-TB **(Figure 8B)**.
  - In 2005, 16.5% of patients who had undergone susceptibility testing had drug-resistance **(Table 4, 8)**; 13 patients (1.8%) had a history of prior anti-TB treatment–of those, 3 (23.1%) had drug-resistant TB, 2 of whom had MDR-TB. Because of the low number of patients with a prior history of anti-TB treatment, Table 8 shows aggregate data.
- **HIV infection.** Since 1992, the rate of TB cases occurring among HIV-infected individuals has declined significantly, from 1,281 (33.3%) in 1992 to 151 (15.3%) in 2005, a decrease of 88%. **(Table 2)**.
  - HIV infection varied by place of birth: 30.1% of US-born TB patients were HIV-infected in 2005, while only 9.1% of non-US-born TB patients had documented HIV infection **(Table 4, 9)**.
  - Of note, 32.3% of non-US-born patients had unknown HIV status, while 24.5% of US-born patients did not have HIV status recorded.
  - Similarly, HIV status varied with age **(Table 9)**. The overwhelming majority of HIV-positive patients were aged 20 to 64 years, while the majority of adults over the age of 65 (62%) had unknown HIV status.

Figure 8A

Multidrug Resistance[1] (MDR) by Area of Birth and History of Previous TB Treatment[2]
New York City, 1992-2005

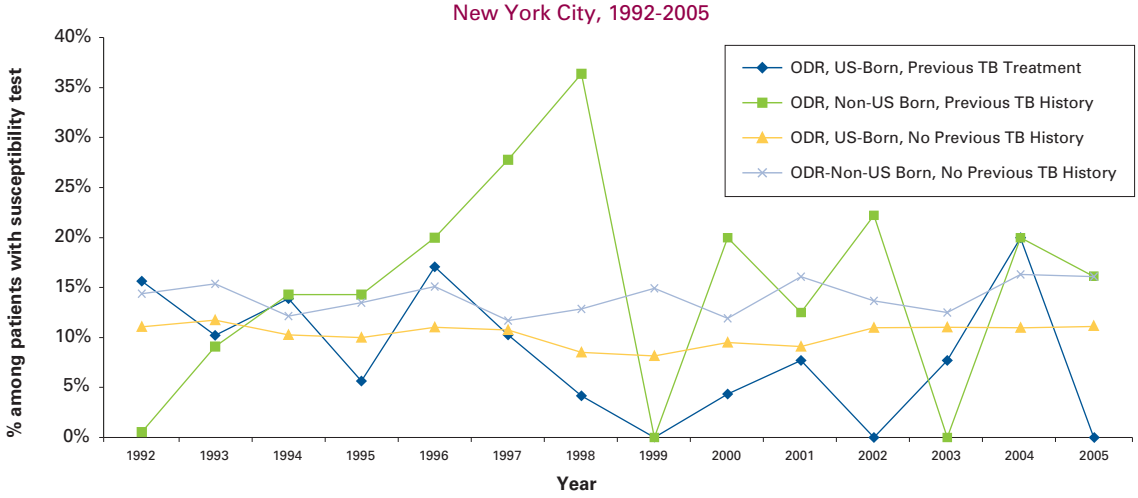


[1] MDR is defined as isolates resistant to at least Isoniazid and Rifampin.

[2] Patients with a history of prior tuberculosis treatment include those who received two or more anti-tuberculosis drugs for confirmed or suspected TB in the past.

Figure 8B

Other Drug Resistance[1] (ODR) by Area of Birth and History of Previous TB Treatment[2]
New York City, 1992-2005



[1] ODR is defined as isolates resistant to other first line drugs but not MDR.

[2] Patients with a history of prior tuberculosis treatment include those who received two or more anti-tuberculosis drugs for confirmed or suspected TB in the past.

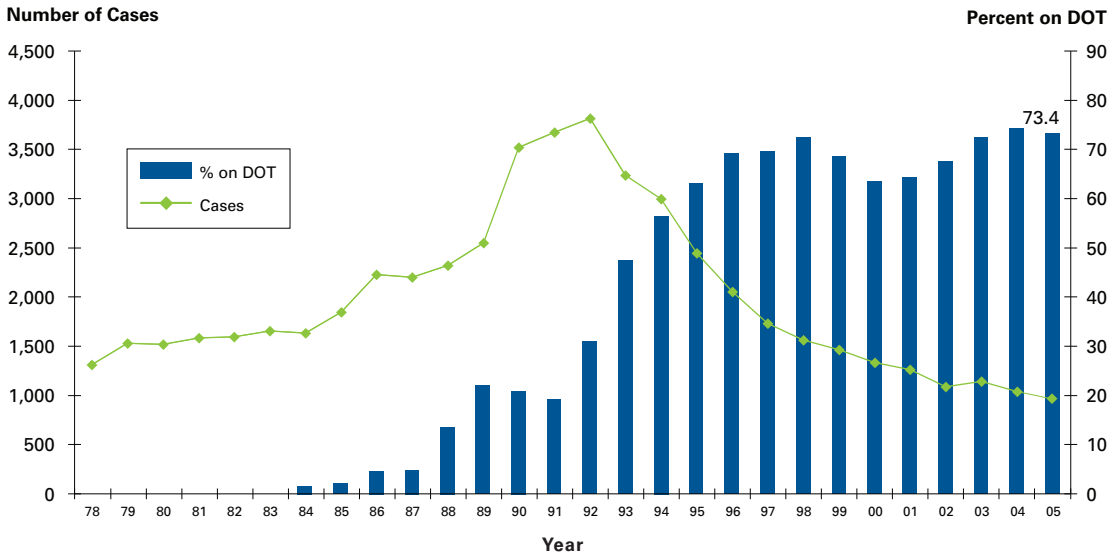
Patient Management and Outcomes

Management

- **Directly Observed Therapy.** The proportion of patients receiving treatment under DOT increased from 31.0% in 1992 to more than 60% in 1995. Since 2003, the proportion has consistently been more than 70% **(Figure 9)**. This figure shows an inverse relationship between DOT use and the number of TB cases in NYC. In 2005, among eligible patients, 643 (73.4%) received treatment under DOT–94.4% of eligible MDR-TB patients, 82.9% of ODR-TB patients, 82.5% of patients with pulmonary smear-positive TB, and 89.2% of patients treated at a DOHMH chest center were treated via DOT **(Figure 10)**. Only 22.6% of patients treated solely in a private practice setting were receiving DOT.

Figure 9

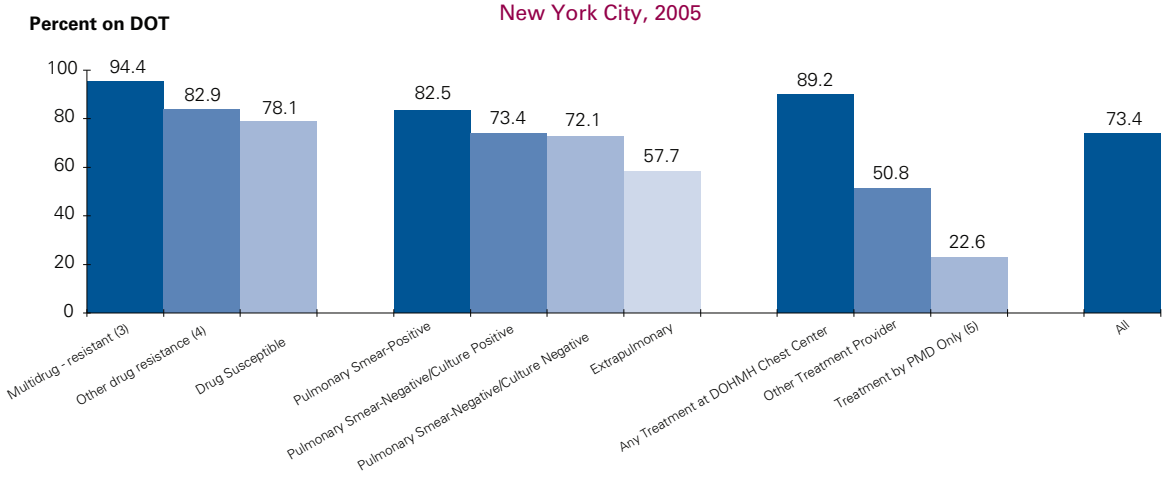
Tuberculosis Cases on Directly Observed Therapy[1]
New York City, 1978-2005



[1]Of those who were diagnosed while alive and received treatment with two or more drugs on an outpatient basis.

Figure 10

Proportion of Eligible[1] Tuberculosis Patients on DOT[2]
New York City, 2005



[1] Eligible patients were those diagnosed while alive and who received treatment with two or more anti-tuberculosis drugs on an outpatient basis.
[2] Ever on DOT as of March of the year after being confirmed as a case of tuberculosis.
[3] Multidrug-resistant is defined as resistant to at least rifampin and isoniazid.
[4] ODR is defined as first-line anti-TB drug resistance other than MDR. [5] PMD=Private medical provider.

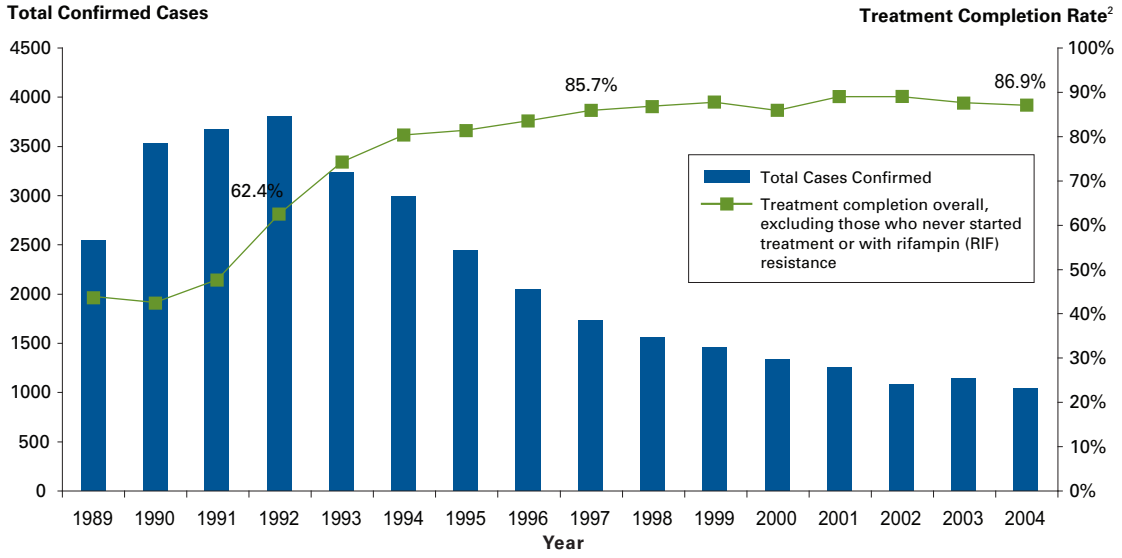
- **Treatment.** Treatment with 4 first-line drugs became the standard in the early 1990s in NYC. The proportion of patients started on 4 first-line drugs rose from 51.4% in 1992 to more than 80% in 1995, and has remained more than 85% since 2001. Of patients confirmed with TB in 2005, 962 (97.8%) were started on anti-TB treatment. The majority, 925 (94%), received 4 anti-TB drugs; 35 (3.6%) received 3 drugs while 22 (2.2%) did not start anti-TB treatment. Of patients not started on treatment, 12 (54.5%) were reported at death. Most patients (87.8%) were started on the standard 4 first-line drugs, rifampin or rifabutin, isoniazid, pyrazinamide and ethambutol. It is important to continue monitoring anti-TB treatment patterns in NYC, as standard treatment with 4 first-line drugs is important to prevent the emergence of drug-resistance.

Outcomes

- **Treatment Outcome.** Treatment outcome is analyzed after 1 year to allow sufficient time for treatment completion. We calculated trends in treatment completion for the first time in this report using the WHO definition of treatment completion, which only excludes patients who were resistant to rifampin and those who never started anti-TB treatment. Overall treatment completion increased from 62.4% for patients confirmed with TB in 1992 to more than 85% since 1997; treatment completion was 86.9% for patients confirmed in 2004 **(Figure 11)**.
  - Of patients confirmed with TB in 2004, 791 completed treatment in 1 year or less, an additional 79 completed treatment in over a year, and 15 were still on treatment **(Figure 12)** as of October 2006.
  - In NYC, we calculate treatment completion for patients whom we consider eligible to complete, either in less than or over 1 year. To calculate treatment completion in less than 1 year, we exclude patients who never started anti-TB medications; those who died before completion; those with rifampin (RIF) resistance; and

Figure 11

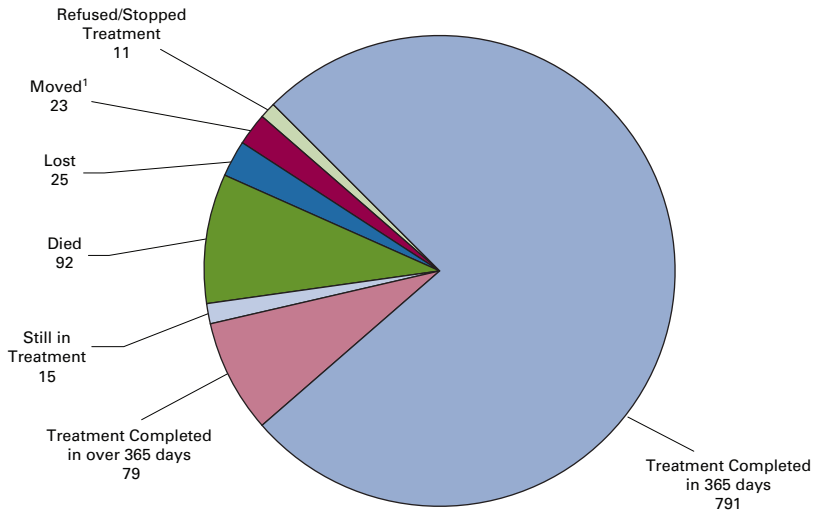
Tuberculosis Treatment Completion
New York City, 1989-2004[1]



[1] Treatment completion is analyzed with one year of delay to allow sufficient time for completion.
[2] Treatment completion is calculated as per World Health Organization (WHO) and does not exclude patients who died.

Figure 12

Outcome for Confirmed Cases Counted in 2004
New York City, 2005



(N=1,036)

[1] Patients are categorized as moved only if their transfer to another jurisdiction is confirmed and further follow-up information is available.

children less than 15 years old with bone, meningeal, or miliary TB, which yielded a treatment completion in less than 1 year of 85.7% for 2004 patients. Treatment completion in over 1 year is 8.4%, excluding patients who were never started on anti-TB medication and those who died before treatment completion. The overall treatment completion is 94.1% for 2004.

- **Deaths**. Based on analysis of vital record data, the number of deaths due to TB decreased significantly, from 200 in 1992 to less than 50 in 1998 and to an all-time low of 21 deaths in 2005 **(Table 1)**, a 90% decrease from 1992. The death rate among patients with TB increases both with age and for HIV-positive patients, particularly at younger ages (data not shown).

Tuberculosis Control Activities, 2005

The NYC Department of Health and Mental Hygiene (DOHMH) was established in 1866 under the name of the Metropolitan Board of Health. Its role was to consolidate activities aimed at controlling public health problems in NYC. The DOHMH has been fighting TB since the 19th century. For example, when department physicians discovered that bovine TB was transmitted by milk, the agency started certifying milk and initiated an extensive public education campaign. A registry for TB was established in 1894 and physicians were urged to report cases–in 1897, TB reporting became mandatory. TB clinics started to open in 1904 and a Division of Tuberculosis was created within the new Bureau of Infectious Diseases in 1913. Surveillance reports for TB are available since the early 1900s.

The Bureau's main functions are to:

- Provide case management and conduct contact investigations for all NYC TB patients, including those treated by non-DOHMH providers.
- Provide testing and treatment for latent and active TB at BTBC's chest centers.
- Monitor TB incidence and transmission to detect outbreaks and other important trends.
- Educate health care providers and the general public about key TB control issues and policies.
- Engage in research to ensure that the BTBC operates in an effective and efficient manner.
- Disseminate findings of research and evaluation activities.
- Assist organizations that serve populations at risk to better detect and treat TB.

TB Clinical Management

The Bureau operates 10 chest centers staffed with board-certified physicians, nurses, and non-clinical personnel. Chest centers provide free TB testing and state-of-the-art treatment to all patients. Services include TB screening, tuberculin skin testing (TST), chest X-rays, sputum induction, outpatient medical and nursing care for active and latent TB, social services, HIV counseling and testing, patient education, and translation services into more than 170 languages.

At Chest Centers in 2005:

- 32,309 patients received care, accounting for 124,256 visits, including 24,333 DOT visits.
- 21,609 TSTs were performed.
- 13,359 chest radiographs were performed and interpreted, of which 1,799 (13%) were for children.
- 674 patients with active TB received part or all their care at a chest center. Of this number, 379 were diagnosed at the centers, while the remainder was referred after diagnosis.
- HIV rapid testing was started in the second half of 2004, and by December 2005, 7 of the 10 chest centers were offering rapid testing.
    - 3,638 patients received HIV counseling—3,550 patients were tested for HIV compared to 2,996 counseled and 2,542 tested for that same period in 2004; 34 HIV-positive patients were identified and confirmed with Western Blot blood test.
    - Of patients tested, 2,195 received a rapid HIV test.
    - Anonymous and confidential rapid testing was available at all chest centers.

Free Services Offered Through the Bureau

- **TB evaluation, testing, and treatment at 10 chest centers, located in all 5 boroughs.** The centers work with patients with or without health insurance, do not ask about immigration status, and provide interpreters as needed.
- **Case management for all patients with TB, regardless of medical provider.** This includes patient education; treatment oversight; return of non-compliant patients to care; provision of directly observed therapy (DOT); and contact investigations, identification, and monitoring, along with TB testing when necessary.
- **On-call physicians for consultation on all aspects of TB management during work hours.**
- **Medications for all patients enrolled in a state-approved DOT program.**
- **Evaluation of new immigrants in need of TB care and follow-up.**
- **Physician access to a confidential registry of patients with active TB, their drug susceptibilities, and their treatment histories.**
- **Laboratory services for tests submitted by physicians and medical institutions.**

- 10,392 patients with LTBI were identified.
  - Of those, 5,540 began treatment and 1,618 (29.2%) completed treatment as of July 27, 2006, while 2,572 patients are still undergoing treatment.
  - Of patients started on LTBI treatment in 2004, and as of July 2006, 3,064 (51.4%) completed treatment.

Case Management and Contact Investigation

Case management is provided for all patients with confirmed TB and for persons suspected of having TB who meet certain criteria, such as AFB smear-positive results; cavitary chest X-ray; people who are on anti-TB treatment; and patients aged 18 years or less; among others. Contact investigations are conducted for eligible NYC patients—primarily those with smear-positive pulmonary or laryngeal TB, or with cavitary chest X-ray—even before confirmation of TB. These services are provided for all patients, regardless of where they are receiving care.

Case management for TB includes a comprehensive patient interview; review of the patient's medical record for information on medical history, diagnostic procedures, and treatment; treatment oversight; patient education; support to improve or maintain patient adherence to treatment; provision of DOT; use of legal interventions when patients fail to adhere to treatment despite education and case management efforts; and transfer of medical data to and from NYC and other jurisdictions for patients who move.

In 2005:

- BTBC outreach staff members conducted 1,777 patient interviews and evaluated 6,625 contacts.
  - Of contacts identified, 5,219 (78.8%) were evaluated and 1,340 (25.7%) were TST positive.
  - Of contacts infected with *Mycobacterium tuberculosis (M. tuberculosis)*, 934 (69.7%) were started on treatment for LTBI and, as of June 14, 2006, 275 (29.4%) completed treatment, while 500 (53.5%) were still undergoing treatment.
  - Of contacts to 2004 TB patients, 83.3% were evaluated, 26.1% were infected, 68.4% were started on treatment, 64.6% completed treatment, and 7.9% were still receiving LTBI treatment.
- Of patients treated by BTBC providers at some point during their illness, 88.2% of those eligible for DOT received treatment under DOT.

- In instances of non-compliance with examinations or treatment, patients are referred to the Bureau's Regulatory Affairs Unit (RAU) for evaluation for possible regulatory intervention, as authorized by the NYC Health Code. In 2005, RAU issued 1 order for examination, 2 for treatment completion, 33 for DOT, and 18 for detention (this included 3 until no longer infectious and 15 until treatment completion). At the end of December 2005, 7 patients were detained in the Bellevue Secure TB Unit.
- In 2005, the Interstate Desk referred 517 patients from NYC to other jurisdictions, including 114 confirmed TB cases (49 NYC patients and 65 patients who were not NYC residents), 121 TB suspected cases, 248 contacts or other LTBI patients, and 34 referrals for contact investigations. Other jurisdictions also made 375 referrals to NYC, including confirmed TB cases (12 NYC and 32 non-NYC cases), patients suspected of having TB (94), contacts and LTBI patients (190), 14 referrals for contact investigations, and 33 letters to offer LTBI treatment.
- BTBC evaluated 240 patients involved in exposures in 332 congregate sites to determine eligibility for an Expanded Contact Investigation (ECI) **(Table 10)**.
    - After patient and site evaluation, the ECI Unit selected 23 sites for epidemiologic investigations, involving 26 cases.
    - Of the 23 investigations, 12 (52%) involved workplace exposure; 5 (22%) were conducted in schools; 1 (4%) involved a healthcare facility; while 5 (22%) were conducted in residences, including residential drug treatment facilities (2), a housing project (1), and single-room occupancy hotels (2).
    - After investigation, transmission was considered unlikely in 8 (35%) instances, possible in 1 (4%), and probable in 10 (44%). In 4 (18%) investigations, the number of contacts tested was not sufficient to assess transmission. The number of contacts tested in these investigations totaled 860; 410 (48%) were close contacts and 450 (52%) were other-than-close contacts **(Table 10)**.
- BTBC held monthly MD Meetings to discuss important issues in the treatment, diagnosis, medical care, and case management of patients with TB and LTBI.
- Physicians-in-charge and medical consultants met monthly to discuss administrative and patient care issues.

Surveillance, Outbreak Detection, and Reporting

Providers and laboratories report patients confirmed and suspected of having TB to the BTBC. BTBC staff members also visit health care facilities to solicit reports about such patients and to educate providers on surveillance and reporting. TB patients' information is maintained in a computerized and secure registry, which includes patient demographic and social information, tuberculosis history, diagnostic tests results, treatment, and DOT information. *M. tuberculosis* molecular typing results (restriction length fragment polymorphism [RLFP] and spoligotying); epidemiologic linkage information is maintained in a separate database.

The BTBC regularly reports data on confirmed TB cases to the Centers for Disease Control and Prevention (CDC) and to the New York State Department of Health. BTBC staff members, health care providers, and the general public receive various reports. The annual report is distributed widely and made available on the Internet. Data not available from these sources can be provided upon request.

In 2005:

- Forty-three health care workers (HCWs) were diagnosed with TB, compared to 47 in 2004.
    - The majority of these workers (84%) were non-US-born and most were black non-Hispanic (47%) or Asian (30%).
    - More than half (54%) worked in hospitals, while 23% worked in home health care agencies. The rest were employed by nursing homes, other State-licensed facilities, outpatient health care facilities, and a dental office.

- Twenty-two (52%) had a prior history of TB or had had a positive TST at the time of employment. Of those, only 4 (18%) had received treatment for LTBI. Of 21 HCWs (49%) with negative or unknown TST status at employment, 3 (14%) received treatment for LTBI. Five (11%) HCWs reported having a community exposure to a TB case.

- The Bureau conducted 73 investigations of potential false-positive cultures for *M. tuberculosis*. Of these, 19 cultures were proven to be false-positive due to errors either in laboratory procedures or specimen handling. As a result, 16 patients were ultimately found not to have TB, 1 patient had other positive cultures, and 2 were confirmed with TB on clinical grounds.

- The Bureau continued to review the timeliness of reporting and to follow up with providers on reporting delays. This resulted in a decrease in reporting delays from 43% in 2003 to 32.6% in 2004, and to 22.8% in 2005. In 2005, patients with AFB smear-positive specimens were reported late 18.7% of the time. That year, 15.4% of patients started on 2 or more anti-TB drugs, and 46.9% of patients reported on the basis of pathology findings were also reported late.

- The BTBC conducted a survey of NYC hospital-based laboratories to assess TB-related laboratory services. All 76 laboratories were surveyed. Of these, 36 laboratory supervisors/directors stated that they have TB-related services and 35 returned a complete survey. The other laboratories were either closed (4) or had no TB laboratory (36). Only 4 laboratories process all currently available TB tests (from smear to susceptibility tests). All laboratories performed AFB smears, 7 performed NAA tests, 32 had mycobacterial culture capacity, and only 5 performed susceptibility testing.

- The Bureau managed an outbreak of MDR-TB in a residence for HIV-infected homeless persons. Between April and July 2005, 3 patients with AFB sputum smear-positive TB were diagnosed at a 42-bed residence for homeless, HIV-infected persons.

  - All isolates had identical genotypes and were resistant to isoniazid, rifampin, pyrazinamide, ethambutol, and streptomycin. They matched that of strain W, the strain of *M. tuberculosis* responsible for large nosocomial outbreaks in NYC in the late 1980s and early 1990s.

- In July 2005, BTBC initiated case-finding activities. BTBC staff evaluated individuals who had worked or lived at the homeless shelter from January through July 2005, using TST, chest X-ray, medical examination, and sputum induction. The team completed evaluations on every current resident and on 96% of staff members. They made extensive efforts to locate and evaluate the 49 residents who had been discharged from the facility before the screening began. One additional HIV-positive, TST-positive resident with a normal chest X-ray was diagnosed during the screening. This patient had culture-positive pulmonary TB with the same TB strain as the initial 3 cases. Another patient was identified when diagnosed in New Jersey. This resident had been discharged before the screening began, and was not located until his diagnosis in New Jersey.

- Recommendations included LTBI treatment with moxifloxacin for HIV-infected contacts and for HIV-negative contacts with new positive TST results or prior positive results and intense exposure. Twenty-eight (44%) HIV-infected and 2 (11%) HIV-negative persons began treatment with moxifloxacin for latent TB infection.

- Ongoing surveillance efforts are in place to identify active TB in residents of the facility at the time of exposure in order to enhance the likelihood of identifying their exposure history. These efforts include the distribution of a health alert via the Health Alert Network (HAN) in NYC, New Jersey, surrounding New York State counties, and via various AIDS, TB, and infectious diseases associations. In addition, the information has been included in the monthly review of the TB, homeless services, prison, and death registries.

Education

The Bureau continues to offer TB-related training for staff members and NYC health care providers, as well as educational sessions for the public.

In 2005:

- BTBC physicians presented up-to-date information on TB and LTBI to the medical community at 30 medical grand rounds and clinical conferences.
- Bureau staff members gave 23 medical lectures in high-incidence facilities and community clinics, and conducted 5 City-wide TB rounds at high-TB-incidence facilities. In addition, the Bureau conducted 2 sessions of Tuberculin Skin Test Administration Training for non-DOHMH staff in 2005, reaching 40 health care providers.
- The staff also provided TB education for contacts of patients with active TB at 53 sites for 1,166 individuals, and conducted basic TB educational sessions at 60 sites for 1,933 people.
- The BTBC, in conjunction with the NYC DOHMH, the Charles P. Felton National TB Center, the New Jersey Medical School National TB Center, and the Center for Immigrant Health, sponsored a continuing medical education (CME) symposium entitled *2005 TB Symposium: Current Challenges and New Developments* on December 9, 2005. The symposium was well received by 189 health care providers (91 DOMHH, 98 Non-DOHMH), including physicians, nurses, infection control practitioners, public health workers, and laboratory personnel.
- The BTBC planned and developed a TB Awareness Campaign, which was launched on World TB Day 2006 (March 24th). Its mission was to raise TB awareness and encourage high-risk persons to get tested and take advantage of the free TB services offered by the NYC DOHMH.
    - The campaign, under the theme *Moving Towards a Tuberculosis-Free New York City,* combines local media advertising and partnership efforts with medical providers and community-based organizations. Its goal is to target US- and non-US-born communities in neighborhoods with high rates of TB.
    - The 3-month campaign targets Chinese, Korean, Hispanic, Haitian, South Asian, and US-born African American communities residing in East Flatbush-Flatbush and Bedford Stuyvesant-Crown Heights in Brooklyn; Union Square-Lower East Side in Manhattan; and West Queens and Flushing in Queens. These communities were chosen based on their disproportionately high rates of TB infection and disease.
    - The BTBC has planned a series of events in 2006 to mobilize high-risk communities, encourage support, expand partnerships, reach out to medical providers serving high risk communities, and promote high-quality TB control and care.

Research

BTBC staff members continue their active research on the epidemiology, risk factors, management, and prevention of TB. In 2005, Bureau staff members co-authored 15 papers published in peer-reviewed journals and presented 11 posters or oral presentations at national and international conferences.

Research conducted in 2005 included:

- **Use of NAA Tests for the Diagnosis of TB in NYC.** This study was conducted to describe the use of NAA tests among NYC patients evaluated for TB and to determine the sensitivity, specificity, and predictive value (PV) in respiratory specimens. Data for patients reported from 2000 to 2004 were analyzed. Among 16,511 NYC patients with suspected or confirmed pulmonary TB, 52.1% of AFB smear-positive-confirmed TB cases had a NAA test done, while 43.6% of AFB smear-positive suspects without TB had a NAA test done. The NAA assay was positive in 94.2% of AFB smear-positive TB patients, while the test was negative for 98.1% of non-TB patients. In AFB smear-positive patients, the sensitivity of NAA was 94.2%; specificity was 98.1%; PPV was 98.7%; and NPV was 92%. The high sensitivity, specificity, and predictive value of the NAA test in AFB smear-positive respiratory specimens all argue for the more frequent use of this test to confirm or reject the diagnosis of pulmonary TB.

- **NAA Use Among NYC Providers.** A survey was conducted in a sample of NYC providers (primarily infectious disease, pulmonary, and internal medicine specialists) to assess their use of NAA tests and reporting practices. The survey showed that the NAA test is underutilized in NYC—infectious diseases and pulmonary specialists order the test more frequently than general practitioners.
- **Treatment of Latent Tuberculosis Infection (LTBI) in BTBC Chest Centers.** The project aimed to assess LTBI prevalence and completion of treatment among BTBC chest center patients. The overall prevalence of LTBI was 24.2%. Contacts to patients with pulmonary TB and non-US-born persons had the highest prevalence of LTBI (35.5% and 40.7%, respectively). Of persons started on LTBI treatment, 8,310 (50.3%) completed their regimen. Patients who completed treatment were more likely to be less than 20 or more than 35 years of age, Asian, contacts of patients with pulmonary TB, to have increased medical risk for TB, or to have been receiving a rifamycin-type medication only.
- **Cohort Tracking.** In 2004, the BTBC implemented a protocol to track issues identified during cohort review meetings. These issues encompassed treatment, surveillance, and reporting; contact investigation; case management; epidemiology; data quality; and education. After each cohort review, a spreadsheet of outstanding issues is distributed to the relevant supervisors to investigate and provide follow-up information. For TB cases reviewed in 2005, issues related to the quality of the data were most common (50.8%), followed by treatment (17.1%), contact investigation (13.5%), case management (7.5%), epidemiology (5.8%), and education (1.3%) issues. To date, 83.7% of issues identified were addressed within 30 days of the cohort review meeting and 83.8% of all issues were resolved by the subsequent cohort.
- **Tuberculosis Epidemiology Studies Consortium.** The BTBC continued its participation in existing TB Epidemiology Studies Consortium Studies, including Task Orders 4, 8, and 9. The Bureau also collaborated with the Charles P. Felton Model Center (CPFMC) on Task Orders 2, 3, and 13.

Collaboration with Other Organizations

The Bureau collaborates with other offices within NYC DOHMH, other City agencies, and non-governmental organizations (NGOs) that serve communities at high risk for TB. In 2005, the Bureau collaborated with the following offices and organizations:

- ### The NYC DOHMH Office of Correctional Health

  The BTBC provides Riker's Island inmates with TB-related services such as surveillance, education, and interviews of suspected and confirmed TB cases. BTBC staff members are posted at Riker's Island to serve as liaison between prison health providers and the rest of the Bureau. In 2005:

  - The Bureau received reports of 46 confirmed or suspected TB patients from the Riker's Island facility; 9 were confirmed to have TB.
  - Among all NYC patients confirmed with TB, 22 patients received some or all of their care and treatment at Riker's Island.
  - BTBC, the Bureau of Informatics and Information Technology (BIIT), and Correctional Health staff started planning and testing for a daily match between the TB Registry and the Riker's Island database. The purpose of the match is to identify TB patients who may be lost and need to be restarted on treatment, and to review the TB history of new inmates for better planning of their TB screening. The daily match started in early 2006.
  - Several lectures on LTBI and TB were delivered to staff at Riker's Island.

- ### Selected Single-Room-Occupancy Hotels (SROs)

  BTBC staff members continue to provide DOT for SRO hotel residents with active TB and for HIV-infected patients who have LTBI. The Bureau screens new SRO residents for TB via onsite TST screening and through referrals to chest centers. Its goal is to ensure that all eligible patients receive appropriate treatment. In 2005:

- 446 individuals were screened for TB, 348 TSTs were implanted, and 27 individuals tested positive.
- BTBC staff members provided DOT for 45 SRO residents with active TB or LTBI.

- **The Department of Homeless Services**
  The Bureau ensures screening and treatment of homeless individuals, as well as education and screening of employees:
  - Services continue at the 30th Street Men's Shelter TB Unit, including comprehensive TB treatment (excluding laboratory and radiology services). In 2005, 68 men lived in the unit, 27 were already in the shelter in 2004, and 41 were enrolled in 2005. Of these 68 individuals, 14 were receiving treatment for active TB; of the 14, 2 were later found not to have TB and 8 (66.7%) completed treatment as of December 31st, 2005. The others are still undergoing anti-TB treatment. Of 54 persons receiving treatment for LTBI, 30 (55.6%), completed treatment as of December 2005.
  - At the Kingsboro Men's Shelter, BTBC provides TB case management, TSTs, and DOT for LTBI. In 2005, 112 persons were screened for TB; 109 were found eligible for TSTs; and 108 received a TST. Five were prescribed therapy for LBTI and were enrolled in the DOT program.
  - The Shelter Employee TB Screening Project continues to provide TB education and TSTs to employees. In 2005, 91 employees at the 30th Street Men's Shelter and 47 at the Atlantic Assessment Facility received TSTs. Three individuals were found to have positive results at each location.
  - The Homeless Services Unit continued to provide TB education to employees of the Department of Homeless Services at approximately 40 facilities throughout the city. In 2005, 1,035 employees participated in education sessions, 256 were screened for TB, and 196 were tested. Fourteen employees had a positive TST reaction.

- **The United States Public Health Service, Division of Quarantine, at JFK International Airport**
  The Bureau continues to ensure that all immigrants and refugees entering the United States through the Port of New York with a TB diagnosis receive appropriate treatment. In 2005, 316 notifications of immigrants or refugees needing follow-up were processed; 284 (90%) of these persons were located and evaluated; and 14 (5%) patients were diagnosed with active TB.

- **School and Community Health Centers**
  The Pharmacy Support Program continues for:
  - Community-based organizations (CBOs)
  - School-based clinics
  - Health centers that serve people who have come to New York from countries with a high prevalence of TB and US minorities at high risk for TB

  The participating facilities receive free PPD antigen, syringes, and TB medications for LTBI treatment. In 2005, 13 participating facilities performed TST for 2,593 persons. Of these, 781 were positive and 1,130 persons were started on treatment for LTBI, including some who had received their TST elsewhere.

- **Health and Hospitals Corporation (HHC) Facilities**
  The Bureau maintains contracts with various HHC facilities to aid in TB testing and provision of LTBI treatment for high-risk patients. These services are provided by Elmhurst and Lincoln Hospitals and by the Center for Immigrant Health via a contract with Bellevue/New York University. In 2005, we have sought to expand this collaboration, and are working with Kings County Medical Center and Harlem Hospital to develop contracts for these activities for 2006.

Table 1. Tuberculosis Incidence, New York City, 1900-2005

Year[1]	Number[2,3]	Rate per 100,000[4]	Culture-Positive Cases	Sputum Smear-Positive Cases[5] (Rate per 100,000)		Multidrug-Resistant Cases[6,7]	Other Drug Resistant Cases[7,8]	Deaths[9]	Death Rate Per 100,000
1900	11,997	348.1						9,630	279.5
1910	32,065	670.0						10,074	210.5
1920	14,035	246.9						7,915	144.1
1930	11,821	170.2						4,574	68.2
1940	9,005	120.8						3,680	50.0
1950	7,717	97.8						2,173	27.4
1960	4,699	60.4						824	10.6
1970	2,590	32.8						432	5.5
1971	2,572	32.9						316	4.0
1972	2,275	29.4						335	4.3
1973	2,101	27.5						259	3.4
1974	2,022	26.7						215	2.8
1975	2,151	28.7						208	2.8
1976	2,151	29.1						187	2.5
1977	1,605	21.9						175	2.4
1978[3]	1,307	18.1						188	2.6
1979	1,530	21.4						121	1.7
1980	1,514	21.4						143	2.0
1981	1,582	22.3						155	2.2
1982	1,594	22.4						168	2.4
1983	1,651	23.1						151	2.1
1984	1,629	22.7	1,527					168	2.3
1985	1,843	25.6	1,785					155	2.2
1986	2,223	30.8	2,181					186	2.6
1987	2,197	30.3	2,157					219	3.0
1988	2,317	31.9	2,241					246	3.4
1989	2,545	34.9	2,405					236	3.2
1990	3,520	48.1	3,372					256	3.5
1991	3,673	49.7	3,484	1,772	24.0	366		245	3.3
1992	3,811	51.1	3,442	1,856	24.9[8]	441	442	200	2.7
1993	3,235	43.0	2,854	1,526	20.3	296	328	166	2.2
1994	2,995	39.4	2,479	1,265	16.7	176	245	133	1.8
1995	2,445	31.9	2,014	989	12.9	109	216	94	1.2
1996	2,053	26.5	1,721	837	10.8	84	216	67	0.9
1997	1,730	22.2	1,401	665	8.5	56	162	55	0.7
1998	1,558	19.8	1,255	558	7.1	38	135	52	0.7
1999	1,460	18.4	1,143	515	6.5	34	131	49	0.6
2000	1,332	16.6	1,066	467	5.8	25	114	44	0.5
2001	1,261	15.7	964	453	5.7	24	129	33	0.4
2002	1,084	13.5	823	429	5.4	27	102	30	0.4
2003	1,140	14.2	872	427	5.3	21	103	34	0.2
2004	1,039	13.0	798	391	4.9	18	117	30	0.4
2005	984	12.3	745	373	4.7	24	98	21	0.3

[1] TB became reportable on January 19, 1897.

[2] For "phthisis," or pulmonary cases, 1920-1940; thereafter, all forms of tuberculosis.

[3] Case definition revised in 1978 to include persons who had verified disease in the past and were discharged or lost to supervision for more than 12 months and had verified disease again.

[4] Rates through 2000 are based on official Census population data and intercensal estimates. Rates since 2000 are based on 2000 Census data.

[5] Patients with a sputum smear positive for acid-fast bacilli regardless of culture result.

[6] Resistant to at least isoniazid and rifampin. Mandatory drug susceptibility reporting became effective during 1991; figure from that year is not complete.

[7] Definition for 'Other Drug Resistant Cases' changed in 2004 to include all non-MDR cases with a resistant result reported for a first-line drug, regardless of drug susceptibility testing method. All historical data updated to reflect this definition.

[8] This information was estimated for 1992, exact figures are not available.

[9] TB deaths are obtained from vital statistics records and may include cases diagnosed in previous years.

Table 2. HIV Status of Tuberculosis Cases by Sex and Area of Birth, New York City, 1992-2005

Year	Number (Percent)									
	Females HIV (+)		Males HIV (+)		US-Born HIV (+)		Non-US-Born HIV (+)		Total[1] HIV (+)	
1992[2]	297	(25.1)	984	(37.4)	1294	(42.6)	118	(16.5)	1281	(33.6)
1993	308	(27.5)	760	(35.9)	958	(38.4)	110	(14.9)	1068	(33.0)
1994	244	(23.5)	767	(39.2)	852	(42.9)	147	(15.4)	1011	(33.8)
1995	226	(25.4)	575	(37.0)	658	(46.9)	139	(13.8)	801	(32.8)
1996	204	(26.0)	429	(33.8)	490	(45.9)	124	(13.4)	633	(30.8)
1997	147	(21.8)	301	(28.5)	323	(39.4)	122	(13.8)	448	(25.9)
1998	108	(18.6)	238	(24.4)	250	(35.7)	96	(11.3)	346	(22.2)
1999	102	(18.3)	219	(24.3)	216	(35.7)	102	(12.2)	321	(22.0)
2000	74	(14.1)	167	(20.6)	159	(31.1)	77	(9.6)	241	(18.1)
2001	65	(13.3)	119	(15.4)	123	(29.9)	60	(7.2)	184	(14.6)
2002	57	(13.7)	136	(20.4)	129	(35.6)	58	(8.3)	193	(17.8)
2003	47	(11.1)	131	(18.3)	106	(30.0)	72	(9.3)	178	(15.6)
2004	52	(12.6)	117	(18.7)	99	(29.7)	70	(9.9)	169	(16.3)
2005	38	(10.9)	113	(17.8)	87	(30.1)	63	(9.1)	151	(15.3)

[1] Total HIV infected cases may be more than the sum of US and non-US-born HIV infected cases because area of birth is unknown for some cases.
[2] Breakdown by the area of birth for 1992 is estimated, exact figures are not available.

Table 3. Tuberculosis Incidence (Rate per 100,000) by Race/Ethnicity, Sex, and Age, New York City, 2005[1]

Race/Ethnicity/Sex	Age Group in Years										
	0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 34	35 - 44	45 - 54	55 - 64	65+	Total[2]
	N Rate	N Rate	N Rate	N Rate	N Rate	N Rate	N Rate	N Rate	N Rate	N Rate	
Non-Hispanic White, total	2.0 1.5	0.0 0.0	0.0 0.0	1.0 0.8	5.0 2.8	14.0 2.9	12.0 2.9	12.0 3.0	15.0 5.2	31.0 5.8	92 3.3
Male	1.0 1.4	0.0 0.0	0.0 0.0	0.0 0.0	3.0 3.6	6.0 2.5	8.0 3.7	8.0 4.2	12.0 9.0	15.0 7.1	53 4.0
Female	1.0 1.5	0.0 0.0	0.0 0.0	1.0 1.6	2.0 2.2	8.0 3.4	4.0 2.0	4.0 2.0	3.0 2.0	16.0 4.9	39 2.7
Non-Hispanic Black, total	5.0 3.4	1.0 0.6	3.0 1.8	10.0 6.6	14.0 10.2	47.0 16.1	84.0 26.7	60.0 25.2	42.0 25.1	39.0 21.1	305 15.5
Male	4.0 5.4	1.0 1.2	2.0 2.4	6.0 8.0	9.0 14.3	30.0 23.7	56.0 40.8	39.0 38.6	33.0 49.1	25.0 39.1	205 23.4
Female	1.0 1.4	0.0 0.0	1.0 1.2	4.0 5.3	5.0 6.7	17.0 10.2	28.0 15.8	21.0 15.3	9.0 9.0	14.0 11.6	100 9.2
Hispanic, total	10.0 5.4	4.0 2.0	6.0 3.4	19.0 10.9	30.0 15.8	65.0 16.9	58.0 17.5	36.0 15.4	24.0 16.1	27.0 19.4	279 12.9
Male	5.0 5.3	3.0 3.0	2.0 2.2	14.0 15.5	15.0 15.6	45.0 23.7	40.0 25.4	24.0 22.8	17.0 25.9	17.0 33.2	182 17.5
Female	5.0 5.5	1.0 1.0	4.0 4.6	5.0 5.9	15.0 16.0	20.0 10.3	18.0 10.3	12.0 9.4	7.0 8.4	10.0 11.4	97 8.7
Asian, total	5.0 10.4	0.0 0.0	6.0 13.2	8.0 16.7	23.0 36.9	63.0 39.6	32.0 22.2	37.0 34.5	40.0 66.7	71.0 120.6	285 36.5
Male	2.0 8.1	0.0 0.0	2.0 8.4	5.0 20.2	7.0 23.4	33.0 42.7	18.0 24.3	26.0 48.5	30.0 102.8	57.0 216.5	180 46.4
Female	3.0 12.8	0.0 0.0	4.0 18.5	3.0 13.0	16.0 49.5	30.0 36.7	14.0 19.9	11.0 20.5	10.0 32.5	14.0 43.0	105 26.8
TOTAL[2]	22.0 4.1	5.0 0.9	15.0 2.8	38.0 7.3	76.0 12.9	191.0 14.0	192.0 15.2	150.0 14.8	123.0 18.0	172.0 18.3	984 12.3
Male	12.0 4.3	4.0 1.4	6.0 2.2	25.0 9.4	37.0 13.0	116.0 17.5	127.0 20.7	99.0 21.0	92.0 30.1	117.0 32.5	635 16.7
Female	10.0 3.8	1.0 0.4	9.0 3.5	13.0 5.1	39.0 12.8	75.0 10.6	65.0 10.0	51.0 9.4	31.0 8.2	55.0 9.5	349 8.3

[1] Rates are based on 2000 census data.
[2] There are 11 patients with multiple races, and 12 patients with unknown race or ethnicity. They are included in the totals.

Table 4. Selected Characteristics of US-Born and Non-US-Born Cases, New York City, 2005

Characteristic	# US-Born	%	# Non-US-Born	%	Total	%
DEMOGRAPHICS						
Age Group						
0-19	37	12.8	43	6.2	**80**	**8.1**
20-44	94	32.5	364	52.8	**459**	**46.6**
45-64	106	36.7	164	23.8	**273**	**27.7**
65+	52	18.0	119	17.2	**172**	**17.5**
Sex						
Female	103	35.6	243	35.2	**349**	**35.5**
Male	186	64.4	447	64.8	635	64.5
Race/ethnicity						
Black Non-Hispanic	156	54.0	146	21.2	**305**	**31.0**
White Non-Hispanic	42	14.5	50	7.2	**92**	**9.3**
Hispanic	80	27.7	199	28.8	**279**	**28.4**
Asian	9	3.1	276	40.0	**285**	**29.0**
Multiple	0	0.0	11	1.6	**11**	**1.1**
Unknown ethnicity or race	2	0.7	8	1.2	**12**	**1.2**
Borough of residence						
Manhattan	76	26.3	106	15.4	**182**	**18.5**
Bronx	68	23.5	88	12.8	**158**	**16.1**
Brooklyn	100	34.6	221	32.0	**323**	**32.8**
Queens	39	13.5	264	38.3	**304**	**30.9**
Staten Island	6	2.1	11	1.6	**17**	**1.7**
Time in the US						
<1 year	n/a	n/a	79	11.4	**79**	**11.4**
1-5 years	n/a	n/a	199	28.8	**199**	**28.8**
> 5 years	n/a	n/a	394	57.1	**394**	**57.1**
Unknown	n/a	n/a	18	2.6	**18**	**2.6**
CLINICAL CHARACTERISTICS[1]						
Ever on DOT (of those eligible)	169	72.5	474	73.8	**643**	**73.4**
Ever smear positive	152	52.6	354	51.3	**509**	**51.7**
Sputum smear positive	117	40.5	255	37.0	**373**	**37.9**
NAA positive	106	36.7	210	30.4	**319**	**32.4**
Culture positive	209	72.3	532	77.1	**745**	**75.7**
Clinical case[2]	80	27.7	158	22.9	**239**	**24.3**
Pulmonary site of disease	210	72.7	451	65.4	**662**	**67.3**
Cavitary chest x-ray	50	23.8	94	20.8	**114**	**17.2**
Extra-pulmonary site of disease	51	17.6	169	24.5	**223**	**22.7**
Both pulmonary & extra-pulmonary	28	9.7	70	10.1	**99**	**10.1**
Multidrug resistance[3]	10	4.8	13	2.5	**24**	**3.3**
Other drug resistance[4]	22	10.6	75	14.3	**98**	**13.3**
History of prior TB	8	2.8	9	1.3	**17**	**1.7**
HIV Status						
Positive	87	30.1	63	9.1	**151**	**15.3**
Negative	131	45.3	404	58.6	**536**	**54.5**
Refused	33	11.4	142	20.6	**175**	**17.8**
Not offered/done and unknown	38	13.1	81	11.7	**122**	**12.4**
Last medical provider type						
DOHMH chest center	95	32.9	319	46.2	**414**	**42.1**
Health and Hospitals Corporation hospitals	59	20.4	182	26.4	**241**	**24.5**
Private hospitals	63	21.8	63	9.1	**128**	**13.0**
Private physicians	35	12.1	98	14.2	**134**	**13.6**
Other providers[5]	37	12.8	28	4.1	**67**	**6.8**
Started on 4 or more anti-TB drugs	274	94.8	646	93.6	**925**	**94.0**
Started on 4 first line anti-TB drugs	253	87.5	606	87.8	**864**	**87.8**
SOCIAL CHARACTERISTICS[6]						
Homeless[7]	51	17.6	17	2.5	**69**	**7.0**
Employed[8]	65	22.5	313	45.4	**379**	**38.5**
Health care worker	7	2.4	36	5.2	**43**	**4.4**
Correctional employee	0	0.0	1	0.1	**1**	**0.1**
Injection drug use[9]	23	8.0	1	0.1	**24**	**2.4**
Non-injection drug use[9]	74	25.6	14	2.0	**88**	**8.9**
Alcohol abuse[9]	77	26.6	68	9.9	**146**	**14.8**
Any drug or alcohol abuse	112	38.8	72	10.4	**195**	**19.8**
Resident of correctional facility[10]	19	6.6	4	0.6	**23**	**2.3**
Resident of long-term care facility[10]	8	2.8	3	0.4	**11**	**1.1**
Total	**289**	**29.4%**	**690**	**70.1%**	**984**	

[1]Not all categories are complete and totals may include cases with unknown area of birth. There were 5 cases with unknown country of birth; [2]As per CDC clinical case definition; [3]Multidrug resistant is defined as resistant to at least Isoniazid and Rifampin, percent is of culture positive and susceptibility done; [4]Other drug resistance is defined as not MDR, but resistant to one or more first line drugs, percent is of culture positive and susceptibility done; [5]Other providers include correctional facilities, VA hospitals, out-of-NYC, and psychiatric providers; [6]Categories are not mutually exclusive; [7]Homeless is at diagnosis or any time during treatment; [8]Occupation is for the past 24 months before diagnosis; [9]In past 12 months before TB diagnosis; [10]At time of diagnosis

Table 5. Tuberculosis Rates by United Hospital Fund Neighborhood, New York City, 1995-2005

UHF Neighborhood	2005 # Cases	Rate per 100,000 population[1,2] 2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995
BRONX	**158**	**11.9**	**13.3**	**13.3**	**12.4**	**12.7**	**16.3**	**14.9**	**20.2**	**21.5**	**24.3**	**31.1**
High Bridge-Morrisania	34	17.9	18.4	22.7	6.7	17.4	21.1	20.3	31.3	36.0	35.9	55.8
Crotona-Tremont	32	16.0	16.0	14.0	8.1	13.0	23.1	17.7	22.5	27.3	37.5	48.4
Hunts Point-Mott Haven	18	14.6	19.5	13.0	5.9	18.7	13.8	21.2	21.2	36.7	36.0	39.3
Pelham-Throgs Neck	33	11.4	12.1	9.7	16.3	12.8	11.7	9.4	11.6	12.4	14.7	23.5
Fordham-Bronx Park	24	9.6	11.6	17.2	16.3	13.6	20.0	19.0	30.3	21.9	26.8	25.9
Kingsbridge	6	6.7	6.7	7.9	17.5	6.7	16.9	11.2	9.0	8.9	15.6	8.9
North East Bronx	11	5.9	8.1	6.5	16.4	5.4	7.5	7.1	11.0	10.0	6.2	11.5
BROOKLYN	**323**	**13.1**	**12.7**	**14.8**	**14.0**	**15.8**	**18.1**	**19.1**	**20.7**	**23.8**	**25.9**	**35.5**
Sunset Park	36	29.9	22.4	19.9	14.4	27.4	33.2	13.5	22.4	21.0	30.4	35.5
Williamsburg-Bushwick	45	23.2	19.6	24.7	5.6	25.2	22.1	26.8	25.8	39.2	51.6	62.0
East Flatbush-Flatbush	61	19.3	14.5	18.6	11.5	18.9	31.3	23.3	23.0	29.8	28.2	42.9
Bedford Stuyvesant-Crown Heights	42	13.2	14.2	18.6	18.6	18.0	23.6	24.9	40.5	40.9	47.0	65.9
Borough Park	40	12.3	13.3	13.6	14.2	10.5	10.5	18.4	21.6	16.7	16.0	20.6
East New York	21	12.1	13.8	11.5	15.3	16.7	15.0	24.9	20.4	18.8	28.4	45.3
Coney Island	29	10.1	10.8	10.5	9.1	12.9	11.5	16.9	12.8	17.2	14.8	19.3
Downtown-Bklyn Heights-Park Slope	18	8.4	9.3	12.1	19.1	15.4	15.4	17.2	13.0	20.9	23.2	28.8
Greenpoint	8	6.4	4.8	9.6	22.1	9.6	15.3	12.1	11.4	18.9	20.7	25.9
Bensonhurst-Bay Ridge	12	6.2	7.7	8.7	10.5	10.8	13.4	14.0	11.0	11.1	10.7	14.6
Canarsie-Flatlands	11	5.6	9.6	12.6	10.8	12.1	9.1	8.7	13.0	15.9	8.6	18.1
MANHATTAN	**182**	**11.9**	**12.9**	**15.6**	**14.8**	**16.7**	**17.9**	**21.5**	**23.8**	**29.3**	**40.9**	**42.1**
Central Harlem	35	23.2	24.5	21.2	20.8	20.5	28.5	38.6	46.7	52.3	82.2	93.4
Chelsea-Clinton	21	17.1	6.5	10.6	11.4	23.6	16.3	22.7	17.8	34.0	52.6	44.4
East Harlem	17	15.7	24.1	28.7	17.6	28.7	27.8	24.2	39.2	42.2	58.5	68.2
Union Square-Lower East Side	29	14.7	17.8	19.8	8.4	20.8	22.3	32.0	32.1	38.8	44.5	44.6
Lower Manhattan	4	12.9	19.4	3.2	6.9	12.9	12.9	19.7	30.0	23.6	24.0	38.3
Gramercy Park-Murray Hill	15	12.1	13.7	19.3	9.7	15.3	20.1	19.4	22.7	26.8	33.4	44.2
Washington Heights-Inwood	32	11.8	12.6	19.6	31.1	17.7	19.2	24.1	28.7	28.9	48.7	34.1
Greenwich Village-Soho	9	10.8	15.5	9.6	8.6	16.7	19.1	21.6	12.1	25.5	42.7	35.6
Upper East Side	11	5.0	2.3	4.1	14.5	5.0	8.3	4.6	6.9	11.1	9.3	14.5
Upper West Side	9	4.1	7.2	13.1	16.3	12.6	9.9	13.5	11.7	18.4	22.5	30.1
QUEENS	**304**	**13.6**	**14.3**	**14.7**	**14.4**	**18.6**	**16.2**	**19.7**	**18.5**	**18.6**	**22.3**	**25.3**
West Queens	107	22.4	26.8	30.6	20.8	32.5	25.3	32.5	28.4	27.0	35.8	40.3
Flushing	44	17.2	17.6	15.7	17.2	22.3	21.9	19.3	19.5	24.9	19.5	27.8
Jamaica	35	12.3	12.6	8.1	6.8	18.9	11.9	18.0	18.9	18.8	27.7	28.0
Southwest Queens	32	11.9	9.3	9.6	7.5	11.5	10.0	9.8	15.4	9.4	12.8	18.8
Long Island City-Astoria	25	11.3	14.0	12.7	25.5	19.0	16.7	28.4	25.1	25.4	22.9	28.1
Ridgewood/Forest Hills	26	10.8	5.8	11.2	10.7	10.0	12.9	10.5	11.8	10.7	12.1	10.4
Southeast Queens	17	8.3	4.4	8.8	6.4	13.3	10.3	15.8	11.0	15.1	18.7	18.4
Fresh Meadows	7	7.5	17.2	12.9	10.3	10.7	17.2	17.4	8.8	8.9	15.7	18.2
Rockaway	8	7.5	7.5	0.9	4.8	11.2	10.3	16.0	12.3	16.2	22.0	29.9
Bayside-Little Neck	3	3.4	7.9	10.2	13.7	6.8	11.3	5.7	6.9	9.3	12.9	3.6
STATEN ISLAND	**17**	**3.8**	**6.3**	**6.5**	**5.6**	**6.1**	**7.2**	**7.8**	**5.8**	**7.5**	**6.9**	**9.5**
Stapleton-St George	8	6.9	10.3	17.2	8.0	9.5	15.5	12.2	9.8	11.7	12.8	19.5
Port Richmond	3	4.8	9.6	8.0	8.6	17.5	11.1	17.8	11.6	13.5	12.0	14.0
Willowbrook	4	4.7	5.9	4.7	4.7	3.5	5.9	4.8	3.6	4.8	4.9	2.5
South Beach-Tottenville	2	1.1	2.8	0.0	3.3	1.1	1.1	2.8	2.3	4.1	2.4	4.8
Total NYC	**984**	**12.3**	**13.0**	**14.2**	**13.5**	**15.7**	**16.6**	**18.4**	**19.8**	**22.2**	**26.5**	**31.9**

[1] Rates are based on intercensal estimates prior to 1999. Rates since 2000 are based on 2000 census data.

[2] There were 2 cases in 2001 and 1 case in 1998 with missing zipcode information that are not included in the totals. Rates are estimated for these years.

Table 6A. Tuberculosis Cases by Age and Area of Birth, New York City, 2005

Area of Birth	Age Group in Years 0 - 19 Number	(Percent)	20-44 Number	(Percent)	45-64 Number	(Percent)	65+ Number	(Percent)	TOTAL	Rate/ 100,000
CARIBBEAN AND LATIN AMERICA[1]	24	(7.9)	182	(60.3)	65	(21.5)	31	(10.3)	302	19.8
ASIA[2]	12	(4.2)	124	(43.1)	79	(27.4)	73	(25.3)	288	45.2
AFRICA[3]	5	(8.2)	47	(77.0)	9	(14.8)	0	(0.0)	61	64.4
EUROPE[4]	0	(0.0)	9	(27.3)	9	(27.3)	15	(45.5)	33	5.5
MIDDLE EAST[5]	2	(33.3)	2	(33.3)	2	(33.3)	0	(0.0)	6	12.4
TOTAL NON-USA	43	(6.2)	364	(52.8)	164	(23.8)	119	(17.2)	690	24.0
USA[6]	37	(14.7)	85	(33.7)	92	(36.5)	38	(15.1)	252	5.2
PUERTO RICO	0	(0.0)	9	(3.0)	14	(37.8)	14	(37.8)	37	20.1
TOTAL USA	37	(12.8)	94	(31.1)	106	(36.7)	52	(18.0)	289	5.6
UNKNOWN	0	(0.0)	1	(20.0)	3	(60.0)	1	(20.0)	5	
TOTAL	80	(8.1)	459	(46.6)	273	(27.7)	172	(17.5)	984	12.3

[1] Ecuador (67), Haiti (48), Mexico (40), Dominican Republic (36), Guyana (18), Peru (18), Honduras (15), Guatemala (10), Jamaica (10), Colombia (6), Trinidad & Tobago (5), Barbados (4), Bolivia (4), El Salvador (4), St. Vincent's & Grenadines (4), Other (13)"

[2] China (104), India (40), Philippines (23), South Korea (20), Pakistan (20), Bangladesh (17), Nepal (14), Hong Kong (12), Vietnam (9), Burma (7), Indonesia (7), Thailand (4), Other (11)"

[3] Guinea (11), Ivory Coast (7), Nigeria (6), Ghana (5), Gambia (4), Liberia (4), Senegal, (4), Other (20)

[4] Russia (9), Italy (4), Other (20)

[5] Yemen (3), Other (3)

[6] Includes the US Virgin Islands and other US territories, excludes Puerto Rico

Table 6B. Non-US-Born TB Rates by Country of Birth vs. New York City, 2000-2005

Countries	In-Country Estimated TB Rate (WHO - 2004) (/100,000)	Annual average TB Rate for NYC Residents Born in Each Country 2000-2005 (/100,000)	Median Years in the US Before TB Diagnosis 2000-2005
China	101	51.5	7.3
Ecuador	131	59.8	4.6
Haiti	306	49.9	11.0
India	168	65.2	4.5
Mexico	32	38.3	4.7
Dominican Republic	91	14.0	10.0
Philippines	293	55.3	6.4
South Korea	90	232.5	10.1
Pakistan	181	53.3	3.9
Peru	178	62.5	5.7
Guyana	140	13.8	8.7
Bangladesh	229	41.4	3.6
Honduras	77	40.2	8.5
Nepal	184	738.5	1.6

Table 7. Nucleic Acid Amplication (NAA) Testing, New York City, 2005

	Site of Disease				
	Any pulmonary[1]				
		NAA done		NAA positive	
	Total	Number	(%)	Number	(%)
AFB[2] smear-positive					
All patients	911	586	64.3	289	49.3
Confirmed cases	418	309	73.9	289	93.5
AFB smear-negative					
All patients	3083	71	2.3	15	21.1
Confirmed cases	337	31	9.2	15	48.4
	Extra-pulmonary only				
		NAA done		NAA positive	
	Total	Number	(%)	Number	(%)
AFB smear-positive					
All patients	162	27	16.7	6	22.2
Confirmed cases	68	6	8.8	5	83.3
AFB smear-negative					
All patients	335	22	6.6	9	40.9
Confirmed cases	150	15	10.0	9	60.0

[1] These patients had a respiratory specimen tested
[2] AFB = acid-fast bacilli

Table 8. First-Line Drug Resistance by Area of Birth, New York City, 2005

	U.S.-BORN[1]		NON-U.S.-BORN		TOTAL[2]	
Positive Culture For *M. tuberculosis*	209		532		745	
Number tested for susceptibility to first-line drugs (% of those with positive culture for *M. tuberculosis*)	208	(99.5%)	526	(98.9%)	738	(99.1%)
Susceptibility results (% of those tested for susceptibility to first-line drugs)						
	Number	(%)	Number	(%)	Number	(%)
Overall resistance	32	(15.4)	88	(16.7)	122	(16.5%)
Multidrug-resistant (resistant to at least isoniazid & rifampin)	10	(4.8)	13	(2.5)	24	(3.3)
Other Drug Resistant	22	(10.6)	75	(14.3)	98	(13.3)
Isoniazid Resistance Only	6	(2.9)	25	(4.8)	31	(4.2)
Rifampin Resistance Only	2	(1.0)	2	(0.4)	4	(0.5)
Ethambutol Resistance Only	0	(0.0)	0	(0.0)	0	(0.0)
Streptomycin Resistance Only	8	(3.8)	11	(2.1)	19	(2.6)
Pyrazinamide Resistance Only	2	(1.0)	7	(1.3)	9	(1.2)
>1 First-line Drug Resistance	16	(7.7)	45	(8.6)	63	(8.5)
INH Resistance + Other First Line	14	(6.7)	39	(7.4)	55	(7.5)
INH + SMN Resistance + Other First Line	9	(4.3)	15	(2.9)	24	(3.3)
Susceptible to all first-line drugs	176	(84.6)	438	(83.3)	616	(83.5)

[1] Includes Puerto Rico, US Virgin Islands and other US territories.
[2] Totals include drug resistance for patients with unknown country of birth.
Note that 13 patients had a history of prior anti-TB treatment; 3 of those had current TB with a drug resistant strain

Table 9. HIV Status by Area of Birth and Age, New York City, 2005

HIV Status/Area of Birth		Age Groups in Years 0 - 19	20 - 44	45-64	65+	**Total**
		Number Percent	Number Percent	Number Percent	Number Percent	
HIV positive		3 2.0	83 55.3	60 40.0	4 2.7	**150** **15.3**
US-born		3 3.4	39 44.8	44 50.6	1 1.1	**87** **30.1**
Non-US-born		0 0.0	44 69.8	16 25.4	3 4.8	**63** **9.1**
HIV negative		51 9.5	296 55.3	127 23.7	61 11.4	**535** **54.6**
US-born		22 16.8	48 36.6	43 32.8	18 13.7	**131** **45.3**
Non-US-born		29 7.2	248 61.4	84 20.8	43 10.6	**404** **58.6**
HIV test refused or status unknown		26 8.8	79 26.9	83 28.2	106 36.1	**294** **30.0**
US-born		12 16.9	7 9.9	19 26.8	33 46.5	**71** **24.6**
HIV test refused		6 18.2	5 15.2	9 27.3	13 39.4	**33** **11.4**
Non-US-born		14 6.3	72 32.3	64 28.7	73 32.7	**223** **32.3**
HIV test refused		8 5.6	43 30.3	47 33.1	44 31.0	**142** **20.6**
TOTAL[1]	Number	80	458	270	171	**979**
	Percent	8.2	46.8	27.6	17.5	
US-born	Number	37	94	106	52	**289**
	Percent	12.8	32.5	36.7	18.0	**29.5**
Non-US-born	Number	43	364	164	119	**690**
	Percent	6.2	52.8	23.8	17.2	**70.5**

[1] Total does not include 5 patients with unknown country of birth

Table 10. Epidemiologic Investigations of Tuberculosis Exposure in Congregate Settings, New York City, 2005 (N=23)

Site	Close contacts					Other-than-close contacts					#Transmission[1]
	#Identified	#Tested	%Tested	#Positive	%Positive	#Identified	#Tested	%Tested	#Positive	#Positive	
Health care facilities											
HCF A	11	7	64	1	14	51	44	86	2	5	Unable to assess
Sub-total	**11**	**7**	**64**	**1**	**14**	**51**	**44**	**86**	**2**	**5**	
Residences											
Residence A	9	9	100	7	78	41	29	71	8	28	Probable
Residence B[2]	7	7	100	4	57	2	2	100	0	0	Probable
Residence C[3]	7	5	71	0	0	31	17	55	0	0	Unable to assess
Residence D[2]	61	31	51	8	26	0	0	0	0	0	Probable
Residence E	17	11	65	1	9	3	3	100	0	0	Unable to assess
Sub-total	101	63	62	20	32	77	51	66	8	16	
Schools											
Middle School A	49	41	84	1	2	12	7	58	0	0	Unlikely
Middle School B	28	23	82	1	4	1	1	100	0	0	Unlikely
Middle School C	36	36	100	2	6	0	0	0	0	0	Unlikely
High School A	13	10	77	1	10	203	23	11	1	4	Unlikely
High School B[4]	102	52	51	13	25	333	34	10	7	21	Probable
Sub-total	228	162	71	18	11	549	65	12	8	12	
Worksites											
Worksite A	12	12	100	3	25	36	28	78	1	4	Probable
Worksite B	4	3	75	0	0	125	46	37	6	13	Unlikely
Worksite C	11	7	64	4	57	13	3	23	2	67	Probable
Worksite D	28	20	71	5	25	17	6	35	1	17	Probable
Worksite E	11	10	91	2	20	45	37	82	9	24	Probable
Worksite F	13	12	92	5	42	0	0	0	0	0	Probable
Worksite G	36	33	92	3	9	118	65	55	2	3	Probable
Worksite H	9	8	89	0	0	26	20	77	5	25	Unlikely
Worksite I	20	17	85	4	24	51	12	24	4	33	Unlikely
Worksite J	15	10	67	2	20	3	3	100	1	33	Possible
Worksite K	7	6	86	0	0	66	32	48	1	3	Unlikely
Worksite L[5]	85	40	47	6	15	128	38	30	22	58	Unable to assess
Sub-total	**251**	**178**	**71**	**34**	**19**	**628**	**290**	**46**	**54**	**19**	
Totals	**591**	**410**	**70**	**73**	**18**	**1305**	**450**	**34**	**72**	**16**	

[1] Transmission is "probable" when the exposed group has a significantly higher proportion of TST-positive individuals than a comparison group; or there are documented TST conversions in non-BCG vaccinated individuals; or secondary cases with epidemiologic or molecular linkage to the index case. Transmission is considered "possible" when the proportion of contacts that are TST-positive is significantly greater than the proportion in a comparison group but the proportion of identified contacts tested is less than 75%. Transmission is considered "unlikely" when these conditions are not met. "Unable to assess" indicates that less than 75% of potential contacts are tested and the proportion that is TST-positive among those tested is not greater than expected, and there are no TST conversions or secondary cases.

[2] Investigation was around 2 or more TB cases diagnosed at the same residence and linked by DNA fingerprint

[3] Investigation was at a residence and at a day program. Two cases who attended the day program at time of diagnosis were linked by DNA

[4] Two cases, not linked by DNA fingerprint, were investigated at this site. Transmission was probable around one case and possible around the other

[5] Preliminary numbers; investigation is on-going

Appendix 1

Healthy People 2010 Tuberculosis Objectives

14.11 Reduce tuberculosis.

Target: 1.0 new case per 100,000 populations.

14.12 Increase the proportion of all tuberculosis patients who complete curative therapy within 12 months.

Target: 90.0% of patients.

14.13 Increase the proportion of contacts and other high-risk persons with latent tuberculosis infection who complete a course of treatment.

Target: 85.0%.

14.14 Reduce the average time for a laboratory to confirm and report tuberculosis cases.

Target: 2 days for 75.0% of cases.

Source: U.S. Department of Health and Human Services. *Healthy People 2010*. 2nd Ed. With Understanding and Improving Health and Objectives for Improving Health. 2 vols. Washington, DC: U.S. Government Printing Office, November 2000.

Appendix 2

How to Report Suspected and Confirmed Cases of Tuberculosis

TB Reporting Requirements

By law, medical providers, infection control practitioners, and laboratories **must report all suspected or confirmed cases of tuberculosis within 24 hours of diagnosis.** Routine follow-up visits must also be reported.

What to Report

Suspected and Confirmed TB Cases

Clinicians and laboratories must report:

- A smear from any site that is positive for acid-fast bacilli (AFB)
- A nucleic acid-based assay positive for *M. tuberculosis* complex [e.g., *M. tb* Direct Test (MTD) or Amplicor]
- A positive culture for M. tb complex
- Biopsy, pathology, or autopsy findings consistent with active TB
- A patient being treated with 2 or more anti-TB medications for suspected or confirmed TB
- Clinical suspicion of TB
- Any child under 5 years of age with a positive tuberculin skin test

In addition, laboratories must report:

- *M. tb* drug susceptibility test results
- Any culture result associated with AFB-positive smear (even if negative for *M. tb* complex)

Outpatient Follow-up

Clinicians are also required to report continuation, discontinuation, completion, and other outcomes of patient treatment. In addition, they should report contacts of active TB cases who are receiving treatment for TB infection.

When to Report

Within 24 hours of diagnosis, all suspected and confirmed cases of TB must be reported by express or overnight mail, fax, telephone, or electronically.

Within 48 hours, a hard copy or electronic "Universal Reporting Form" **(Form PD-6)** must follow telephone and fax reports.

The Universal Reporting Form and other TB forms are available online at nyc.gov/health/tb. Click "Information for Health Care Providers." Forms are also available by mail. Call the TB Hotline to request hard copies.

How to Report

Clinics, individual health care providers, and laboratories should contact the Health Department **within 24 hours of diagnosis** to report suspected or confirmed TB cases.

How Clinicians Should Report

Suspected and Confirmed TB Cases

Use one of the following methods to report:

TB Provider Hotline

1. Call the hotline to make an initial report within 24 hours of diagnosis.

A representative will take your call Monday-Friday, 8:30 a.m.-5:00 p.m. At other times, a recorded message will provide reporting information.

2. If report was called in, a hard copy of the report should follow. Mail a hard copy of the completed Universal Reporting Form to the Health Department within 48 hours to:

NYC Department of Health and Mental Hygiene

125 Worth St., Room 315/CN-6
New York, NY 10013

Fax

1. Fax the completed Universal Reporting Form to (212) 788-4179 within 24 hours of diagnosis.
2. Mail a hard copy of the form to the Health Department within 48 hours (see address above).

Mail

Mail the completed Universal Reporting Form to the Health Department within 24 hours of diagnosis. To meet the 24-hour deadline, use an overnight courier.

Electronically through NYC MED (health care providers only)

1. Create an account at nyc.gov/health/nycmed.
2. Submit required information online within 24 hours of diagnosis.

For help with NYC MED submissions, call (888) 692-6339

Outpatient Follow-up

To report continuation, discontinuation, completion, and other outcomes of patient treatment, mail or fax the following form to the Health Department:

- "Report of Patient Services" **(Form TB-65):** monthly visits of patients with active TB.

How Laboratories Should Report

Microbiology Laboratories Must Report Electronically

As of July 1, 2006, electronic reporting is mandatory for microbiology laboratories. Before using the system, all laboratories must call the Electronic Clinical Laboratory Reporting System at (212) 442-3380 to complete a certification process.

Pathology laboratories continue to report via fax/mail.

All positive TB laboratory results must be reported within 24 hours

Fax and/or mail forms to:

NYC Department of Health and Mental Hygiene

125 Worth St., Room 315/CN-6
New York, NY 10013
Fax: (212) 788-4179

Electronically

Using the Electronic Clinical Laboratory Reporting System, certified laboratories should report all positive TB laboratory results within 24 hours.

Notes:

1. Product names are provided for identification purposes only; their use does not imply endorsement by the New York City Department of Health and Mental Hygiene.
2. To report tuberculosis skin tests in children less than 5 years old, use the Universal Reporting Form. For guidelines for interpreting skin test results, see New York City Department of Health and Mental Hygiene, *Guidelines for Testing and Treatment for Latent TB Infection*, January 2005, available at: www.nyc.gov/html/doh/downloads/pdf/chi/chi25-4.pdf

TB CHEST CENTERS

Bronx
Morrisania Chest Center
1309 Fulton Avenue, First Floor
Bronx, NY 10456

Brooklyn
Bedford Chest Center
485 Throop Avenue, Third Floor
Brooklyn, NY 11221

Brownsville Chest Center
259 Bristol Street, Third Floor
Brooklyn, NY 11212

Bushwick Chest Center
335 Central Avenue, Second Floor
Brooklyn, NY 11212

Fort Greene Chest Center
295 Flatbush Ave. Ext., Fourth Floor
Brooklyn, NY 11201

Manhattan
Chelsea Chest Center
303 9th Avenue, Third Floor
New York, NY 10001

Washington Heights Chest Center
600 West 168th Street, Third Floor
New York, NY 10032

Queens
Corona Chest Center
34-33 Junction Blvd., Second Floor
Queens, NY 11372

Jamaica Chest Center
90-37 Parsons Blvd, 4th Floor
Jamaica, NY 11432

Staten Island
Richmond Chest Center
51 Stuyvesant Place, Fourth Floor
Staten Island, NY 10301

Call 311 for more information including hours of operation.

NYC Health
nyc.gov/health

The New York City Department of Health and Mental Hygiene

Thomas R. Frieden, MD, MPH
Commissioner

Michael R. Bloomberg
Mayor

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