2006 TB ANNUAL SUMMARY

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

TB Anywhere is TB Everywhere

Mission Statement

New York City Department of Health and Mental Hygiene

Bureau of Tuberculosis Control

The mission of the Bureau of Tuberculosis Control 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

TB ANYWHERE
IS TB EVERYWHERE

2006 TB Annual Summary

NYC Health

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New York City Department of Health and Mental Hygiene

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Assistant Commissioner Letter

Dear Fellow New Yorkers:

It has been a busy year for tuberculosis (TB) control efforts in New York City (NYC). The Bureau of TB Control (Bureau) continued to respond to TB outbreaks and to conduct contact investigations throughout the five boroughs, while at the same time implementing several new initiatives and innovations in 2006.

The year started with identification of an outbreak of multidrug resistant TB (MDRTB) among HIV-infected residents of a nursing home in the Bronx. The Bureau dedicated a great deal of time to working with the facility, in order to ensure that residents were promptly evaluated and given appropriate treatment for multidrug resistant latent TB infection (LTBI). Five cases of MDRTB were attributed to this outbreak. This year we also conducted a greater number of TB contact investigations in congregate settings, reflecting the fact that many more of our patients study or work in such settings.

Early in the year, it appeared that there may have been an increase in TB cases compared to 2005. However, by December 2006 fewer cases of TB were observed than were seen by December 2005, and the year ended with a 3% decrease overall in new TB cases.

On World TB Day in March we launched a TB awareness campaign, the first multilingual media TB campaign in NYC. The campaign targets both high-risk communities and health care providers in six NYC neighborhoods that are at highest risk for TB. Its goals are to provide information about TB and to raise awareness of free services available through the NYC Department of Health and Mental Hygiene (DOHMH). As part of this campaign, we developed or revised many educational materials for patients and providers and distributed them widely.

We continued to work with New York State regulatory authorities to mandate that laboratories use rapid diagnostic tests for all patients who are pulmonary smear positive, so that TB can be more rapidly diagnosed. More than 70% of smear-positive patients in NYC now receive a rapid diagnostic test for TB, compared to less than 50% of similar patients just two years ago. Increasing the use of this test will move us closer to the Healthy People 2010 goal of diagnosing 70% of TB cases within 48 hours of specimen receipt.

A huge undertaking in 2006 was the implementation of the blood-based test for TB infection, QuantiFERON®-TB Gold (QFT®-G), in the chest centers. We also amended the NYC health code to allow for the use of either blood-based tests for TB infection or the Mantoux skin test for all groups for whom TB testing is required by the health code.

The implementation of a system to track nosocomial TB exposures in NYC facilities revealed that exposures are, unfortunately, common. The tracking system also shows that many exposures could be prevented if providers were more prompt in thinking of TB as a possible diagnosis. We are now working to disseminate this information to facilities and providers, with the goal of raising the index of suspicion for a diagnosis of TB, in order to reduce delays in identification of possible TB patients.

Controlling TB continues to be a priority for the DOHMH. Great progress has been made—2006 saw the lowest number of TB cases, only 953, since it became a reportable disease in NYC in 1897. The City remains a center of expertise for TB control and treatment, and I thank all the providers who report and manage TB patients and contacts, as well as the staff of the Bureau for their continued efforts. Working together, we will continue to make progress toward a TB-free NYC.

Sincerely,
Sonal Munsiff, MD
Assistant Commissioner, Bureau of TB Control

Executive Summary

The efforts and resources required to control tuberculosis (TB) and to fight toward its elimination are often hidden. While the number of TB cases continues to decline in New York City (NYC), the Bureau worked extensively to control outbreaks and to maintain the highest level of patient care. For each of the 953 cases of TB diagnosed during 2006 in NYC, the Bureau received reports of four patients who were evaluated for suspected TB disease and tested an average of 14 contacts per infectious TB case. We conducted expanded contact investigations at 33 sites; 1,951 contacts were identified and 1,397 were tested. In addition, we provided free clinical services such as testing and treatment for active TB and latent tuberculosis infection (LTBI) to 29,150 New Yorkers during 121,347 patient visits to our 10 chest centers.

Tuberculosis Control Activities, 2006

The Bureau continued to perform its core activities to control TB in 2006. Surveillance efforts ensured that suspected and confirmed cases of TB were identified and reported to the Bureau and were documented on the computerized, confidential TB registry. Intensive case interviews were conducted for all patients, including outreach efforts to ensure that they completed a full course of treatment and that their contacts received appropriate medical care. Additionally, the Bureau worked to set new standards and guidelines and to educate providers about them. The Bureau also provided consultation on the prevention, diagnosis and treatment of LTBI and disease. State-of-the-art care for persons with suspected or confirmed TB disease and their close contacts continues to be provided at public health clinics, at no cost to the patient. Finally, the Bureau collaborated with community-based organizations and health and social agencies in NYC and New York State (NYS) to improve case finding and the prevention and control of TB through education, outreach and targeted screening in communities at high risk for TB. Key innovations and accomplishments in 2006 are detailed in Box on page 7.

Tuberculosis in 2006: Trends and Profile

TB is a disease that disproportionately affects certain segments of the community, and in 2006, NYC TB patients were largely non-US-born and people of color. The overall proportion of TB patients with TB/HIV coinfection declined, and TB/HIV coinfection was more common among US-born patients (26.8% coinfected) than among the non-US-born (7.9%). Compared to 2005, rates of TB increased slightly among persons 45-64 years of age, non-Hispanic whites and Asians, while rates declined slightly among non-Hispanic blacks, Hispanics and among other age groups. Fifteen NYC health districts had rates higher than the city average of 11.9/100,000, while two health districts had TB rates lower than the national average of 4.6/100,000.

The majority of patients had pulmonary disease (75.7%), with 354 (37.1%) having acid-fast bacilli (AFB) smear-positive sputum specimens; 74.3% had their TB diagnosis confirmed via positive culture. In 2006, there were 21 cases of MDRTB, two of which met the definition for extensively drug resistance (XDR). Most patients (72.9%) received their anti-TB treatment via directly observed therapy (DOT) and 76.4% of eligible patients diagnosed in 2005 completed treatment within a year.

Dedication, innovation and resources are required to sustain NYC's state-of-the-art patient services, surveillance and outbreak control. The reduction in rates of TB for many population groups is encouraging. However, support for strong TB control programs worldwide, new medications and faster diagnostic tools are required to achieve TB elimination—in NYC and beyond.

Key Accomplishments of the Bureau of TB Control, 2006

Surveillance and Reporting

- A new *TB Registry* that will use up-to-date technology for better patient data management is under development.
- The Bureau encouraged hospitals to implement in-house pharmacy surveillance systems that would allow infection control staff to identify patients placed on two or more anti-TB medications.
- Reporting delays continued to decrease due to interventions that provided ongoing feedback and provider education.

Clinical Management

- The Bureau introduced the QFT®-G blood-based test for TB infection into chest centers in October, improving patient care through better diagnostics, with the added benefit that only one clinic visit is required.
- Innovations to improve LTBI completion rates included nurse monitoring via telephone, increased contracts with hospitals and community-based organizations to provide testing and treatment services, and the publicationof a City Health Information newsletter on testing and treatment for LTBI.
- The implementation of the rapid HIV test in Bureau clinics led to a 39% increase in the number of patients tested.
- The use of rapid diagnostic testing for TB led to improved diagnosis times and better patient management.
- The use of electronic medical records in the clinics facilitated the finding, sharing and analysis of patient information.
- Extended clinic hours made services more accessible for 19,656 patient visits.

Outbreak Detection and Management

- The Bureau evaluated 247 congregate settings to determine if screening for TB at each site was warranted. We also conducted 33 expanded contact investigations, including 22 in workplaces.
- When an MDRTB outbreak occurred at a nursing home, we conducted extensive case-finding activities, which included sputum induction, leading to the identification of secondary cases and the initiation of LTBI treatment for exposed residents.
- A new tracking system for TB exposures in health care facilities revealed that nosocomial exposures were common. Now, efforts to improve rapid identification of TB patients and to enhance infection control practices are being conducted.
- Routine DNA genotyping identified cases with a matching result, suggesting that patients were exposed to one another and that there was ongoing recent transmission in several communities. The Bureau responded with patient re-interviews, targeted testing and a TB awareness campaign.
- We undertook outreach efforts to the Tibetan community in response to a steady rise of TB patients of Tibetan heritage.

Education and Outreach

- On World TB Day, the Bureau launched a *TB Awareness Campaign* combining local media advertising in five high-burden neighborhoods and in at-risk communities throughout the city, and formed partnerships with medical providers and community-based organizations.
- The Bureau worked with community partners to launch *The Coalition for a TB-Free New York*, striving to engage leaders of communities with a high burden of TB. The goals are both to ensure that communities are accessing services and to advocate for funding of national and global TB research and programs.
- We also developed, revised and updated educational materials for patients and providers. The Bureau distributed more than 1,000 *Provider TB Information Kits*.

Introduction

The efforts and resources required to control TB and to fight toward its elimination are often hidden. In 2006, NYC again recorded the lowest number of confirmed TB cases, 953, since TB was designated a reportable disease in 1897. While the number of cases continues to decline in NYC, the Bureau worked tirelessly to control outbreaks and maintain the highest level of patient care. For each case of TB diagnosed in NYC during 2006, we received reports of four patients who were evaluated for suspected TB disease; tested an average of 11 contacts to active cases to evaluate their risk for TB infection; and provided treatment for LTBI.

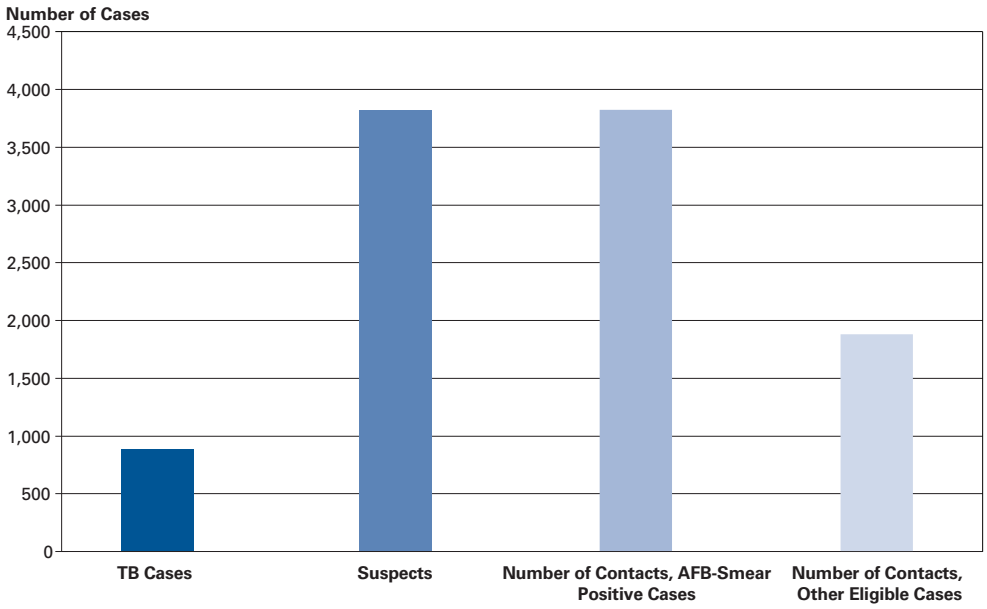
Over the course of the year, in addition to the 953 confirmed TB cases, our patient involvement added up to 3,815 people evaluated for TB disease and 5,635 contacts evaluated for latent infection and TB disease **(Figure 1)**. In total, we provided free TB testing and cutting-edge treatment to 29,150 New Yorkers during 121,347 patient visits to the Bureau's chest centers.

In 2006, the Bureau responded to new and ongoing challenges, including the impact of the global TB epidemic in NYC's non-US-born population, low LTBI treatment completion rates, ongoing transmission in some neighborhoods and a reduction of resources allocated for TB control.

TB Control in NYC since the height of the epidemic in 1992 can undoubtedly be viewed as a success story, with valuable lessons learned and shared. However, the 953 cases of TB represent a case rate of 11.9/100,000, which is more than two times higher than the national average of 4.6/100,000. In addition, the rate of decline has reached a plateau. Support for strong TB control programs, new medications and faster diagnostic tools is required to achieve TB elimination—both in New York City and beyond.

Figure 1

The Workload: Cases, Suspects and Contacts Evaluated by the Bureau of TB Control, NYC, 2006



Core Activities

Surveillance and Reporting

TB became a reportable disease in NYC in 1897. Health care providers and laboratories are required to report patients confirmed with or suspected of having TB to the Bureau. In addition, Bureau staff members visit health care facilities several times a week to perform active case finding in microbiology and pathology laboratories and to meet with the infection control nurse at the facility. Active surveillance ensures that unreported patients are identified and properly treated and that providers are constantly reminded of reporting requirements. A secure, computerized registry stores each patient's demographic and social information, TB history, diagnostic test results, treatment regimens and adherence rates. Separate databases contain information on molecular genotype, epidemiologic connections between patients and LTBI treatment.

2006 Surveillance and Reporting Innovations and Accomplishments

- The Bureau is developing a new *TB Registry* that will use up-to-date technology for better patient data management.
- Electronic reporting for laboratories was mandated in NYC in July 2006. Due to the complexity of TB diagnostics and reporting requirements, only five laboratories were certified to report TB test results electronically through the Electronic Laboratory Reporting System in 2006. The Surveillance Office is working with the Bureau of Informatics and Information Technology to certify the remaining laboratories as quickly as possible.
- The Bureau worked with hospitals to encourage the implementation of in-house pharmacy surveillance. Pharmacy surveillance allows infection control staff to identify patients placed on anti-TB medications in cases where providers failed to report them. Four facilities established pharmacy surveillance in 2006.
- Reporting delays continued to decrease, due to interventions implemented in 2004 to provide feedback and ongoing education to providers. The percentage of reports received late fell from 43.6% in 2003 to 20.5% in 2006. Late reports of pathology findings consistent with TB and late reports from private doctors composed the largest proportion of delayed reports. The Bureau identified late reports and gave feedback to providers via phone calls and educational materials. Additionally, annual letters are sent to each facility to provide them with information about TB in NYC, and to remind hem of the reporting requirements.

TB Clinical Management

The diagnosis and treatment of TB disease and LTBI in NYC continues to see improvement. In May 2006, New York State mandated that nucleic acid amplification (NAA) testing be performed on all AFB smear-positive respiratory specimens. The test allows for the rapid diagnosis—or lends support to the rejection of a diagnosis—of TB within two days, and can be used in determining appropriate patient management and the need for contact investigations. Seventy percent of AFB smear-positive TB patients in NYC received NAA testing following the implementation of the mandate, compared to 64.3% in 2005. To increase testing and treatment services for persons at high risk for LTBI, we extended contracts with hospitals and community-based organizations to three new partners, increasing the scope of LTBI services in NYC. Additionally, the Bureau published a City Health Information newsletter to provide information on diagnosing and managing LTBI.

New York City TB patients can choose to receive care through the Bureau's TB chest centers or through their own private providers. The Bureau provides all patients with case management services, regardless of provider. All patients are evaluated during weekly case management meetings attended by physicians, nurses and public health advisers. Additionally, information about these patients and their contacts is presented and discussed at the Cohort Review Meeting with the Bureau Director.

Chest Centers

Many NYC TB patients are initially identified, reported and treated through the 10 Bureau chest centers (see inside back cover for clinic locations). In 2006, these clinics provided free TB testing and cutting-edge treatment to 29,150 New Yorkers during 121,347 patient visits. At the clinics, the Bureau provides TB diagnostic testing, outpatient medical and nursing care, treatment for latent and active TB, social service assistance, HIV counseling, testing and patient education. Chest centers reported 10.2% of all confirmed cases in 2006 and identified 13.2% of all suspects.

2006 Clinical Management Innovations and Accomplishments

- The Bureau took the lead in making the recently approved QFT®-G (Cellestis, Inc., Carnegie, Australia) test available to patients in two of our chest centers. This blood-based test for TB infection has several advantages over the tuberculin skin test (TST), including that it only requires a single visit and is less likely to show a false positive.
    - An amendment to the NYC Health Code now allows the use of FDA-approved blood-based tests as a diagnostic tool for TB infection.
    - The Bureau implemented QFT®-G testing in two clinics on October 2, 2006. From that date through December 31, 2006, 1,601 patients received QFT®-G tests.
- We initiated a videophone DOT pilot project in October for patients on medication regimens requiring DOT twice a day. Overall adherence has been greater than 90.0%, with favorable feedback from patients and staff.
- Treatment of LTBI is an important tool in TB prevention. In 2006, 7,344 patients started LTBI treatment. To improve LTBI treatment completion rates, the Bureau piloted nurse monitoring via telephone for follow-up of LTBI patients with low hepatitis risk, to reduce the number of required clinic visits.
- We have extended the chest center hours to make DOT, contact evaluation and LTBI treatment available to patients unable to receive services during regular business hours. In 2006, a total of 19,656 patient visits were made during extended clinic hours.
- Rapid testing for HIV has led to higher acceptance rates for the test and a 38.8% increase in the number of patients tested in the Bureau's chest centers. In 2006, 4,929 patients received an HIV test, compared to 3,550 in 2005.
- The use of electronic medical records helped move the clinics toward a paperless record system that helped facilitate finding, sharing and analyzing patient information.

Field Services

Patients receiving care from non-DOHMH providers are evaluated during weekly case management meetings and receive medical consultation services. The medical consultants also perform standardized two- and four-month reviews of all confirmed TB patients' care, in order to assess response to treatment and possible failure of treatment. Bureau medical consultants follow up with non-DOHMH providers to ensure that they know the Bureau's treatment and management recommendations.

Case Management and Contact Investigation

Case management is provided for all patients with confirmed TB and for all persons suspected of having TB who meet assignment criteria. Because of the 6-9 months of treatment required for TB, 727 patients diagnosed in previous years received case management services in 2006, in addition to the 953 TB cases diagnosed and the 1,512 suspected TB patients evaluated in that year. DOT is the standard of care in NYC. Effective case management and treatment of persons with active TB is ensured through cohort reviews conducted by the Bureau Director.

2006 Case Management and Contact Investigation Innovations and Accomplishments

- In 2006, Bureau network staff provided case management for 3,241 cases and TB suspects, including 727 cases from the previous year.
- In 2006, 347 of the 354 (98.0%) AFB-smear-positive cases had 4,967 contacts identified. Of the contacts evaluated, 943 had LTBI, and 38.4% of infected contacts completed LTBI therapy by August 2007.
- Of eligible patients, 588 (71.8%) were treated under DOT and among the 21 patients with MDRTB, 93.4% were treated under DOT. In 2006, 1,507 patients—including 513 patients who were reported in previous years—received DOT services.

Outbreak Detection and Management

Detection is crucial to halting TB transmission and controlling outbreaks. The Bureau utilizes multiple detection methods to identify where transmission may be occurring in order to provide education, testing and treatment. Contact investigations are conducted for patients with clinical characteristics that indicate an increased possibility of infection transmission, such as an AFB-positive sputum specimen or cavitary chest X-ray (CXR). The number of expanded contact investigations, consisting of on-site screenings in settings where transmission is suspected, increased in 2006. Additionally, the use of DNA genotyping allows for the identification of people with matching TB strains—another indicator of TB transmission.

2006 Outbreak Detection and Control Activities, Innovations and Accomplishments

- In addition to screening individual contacts to infectious patients, the Bureau evaluated 247 congregate sites (workplaces, schools, religious institutions or congregate residences) to determine if on-site screening was warranted.
    - We conducted an expanded contact investigation at 33 sites: 22 (66.7%) workplaces, five (15.1%) schools, three (9.1%) residences (including one for HIV-infected homeless persons) and three (9.1%) healthcare facilities.
    - We considered transmission probable at 16 (48.5%) sites, possible at seven (21.2%) sites and unlikely at four (12.1%) sites. Transmission could not be assessed at six (18.2%) sites.
- We conducted extensive case finding activities (TST, chest X-rays, medical evaluation and sputum induction) to control an MDRTB outbreak at a nursing home that housed HIV-positive residents. Sputum induction identified one additional case. In settings where TB transmission has occurred among HIV-infected persons, case finding with sputum induction—even in the absence of symptoms or abnormal CXR findings—may be more effective in identifying new cases than traditional contact investigation activities. In addition, LTBI prophylaxis treatment recommendations were made for all current nursing home residents. This was very complicated given the high likelihood of significant exposure at the nursing home, the difficulty of diagnosing LTBI in immunocompromised patients, and the lack of proven treatment regimens for latent MDRTB infection. No new cases have been detected.
- A new tracking system for TB exposures in NYC health care facilities, implemented in 2006, revealed that nosocomial exposures are more common than expected. In 2006, 81 cases with culture-positive pulmonary TB caused exposures at 92 health care facilities (71 hospitals, seven nursing homes, six drug treatment facilities, four private clinics, two dialysis centers, one physical therapy facility and one dental office). Patients were the source of these exposures in 92.6% of cases and health care workers were the source in the other 7.4%. Many of the patient-related nosocomial exposures might have been prevented if the health care providers had considered TB at the onset, and had placed the patient in isolation upon admission.
- Ongoing DNA genotyping identified "clustered" cases, where a matching result both suggested that patients were exposed to one another and provided evidence of recent transmission in several communities. Ongoing transmission was identified in a specific area surrounding a small apartment building in Brooklyn. Through use of genotyping, the Bureau was able to respond with patient reinterviews to establish relatedness, targeted testing at the apartment

building and a *TB Awareness Campaign* in the surrounding neighborhood.

- Twenty-five patients with a particular strain of TB were diagnosed in NYC from December 2003 to December 2006. An investigation of potential sources and venues of transmission is ongoing. Geographical coding of addresses showed that patients in this cluster were concentrated in the Central Harlem and South Bronx areas of NYC. Thirteen (52.0%) patients were non-US-born and had been in the US for a median of 11 years (range five-12). Six (46.2%) were born in the Ivory Coast. Two (8.0%) cases were isoniazid-resistant, 10 (40.0%) were HIV coinfected and 10 (40.0%) had a history of substance abuse. No patient named another as a contact; however, epidemiologic links to four houses of worship were identified for six (24.0%) patients. The rapid growth of the cluster suggests extensive recent TB transmission. Contact investigation activities emphasizing place-based TB screenings, additional intensive interviews and community and provider outreach have been implemented in the area to interrupt transmission.
- An education and awareness campaign response to an outbreak of *M. bovis* effectively decreased the number of patients affected in 2006. Eight patients were diagnosed with TB caused by *M. bovis* in 2006, a 20% decrease from 2005. Two (25.0%) of the eight cases in 2006 were US-born, and six (75.0%) had extrapulmonary disease. One case under five years of age was reported—a US-born child of Mexican parents who had extrapulmonary disease. Consumption of unpasteurized dairy products was identified as the likely source of infection.
- Special outreach efforts have been made in response to a steady rise in the number of TB patients from Tibet since 2000. In 2006, there were 26 patients of Tibetan heritage, including two who had XDRTB. In response, the Bureau launched a full-scale investigation of TB in the Tibetan community. This involved analysis of past data, enhanced surveillance of Tibetan patients, and collaboration with TB controllers in Canada and India, as well as with the Centers for Disease Control. Most importantly, we launched active outreach efforts with the NYC Office of Tibet and other Tibetan community-based organizations, in order to raise awareness through educational sessions and materials written in both English and Tibetan.

Education and Outreach

As the number of TB cases decreases, the need for continuous educational efforts to maintain knowledge and vigilance about TB becomes essential. The Bureau offers TB-related training for staff members and health care providers, as well as education sessions for the public. Collaboration with community-based organizations has increased the Bureau's ability to reach out to more New Yorkers with information and services. Efforts have focused on neighborhoods with TB rates that are greater than the city as a whole, and on areas where ongoing transmission has been identified though molecular cluster investigations.

2006 Education and Outreach Innovations and Accomplishments

- Local media, providers and community-based organizations serving high-risk communities attended a media breakfast event. Its purpose was both to commemorate World TB Day 2006 and to launch two major new TB control initiatives:
  - The event marked the launch of *The Coalition for a TB-Free NYC*, led by the American Lung Association of the City of New York, the Bureau of TB Control, the Center for Immigrant Health, the Charles P. Felton National TB Center at Harlem Hospital and the Treatment Action Group. The Coalition's mandate is to involve community leaders in areas where the TB burden is high, in order to ensure that communities access services and to increase advocacy for funding for national and global TB research and programs.
  - The TB Awareness Campaign entitled *Toward a Tuberculosis-Free New York City* also debuted at the event. The campaign united local advertising and partnership efforts with

medical providers and community-based organizations. The three-month campaign ran from mid–March through June 2006 and targeted Chinese, Korean, Hispanic, Haitian, South Asian and US-born African-American communities in Brooklyn (East Flatbush-Flatbush and Bedford Stuyvesant-Crown Heights), Manhattan (Union Square-Lower East Side) and Queens (West Queens and Flushing). The campaign used billboards, signs and ads in local community newspapers to increase awareness about TB and to encourage high-risk populations to get tested and take advantage of the free TB services offered by the Bureau chest centers. Key community partners included Astro Care Medical Center, Brownsville Multi-Service Family Health Center, Center for Immigrant Health, Charles B. Wang Community Health Center, Charles P. Felton National TB Center at Harlem Hospital, Elmhurst Hospital, Interfaith Medical Center, Kings County Hospital, NYC Department of Homeless Services and NYC DOHMH Correctional Health Services.

- In 2006, the Bureau also developed new materials and revised and updated existing publications for patients and providers. Nine publications in 10 languages have now been distributed (for a list of available materials see **Appendix 3**). The Bureau distributed more than 1,000 *Provider TB Information Kits*, containing easy-to-use and up-to-date educational materials, guidelines and resources for TB case management referrals.

Research

The Bureau continues to contribute to the evidence base for TB control and patient management strategies. Bureau staff coauthored 11 papers published in peer-reviewed journals and presented five posters in national and international conferences in 2006 **(Appendix 4)**.

The Bureau made a significant contribution to the literature by publishing four papers on molecular epidemiology and genotyping in TB control programs. The studies demonstrated the utility of molecular epidemiology to identify clusters of TB cases among urban communities and the homeless.

Two of the papers explored treatment options targeted toward unique patient needs. The first dealt with the use of rifapentine for the treatment of pulmonary TB, while the second considered the use of moxifloxacin in place of ethambutol during the first two months of treatment. The Bureau also published and made presentations about: trends in drug resistance in NYC from 1991-2003, extensive transmission of MDRTB among HIV-infected homeless persons and active case finding in response to an outbreak of MDRTB.

The Bureau also published information about its innovative TB control practices. Experiences with public-private collaboration, the cohort review method and treatment of LTBI in Bureau chest centers were presented and analyzed, in order to share the results of NYC's TB control experience and leadership.

Profile of 2006 Cases

Overview

- In 2006, 953 patients were confirmed to have TB in NYC, a 3.2% decrease compared to 2005 and the lowest number of TB cases ever recorded in NYC since TB became reportable in 1897 **(Figure 2)**.
- The rate of TB has declined from 51.1 per 100,000 in 1992 to 11.9 per 100,000 in 2006 **(Figure 2)**. However, NYC's rate is still 2.6 times the 2006 national average of 4.6 per 100,000.
- People living with HIV/AIDS experience greater risks of progressing from LTBI to active disease. In 1992, people living with HIV/AIDS comprised 33.6% of TB patients. Improved HIV treatment and TB control practices have led to a large decline in the proportion of TB patients with HIV coinfecton: only 13.3% of 2006 TB patients were coinfected with HIV.
- There was a 14.5% decrease in the number of TB cases among the homeless in 2006 compared to 2005 (data not shown).
- The Bureau received reports of an additional 3,815 patients with suspected TB, a slight decrease from the 3,852 reported in 2005. The suspect-to-case ratio remained 4.0. Most reported suspects were ages 45–64 (41.2%), non-Hispanic Black (33.4%) or Hispanic (21.0%), and lived in Brooklyn (36.9%).

Patient Characteristics

Country of Origin

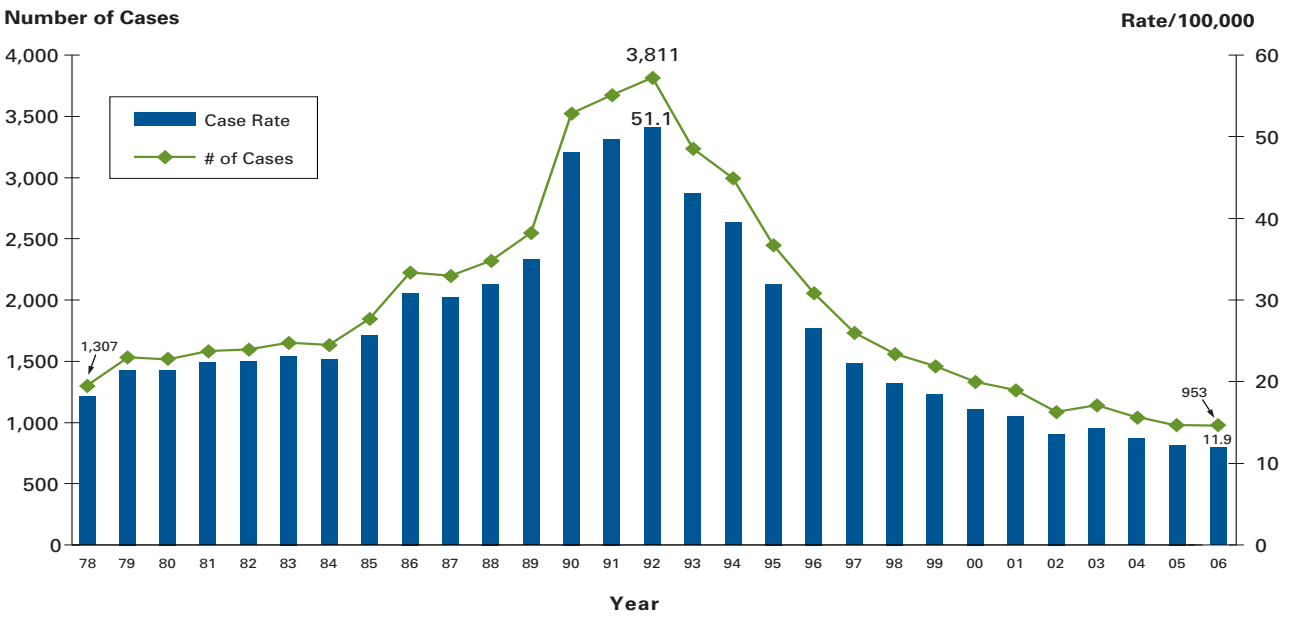
- Persons born outside the United States continued to bear the highest burden of TB, constituting 70.5% (672/953) of NYC TB patients **(Figure 3)**.
- The TB rate in non-US-born persons was more than four times that in US-born persons (23.4/100,000 versus 5.4/100,000).
- The main countries of origin for non-US-born patients were: China (111), the Dominican Republic (53), Ecuador (50), Mexico (47) and the Philippines (35).
- TB-HIV coinfection was more common among US-born patients (26.8%) than among the non-US-born (7.9%).

Age

- The majority of TB cases were found in persons aged 20-44 years. Among the 445 patients in that age cohort, 85.8% were over the age of 25.
- Persons over age 65 had the highest rate of TB at 17.3/100,000 population, a slight decrease from 18.3/100,000 in 2005. A slight increase was observed for persons 45-64, and rates of TB for persons younger than 45 declined compared to 2005 **(Figure 4)**.
- The highest rate for women was observed in those aged 25-34 years (14.6/100,000), while the highest rate for men was observed for those in the 45-54 age cohort (26.4/100,000).

Figure 2

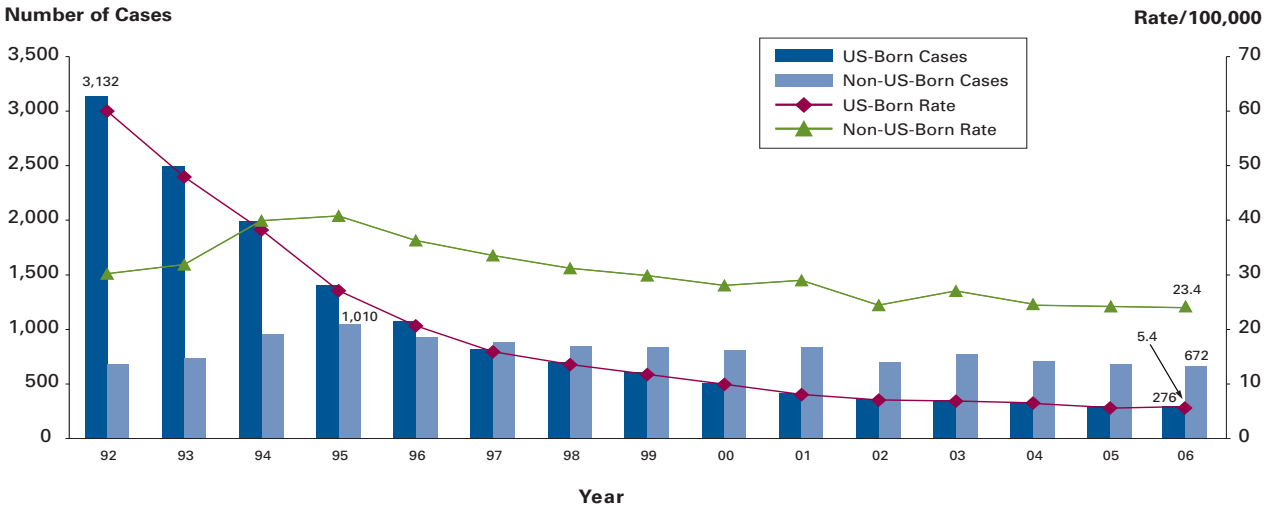
Tuberculosis Cases and Rates[1]
New York City, 1978-2006



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

Figure 3

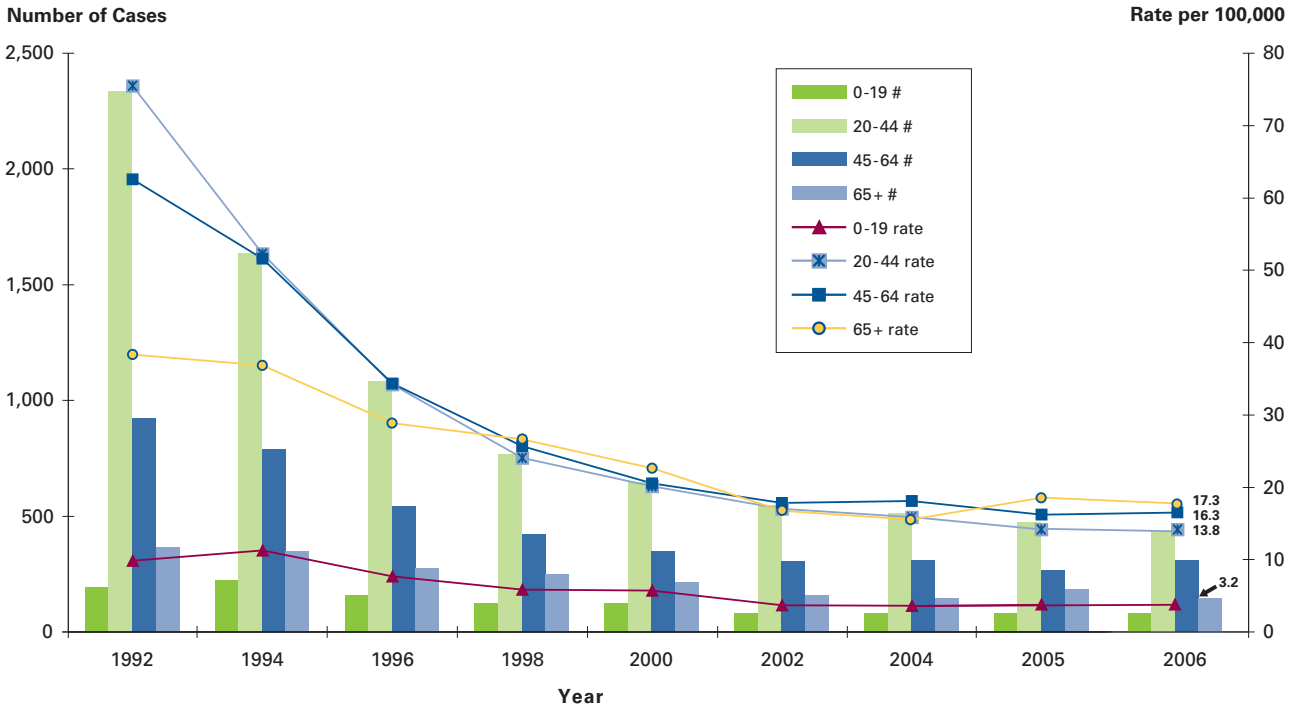
US-Born[1] and Non-US-Born Tuberculosis Cases and Case Rates[2]
New York City, 1992-2006



[1] Puerto Rico and US Virgin Islands are included as US-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 4

Tuberculosis Cases and Rates[1] by Age Group
New York City, 1992-2006



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

Race/Ethnicity

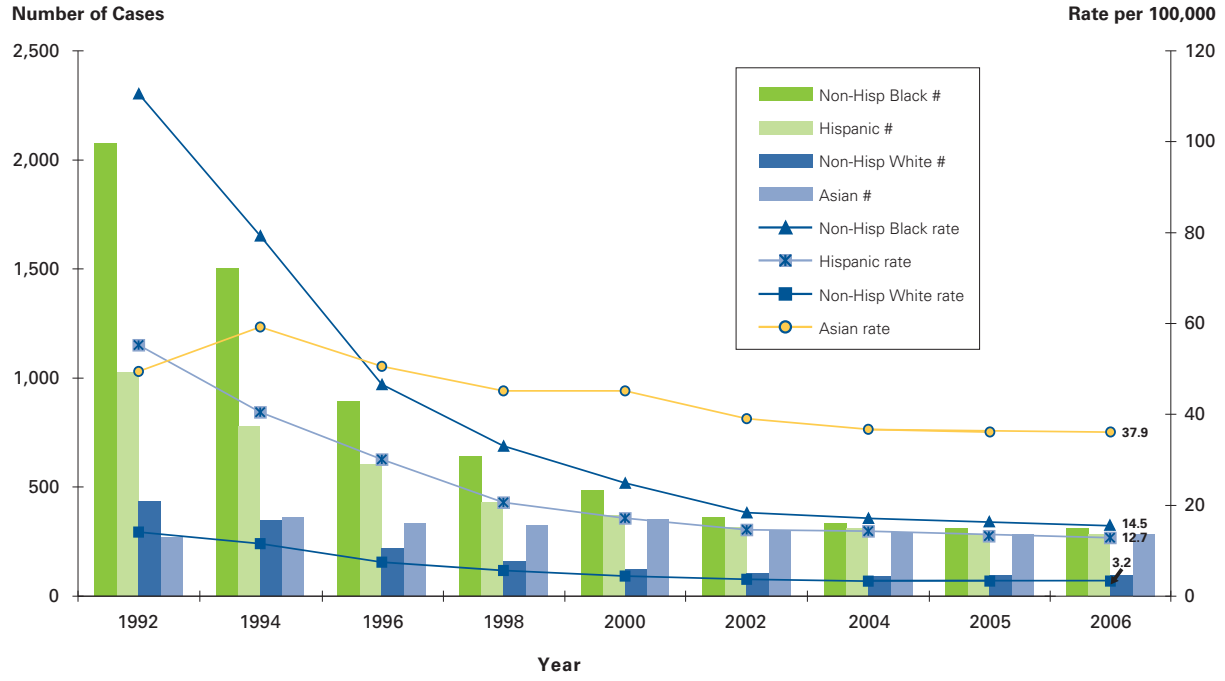
- TB patients were nine times more likely to be people of color.
- For the first time, the number of Asian TB cases (296) surpassed non-Hispanic black (284) and Hispanic cases (275).
- The TB rate for non-Hispanic blacks declined from 15.5/100,000 in 2005 to 14.5/100,000 in 2006, and increased slightly for Asians to 37.9/100,000 **(Figure 5)**.

Neighborhoods

- The borough of Queens carried the highest burden of TB, with 303 (31.8%) of the patients residing there. A similar proportion resided in Brooklyn (30.5%) **(Figure 6)**.
- Brooklyn had the highest proportion of US-born patients (98/291 or 33.7%), while the greatest number of non-US-born patients lived in Queens (268/303 or 88.4%).
- The TB rate for Staten Island increased from 3.8/100,000 in 2005 to 6.3/100,000 in 2006. A slight increase in the TB rate was also observed in the Bronx, from 11.9 to 12.4/100,000.

Figure 5

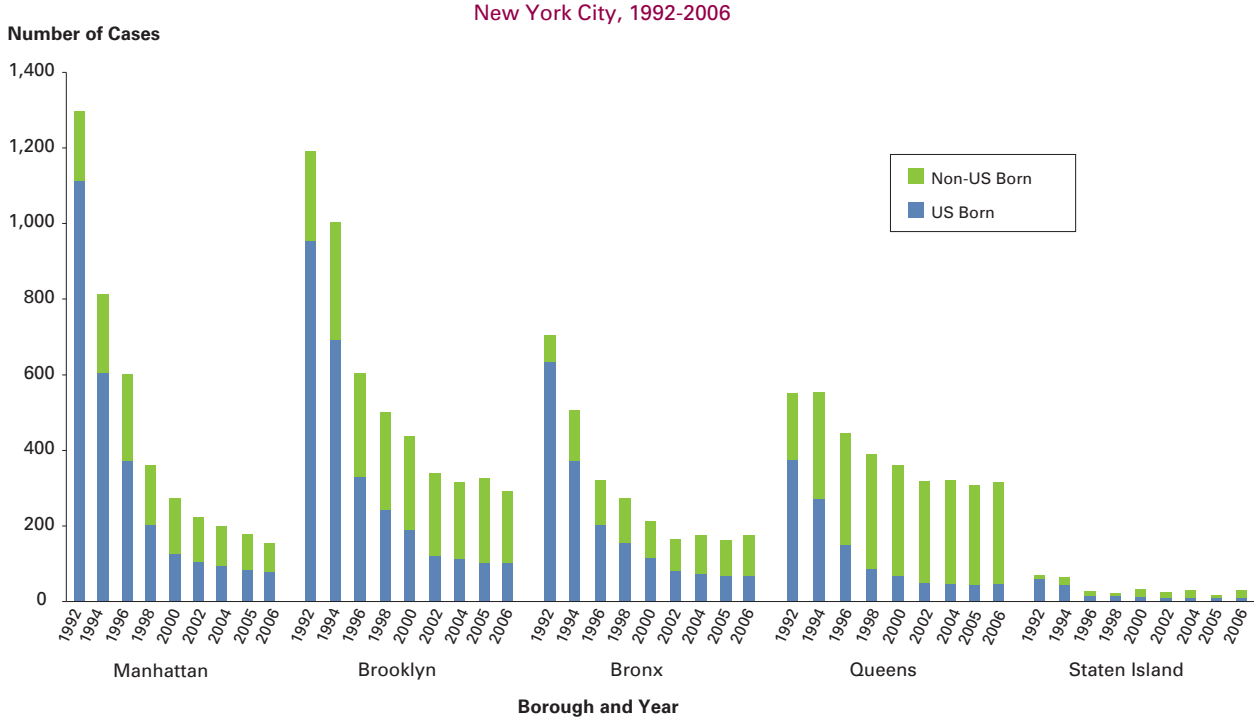
Tuberculosis Cases and Rates[1] by Race/Ethnicity
New York City, 1992-2006



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

Figure 6

Tuberculosis Cases by Borough and Area of Birth[1]
New York City, 1992-2006

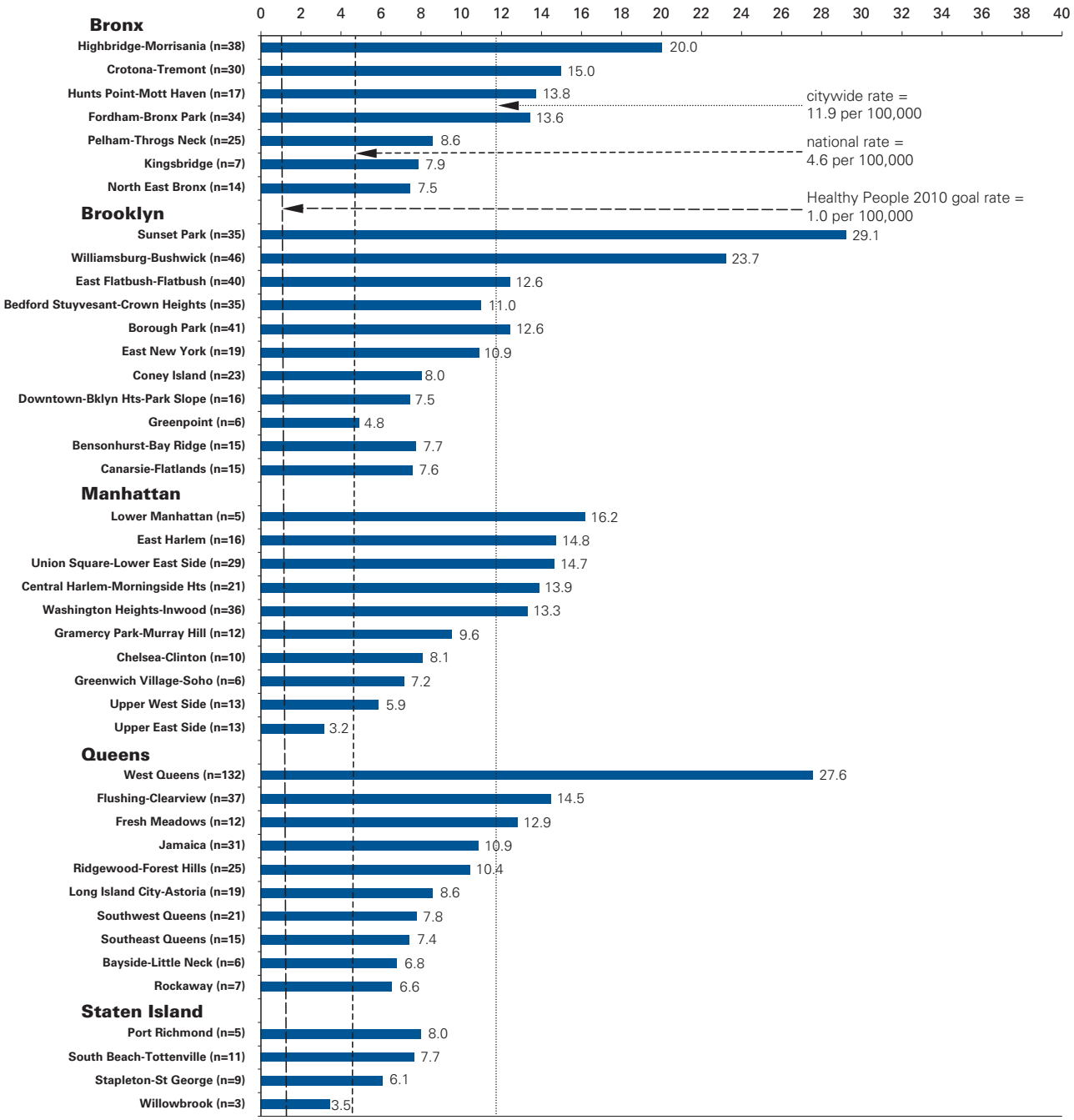


[1] Puerto Rico and US Virgin Island are included as US-born.

- Fifteen of the 42 NYC health districts had higher than average rates of TB per 100,000 population **(Figure 7)**.
- Rates of TB in Sunset Park (29.1/100,000), Williamsburg-Bushwick (23.7/100,000) and West Queens (27.4/100,000) were two or more times higher than the NYC average of 11.9/100,000 population. Rates increased from 22.4/100,000 in 2005 to 27.4/100,000 in 2006 in West Queens, and decreased in East-Flatbush/Flatbush and Lower Manhattan.
- Two health districts—the Upper East Side and Willowbrook—had TB rates lower than the national average case rate of 4.6/100,000.

Figure 7

Rates of Tuberculosis by United Hospital Fund Neighborhood[1]
New York City, 2006



[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.

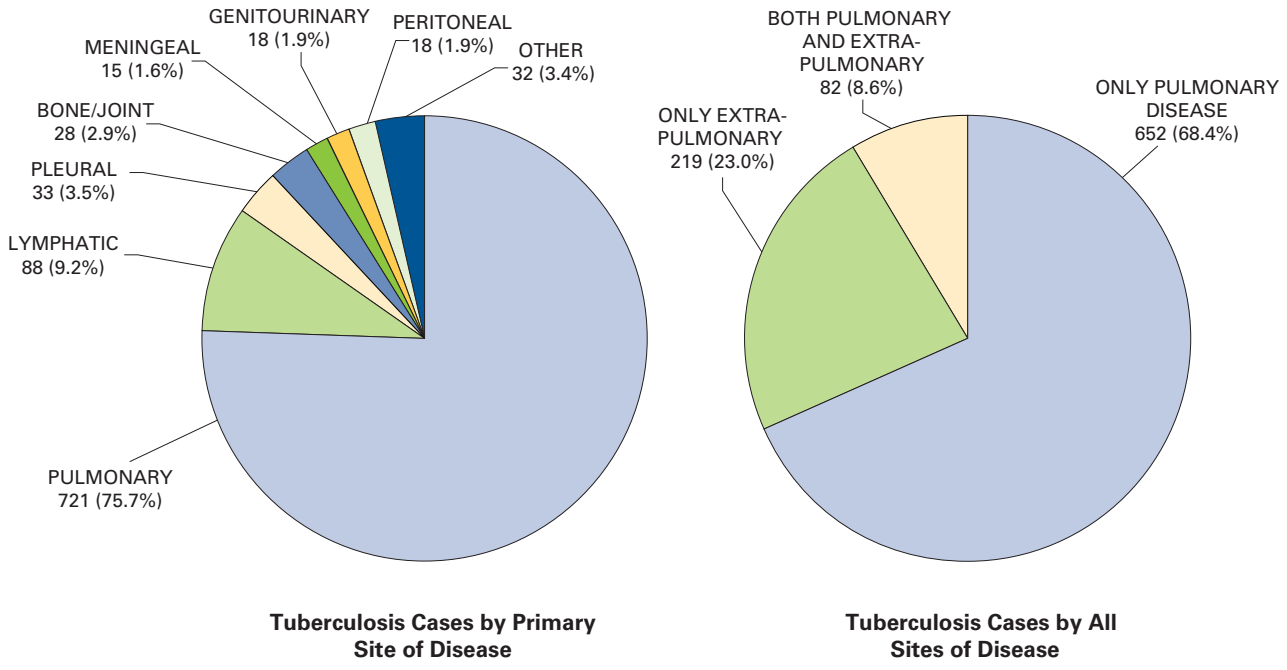
Clinical Characteristics

Of the 953 TB cases in 2006, 708 (74.3%) were culture positive and 354 (37.1%) were AFB-sputum smear positive.

- The lungs were the most common site of disease observed in NYC, with 721 (75.7%) cases of pulmonary TB identified in 2006. Eighty-two (8.6%) patients had both pulmonary TB and an additional site of disease, and 219 (23.0%) had only extrapulmonary TB.
- The lymphatic system was the second most common site of TB (88 cases), followed by pleural TB (33) and TB of the bone/joint (28) **(Figure 8)**.
- Among culture-positive patients, 115 (16.4%) exhibited drug resistance.
- We observed 21 cases of MDRTB and 95 cases with other drug resistance patterns—including two cases of XDRTB in 2006.
- Compared to 2005, a slight increase in the proportion of cases with drug resistance was observed among non-US-born patients, while the proportion of drug resistance cases among US-born patients showed a slight decrease.

Figure 8

Tuberculosis Cases by Site of Disease
New York City, 2006

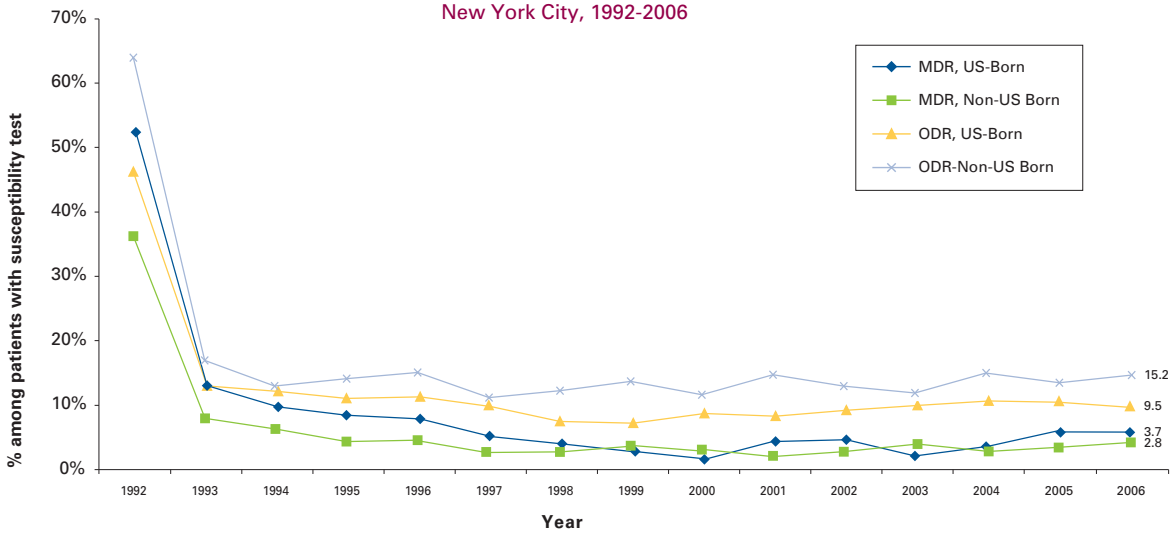


Tuberculosis Cases by Primary Site of Disease

Tuberculosis Cases by All Sites of Disease

Figure 9

Drug Resistance[1] by Area of Birth
New York City, 1992-2006



[1] Drug Resistance is defined as patient that is Multidrug resistant (MDR) or Other-Drug resistant (ODR).
MDR is defined as isolates resistant to at least isoniazid and rifampin
ODR is defined as isolates resistant to other anti-TB medications drugs but not MDR

- Among cases with drug resistance, a greater proportion of US-born cases experienced MDRTB, while a larger percentage of non-US-born cases experienced other forms of drug resistance **(Figure 9)**.

Patient Management and Outcomes

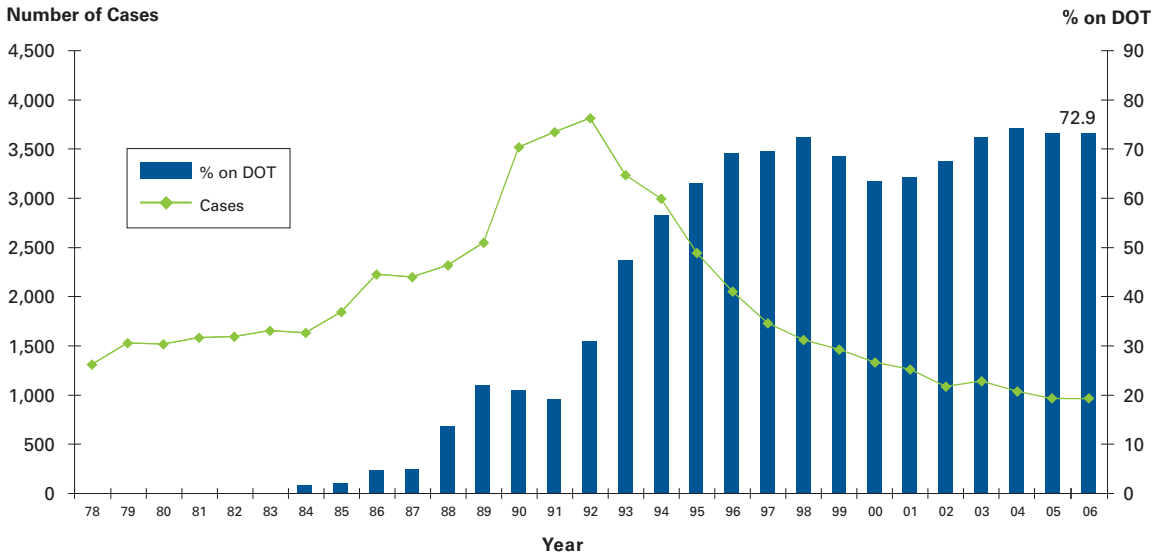
- DOT remains a crucial tool for ensuring treatment completion and preventing drug resistance. In 2006, 72.9% of eligible TB patients received DOT **(Figure 10)**.

DOT Participation Varied According to the Clinical Characteristics of Patients

- DOT rates were higher than average for patients who had drug-resistant TB, for those who were pulmonary AFB smear positive, and for those who were treated at a Bureau chest center.
- DOT rates were lower than average among patients with extrapulmonary TB and for those who were treated exclusively by a private medical provider. However DOT rates for patients treated

Figure 10

Tuberculosis Cases on Directly Observed Therapy[1]
New York City, 1978-2006



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

by a private provider improved from 22.8% in 2005 to 32.3% in 2006. **(Figure 11)**.

Treatment Outcomes

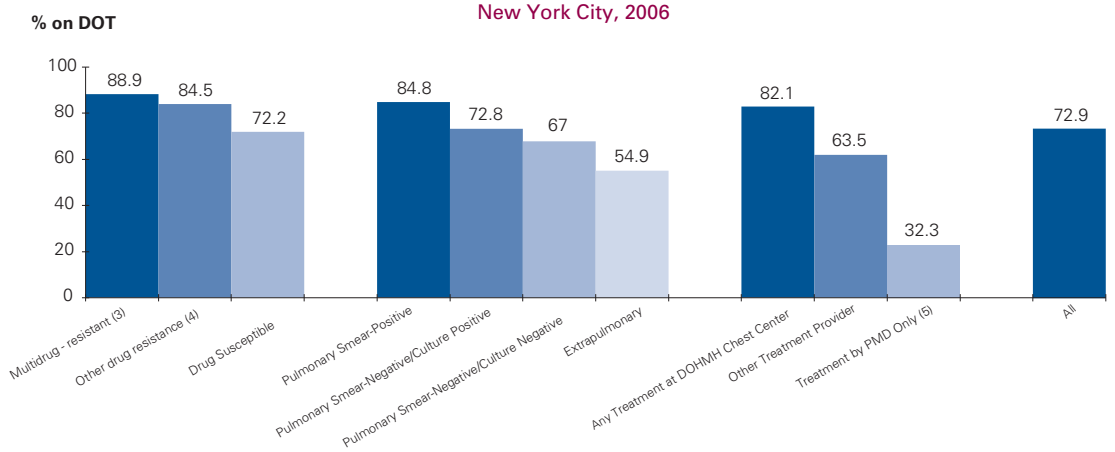
TB treatment requires most patients to take medications for six to nine months. Most NYC patients who were diagnosed in 2005 (83.1%) completed their treatment within a year, with an additional 8.9% completing treatment in more than 365 days.* Because of the length of treatment, many patients diagnosed in 2006 will not complete treatment until 2007. The completion rates for patients diagnosed in 2005 are analyzed in this report.

- Almost all patients completed treatment **(Figure 12)**. Only 11 (1.1%) refused to continue with treatment and 34 (3.5%) were lost to follow-up.
- Efforts were made to ensure that the 17 patients who moved away from NYC completed treatment in their new location through interstate coordination programs.

* These numbers exclude some people out of the denominator, e.g., those who died.

Figure 11

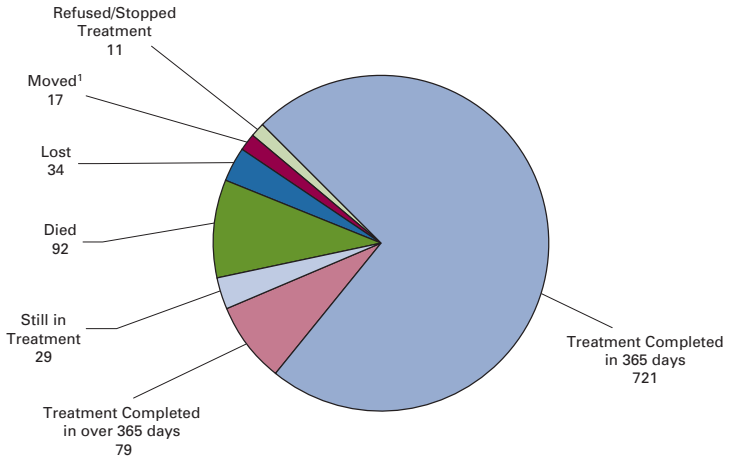
Proportion of Eligible[1] Tuberculosis Patients on DOT[2]
New York City, 2006



[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.

Figure 12

Outcome for Confirmed Cases Counted in 2005
New York City, 2006



[1] Patients are categorized as moved only if their transfer to another jurisdiction is confirmed and further follow-up information is available.
Data as of July 16, 2007

Appendix 1

Tables

Table 1. Tuberculosis Incidence, New York City, 1900-2006

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[6,8]	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	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
2006	953	11.9	708	354	4.4	21	94	17	0.2

[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, 1992-2006

Year	Number (%)									
	Females HIV (+)	%	Males HIV (+)	%	US-Born HIV (+)	%	Non-US-Born HIV (+)	%	Total[1] HIV (+)	%
1992	297	25.1	984	37.4	1294[2]	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
2006	39	10.2	88	15.4	74	26.8	53	7.9	127	13.3

[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[1]) by Race/Ethnicity, Sex, and Age, New York City, 2006

Race/Ethnicity/Sex	Age Groups (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[1]	N Rate[1]	N Rate[1]	N Rate[1]	N Rate[1]	N Rate[1]	N Rate[1]	N Rate[1]	N Rate[1]	N Rate[1]	
Non-Hispanic White, total	0 0.0	0 0.0	0 0.0	2 1.6	2 1.1	18 3.8	5 1.2	11 2.8	18 6.3	36 6.7	92 3.3
Males	0 0.0	0 0.0	0 0.0	1 1.6	1 1.2	7 2.9	3 1.4	10 5.2	11 8.2	21 10.0	54 4.0
Females	0 0.0	0 0.0	0 0.0	1 1.6	1 1.1	11 4.7	2 1.0	1 0.5	7 4.6	15 4.6	38 2.6
Non-Hispanic Black, total	7 4.8	4 2.4	4 2.5	4 2.6	12 8.7	50 17.1	69 21.9	70 29.4	37 22.1	27 14.6	284 14.5
Males	2 2.7	3 3.5	1 1.2	0 0.0	9 14.3	27 21.3	46 33.5	48 47.5	23 34.2	14 21.9	173 19.8
Females	5 6.9	1 1.2	3 3.7	4 5.3	3 4.0	23 13.8	23 12.9	22 16.0	14 14.0	13 10.7	111 10.2
Hispanic, total	13 7.0	4 2.0	1 0.6	15 8.6	27 14.2	72 18.8	56 16.9	39 16.7	22 14.8	26 18.7	275 12.7
Males	6 6.3	3 3.0	0 0.0	11 12.2	14 14.6	39 20.6	36 22.8	33 31.3	14 21.3	15 29.3	171 16.4
Females	7 7.7	1 1.0	1 1.1	4 4.8	13 13.9	33 17.0	20 11.5	6 4.7	8 9.6	11 12.5	104 9.3
Asian, total	2 4.2	1 2.1	1 2.2	10 20.9	22 35.3	67 42.1	41 28.4	47 43.8	32 53.4	73 124.0	296 37.9
Males	0 0.0	1 4.1	0 0.0	7 28.2	6 20.0	32 41.4	25 33.8	33 61.6	23 78.8	44 167.1	171 44.1
Females	2 8.5	0 0.0	1 4.6	3 13.0	16 49.5	35 42.8	16 22.8	14 26.1	9 29.3	29 89.1	125 31.9
TOTAL[2]	23 4.3	9 1.6	6 1.1	31 6.0	63 10.7	210 15.4	172 13.6	167 16.5	110 16.1	162 17.3	953 11.9
Males	8 2.9	7 2.4	1 0.4	19 7.2	30 10.5	107 16.2	111 18.1	124 26.4	71 23.2	94 26.1	572 15.1
Females	15 5.1	2 0.7	5 1.9	12 4.7	33 10.8	103 14.6	61 9.4	43 7.9	39 10.3	68 11.8	381 9.0

[1] Rates are based on 2000 Census data.
[2] There are 2 patients with multiple races, 3 patients who are of Pacific Islander race, and 1 patient 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, 2006

Characteristic	# US-Born	%	# Non-US-Born	%	Total	%
DEMOGRAPHICS						
Age Group						
0-19	35	12.7	34	5.1	**69**	**7.2**
20-44	96	34.8	346	51.5	**445**	**46.7**
45-64	102	37.0	174	25.9	**277**	**29.1**
65+	43	15.6	118	17.6	**162**	**17.0**
Sex						
Female	114	41.3	266	39.6	**381**	**40.0**
Male	162	58.7	406	60.4	**572**	60.0
Race/ethnicity						
Black Non-Hispanic	154	55.8	129	19.2	**284**	**29.8**
White Non-Hispanic	43	15.6	49	7.3	**92**	**9.7**
Hispanic	73	26.4	200	29.8	**275**	**28.9**
Asian	9	1.8	289	43.0	**296**	**31.1**
Multiple	0	0.0	2	0.3	**2**	**0.2**
Pacific Islander	0	0.0	3	0.4	**3**	**0.3**
Unknown ethnicity or race	1	0.4	0	0.0	**1**	**0.1**
Borough of residence						
Manhattan	62	22.5	98	14.6	**164**	**17.2**
Bronx	73	26.4	92	13.7	**165**	**17.3**
Brooklyn	98	35.5	192	28.6	**291**	**30.5**
Queens	35	12.7	270	40.2	**305**	**32.0**
Staten Island	8	2.9	20	3.0	**28**	**2.9**
Time in the US						
<1 year	n/a	n/a	84	12.5	**84**	**12.5**
1-5 years	n/a	n/a	160	23.8	**160**	**23.8**
>5 years	n/a	n/a	412	61.3	**412**	**61.3**
Unknown	n/a	n/a	16	2.4	**16**	**2.4**
CLINICAL CHARACTERISTICS[1]						
Ever on DOT (of those eligible)	160	71.1	465	74.8	**627**	**73.8**
Ever smear positive	135	48.9	342	50.9	**478**	**50.2**
Sputum smear positive	100	36.2	254	37.8	**354**	**37.1**
NAA positive	86	31.2	229	34.1	**316**	**33.2**
Culture positive	191	69.2	513	76.3	**708**	**74.3**
Clinical case[2]	85	30.8	159	23.7	**245**	**25.7**
Pulmonary site of disease	196	71.0	454	67.6	**652**	**68.4**
Cavitary chest x-ray	29	14.8	102	22.5	**131**	**20.1**
Extra-pulmonary site of disease	58	21.0	159	23.7	**219**	**23.0**
Both pulmonary & extra-pulmonary	22	8.0	59	8.8	**82**	**8.6**
Multidrug resistance[3]	7	3.7	14	2.8	**21**	**3.0**
Other drug resistance[4]	18	9.5	76	15.0	**94**	**13.3**
History of prior TB	10	3.6	8	1.2	**18**	**1.9**
HIV Status						
Positive	74	26.8	53	7.9	**127**	**13.3**
Negative	132	47.8	414	61.6	**548**	**57.5**
Refused	41	14.9	150	22.3	**192**	**20.1**
Not offered/done and unknown	29	10.5	55	8.2	**86**	**9.0**
Last medical provider type						
DOHMH chest center	102	37.0	326	48.5	**430**	**45.1**
Health and Hospitals Corporation hospitals	50	18.1	172	25.6	**222**	**23.3**
Private hospitals	52	18.8	60	8.9	**114**	**12.0**
Private physicians	31	11.2	90	13.4	**122**	**12.8**
Other providers[5]	41	14.9	24	3.6	**65**	**6.8**
Started on 4 or more anti-TB drugs	264	95.7	619	92.1	**889**	**93.3**
Started on 4 first line anti-TB drugs	252	91.3	593	88.2	**851**	**89.3**
SOCIAL CHARACTERISTICS[6]						
Homeless[7]	40	14.5	20	3.0	**60**	**6.3**
Employed[8]	75	27.2	336	50.0	**414**	**43.4**
Health care worker	8	2.9	24	3.6	**32**	**3.4**
Correctional employee	0	0.0	0	0.0	**0**	**0.0**
Injection drug use[9]	26	9.4	1	0.1	**27**	**2.8**
Non-injection drug use[9]	58	21.0	11	1.6	**70**	**7.3**
Alcohol abuse[9]	69	25.0	68	63.0	**132**	**13.9**
Any drug or alcohol abuse	86	31.2	68	10.1	**155**	**16.3**
Resident of correctional facility[10]	17	6.2	2	0.3	**19**	**2.0**
Resident of long-term care facility[10]	4	1.4	3	0.4	**7**	**0.7**
Total	**276**	**30.3%**	**672**	**72.4%**	**953**	

[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, 1995-2006

UHF Neighborhood	2006 # Cases	Rate per 100,000 population[1,2] 2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996
BRONX	**165**	**12.4**	**11.9**	**13.3**	**13.3**	**12.4**	**12.7**	**16.3**	**14.9**	**20.2**	**21.5**	**24.3**
High Bridge-Morrisania	38	20.0	17.9	18.4	22.7	6.7	17.4	21.1	20.3	31.3	36.0	35.9
Crotona-Tremont	30	15.0	16.0	16.0	14.0	8.1	13.0	23.1	17.7	22.5	27.3	37.5
Hunts Point-Mott Haven	17	13.8	14.6	19.5	13.0	5.9	18.7	13.8	21.2	21.2	36.7	36.0
Fordham-Bronx Park	34	13.6	9.6	11.6	17.2	16.3	13.6	20.0	19.0	30.3	21.9	26.8
Pelham-Throgs Neck	25	8.6	11.4	12.1	9.7	16.3	12.8	11.7	9.4	11.6	12.4	14.7
Kingsbridge	7	7.9	6.7	6.7	7.9	17.5	6.7	16.9	11.2	9.0	8.9	15.6
North East Bronx	14	7.5	5.9	8.1	6.5	16.4	5.4	7.5	7.1	11.0	10.0	6.2
BROOKLYN	**291**	**11.8**	**13.1**	**12.7**	**14.8**	**14.0**	**15.8**	**18.1**	**19.1**	**20.7**	**23.8**	**25.9**
Sunset Park	35	29.1	29.9	22.4	19.9	14.4	27.4	33.2	13.5	22.4	21.0	30.4
Williamsburg-Bushwick	46	23.7	23.2	19.6	24.7	5.6	25.2	22.1	26.8	25.8	39.2	51.6
East Flatbush-Flatbush	40	12.6	19.3	14.5	18.6	11.5	18.9	31.3	23.3	23.0	29.8	28.2
Borough Park	41	12.6	12.3	13.3	13.6	14.2	10.5	10.5	18.4	21.6	16.7	16.0
Bedford Stuyvesant-Crown Heights	35	11.0	13.2	14.2	18.6	18.6	18.0	23.6	24.9	40.5	40.9	47.0
East New York	19	10.9	12.1	13.8	11.5	15.3	16.7	15.0	24.9	20.4	18.8	28.4
Coney Island	23	8.0	10.1	10.8	10.5	9.1	12.9	11.5	16.9	12.8	17.2	14.8
Bensonhurst-Bay Ridge	15	7.7	6.2	7.7	8.7	10.5	10.8	13.4	14.0	11.0	11.1	10.7
Canarsie-Flatlands	15	7.6	5.6	9.6	12.6	10.8	12.1	9.1	8.7	13.0	15.9	8.6
Downtown-Bklyn Heights-Park Slope	16	7.5	8.4	9.3	12.1	19.1	15.4	15.4	17.2	13.0	20.9	23.2
Greenpoint	6	4.8	6.4	4.8	9.6	22.1	9.6	15.3	12.1	11.4	18.9	20.7
MANHATTAN	**164**	**10.7**	**11.9**	**12.9**	**15.6**	**14.8**	**16.7**	**17.9**	**21.5**	**23.8**	**29.3**	**40.9**
Union Square-Lower East Side	38	19.3	14.7	17.8	19.8	8.4	20.8	22.3	32.0	32.1	38.8	44.5
Lower Manhattan	5	16.2	12.9	19.4	3.2	6.9	12.9	12.9	19.7	30.0	23.6	24.0
East Harlem	16	14.8	15.7	24.1	28.7	17.6	28.7	27.8	24.2	39.2	42.2	58.5
Central Harlem	21	13.9	23.2	24.5	21.2	20.8	20.5	28.5	38.6	46.7	52.3	82.2
Washington Heights-Inwood	36	13.3	11.8	12.6	19.6	31.1	17.7	19.2	24.1	28.7	28.9	48.7
Gramercy Park-Murray Hill	12	9.6	12.1	13.7	19.3	9.7	15.3	20.1	19.4	22.7	26.8	33.4
Chelsea-Clinton	10	8.1	17.1	6.5	10.6	11.4	23.6	16.3	22.7	17.8	34.0	52.6
Greenwich Village-Soho	6	7.2	10.8	15.5	9.6	8.6	16.7	19.1	21.6	12.1	25.5	42.7
Upper West Side	13	5.9	4.1	7.2	13.1	16.3	12.6	9.9	13.5	11.7	18.4	22.5
Upper East Side	7	3.2	5.0	2.3	4.1	14.5	5.0	8.3	4.6	6.9	11.1	9.3
QUEENS	**305**	**13.5**	**13.6**	**14.3**	**14.7**	**14.4**	**18.6**	**16.2**	**19.7**	**18.5**	**18.6**	**22.3**
West Queens	132	27.6	22.4	26.8	30.6	20.8	32.5	25.3	32.5	28.4	27.0	35.8
Flushing	37	14.5	17.2	17.6	15.7	17.2	22.3	21.9	19.3	19.5	24.9	19.5
Fresh Meadows	12	12.9	7.5	17.2	12.9	10.3	10.7	17.2	17.4	8.8	8.9	15.7
Jamaica	31	10.9	12.3	12.6	8.1	6.8	18.9	11.9	18.0	18.9	18.8	27.7
Ridgewood/Forest Hills	25	10.4	10.8	5.8	11.2	10.7	10.0	12.9	10.5	11.8	10.7	12.1
Long Island City-Astoria	19	8.6	11.3	14.0	12.7	25.5	19.0	16.7	28.4	25.1	25.4	22.9
Southwest Queens	21	7.8	11.9	9.3	9.6	7.5	11.5	10.0	9.8	15.4	9.4	12.8
Southeast Queens	15	7.4	8.3	4.4	8.8	6.4	13.3	10.3	15.8	11.0	15.1	18.7
Bayside-Little Neck	6	6.8	3.4	7.9	10.2	13.7	6.8	11.3	5.7	6.9	9.3	12.9
Rockaway	7	6.6	7.5	7.5	0.9	4.8	11.2	10.3	16.0	12.3	16.2	22.0
STATEN ISLAND	**28**	**6.3**	**3.8**	**6.3**	**6.5**	**5.6**	**6.1**	**7.2**	**7.8**	**5.8**	**7.5**	**6.9**
Port Richmond	5	8.0	4.8	9.6	8.0	8.6	17.5	11.1	17.8	11.6	13.5	12.0
Stapleton-St George	9	7.7	6.9	10.3	17.2	8.0	9.5	15.5	12.2	9.8	11.7	12.8
South Beach-Tottenville	11	6.1	1.1	2.8	0.0	3.3	1.1	1.1	2.8	2.3	4.1	2.4
Willowbrook	3	3.5	4.7	5.9	4.7	4.7	3.5	5.9	4.8	3.6	4.8	4.9
Total NYC	**953**	**11.9**	**12.3**	**13.0**	**14.2**	**13.5**	**15.7**	**16.6**	**18.4**	**19.8**	**22.2**	**26.5**

[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 6. Tuberculosis Cases by Age in Years and Area of Birth, New York City, 2006

	Age Groups (in Years)									
	0 - 19		20-44		45-64		65+			Rate/
Area of Birth	Number	%	Number	%	Number	%	Number	%	TOTAL	100,000
CARIBBEAN AND LATIN AMERICA[1]	17	5.9	173	59.9	72	24.9	27	9.3	289	18.9
ASIA[2]	15	5.1	128	43.4	80	27.1	72	24.4	295	46.3
AFRICA[3]	1	2.2	33	71.7	9	19.6	3	6.5	46	48.6
EUROPE[4]	0	0.0	9	26.5	10	29.4	15	44.1	34	5.7
MIDDLE EAST[5]	1	14.3	3	42.9	2	28.6	1	14.3	7	14.5
TOTAL NON-USA	34	5.1	346	51.6	173[6]	25.9	118	17.6	671	24.0
USA[6]	35	14.1	92	36.9	87	34.9	35	14.1	249	5.2
PUERTO RICO	0	0.0	4	1.4	15	55.6	8	29.6	27	8.9
TOTAL USA	35	12.7	96	33.2	102	37.0	43	15.6	276	5.4
UNKNOWN	0	0.0	3	50.0	2	33.3	1	16.7	6	
TOTAL	**69**	**7.2**	**445**	**46.7**	**277**	**29.1**	**162**	**17.0**	**953**	**11.9**

[1] Dominican Republic (53), Ecuador (50), Mexico (47), Haiti (32), Guyana (22), Trinidad & Tobago (15), Jamaica (13), Peru (13), Colombia (9), Honduras (7), Guatemala (5), Brazil (3), Other (20)
[2] China (111), Philippines (35), South Korea (32), India (26), Nepal (18), Bangladesh (14), Pakistan (12), Vietnam (9), Burma (7), Hong Kong (7), Indonesia (4), Other (20)
[3] Guinea (6), Ivory Coast (5), Nigeria (5), Ghana (4), Gambia (3), Mali, (3), Other (20)
[4] Poland (7), Russia (6), Greece (3), Italy (3), Serbia and Montenegro (3), Other (12)
[5] Yemen (3), Other (5)
[6] Includes the US Virgin Islands and other US territories, excludes Puerto Rico
Note: Percentage totals for each given area of birth in specific age groups are horizontal.

Table 7. Nucleic Acid Amplication (NAA) Testing, New York City, 2006

	Site of Disease				
	Any pulmonary[1]				
		NAA done		NAA positive	
	Total	Number	%	Number	%
AFB[2] smear-positive					
All patients	844	585	69.3	286	48.9
Confirmed cases	395	309	78.2	284	91.9
AFB smear-negative					
All patients	3125	71	2.3	15	21.1
Confirmed cases	331	51	15.4	16	31.4
	Extra-pulmonary only				
		NAA done		NAA positive	
	Total	Number	%	Number	%
All patients	501	61	12.2	16	26.2
Confirmed cases	213	28	13.1	16	57.1

[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, 2006

	US-BORN[1]		NON-US-BORN		TOTAL[2]	
Positive Culture For *M. tuberculosis*	191		513		708	
Tested for susceptibility to first-line drugs (% of those with positive culture for *M. tuberculosis*)	189	99.0%	508	99.0%	701	99.0%
Susceptibility results (% of those tested for susceptibility to first-line drugs)						
	Number	%	Number	%	Number	%
Any resistance[3]	25	13.2	90	17.8	115	16.4%
Multidrug-resistant (resistant to at least isoniazid & rifampin)	7	3.7	14	2.8	21	3.0
Other Drug Resistant TB[4]	18	9.5	76	15.0	94	13.4
Isoniazid Resistance Only	5	2.6	23	4.5	28	4.0
Rifampin Resistance Only	0	0.0	0	0.0	0	0.0
Ethambutol Resistance Only	1	0.5	0	0.0	1	0.1
Streptomycin Resistance Only	4	2.1	22	4.3	26	3.7
Pyrazinamide Resistance Only	1	0.5	10	2.0	11	1.6
>1 First-line Drug Resistance	14	7.4	35	6.9	49	7.0
Isoniazid Resistance + Other First Line	11	5.8	25	4.9	36	5.1
Isoniazid + Streptomycin Resistance + Other First Line	3	1.6	7	1.4	10	1.4
Susceptible to all first-line drugs	164	86.8	417	82.2	585	83.6

[1] Includes Puerto Rico, US Virgin Islands and other US territories.
[2] Totals include drug resistance for patients with unknown country of birth.
[3] 10 patients, with positive cultures and susceptibility done, had a history of prior anti-TB treatment; none of these patients had a drug resistant strain.
[4] Forms of other drug resistance are not mutually exclusive.

Table 9. HIV Status by Area of Birth and Age, New York City, 2006

HIV Status/Area of Birth	Age Groups (in Years) 0 - 19		20 - 44		45-64		65+		Total	
	Number	%	Number	%	Number	%	Number	%		
HIV positive	1	0.8	64	50.4	59	46.5	3	2.4	**127**	**13.4**
US-born	1	1.4	37	50.0	35	47.3	1	1.4	**74**	**26.8**
Non-US-born	0	0.0	27	50.9	24	45.3	2	3.8	**53**	**7.9**
HIV negative	39	7.1	314	57.5	136	24.9	57	10.4	**546**	**57.6**
US-born	18	13.6	52	39.4	44	33.3	18	13.6	**132**	**47.8**
Non-US-born	21	5.1	262	63.3	92	22.2	39	9.4	**414**	**61.6**
HIV status unknown	29	10.5	64	23.3	81	29.5	101	36.7	**275**	**29.0**
US-born all unknown	16	22.9	7	10.0	23	32.9	24	34.3	**70**	**25.4**
HIV test refused	8	19.5	2	4.9	16	39.0	15	36.6	**41**	**14.9**
Non-US-born	13	6.3	57	27.8	58	28.3	77	37.6	**205**	**30.5**
HIV test refused	6	4.0	47	31.3	45	30.0	52	34.7	**150**	**22.3**
TOTAL[1]	**69**	7.3	**442**	46.6	**276**	29.1	**161**	17.0	**948**	**100.0**
US-born	**35**	12.7	**96**	34.8	**102**	37.0	**43**	15.6	**276**	**29.1**
Non-US-born	**34**	5.1	**346**	51.5	**174**	25.9	**118**	17.6	**672**	**70.9**

[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, 2006 (N=33)

Site	Close contacts					Other-than-close contacts					Transmission[1]
	#Identified	#Tested	%Tested	#Positive	%Positive	#Identified	#Tested	%Tested	#Positive	%Positive	
Health care facilities											
HCF A[2]	106	71	67	4	6	0	0	0	0	0	Probable
HCF B[3]	107	71	66	4	6	0	0	0	0	0	Probable
HCF C	0	0	0	0	0	38	38	100	2	5	Possible
Sub-total	**213**	**142**	**67**	**8**	**6**	**38**	**38**	**100**	**2**	**5**	
Residences											
Residence A	11	5	45	0	0	14	9	64	0	0	Unable to assess
Residence B	13	11	85	3	27	0	0	0	0	0	Probable
Residence C	5	4	80	1	25	151	81	54	2	2	Probable
Sub-total	**29**	**20**	**69**	**4**	**20**	**165**	**90**	**55**	**2**	**2**	
Schools											
School A	32	31	97	3	10	1	1	100	0	0	Probable
School B	89	86	97	6	7	32	19	59	1	0	Possible
School D	6	3	5	0	0	28	14	50	2	14	Unable to assess
School E	20	13	65	1	8	12	5	42	1	20	Unable to assess
School F	16	12	75	1	8	5	5	100	2	40	Probable
Sub-total	**163**	**145**	**89**	**11**	**8**	**78**	**44**	**56**	**6**	**14**	
Worksites											
Worksite A	28	25	89	11	44	9	8	89	1	13	Probable
Worksite B	6	6	100	3	50	23	23	100	11	48	Probable
Worksite C	21	19	90	11	58	64	59	92	23	39	Probable
Worksite D	29	27	93	1	4	75	75	100	5	7	Unable to assess
Worksite E	8	5	63	0	0	6	6	100	1	17	Unable to assess
Worksite F	13	6	46	2	33	43	42	98	5	12	Possible
Worksite G	9	8	89	2	25	73	52	71	9	17	Unlikely
Worksite H	0	0	0	0	0	137	90	66	28	31	Possible
Worksite I	58	25	43	13	52	11	8	73	1	13	Unable to assess
Worksite J	3	3	100	1	33	52	43	83	12	28	Unlikely
Worksite K	9	4	44	2	50	12	11	48	5	45	Possible
Worksite L[3]	19	13	68	6	46	125	59	47	33	56	Probable
Worksite M[3]	23	18	78	4	22	10	1	10	0	0	Probable
Worksite N	10	10	100	5	50	0	0	0	0	0	Probable
Worksite O	47	35	74	3	9	107	43	40	1	2	Possible
Worksite P	12	10	83	1	10	17	15	88	0	0	Possible
Worksite Q	32	29	91	11	38	3	1	33	0	0	Probable
Worksite R	32	27	84	17	63	69	50	72	16	32	Probable
Worksite S	22	20	91	10	50	0	0	0	0	0	Probable
Worksite T	11	11	100	5	45	5	2	40	0	0	Probable
Worksite U	15	15	87	1	8	0	0	0	0	0	Unlikely
Sub-total	**407**	**314**	**77**	**109**	**35**	**841**	**58**	**70**	**151**	**26**	
Other Congregate Settings											
Program A	**17**	**16**	**94**	**1**	**6**	**0**	**0**	**0**	**0**	**0**	**Unlikely**
Totals	**829**	**637**	**77**	**133**	**21**	**1122**	**760**	**68**	**161**	**21**	

[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] Two or more TB cases were diagnosed at the same site; however, investigations were not conducted around the secondary cases due to low likelihood of infectiousness

Appendix 2

Reporting Suspected and Confirmed Tuberculosis

Medical providers and infection control practitioners are required by the New York City Health Code Article 11, in particular, Sections 11.03, 11.05 and 11.47(a), to report all patients suspected and confirmed with tuberculosis (TB) to the New York City Department of Health and Mental Hygiene (DOHMH), Bureau of Tuberculosis Control, within 24 hours of diagnosis or clinical suspicion. Medical providers must report these patients even though microbiologists and pathologists are also required to report findings consistent with TB. Note that the reports must be received by the DOHMH within 24 hours, whether by express or overnight mail, fax, telephone or electronically.

It is **mandatory** to report patients who meet any of the following criteria:

- Smear (from any anatomic site) positive for acid-fast bacilli (AFB)
- Nucleic acid amplification (NAA) test (e.g., Roche's AMPLICOR®, Genprobe's MTD™)[1] result positive for *Mycobacterium tuberculosis* complex
- Culture positive for *M. tuberculosis* complex including: *M. tuberculosis*, *M. africanum*, *M. bovis-BCG*, *M. caprae*, *M. canetti*, *M. microti*, *M. pinnipedii*, *M. bovis*
- Biopsy, pathology or autopsy findings consistent with active TB, including but not limited to caseating and necrotizing granulomas in biopsy of lung, lymph nodes or other specimens
- Treatment with two or more anti-TB medications for suspected or confirmed active TB
- Clinical suspicion of pulmonary or extrapulmonary TB such that the physician or other health care provider has initiated or intends to initiate isolation or treatment for TB
- Continuation, discontinuation, completion or other outcomes of treatment for active TB
- Any child younger than five years old (up to the day of the fifth birthday) who has a positive Tuberculin Skin Test or a positive US Food and Drug Administration (FDA) approved blood-based test for TB infection [such as QuantiFERON®-TB Gold (QFT-G)][1,2]
- In addition, Section 47.21 requires that Day Care staff report those with LTBI to the Bureau of Day Care

When an individual has an AFB-positive smear or has started treatment for TB, reporting should never be delayed pending identification of *M. tuberculosis* with a NAA test. Patients should be reported whenever TB is suspected, even if bacteriologic evidence of disease is lacking or treatment has not been initiated. Additionally, when requested by the DOHMH, a physician shall report the results of any examination of a contact.

Microbiology and Pathology Laboratories

The New York City Health Code also requires laboratories to report as per Articles 11 and 13, Sections 11.03, 11.05, and 13.03, all of the following within 24 hours of identification to the Bureau of Tuberculosis Control:

- AFB-positive smears (regardless of anatomic site)
- Cultures positive for *M. tuberculosis* complex
- NAA test results that identify *M. tuberculosis* complex (e.g. Amplicor®, MTD™)
- Results of susceptibility tests performed on *M. tuberculosis* complex cultures
- Pathology findings consistent with TB, including the presence of AFB and granulomas

- Any culture or NAA result associated with an AFB-positive smear (even if negative for *M. tuberculosis* complex)

Reporting by Telephone and the URF

Suspected and confirmed TB patients may be reported by telephone to the TB Hotline, 212-788-4162, but a completed Universal Reporting Form (URF) must follow within 48 hours. The URF should be faxed to the Bureau of Tuberculosis Control at 212-788-4179 and the original mailed to the Bureau of Tuberculosis Control, DOHMH at 253 Broadway, Room 602, CN-72, NY, NY 10007. The URF can also be completed online, by first creating an account on NYC-MED at http://www.nyc.gov/health/nycmed. Assistance is available by calling 1-888-NYC-MED9 or 212-442-3384.

Information reported on the URF should be as complete as possible. The following essential information must be included when the report is submitted to the New York City DOHMH:

- Information needed to identify and locate the individual (i.e., name, telephone, address and date of birth)
- Provider information (i.e., physician's name and telephone number, reporting facility)
- Results of smear for AFB (including date specimen obtained and accession number, if available)
- Results of chest radiographs
- Any treatment information

Laboratories are required to report via the Electronic Clinical Laboratory Reporting System (ECLRS) as of July 1, 2006. Assistance with ECLRS is available by calling 212-313-5137. In addition, within 24 hours of observing growth of *M. tuberculosis* complex in a culture from any specimen, the New York City Health Code Section 13.05(a) requires that a portion of the initial culture be sent for DNA analysis to the NYC DOHMH Public Health Laboratory (455 First Avenue, Room 236, NY, NY 10016). Laboratories outside of New York City should submit isolates directly to the Wadsworth Center Mycobacteriology Laboratory in Albany, NY for genotyping.

Patient Follow-up

The treating physician should also report whether the patient completed treatment and the outcome of the patient (cured, failed, relapsed, lost, moved) or whether treatment was discontinued if the patient was found not to have TB. Physicians must assist the DOHMH in its efforts to evaluate persons suspected of having TB and in patient follow-up. Case managers will be in contact with the treating physicians to request updates and ensure that appropriate treatment and monitoring is being conducted. A Report of Patient Services Form (TB 65) may need to be completed.

Reporting TB-related Evaluation and Treatment of Contacts

Medical providers are required, under Section 11.47(b) of the New York City Health Code, to report to the DOHMH, when requested, all information on the evaluation, testing and treatment of individuals who have been in contact with a person with active TB disease.

Inquiries and Forms

To inquire further about reporting procedures, please call the Surveillance Office at the Bureau of Tuberculosis Control at 212-788-4162. To order copies of the Report of Patients Services Form (TB 65) call 212-442-5100. Obtain the Universal Reporting Form by calling toll free 1-866-NYC-DOH1 (1-866-392-3641) or at http://home2.nyc.gov/html/doh/html/hcp/hcp-urf.shtml

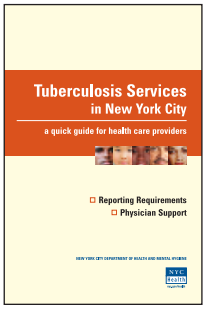
Notes:

1. Product names are provided for identification purposes only; their use does not imply endorsement by the NYC DOHMH.
2. To report a positive test for TB infection in a child less than 5 years old, use the Universal Reporting Form. For guidelines for interpreting skin test results, see City Health Information: Testing and Treating for Latent TB Infection, April 2006, www.nyc.gov/html/doh/downloads/pdf/chi/chi25-4.pdf

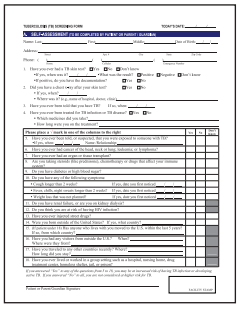
Appendix 3

Educational Materials Developed in 2006, NYC Bureau of TB Control

1. A provider brochure, "Tuberculosis Services in New York City: a Quick Guide for Health Care Providers"

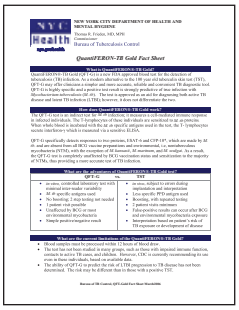


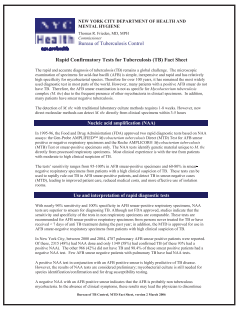
2. A TB screening form, to help providers screen their patients for TB



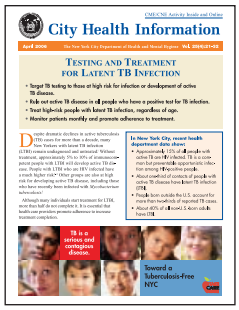
3. A reference guide for the TST test, "The Mantoux/ Tuberculin Skin Test: A Guide for Providers"

4. Separate fact sheets on the QFT®-G TB test for patients and providers, and a fact sheet entitled "Rapid Confirmatory Tests for TB"

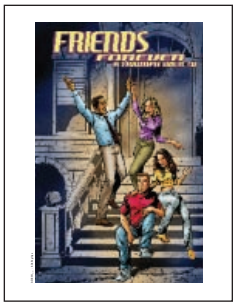




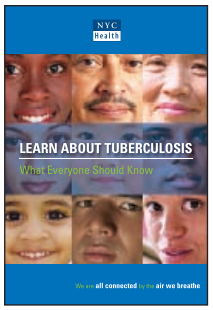
5. A City Health Information publication, "Testing and Treatment for Latent TB Infection"



6. For waiting rooms, a comic book illustrating the importance of completing treatment for LTBI, "Friends Forever: A Triumph Over TB"



7. A patient brochure, "Learn About Tuberculosis: What Everyone Should Know"



8. A TB Awareness Poster containing the message: "TB is a serious and contagious disease. You could be infected even without symptoms. Call 311 for free, confidential testing and treatment"

The patient brochure and TB screening form have been translated into 10 languages. The Spanish, Chinese, Korean, French and Creole versions have been printed by the DOHMH office of Cross-Cultural Affairs, with input from native speakers in the Bureau. Versions in Bengali, Hindi, Urdu, Arabic and Russian are being printed. Over 60,000 of the new educational materials have been distributed to the public, patients and providers. Materials are available at http://www.nyc.gov/html/doh/html/tb/tb.shtml or by calling 311.

Appendix 4

Publications in Peer-Reviewed Journals in 2006:

1. Clark CM, Driver CR, Munsiff SS, Driscoll JR, Kreiswirth BN, Zhao B, Ebrahimzadeh A, Salfinger M, Piatek AS, Abdelwahab J, and the New York City Molecular Epidemiology Working Group. Universal genotyping in tuberculosis control program, New York City, 2001-2003. *Emerg Infect Dis*. 2006;12:719-24.
2. Driver CR, Macaraig M, McElroy PD, Clark C, Munsiff SS, Kreiswirth B, Driscoll J, Zhao B. Which patients' factors predict the rate of growth of *Mycobacterium tuberculosis* clusters in an urban community? *Am J Epidimiol Infect*. 2006;164:21-31.
3. Driver CR, Kreiswirth B, Macaraig M, Munsiff SS, Driscoll J, Zhao B. Molecular epidemiology of tuberculosis after declining incidence, NYC. *Epidemiol Infect*. 2007;135: 634-43.
4. Munsiff SS, Kambili C, Ahuja SD. Use of rifapentine for the treatment of pulmonary tuberculosis. *Clin Infect Dis*. 2006;43:1468-75.
5. Manangan LP, Moore M, Macaraig M, MacNeil J, Shevick G, Northrup J, Pratt R, Adams L, Boutotte J, Sharnprapai S, Qualls N. Health department costs of managing persons with suspected and non-counted tuberculosis in New York City, 3 Texas Counties, and Massachusetts. *J Public Health Manag Pract*. 2006;12:248-53.
6. Munsiff S, Li J., Cook S, Piatek A, Laraque F, Ebrahimzadeh A, Fujiwara P. Trends in *Mycobacterium tuberculosis* drug resistance, New York City, 1991 - 2003. *Clin Infect Dis*. 2006;42:1702-10.
7. Munsiff SS, Ahuja S, Li J, Driver C. Public-private collaboration for multidrug-resistant tuberculosis control in New York City. *Int J Tuberc Lung Dis*. 2006;10:639-48.
8. Munsiff SS, Ahuja SD, King L, Udeagu C, Dorsinville M, Frieden TR, Fujiwara P. Ensuring accountability: the cohort review method for tuberculosis control in New York City. *Int J Tuberc Lung Dis*. 2006;10:1133-9.
9. Macaraig M, Agerton TB, Driver CR, Munsiff SS, Abdelwahad J, Park J, Kreiswirth B, Driscoll J, Zhao B. Strain-specific differences in two large *Mycobacterium tuberculosis* genotype clusters among homeless in NYC 2001-2004. *J Clin Microbiol*. 2006;44:2890-6.
10. Sackoff JE, Pfeiffer MR, Driver CR, Streett LS, Munsiff SS, DeHovitz JA. Tuberculosis prevention for non-US-born pregnant women. *Am J Obstet Gynecol*. 2006;194:451-6.
11. Burman WJ, Goldberg S, Johnson JL, Muzanye G, Engle M, Mosher AW, Choudhri S, Daley CL, Munsiff SS, Zhao Z, Vernon A, Chaisson RE. Moxifloxacin versus ethambutol in the first two months of treatment for pulmonary tuberculosis. *Am J Respire Crypt Care Med*. 2006; 174:331-8.

Oral or Poster Presentations Made in Scientific and Professional Meetings in 2006:

1. Agerton T. Extensive transmission of MDR TB among HIV-infected homeless, New York City, 2005. *CDC Brown Bag*. January 25, 2006.
2. Li J, Munsiff SS, Driver CR, Tarantino T, Dorsinville M. Treatment of latent tuberculosis infection (TLTBI) in New York City chest centers. Poster. 10th Annual Meeting, North American Region, IUATLD, March 2-4, 2006, Chicago, IL.
3. Wiseman R, Joseph K, Chuck C, Poonja S, Agerton T, Winters A, Driver C, Munsiff S. Active case finding following multidrug resistant tuberculosis outbreak at a Residence for HIV-Infected persons. Poster. 10th Annual Meeting, North American Region, IUATLD, March 2-4, 2006, Chicago, IL.
4. Laraque F, Munsiff SS, Griggs A, Slopen M. Use of Nucleic Acid Amplification (NAA) Tests for the Diagnosis of Tuberculosis (TB) in New York City (NYC). National TB Controllers Workshop, June 2006, Atlanta, GA.
5. Laraque F, Munsiff SS, Griggs A, Slopen M. Use of Nucleic Acid Amplification (NAA) Tests for the Diagnosis of Tuberculosis (TB) in New York City (NYC). ATS 2006 International Conference. May 19-24, San Diego, CA.

TB CHEST CENTERS

Bronx

Morrisania Chest Center
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Bronx, NY 10456

Brooklyn

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

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.

The New York City Department of Health and Mental Hygiene

Thomas R. Frieden, MD, MPH
Commissioner

Michael R. Bloomberg
Mayor

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