2003

TB ANNUAL SUMMARY

Bureau of Tuberculosis Control

New York City
Department of Health and Mental Hygiene

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

Mission Statement

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 Tuberculosis Control are:

1. To identify all individuals with suspected or confirmed tuberculosis 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 tuberculosis is widespread) receive treatment for latent tuberculosis 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 tuberculosis identified in all facilities in New York City are reported to the Bureau and documented on the computerized, confidential TB registry.
2. Conducting intensive case interviews and maintaining an effective outreach program so that tuberculosis 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 tuberculosis.
4. Setting standards and guidelines and providing consultation on the prevention, diagnosis, and treatment of latent tuberculosis 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 tuberculosis disease and their close contacts, at no cost to the patient.
6. Ensuring care for persons who have or are suspected of having active tuberculosis 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 tuberculosis through education, outreach, and targeted screening in communities at high-risk for tuberculosis.

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

2003 Information Summary

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Acknowledgments

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I. Executive Summary

New York City (NYC) has made enormous strides in tuberculosis control: the number of tuberculosis cases has declined by 70% since 1992. However, in 2003, the number of tuberculosis cases increased slightly for the first time in over 10 years, with 1,140 tuberculosis cases and a rate of 14.2 per 100,000. Despite the overall 10-year decreasing trend in tuberculosis in New York City, the rate of tuberculosis is 2.8 times higher than the national rate of 5.1 per 100,000 and 14 times higher than the Healthy People 2010 Objective of 1.0 per 100,000.

The increase in tuberculosis cases represents an excess of 56 cases over the number in 2002. This increase is partially the result of a change in case counting methods that occurred at the end of 2002, immigration from countries with high prevalence of tuberculosis and increased transmission of tuberculosis, in residences for homeless individuals.

Profile of Tuberculosis Cases

- Most tuberculosis patients were aged 20 to 64 years, male, non-white, and non-U.S.-born. A little over 7% (85 patients) were homeless.
- Main countries of birth of non-U.S.-born persons with tuberculosis were China, Mexico, Ecuador, the Dominican Republic, Haiti, India, the Philippines, Guyana, South Korea, Peru and Pakistan.
- Most cases were culture positive (76.5%), a decrease since the peak of the recent tuberculosis epidemic when over 90% of cases were culture-positive. This is likely the result of better surveillance methods enabling the Bureau of TB Control (BTBC) to identify more clinically-confirmed tuberculosis cases.
- Only 21 (2.4%) patients had multidrug-resistant tuberculosis (MDRTB, resistance to at least isoniazid and rifampin), while 98 patients (11.3%) had other drug resistance patterns.
- New York City United Hospital Fund (UHF) neighborhoods with the highest rates of tuberculosis were West Queens, East Harlem, Central Harlem-Morningside Heights, Williamsburg-Bushwick, and Highbridge-Morrissania.

Accomplishments

- The number of tuberculosis cases decreased among U.S.-born persons, indicating good control measures limiting the local transmission of *M. tuberculosis*, such as prompt contact investigations, identification and treatment of infected contacts, and the use of appropriate anti-tuberculosis treatment under directly observed therapy (DOT).
- There were fewer tuberculosis patients who were HIV-infected and fewer patients from correctional facilities or who were health care workers, compared to 10 years ago.
- The percent of eligible patients on DOT increased to 72.4% in 2003 from 67.4% in 2002; 94.4% of patients with MDRTB were on DOT while over 80% of those with other drug-resistance, pulmonary smear or culture positive tuberculosis were on DOT.
- Of the patients who were confirmed with tuberculosis in 2002 and were slated to complete treatment in 2002 or 2003, 93.9% completed treatment.
- The number of patients with drug-resistant tuberculosis decreased slightly from 2002 to 2003 and represents a 95% decrease since 1992.
- In 2003, there was a major outbreak investigation at a shelter for men located outside of New York City, where most residents were screened; of residents eligible for latent tuberculosis infection treatment (LTBI), 93% were started on therapy and 87% of those eligible for LTBI were placed on DOT.

Challenges

- For the first time since 1992, there was an increase in tuberculosis in New York City. This should be seen as a warning against the diminishing tuberculosis control budget.
- The increase in tuberculosis cases was solely among non-U.S.-born persons, many of whom had been in the U.S. for over five years, highlighting difficulties in reaching, screening for LTBI and treating non-U.S.-born individuals at risk for tuberculosis.
- A higher number of tuberculosis cases occurred among homeless individuals due to increased transmission of *M. tuberculosis* in congregate settings.
- About half of tuberculosis patients were reported four days or more after identification, while the law requires patients suspected or confirmed with tuberculosis to be reported within 24 hours, highlighting misconceptions about or a lack of priority placed on reporting requirements.
- Of contacts to tuberculosis patients identified in 2002 and found to be TST-positive, only 64.4% completed treatment for LTBI, remaining short of the CDC goal of 85%.
- Of LTBI patients treated at BTBC chest centers, the treatment completion rate was even lower, with only 51.4% of those started on LTBI treatment in 2002 completing treatment. Creative program initiatives will need to be instituted in order to diminish the risk of reactivation of tuberculosis among those with LTBI in New York City.

NYC Tuberculosis Control Activities

- Increased attention to enrolling patients into DOT programs resulted in a higher proportion of patients with active tuberculosis on DOT and a higher treatment completion rate.
- Several initiatives to improve management and services provided to tuberculosis patients were implemented to ensure continuity of care and to provide general health prevention screening in the chest centers.
- A computerized online patient registration system was implemented in all the chest centers; this system will eventually become an electronic medical record that will allow more efficient patient management and billing.
- The Bureau started to collaborate with several major NYC hospitals to reduce unnecessary hospitalization of tuberculosis patients and to promote early discharge where warranted.
- Forty expanded contact investigations (ECIs) were conducted, the largest number since the start of this activity in 1995. This included the largest ECI in the past ten years, conducted at a men's shelter, where TSTs were placed for 593 individuals, and chest radiographs were done for 927 individuals.
- Ninety possibly false-positive *M. tuberculosis* test investigations were initiated; of these, 20 (22%) were confirmed to be false positive.
- The Bureau maintained a high level of epidemiologic research activity, with several major projects, such as a study of missed opportunities for tuberculosis prevention, a drug resistance survey, a decade-long review of tuberculosis in health care workers, and a molecular epidemiology project.

New and Future Strategies

- Activities aiming to achieve the Healthy People 2010 Objectives (see Appendix 3) are being implemented to improve case management, including upgrading data management tools, increasing treatment completion for active tuberculosis and LTBI patients by targeting high-risk groups, and expanding the use of rifapentine.
- New initiatives are being carried out to improve service delivery, partnership development, and outreach to high-risk groups.
- LTBI identification and treatment will focus on identifying missed opportunities for tuberculosis prevention, reaching out to groups at high-risk for LTBI and progression to active tuberculosis, and targeting treatment completion efforts toward contacts of tuberculosis patients.
- The Bureau will continue interventions to improve case identification, reporting, surveillance and epidemiologic activities by educating providers on the need to report promptly, providing on-going feedback on reporting delays, and undertaking a study of the use of nucleic acid amplification (NAA) tests for the rapid diagnosis of tuberculosis.
- All reported cases on two or more anti-tuberculosis drugs will be case managed from the report date, regardless of smear and culture results.
- Spending will be reduced through consolidating services and more efficient use of current resources, including the increased use of intermittent DOT, completing the analysis of inappropriate hospitalization for tuberculosis, implementing the new protocol to decrease unnecessary hospitalizations, uploading automatically from the chest centers' electronic medical records to the TB registry, using electronic reporting through the web-based Universal Reporting Form (URF), and electronic laboratory reporting (ECLRS).
- Outreach to high-risk groups will be expanded by collaborating with the Bureau of HIV/AIDS to reach out to Ryan White funded Community Based Organizations and reaching out to NYC residents from countries with a high prevalence of tuberculosis.
- The Public Health Laboratory (PHL) will change to non-radiometric liquid media for susceptibility testing, thereby reducing costs.
- The BTBC is planning strategies to increase the number of patients who undergo NAA testing for more rapid diagnosis, and meet the Healthy People 2010 tuberculosis objective for confirming tuberculosis diagnosis within 48 hours for at least 75% of patients with culture positive disease.

Our long-term priorities, to control tuberculosis and eliminate it as a public health threat in NYC, will remain challenging given the planned budget cuts for 2005, the cut in 2004 funding, the large homeless and unstably housed population, the difficulties of completing LTBI therapy for a large proportion of those who start treatment, the ongoing global tuberculosis epidemic, and the continuing arrival of new immigrants into the city.

II. Tuberculosis in New York City – Trends, Accomplishments and Challenges in 2003

Globally, tuberculosis affects over 8 million individuals each year, and kills 2 million. Much progress was made in recent years in tuberculosis control worldwide, mainly via the implementation of the World Health Organization's (WHO) recommended program, DOTS (the internationally recommended control strategy for tuberculosis). DOTS controls tuberculosis by relying on case detection via sputum smear microscopy, standardized short-course treatment (under DOT for at least the first two months of therapy) an uninterrupted supply of anti-tuberculosis medications, a standardized reporting and data tracking system and strong government support. By 2002, 180 countries had implemented DOTS, including all 22 high burden countries, such as India, China, Bangladesh, Pakistan, and the Philippines. However, despite this progress, tuberculosis remains common in many nations, and is increasing in parts of the world with a large HIV population.

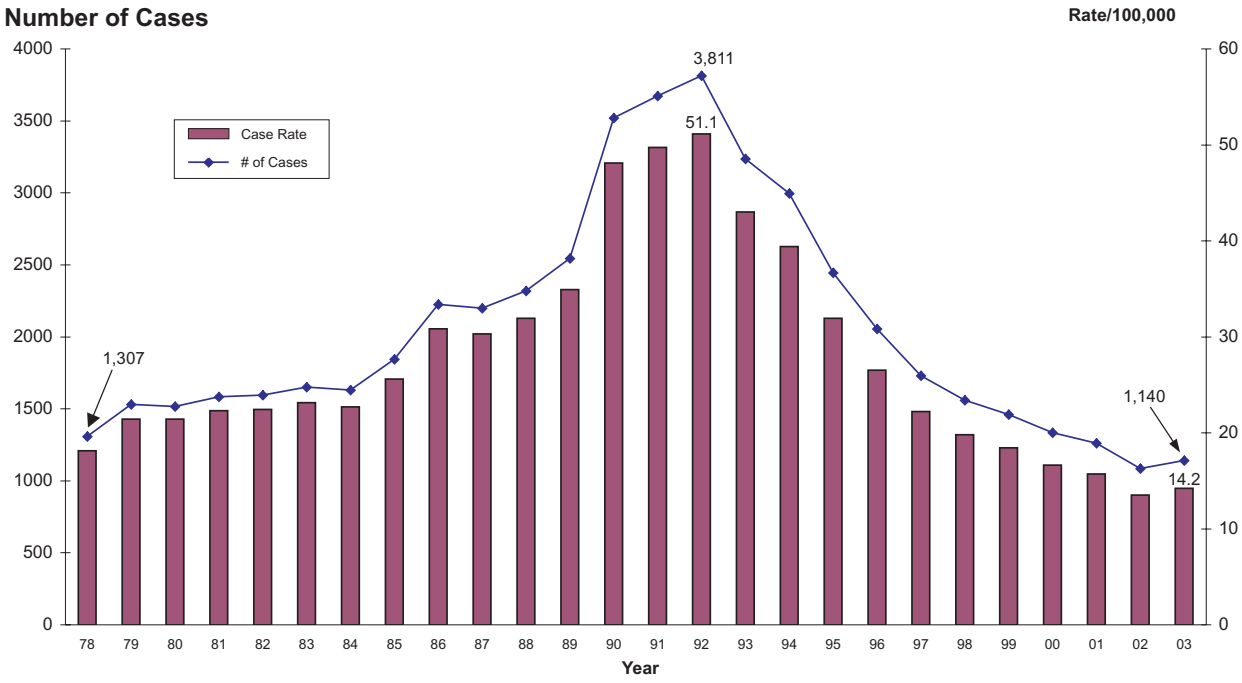
According to 2000 census data, New York City (NYC) is home to over 2.8 million persons (36% of the NYC population) who were not born in the United States. The main countries of birth of non-U.S.-born NYC residents include the Dominican Republic, China, Jamaica, Mexico, Ecuador, Guyana, Haiti, India, Russia, the Philippines, Bangladesh and Pakistan; many of these countries have a high prevalence of tuberculosis. One of the most significant trends in the history of tuberculosis control in NYC is the rapid decline in active tuberculosis among U.S.-born persons, from 3,132 in 1992 to 353 in 2003. At the same time, however, the number of tuberculosis cases among non-U.S.-born persons increased from 676 in 1992 to 776 in 2003, now representing over two-thirds of tuberculosis cases in NYC. The year 2003 is remarkable for having an increase in tuberculosis cases for the first time since 1992.

Significant Trends

Case Number and Rate

In 2003, the number of tuberculosis cases increased by 56 cases (5.2%) compared to 2002 for a total of 1,140 cases. However, this total number of cases is still a decrease from the number in 2001 (Figure 1 and Table 1).

Figure 1
Tuberculosis Cases and Rates[1]
New York City, 1978-2003



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

- After peaking at 51.1 per 100,000 in 1992, the NYC tuberculosis case rate consistently decreased every year to a low of 13.5 per 100,000 in 2002, but increased to 14.2 per 100,000 in 2003.
- Although culture-positive cases increased by 6%, smear-positive and multidrug-resistant cases decreased.

The 2003 increase in tuberculosis cases is attributed to several factors, including a change in surveillance methods instituted in 2002. Until then, the NYC Bureau of Tuberculosis Control (BTBC) counted tuberculosis cases in the year that they were reported if they were verified as a case of tuberculosis by January 31st of the following year. In 2002, based on national recommendations, the BTBC counted cases in the same year that they were verified, regardless of when they were reported. This change resulted in a higher decrease in cases for 2002 and a corresponding increase in cases in 2003. Analysis of cases by date of report and date of confirmation of diagnosis indicates that 23 patients were reported in 2002 but had tuberculosis confirmed in January 2003. Therefore, if these 23 patients had been included in the 2002 final count and not in the 2003 count, the increase from 2002 to 2003 would have been minimal (8 cases).

The increase can also be partially attributed to *M. tuberculosis* transmission among the homeless, mainly due to transmission in a large men's shelter where 11 cases were counted in 2003 in NYC and in an SRO in Manhattan where 8 new patients were confirmed with tuberculosis in 2003. In addition, an increase in cases was observed among non-U.S.-born patients while the number of cases decreased for U.S.-born persons, indicating that the high burden of tuberculosis in the rest of the world is affecting NYC and that successful global tuberculosis control will be essential to eliminate tuberculosis as a public health problem in NYC.

Demographic Characteristics

Most groups of New Yorkers have had a significant decrease in tuberculosis since 1992, most remarkably among those aged 20 to 44 years, where the highest number of cases was concentrated in the early 1990s.

- There was an increase in the number of tuberculosis cases in all age groups from 2002 to 2003 (Figure 2). The largest increase in cases was among children and adolescents, nearly 12%, followed by an increase of about 6% among adults aged 20 to 44 years. The rate of tuberculosis by age group shows a similar trend (Figure 3).
- The number of tuberculosis cases decreased significantly since 1992 among non-Hispanic whites, non-Hispanic blacks and Hispanics, while a slow but steady increase was seen among Asians (Figure 4). There was a slight increase in cases among non-Hispanic blacks and Hispanics from 2002 to 2003.
- Asians have the highest tuberculosis rate (42.6 per 100,000); overall, the trend in the tuberculosis rate among

Figure 2
Tuberculosis Cases by Age
New York City, 1992-2003

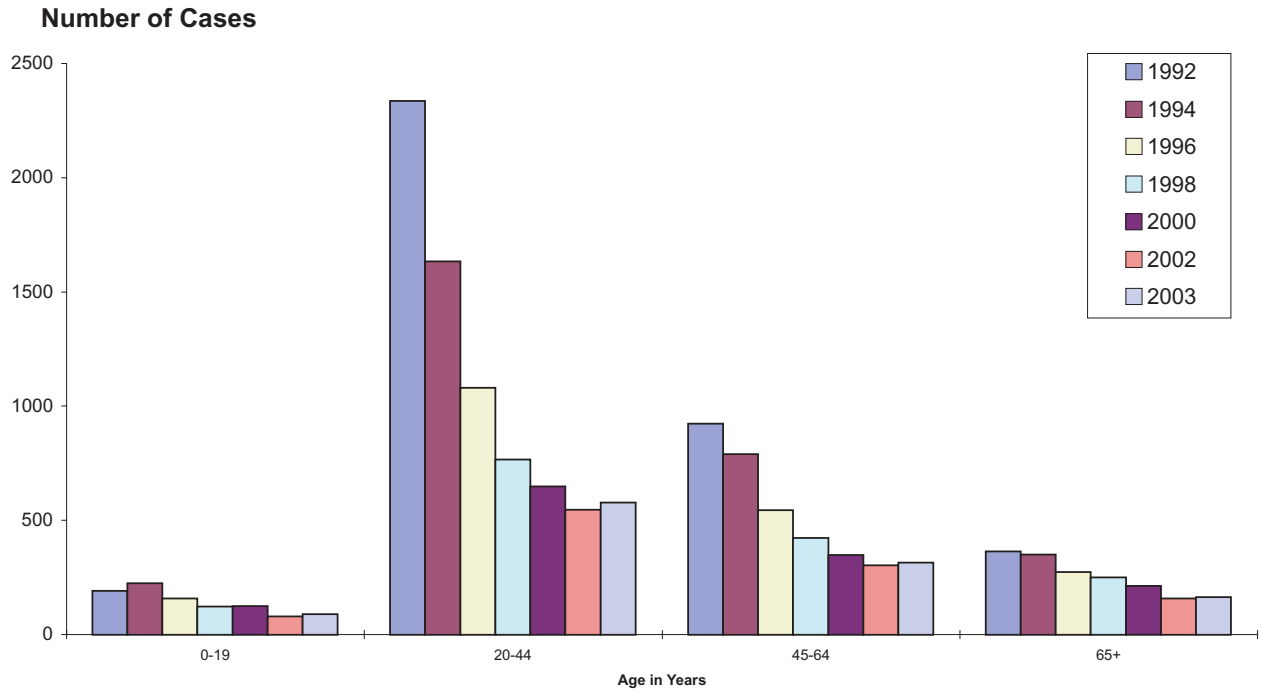
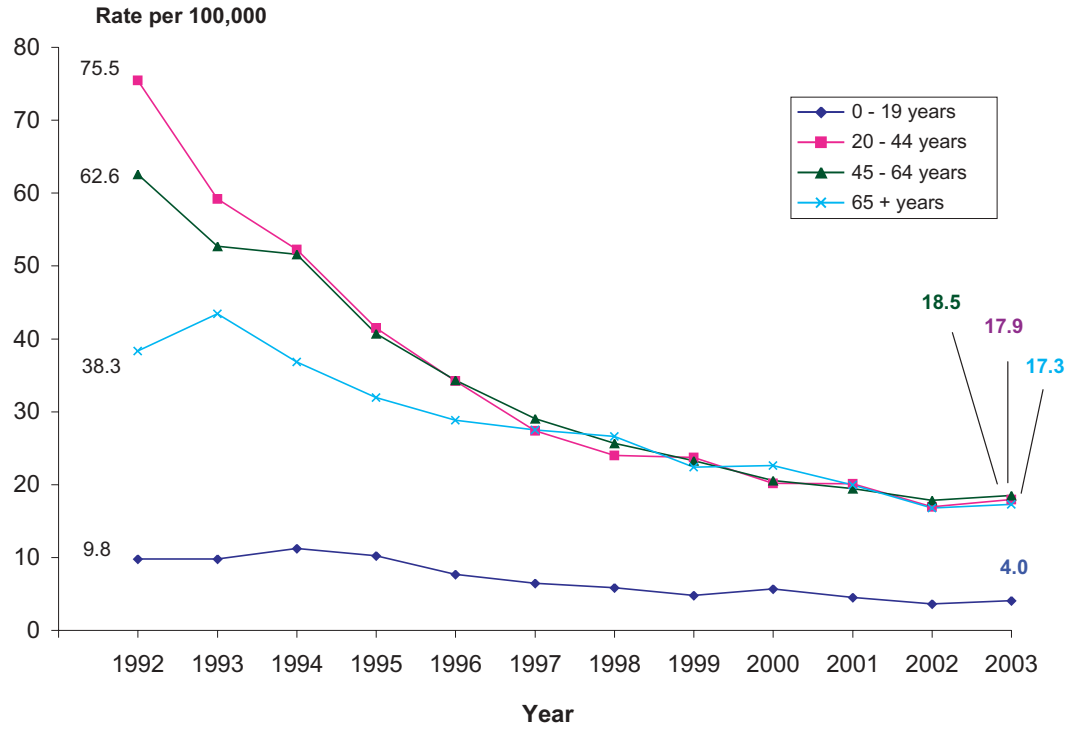
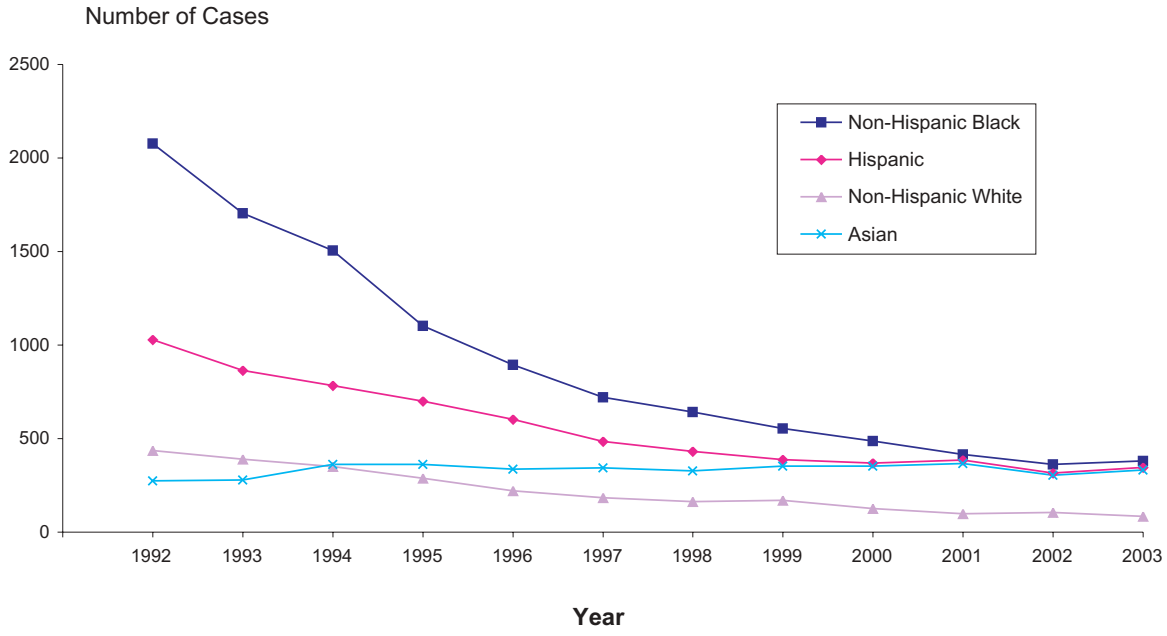


Figure 3
Tuberculosis Rates[1] by Age Group
New York City, 1992-2003



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

Figure 4
Tuberculosis Cases by Race/Ethnicity
New York City, 1992-2003



Asians has remained relatively stable over the last decade, while rates have decreased for all other racial/ethnic groups (Figure 5).

Neighborhoods and Area of Birth

- All of NYC's boroughs experienced a slight increase in tuberculosis cases and rates from 2002 to 2003, while a significant decrease since 1992 is evident. Manhattan had the greatest decrease in cases over the past 10 years (Figure 6).
- Nearly all of NYC's neighborhoods saw a major decrease in tuberculosis over the past decade, particularly in the neighborhoods with the highest initial tuberculosis burden such as Central Harlem, East Harlem, Bedford-Stuyvesant/Crown Heights, and Williamsburg-Bushwick (Table 2).
- Tuberculosis cases decreased among U.S.-born persons from 3,132 (77.1%) cases in 1992 to 353 (31%) in 2003, while the number of non-U.S.-born tuberculosis cases remained relatively stable and represents a higher proportion of tuberculosis cases, from 17.8% in 1992 to 68.1% in 2003 (Figure 7).

Social Characteristics

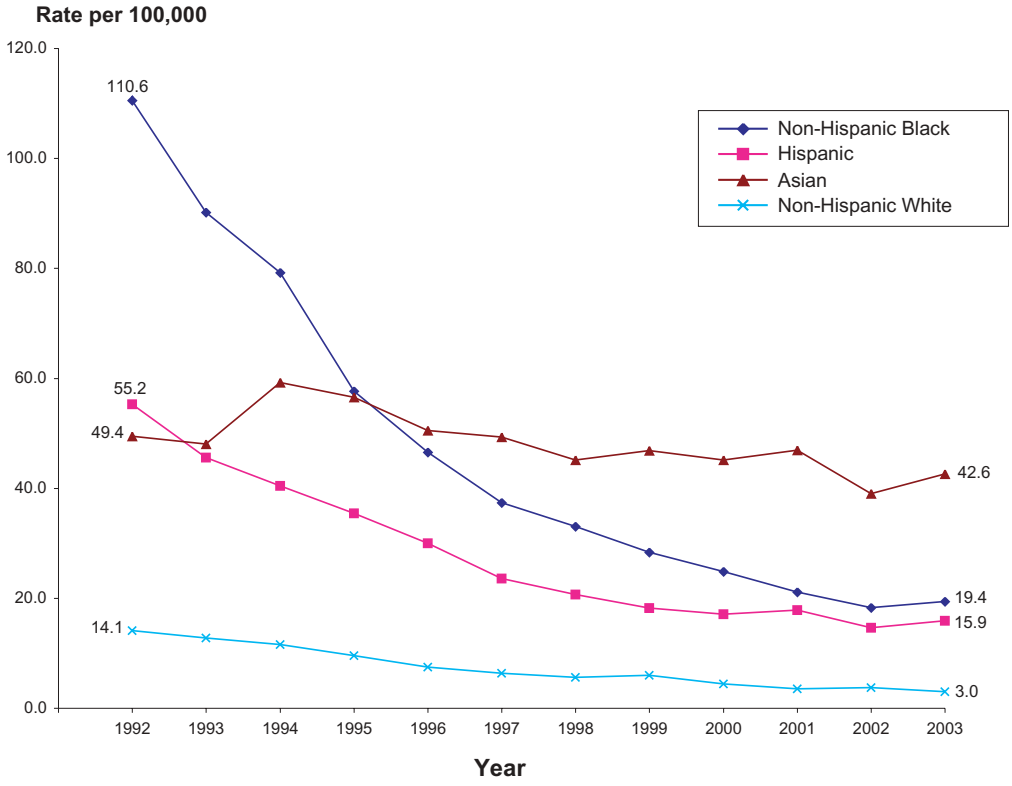
- The number of tuberculosis patients who consumed alcohol excessively and/or used illicit drugs remained relatively stable from 2002 to 2003, and did not decrease much in the past few years.
- The number of tuberculosis patients who were residents of correctional facilities decreased from 2002 to 2003, continuing a several year trend.[1]
- The number of tuberculosis cases who were homeless increased from 49 (4.5% of all cases) in 2002 to 85 (7.5%) in 2003, an increase of 73.5%. This increase can be attributed to active transmission of *M. tuberculosis* in several homeless shelters and single room occupancy (SRO) hotels in NYC in 2003, and to better ascertainment of homelessness status.

Clinical Aspects

- Both culture-positive and smear-positive tuberculosis decreased significantly since 1992. The proportion of culture-positive tuberculosis cases went from 90.5% in

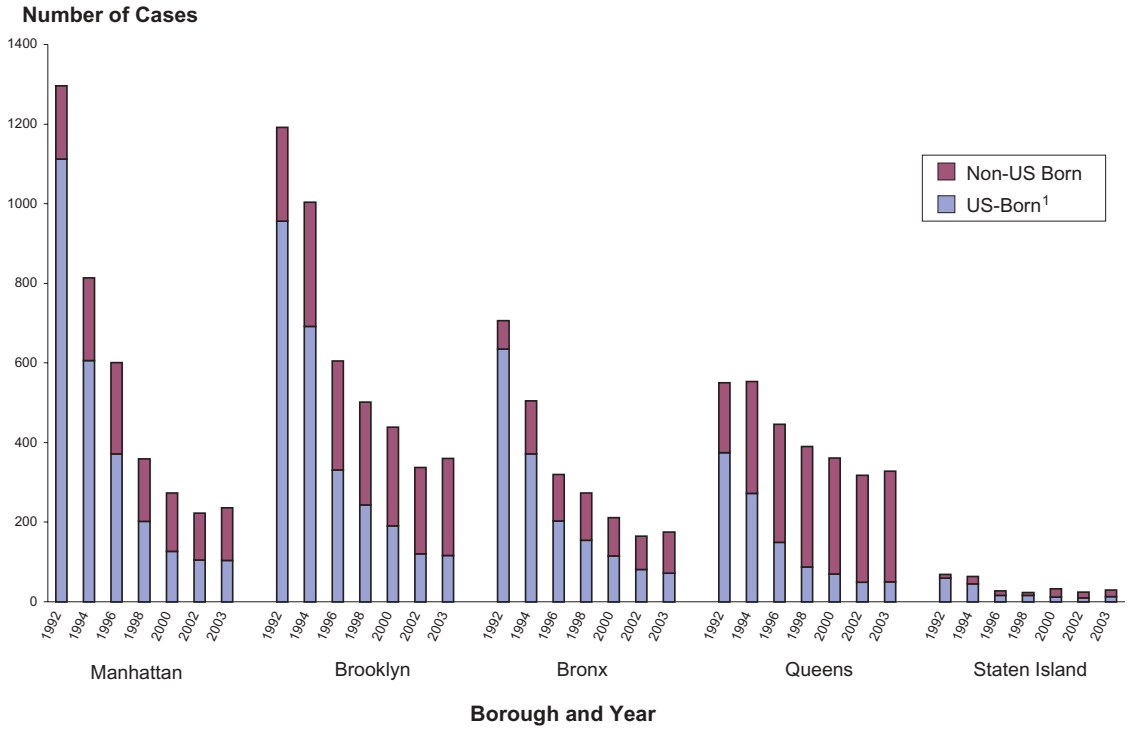
[1]Tuberculosis in New York City, 2002: Information Summary. New York: New York City Department of Health and Mental Hygiene, 2003.

Figure 5
Tuberculosis Rates[1] by Race/Ethnicity
New York City, 1992-2003



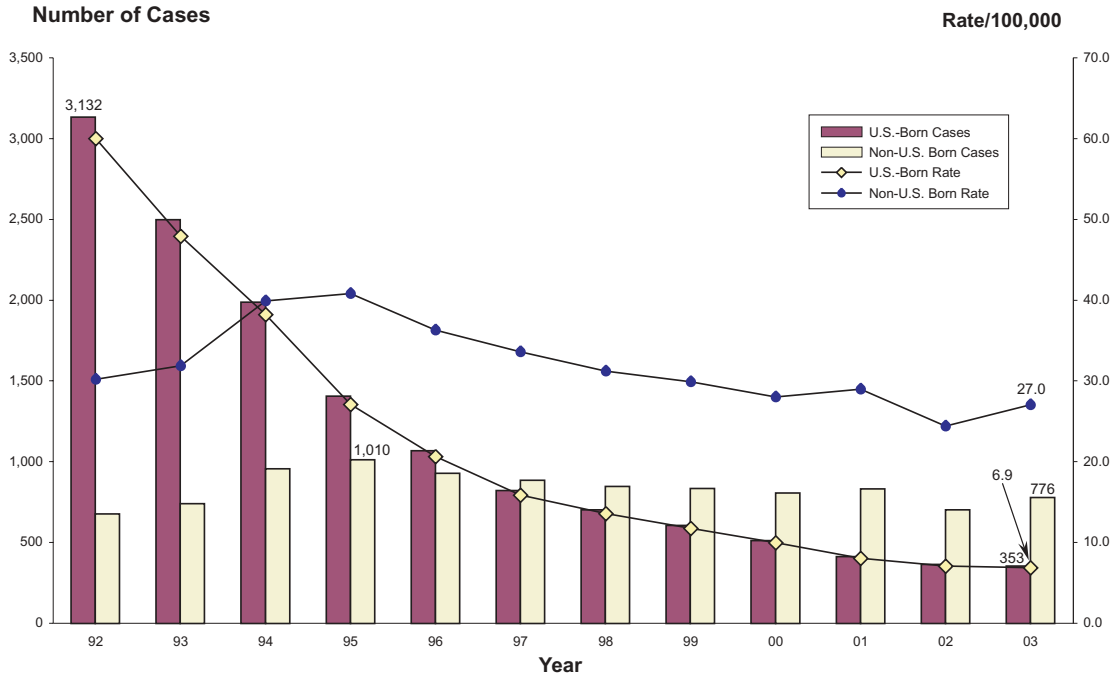
[1]Rates per 100,000 persons based on 1990 Census data and intercensal estimates prior to 2000 and 2000 Census data since 2000.

Figure 6
Tuberculosis Cases by Borough and Area of Birth
New York City, 1992-2003



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

Figure 7
U.S.[1] and Non-U.S. Born Cases and Case Rates [2]
New York City, 1992-2003



[1] Puerto Rico and U.S.-Virgin Islands included as U.S.-born.
[2] Rates per 100,000 persons based on 1990 Census data and intercensal estimates prior to 2000 and 2000 Census data since 2000.

1992 to 76.5% in 2003, indicating that more active tuberculosis surveillance efforts are allowing the BTBC to find more clinically-confirmed cases (Table 1). The proportion of patients with pulmonary tuberculosis has decreased, from 86.1% in 1992 to 66.5% in 2003, perhaps due to better case finding of extra-pulmonary tuberculosis.

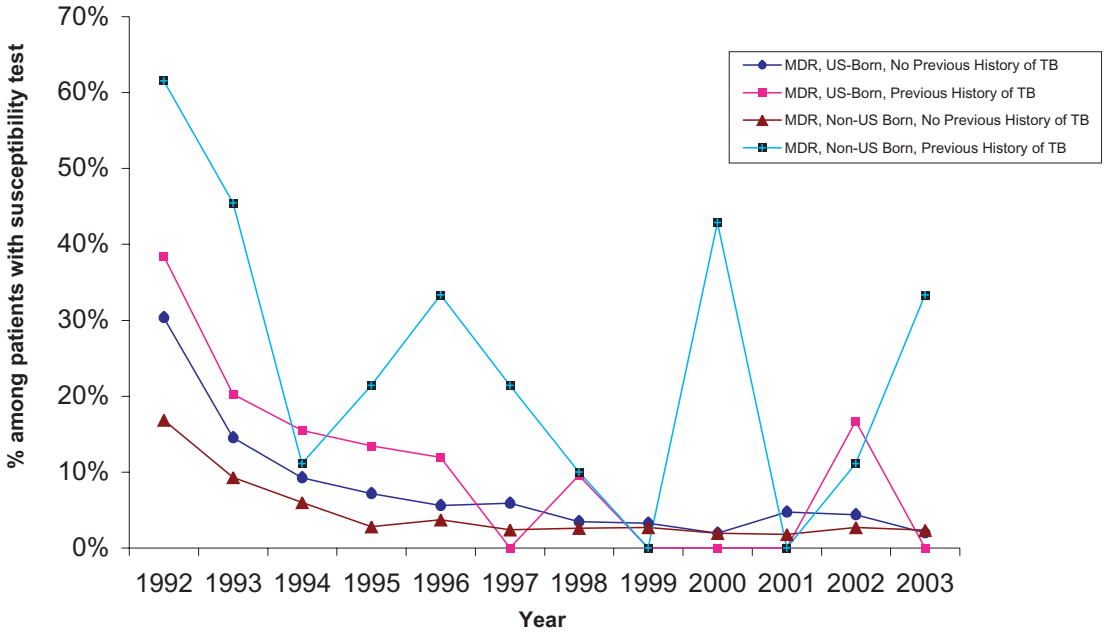
- Since 1992, there has been a dramatic decrease in drug-resistant tuberculosis in NYC: 95.2% fewer multidrug resistant tuberculosis (MDRTB, resistant to at least isoniazid and rifampin) cases and 47.8% fewer other drug resistant (ODRTB, with other types of drug resistance patterns) cases (Table 1).
- The number of MDRTB patients with no history of prior treatment, suggesting primary drug resistance, has decreased since 1992 among both U.S. and non-U.S.-born persons, a decrease attributed to successful tuberculosis control measures such as improved hospital infection control, earlier initiation of patient isolation and appropriate treatment, resulting in less transmission of drug-resistant *M. tuberculosis* strains (Figure 8A).
- The number of drug-resistant tuberculosis cases with a history of prior treatment, usually in the context of poor tuberculosis control programs, has decreased among U.S.-born patients but is highly variable in non-U.S.-born patients and shows no specific trend (Figure 8A).
- No specific trend can be seen among patients with ODRTB when analyzed by history of prior tuberculosis treatment (Figure 8B).
- Rates of isoniazid (INH) resistance (defined as patients with INH resistance alone or in combination with other drugs) have decreased since 1992 among U.S.-born patients with and without a history of prior anti-tuberculosis treatment, from 48.7% to 14.3% and from 37.3% to 6.8%, respectively. However, among patients with a previous history of treatment, there is an upward trend since 1999.
- INH resistance also decreased among non-U.S.-born patients since 1992 (from 28.6% to 10.3% for those with no history of prior treatment and from 76.9% to 33.3% for patients with a history of anti-tuberculosis treatment).
- HIV-positive tuberculosis patients were at their lowest since 1992, decreasing from 1,281 (33.6%) in 1992 to 178 (15.6%) in 2003 (Table 3).
- The proportion of patients receiving DOT increased from 31.0% in 1992 to 72.4% in 2003 (Figure 9).
- The number of deaths due to tuberculosis also decreased significantly in NYC, from 200 in 1992 to 19 in 2003 (Table 1).

Major Accomplishments

Some successes of tuberculosis control in NYC since 1992 include:

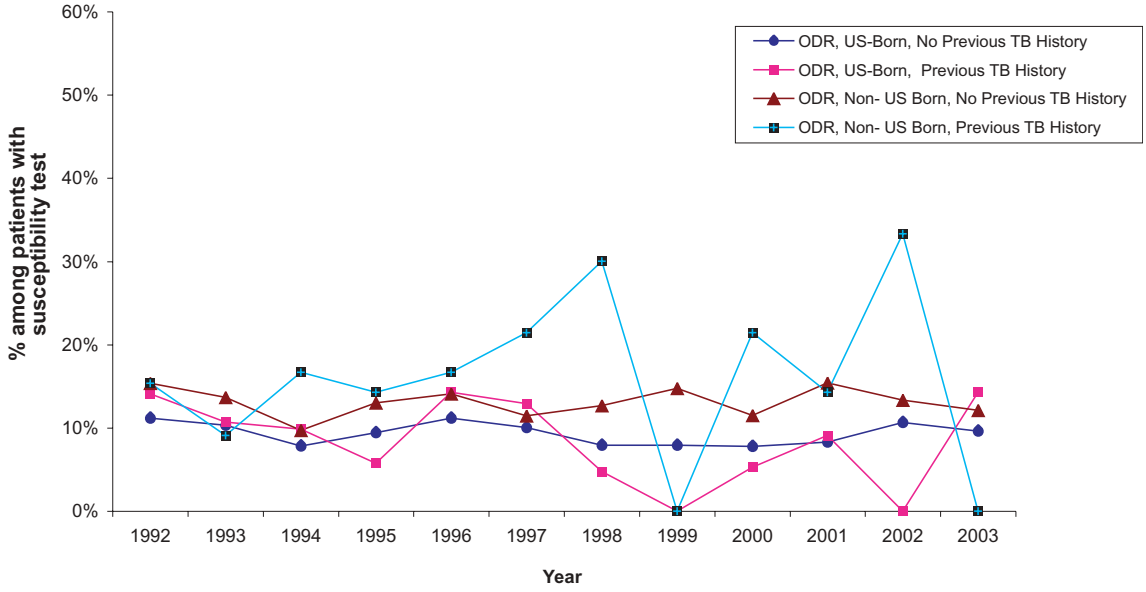
- A decrease in the number of patients with tuberculosis in general and in MDRTB and U.S.-born patients in particular, the result of effective tuberculosis control measures in NYC, including more effective surveillance methods, use of appropriate anti-tuberculosis treatment under DOT,

Figure 8A
Multidrug Resistance[1] (MDR) by Area of Birth and History of Previous TB Treatment
New York City, 1992-2003



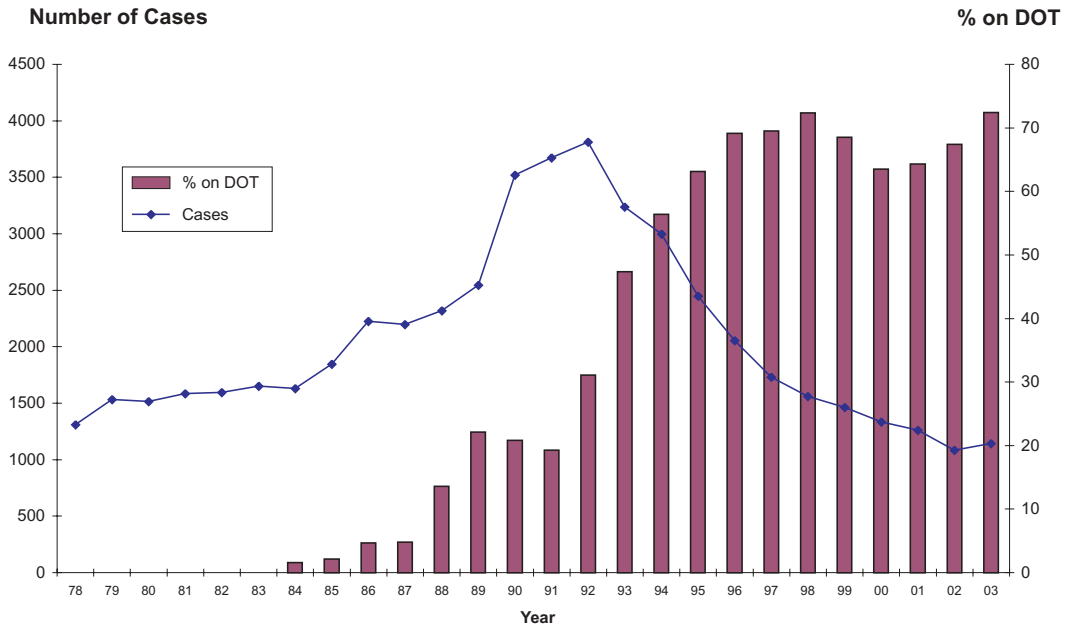
[1] MDR is defined as isolates resistant to at least Isoniazid and Rifampin.

Figure 8 B
Other Drug Resistance[1] (ODR) by Area of Birth and History of Previous TB Treatment
New York City, 1992-2003



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

Figure 9
Tuberculosis Cases on Directly Observed Therapy[1]
New York City, 1978-2003



[1] Of those who were diagnosed while alive and received some treatment on an outpatient basis.

prompt initiation of contact investigations, and treatment of infected contacts.

- A decrease in tuberculosis among certain at-risk groups: 86.1% fewer HIV-positive cases and 75.3% fewer cases among persons aged 20 to 44 years, a group which had the highest prevalence of HIV and the highest number of tuberculosis cases at the height of the epidemic. There were also fewer tuberculosis cases among health care workers or correctional facility employees.
- A marked increase in the use of DOT (from less than 30% of patients on DOT in the late 1980s to over 70% in 2003) and an increase in treatment completion rate; both practices are associated with the decreasing tuberculosis trend.
- Of the patients confirmed with tuberculosis in 2002 and slated to complete treatment in 2002 or 2003 (excluding those who died and those for whom more than 365 days of treatment was indicated), 93.9% completed treatment (86.5% within one year and an additional 7.4% in more than one year).
- The number of patients with *M. tuberculosis* isolates resistant to at least one anti-tuberculosis medication decreased slightly, from 125 in 2002 to 116 in 2003. The number of patients with MDRTB is 95% lower than in 1992.
- In 2003, there was a major outbreak investigation at a shelter for men located outside of New York City. More than 90% of shelter residents were screened for symptoms and 229 residents were recommended to receive LTBI treatment; 93% were started on therapy and 87% of those receiving LTBI treatment were on DOT.
- More than 90% of patients with smear positive tuberculosis had contacts identified. For 2003, the contact case ratio was almost eight overall.
- A higher number of expanded contact investigations were conducted due to better identification of settings where the transmission of *M. tuberculosis* may have occurred.

Remaining Challenges

Despite significant progress in tuberculosis control, serious challenges remain.

- In 2003, there was a 5.2% increase in the number of cases compared to 2002, the first increase since 1992; solely among non-U.S.-born persons, this increase represents an additional 76 non-U.S.-born cases.
- The NYC tuberculosis rate of 14.2 per 100,000 is still far from the Healthy People 2010 objective of 1.0 per 100,000. Completion of treatment in one year or less for those for whom a treatment regimen of less than 12 months is indicated falls short of the CDC objective of 90%.
- Treatment of LTBI also remains less than what is expected, including treatment for contacts.
- The profile of tuberculosis is changing; while tuberculosis is decreasing among U.S.-born individuals, it is increasing among non-U.S.-born persons. With continued immigration from countries with a high burden of tuberculosis, NYC is unlikely to see tuberculosis eliminated in the near future.
- Immigrants to NYC are screened for tuberculosis only if they apply for permanent residency in the U.S., or if they are refugees requesting asylum. Most other immigrants, including students, tourists, temporary workers and illegal immigrants are therefore not screened. Often immigrants, and those caring for them, do not perceive themselves to be at high-risk for tuberculosis.
- Increased transmission in homeless settings occurred in 2003 for several reasons, including difficulty screening unstably housed individuals for LTBI, difficulty initiating and completing LTBI treatment, high prevalence of risk factors (such as alcohol, drug use and HIV infection) for progression to active tuberculosis and increased possibility of transmission due to the nature of congregate settings where homeless and HIV-infected individuals live.
- Despite the known interaction between HIV infection and tuberculosis, HIV status is unknown for approximately one-third of tuberculosis cases. It is a continuing challenge to convince patients and providers alike to test all patients diagnosed with tuberculosis for HIV infection.
- Reporting delays are significant as nearly half of tuberculosis cases are reported four days or more after diagnosis, often causing delays in contact investigations and initiation of appropriate treatment.

III. Profile of Tuberculosis in New York City, 2003

Tuberculosis occurs in persons of diverse demographic, socio-economic and geographic backgrounds. Certain persons, however, are more likely to be infected with *M. tuberculosis*, such as those from countries with a high prevalence of tuberculosis and persons whose occupation or living conditions expose them to tuberculosis (including homeless persons, health care workers and residents or employees of correctional and long term care facilities). Tuberculosis is also more common among individuals who are at high-risk for progression from infection to active disease, such as those with HIV infection, other immune disorders, diabetes, silicosis, and end-stage renal disease, among other conditions.

Case Numbers and Rates

In 2003, 1,140 NYC residents were confirmed to have tuberculosis based on the CDC clinical or laboratory case definition, for a rate of 14.2 per 100,000 (Table 1, Figure 1).

- This case rate is 2.8 times the national rate of 5.1 per 100,000, and much higher than the Healthy People Objective for eliminating tuberculosis in the U.S. (which is to decrease the tuberculosis rate to 1.0 per 100,000 by 2010). Seven years from this goal, NYC's tuberculosis case rate remains one of the highest in the United States, far distant from the national objective.

Demographic, Geographic and Social Information

Demographics

Tuberculosis rates vary widely by age, sex and race/ethnicity (Tables 4, 5, and 6). In 2003:

- Most (50.6%) of tuberculosis patients were aged 20 to 44 years. Patients 35 to 44 years old contributed the most cases while those aged less than 19 years had the fewest cases.
- While 38.2% of U.S.-born patients were between 20 and 44 years of age, over half (56.2%) of non-U.S.-born patients were in this age group.
- Males comprised 62.9% of NYC tuberculosis patients. The tuberculosis case rate for males was 18.9 per 100,000, compared to 10.0 per 100,000 for females.
- Asians had the highest case rate among both men (56.7 per 100,000) and women (28.6 per 100,000), while whites had the lowest rates (3.0 per 100,000). Large disparities exist between racial/ethnic groups in tuberculosis rates.
- Non-Hispanic blacks experienced 380 (33.3%) tuberculosis cases, for a case rate of 19.4 per 100,000; over 60.0% of U.S.-born but only 20.9% of non-U.S.-born patients were non-Hispanic black.
- The second largest group, Hispanics, comprised 30.2% of NYC tuberculosis cases for a rate of 15.9 per 100,000.
- Asians had the highest rate (42.6/100,000), comprising 29.1% of tuberculosis cases; 3.1% of U.S.-born cases and 40.7% of non-U.S.-born patients.

Neighborhood of Residence

Tuberculosis is not equally distributed in all neighborhoods of NYC, concentrating in areas with low socio-economic background and a high proportion of non-U.S.-born residents (Tables 2 and 6; Figure 10).

- Brooklyn (363 cases; 31.8%) and Queens (330 cases; 29.0%) had the greatest number of tuberculosis cases in 2003.
- While the highest proportion of U.S.-born tuberculosis patients lived in Brooklyn (32.9%), the highest proportion of non-U.S.-born patients (35.8%) lived in Queens, where 84.0% of all cases were non-U.S.-born.
- The United Hospital Fund neighborhoods with a case rate higher than the city average were 1) West Queens (30.6) and Flushing-Clearview (15.7) in Queens; 2) East Harlem (28.7), Central Harlem-Morningside Heights (21.2), Union Square-Lower East Side (19.8), Washington Heights-Inwood (19.6), and Gramercy Park-Murray Hill (19.3), in Manhattan; 3) Williamsburg-Bushwick (24.7), Sunset Park (19.9), Bedford Stuyvesant-Crown Heights (18.6), and East Flatbush-Flatbush (18.6) in Brooklyn; 4) Highbridge-Morrisania (22.7) and Fordham-Bronx Park (17.2) in the Bronx; and Stapleton-St. George (17.2) in Staten Island.

Area of Birth

In 2003, 68.1% of tuberculosis cases diagnosed in NYC were among persons born outside of the U.S. (Tables 5 and 6). The rate of tuberculosis for U.S.-born residents was 7.0/100,000, while the rate of tuberculosis for non-U.S.-born residents was 26.5/100,000, based on the 2000 census.

The areas of birth with the most tuberculosis cases were:

- The Caribbean and Latin America, with 351 (45.2%) cases. The rate of tuberculosis for NYC residents born in the Caribbean and Latin America, based on the 2000 census, was 23.2/100,000.
- Asia, with 304 cases (39.2%) and a rate of 48.6/100,000.
- Africa, with 72 cases (9.3%) and a rate of 77.9/100,000.
- Patients aged 20 to 44 years from the Caribbean and Latin America contributed over 25% of tuberculosis cases, while Asians aged 20 to 44 years comprised 21.3% of all non-U.S.-born patients.

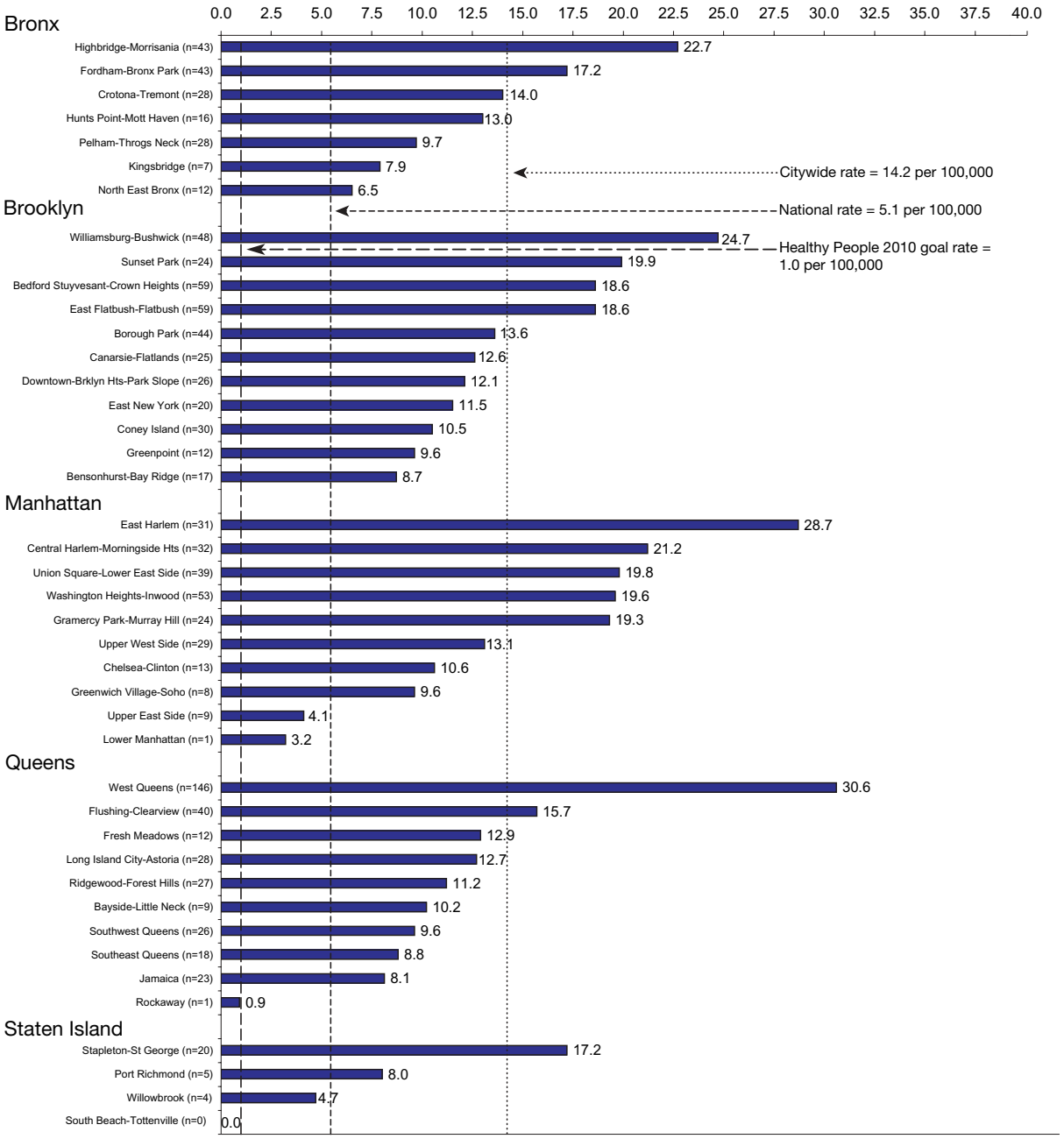
- The majority of non-U.S.-born tuberculosis cases were adults, male, non-white, and had been in the U.S. for more than one year. Compared to U.S.-born patients, non-U.S.-born patients were more frequently aged 20 to 44 years, Asian, HIV-negative, and employed; they were less frequently homeless or alcohol or illicit drugs users.

Social Risk Factors for Tuberculosis

Selected social characteristics increase the risk of being infected with *M. tuberculosis* and eventually developing active disease, affect adherence to treatment, and treatment outcomes (Table 6).

- Eighteen (1.6%) tuberculosis patients were resident of a correctional facility at time of diagnosis; 61.1% of these were U.S.-born.

Figure 10
Rates of Tuberculosis by United Hospital Fund Neighborhood[1]: New York City, 2003



[1] Number of tuberculosis cases and rate per 100,000 population, by United Hospital Fund neighborhood (sorted highest to lowest by rate within each borough), based on 2000 Census. Caution should be used in interpreting case rates with a small number of cases.

- The majority, 645 (56.6%), of patients with tuberculosis was not employed in the 24 months before tuberculosis diagnosis. Of those employed, 41 (8.3%) were health care workers.
- Only 3.0% of tuberculosis cases used injection drugs while 8.2% used non-injection drugs; most illicit drug use occurred among U.S.-born patients.
- Fourteen percent used alcohol excessively, over a quarter of U.S.-born cases and only 9.0% of non-U.S.-born patients.
- ***Homeless*** patients increased in 2003:
  - Eighty-five tuberculosis patients were homeless, a number comparable to that seen in the late 1990s. Homeless patients were primarily adult (95%), male (80%), non-Hispanic black (54%) or Hispanic (25%), unemployed (80%), and U.S.-born (67%) (Data not shown).
  - Close to 60% were smear-positive and 90% were culture-positive; most had pulmonary disease and abnormal chest radiographs; 40% were HIV-positive, 9.4% had a history of prior tuberculosis, 3.5% had MDRTB and almost 12% had ODRTB.
  - A large cluster of tuberculosis cases, with 18 patients diagnosed in 2003 alone, was identified in a shelter for NYC homeless men. Transmission began in the shelter in 2001. The shelter, created to house NYC male homeless persons, is located just north of New York City. In 2003, 11 cases were identified and reported in NYC while 7 were reported to New York State (NYS). A total of 29 patients were diagnosed with tuberculosis during or after residence in the shelter from 2000 to 2003; of those, 20 (69%) were reported in NYC and 9 (31%) were reported in NYS. Most patients were diagnosed with tuberculosis prior to the discovery of the outbreak, while 4 patients were diagnosed as a result of active case finding.
  - In addition, tuberculosis transmission occurred in another facility for homeless persons, an SRO in Manhattan, with 18 cases identified from 2001-2003, 8 of these in 2003 alone.
  - These recent instances of transmission of tuberculosis in settings for homeless individuals underscore the following problems: 1) screening and treatment for LTBI needs to be strengthened in NYC shelters and SROs; 2) ascertainment of tuberculosis among homeless persons can be improved with better symptom screening and chest radiographs upon entry into a shelter; 3) improved interjurisdictional communication is needed, as well as between health and social service providers caring for homeless persons. Agencies should exercise caution when placing homeless HIV-infected individuals in congregate settings.

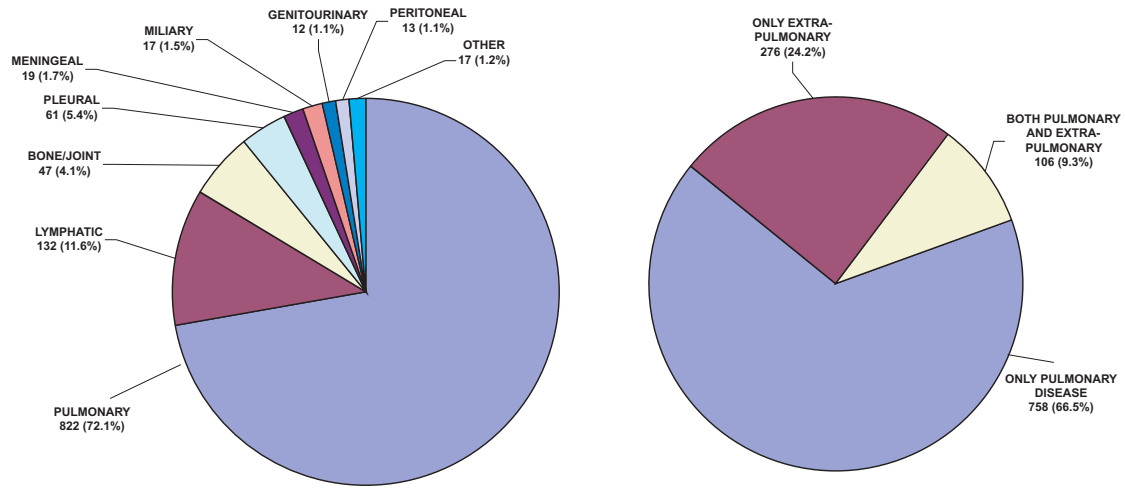
Clinical Characteristics

Type of Disease

The site of tuberculosis disease, smear positivity and culture status affect the decision to perform a contact investigation (Table 1 and 6, Figure 11).

- Pulmonary tuberculosis was present in 864 (75.8%) patients. Of these, 66.5% had pulmonary disease only and 9.3% had both pulmonary and extra-pulmonary disease; 24.2% had only extra-pulmonary disease.
- After pulmonary, the primary sites of disease were lymphatic (11.6%), pleural (5.4%), and bone/joint disease (4.1%).

Figure 11
Tuberculosis Cases by Site of Disease (N=1140)
New York City, 2003



Tuberculosis Cases by Primary Site of Disease

Tuberculosis Cases by All Sites of Disease

- In 2003, 609 (53.4%) of tuberculosis cases were AFB smear-positive at some point during the course of their illness, and 427 (37.5%) were sputum AFB smear positive.
- Only 334 patients had a nucleic acid amplification (NAA) test performed; of those tested, 304 (91.0%) were positive. Among patients with pulmonary disease, 311 (36%) had a NAA test performed; of those, 288 (92.6%) had a positive test. Providers need to request NAA testing with increased frequency for more rapid tuberculosis diagnosis.
- Most tuberculosis cases (872; 76.5%) had a positive culture and 268 were confirmed based on the CDC clinical definition.

Human Immunodeficiency Virus (HIV) Co-Infection

HIV testing is recommended for all patients with tuberculosis. In 2003, HIV testing was conducted for only 790 (69.3%) of cases; 18.2% of patients refused testing (Tables 3 and 6).

- HIV infection was present in 178 (15.8%) tuberculosis patients; 106 (59.6%) of the 178 HIV-positive cases were U.S.-born, while 72 HIV-positive cases (40.4%) were non-U.S.-born.

Drug Resistance

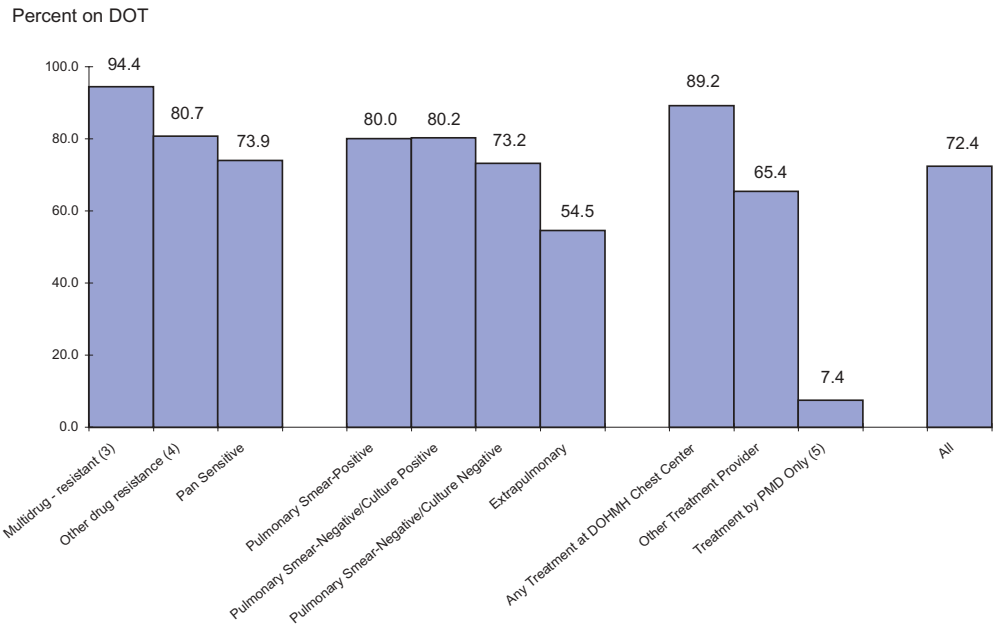
Patients with drug resistant tuberculosis are more difficult to treat than those with drug susceptible tuberculosis, requiring longer, more complex, costly and often toxic treatment. In 2003, 866 of 872 culture-positive tuberculosis cases (99.3%) had drug susceptibility testing performed for first-line tuberculosis drugs; of all patients with susceptibility tests done, only 13 (1.5%) had a history of prior treatment for tuberculosis; this is a minimum proportion, based on data collected in the Tuberculosis Registry.

- Twenty-one (2.4%) patients had MDRTB, 19 had primary resistance and 2 (9.5%) had a history of prior tuberculosis treatment (Tables 6 and 7).
- In addition, 98 (11.3%) had ODRTB, 97 (11.2%) had primary resistance while only 1 (1.0%) had a history of prior anti-tuberculosis treatment.
- In 2003, 9.2% of patients with no previous history of anti-tuberculosis treatment had INH resistance, while 23.1% of patients with a previous history of tuberculosis treatment had INH resistance.
- Of U.S.-born patients, 7 (2.7%) had a history of prior treatment; of these, 1 (14.3%) had INH-resistant tuberculosis and none had MDRTB. Of non-U.S.-born patients, 6 (1.0%) had a history of prior treatment; of these, 2 (33.3%) had MDRTB and none had ODRTB.
- Of patients from birth to 19 years, 2.3% had MDRTB and 15.9% had ODRTB. Of patients aged 20 to 64 years, 2.4% had MDRTB and 11.8% had ODRTB. Among those 65 or older, 2.4% had MDRTB and 7.1% had ODRTB.

Treatment, Directly Observed Therapy, and Outcomes

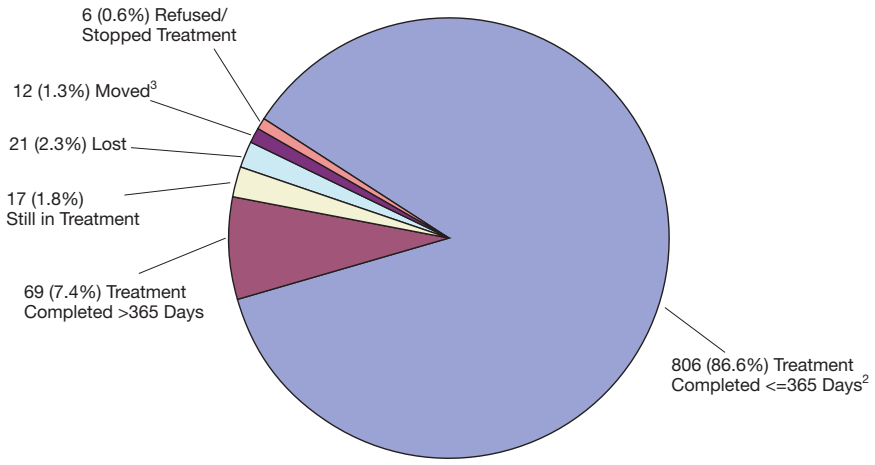
An appropriate initial four drug regimen and DOT are essential for controlling tuberculosis and avoiding the emergence of drug resistance (Figures 12 and 13, Table 6).

Figure 12
Proportion of Eligible[1] Tuberculosis Patients on DOT[2]
New York City, 2003



[1] Eligible patients were those diagnosed while alive and who received some treatment 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 drug resistance other than MDR. [5] PMD=Private medical provider.

Figure 13
Treatment Completion for Active Cases Counted in 2002 (N=931[1])
New York City, 2003



[1]Denominator excludes patients found not to have tuberculosis; those who died; those who never started anti-tuberculosis therapy; and those for whom more than 365 days of treatment is indicated (those under 15 years of age with bone, miliary, or meningeal tuberculosis, and those initially resistant to rifampin). In 2002, 100 (9.3%) cases were either reported at death or died before completing treatment. This leaves 931 patients eligible for treatment completion calculation. Data is as of September 15, 2004.

[2]Currently recommended treatment regimens for most patients can be completed within 365 days.

[3]Patients are categorized as moved only if their transfer to another jurisdiction is confirmed and no further follow-up information is available.

- Of tuberculosis cases diagnosed in 2003, 1,097 (96.2%) were treated with two or more anti-tuberculosis drugs and 42 were not started on treatment (some died before treatment was started). Of patients started on treatment, 995 (90.7%) initially received the standard four drugs regimen (isoniazid, rifampin/rifabutin, ethambutol and pyrazinamide) while 33 received other four-drug regimens.
- Of all treated patients eligible for DOT (those treated at some point as outpatients) 72.4% were on DOT; 94.4% of MDRTB patients were on DOT while 80.7% of ODRTB patients were on DOT, and 80.0% of pulmonary smear-positive patients were on DOT.
- Among patients who received at least some care at a BTBC chest center, 89.2% were on DOT, compared to only 7.4% of patients treated by private physicians.
- The treatment completion index excludes patients who died before being diagnosed or died before completing treatment, those for whom more than 365 days of treatment was indicated (those under 15 years of age with bone, miliary, or meningeal tuberculosis, and those initially resistant to rifampin), and those who never started treatment. Of the patients diagnosed in 2002, 931 were eligible for calculation of index of completion; of these 866 (92.8%) completed treatment; 806 (86.5%) completed within a year while an additional 68 (7.3%) completed in over a year.
- Of 90 patients with tuberculosis who were either reported at death or who died after diagnosis (before completing tuberculosis treatment), 20 (22.2%) were known to be HIV-infected. Nineteen deaths were directly related to tuberculosis. Of those, four (21.1%) were reported at death; 78.9% were male; none were known HIV positive (but 73.7% had unknown HIV status); all were adults (older than 19 years old); 21.1% were homeless; 47.4% were non-Hispanic blacks, none was white; 73.7% had pulmonary disease only; 89.5% had AFB positive smears; 94.7% were culture positive; 78.9% were treated with 2 or more drugs; none had MDRTB, while 22.2% had ODRTB.

IV. New York City Tuberculosis Control Activities, 2003

Since its inception in 1866, the New York City DOHMH has been a leader in the effort to control tuberculosis. To achieve its mission to prevent the spread of tuberculosis and eliminate it as a public health problem in NYC, the Bureau conducts multifaceted activities integrating clinical and field services, case management, directly observed therapy, epidemiology, surveillance, outreach to high-risk groups, and education and training of staff, providers and the public.

Surveillance and Epidemiology

The major goals of the BTBC Surveillance Office are to ensure complete reporting of tuberculosis cases, maintain and improve the quality and integrity of the data, improve the tuberculosis registry and disseminate tuberculosis data. The activities of the BTBC Epidemiology Office consist of conducting investigations of exposures in congregate settings, studying the molecular epidemiology of tuberculosis, providing epidemiologic consultation to Bureau staff, and conducting relevant research studies.

Reporting

- The BTBC receives reports for patients suspected and confirmed to have tuberculosis from medical providers, hospitals infection control practitioners, as well as microbiology and pathology laboratories. In addition, DOHMH staff visit hospitals to actively search for patients with tuberculosis.
- In 2003, 14.5% of cases were reported by DOHMH clinics, 31.8% by municipal hospitals, 45.5% by private hospitals, 4.4% by private physicians, and 3.9% by other facilities such as medical examiners, houses of detention and out-of-city facilities.
- In 2003, the Bureau performed an analysis of the timeliness of reporting. We defined reporting delays as a delay of four or more days from the time of diagnosis to receipt of the report. Time of diagnosis was defined as the time from first positive smear, first identification of pathology findings suggestive of tuberculosis or start of treatment. Among persons reported with suspected or confirmed tuberculosis in 2003, approximately half were reported late, while 30% of patients with AFB smear positive specimens were reported late (Table 9). This proportion varied widely by hospital. Reporting delays lead to delays in appropriate treatment and in contact investigation.

Data Collection and Verification

- In 2003, Bureau staff entered data for 1,140 confirmed cases and for 2,847 persons with suspected tuberculosis who were never confirmed to have tuberculosis. In addition, 10,635 laboratory results were entered for patients confirmed with tuberculosis.
- Bureau staff reviewed over 50,000 pathology results for key terms suggestive of tuberculosis. Of patients with tuberculosis in 2003, 229 (20.1%) had a pathology specimen suggestive of tuberculosis.
- In 2003, 90 false-positive culture investigations were initiated; of these, 20 (22%) results were confirmed to be false positive and 67 (74.4%) were unlikely to be false positive. Two (2.2%) investigations were found to be inconclusive and 1 (1.1%) investigation is still open.

Interjurisdictional Activities

- A BTBC Interstate Coordinator facilitates the transfer of confirmed and suspected tuberculosis patients, as well as contacts and patients on treatment for LTBI, in to or out of NYC.
- In 2003, the Interstate Coordinator referred 344 patients who left NYC to other jurisdictions, including 101 confirmed tuberculosis patients (54 NYC patients and 47 patients counted by other health departments), 68 patients suspected of having tuberculosis, and 175 contacts or LTBI patients. Eight referrals were sent to out-of-NYC jurisdictions for worksite contact investigations. In addition, 194 patients were referred to NYC from another country, state or local health department, including 37 confirmed tuberculosis cases, 23 patients suspected of having tuberculosis, and 99 contacts and LTBI patients. There were also 9 referrals from other jurisdictions for worksite contact investigations in NYC.

Molecular Epidemiology and Cluster Investigations

- The BTBC maintains one of the largest tuberculosis molecular epidemiology databases in the country, which is used to 1) identify possible false-positive *M. tuberculosis* results and nosocomial transmission, 2) assess tuberculosis transmission during outbreak investigations, and 3) determine the extent and dynamics of *M. tuberculosis* transmission. *M. tuberculosis* isolates are typed using restriction fragment length polymorphism (RFLP) typing of IS6110 and spoligotyping, by the Public Health Research Institute and the New York State Public Health Laboratories, respectively. In 2003, DNA analysis was completed for 782 of 880 (88.9%) new culture-positive cases; of these, 195 (25.3%) were clustered exclusively to 2003 cases; that is, they had strains identical to other 2003 culture-positive cases. An additional 68 (8.7%) were clustered to 2001 or 2002 cases.

Research and Special Projects

- As part of the National Tuberculosis Epidemiologic Studies Consortium and the Tuberculosis Trials Consortium, the Bureau participates in the following new or on-going projects: 1) models for incorporating HIV counseling,

testing and referral into tuberculosis contact investigations; 2) a national genotyping registry for molecular epidemiological analysis of MDR tuberculosis; 3) enhanced surveillance to identify missed opportunities for tuberculosis prevention in foreign-born populations in the U.S. and Canada; 4) a clinical trial comparing 9 months of INH therapy with 3 months of INH and rifapentine once weekly by DOT.

- In 2003, the Bureau initiated a major project to evaluate missed opportunities for tuberculosis prevention among persons recently diagnosed. Data collection is complete and analyses will be completed in 2004. Other major studies include 1) an assessment of the need for initial hospitalization for the diagnosis and treatment of tuberculosis; 2) a survey of drug resistant tuberculosis; and 3) a description of the molecular epidemiology of tuberculosis cases in NYC and an examination of factors associated with clustered genotypes.
- The BTBC conducted an evaluation of case management practices in 2002 on a small randomly selected sample of cases. The evaluation found lapses in many aspects of case management practices. In 2003, the BTBC obtained funding from the CDC to conduct a more comprehensive evaluation of case management and a survey to assess communication and coordination of patient care between BTBC and non-DOHMH tuberculosis providers.

Direct Patient Services

Patient Care at the BTBC Chest Centers

- The BTBC operates ten chest centers staffed with board-certified physicians, public health nurses and public health advisors. Services provided at the chest centers include screening for risk factors for tuberculosis; TST; chest radiographs; sputum induction; medical and nursing care for active tuberculosis and LTBI; free anti-tuberculosis medications; social services; routine blood tests; and HIV counseling and testing. Care is confidential and free of charge to the patient.
- In 2003, the BTBC implemented an electronic medical record system (Digital Clinic System) in all chest centers, providing the Bureau with the ability for on-line patient registration. The ultimate goals of the Digital Clinic System are to easily access documentation of patient care, improve communication between medical providers, and facilitate continuity of care.
- In 2003, 133,488 patient visits were registered at a BTBC chest center, representing a slight increase from 2002 (133,001). Services provided include TST (22,988 implanted and 19,744 read [4,743 positive and 15,001 negative]), chest radiographs (2,536 children and 13,157 adults), sputum induction, phlebotomy, medical and nursing care, social services, medications, DOT, and HIV counseling and testing; 787 patients with active tuberculosis and 1,147 patients suspected of having tuberculosis were provided care at a DOHMH chest center.

Case Management

- The chest centers provide expert specialty care for the treatment of patients with active tuberculosis and LTBI, including care for difficult-to-treat patients such as those infected with multidrug-resistant tuberculosis. Of 1,140 patients with active tuberculosis confirmed in 2003, 476 (42%) received all or a portion of their care at a BTBC chest center and 57% of MDRTB patients were treated at a chest center. DOT is strongly promoted for all individuals with active tuberculosis and is offered at the chest centers or other locations convenient to the patient; 89.2% of patients treated at DOHMH chest centers were on DOT.
- The field unit of the BTBC assigns case managers to all tuberculosis patients reported by non-DOHMH providers. The outreach workers conduct patient interviews, contact investigations, and ensure that the patients' treatment regimens are consistent with local and national guidelines, through close collaboration with the patients' health care providers. The field unit also monitors clinical and laboratory findings of patients suspected of having tuberculosis reported by non-DOHMH providers and determine whether these suspects ultimately meet the criteria for confirmed tuberculosis. The field unit also locates and returns non-adherent patients to medical supervision.
- BTBC physicians review the treatment regimens of all confirmed tuberculosis cases in the city and provide recommendations and expert consultation to treating physicians. The Bureau also offers on-site case management to patients at the Riker's Island Correctional Facility, the 30th Street Shelter, and at SRO hotels in Manhattan and the Bronx.
- The BTBC assigns staff to provide tuberculosis-related services in the largest correctional facility in New York City – Riker's Island. The goals of this activity are to identify all suspected and confirmed cases of tuberculosis in persons incarcerated at this facility and ensure that they are treated appropriately and on DOT. These are achieved via patient education, surveillance and prompt reporting, outreach, patient interview and case management, prompt initiation of contact investigations, rapid institution of adequate chemotherapy, coordination of post-incarceration follow-up in the community, in collaboration with correctional officials and health care providers at Riker's Island. In 2003, Bureau staff participated in the Correctional Health Task Force responsible for developing a comprehensive medical care program for persons incarcerated in New York City correctional facilities and consolidating activities of all relevant public health programs in correctional institutions in the City.

Free Services

- In addition to the care at the BTBC chest centers, the following free programs are available to all tuberculosis

patients, including those managed by private providers: 1) case management for all active tuberculosis patients, consisting of patient education, return of lost patients to medical care, DOT, expert consultation and contact investigations and case management of contacts on treatment for LTBI; 2) gratis medications for patients enrolled in a DOT program; 3) evaluation of new immigrants or refugees in need of tuberculosis care follow-up; and 4) free susceptibility and NAA testing for early diagnosis.

Directly Observed Therapy

- Of active tuberculosis patients identified in NYC and on DOT, 90% were adherent to treatment more than 80% of the time each month. To achieve this level of adherence, public health advisors and nurses perform home and field visits to provide DOT or return to care patients who have missed their appointment. To improve adherence, DOT is provided at locations convenient to the patient, such as at the patient's home, school or work, BTBC chest centers, SRO hotels, men's shelters, and in drug treatment centers.
- During 2003, the DOT Working Group continued to implement recommendations to promote acceptance and continuation of DOT generated from surveys conducted in 2002. The DOT Working Group conducted a follow-up review of the current status of distribution of several new DOT materials developed to increase DOT referrals by private medical providers. Approximately 10,000 DOT brochures in English and Spanish were distributed to private providers. The DOT Working Group conducted an intensive review of actions taken as a result of the recommendations of a DOT-related survey conducted at five DOHMH chest centers in 2002. The preliminary results included an increase in patient education related to DOT service. Eighty-three percent (83%) of patients interviewed were informed about and offered DOT compared to 32% in 2002.

Homeless Services

SRO Project

- The SRO Project provides DOT for active tuberculosis and for LTBI in six SROs housing persons who receive HIV and AIDS Services Agency (HASA) services. Through tuberculosis registry searches and matches of SRO admissions with the tuberculosis registry, persons known to have tuberculosis or to be contacts of patients with active tuberculosis can be identified and placed in care.
- In 2003, the SRO project provided DOT to 86 persons (35 received DOT for active tuberculosis and 51 received DOT for LTBI). The overall adherence rate was 91% for patients with active tuberculosis and 89% for persons with LTBI.
- On-site services also include provision of TST to SRO residents and employees. In 2003, 648 TST were implanted for clients and employees, 86% (559/648) were read, of which 7% were positive. All 39 persons with a positive TST were referred for follow-up and an additional 52 persons with a history of prior positive TST were also referred; of those, 6 were placed on LTBI treatment and to date, 1 has completed the course of treatment.

Homeless Shelter Project

- The Homeless Shelter Project consists of a 20 bed Tuberculosis Unit (increased to 30 beds in 2003) in the City's largest homeless shelter (the 30th Street Men's Shelter). A wide variety of services are provided on-site to residents who are receiving treatment for tuberculosis or LTBI, such as meals, medications, DOT, case management, and medical monitoring. In 2003, 68 men received DOT for either active tuberculosis (31) or LTBI (37) at the TB Shelter and the adherence rate was 96% overall.
- A major facet of the Homeless Shelter Project was the creation of a Tuberculosis Exposure Control Plan (ECP). Specifically designed for the 30th Street Shelter, the project was expanded to the Atlantic Assessment Shelter. The TB-ECP includes both environmental and work practice procedures, baseline and annual tuberculin skin testing and tuberculosis education for shelter employees.

Immigrants and Refugees

- The BTBC Immigrant and Refugee Unit (IRU) works closely with the U.S. Public Health Service Division of Quarantine to ensure that all immigrants with permanent residency status and refugees entering the United States through New York City with a confirmed or suspected diagnosis of tuberculosis receive appropriate follow-up. In 2003, the IRU reviewed chest x-rays and medical records and arranged appropriate follow-up for 432 persons, including 364 immigrants and 68 refugees; 16 were confirmed with active tuberculosis.

Regulatory Affairs

- The BTBC uses legal means to improve adherence when other case management efforts have failed. Regulatory orders include orders for examination, DOT, completion of treatment and detention in a secure unit either until no longer infectious or until completion of treatment.
- In 2003, the Bureau reviewed 108 requests for regulatory action and issued a total of 39 regulatory orders, including six orders for completion of treatment, 16 orders for DOT, and 17 detention orders. By the end of December 2003, five persons were detained in the Bellevue Hospital Secure Tuberculosis Treatment Unit.

Education

The Bureau provides training for its staff and for NYC health care providers and educates the public on tuberculosis-related issues at health fairs, during targeted outreach and during expanded contact investigations.

Training for BTBC Staff

- Every outreach worker and clinician employed by the BTBC receives extensive training on tuberculosis transmission, pathogenesis, screening tests and treatment. A bureau-wide TST competency skill review demonstrated the need for on-going training on TST interpretation. As a result, in May 2003, the BTBC implemented a mandatory certification and annual re-certification for all employees who perform TST implant and interpretation in the Bureau. Similar TST certification/re-certification will be made available to non-DOHMH providers.

Training for Non-BTBC Providers

- In 2003, the Bureau provided training on TST, tuberculosis risk factors during ECIs, basic tuberculosis education, and organized a 'Tuberculosis Update for the 21st Century' conference for physicians and other health care workers.

Educational Materials

The Bureau's education unit develops a wide variety of culturally targeted educational materials.

- In 2003, the Bureau developed several new patient brochures on the following subjects: BCG, Student TB Patrol, TST, a wallet size INH card, a tuberculosis medications card, a Directly Observed Therapy brochure, a City Health Information (CHI) on tuberculosis treatment, and the Services for Health Care Providers pamphlet.
- The Clinical Policies and Protocols Manual and CHI on LTBI treatment are in development and completion is expected in 2004.
- The Bureau distributed 306,554 education materials in 2003.

Mycobacteriology Laboratory Services

- The NYC DOHMH Public Health Laboratory (PHL) processes clinical specimens from DOHMH chest centers and from more than 60 non-DOHMH facilities in New York City. Specimen processing includes acid-fast staining, diagnostic detection of *M. tuberculosis* complex through nucleic acid amplification from raw specimen, culture by liquid and solid media, identification of mycobacteria by high performance liquid chromatography (HPLC) from growing culture, and drug susceptibility testing via radiometric and conventional methods.
- In 2003, the PHL Mycobacteriology Laboratory processed 11,277 clinical specimens from 5,919 patients. Of these, 786 (8%) were AFB smear positive, 768 (7%) were *M. tuberculosis* culture positive, and 1,629 were culture positive for non-tuberculous mycobacteria (NTM). In addition, 1,297 positive cultures were tested for drug susceptibility (768 in-house grown cultures and 529 referrals).
- Nucleic acid amplification rapid testing has become an established tool for initial testing of smear positive respiratory specimens for non-treated patients suspected of having tuberculosis. The PHL Mycobacteriology Laboratory performs NAA tests for smear positive and negative respiratory specimens and for smear positive non-respiratory specimens. However, in special cases, NAA are used on smear negative non-respiratory specimens such as cerebro-spinal fluid or lymph node tissue if requested and justified by the treating physician. In 2003, PHL provided NAA testing to 32 health care facilities free of charge; 323 NAA tests were performed; of those 117 (36%) were positive, 194 (60%) were negative, and 12 (4%) were inconclusive.

V. Prevention of Tuberculosis

Persons infected with *M. tuberculosis* who are at high-risk for progression to active disease include recent contacts to infectious patients; persons who are HIV-infected or otherwise immuno-compromised; children under five years of age; persons who have recently arrived in the United States from areas of the world where tuberculosis is endemic; and persons with certain medical conditions.

The main steps in controlling the spread of tuberculosis are to find all or most cases rapidly, ensure the complete treatment of patients with active tuberculosis and identify and treat persons recently infected with *M. tuberculosis* and those at high-risk for progression to active disease.

In June 2000, the CDC and the ATS jointly published guidelines for testing and treatment of LTBI *(MMWR Recommendations and Reports — Targeted Tuberculin Testing and Treatment of Latent Tuberculosis Infection)*. Recommended prevention strategies focused on tuberculin skin testing only for those at high-risk of developing active tuberculosis. The BTBC uses the following activities to reach these high-risk groups: contact investigations, outreach to those at high-risk for LTBI and progression to active disease, screening for and treatment of LTBI for contacts and others at high-risk.

Contact Investigations

The BTBC aims to evaluate at least five contacts per active tuberculosis case. Besides ensuring that contacts to smear positive pulmonary cases are routinely evaluated, the BTBC expanded its efforts to evaluate all contacts to patients 15 years and older with culture-confirmed pulmonary or laryngeal disease. Expanded contact investigations are conducted in congregate settings as needed.

In order to ensure higher levels of completion of treatment for latent infection, the BTBC adopted a case management approach for contacts of infectious tuberculosis patients and other infected persons at high-risk for developing active disease. Patients are assigned to a case manager who reminds the patients to take their medication and follow-up with their medical provider. The status of these patients is reviewed on a quarterly basis in a group meeting with all involved staff.

Routine Contact Investigations

- Of 2003 sputum AFB smear-positive tuberculosis patients, 94% had contacts identified, for a total of 3,887 contacts or a ratio of 10 contacts per patient.
- Of 629 patients with active tuberculosis verified in 2003 and for whom a contact investigation was indicated, a total of 4,963 contacts were identified, for a contact to case ratio of 7.9. Preliminary data analysis indicates that of contacts identified, 3,217 (64.8%) received tuberculin skin tests and 1,673 were TST positive. Of 1,158 contacts started on treatment for LTBI in 2003, 391 (33.8%) have completed treatment so far. An additional 589 associates were evaluated as part of source case investigations to pediatric cases. Of all contacts and associates evaluated, 75 were diagnosed with active tuberculosis (44 among contacts to sputum smear positive patients).
- The treatment completion rate for contacts to patients confirmed with active tuberculosis in 2002 was 64.4% (816/1268).

Expanded Contact Investigations

An Expanded Contact Investigation (ECI) Unit was created in 1995 in the Bureau to allow rapid evaluation of possible transmission of tuberculosis in congregate settings (e.g., schools, work sites or other institutions). When indicated, mass tuberculin skin testing and education about tuberculosis are provided.

- In 2003, there were 40 expanded contact investigations, a significant increase over previous years, partly as a result of improvements in the identification of congregate settings where *M. tuberculosis* exposures may have occurred (Table 8).
- The Expanded Screening Unit performed TST for 2,639 individuals during these ECIs. Of those who received a TST, 509 were referred for medical evaluation.
- ECIs were conducted at 18 workplaces, 6 residential facilities (including two shelters), 3 adult educational facilities, 11 children's educational facilities, 3 SROs, and 2 other congregate settings.
- Probable transmission was identified in 17 (42.5%) investigations, defined as a setting where secondary cases are identified or when persons with low-risk of infection are found TST positive.
- Investigation of a large cluster of tuberculosis cases in a shelter for NYC homeless men located outside of NYC identified 18 cases in 2003 among shelter residents. Of these 18 patients, 12 had *M. tuberculosis* strains that matched that of another patient who resided at the same shelter. One of the two strains infecting more than one case is common in New York City, while the other strain, seen in 8 cases, was unique to this location. Of 1,038 potentially exposed residents, 958 (92.3%) were screened for symptoms, 927 (89%) received a chest radiograph, and 593 (57%) had a TST placed; of those, 583 (98%) had the TST read. Including prior-positive TST results, the prevalence of tuberculosis infection was 49%. Of 537 shelter residents who were given appointments for evaluation at BTBC chest centers, 414 (77%) were evaluated, 340

(83%) of those completed the evaluation, and treatment was recommended for 229 persons (67%). Of those, 213 (93%) started treatment for LTBI and 186 (87%) received their medications under DOT at either the upstate shelter or another shelter in Manhattan by BTBC staff.

Outreach and Screening for LTBI

- The BTBC continued to support and expand partnerships with community-based organizations (CBO) and others working with groups at high-risk of acquiring or developing tuberculosis. BTBC staff reached out to the Mexican community, where, in conjunction with the Charles P. Felton National Tuberculosis Center, BTBC conducted targeted testing activity with a Mexican CBO. Thirty-one (31) people were tested and 12 tested positive; eight went for follow-up medical evaluations and began treatment for LTBI.
- In addition, collaborations were started with South Asian groups, via outreach through mosques and temples, Ecuadorian groups, and various other immigrant and HIV-focused organizations.
- The BTBC continued to raise awareness of tuberculosis in non-U.S.-born communities by utilizing the ethnic media and arranged coverage of its outreach efforts in two Mexican newspapers and a Haitian radio program.
- The BTBC reaches out to medical providers in targeted communities by offering a pharmacy support program, which facilitates targeted LTBI screening and treatment. This support includes free TST supplies and isoniazid to participating medical providers that serve persons with a high rate of LTBI or who are at high-risk of developing active tuberculosis. Currently, 16 programs participate in this activity.
- In 2003, 22,988 patients were screened for LTBI at the ten DOHMH chest centers. Of these, 4,743 were TST positive.
- Over 10,000 patients were started on LTBI treatment at either a DOHMH chest center or by a non-DOHMH medical provider (as reported by such providers); BTBC chest centers followed 68% of these patients.

Treatment of Latent Tuberculosis Infection

Targeted Testing and Treatment of LTBI at the Chest Centers

In accordance with the 2000 CDC and ATS guidelines for testing and treatment of LTBI, the BTBC developed and implemented a comprehensive screening tool to identify tuberculosis patients in high-risk groups. The impact of this screening tool is reflected in the ratio of patients in high-risk groups that were started on treatment in 2003.

- The BTBC chest centers placed 6,931 patients on LTBI treatment in 2003. Of these, 16.3% (1,227) were contacts, 16.2% (1,121) were individuals who have underlying medical conditions that substantially increase their risk of developing disease (medical risk category); and 61.9% (4,293) were individuals who have immigrated within the past five years from areas with high rates of tuberculosis. Only 4.2% (290) were low-risk patients, meaning patients who do not fall into any of the above categories typically required to receive the TST for work or school entry.
- Of all patients started on LTBI treatment in 2003 by DOHMH chest centers, as of June 11, 2004, 2,262 (32.6%) have completed treatment.
- Of patients started on LTBI treatment in 2002, 51.4% have completed to date.

BTBC efforts to improve treatment completion for persons with LTBI focus on those at high-risk for progression to active tuberculosis. BTBC chest centers conduct screening for LTBI and provide treatment to those at high-risk of developing active tuberculosis. In addition, the Bureau collects treatment completion information on patients with LTBI who receive treatment at NYC-funded programs, through the pharmacy support program and on those who are reported by their providers. Data on LTBI patients who are not receiving care at BTBC chest centers or from a program that has a contract with the NYC DOHMH are incomplete as reporting of LTBI patients is not compulsory.

LTBI Treatment by Non-DOHMH Providers

- Non-DOHMH providers, including both contracted and non-contracted providers, report having placed 3,269 patients on LTBI treatment in 2003; of those, 11.6% were contacts, 24.7% had a medical risk factor for progression to active disease, 61.4% were from countries with a high prevalence of tuberculosis, while 2.3% were low-risk patients. As of June 11, 2004, only 651 (19.9%) have completed their course of therapy based on reports received by BTBC Surveillance Office, while an additional 2% was still undergoing treatment.
- Of LTBI patients 4,231 started on treatment in 2002 by non-DOHMH providers; 1,626 (38.4%) have completed their course of treatment.

Table 1
Tuberculosis Incidence
New York City, 1920 - 2003

Year	Number[1]	Rate per 100,000[2]	Culture-Positive Cases	Sputum Smear-Positive Cases[3] (Rate per 100,000)		Multidrug-Resistant Cases[4]	Other Drug Resistant Cases[5]	TB Deaths (Rate per 100,000)	
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[6]	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)[7]	441	186	200	(2.7)
1993	3,235	43.0	2,854	1,526	(20.3)	296	235	166	(2.2)
1994	2,995	39.4	2,479	1,265	(16.7)	176	176	133	(1.8)
1995	2,445	31.9	2,014	989	(12.9)	109	203	94	(1.2)
1996	2,053	26.5	1,721	837	(10.8)	84	206	67	(0.9)
1997	1,730	22.2	1,401	665	(8.5)	56	147	55	(0.7)
1998	1,558	19.8	1,255	558	(7.1)	38	129	52	(0.7)
1999	1,460	18.4	1,143	515	(6.5)	31	128	49	(0.6)
2000	1,332	16.6	1,066	467	(5.8)	25	104	44	(0.5)
2001	1,261	15.7	964	453	(5.7)	24	121	33	(0.4)
2002	1,084	13.5	823	429	(5.4)	27	100	30	(0.4)
2003	1,140	14.2	872	427	(5.3)	21	97	19	(0.2)

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

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

[3]Patients with a sputum smear positive for acid-fast bacilli regardless of culture result and regardless of site of disease.

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

[5]Resistant to other first-line drugs, but not multidrug resistant.

[6]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.

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

Table 2
Tuberculosis Rates by United Hospital Fund (UHF) Neighborhood
New York City, 1993-2003

UHF Neighborhood	2003 cases	Rate per 100,000 population[1,2]										
		2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993
BRONX	**177**	**13.3**	**12.4**	**12.7**	**16.3**	**14.9**	**20.2**	**21.5**	**24.3**	**31.1**	**39.1**	**45.1**
KINGSBRIDGE	7	7.9	17.5	6.7	16.9	11.2	9.0	8.9	15.6	8.9	24.5	16.7
NORTHEAST BRONX	12	6.5	16.4	5.4	7.5	7.1	11.0	10.0	6.2	11.5	20.3	18.2
FORDHAM-BRONX PARK	43	17.2	16.3	13.6	20.0	19.0	30.3	21.9	26.8	25.9	33.1	33.9
PELHAM-THROGS NECK	28	9.7	16.3	12.8	11.7	9.4	11.6	12.4	14.7	23.5	17.9	29.8
CROTONA-TREMONT	28	14.0	8.1	13.0	23.1	17.7	22.5	27.3	37.5	48.4	63.8	65.5
HIGH BRIDGE-MORRISANIA	43	22.7	6.7	17.4	21.1	20.3	31.3	36.0	35.9	55.8	68.9	78.3
HUNTS POINT-MOTT HAVEN	16	13.0	5.9	18.7	13.8	21.2	21.2	36.7	36.0	39.3	54.0	79.5
BROOKLYN	**364**	**14.8**	**14.0**	**15.8**	**18.1**	**19.1**	**20.7**	**23.8**	**25.9**	**35.5**	**43.0**	**47.0**
GREENPOINT	12	9.6	22.1	9.6	15.3	12.1	11.4	18.9	20.7	25.9	34.5	50.1
DOWNTOWN-BKLYN HEIGHTS-PARK SLOPE	26	12.1	19.1	15.4	15.4	17.2	13.0	20.9	23.2	28.8	38.1	52.5
BEDFORD STUYVESANT-CROWN HEIGHTS	59	18.6	18.6	18.0	23.6	24.9	40.5	40.9	47.0	65.9	77.8	85.3
EAST NEW YORK	20	11.5	15.3	16.7	15.0	24.9	20.4	18.8	28.4	45.3	64.9	53.8
SUNSET PARK	24	19.9	14.4	27.4	33.2	13.5	22.4	21.0	30.4	35.5	32.5	33.1
BOROUGH PARK	44	13.6	14.2	10.5	10.5	18.4	21.6	16.7	16.0	20.6	22.2	17.8
EAST FLATBUSH-FLATBUSH	59	18.6	11.5	18.9	31.3	23.3	23.0	29.8	28.2	42.9	52.5	59.0
CANARSIE-FLATLANDS	25	12.6	10.8	12.1	9.1	8.7	13.0	15.9	8.6	18.1	18.4	20.4
BENSONHURST-BAY RIDGE	17	8.7	10.5	10.8	13.4	14.0	11.0	11.1	10.7	14.6	14.8	17.7
CONEY ISLAND	30	10.5	9.1	12.9	11.5	16.9	12.8	17.2	14.8	19.3	23.1	21.5
WILLIAMSBURG-BUSHWICK	48	24.7	5.6	25.2	22.1	26.8	25.8	39.2	51.6	62.0	77.6	90.6
MANHATTAN	**239**	**15.6**	**14.8**	**16.7**	**17.9**	**21.5**	**23.8**	**29.3**	**40.9**	**42.1**	**55.0**	**62.8**
WASHINGTON HEIGHTS-INWOOD	53	19.6	31.1	17.7	19.2	24.1	28.7	28.9	48.7	34.1	45.7	51.0
CENTRAL HARLEM	32	21.2	20.8	20.5	28.5	38.6	46.7	52.3	82.2	93.4	101.4	141.5
EAST HARLEM	31	28.7	17.6	28.7	27.8	24.2	39.2	42.2	58.5	68.2	81.0	94.7
UPPER WEST SIDE	29	13.1	16.3	12.6	9.9	13.5	11.7	18.4	22.5	30.1	37.8	54.0
UPPER EAST SIDE	9	4.1	14.5	5.0	8.3	4.6	6.9	11.1	9.3	14.5	17.8	17.9
CHELSEA-CLINTON	13	10.6	11.4	23.6	16.3	22.7	17.8	34.0	52.6	44.4	67.8	64.4
GRAMERCY PARK-MURRAY HILL	24	19.3	9.7	15.3	20.1	19.4	22.7	26.8	33.4	44.2	63.2	61.0
GREENWICH VILLAGE-SOHO	8	9.6	8.6	16.7	19.1	21.6	12.1	25.5	42.7	35.6	60.5	72.0
UNION SQUARE-LOWER EAST SIDE	39	19.8	8.4	20.8	22.3	32.0	32.1	38.8	44.5	44.6	64.2	61.7
LOWER MANHATTAN	1	3.2	6.9	12.9	12.9	19.7	30.0	23.6	24.0	38.3	49.5	35.9
QUEENS	**330**	**14.7**	**14.4**	**18.6**	**16.2**	**19.7**	**18.5**	**18.6**	**22.3**	**25.3**	**28.8**	**28.2**
LONG ISLAND CITY-ASTORIA	28	12.7	25.5	19.0	16.7	28.4	25.1	25.4	22.9	28.1	37.8	29.9
WEST QUEENS	146	30.6	20.8	32.5	25.3	32.5	28.4	27.0	35.8	40.3	42.7	44.5
FLUSHING	40	15.7	17.2	22.3	21.9	19.3	19.5	24.9	19.5	27.8	22.3	20.8
BAYSIDE-LITTLE NECK	9	10.2	13.7	6.8	11.3	5.7	6.9	9.3	12.9	3.6	14.3	15.7
RIDGEWOOD	27	11.2	10.7	10.0	12.9	10.5	11.8	10.7	12.1	10.4	18.0	20.4
FRESH MEADOWS	12	12.9	10.3	10.7	17.2	17.4	8.8	8.9	15.7	18.2	13.8	11.6
SOUTHWEST QUEENS	26	9.6	7.5	11.5	10.0	9.8	15.4	9.4	12.8	18.8	18.0	17.5
JAMAICA	23	8.1	6.8	18.9	11.9	18.0	18.9	18.8	27.7	28.0	39.5	38.1
SOUTHEAST QUEENS	18	8.8	6.4	13.3	10.3	15.8	11.0	15.1	18.7	18.4	20.6	20.7
ROCKAWAY	1	0.9	4.8	11.2	10.3	16.0	12.3	16.2	22.0	29.9	30.1	30.2
STATEN ISLAND	**29**	**6.5**	**5.6**	**6.1**	**7.2**	**7.8**	**5.8**	**7.5**	**6.9**	**9.5**	**16.5**	**14.1**
PORT RICHMOND	5	8.0	8.6	17.5	11.1	17.8	11.6	13.5	12.0	14.0	26.7	20.0
STAPLETON-ST GEORGE	20	17.2	8.0	9.5	15.5	12.2	9.8	11.7	12.8	19.5	25.5	22.1
WILLOWBROOK	4	4.7	4.7	3.5	5.9	4.8	3.6	4.8	4.9	2.5	17.4	15.0
SOUTH BEACH-TOTTENVILLE	0	0.0	3.3	1.1	1.1	2.8	2.3	4.1	2.4	4.8	6.8	6.3
Total NYC	**1140[3]**	**14.2**	**13.5**	**15.7**	**16.6**	**18.4**	**19.8**	**22.2**	**26.5**	**31.9**	**39.4**	**43.0**

[1]Rates are based on intercensal estimates for 1993-1999. Rates since 2000 are based on 2000 Census data.

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

[3]There is one case missing a UHF code. This case lives outside of the 5 boroughs but is counted as a NYC case.

TABLE 3
HIV Status of Tuberculosis Cases by Sex and Area of Birth
New York City, 2003

Year	N (%)									
	Females HIV (+)		Males HIV (+)		U.S.-Born HIV (+)		Non-U.S.-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)

[1]Total HIV infected cases may be more than the sum of U.S. and non-U.S.-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 4

Tuberculosis Incidence (Rates per 100,000) by Race/Ethnicity, Sex, and Age in Years
New York City, 2003

Race/Sex	Age Groups 0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 34	35 - 44	45 - 54	55 - 64	65+	Total
	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	1 0.7	0 0.0	1 0.8	2 1.6	3 1.7	3 0.6	11 2.6	16 4.0	13 4.5	34 6.4	**84** **3.0**
Males	0 0.0	0 0.0	1 1.6	1 1.6	0 0.0	1 0.4	5 2.3	12 6.2	9 6.7	16 7.6	**45** **3.4**
Females	1 1.5	0 0.0	0 0.0	1 1.6	3 3.3	2 0.8	6 2.9	4 2.0	4 2.6	18 5.6	**39** **2.7**
Non-Hispanic Black, total	10 6.8	5 3.0	2 1.2	13 8.6	18 13.1	60 20.5	111 35.2	78 32.7	42 25.1	41 22.1	**380** **19.4**
Males	6 8.1	4 4.7	0 0.0	10 13.3	8 12.7	39 30.8	74 53.9	57 56.4	25 37.2	18 28.2	**241** **27.6**
Females	4 5.5	1 1.2	2 2.5	3 3.9	10 13.4	21 12.6	37 20.8	21 15.3	17 17.0	23 19.0	**139** **12.8**
Hispanic, total	11 5.9	4 2.0	2 1.1	20 11.5	40 21.1	81 21.1	72 21.7	52 22.3	27 18.1	35 25.2	**344** **15.9**
Males	5 5.3	0 0.0	0 0.0	13 14.4	20 20.8	52 27.4	48 30.4	36 34.1	19 28.9	18 35.2	**211** **20.3**
Females	6 6.6	4 4.1	2 2.3	7 8.3	20 21.4	29 14.9	24 13.8	16 12.5	8 9.6	17 19.4	**133** **11.9**
Asian, total	2 4.2	1 2.1	4 8.8	10 20.9	26 41.8	83 52.2	69 47.9	42 39.1	43 71.7	52 88.3	**332** **42.6**
Males	2 8.1	1 4.1	1 4.2	6 24.2	19 63.4	55 71.2	41 55.4	29 54.1	29 99.4	37 140.5	**220** **56.7**
Females	0 0.0	0 0.0	3 13.9	4 17.4	7 21.7	28 34.2	28 39.9	13 24.2	14 45.5	15 46.1	**112** **28.6**
TOTAL	**24** **4.4**	**10** **1.8**	**9** **1.7**	**45** **8.6**	**87** **14.7**	**227** **16.6**	**263** **20.8**	**188** **18.6**	**125** **18.3**	**162** **17.3**	**1140** **14.2**
Males	**13** **4.7**	**5** **1.7**	**2** **0.7**	**30** **11.3**	**47** **16.5**	**147** **22.2**	**168** **27.4**	**134** **28.5**	**82** **26.9**	**89** **24.7**	**717** **18.9**
Females	**11** **4.2**	**5** **1.8**	**7** **2.7**	**15** **5.9**	**40** **13.1**	**80** **11.3**	**95** **14.6**	**54** **10.0**	**43** **11.4**	**73** **12.6**	**423** **10.0**

[1]Rates are based on 2000 census data.

Table 5
Tuberculosis Cases by Age in Years and Area of Birth
New York City, 2003

	Age Groups								
	0 - 19		20 - 44		45 - 64		65+		TOTAL
Area of Birth	**N**	**(%)**	**N**	**(%)**	**N**	**(%)**	**N**	**(%)**	
CARIBBEAN AND LATIN AMERICA **[1]**	32	**(9.1%)**	195	**(55.6%)**	87	**(24.8%)**	37	**(10.5%)**	**351**
ASIA **[2]**	10	**(3.3%)**	165	**(54.3%)**	79	**(26.0%)**	50	**(16.4%)**	**304**
AFRICA **[3]**	3	**(4.2%)**	57	**(79.2%)**	8	**(11.1%)**	4	**(5.6%)**	**72**
EUROPE **[4]**	3	**(8.8%)**	10	**(29.4%)**	6	**(17.6%)**	15	**(44.1%)**	**34**
MIDDLE EAST **[5]**	0	**(0.0%)**	8	**(57.1%)**	6	**(42.9%)**	0	**(0.0%)**	**14**
OTHER **[6]**	0	**(0.0%)**	1	**(100.0%)**	0	**(0.0%)**	0	**(0.0%)**	**1**
TOTAL NON-USA	**48**	**(6.2%)**	**436**	**(56.2%)**	**186**	**(24.0%)**	**106**	**(13.7%)**	**776**
USA **[7]**	40	**(12.7%)**	125	**(39.8%)**	106	**(33.8%)**	43	**(13.7%)**	**314**
PUERTO RICO	0	**(0.0%)**	10	**(2.8%)**	19	**(48.7%)**	10	**(25.6%)**	**39**
TOTAL USA	**40**	**(11.3%)**	**135**	**(38.5%)**	**125**	**(35.4%)**	**53**	**(15.0%)**	**353**
UNKNOWN	0	(0.0%)	6	**(1.7%)**	2	**(18.2%)**	3	**(27.3%)**	**11**
TOTAL	**88**	**(7.7%)**	**577**	**(50.6%)**	**313**	**(27.5%)**	**162**	**(14.2%)**	**1,140**

[1] Dominican Republic (58), Haiti (51), Cuba (9), Trinidad & Tobago (7), Jamaica (6), Mexico (64), Ecuador (62), Guyana (25), Peru (22), Honduras (10), Colombia (9), Guatemala (8), El Salvador (4), Panama (4), Other (12)

[2] India (48), Pakistan (23), Nepal (17), Bangladesh (11), Philippines (27), Vietnam (14), Cambodia (4), Indonesia (4), Myanmar (3), Thailand (2), China (99), Korea, Rep. (24), Hong Kong (16), Other (12)

[3] Senegal (10), Ivory Coast (8), Mali (8), Guinea (7), Gambia (6), Ghana (6), Other (27)

[4] Russia (8), Italy (5), Hungary (3), Romania (3), Ukraine (3), Other (12)

[5] Turkey (5), Yemen (5), Saudi Arabia (2), Other (2)

[6] Canada (1)

[7] Includes the U. S. Virgin Islands, excludes Puerto Rico

Table 6
Selected Characteristics of U.S.-Born and Non-U.S.-Born Cases
New York City, 2003

Characteristic	U.S.-Born		Non-U.S.-Born		Total	
	#	(%)	#	(%)	#	(%)
DEMOGRAPHICS						
Age Group						
0-19	40	11.3%	48	6.2%	**88**	**7.7%**
20-44	135	38.2%	436	56.2%	**577**	**50.6%**
45-64	125	35.4%	186	24.0%	**313**	**27.5%**
65+	53	15.0%	106	13.7%	**162**	**14.2%**
Sex						
Female	134	38.0%	283	36.5%	**423**	**37.1%**
Male	219	62.0%	493	63.5%	**717**	**62.9%**
Race/ethnicity						
Black Non-Hispanic	214	60.6%	162	20.9%	**380**	**33.3%**
White Non-Hispanic	38	10.8%	45	5.8%	**84**	**7.4%**
Hispanic	90	25.5%	253	32.6%	**344**	**30.2%**
Asian	11	3.1%	316	40.7%	**332**	**29.1%**
Borough of residence						
Manhattan	103	29.2%	133	17.1%	**239**	**21.0%**
Bronx	71	20.1%	104	13.4%	**177**	**15.5%**
Brooklyn	116	32.9%	244	31.4%	**363**	**31.8%**
Queens	50	14.2%	278	35.8%	**331**	**29.0%**
Staten Island	12	3.4%	17	2.2%	**29**	**2.5%**
Time in the U.S.						
<1 year	n/a	n/a	106	13.7%	**106**	**13.7%**
1-5 years	n/a	n/a	244	31.4%	**244**	**31.4%**
>5 years	n/a	n/a	404	52.1%	**404**	**52.1%**
CLINICAL CHARACTERISTICS[1]						
Ever on DOT (of those eligible)	211	70.1%	530	73.5%	**742**	**72.4%**
Smear positive	197	55.8%	408	52.6%	**609**	**53.4%**
NAA positive	110	31.2%	192	24.7%	**304**	**26.7%**
Culture positive	259	73.4%	605	78.0%	**872**	**76.5%**
Clinical case[2]	94	26.6%	171	22.0%	**268**	**23.5%**
Pulmonary site of disease	243	68.8%	509	65.6%	**758**	**66.5%**
Cavitary chest x-ray	42	17.3%	102	20.0%	**144**	**12.6%**
Extra-pulmonary site of disease	66	18.7%	206	26.5%	**276**	**24.2%**
Both pulmonary & extra-pulmonary	44	12.5%	61	7.9%	**106**	**9.3%**
Multidrug resistance[3]	5	1.4%	16	2.1%	**21**	**1.8%**
Other drug resistance[4]	25	7.1%	72	9.3%	**98**	**8.6%**
History of prior tuberculosis	25	7.1%	18	2.3%	**44**	**3.9%**
HIV Status						
Positive	106	30.0%	72	9.3%	**178**	**15.6%**
Negative	150	42.5%	458	59.0%	**612**	**53.7%**
Refused	48	13.6%	160	20.6%	**208**	**18.2%**
Not offered/done	27	7.6%	43	5.5%	**71**	**6.2%**
Unknown	22	6.2%	43	5.5%	**71**	**6.2%**
Last medical provider type						
DOHMH chest center	130	36.8%	356	45.9%	**487**	**42.7%**
Health and Hospitals Corporation hospitals	66	18.7%	220	28.4%	**288**	**25.3%**
Private hospitals	77	21.8%	82	10.6%	**165**	**14.5%**
Private physicians	58	16.4%	100	12.9%	**160**	**14.0%**
Other providers[5]	22	6.2%	18	2.3%	**40**	**3.5%**
SOCIAL CHARACTERISTICS[6]						
Homeless[7]	57	16.1%	27	3.5%	**85**	**7.5%**
Employed[8]	82	23.2%	369	47.6%	**452**	**39.6%**
Health care worker	10	2.8%	31	4.0%	**41**	**3.6%**
Correctional employee	2	0.6%	0	0.0%	**2**	**0.2%**
Injection drug use[9]	32	9.1%	2	0.3%	**34**	**3.0%**
Non-injection drug use[9]	79	22.4%	15	1.9%	**94**	**8.2%**
Alcohol abuse[9]	89	25.2%	70	9.0%	**160**	**14.0%**
Any drug abuse	121	34.3%	77	9.9%	**199**	**17.5%**
Resident of correctional facility[10]	11	3.1%	7	0.9%	**18**	**1.6%**
Resident of long-term care facility[10]	11	3.1%	7	0.9%	**18**	**1.6%**
Total	**353**		**776**		**1140**	

[1]Not all categories are complete and totals may include cases with unknown area of birth; [2]As per CDC clinical case definition; [3]Multidrug resistant is defined as resistant to at least Isoniazid and Rifampin; [4]Other drug resistance is defined as not MDR, but resistant to one or more first-line drugs; [5]Other providers include correctional facilities, VA hospitals, out-of-NYC, and psychiatric providers; [6]Categories 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 tuberculosis diagnosis; [10]At time of diagnosis.

Table 7
First Line Drug Resistance by Area of Birth and History of Prior Tuberculosis Treatment[1]
New York City, 2003

N (%)

	TOTAL		U.S.-BORN[2]		NON-U.S.-BORN	
	Prior Tuberculosis Treatment	No Prior Treatment	Prior Tuberculosis Treatment	No Prior Treatment	Prior Tuberculosis Treatment	No Prior Treatment
Positive Culture For *M. tuberculosis*	13	859	7	252	6	599
Tested for susceptibility to first-line drugs (% of those with positive culture for *M. tuberculosis*)	13 (100.0)	853 (99.3)	7 (100.0)	250 (99.2)	6 (100.0)	595 (99.3)
Susceptibility results (% of those tested for susceptibility to first-line drugs)						
Multidrug-resistant (resistant to at least isoniazid & rifampin)	2 (15.4)	19 (2.2)	0 (0.0)	5 (2.0)	2 (33.3)	14 (2.4)
Isoniazid-resistant and rifampin-susceptible	1 (7.7)	60 (7.0)	1 (14.3)	12 (4.8)	0 (0.0)	47 (7.9)
Resistant to first-line drugs other than isoniazid & rifampin	0 (0.0)	34 (4.0)	0 (0.0)	11 (4.4)	0 (0.0)	23 (3.9)
Rifampin-resistant and isoniazid-susceptible	0 (0.0)	3 (0.4)	0 (0.0)	1 (0.4)	0 (0.0)	2 (0.3)
Susceptible to all first-line drugs	10 (76.9)	737 (86.4)	6 (85.7)	221 (88.4)	4 (66.7)	509 (85.5)

[1]Patients with a history of prior tuberculosis treatment includes those who received one or more anti-tuberculosis drugs for confirmed or suspected tuberculosis in the past, at least 30 days before the current diagnosis.

[2]Includes Puerto Rico and Virgin Islands.

Table 8
Epidemiologic Investigations of Tuberculosis (TB) Exposure in Congregate Settings
New York City, 2003 (N=40)

Site	Close Contacts					Other-than-close contacts					Transmission[1,2]
	Identified #	Tested #	Tested %	Positive #	Positive %	Identified #	Tested #	Tested %	Positive #	Positive %	
Worksites											
Worksite E	70	34	49	11	32	26	15	58	1	7	Possible
Worksite D	39	36	100	3	8	2	1	50	1	100	Probable
Worksite G	7	7	100	4	57	12	9	75	2	22	Probable
Worksite I	18	13	72	6	46	5	5	100	1	20	Probable
Worksite J	24	20	83	18	90	0	0	N/A	0	N/A	Probable
Worksite L	21	19	90	7	37	73	55	75	9	16	Probable
Worksite M	21	20	95	9	45	12	10	83	2	20	Probable
Worksite O	12	11	92	6	55	19	17	89	7	41	Probable
Worksite F	20	6	30	2	33	0	0	N/A	0	N/A	Unable to assess
Worksite H	29	14	48	2	14	53	15	28	2	13	Unable to assess
Worksite A	8	7	88	1	14	38	28	74	0	0	Unlikely
Worksite C	14	14	100	2	14	34	30	88	6	20	Unlikely
Worksite K	14	9	64	0	0	15	8	53	0	0	Unlikely
Worksite N	20	16	80	3	19	2	2	100	1	50	Unlikely
Worksite P	10	9	90	0	0	34	23	67	2	9	Unlikely
Worksite R	4	4	100	1	25	2	1	50	1	100	Unlikely
Worksite Q	3	3	100	0	0	46	9	20	0	0	Unlikely
Worksite S	4	3	75	0	0	30	20	67	1	5	Unlikely
Residential settings											
Shelter	27	8	30	1	13	14	8	57	0	0	Probable
SRO	3	3	100	0	0	57	41	72	1	2	Probable
Shelter	21	21	100	10	48	937	562	60	213	38	Probable
SRO	35	16	46	3	19	57	18	32	0	0	Unable to assess
Residence	33	19	58	5	26	98	41	42	8	20	Unable to assess
SRO	5	4	80	0	0	30	18	60	3	17	Unlikely
Educational facilities—adults											
Language School	31	8	26	7	88	0	0	N/A	0	N/A	Possible
Language Institution	21	15	71	3	20	8	7	88	0	0	Possible
Special Needs School	12	12	100	6	50	214	179	84	6	3	Probable
Educational facilities—children											
Nursery School	44	39	89	8	21	0	0	N/A	0	N/A	Probable
High School	22	16	73	6	38	168	77	46	20	26	Probable
Early Ed. Magnet School	35	35	100	2	6	33	33	100	1	3	Probable
Special Needs Pre-School	19	19	100	1	5	17	16	94	1	6	Probable
High School	34	24	71	4	17	130	22	17	2	9	Probable
High School	77	50	65	3	6	210	15	7	1	7	Unable to assess
High School	53	7	13	0	0	82	9	11	0	0	Unable to assess
High School	33	14	42	3	21	155	24	15	4	17	Unable to assess
Middle School	28	17	61	0	0	101	49	49	0	0	Unable to assess
Middle School	29	25	86	0	0	14	12	86	1	8	Unlikely
High School	38	20	53	0	0	99	45	45	3	7	Unlikely
Church	12	12	100	7	58	12	11	92	3	27	Probable
Rehabilitation Program	16	8	50	0	0	0	0	N/A	0	N/A	Unable to assess
TOTAL	**950**	**629**	**66**	**144**	**23**	**2839**	**1435**	**51**	**303**	**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 who are TST-positive is significantly greater than the proportion in a comparison group but the proportion of identified contacts tested is less than 50%. Transmission is considered **"unlikely"** when these conditions are not met. **"Unable to assess"** indicates that less than 50% 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]575 unexposed individuals were tested upon their request and 62 (11.0%) were TST-positive and were referred for evaluation.

Table 9
Tuberculosis Reporting Delays of ≥ 4 Days for Cases and Suspects
New York City, 2003

Type of Patients with Delay	Cases		Suspects		Total	
	#	%	#	%	#	%
Smear (+)[1]	139	28.4%	178	37.2%	**317**	32.7%
Pathology Specimens[2]	166	72.5%	190	85.6%	**356**	78.9%
Medication Start[3]	344	31.4%	357	41.2%	**701**	35.7%
Any reporting delay[4]	502	44.9%	658	51.7%	**1,160**	48.5%

[1] ≥ 4 days delay for smear-positive patients, excluding pathology smear positive results. The denominator consists of all smear-positive patients. Both the laboratory and the provider should report these patients.

[2] ≥ 4 days delay for pathology specimen results reported as consistent with tuberculosis. The denominator consists of all patients with a pathology specimen.

[3] ≥ 4 days delay from start of treatment for patients who were started on 2 or more anti-tuberculosis drugs. The denominator consists of all patients started on two or more anti-tuberculosis drugs.

[4] Any ≥ 4 days delay; this category is not mutually exclusive. Some patients may be in more than one delay category. The denominator consists of cases and suspects with positive smear, pathology findings, or ever started on 2 or more anti-tuberculosis drugs.

Appendix 1: Centers for Disease Control and Prevention's Objectives for Tuberculosis Control Programs

The Centers for Disease Control and Prevention's (CDC) objectives for tuberculosis control programs nationwide may be categorized as pertaining to reporting, completion of therapy, contact investigations, and treatment of latent tuberculosis infection. These objectives are as follows:

Reporting:

1. All newly diagnosed cases of tuberculosis will be reported to CDC using the electronic reporting system developed by CDC. There will be at least 95% completeness for variables in the expanded Report of a Verified Case of Tuberculosis (RVCT).
2. Drug susceptibility results will be reported for at least 90% of all newly reported culture-positive tuberculosis cases.
3. Human immunodeficiency virus (HIV) status will be reported for at least 75% of all newly reported tuberculosis cases aged 25 through 44 years.

Completion of Therapy:

1. At least 90% of patients with newly diagnosed tuberculosis, for whom therapy of one year or less is indicated, will complete therapy within 12 months.

Contact Investigation:

1. Contacts will be identified for at least 90% of sputum acid-fast bacilli (AFB) smear-positive tuberculosis cases.
2. At least 95% of close contacts of sputum AFB smear-positive tuberculosis cases will be evaluated for infection and disease.
3. At least 85% of infected contacts who are started on treatment for latent tuberculosis infection will complete therapy.

Treatment of Latent Tuberculosis Infection:

1. At least 75% of persons with latent tuberculosis infection (LTBI) found through targeted skin testing activities (supported with program resources) and started on treatment for LTBI will complete therapy.

Laboratory:

1. All initial isolates of *M. tuberculosis* complex obtained by the public health laboratory will be reported to CDC using the electronic reporting system developed by CDC. For at least 95% of the isolates, all information specified in the Mycobacterium module of the Public Health Laboratory Information System (PHLIS) will be completed.
2. For at least 80% of initial diagnostic specimens received by the public health laboratory for tuberculosis diagnosis, the following laboratory turnaround times will be met: reporting of smear-positive or smear-negative results of acid-fast examination of specimens within 24 hours of specimen receipt; for culture-positive specimens, reporting of *M. tuberculosis* complex or not *M. tuberculosis* complex within 14-21 days from specimen receipt; and reporting of drug susceptibility tests for first-line drugs within 15 to 35 days from specimen receipt.
3. For at least 80% of isolates of mycobacteria referred to the public health laboratory for additional tuberculosis diagnostic testing, the following laboratory turnaround times will be met: reporting of isolates as *M. tuberculosis* complex or not *M. tuberculosis* complex within seven days of isolate receipt, and reporting of first-line drug susceptibility tests within 10 to 14 days from isolate receipt.

Appendix 2: CDC Tuberculosis Case Definition

Laboratory Definition

- Isolation of *M. tuberculosis* from a clinical specimen by culture or
- Demonstration of *M. tuberculosis* from a clinical specimen by nucleic acid amplification test, or
- Demonstration of acid-fast bacilli in a clinical specimen when a culture has not been or cannot be obtained

Clinical Definition

A case that meets **all** the following criteria:

- A positive tuberculin skin test
- Signs and symptoms compatible with tuberculosis (e.g., an abnormal, unstable [i.e., worsening or improving] chest radiograph, or clinical evidence of current disease)
- Treatment with two or more anti-tuberculosis medications
- Completed diagnostic evaluation

Appendix 3: Healthy People 2010 Tuberculosis Objectives

14.11 Reduce tuberculosis.

Target: 1.0 new case per 100,000 population.

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.

Appendix 4: 2003 Bureau Publications

Publications

1. Cook S, Maw KL, Munsiff SS, Fujiwara PI, Frieden TR. Prevalence of tuberculin skin test positivity and conversions among healthcare workers in New York City during 1994 to 2001. Infect Control Hosp Epidemiol 2003;24(11):807-13.
2. Driver CR, Balcewicz-Sablinska MK, Kim Z, Scholten J, Munsiff SS. Contact investigations in congregate settings, New York City. Int J Tuberc Lung Dis 2003;7(12 Suppl 3):S432-8.
3. Frieden TR, Driver CR. Tuberculosis control: past 10 years and future progress. Tuberculosis (Edinb), 2003;83(1-3):82-5.
4. Frieden TR, Sterling TR, Munsiff SS, Watt CJ, Dye C. Tuberculosis. Lancet 2003;362(9387):887-99.
5. Gounder CR, Driver CR, Scholten JN, Shen H, Munsiff SS. Tuberculin testing and risk of tuberculosis infection among New York City schoolchildren. Pediatrics 2003;111(4 Pt 1):e309-15.
6. Lambert L, Rajbhandary S, Quails N, Budnick L, Catanzaro A, Cook S, Daniels-Cuevas L, Garber E, Reves R. Costs of implementing and maintaining a tuberculin skin test program in hospitals and health departments. Infect Control Hosp Epidemiol 2003;24(11):814-20.
7. Li J, Driver CR, Munsiff SS, Fujiwara PI. Finding contacts of homeless tuberculosis patients in New York City. Int J Tuberc Lung Dis 2003;7(12 Suppl 3):S397-404.
8. Li JH, Driver CR, Munsiff SS, Yip R, Fujiwara PI. Differential decline in tuberculosis incidence among U.S.- and non-U.S.-born persons in New York City. Int J Tuberc Lung Dis 2003;7(5):451-7.
9. Munsiff SS, Nivin B, Sacajiu G, Mathema B, Bifani P, Kreiswirth BN. Persistence of a highly resistant strain of tuberculosis in New York City during 1990-1999. J Infect Dis 2003;188(3):356-63.
10. Scholten JN, Driver CR, Munsiff SS, Kaye K, Rubino MA, Gourevitch MN, Trim C, Amofa J, Seewald R, Highley E, Fujiwara PI. Effectiveness of isoniazid treatment for latent tuberculosis infection among human immunodeficiency virus (HIV)-infected and HIV uninfected injection drug users in methadone programs. Clin Infect Dis 2003;37(12):1686-92.
11. Sterling T, Munsiff SS, Frieden TR. Management of latent tuberculosis infection in immigrants. N Engl J Med 2003;348(13):1289-92; (letter).

- To order copies of the Universal Reporting Form (URF), call 1-866-NYC-DOH1.
- To order copies of the LTBI Reporting Form (TB78), laboratory/pathology report forms, or report of patient services forms, call or mail order form to:

  Patient Care Services Unit,
  Bureau of Tuberculosis Control
  225 Broadway, 22nd floor, Box 72B
  New York, NY 10007
  Tel: (212) 442-9743

  To order additional copies of the Information Summary or tuberculosis educational materials, call 311. The Information Summary can also be accessed at the NYC DOHMH website at www.nyc.gov/html/doh/html/tb/tb-ar.html.

Reporting Requirements for Health Care Providers

New York City Health Code section 11.03 (a) mandates that health care providers report two groups of patients to the New York City Department of Health and Mental Hygiene within 24 hours of detection:

1. All suspected and confirmed tuberculosis cases which have:
   a. A smear (from any anatomic site) positive for acid-fast bacilli (AFB);
   b. A nucleic acid amplification test (e.g., Amplicor®, Genprobe®)[1] result suggesting *M. tuberculosis*;
   c. A culture positive for *M. tuberculosis*;
   d. Started on two or more anti-tuberculosis medications for suspected or confirmed tuberculosis; or
   e. Suspected of having tuberculosis regardless of treatment, such as a patient placed on respiratory isolation or for whom anti-tuberculosis treatment is intended.
2. All children younger than 5 years old with a positive tuberculin skin test

Physicians are also required to report when a patient with confirmed tuberculosis ceases to receive anti-tuberculosis treatment and the reason for the cessation, as well as any other information required by the DOHMH for the control of tuberculosis.

Physicians are required to test (or refer to the DOHMH for testing) household contacts of infectious cases and to notify the DOHMH of the test results or referral. Furthermore, the DOHMH may require household and non-household contacts to be tested and reexamined as needed.

Reporting Requirements for Laboratories

New York City Health Code section 13.03 (a) requires mycobacteriology and pathology laboratories to report to the New York City Department of Health and Mental Hygiene, within 24 hours of detection, any bacteriologic findings which suggest or confirm tuberculosis:

1. AFB-positive smears
2. Cultures positive for *M. tuberculosis*
3. Any culture result associated with an AFB-positive smear (even if negative for *M. tuberculosis*)
4. Rapid diagnostic results that identity *M. tuberculosis*
5. Any rapid diagnostic result associated with an AFB-positive smear (even if negative for *M. tuberculosis*)
6. Results of susceptibility tests performed on *M. tuberculosis* cultures
7. Pathology findings consistent with tuberculosis, include, but are not limited to, the presence of AFB, caseating and non-caseating granuloma, or tubercles

If a patient has multiple positive results, all results must be reported, not just the first positive result.

As of January 1, 2001 mycobacteriology and pathology laboratories are required to forward the initial *M. tuberculosis* culture or sub-culture from each new patient to the New York City Public Health Laboratories within 24 hours of identification for genotyping.

Prompt Reporting

The reports have to be received at DOHMH within 24 hours, whether by express or overnight mail, fax, telephone or electronically.

[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.

TUBERCULOSIS CHEST CENTERS

Bronx

Morrisania Chest Center
1309 Fulton Avenue, First Floor
Bronx, NY 10456
Tel. (718) 579-4157/4161/4162

Brooklyn

Bedford Chest Center
485 Throop Avenue, Third Floor
Brooklyn, NY 11221
Tel. (718) 574-2462/3/4

Brownsville Chest Center
259 Bristol Street, Third Floor
Brooklyn, NY 11212
Tel. (718) 495-8281/7256/7/8

Bushwick Chest Center
335 Central Avenue, Second Floor
Brooklyn, NY 11221
Tel. (718) 573-4886/91/89

Fort Greene Chest Center
295 Flatbush Ave. Ext., Fourth Floor
Brooklyn, NY 11201
Tel. (718) 643-6575/6531/6540/8357

Manhattan

Chelsea Chest Center
303 9th Avenue, Third Floor
New York, NY 10031
Tel. (212) 239-0919/1757/1790

Washington Heights Chest Center
600 West 168th Street, Third Floor
New York, NY 10032
Tel. (212) 368-4500

Queens

Corona Chest Center
34-33 Junction Blvd., Second Floor
Queens, NY 11372
Tel. (718) 476-7635/36/37

Far Rockaway Chest Center
67-10 Rockaway Beach Blvd., Room 201
Queens, NY 11692
Tel. (718) 474-2100/1

Staten Island

Richmond Chest Center
51 Stuyvesant Place, Room 415
Staten Island, NY 10301
Tel. (718) 420-1028/1167

Chest clinics can also be reached by calling New York City's Citizen Hotline at 311.

NYC Health
nyc.gov/health

Department of Health and Mental Hygiene
The City of New York

Thomas R. Frieden, M.D., M.P.H.
Commissioner

Michael R. Bloomberg
Mayor