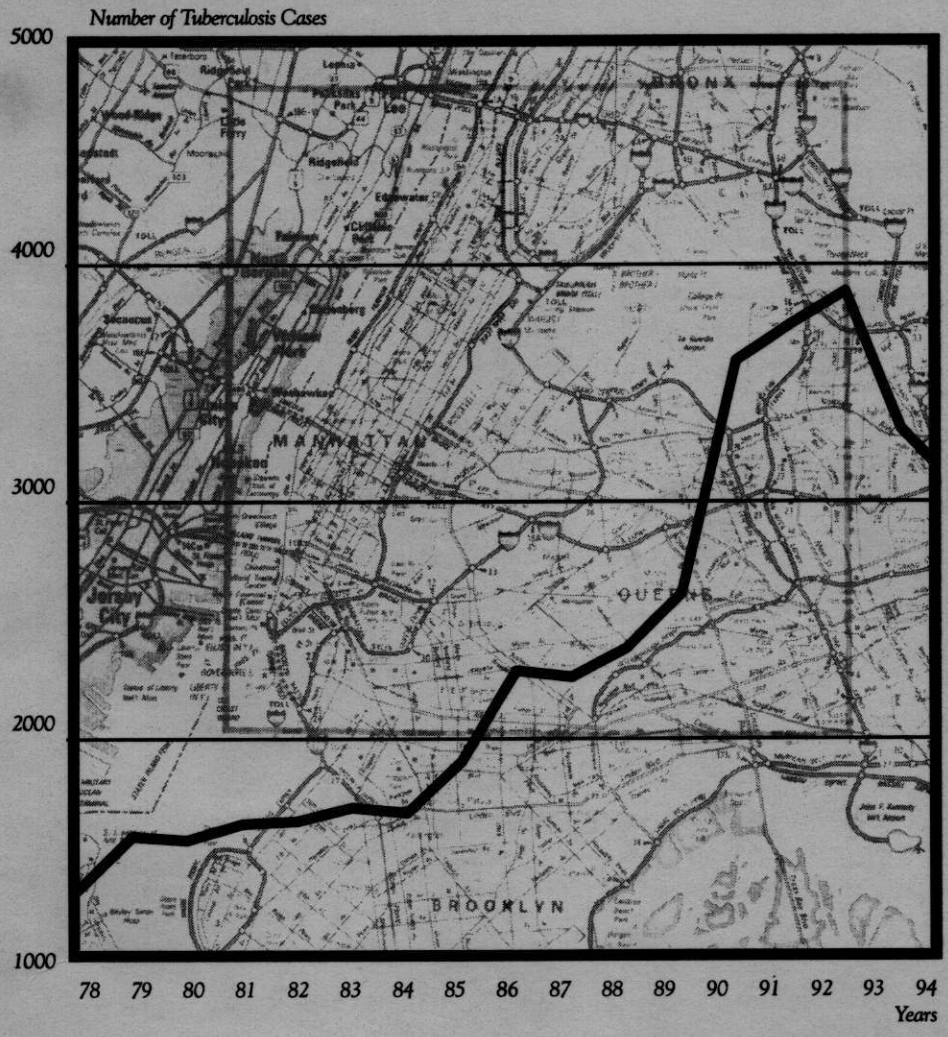
BUREAU OF TUBERCULOSIS CONTROL
NEW YORK CITY DEPARTMENT OF HEALTH



INFORMATION SUMMARY 1994

HIGHLIGHTS

TUBERCULOSIS CONTROL IN NEW YORK CITY, 1994

Progress:

- In 1994, 2995 individuals in New York City were diagnosed with tuberculosis. This is a decrease of 7.4 per cent from the number reported in 1993 (3235) and of 21.4 per cent from the number reported in 1992 (3811), at the peak of the current epidemic.
- In 1994, the number of tuberculosis patients with positive cultures decreased even more dramatically than did overall cases: there were 2479 tuberculosis patients with positive cultures in 1994, compared with 2854 in 1993 and 3446 in 1992—decreases of 13.1 per cent and 28.1 per cent respectively.
- In 1994, 176 reported tuberculosis patients had strains of the microorganism which were multidrug-resistant. This is a decrease of 40.5 per cent from the 296 multidrug-resistant cases reported in 1993, and of 60.0 per cent from the 441 reported in 1992.
- Of individuals first diagnosed with tuberculosis in 1993, 89 per cent completed anti-tuberculosis therapy in 1994; in the late 1980s, fewer than 50 per cent of tuberculosis patients completed their treatment.

Continuing challenges:

- The number of tuberculosis patients who were foreign-born increased by 29.1 per cent, from 739 reported in 1993 to 954 in 1994.
- Of the 2995 tuberculosis patients reported in 1995, human immunodeficiency virus (HIV) status was unknown for 44.3 per cent. Health care providers should encourage all their tuberculosis patients to undergo voluntary HIV testing.

The New York City Department of Health Bureau of Tuberculosis Control thanks health care providers throughout the city for their work in controlling the tuberculosis epidemic and their compliance with reporting requirements.

BUREAU OF TUBERCULOSIS CONTROL
NEW YORK CITY DEPARTMENT OF HEALTH

INFORMATION SUMMARY 1994

MISSION STATEMENT

The mission of the Bureau of Tuberculosis Control is to prevent the spread of tuberculosis and eliminate it as a public health problem in New York City. The goals of the tuberculosis control program are:

1 To assure identification and appropriate treatment of all individuals with suspected or confirmed tuberculosis disease;

2 To ensure that high risk individuals (e.g., contacts, immunocompromised persons, foreign-born persons from areas of high tuberculosis prevalence) who are infected with tuberculosis but without tuberculosis disease receive preventive treatment and do not develop disease.

The Bureau achieves its goals through direct patient care, education, surveillance and outreach. Mandated activities include:

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 tuberculosis disease 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 that identified contacts receive appropriate medical care;

3 Monitoring and documenting the treatment status of all individuals with active tuberculosis;

4 Setting standards and guidelines, and providing consultation, on the prevention, diagnosis and treatment of tuberculosis infection and disease in New York City;

5 Operating free chest clinics throughout New York City to provide state-of-the-art care for persons with suspected or confirmed tuberculosis disease and their close contacts; and

6 Ensuring free 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.

INFORMATION SUMMARY

An Overview of Activities of the Bureau of Tuberculosis Control

The Bureau of Tuberculosis Control operates a multifaceted program encompassing surveillance, epidemiology, outreach, clinical services, education, training, and other activities.

Clinical Services

The Clinical Services Unit operates ten chest clinics located throughout the City. The primary activity of these clinics is to provide specialty care, including Directly Observed Therapy, for individuals with active tuberculosis. The clinics also provide preventive therapy, especially to individuals at high risk for developing tuberculosis. Services include tuberculin skin testing, chest x-rays, sputum induction, medical and nursing care, social services, HIV counseling and testing, and other services. The clinics use a multi-disciplinary team approach to case management in order to enhance patient adherence and treatment completion.

Outreach Services

The Bureau's outreach workers monitor hospitalized patients and outpatients, evaluate contacts of individuals with tuberculosis disease, and update case information on a computerized registry. Outreach staff provide medical case management, travel throughout the City to directly observe individuals as they ingest their medication, locate and return patients to medical care, and test contacts of individuals with tuberculosis. Specialized outreach groups offer tuberculosis control services at the 30th Street Shelter and at Rikers Island and, in partnership with the Division of AIDS Services, at single room occupancy sites in Upper Manhattan. The city operates a controlled treatment center at Goldwater Memorial Hospital for use when all other efforts have been exhausted, so that the most difficult-to-treat patients can complete a full course of treatment while the public health is safeguarded.

Directly Observed Therapy

Directly Observed Therapy (DOT) is a program in which individuals with active tuberculosis ingest their medication under the direct observation of a trained health care worker. This program ensures that individuals with active disease receive individual attention and optimal medical supervision through the entire course of treatment. DOT is provided through Department of Health (DOH) clinics, outreach services, and private providers funded by the New York State Department of Health, Medicaid and Ryan White Care Act Funds. Although it is labor intensive, DOT reduces hospitalizations, decreases the costs of care, and increases the number of individuals completing the full course of treatment. DOT is now the standard of care for individuals with active tuberculosis.

Epidemiology and Surveillance

The New York City Health Code requires that all health facilities and private physicians report confirmed or suspected cases of tuberculosis to the Department of Health within 24 hours of diagnosis. The Surveillance Unit ensures that this reporting is done in a timely and thorough manner. The Bureau's Surveillance Unit conducts active surveillance at hospitals and laboratories throughout the City.

Epidemiologists are involved in ongoing evaluations related to disease prevention and program management. The unit also conducts outbreak investigations and periodic reviews of the status of clinical and outreach cases.

Education and Training

In addition to providing introductory and in-service training to Department of Health staff and non-DOH health professionals, the Education and Training Unit responds to public requests for information. The unit also provides multilingual educational brochures, fliers, posters, publications and technical articles. It distributes materials at health fairs, Department of Health clinic facilities and field offices, and other sites requesting educational documents.

METHODS

Case Counting

Cases counted in 1994 were those verified during that year. Some 1994 cases were first suspected of having disease in 1993; likewise, some individuals first suspected of having tuberculosis in late 1994 will be counted in 1995 if active tuberculosis is confirmed. Individuals who first submitted a specimen for mycobacteriology culture in late 1994 were included in the 1994 count if their culture was reported to be positive by February 15, 1995. A certain proportion of each year's counted cases are culture-negative. These cases never had a positive culture for *M. tuberculosis* and were instead verified because their clinical symptoms and/or radiologic signs improved while they were on anti-tuberculosis medications. More complete verification of culture negative cases by the Bureau of Tuberculosis Control in recent years has led to some surveillance artifact when longitudinal trends are considered, especially regarding tuberculosis cases in children, who tend to be culture-negative.

Rate Calculation

This report uses 1990 census figures for New York City to calculate case rates per 100,000 population. The 1992 and 1993 report also used the 1990 census data. Case rates from years before 1991 were based on the 1980 census.

Age-adjusted case rates are provided in the section of the report on the geographic distribution of cases. Age standardization is a numerical technique that adjusts age-specific observed rates in population groups to a standard population age distribution so that different populations can be compared. Age standardization of the rates removes age, per se, as a possible explanation for the difference in rates.

Since denominators used to calculate rates are derived from the 1990 census, rates included here *do not reflect the significant numbers of immigrants* (documented as well as undocumented) who have entered New York City since 1990. Therefore, whenever possible, absolute numbers as well as crude and/or age-adjusted rates are provided. Cases from Puerto Rico, the U.S. Virgin Islands, and all U.S. territories were included in the figures for the United States. Ascertainment and reporting of place of birth has improved in the last year, leading to some surveillance artifact in analysis of longitudinal trends.

Introduction

New York City continues to have one of the highest case rates of tuberculosis in the country. This report presents the demographic and geographic distribution of tuberculosis cases reported and confirmed in New York City in 1994.

In 1994, 2,995 new cases of tuberculosis were reported in the city. This represents a 7.4% annual decrease compared to the 3,235 cases reported in 1993, but is still a 98% increase over 1980, when 1,514 cases were reported. Culture-confirmed cases decreased by 13.1% between 1993 and 1994. Case rates had been rising since 1979, and peaked at 52.0 per 100,000 in 1992. The case rate is now 40.9 per 100,000 population (Table 1, Figure 1). The 1994 case rate is still higher than any of the City's case rates which occurred in the 1970s and 1980s (Table 1). The City's rate of 40.9 per 100,000, is more than four times the national case rate of 9.4 per 100,000. In 1994, New York City represented 12.3% of the nation's 24,361 reported tuberculosis cases. Nationally, between 1993 and 1994, the number of new cases decreased by 926. In New York City, between 1993 and 1994, the number of new cases decreased by 240; therefore, in 1994, New York City contributed 26% of the national decrease.

Age Distribution

In 1994, people with active tuberculosis ranged in age from less than one year old to one hundred five years old. The number of cases among children under 5 years old increased to 84 in 1994 from 67 in 1993, an increase of 25%, although the number of culture-positive children decreased by 36.7% in this age group. Among those aged 0 to 5 years (Table 2), black children represented 43 of the 84 cases (51.2%) and Hispanic children represented 31 of the 84 cases (36.9%).

Overall, there were 153 tuberculosis cases reported in children younger than 15 years, a 19.5% increase from 1993. This increase likely represents a surveillance artifact related to the counting of clinically confirmed culture-negative

Table 1
Tuberculosis Incidence
New York City, 1920 - 1994

Year	Number*	Rate Per 100,000**	Culture-Positive Cases	Multidrug-Resistant Cases+
1920	14,035	246 9		
1930	11,821	170 2		
1940	8,212	110 0		
1950	6,518	98 0		
1960	4,699	60 4		
1970	2,590	32 8		
1971	2,572	32 6		
1972	2,275	28 8		
1973	2,101	26 6		
1974	2,022	25.6		
1975	2,151	27.2		
1976	2,151	27.2		
1977	1,605	21.1		
1978++	1,307	17.2		
1979	1,530	20.1		
1980	1,514	19 9		
1981	1,582	22 4		
1982	1,594	22 5		
1983	1,651	23 4		
1984	1,629	23 0	1,527	
1985	1,843	26.0	1,785	
1986	2,223	31 4	2,181	
1987	2,197	31 1	2,157	
1988	2,317	32.8	2,241	
1989	2,545	36 0	2,405	
1990	3,520	49 8	3,372	
1991	3,673	50.2	3,484	366
1992	3,811	52 0	3,442	441
1993	3,235	44 2	2,654	296
1994	2,995	40.9	2,479	176

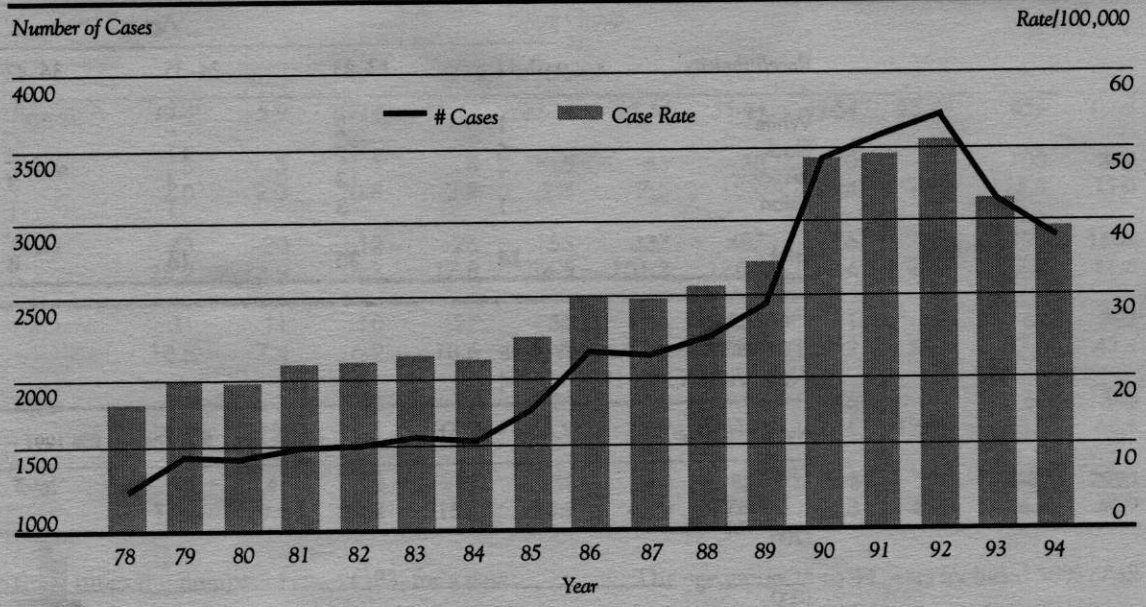
* For "phthisis," or pulmonary cases, 1920-1940; thereafter all forms of tuberculosis

** Population based on census data for each decade.

\+ Drug susceptibility made mandatorily reportable during 1991; figure from that year is not complete. Number for 1994 is preliminary because drug susceptibility tests have not yet been performed and results reported on some patients' isolates.

++ 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.

FIGURE 1
TUBERCULOSIS CASES AND RATES
NEW YORK CITY, 1978 - 1994



cases, since the number of culture-confirmed cases in this age group decreased slightly (from 43 to 36) between 1993 and 1994. The 153 cases among children younger than 15 years represent 5.1% of all cases. The 656 tuberculosis cases among 25 to 34 year olds represent 21.9% of all cases; the incidence of tuberculosis cases in this age group has decreased by 11.1% compared to 1993. The largest proportion of cases, 28%, were in the 35 to 44 year age group; there were 839 cases between the ages of 35 and 44 years, a 12.9% decrease since 1993. Cases among those aged 45 to 64 years remained essentially stable, with 789 cases in 1994 and 791 cases in 1993. Cases among individuals over age 65 years decreased 15.3% (412 to 349) compared with 1993 and represent 11.7% of all 1994 cases (Figure 2).

RACIAL/ETHNIC DISTRIBUTION

Blacks and Hispanics together represent almost 76% of tuberculosis cases reported in the City (Figures 3 and 4). Blacks (males and females) represented 50.2% of all cases (Table 3). Their case rate of 81.4 per 100,000 was the highest of any racial/ethnic group. Hispanics represented 26.1% of all cases and had a case rate of 43.8 per 100,000. Blacks had the largest decrease in cases (11.7%) from 1993 of any racial/ethnic group.

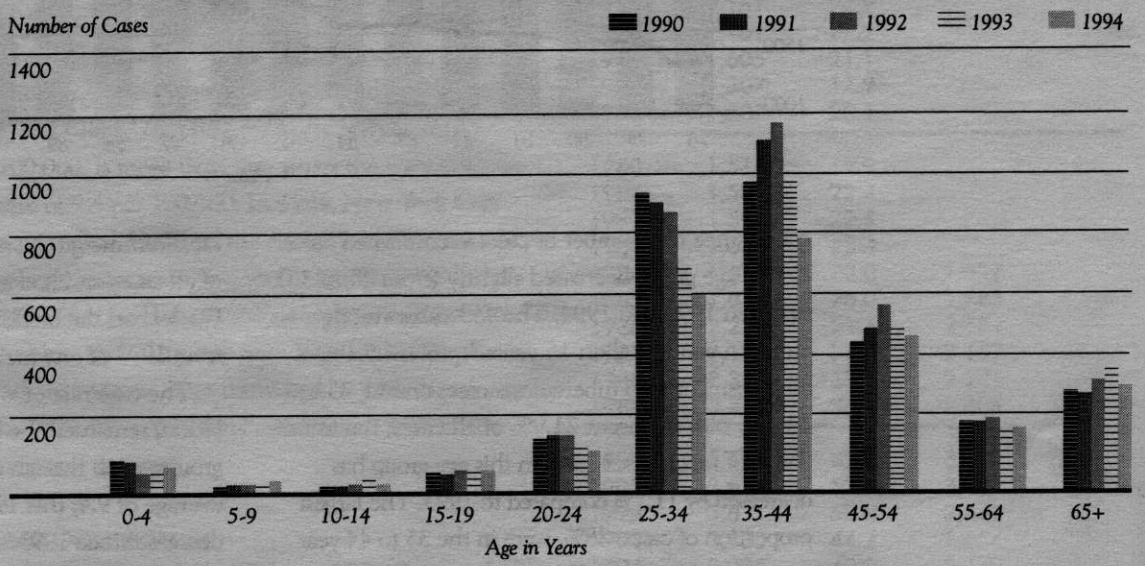
The case rate of whites, 11.0 per 100,000 population, remained the lowest of the racial/ethnic groups, even though it is higher than the national average of 9.4; this 1994 rate represents a 10.5% decrease since 1993.

Asians represented 12% of all cases and had a case rate of 68.1 per 100,000, up from 52.6 per 100,000 in 1993. Asians experienced a large increase in cases (29.5%) compared with 1993, and were the only racial/ethnic group to experience an increase in cases. Among Asians, there was a 91.7% increase in tuberculosis cases in the 45 to 54 age group and a 56.7% increase in tuberculosis cases in the 55 to 64 age group. Asian males 65 years and older had a case rate of 304.8 per 100,000. This rate was the highest of any age, sex or racial/ethnic group. However, this represents a 19% decrease in the number of cases compared with 1993.

TABLE 2
TUBERCULOSIS CASES BY RACE, ETHNICITY AND AGE
IN CHILDREN UNDER 5 YEARS, 1994

	Age in Months					
Race/Ethnicity	*0–11*	*12–23*	*24–35*	*36–47*	*48–60*	*Total*
White	1	2	–	–	–	3
Black	5	12	11	4	11	43
Hispanic	7	13	4	3	4	31
Asian	1	3	1	1	1	7
Total	**14**	**30**	**16**	**8**	**16**	**84**

FIGURE 2
TUBERCULOSIS CASES BY AGE
NEW YORK CITY, 1990 - 1994



Tuberculosis incidence rates by age peaked between 35 to 44 years for blacks and Hispanics, and between the ages of 45 to 54 for whites, while Asians experienced the highest case rates in the oldest age group, 65+ (Figure 5).

DISTRIBUTION BY SEX
(Tables 4 and 5, Figures 6 and 7)

The incidence rate of tuberculosis among males is more than two times that of females (57 vs. 26.7 cases per 100,000, respectively, Figure 6). The annual decrease in tuberculosis cases from 1993 to 1994 was the same in both males and females, 7.4%. Women constituted 34.6% of cases in 1994 and 1993, 31.0% in 1992, 29.9% in 1991, and 29.3% in 1990. Substantial differences in tuberculosis case rates between the sexes start to occur in the 25 to 34 year age group. Males in this age group experienced a case rate of 59.4 per 100,000 population, whereas females experienced a case rate of 37.1 per 100,000. Males in the 35 to 44 year age group experienced a case rate of 110.9 per 100,000 population, whereas females of this same age group experienced a case rate of 42.6 per 100,000 population, less than half the age-specific case rate of males. An even more substantial difference between the sexes occurred in the 45 to 54 year age group. Males in this age group experienced

FIGURE 3
TUBERCULOSIS CASES BY RACE/ETHNICITY
NEW YORK CITY, 1994

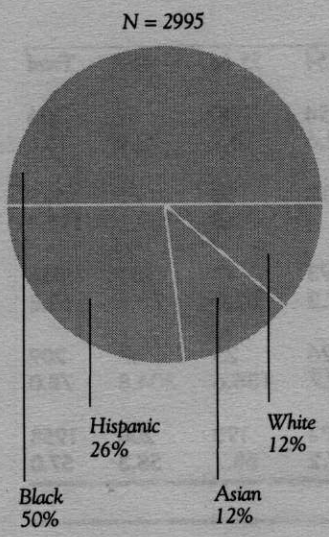


TABLE 3
TUBERCULOSIS INCIDENCE (RATES PER 100,000) BY RACE/ETHNICITY AND AGE IN YEARS
NEW YORK CITY, 1994

	Age Group N (Rate)										
Race	*0-4*	*5-9*	*10-14*	*15-19*	*20-24*	*25-34*	*35-44*	*45-54*	*55-64*	*65+*	***Total***
White	3	3	1	4	5	43	78	70	39	103	**349**
	2.0	2.3	0.8	2.8	2.4	7.5	16.0	20.4	11.3	15.8	**11.0**
Black	43	20	12	26	53	337	487	276	126	124	**1504**
	28.2	13.9	8.3	17.8	34.5	101.3	178.6	138.6	88.4	77.8	**81.4**
Hispanic	31	11	10	27	55	186	215	121	64	62	**782**
	18.6	7.4	6.9	18.6	33.0	53.8	82.5	69.2	53.1	57.0	**43.8**
Asian	7	7	5	14	25	90	59	46	47	60	**360**
	18.4	21.4	15.1	37.7	56.9	74.9	61.9	81.5	124.2	175.1	**68.1**
Total	**84**	**41**	**28**	**71**	**138**	**656**	**839**	**513**	**276**	**349**	**2995**
	16.5	**9.0**	**6.2**	**15.1**	**23.9**	**47.9**	**75.1**	**66.3**	**42.8**	**36.6**	**40.9**

three times the number of cases (383, for a case rate of 107.2 per 100,000 population) compared to females who experienced only 130 cases (and had a case rate of 31.2 per 100,000 population). There were 198 cases among males in the 55 to 64 year age group (for a case rate of 68.7) and 78 cases among females in this age group (for a case rate of 21.9). Among individuals older than 65 years, men had 208 cases and a case rate of 58.3; women had 141 cases and a case rate of 23.6.

Males

The largest proportional decrease during the past year was among black men, in whom cases dropped 11% from 1,100 in 1993 to 979 in 1994. The only group of males to experience an increase in tuberculosis cases were Asians. Compared with 1993, the number of cases among Asian males increased in all age groups except those aged 65 and older. Overall, the number of cases in Asian males increased by 18.8%, although Asian males represent only 10.7% of all male cases. Among white men, cases decreased 6.7%, from 253 in 1993 to 236 in 1994. Hispanic men also experienced a decrease, from 586 cases in 1993 to 534 in 1994, a 8.9% decrease.

The age group 25 to 44 years included 50% of all male cases in 1994 (Table 4), versus 53% in 1993. Men in this age group also experienced the greatest decrease in cases, from 1112 in 1993 to 985 in 1994, an 11.4% decrease.

As shown in Table 4, black males continued to experience the highest incidence of tuberculosis among all racial/ethnic groups, with a case rate of 118.4 per 100,000 population. As in the previous nine years, 1994 incidence rates among black males peaked among those aged 35 to 44, who had an age-specific case rate of 278.3 per 100,000; this is second only to the rate of 304.8 per 100,000 in Asian men older than 65 years.

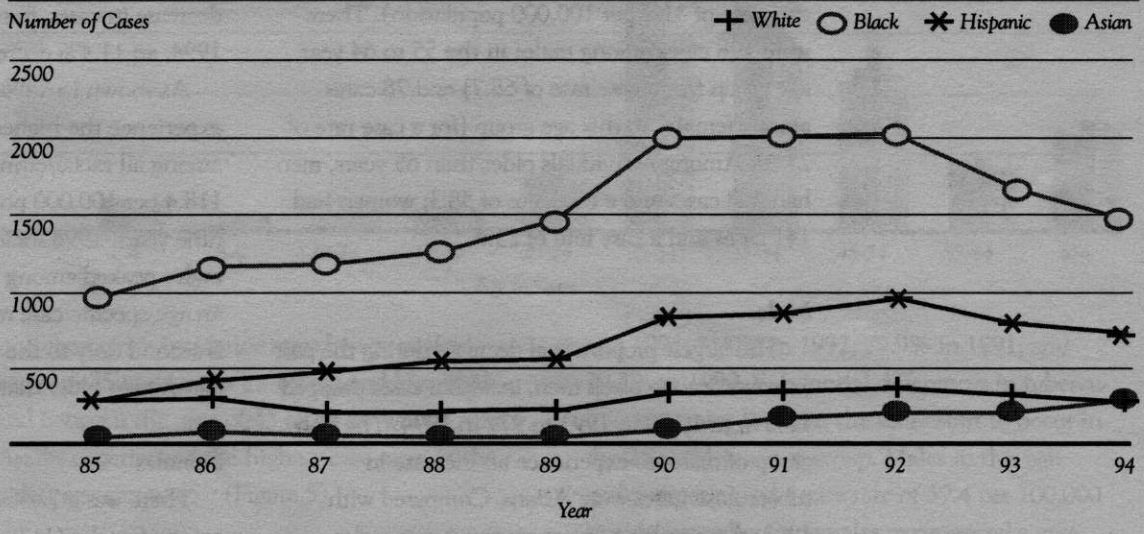
Females

There was a 7.4% decrease in tuberculosis cases among females (1120 to 1037 cases) from 1993 to 1994 (Table 5). The number of cases decreased in all racial/ethnic groups except Asians. Asian females experienced a 48% increase in cases (102 in 1993 to 151 in 1994). The case rate of 57.8 per 100,000 in Asian females is the highest for females in any racial/ethnic group, slightly higher than that of black females (51.1 per 100,000). A 10.8% decrease in tuberculosis cases occurred in Hispanic females,

TABLE 4
TUBERCULOSIS INCIDENCE (RATES PER 100,000) IN MALES BY RACE/ETHNICITY AND AGE IN YEARS
NEW YORK CITY, 1994

	Age Group N (Rate)										
Race	*0-4*	*5-9*	*10-14*	*15-19*	*20-24*	*25-34*	*35-44*	*45-54*	*55-64*	*65+*	**Total**
White	2	1	1	1	0	27	61	54	30	59	**236**
	2.5	1.5	1.5	1.4	0.0	9.4	24.9	32.6	18.7	23.9	**15.8**
Black	21	9	4	11	29	197	327	210	100	71	**979**
	27.3	12.4	5.6	15.3	40.8	132.5	278.3	251.4	172.8	129.1	**118.4**
Hispanic	9	9	5	16	34	125	169	93	43	31	**534**
	10.6	11.9	6.8	21.5	40.7	74.8	140.4	117.3	82.8	78.6	**62.8**
Asian	3	5	3	6	15	46	33	26	25	47	**209**
	15.2	29.5	17.7	31.6	68.8	74.9	67.0	89.7	136.6	304.8	**78.0**
Total	**35**	**24**	**13**	**34**	**78**	**395**	**590**	**383**	**198**	**208**	**1958**
	13.5	**10.3**	**5.7**	**14.3**	**27.8**	**59.4**	**110.9**	**107.2**	**68.7**	**58.3**	**57.0**

FIGURE 4
TUBERCULOSIS CASES BY RACE/ETHNICITY
NEW YORK CITY, 1985 - 1994



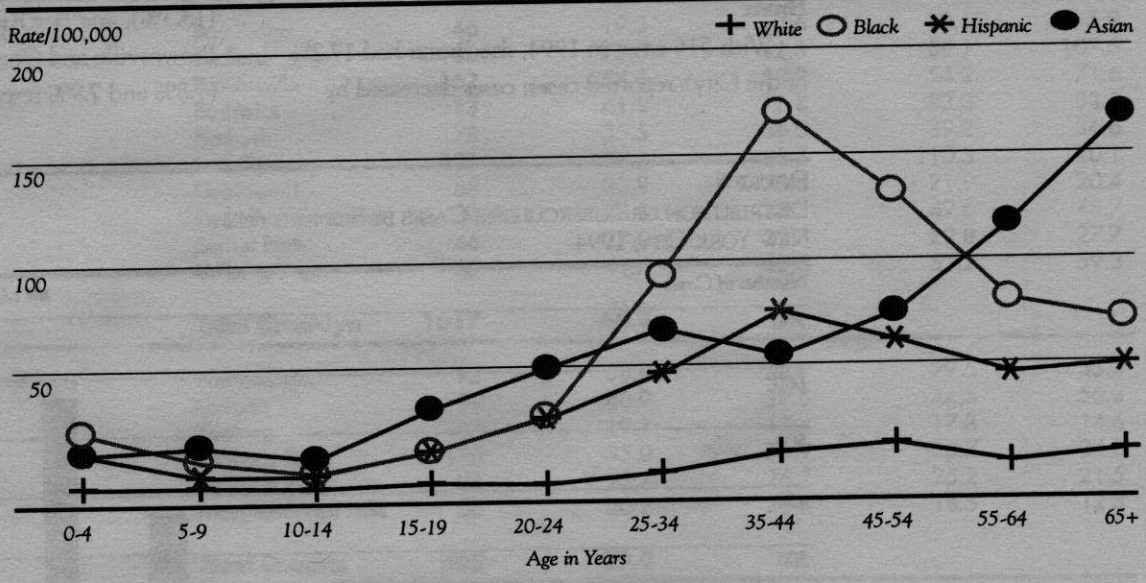
and a 12.9% decrease occurred in black females. White women have maintained the lowest rate in all racial/ethnic groups (6.8 per 100,000 population). The number of cases among white females decreased by 17.5% from 137 in 1993 to 113 in 1994.

Overall, the highest incidence rates for women occur in the 35 to 44 year age group. Incidence rates for black women peak at 103.1 cases per 100,000 in the 35 to 44 year age group while rates for women of other racial/ethnic groups peak at later ages. Among Asian women the peak rate of 112.6 per 100,000 is for those aged 55 to 64; among white and Hispanic women, incidence rates peak in those 65 and older (10.9 and 44.8 per 100,000 respectively).

TABLE 5
TUBERCULOSIS INCIDENCE (RATES PER 100,000) IN FEMALES BY RACE/ETHNICITY AND AGE IN YEARS
NEW YORK CITY, 1994

	Age Group N (Rate)										
Race	*0-4*	*5-9*	*10-14*	*15-19*	*20-24*	*25-34*	*35-44*	*45-54*	*55-64*	*65+*	***Total***
White	1	2	0	3	5	16	17	16	9	44	**113**
	1.3	3.1	0.0	4.3	4.6	5.7	7.0	9.0	4.9	10.9	**6.8**
Black	22	11	8	15	24	140	160	66	26	53	**525**
	29.2	15.5	11.0	20.2	29.0	76.1	103.1	57.1	30.7	50.7	**51.5**
Hispanic	22	2	5	11	21	61	46	28	21	31	**248**
	26.9	2.7	7.0	15.4	25.3	34.2	32.8	29.3	30.6	44.8	**26.6**
Asian	4	2	2	8	10	44	26	20	22	13	**151**
	21.9	12.7	12.3	44.1	45.2	74.9	56.5	72.9	112.6	69.0	**57.8**
Total	**49**	**17**	**15**	**37**	**60**	**261**	**249**	**130**	**78**	**141**	**1037**
	19.6	**7.6**	**6.7**	**15.8**	**20.2**	**37.1**	**42.6**	**31.2**	**21.9**	**23.6**	**26.7**

FIGURE 5
TUBERCULOSIS CASE RATES BY AGE AND RACE/ETHNICITY
NEW YORK CITY, 1994



GEOGRAPHIC DISTRIBUTION

Incidence rates by health district of residence were calculated for 1994; age-adjusted and crude rates are presented in Table 6.

The four districts with the highest age-adjusted case rates in 1994 were Central Harlem in Manhattan, Tremont and Mott Haven in the Bronx, and Fort Greene in Brooklyn.

Between 1993 and 1994, the number of new tuberculosis cases decreased in three boroughs. The decreases were as follow: Bronx (with a 12.2% decrease); Manhattan (with a 12.0% decrease); and Brooklyn (with an 8.2% decrease). Between 1993 and 1994, tuberculosis cases increased in both

Staten Island and Queens (by 19.6% and 4.6% respectively). Figure 8 depicts the distribution of 1994 tuberculosis cases by borough of residence using crude (not age-adjusted) case rates.

Manhattan

With 830 cases, Manhattan had 27.7% of the City's reported cases in 1994. The 1994 age-adjusted rate in Central Harlem remains the highest in the City at 121.6 per 100,000, yet that health district experienced a 33.2% decrease in cases since 1993. Numbers of tuberculosis cases increased since 1993 in two health districts in Manhattan. The number of cases in the Lower East Side increased by 5%, from 181 to 190, and cases in the Lower West Side increased slightly, from 159 to 160. Numbers of tuberculosis cases decreased in the remaining Manhattan health districts: by 31.2% in Riverside, 9.5% in Kips Bay-Yorkville, 7.3% in Washington Heights, and 1.1% in East Harlem.

Bronx

With 516 cases in 1994, the Bronx had 17.2% of the City's reported cases; cases decreased by 12.2% compared with 1993. With a case rate of 88.5 per 100,000, Tremont was tied for the second highest age-adjusted case rate in the City; Tremont experienced a 12.7% increase in cases from 1993. Mott Haven had the fourth highest age-adjusted rate in the City (87.7 per 100,000), but experienced a 19.2% decrease in cases. In addition, both Morrisania and Westchester had substantial decreases in cases, 31.9% and 40.7% respectively.

Brooklyn

With 1,017 cases in 1994, Brooklyn had 34.0% of all the City's reported cases, more than any borough for the second year in a row. However, even in Brooklyn, cases decreased by 8.2% compared to 1993. Fort Greene was tied with Tremont for the second highest case rate in the City (88.5 per 100,000), but had a 19.1% decrease in cases. Three health districts with substantial declines in cases since 1993 were Red Hook-Gowanus (29.6%), Williamsburg-Greenpoint (13.3%), and Bay Ridge (11.5%). Both Brownsville and Gravesend experienced increases (7.8% and 7.9% respectively).

FIGURE 6
DISTRIBUTION OF TUBERCULOSIS CASES BY SEX AND AGE
NEW YORK CITY, 1994

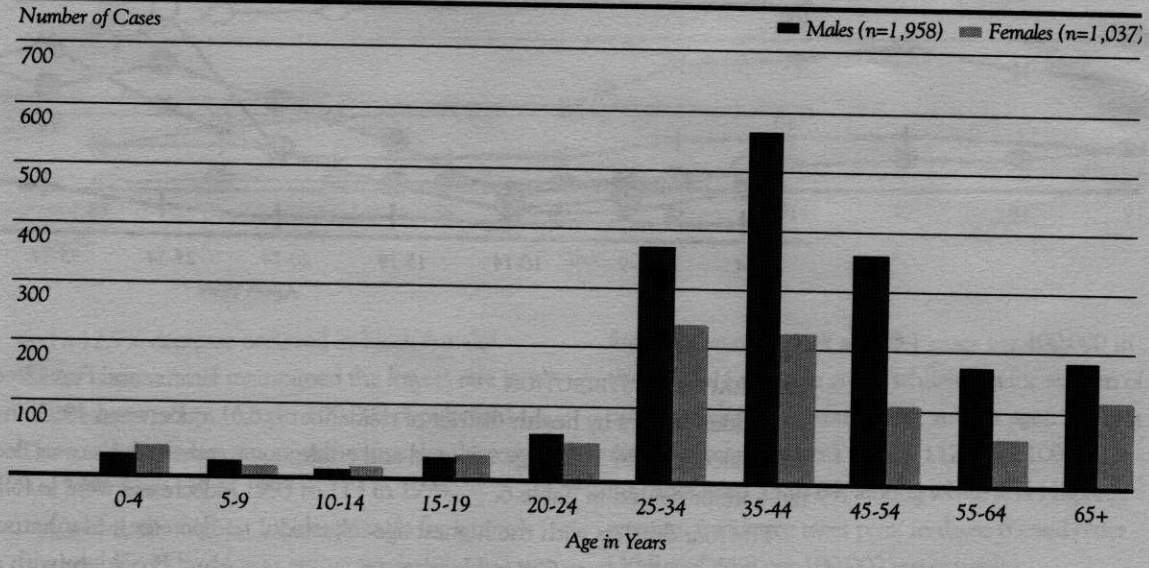


TABLE 6
CRUDE AND AGE-ADJUSTED TUBERCULOSIS RATES
NEW YORK CITY, 1992, 1993, 1994

Borough	*Health District*	*Cases*	*Rate per 100,000 population*			
			1994 Crude+	*1994 Age-Adjusted**	*1993 Age-Adjusted**	*1992 Age-Adjusted**
Manhattan	Central Harlem	131	113.4	121.6	181 7	240.2
	East Harlem	89	69.9	71.5	73.1	95.8
	Kips Bay-Yorkville	38	16.1	14.8	14.4	19.1
	Lower East Side	190	79.3	74.8	69.5	101.5
	Lower West Side	160	54 4	45.9	44.8	77.9
	Riverside	95	45.5	41.1	59.0	72.1
	Washington Heights	127	47.7	49.1	52 9	60.9
	Total Manhattan	**830**	**55.8**			
Bronx	Fordham-Riverdale	81	33.0	34.6	27.5	37.8
	Morrisania	92	63.6	74.4	109.3	96.5
	Mott Haven	101	77.8	87.7	107.8	1682
	Pelham Bay	46	21.1	21.1	20.1	20 3
	Tremont	142	74.5	88.5	76.0	105.8
	Westchester	54	19.6	19.8	34.0	35.8
	Total Bronx	**516**	**42.9**			
Brooklyn	Bay Ridge	46	19.3	18.6	20.1	15.9
	Bedford	180	77.3	82.3	89.1	107.5
	Brownsville	152	54.6	58.9	54.2	71.6
	Bushwick	113	61.9	72.8	83.3	83.1
	Flatbush	178	35.5	36.0	39.2	36.6
	Fort Greene	131	87.2	88.5	110.3	120.1
	Gravesend	68	23.9	23.6	21 9	20.4
	Red Hook-Gowanus	38	36.0	34.3	49.6	48.7
	Sunset Park	46	27.0	29.3	29.8	27.7
	W'burg-Gnpt.	65	41.7	45.6	52.2	59 3
	Total Brooklyn	**1017**	**44.2**			
Queens	Astoria-L.I.C.	92	38.9	38.7	29.5	35.3
	Corona	119	40.9	39.5	44.5	56.3
	Flushing	87	19.1	18.4	17.3	14.6
	Jamaica East	118	35.0	35.9	33.7	34.0
	Jamaica West	93	25.7	26.2	25.2	21.5
	Maspeth-Forest Hills	56	20.8	20.4	18.5	12.3
	Total Queens	**565**	**29.0**			
Staten Island	Richmond	67	17.7	17.7	15.3	17.8
TOTAL NYC		**2995**	**40.9**	**40.9**	**44.2**	**52.0**

+1994 crude rates are based on the 1990 Census for New York City.
*1994, 1993, and 1992 age-adjusted rates are based on the 1990 Census for New York City by the method of direct adjustment.

Queens

With 565 cases in 1994, Queens had 18.9% of the City's reported cases; cases in Queens increased by 4.6% since 1993. As in previous years, Corona was the only health district in the borough which had a case rate as high as the City average of 40.9, even though it experienced a 10.5% drop in the number of cases since 1993. All other health districts in Queens had increases in their number of cases when compared to 1993. Astoria increased by 29.6%, Jamaica East by 7.3%, Maspeth-Forest Hills by 5.7%, Flushing by 4.8%, and Jamaica West by 3.3%.

Staten Island

With 67 tuberculosis cases in 1994, Staten Island had 2.2% of the City's reported cases, and an age-adjusted rate of 17.7 per 100,000 population, the lowest of any borough. Cases increased by 19.6% when compared with 1993. Richmond had one of the lowest case rates of any health district in New York City, second only to Kips Bay-Yorkville in Manhattan.

Area of Birth

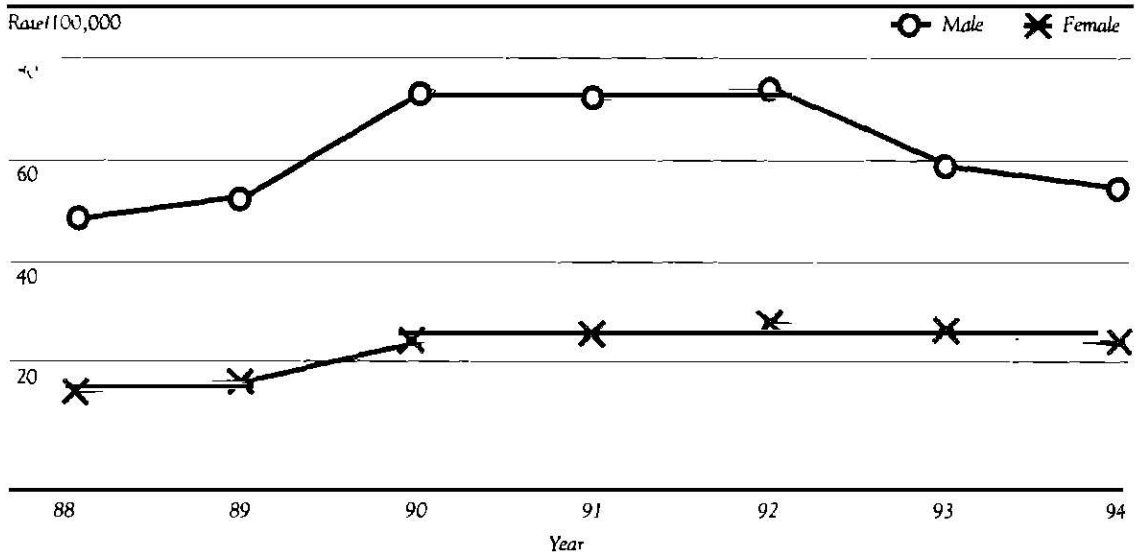
Among newly reported cases whose country of birth was known, those born outside the United States increased to 32.5% from 22.8% in 1993 (Table 7, Figure 9). This increase represents a 29.4% increase in the number of cases among foreign-born persons (739 to 956), compared with a 20.4% decrease in cases among the U.S.-born population (2496 to 1987).

A total of 88 countries were reported as place of birth for individuals with tuberculosis who were born outside of the United States. The Caribbean area accounted for 284 (9.5%) of total cases, the largest foreign-born group represented. Cases born in Puerto Rico, which were included with the United States group, accounted for 185 (6.2%) of total cases.

Drug Resistance

During 1994, 2479 (82.8%) of the City's 2995 newly counted tuberculosis cases were reported as having positive cultures for *M.tuberculosis*. Among these 2479 individuals, drug susceptibility results were available for 2311 (93.2%) and 763 (30.8%) had second-line testing performed and reported. Of individuals with drug susceptibility results, 176 of 2311 (7.6%) were found to have isolates which were resistant to at least isoniazid (INH) and

FIGURE 7
TREND OF TUBERCULOSIS CASE RATES BY SEX
NEW YORK CITY, 1988 - 1994



rifampin (RIF), a 40.5% decrease in number of cases reported in 1993. This includes both individuals with initial multidrug resistance, and those who developed multidrug resistance during the course of treatment. Approximately 12% of these newly counted cases with multidrug resistance reported a prior history of tuberculosis, compared to 7% in 1993.

Of those individuals with multidrug-resistant strains of tuberculosis, 30% had isolates which were resistant to only INH and RIF; 16% to INH, RIF and one other first line drug; 24% to INH, RIF and two other first line drugs; and 10% to INH, RIF and three other first line drugs. The remaining 20% were resistant to most first line drugs plus kanamycin.

Site of Disease

In 1994, pulmonary tuberculosis was the primary site of disease for 82.9% of all cases. Of persons with extrapulmonary disease, lymphatic tuberculosis was the most common form of disease, followed by bone/joint tuberculosis. Of all cases reported in 1994, 7.7% had both pulmonary and extrapulmonary disease (Table 8). Of 2753 cases with pulmonary involvement, 1214 (44.1%) had a positive smear from either sputum or a respiratory specimen.

Sociomedical Factors

A patient's ability to adhere to a treatment regimen depends, to some extent, on various sociomedical factors. Data on homelessness and

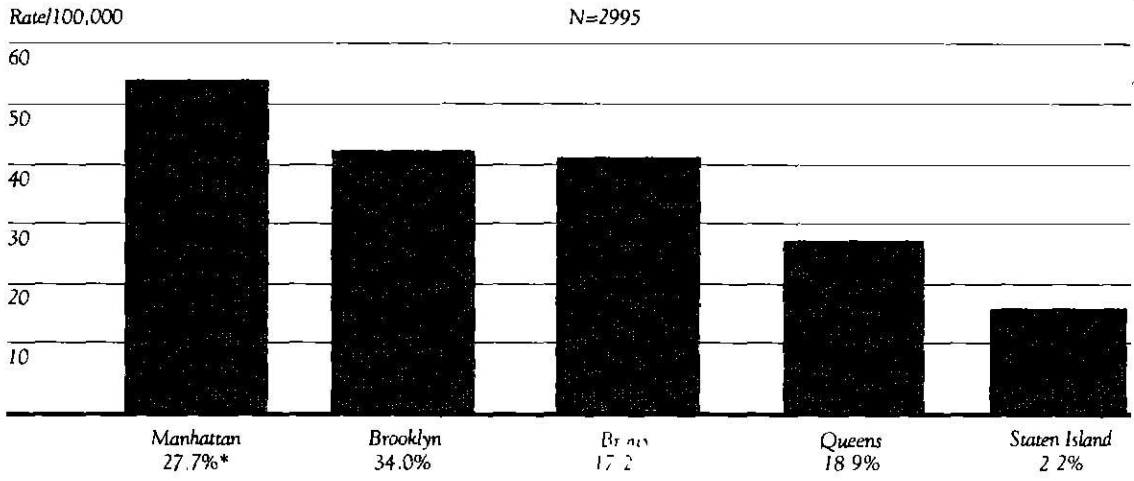
Table 7
Tuberculosis Cases by Age in Years and Area of Birth
New York City, 1994

	Age Groups										
Area of Birth	*0–4*	*5-9*	*10–14*	*15-19*	*20–24*	*25–34*	*35–44*	*45–54*	*55-64*	*65+*	*Total*
Africa	0	1	1	1	5	17	19	3	0	1	48
Asia [1]	1	2	2	9	7	31	24	18	25	43	162
Canada	0	0	0	0	0	0	0	0	0	1	1
Caribbean [2]	3	4	2	11	16	70	81	37	31	29	284
Central/S.America [3]	1	3	4	14	37	58	48	33	12	10	220
Europe [4]	1	0	1	1	3	8	12	15	13	36	90
Indo/Pakistan [5]	2	2	1	0	11	28	12	14	6	3	79
Middle East [6]	0	0	1	0	1	3	3	2	1	2	13
Southeast Asia [7]	0	1	0	1	3	18	12	5	9	10	59
Total Non USA	**8**	**13**	**12**	**37**	**83**	**232**	**211**	**127**	**97**	**134**	**956**
USA*	71	27	16	32	49	384	556	337	147	183	1802
Puerto Rico	1	0	0	1	3	29	60	42	29	20	185
Total USA	**72**	**27**	**16**	**33**	**52**	**413**	**616**	**379**	**176**	**203**	**1987**
Unknown	**4**	**1**	**0**	**1**	**3**	**10**	**12**	**7**	**3**	**11**	**52**
Total	**84**	**41**	**28**	**71**	**138**	**656**	**839**	**513**	**276**	**349**	**2995**

* Includes the U.S. Virgin Islands (9)

[1] China (122), Korea (23), Hong Kong (10), Japan (4), Other (3)
[2] Dominican Republic (110), Haiti (103), Jamaica (25), Trinidad & Tobago (15), Cuba (12), Grenada (5), Barbados (4), Other (10)
[3] Ecuador (52), Mexico (43), Guyana (25), Peru (24), Columbia (17), Honduras (15), Panama (11), Brazil (9), El Salvador (7), Guatemala (4), Other (13)
[4] Russia (32), Poland (16), Italy (10), Yugoslavia (7), Ireland (4), Germany (4), Greece (3), Hungary (3), United Kingdom (3), Other (8)
[5] India (42), Pakistan (17), Bangladesh (15), Afghanistan (4), Nepal (1)
[6] Yemen (7), Turkey (3), Israel (2), Jordan (1)
[7] Philippines (36), Vietnam (12), Thailand (5), Kampuchea (3), Other (3)

FIGURE 8
TUBERCULOSIS CASE RATES BY BOROUGH
NEW YORK CITY, 1994



*Percent of total cases

TABLE 8
TUBERCULOSIS CASES BY PRIMARY SITE OF DISEASE
NEW YORK CITY, 1994

	Number of Cases	(%)
Pulmonary	2,483	(82.9)
Lymphatic	174	(5.8)
Bone/Joint	94	(3.1)
Pleural	83	(2.8)
Genitourinary	42	(1.4)
Meningeal	38	(1.3)
Miliary	19	(0.6)
Peritoneal	16	(0.5)
Other	46	(1.5)
Total	**2,995**	**(100.0)**
Both Pulmonary and Extrapulmonary	232	(7.7)

tuberculosis have been compiled by the City since 1985. Computerized matching between names of persons in homeless shelters and in the Tuberculosis Registry in 1994 identified 364 (12.2%) newly reported cases who were homeless or had ever used the public shelter system. This represents an increase from the 8.7% who were reported as homeless in 1993.

Information on incarceration within the twelve months before diagnosis was available for 2976 (99.4%) of total cases; of these, 103 (3.5%) were incarcerated. Information on residence in a long-term care facility within the twelve months before diagnosis was available for 2317 (77.4%) of total cases; of these, 79 (3.4%) were residents of a long-term care facility. Information on the use of illegal injectable drugs within the twelve months before diagnosis was available for 2198 (73.4%) of total cases, of these, 231 (10.5%) had used illegal injectable drugs. Information on the use of illegal non-injectable drugs within the twelve months before diagnosis was available for 2125 (71.0%) of total cases, of these, 349 (16.4%) had used illegal non-injectable drugs. Information on the abuse of alcohol within the twelve months before diagnosis was available for 2167 (72.4%) of total cases; of these, 334 (15.4%) had abused alcohol.

Of total 1994 cases, 90 (3.0%) were known to be health care workers.

MORTALITY

Mortality figures presented in this year's report are based on statistics issued by the Bureau of Health Statistics and Analysis of the New York City Department of Health. In 1994, there were 129 deaths in New York City with tuberculosis listed as the underlying cause of death on the death certificate. The crude tuberculosis mortality rate for 1994 was 1.8 per 100,000 (Table 9). There were an additional 301 deaths in which tubercu-

losis was listed as a secondary cause of death. Of these deaths, 245 (81.4%) listed AIDS or HIV infection as the underlying cause of death.

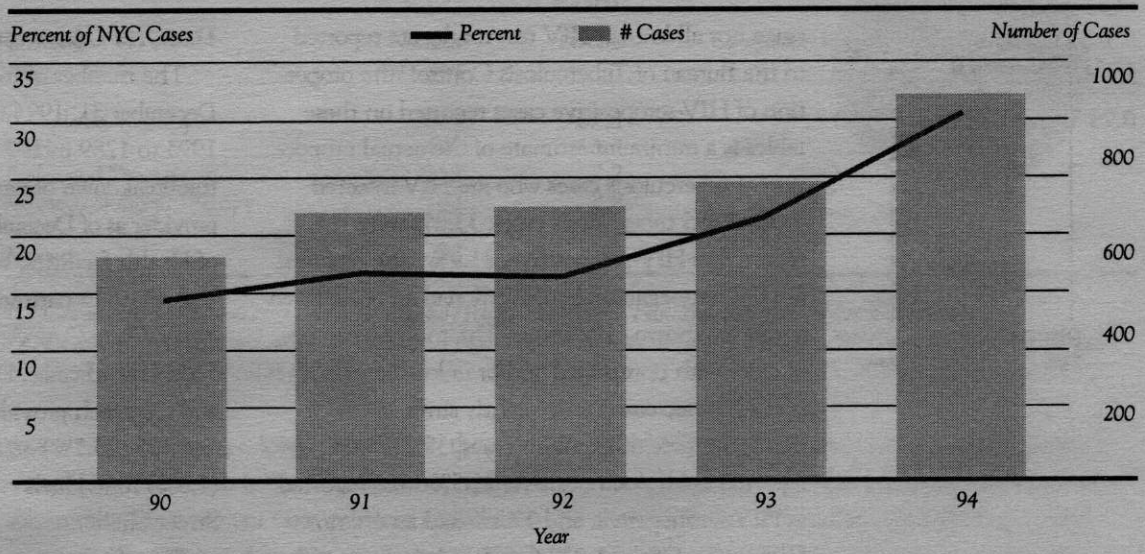
Tuberculosis and HIV Infection

Since 1990, the Department of Health has collected information on the HIV-serostatus of individuals with active tuberculosis. This information is necessary for the public health control of tuberculosis (e.g., to determine the appropriate duration of anti-tuberculosis treatment). In 1994, 55.7% of tuberculosis cases had a known and reported HIV status. In all age groups, male tuberculosis cases had a higher reported proportion of HIV infection than female cases. Male tuberculosis cases 35 to 44 years of age had the highest proportion of known and reported HIV infection (58.3%). Table 10 presents the documented and reported HIV-serostatus of individuals with active tuberculosis by age and sex. Since not all individuals with tuberculosis undergo testing for HIV, and

Table 9
Tuberculosis Deaths and Rate (per 100,000)
New York City, 1910 - 1994

Year	*# Deaths*	*Rate*
1910	8,832	197.5
1920	7,915	144.1
1930	4,574	68.2
1940	3,680	50.0
1950	2,173	27.4
1960	824	10.6
1970	432	5.5
1980	143	2.0
1981	155	2.2
1982	168	2.4
1983	151	2.1
1984	168	2.4
1985	155	2.2
1986	186	2.6
1987	219	3.1
1988	247	3.5
1989	233	3.3
1990	250	3.5
1991	241	3.3
1992	199	2.7
1993	166	2.3
1994	129	1.8

Figure 9
Foreign-Born Cases*
New York City, 1990-1994



* *Puerto Rico and the U.S. Virgin Islands are not included as foreign-born.*

FIGURE 10
HIV STATUS OF TUBERCULOSIS CASES BY SEX
NEW YORK CITY, 1994

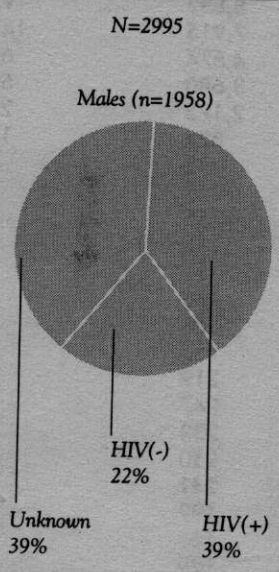


TABLE 10
HIV STATUS OF TUBERCULOSIS CASES BY SEX
NEW YORK CITY, 1994

Number (%)

	Females			Males			Total		
AGE	HIV(+)	HIV(–)	NA*	HIV(+)	HIV(–)	NA	HIV(+)	HIV(–)	NA
0–4	2 (4.1)	10 (20.4)	37 (75.5)	3 (8.6)	8 (22.9)	24 (68.6)	5 (6.0)	18 (21.4)	61 (72.6)
5–9	1 (5.9)	3 (17.6)	13 (76.5)	1 (4.2)	8 (33.3)	15 (62.5)	2 (4.9)	11 (26.8)	28 (68.3)
10–14	2 (13.3)	3 (20.0)	10 (66.7)	1 (7.7)	4 (30.8)	8 (61.5)	3 (10.7)	7 (25.0)	18 (64.3)
15–19	2 (5.4)	14 (37.8)	21 (56.8)	1 (2.9)	17 (50.0)	16 (47.1)	3 (4.2)	31 (43.7)	37 (52.1)
20–24	9 (15.0)	16 (26.7)	35 (58.3)	18 (23.1)	25 (32.1)	35 (44.9)	27 (19.6)	41 (29.7)	70 (50.7)
25–34	88 (33.7)	63 (24.1)	110 (42.1)	177 (44.8)	83 (21.0)	135 (34.2)	265 (40.4)	146 (22.3)	245 (37.3)
35–44	99 (39.8)	41 (16.5)	109 (43.8)	344 (58.3)	94 (15.9)	152 (25.8)	443 (52.8)	135 (16.1)	261 (31.1)
45–54	32 (24.6)	36 (27.7)	62 (47.7)	167 (43.6)	82 (21.4)	134 (35.0)	199 (38.8)	118 (23.0)	196 (38.2)
55–64	3 (3.8)	18 (23.1)	57 (73.1)	41 (20.7)	47 (23.7)	110 (55.6)	44 (15.9)	65 (23.6)	167 (60.5)
65+	6 (4.3)	33 (23.4)	102 (72.3)	14 (6.7)	52 (25.0)	142 (68.3)	20 (5.7)	85 (24.4)	244 (70.0)
TOTAL	**244 (23.5)**	**237 (22.9)**	**556 (53.6)**	**767 (39.2)**	**420 (21.5)**	**771 (39.4)**	**1011 (33.8)**	**657 (21.9)**	**1327 (44.3)**

* Not available

since not all known HIV test results are reported to the Bureau of Tuberculosis Control, the proportion of HIV-seropositive cases reported on these tables is a minimum estimate of the actual proportion of tuberculosis cases who are HIV-infected.

Of 2,995 tuberculosis cases, 33.8% were reported as HIV-seropositive, 21.9% were reported as HIV-seronegative, and 44.3% had an unreported and/or unknown HIV status. The total percentage of cases with unreported and/or unknown HIV status has decreased only slightly since 1993. Of the 1,958 male tuberculosis cases, 39.2% were reported as HIV-seropositive, 21.5% were reported as HIV-seronegative, and 39.3% had an unknown HIV status. Of the 1,037 female tuberculosis cases, 23.5% were reported as HIV-seropositive, 22.9% were reported as HIV-seronegative, and 53.6% had an unknown HIV status (Figure 10).

DIRECTLY OBSERVED THERAPY (DOT)

The number of individuals on DOT as of December 31, 1994 increased 5.1%, from 1227 in 1993 to 1289 in 1994 (Figure 11). Figure 12 shows the breakdown of patients on DOT by type of provider as of December 31, 1994. Non-Department of Health facilities, which are funded by the New York State Department of Health, Medicaid, and Ryan White Care Act Funds, provided DOT to 538 (41.7%) cases. Department of Health Clinics and Outreach provided DOT to 261 (20.2%) cases and 305 (23.7%) cases respectively. Thirty-six (2.8%) individuals received DOT at the 30th Street Shelter.

The effectiveness of DOT and intensive case management in increasing completion of therapy is illustrated in Table 11. Of the cohort of patients diagnosed while alive in 1993 (2966), 84.5% completed treatment. After removing multidrug-resistant

FIGURE 11
TUBERCULOSIS CASES ON DIRECTLY OBSERVED THERAPY
NEW YORK CITY, 1978 - 1994

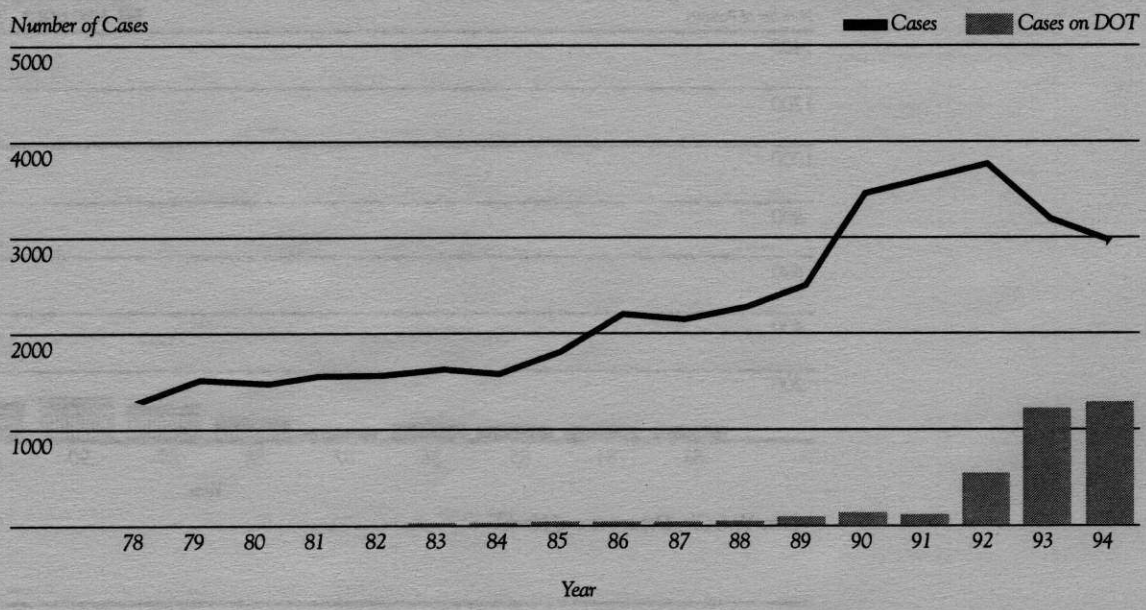


TABLE 11
COMPLETION INDEX FOR ACTIVE CASES
DIAGNOSED IN 1993

N = 2966

Outcome	Number of Cases	Percent	Completion Index*	Completion Index** Without MDR Cases
Completed Therapy	2002	67.5	84.5	89.0
Died	498	16.8		
Prolonged Therapy	213	7.2		
Refused/Stopped Therapy	83	2.8		
Lost	72	2.4		
Moved	98	3.3		

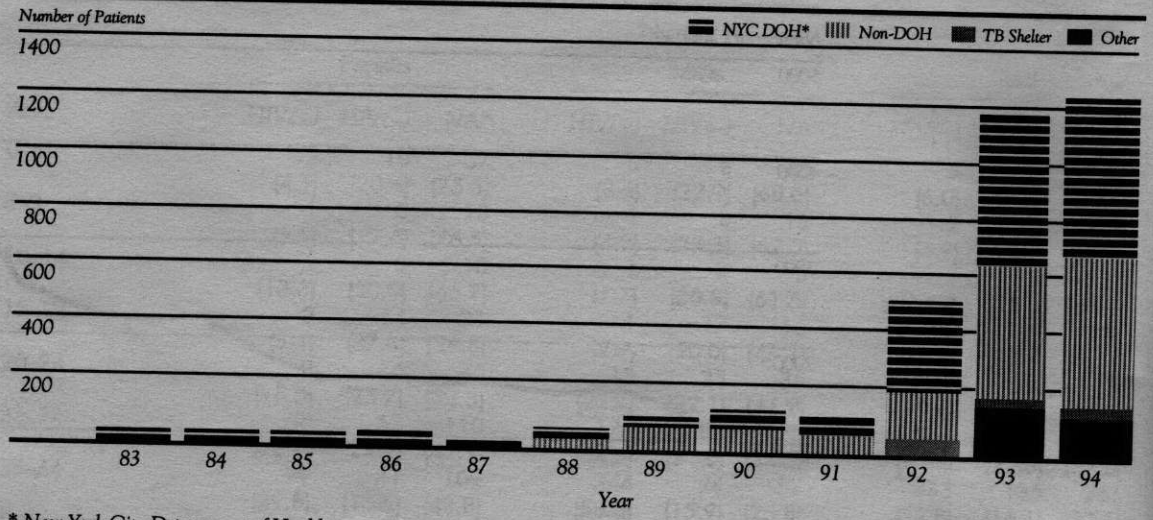
* Completion Index = Number Completed/(Total Number – Number Moved – Number Died)
** Completion Index without MDR Cases = Number Completed/(Total Number – Number Moved – Number Died – Number of MDR [121])

patients, who require prolonged treatment, the completion index was 89%. This figure represents a substantial improvement from previous completion rates, which were less than 50% in the late 1980s.

CULTURE-NEGATIVE CASES

Of the 2,995 tuberculosis cases verified in 1995, 516 (17.2%) had no positive bacteriologic culture for *M.tuberculosis*. These culture-negative cases were determined to have tuberculosis because of their clinical and/or radiologic response to anti-tuberculosis medications. Figure 13 illustrates trends, since 1984, in all verified cases and in culture positive cases. The drop in culture-positive cases is even more dramatic than the decrease in overall cases (28.0% since 1992).

FIGURE 12
TUBERCULOSIS CASES ON DIRECTLY OBSERVED THERAPY BY TYPE OF PROVIDER
NEW YORK CITY, 1983-1994



* New York City Department of Health

FIGURE 13
TREND OF TUBERCULOSIS CASES
NEW YORK CITY, 1984 - 1994