

Breathe



>> MISSION: The New York City (NYC) Health Department aims to prevent the spread of tuberculosis (TB) and eliminate it as a public health problem in NYC.

GOALS

1

Identify all individuals with suspected or confirmed TB disease and ensure their appropriate treatment, ideally on directly observed therapy (DOT).

2

Ensure that individuals at high risk for progression from latent TB infection to TB disease complete treatment and do not develop disease.

CORE ACTIVITIES

To fulfill its mission and core goals related to TB care, prevention and elimination, the Health Department performs a number of integrated activities in collaboration with local health care providers, laboratories, community partners and others. With a focus on public health and the clinical care needs of patients and their families, these activities support effective TB care and control in NYC.

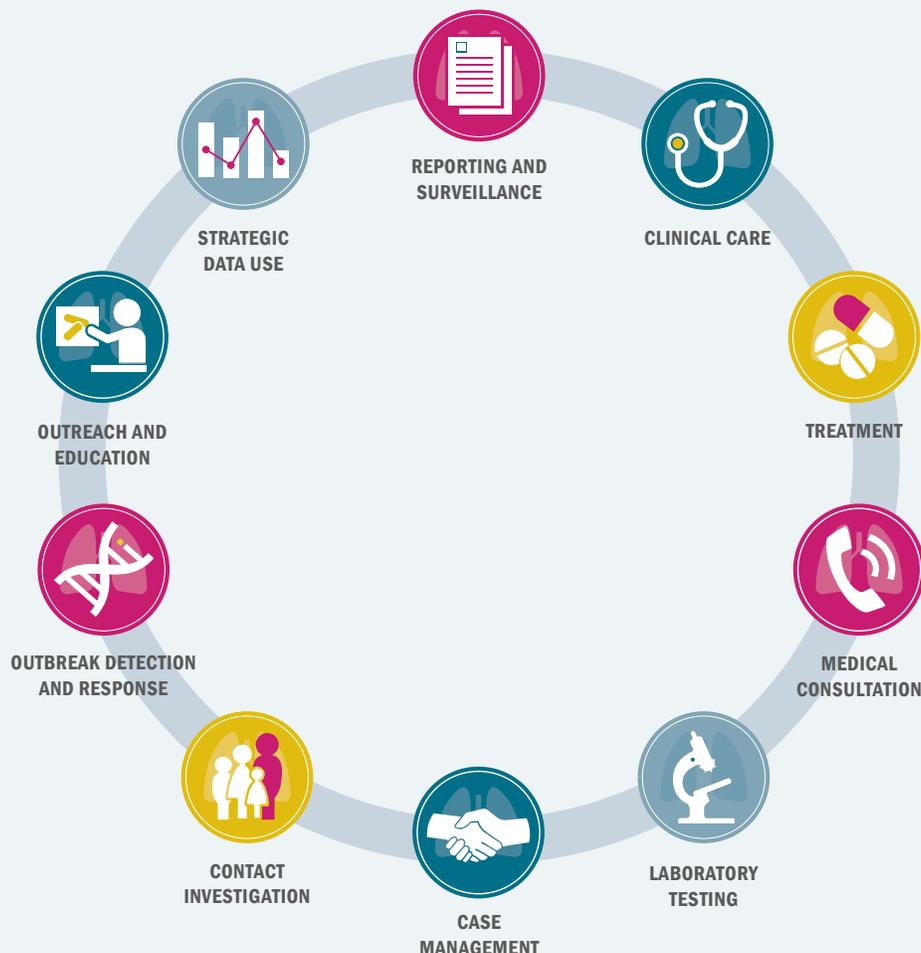


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ABOUT THIS REPORT: This report provides surveillance data and summaries of core program activities for calendar year 2019.

The data reflect the most complete information available as of January 15, 2020. For additional details on the use of denominators and definitions in this report, please see Technical Notes (page 36).

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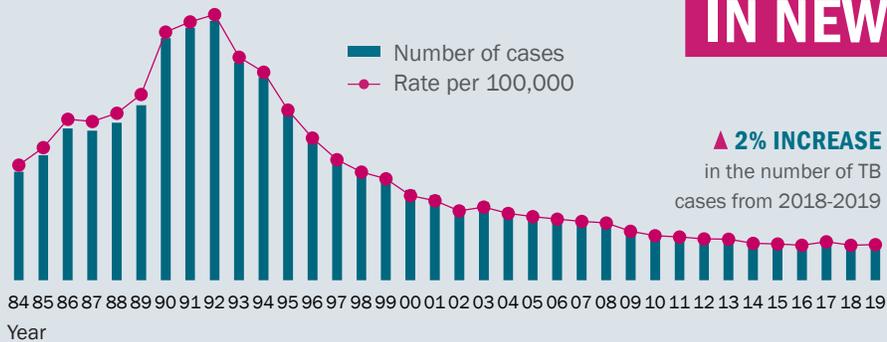
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COVER ART: "Breathe" by Dr. Sneha

TUBERCULOSIS

IN NEW YORK CITY, 2019

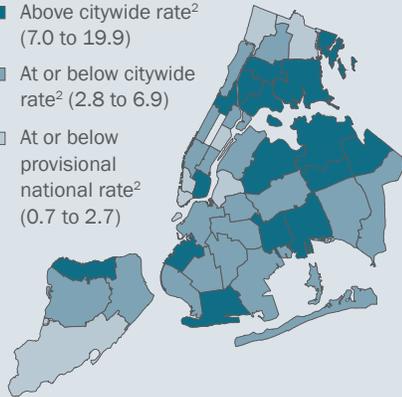


566 Number of TB cases verified in NYC in 2019

6.9 NYC citywide TB rate per 100,000 people

TB IN NYC NEIGHBORHOODS¹

- Above citywide rate² (7.0 to 19.9)
- At or below citywide rate² (2.8 to 6.9)
- At or below provisional national rate² (0.7 to 2.7)



100% Proportion of neighborhoods¹ with at least one TB case

15 Number of neighborhoods¹ with a TB rate higher than the 2019 NYC citywide rate

1. Defined by United Hospital Fund neighborhood designation (n=42). 2. Rates are per 100,000.

COUNTRY OF BIRTH



70 Number of countries of birth represented among patients with TB disease

MULTIDRUG RESISTANCE

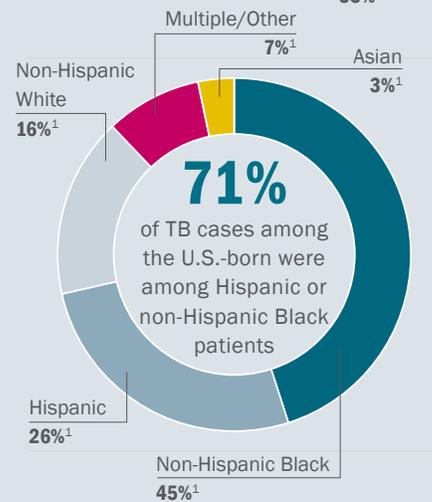
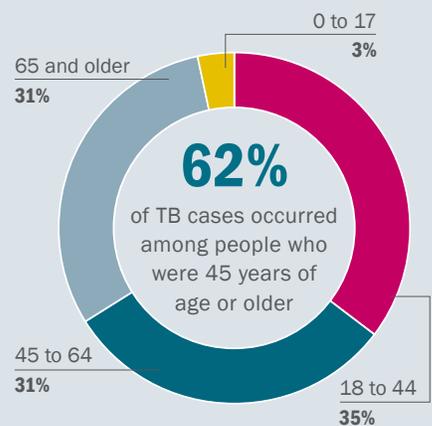
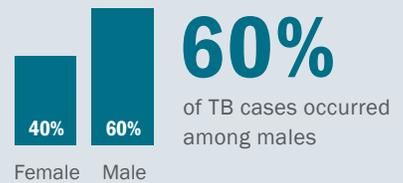
11 Number of patients diagnosed in 2019 who had multidrug-resistant TB (MDR-TB)¹

7 Median number of drugs to which there was known drug resistance among MDR-TB cases (range 3-10)

1. Defined as resistance to at least isoniazid and rifampin.



PATIENT CHARACTERISTICS



1. Among U.S.-born patients (n=91). Two patients had unknown race/ethnicity.

NYC HEALTH DEPARTMENT TB SERVICES AND KEY ACTIVITIES

The NYC Health Department performs a range of TB services and activities in collaboration with local health care providers, laboratories, community partners and others. Health Department services are provided free of charge to **ALL PATIENTS**, regardless of the patient's immigration status, insurance status or ability to pay. For a list of Health Department chest clinics, see page 37.



March 2020

DEAR COLLEAGUES,

Last year was full of promising steps in the fight against TB, including advances in the development and implementation of new diagnostic, treatment and prevention tools; continued coalition-building; renewed energy for advocacy; and collective efforts toward TB elimination.

The incidence of TB has remained steady in NYC, with 566 cases of active TB disease counted in 2019. Among those, 11 cases involved a multidrug-resistant TB (MDR-TB) strain. At a disease rate of 6.9 per 100,000, more than twice the national rate, we must approach TB treatment and prevention from new angles and with improved focus.

In 2019, the NYC Health Department continued to move toward a more patient-centered approach to TB care. We expanded social support services for patients and their families. We continued to make directly observed therapy (DOT) easier and more accessible for patients by expanding the use of video-based DOT. We developed a contact case management unit, which enhanced our ability to provide blood-based TB testing and HIV testing to contacts in household settings. In our clinics, we maintained extended hours and weekend clinical services. We also continued to use whole genome sequencing and other molecular tests to more rapidly identify drug resistance and ensure that patients are placed on appropriate treatment sooner.

In order to be successful in our fight against TB, we need to maintain strong ties with external partners. To that end, we strengthened our collaboration with interdisciplinary stakeholders through the Coalition for a TB-Free NYC. In order to think critically about our treatment of drug-resistant TB, we met with local TB experts, advocates and patient representatives to discuss how new MDR-TB treatment guidelines released by the World Health Organization (WHO) might influence treatment. The outcome of this meeting was to preferentially adapt MDR-TB regimens to avoid medications administered by injection. These regimens include new drugs that are effective, well-tolerated and avoid the discomfort and potential for serious side effects associated with injectable TB medications.

TB remains a formidable challenge in NYC. Yet the Health Department remains undaunted and committed to our mission. As always, we feel fortunate to be able to work closely with our many partners to ensure that, collectively, we can continue to provide the best possible care to our patients and communities as we work toward a TB-free NYC.

Sincerely,



Joseph N. Burzynski, MD, MPH
Assistant Commissioner, Bureau of Tuberculosis Control
New York City Department of Health and Mental Hygiene

CORE ACTIVITIES

>> 2019 BY THE NUMBERS

SURVEILLANCE:

- 566** Confirmed TB cases were verified by the Health Department.
- 3,191** People with suspected TB disease were reported to the Health Department.
- 109** Children younger than 5 years of age with TB infection were reported to the Health Department.
- 93** Facilities reported at least one TB case; nearly half of all cases were reported by one of **14** facilities.

>> **HEALTH CODE CHANGE FOR LTBI REPORTING:**

In 2019, the NYC Health Code was amended to require laboratories to report results of all blood-based tests for TB infection to the Health Department, regardless of patient age or test result. This change became effective Nov. 15, 2019.

>> *For more information about NYC TB reporting requirements and related resources, see pages 32-33.*

CORE ACTIVITIES

TB is an airborne, infectious disease caused by a bacteria. TB has two stages: active TB disease and latent TB infection (LTBI). TB is treatable and preventable, but without effective treatment, TB may lead to serious illness and death.

The NYC Health Department performs a variety of integrated activities to address TB disease and LTBI. These include surveillance, clinical care and treatment, medical consultation, case management, contact investigation, coordination of laboratory tests (e.g., drug susceptibility testing and genotyping), outbreak detection and response, outreach, program evaluation and research. These activities support effective, patient-centered TB care, control and prevention in NYC.

SURVEILLANCE

Health care providers and laboratories are required to report to the Health Department:

1. All patients with confirmed TB disease
2. Anyone suspected of having TB disease
3. Children younger than 5 years of age with a positive test for TB infection and related chest radiograph findings and treatment information
4. Results of any blood-based test for TB infection, regardless of patient age (laboratories only)

The Health Department reviews submitted reports for completeness and timeliness and determines whether patients are eligible for case management. The Health Department maintains an electronic TB surveillance registry and case management system (Maven version 5.4.3.1, Conduent Public Health Solutions, Florham Park, NJ) that includes information for all reported patients and individuals exposed to TB. These data are used to conduct case management; ensure treatment completion; monitor trends; detect, investigate and respond to outbreaks; prepare surveillance reports; report aggregated data to the New York State Department of Health (NYSDOH) and the Centers for Disease Control and Prevention (CDC); identify reporting and data quality issues; and inform programmatic decision-making.

>> 2019 BY THE NUMBERS

CLINICAL CARE & TREATMENT:

- 284** Patients confirmed with TB disease in 2019 received care at a Health Department chest clinic.
- 46** Patients with an MDR-TB strain received treatment, care and case management through the Health Department, including **11** patients newly diagnosed with an MDR-TB strain in NYC and **10** patients initially verified as TB cases outside of NYC.
- 18** Patients received bedaquiline; **15** patients received clofazimine.
- 1,266** Immigrants and refugees arriving in NYC with a Class B designation were notified to the Health Department; **1,154** (91%) were eligible for evaluation; **703** (61%) were evaluated as of Jan. 15, 2020.

CLINICAL CARE AND TREATMENT

The Health Department is a leading provider of TB care in NYC. TB services are available at four Health Department chest clinics located in The Bronx, Brooklyn, Manhattan and Queens. Physicians working at the chest clinics are specialists in internal, preventive, and pulmonary medicine, pediatrics and infectious disease.

The Health Department provides TB diagnostic services, including testing for TB infection (using blood-based QuantiFERON-TB Gold Plus [QFT] test and tuberculin skin test [TST]), sputum induction, laboratory tests, medical evaluation, chest radiographs, treatment for TB disease and LTBI and directly observed therapy (DOT) services. The majority of patients evaluated and treated at Health Department chest clinics are referred by NYC health care providers, other health departments or social service providers. Health Department staff refer patients to other medical professionals for further evaluation and treatment of non-TB related conditions.

OBTAINING MEDICATIONS WITH LIMITED AVAILABILITY FOR THE TREATMENT OF MDR-TB:

Health Department staff can assist with obtaining certain medications that are available under limited circumstances, including delamanid, bedaquiline and clofazimine. Clofazimine and delamanid require the submission of a Single Patient Investigational New Drug application to the Food and Drug Administration and to the Health Department's Institutional Review Board for approval.



*For more information about these drugs or for help obtaining them, please call the **TB HOTLINE** at **844-713-0559**.*

EVALUATION OF NEWLY ARRIVED IMMIGRANTS AND REFUGEES:

People who are applying for permanent U.S. immigration status and refugee status are screened for TB as part of their overseas medical examination. If the pre-immigration examination finds clinical diagnosis of TB, a Class A designation is given and the applicant is not allowed to travel until treatment is completed or the patient is no longer infectious. If findings suggest non-infectious TB, the applicant is given a Class B designation and travel clearance and the applicant's destination city is notified by CDC. The destination city then notifies that individual of the need for TB re-evaluation. The Health Department follows up with all immigrants and refugees who arrive in NYC with Class B status. The majority come to a Health Department chest clinic for evaluation.

>> 2019 BY THE NUMBERS

CASE MANAGEMENT:

2,452 Patients received case management services, including **566** patients with newly confirmed TB disease, **1,375** patients with suspected TB disease, **412** patients with TB diagnosed before 2019 and **99** patients with TB initially verified outside of NYC.

393 Eligible patients with confirmed TB disease were enrolled in DOT through the Health Department or another health care provider. **127** patients were enrolled exclusively in face-to-face DOT; **266** received some or all observations through vDOT.

3,376 Contacts were identified for **463** potentially infectious patients; **2,365** (70%) were evaluated as of Jan. 15, 2020; **372** (16%) had a new positive TB test result.

HIV TESTING SERVICES: Health Department staff provide opt-out rapid HIV testing services to every eligible patient at Health Department chest clinics and refer patients who have HIV infection to health care providers who specialize in HIV care. In 2019, the Health Department began offering rapid HIV testing to contacts in household settings. Anonymous HIV testing services are available at all chest clinics independent of need for TB services.

MEDICAL CONSULTATION

Health Department TB medical consultants are physicians with years of experience treating TB disease and LTBI. They provide expert consultation to community-based care providers and others regarding TB diagnosis; hospital discharge planning; TB treatment (including treatment of MDR-TB, adverse reactions to TB drugs and treatment completion); contact investigation; infection control; and other TB-related public health concerns. Recommendations are based on these physicians' professional experience and Health Department policies, which are informed by guidelines from the CDC, the American Thoracic Society, the Infectious Diseases Society of America, the National TB Controllers Association and WHO. Medical consultants also conduct TB rounds and give medical talks throughout NYC.



*For consultation related to the management and treatment of TB, including MDR-TB, please call the **TB HOTLINE** at **844-713-0559**.*

CASE MANAGEMENT

The Health Department provides case management activities for NYC residents diagnosed with or suspected of having TB disease and their contacts, regardless of where the patient receives their TB care. Case management includes patient interviews, TB education, chart reviews, contact investigation, DOT and coordination with community providers to ensure optimal TB treatment and care. Health Department staff conduct home assessments to identify contacts and to determine whether infectious TB patients can be discharged from the hospital. The Health Department also coordinates with colleagues in other jurisdictions to ensure continuity of care for patients with confirmed TB disease and contacts who work or live outside of NYC. Case managers perform monthly monitoring for treatment adherence and locate patients who have significant lapses in medical appointments or medication and help them return to medical supervision.

>> 2019 SPOTLIGHT ON...

TELEMEDICINE:

Starting in 2019, the Health Department now offers telemedicine services for patients who initiate treatment for LTBI at its Corona Chest Clinic.

Eligible patients now have the option to have follow-up medical visits with a nurse through video conferencing instead of a traditional in-person visit. The pilot program will expand from Corona to other sites in 2020 and telemedicine services will be available to all eligible patients being treated for LTBI at a Health Department chest clinic.

CONTACT CASE MANAGEMENT UNIT:

In 2019, the Health Department developed a dedicated team to coordinate evaluation of household contacts. Health Department staff in the TB Contact Case Management Unit conduct all home assessments and provides blood-based TB testing and HIV testing to contacts in household settings.

DIRECTLY OBSERVED THERAPY: DOT is the standard of care for patients with suspected or confirmed TB disease in NYC, regardless of where they receive TB care. During DOT, a health care worker observes a patient ingesting their anti-TB medications. The Health Department provides face-to-face DOT services at all chest clinics and at homes, worksites and other locations as requested by the patient. The Health Department also provides video DOT (vDOT), which facilitates continuity of DOT outside traditional business hours and when patients travel. Face-to-face DOT is also available through three NYC Health+Hospitals facilities: NYC Health+Hospitals/Elmhurst, NYC Health+Hospitals/Kings County and NYC Health+Hospitals/Bellevue.



*To learn more about the DOT program at the Health Department or to enroll a patient, please call **311**.*

CONTACT INVESTIGATION: The Health Department conducts TB contact investigations in household, social and other congregate settings (e.g., worksites and schools). During contact investigation, Health Department staff identify and evaluate individuals who were exposed to infectious TB patients, ensure appropriate treatment among contacts who are diagnosed with TB disease or LTBI, determine whether transmission occurred and assess whether further testing or other intervention is needed. When TB exposures occur in health care facilities, epidemiologists at the Health Department provide technical guidance and assist with contact investigation at the site as needed.

SOCIAL SERVICE REFERRALS: Health Department staff identify and address obstacles to care and unmet social service needs among patients and their families whenever possible. These include concerns about finances, housing, food security, unstable employment, school, health insurance eligibility, access to health care services, immigration status, language barriers, drug and alcohol use and mental health issues. When these situations are identified, patients are referred to a social worker, who facilitates referrals to social service resources.

REGULATORY ACTION: The Health Department has authority under the New York City Health Code to mandate compulsory evaluation, DOT or involuntary hospitalization for patients with infectious TB who are not adherent to evaluation, isolation or treatment recommendations and pose a public health risk.

>> 2019 BY THE NUMBERS

DST, GENOTYPING AND WGS:

- 436** Culture-confirmed TB cases had phenotypic DST results available (95%); among all cases, molecular DST results were available for **471** (83%) cases.
- 384** Culture-confirmed TB cases had genotype results available (83%); **438** (95%) cases had WGS results available.
- 37** Instances of potential false positive laboratory results were investigated; **9** investigations confirmed a false positive result.

OUTREACH:

- 106** Individuals were tested for LTBI during **5** community health events conducted in collaboration with community partners* and made possible with a grant from Stony Wold-Herbert Fund.

* Including the Academy of Medical and Public Health Services, the Office of Assembly Member Felix Ortiz, the Charles B. Wang Community Health Center, the Chinese Planning Council, Mixteca, the Philippine Nurses Association, Sapna NYC, Flushing YWCA and Queensboro Community College

DRUG SUSCEPTIBILITY TESTING, GENOTYPING AND WHOLE GENOME SEQUENCING

The NYC Health Code mandates that a portion of the initial isolate from all culture-positive TB patients be sent for drug susceptibility testing (DST) and genotyping, which are performed at local, state and national public health laboratories.

DRUG SUSCEPTIBILITY TESTING: DST identifies drug resistance in TB strains and informs clinical management and treatment for patients with TB disease and their contacts. The NYC Public Health Laboratory (PHL) performs phenotypic DST testing for first-line and select second-line TB drugs. Molecular-based laboratory tests are also being used routinely at PHL, commercial laboratories, hospitals and other public health reference laboratories. These tests rapidly confirm the presence of *Mycobacterium tuberculosis* (*M. tuberculosis*) complex and can provide information about the presence of mutations in specific genes that are known to predict drug resistance.

GENOTYPING: Genotyping is a laboratory technique used to determine the genetic pattern of *M. tuberculosis* strains. Genotyping results can help identify whether TB strains are genetically related, which helps the Health Department identify false positive laboratory results, detect outbreaks and assess TB transmission. Possible instances of contamination and potential false positive results are promptly and systematically investigated to ensure patients are not placed on anti-TB medications unnecessarily. Cases among patients with similar TB strains are investigated to identify and interrupt TB transmission.

UNIVERSAL WHOLE GENOME SEQUENCING (WGS): In NYC, WGS enables identification of the *M. tuberculosis* complex and species within it; detection of genetic mutations associated with drug resistance; and analysis of single nucleotide polymorphisms to characterize and compare TB strains. The Health Department collaborates with the NYSDOH Wadsworth Center and PHL to conduct WGS for all patients with a positive culture for *M. tuberculosis*. NYS currently reports 17 mutations associated with resistance to 9 TB drugs. The CDC began universal WGS for TB in May 2019 and reports results in conjunction with outbreak investigation.

>> For more information about drug resistance among NYC cases in 2019, see pages 22-23. For more information about WGS and NYC clusters, see page 27.

>> 2019 SPOTLIGHT ON...

IMMIGRANT HEALTH CIVIL SURGEON SYMPOSIUM:

In September 2019, subject matter experts from the Health Department, the Mayor's Office of Immigrant Affairs, Safe Horizon, the New York Immigration Coalition and the United States Citizenship and Immigration Services came together to provide essential updates on the health of immigrants and changes to the federal civil surgeon technical instructions for TB testing and reporting.

This event was co-sponsored by the Rutgers Global TB Institute, the Northeast Caribbean AIDS Education and Training Center, the U.S. Citizenship and Immigration Services and the Health Department.

More than **100** federal civil surgeons and other providers from New York, New Jersey, Pennsylvania and Connecticut attended.



For more information on the updated technical instructions for Civil Surgeons, please visit

www.cdc.gov/immigranrefugeehealth/

OUTREACH AND EDUCATION

The Health Department engages various stakeholders to advance efforts to detect, treat and prevent TB throughout NYC.

HEALTH DEPARTMENT STAFF: Educational materials developed by the Health Department, the CDC and others are used to supplement staff training, which is delivered by experts from the Health Department and the Rutgers Global TB Institute.

HEALTH CARE PROVIDERS: Health care providers collaborate with the Health Department in many capacities and are invited to discuss TB testing, diagnosis and treatment through numerous channels. Health Department experts participate in TB presentations and case management conferences and provide clinical consultation at health care facilities across NYC. The Health Department co-sponsors two annual day-long educational events for health care providers and other colleagues: a medical conference in honor of World TB Day; and a conference to discuss advances in and applications of TB genotyping. Bi-monthly trainings on TST are offered to physicians and nurses from various agencies. In addition, Health Department staff regularly consult with colleagues in local, national and international settings on matters related to TB policy and practice.

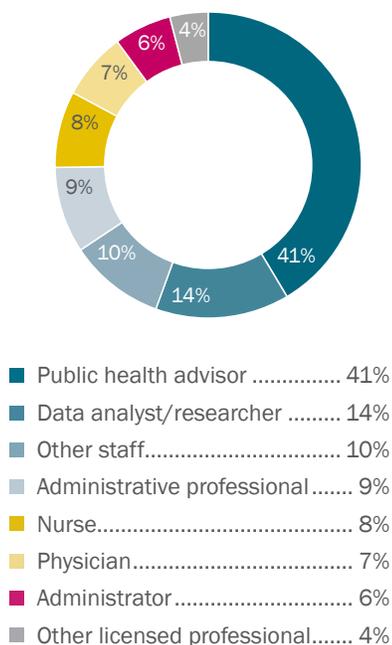
COMMUNITIES: Communities with a high burden of TB are engaged as partners in efforts to increase TB knowledge and inform care-seeking behavior. In partnership with elected officials, community-based groups and others, the Health Department delivers culturally and linguistically appropriate educational messaging through community events and print and electronic media. Community partners also support TB screening efforts at health fairs and other testing events.

>> *For more information about the Health Department's TB community events or conferences, email TBoutreach@health.nyc.gov.*

PROGRAM EVALUATION

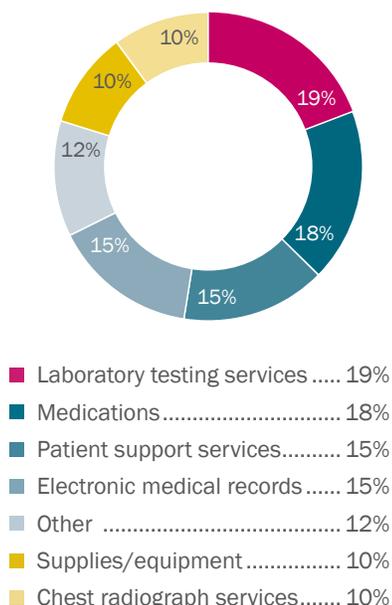
The Health Department uses local, state and national performance indicators to assess program impact and success. These indicators inform planning and policy decisions and help identify programmatic issues and areas for improvement. Performance indicators and targets are developed in coordination with Health Department partners and funders, including CDC, NYSDOH and the NYC Mayor's Office. Reports

FIGURE 1: Bureau of Tuberculosis Control staff by job function, 2019 (n=222)^{1,2}



1. As of Jan. 15, 2020. 2. Excludes 13 non-Health Department personnel

FIGURE 2: Bureau of Tuberculosis Control funding distribution for other-than-personnel services by type, 2019



include the Health Department’s *Quality and Performance Review*, a quarterly report to NYSDOH, the CDC’s *Annual Performance Report*, the CDC’s *Aggregate Reports for TB Program Evaluation* and the CDC’s *National Tuberculosis Indicators Project*.

>> For the most recent performance indicators, see page 25.

COHORT REVIEW: One of the Health Department’s primary tools for evaluating its TB control program is the quarterly cohort review process. Health Department staff review case management activities, treatment status and data quality for all patients with confirmed TB disease and their contacts four to six months after a patient’s TB diagnosis. Successes and challenges related to patient care and case management are used to inform programmatic changes and identify training needs.

FUNDING AND ADMINISTRATION

The Health Department receives city, state and federal funding for TB care and control. Eighty-seven percent of the operating budget for the Health Department’s Bureau of TB Control supports personnel services and 13% supports other-than-personnel services. These funds support all TB prevention and control activities, from hiring staff to operating Health Department chest clinics. Health Department staff ensure that funds are allocated, monitored and utilized efficiently.

RESEARCH

Health Department staff actively participate in research, including epidemiologic studies, implementation science and clinical research. This includes collaboration with the CDC TB Trials Consortium, which conducts national and international studies to develop TB treatment regimens. Health Department staff also participate in professional organizations and TB advisory groups and coordinate the **NYC TB RESEARCH CONSORTIUM**, which brings together Health Department, academic and laboratory-based colleagues to collaborate on projects focusing on TB in NYC.

CONFERENCES: NYC’s TB data and expertise are shared at meetings locally, nationally and internationally. In 2019, these included the 13th Annual TB Medical Consultant’s Meeting, the 23rd Annual Conference of The Union North America Region, the Advanced Molecular Detection

>> STAFF PARTICIPATION IN ADVISORY GROUPS AND CONSORTIA, 2019

- Advisory Council for the Elimination of TB
- CDC/Infectious Disease Society of America/American Thoracic Society National MDR-TB Guidelines Writing Committee
- CDC TB Education and Training Network
- CDC TB Program Evaluation Network
- CDC TB Outbreak Detection Workgroup
- CDC TB Trials Consortium
- Council of State and Territorial Epidemiologists
- Maven Users Group
- National TB Controllers Association: Board of Directors; LTBI Reporting Workgroup; National Society of TB Clinicians; Society for Epidemiology in TB Control and Survey Committee
- Northeastern TB Center of Excellence for Training, Education and Medical Consultation Medical Advisory Board
- International Union Against TB and Lung Disease

conference, the Rutgers Global TB Institute Medical Consultants Meeting, the National TB Conference, the New England TB Clinicians' Conference, the NYC Annual Genotyping Update, the NYC World TB Day Medical Conference, the Rutgers Global TB Institute TB Intensive Workshop, the TB Education and Training Network and TB Program Evaluation Network Conference and the U.S. Civil Surgeon Symposium.

STAFF PUBLICATIONS IN PEER-REVIEWED JOURNALS, 2019:

1. Hood G, Trieu L, Ahuja SD. Mortality among tuberculosis patients in New York City. *Int J Tuberc Lung Dis.* 2019 Feb 1;23(2):252-259.
2. Lam CK, Fluegge K, Macaraig M, Burzynski J. Cost savings associated with video directly observed therapy for treatment of tuberculosis. *Int J Tuberc Lung Dis.* 2019 Nov 1;23(11):1149-1154.
3. Mase S, Chorba T, Parks S, Belanger A, Dworkin F, Seaworth B, Warkentin J, Barry P, Shah N. Bedaquiline for the treatment of multidrug-resistant tuberculosis in the United States. *Clin Infect Dis.* 2019 Sep 26. [Epub ahead of print]
4. Nahid P, Mase SR, Migliori GB, Sotgiu G, Bothamley GH, Brozek JL, Cattamanchi A, Cegielski JP, Chen L, Daley CL, Dalton TL, Duarte R, Fregonese F, Horsburgh CR Jr, Ahmad Khan F, Kheir F, Lan Z, Lardizabal A, Lauzardo M, Mangan JM, Marks SM, McKenna L, Menzies D, Mitnick CD, Nilsen DM, Parvez F, Peloquin CA, Raftery A, Schaaf HS, Shah NS, Starke JR, Wilson JW, Wortham JM, Chorba T, Seaworth B. Treatment of drug-resistant tuberculosis. An official ATS/CDC/ERS/IDSA clinical practice guideline. *Am J Respir Crit Care Med.* 2019 Nov 15;200(10):e93-e142.
5. Narita M, Sullivan Meissner J, Burzynski J. Use of Modeling to Inform Tuberculosis Elimination Strategies. *Am J Respir Crit Care Med.* 2019 Nov 7. [Epub ahead of print]
6. Nguyen MH, Levy NS, Ahuja SD, Trieu L, Proops DC, Achkar JM. Factors Associated with Sputum Culture-Negative vs Culture-Positive Diagnosis of Pulmonary Tuberculosis. *JAMA Netw Open.* 2019 Feb 1;2(2):e187617.
7. Wilson JW, Nilsen DM, Marks SM. Multidrug Resistant Tuberculosis in Patients with HIV: Management Considerations within High-Resourced Settings. *Ann Am Thorac Soc.* 2019 Jul 31. [Epub ahead of print]

>> SPOTLIGHT ON COALITION-BUILDING, EQUITY AND INTERNAL REFORM, 2019

THE COALITION FOR A TUBERCULOSIS-FREE NYC

THE COALITION FOR A TB-FREE NYC is a collaborative, citywide effort to unite partners across multiple industries, disciplines, and care levels to develop and implement a strategic plan to eliminate TB in NYC. Since its inaugural meeting in March 2019, the Coalition has focused on the implications of the CDC and NTCA's updated *Tuberculosis Screening, Testing, and Treatment of U.S. Health Care Personnel* recommendations and the development of a risk assessment tool for NYC health care personnel. The Coalition meets quarterly to disseminate information, share resources and discuss topics of concern to the TB community. All are welcome to join.

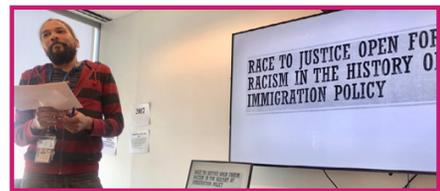
>> For more information, please visit the Coalition's website at: tbfreencyc.wixsite.com/tbfreencyc. To join the Coalition for a TB-Free NYC, please contact tboutreach@health.nyc.gov.

NYC HEALTH DEPARTMENT RACE TO JUSTICE INITIATIVE

Recognizing that structural racism has been identified as a root cause of gaps and differences in health outcomes, the Health Department has begun an internal reform initiative, **RACE TO JUSTICE** to develop strategies, action plans and the infrastructure needed to advance racial equity and social justice in policy and practice across all areas of the Agency's work.

The Health Department aims to promote justice and build capacity within the Agency to improve health outcomes for all New Yorkers by:

- Building awareness among staff of how racism operates within our institutions and structures;
- Developing and implementing strategies to advance racial equity and social justice across programs, policies and practices;
- Strengthening collaborations with NYC's communities to counter racist and oppressive systems within the Health Department and across the city.



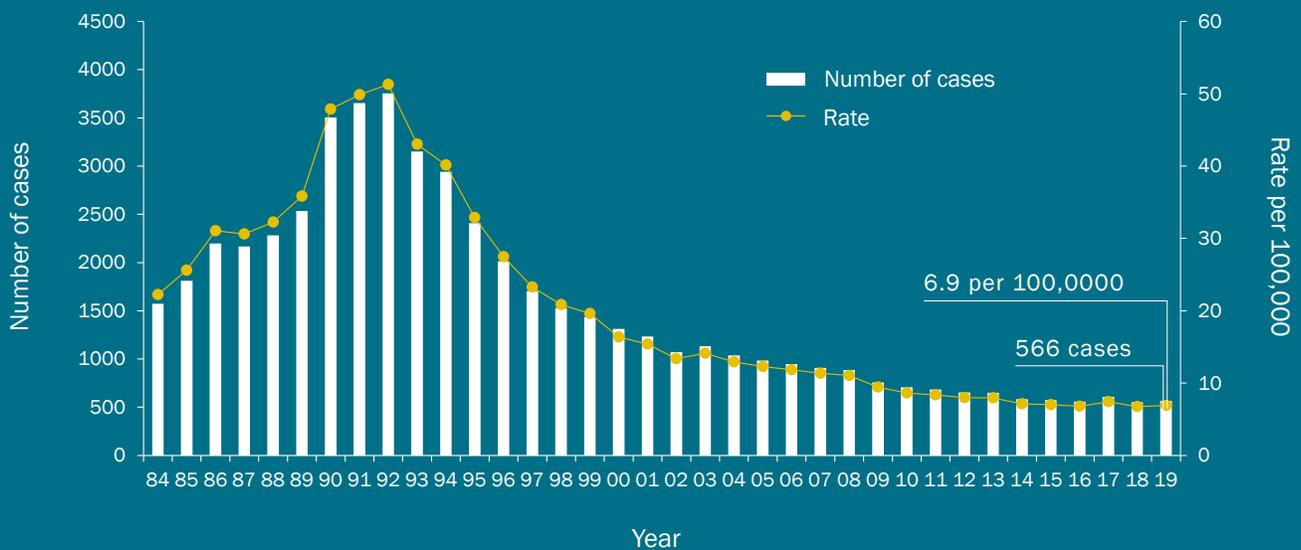
To support these aims, the Health Department's Bureau of TB Control participates in the agency's efforts to plan action steps that will engage all staff in furthering equity and justice in the workplace and in our interactions with patients and community partners.

In 2019, the Bureau of TB Control conducted open forums in its central office and at four Health Department chest clinics to engage staff in discussions about health and racial equity professional practices both internally and externally. More than one hundred Bureau staff members participated in these events, and a clinic-specific workgroup will be launched in 2020.

PROFILE OF TB CASES

There were **566** cases of active TB disease counted in New York City (NYC) in 2019, an increase of 2% since 2018. The NYC TB incidence rate was 6.9 per 100,000, more than two times higher than the national TB rate.

FIGURE 3: Tuberculosis cases and rates,¹ New York City, 1984-2019



1984-1992:

Overall increase: **139%**
Average annual increase: **12%**

1992-2010:

Overall decrease: **81%**
Average annual decrease: **8%**

2010-2019:

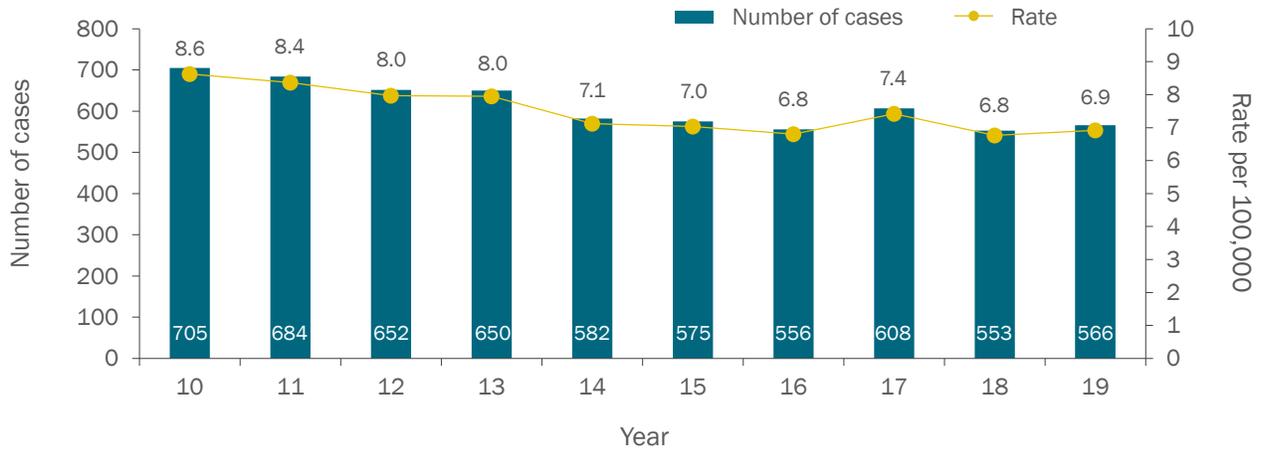
Overall decrease: **20%**
Average annual decrease: **2%**

1. Rates are based on decennial census data.

TB IN NEW YORK CITY

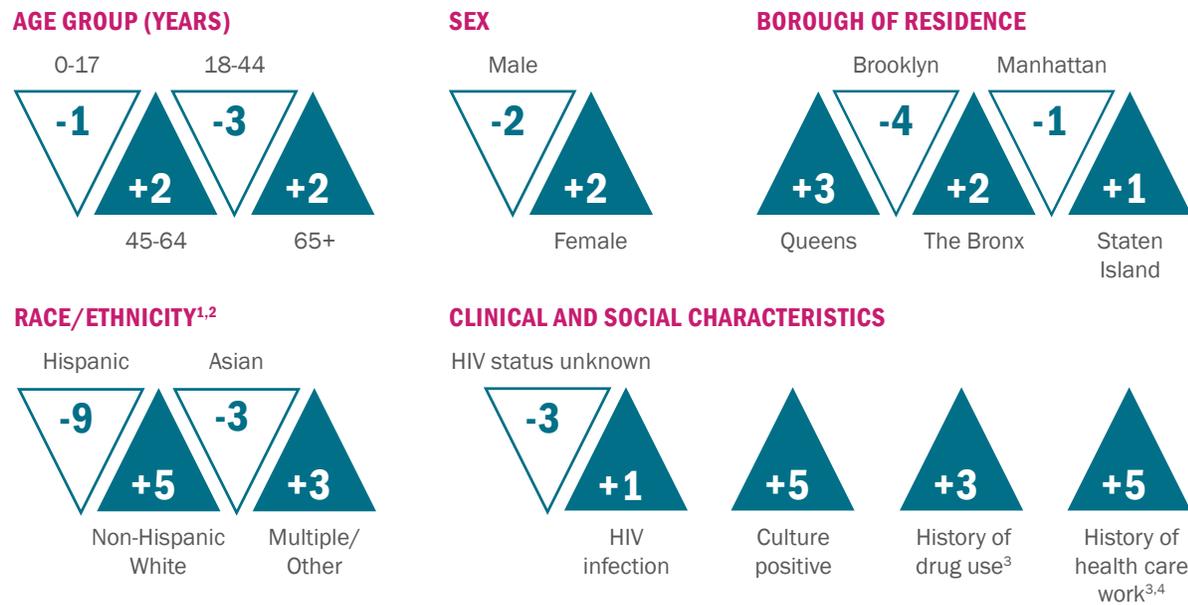
Though the number of TB cases in NYC declined by 85% between 1992 and 2019, the rate of decline has slowed. Since 2010, there has been a 2% average annual decrease in TB cases. Over the past decade, the overall TB rate has remained relatively stable, with variations in burden among certain populations from year to year.

FIGURE 4: Tuberculosis cases and rates,¹New York City, 2010-2019



1. Rates are based on decennial census data.

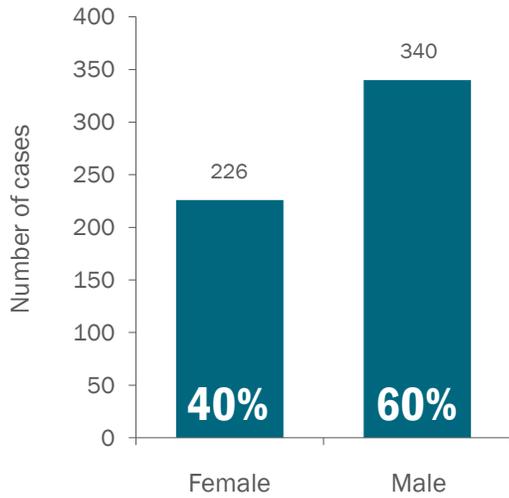
FIGURE 5: Percentage point change for select characteristics among patients with tuberculosis disease, 2018-2019, New York City



1. Race/ethnicity is among patients born in the U.S. 2. There was no change between 2018 and 2019 in the proportion of cases among U.S.-born Blacks. 3. Within 12 months of diagnosis. 4. Among patients 18 years of age and older.

AGE AND SEX

FIGURE 6: Tuberculosis cases by sex,¹ New York City, 2019



1. Data on patient sex are currently collected and categorized as "Male," "Female" and "Transgender." In future reports, more expansive categories of gender identity will be presented to reflect changes in data collection methods.

FIGURE 7: Tuberculosis cases by age group in years, New York City, 2019

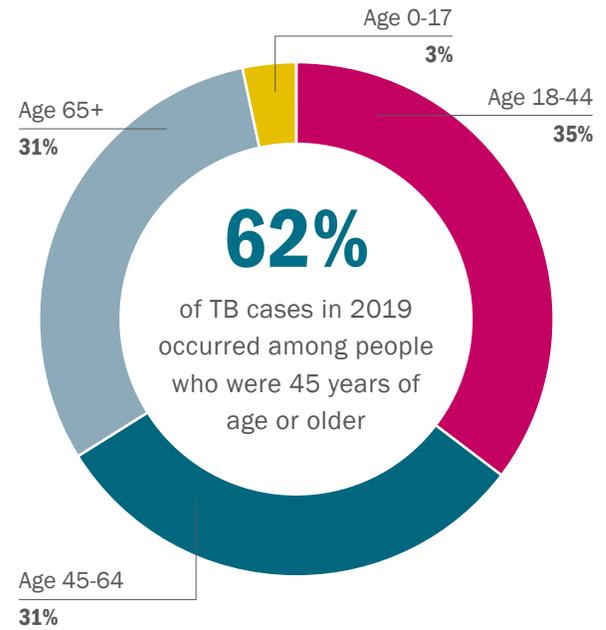
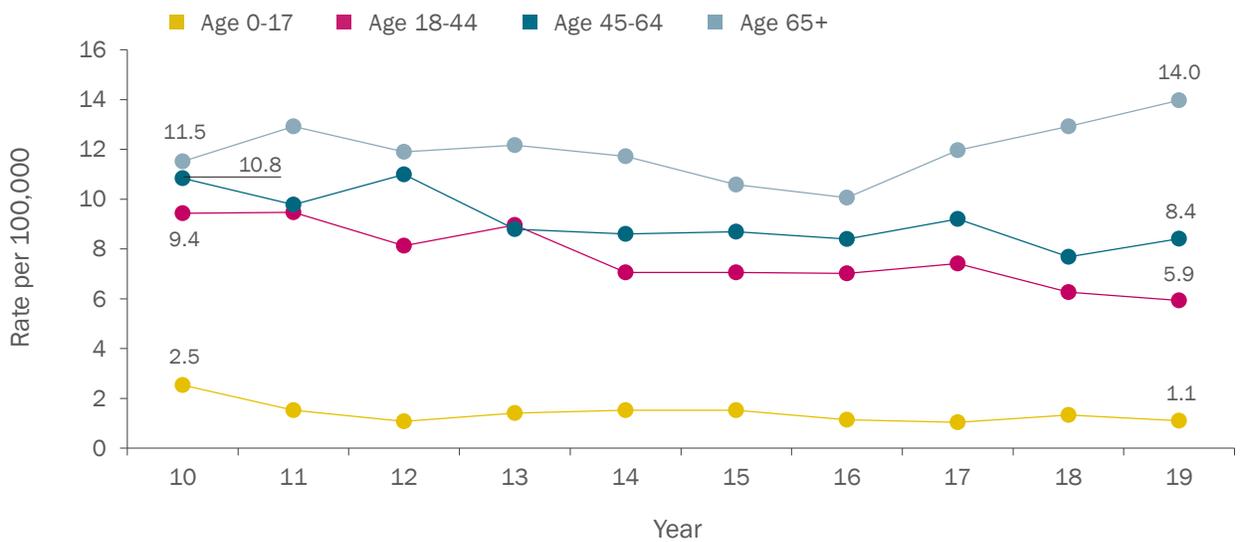


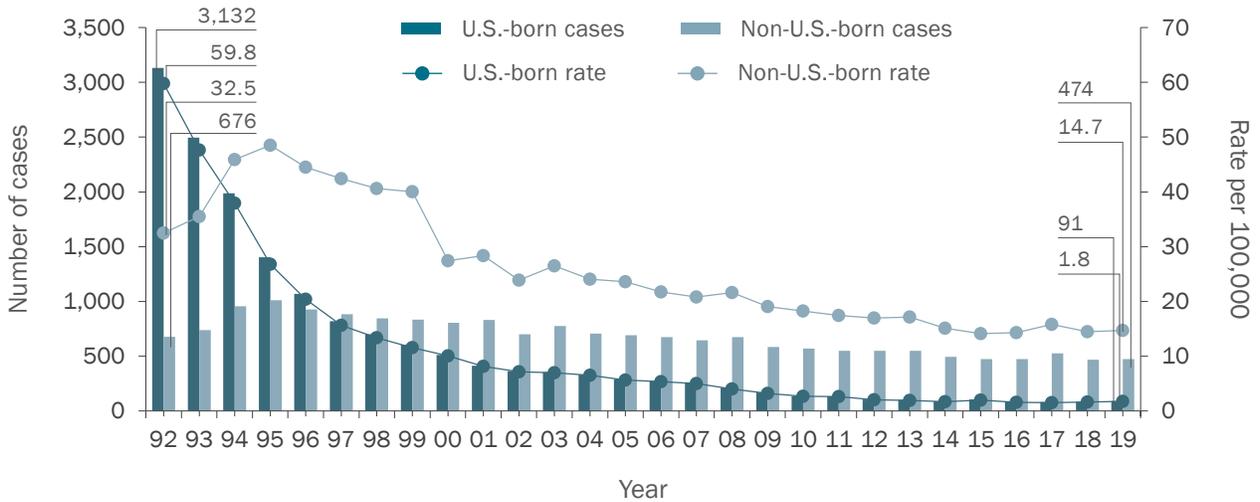
FIGURE 8: Tuberculosis rates¹ by age group in years, New York City, 2010-2019



1. Rates are based on New York City Health Department population estimates, modified from U.S. Census Bureau interpolated intercensal population estimates, 2000-2018. Updated August 2019.

BIRTH IN THE UNITED STATES

FIGURE 9: Tuberculosis cases and rates¹ by birth in the United States (U.S.),^{2,3} New York City, 1992-2019

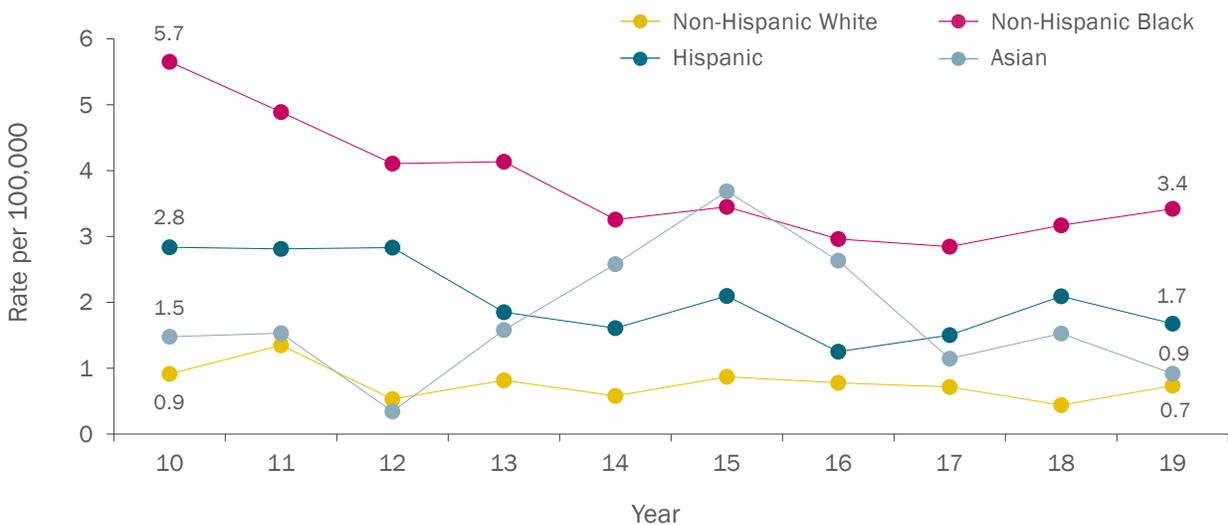


1. Rates prior to 2000 are based on 1990 U.S. Census data. Rates for 2000-2005 are based on 2000 U.S. Census data. Rates after 2005 are based on one-year American Community Survey data for the given year or the most recent available data. 2. U.S.-born includes individuals born in the U.S. and U.S. territories. 3. Excludes cases with unknown country of birth.

84% | Proportion of TB cases among patients born outside the U.S.

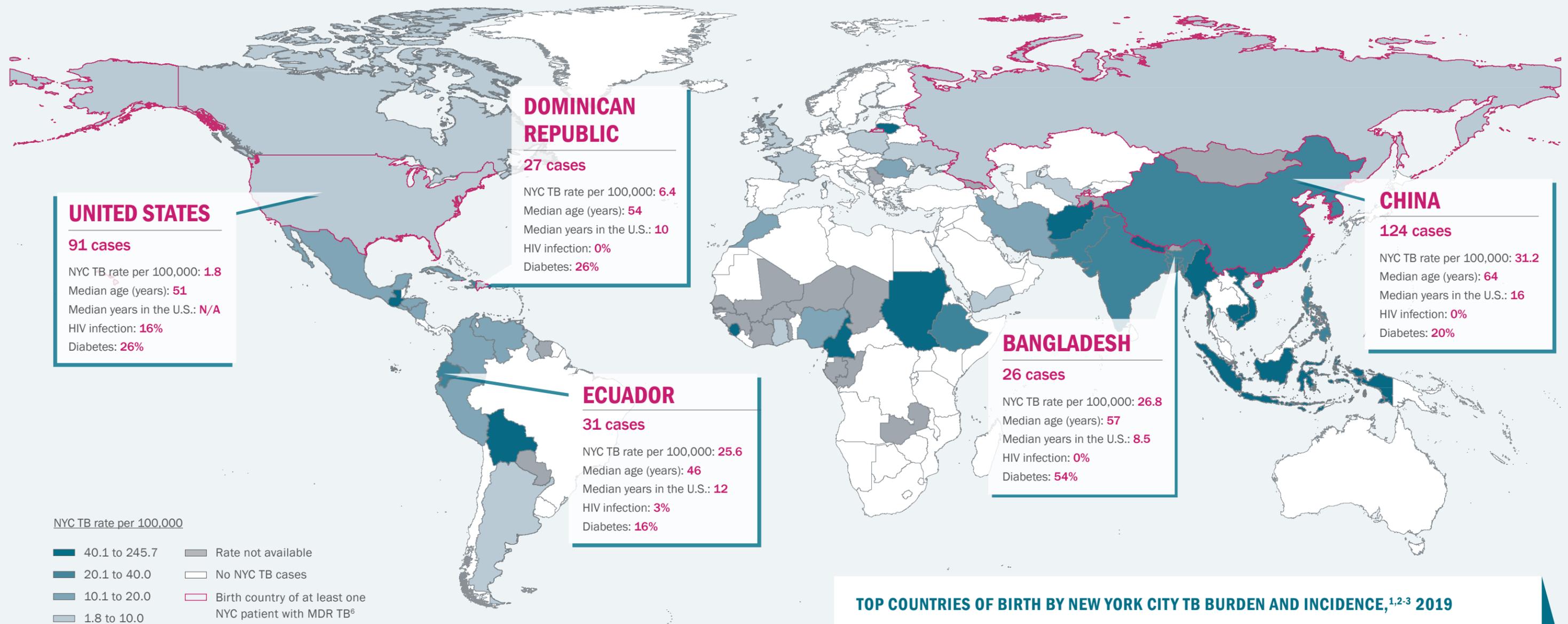
71% | Proportion of U.S.-born patients who were non-Hispanic Black or Hispanic

FIGURE 10: Tuberculosis rates¹ by race/ethnicity² among patients born in the United States (U.S.),^{3,4} New York City, 2010-2019



1. Rates are based on one-year American Community Survey Public Use Microdata Sample data for the given year or the most recent available data. 2. Data shown do not include patients with multiple, other or unknown race/ethnicity. 3. U.S.-born includes individuals born in the U.S. and U.S. territories. 4. Excludes cases with unknown country of birth.

FIGURE 11: Tuberculosis cases, rates¹ and select characteristics by patient country of birth,²⁻⁵ New York City (NYC), 2019



COUNTRY OF BIRTH

There were 70 countries of birth among patients with TB disease in 2019, and patient characteristics and TB risk factors differ by country of birth. The Health Department works in partnership with the communities most affected by TB to develop tailored interventions to reduce TB burden.

70 | Number of countries of birth represented among patients with TB disease in 2019

13 | Median number of years in the U.S. among non-U.S.-born TB patients

TOP COUNTRIES OF BIRTH BY NEW YORK CITY TB BURDEN AND INCIDENCE, 1,2-3 2019

COUNTRY	NUMBER OF CASES	COUNTRY (CASES)	NYC TB RATE/100,000
China ⁴	124	Sudan (1)	245.7
United States (U.S.) ⁵	91	Burma (9)	149.8
Ecuador	31	Nepal (14)	134.4
Dominican Republic	27	Cambodia (1)	113.3
Bangladesh	26	Bolivia (3)	101.3
Mexico	23	Sierra Leone (2)	97.3
India	20	Cameroon (1)	72.7
Philippines	20	Lithuania (1)	58.2
Haiti	18	Indonesia (2)	56.2

1. Rates are based on 2018 American Community Survey one-year sample data.
2. One case in 2019 was in a patient with unknown country of birth.
3. There were 20 countries for which rate could not be calculated due to insufficient population data.
4. China includes individuals born in mainland China, Hong Kong, Taiwan and Macau.
5. U.S.-born includes individuals born in the U.S. and U.S. territories.
6. MDR-TB is defined as resistance to at least isoniazid and rifampin.

TB IN NYC NEIGHBORHOODS

FIGURE 12: Tuberculosis rates¹ by United Hospital Fund (UHF) neighborhood, New York City, 2019

Rate per 100,000

- Above citywide rate (7.0 to 19.9)
- At or below citywide rate (2.8 to 6.9)
- At or below provisional national rate (0.7 to 2.7)

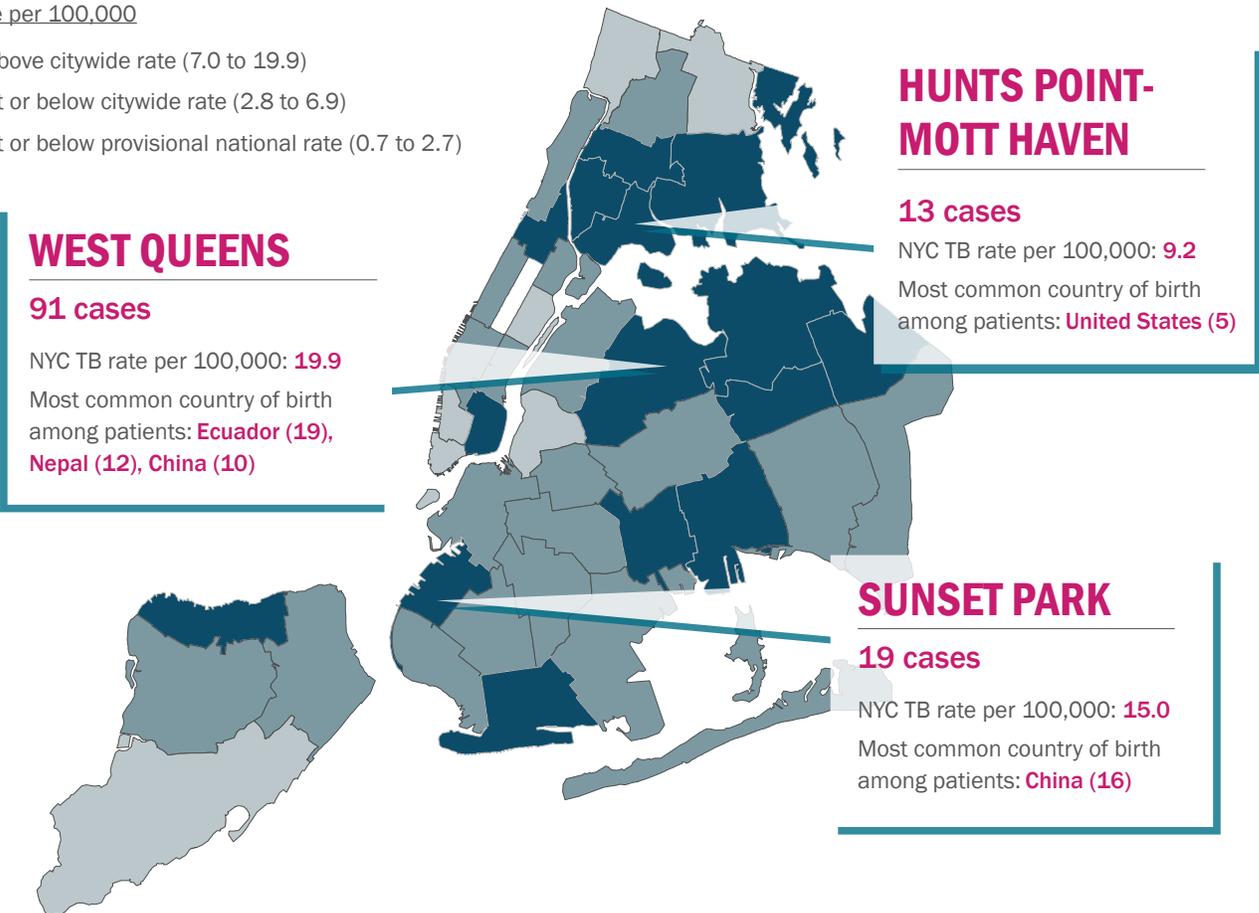
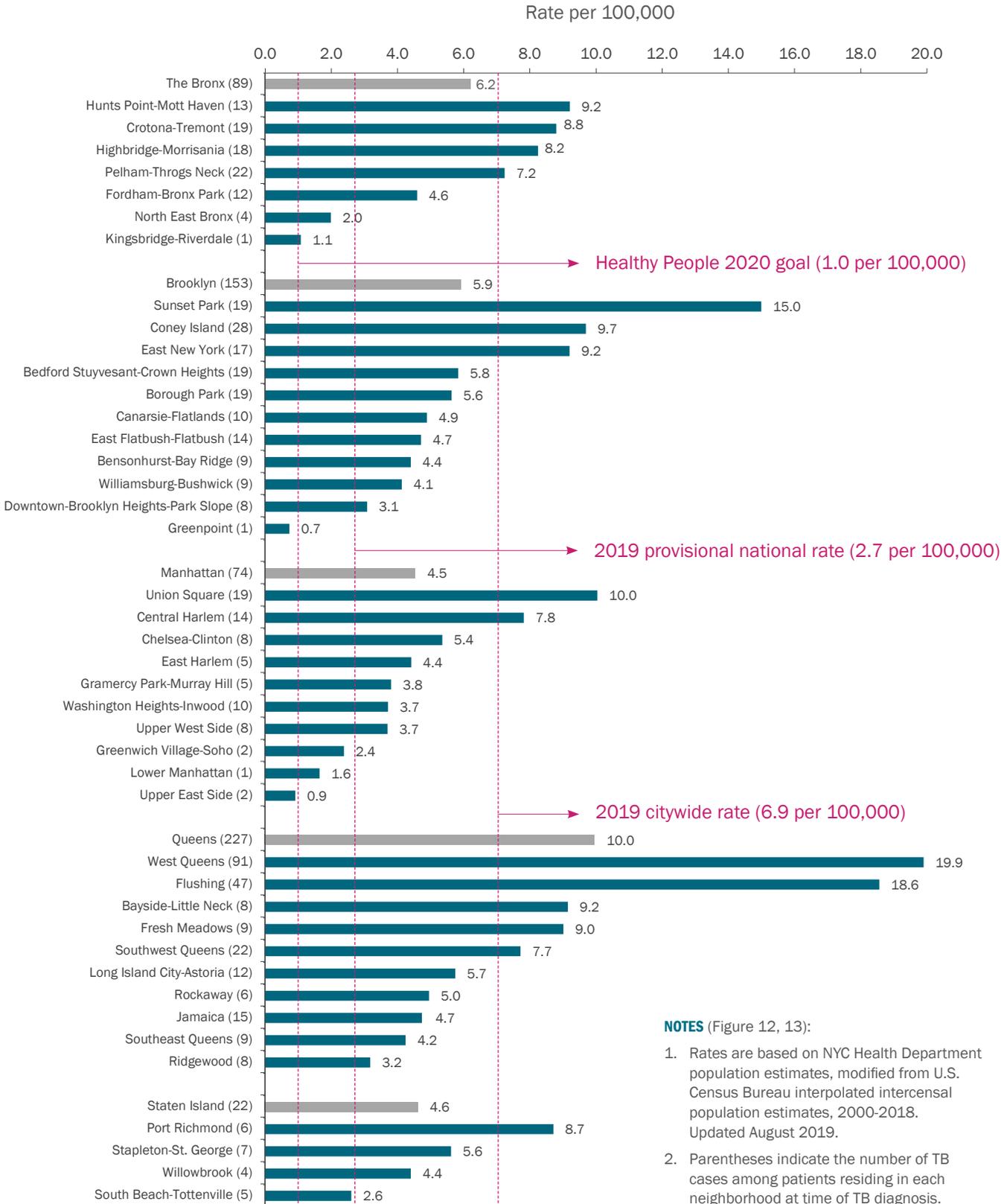


TABLE 1: Proportion of tuberculosis (TB) cases and TB rates¹ by birth in the United States (U.S.)²⁻³ and area-based poverty level of patient's residential neighborhood,^{4,5} New York City, 2019

Area-based poverty level ^{4,5}	U.S.-born TB rate	% U.S.-born	Non-U.S.-born rate	% non-U.S.-born	Total NYC TB rate	% of all cases
Very high (30 to 100%)	3.3	32%	15.7	17%	7.8	19%
High (20 to < 30%)	2.3	31%	18.0	30%	8.5	30%
Medium (10 to < 20%)	1.1	24%	14.7	44%	6.9	41%
Low (< 10%)	1.0	13%	7.3	8%	3.0	9%

1. Rates are based on 2014-2018 American Community Survey data. 2. U.S.-born includes individuals born in the U.S. and U.S. territories. 3. One case in 2019 had unknown country of birth. 4. Area-based poverty level is based on 2013-2017 American Community Survey data on the proportion of ZIP code residents living below the federal poverty limit. 5. Cases were assigned to a ZIP code based on their residence at time of TB diagnosis.

FIGURE 13: Tuberculosis cases and rates^{1,2} by borough and United Hospital Fund (UHF) neighborhood, New York City, 2019



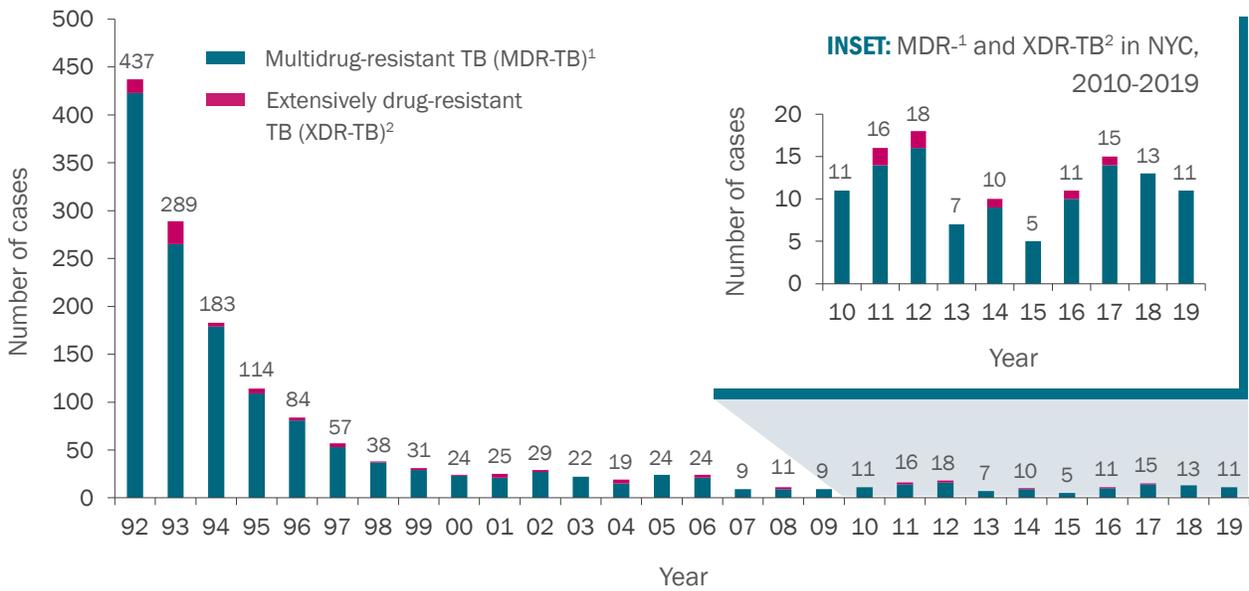
NOTES (Figure 12, 13):

1. Rates are based on NYC Health Department population estimates, modified from U.S. Census Bureau interpolated intercensal population estimates, 2000-2018. Updated August 2019.
2. Parentheses indicate the number of TB cases among patients residing in each neighborhood at time of TB diagnosis.

DRUG RESISTANCE

In 2019, 11 patients were newly-diagnosed with MDR-TB, defined as a TB strain resistant to both isoniazid and rifampin, two of the most effective TB drugs. Molecular-based tests, which can rapidly detect mutations associated with drug resistance, are now being used routinely in hospitals, commercial laboratories and public health reference laboratories.

FIGURE 14: Multidrug resistance¹ among tuberculosis cases, New York City (NYC), 1992-2019



1. MDR-TB is defined as resistance to at least isoniazid and rifampin. 2. XDR-TB is defined as resistance to at least isoniazid and rifampin plus a fluoroquinolone and a second-line injectable anti-TB medication.

TABLE 2: Select characteristics among patients diagnosed with multidrug-resistant tuberculosis (MDR-TB),¹ New York City, 2019 (n=11)

Characteristics	
Median age (range)	57 (32-84)
Number born outside of the United States (%)	10 (91%)
Pulmonary site of disease (%)	11 (100%)
Median number of drugs to which there was known resistance among MDR-TB cases ² (range)	7 (3-10)
Median number of contacts identified around patients with MDR-TB (range)	3 (0-55)

1. MDR-TB is defined as resistance to at least isoniazid and rifampin.
 2. Resistance to any fluoroquinolone was counted once.
 3. Based on World Health Organization regional definitions.

REGION OF BIRTH³

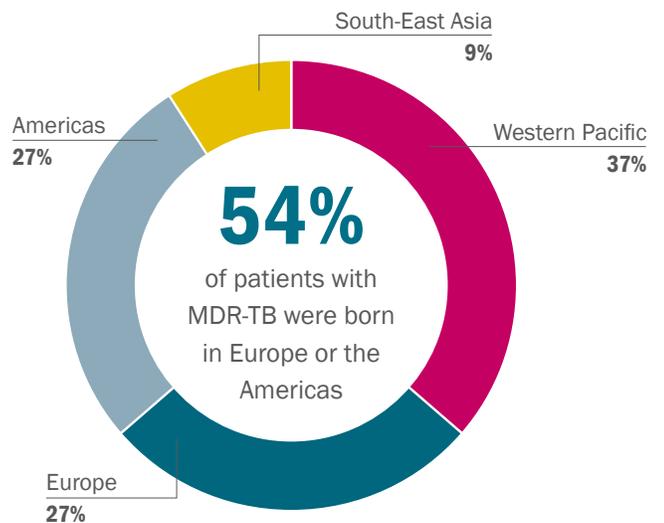


TABLE 3: Number of tests performed, gene targets and median turnaround time for select molecular tests for tuberculosis, New York City, 2019

Test type	Gene targets and corresponding medication							Number of patients with test conducted	Median turnaround time (days) ³
	INH		RIF	EMB	PZA	FLQ ¹	INJ ²		
	• inhA • katG	• oxyR-ahpC PR • mabA-inhA PR • mabA	• rpoB	• embB • embC-embA PR	• pncA • pncA PR	• gyrA • gyrB	• rrs1400 • eis • tlyA		
GeneXpert® MTB/RIF			•					229	2
Pyrosequencing	•		•			•		89	15
Whole genome sequencing	•	•	•	•	•	•	•	403	49

Abbreviations: INH - Isoniazid; RIF - Rifampin; EMB - ethambutol; PZA - pyrazinamide; FLQ - fluoroquinolones; INJ - injectables

1. Fluoroquinolones include levofloxacin, moxifloxacin, ciprofloxacin and ofloxacin. 2. Injectables include kanamycin, capreomycin and amikacin. 3. Turnaround time is defined as the number of days between the earliest date a result is reported and the collection date of that respective specimen.

11 | Number of patients newly-diagnosed with an MDR-TB strain in 2019

97% | Percent decrease in the number of MDR-TB cases in NYC from 1992-2019

TABLE 4: Detection of resistance to select tuberculosis medications by test type,¹ New York City, 2019

	INH	RIF	EMB	PZA	FLQ ²	INJ ³
Number of patients with a molecular test conducted ⁴	418	450	403	403	411	403
➤➤ Number with mutation detected (%)	36 (9%)	15 (3%)	3 (1%)	15 (4%)	5 (1%)	3 (1%)
Number of patients with a phenotypic test conducted	397	395	392	390	67	61
➤➤ Number with resistance detected (%)	46 (12%)	12 (3%)	8 (2%)	20 (5%)	5 (7%)	4 (7%)
Number of patients with any drug susceptibility test conducted	440	461	425	427	412	404
➤➤ Number with resistance detected (%)	47 (11%)	15 (3%)	8 (2%)	24 (6%)	6 (1%)	4 (1%)

Abbreviations: INH - Isoniazid; RIF - Rifampin; EMB - ethambutol; PZA - pyrazinamide; FLQ - fluoroquinolones; INJ - injectables

1. Categories are not mutually exclusive. 2. Fluoroquinolones include levofloxacin, moxifloxacin, ciprofloxacin and ofloxacin. 3. Injectables include kanamycin, capreomycin and amikacin. 4. Molecular tests include GeneXpert® MTB/RIF, Genotype MTBDRplus (Hain), pyrosequencing, Sanger sequencing and whole genome sequencing.

30 | Number of patients with MDR-TB treated at a Health Department chest clinic in 2019

13% | Proportion of cases with resistance to at least one first-line drug

DISEASE SITE, CULTURE STATUS AND CO-MORBIDITIES

FIGURE 15: Tuberculosis cases by disease site, New York City, 2019

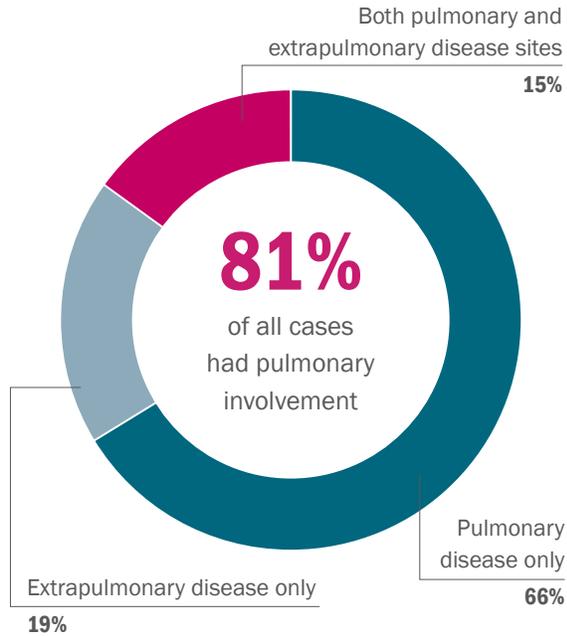


TABLE 5: Disease site among tuberculosis cases with extrapulmonary disease,¹ New York City, 2019 (n=191)

Disease site	Number of cases	Percent
Any extrapulmonary site	191	-
Lymphatic	80	42%
Pleural	61	32%
Bone/joint	20	10%
Peritoneal	11	6%
Genitourinary	9	5%
Meningeal	4	2%
Laryngeal	1	1%
Other	36	19%

1. Categories are not mutually exclusive.

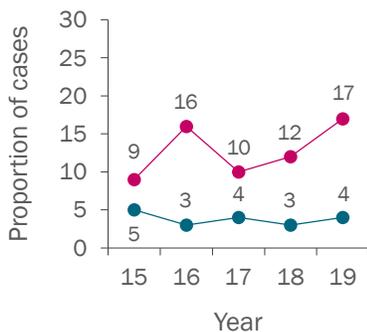
FIGURE 16: Proportion of culture-confirmed tuberculosis cases among all cases, New York City, 2019



FIGURE 17: Select co-morbidities among patients with tuberculosis disease by birth in the United States (U.S.),^{1,2} New York City, 2015-2019

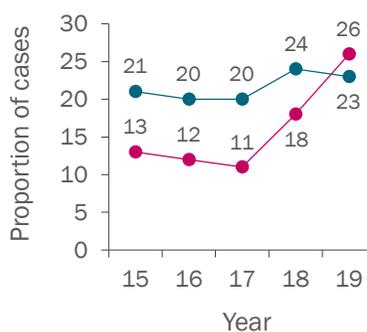
HIV INFECTION³

Overall proportion, 2019: **6%**



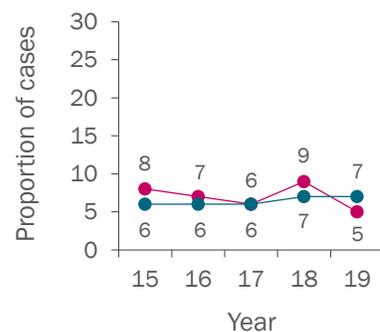
DIABETES

Overall proportion, 2019: **23%**



IMMUNOSUPPRESSION (NON-HIV)⁴

Overall proportion, 2019: **7%**



1. U.S.-born includes individuals born in the U.S. and U.S. territories. 2. Excludes cases with unknown country of birth. 3. There were 87 patients in 2019 with an unknown HIV status. 4. Immunosuppression due to use of immunosuppressive therapy or having a medical condition, not including HIV/AIDS.

MORTALITY, TREATMENT COMPLETION AND INDICATORS

FIGURE 18: Treatment outcomes for tuberculosis (TB) cases counted in 2018,^{1,2} New York City (n=553)

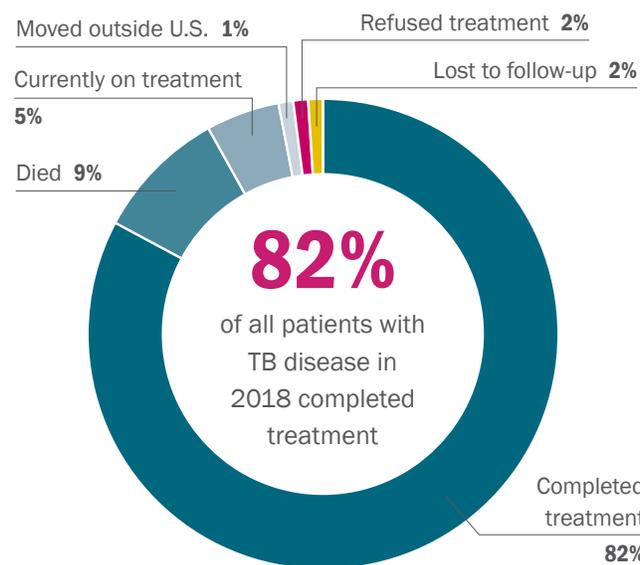
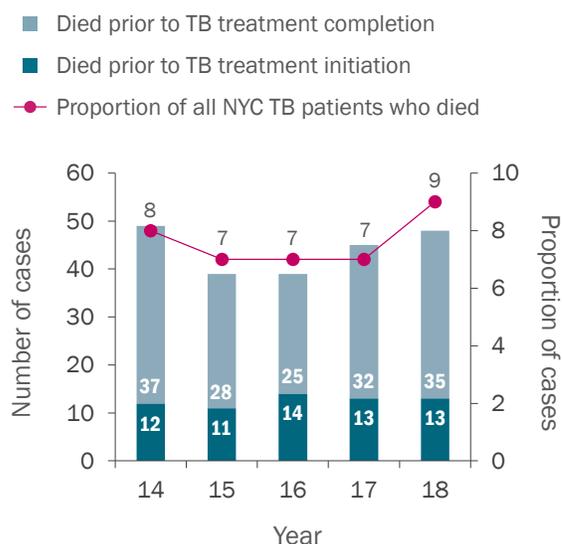


FIGURE 19: Number and proportion of patients with tuberculosis (TB) who died^{1,2} before or during treatment, New York City (NYC), 2014-2018



1. Treatment outcomes are not reported for the current year to allow sufficient time for follow-up. 2. A death is defined as any patient who died prior to or during TB treatment, regardless of the cause of death. This excludes any patient who died after the completion of TB treatment.

TABLE 6: Select performance measures, national targets¹ and New York City outcomes, 2017-2018

Indicator	2017	2018	2020 target
Treatment and case management for persons with active tuberculosis (TB)			
Initiated TB treatment within seven days of specimen collection ²	92%	88%	97%
Sputum culture conversion within 60 days of treatment initiation ³	67%	74%	73%
Completed treatment within 365 days of initiation ⁴	92%	92%	95%
Contact investigation			
Eligible cases with contacts elicited ⁵	95%	93%	100%
Eligible contacts evaluated ⁶	85%	83%	93%
Eligible contacts who initiated treatment for TB infection ⁷	85%	86%	91%
Eligible contacts who completed treatment for TB infection ⁸	82%	62%	81%

1. Definitions for performance measures and national indicators are established by the CDC; the 2020 targets were set in 2015. For details, visit cdc.gov/tb/programs/evaluation/indicators. Performance measures are not reported for the current year to allow sufficient time for follow-up. 2. Of TB patients with positive acid-fast bacilli (AFB) sputum-smear results who were alive at diagnosis. 3. Of TB patients with positive sputum culture results who were alive at diagnosis and have initiated treatment. Excludes patients who died within 60 days of initiating treatment. 4. Excludes patients who never started on anti-TB medications, those who died or moved outside of the U.S. within 365 days of treatment initiation, those with any rifampin resistance, those with meningeal TB and children 14 years of age or younger with disseminated TB. 5. Of AFB sputum smear-positive TB patients. 6. Of contacts to AFB sputum smear-positive TB patients counted in the year of interest. 7. Of contacts to AFB sputum smear-positive TB patients who have newly diagnosed TB infection. 8. Of contacts to sputum AFB smear-positive TB patients with newly diagnosed TB infection who started treatment.

CONTACT INVESTIGATION IN NON-HOUSEHOLD SETTINGS

The Health Department investigates TB exposures in non-household settings in NYC to identify and evaluate contacts, ensure appropriate treatment for contacts with TB disease or LTBI, determine if transmission has occurred and assess whether testing of additional contacts may be warranted.

TABLE 7: Contact investigation outcomes in non-household settings¹ by number of exposed contacts, New York City, 2019 (n=59)

	≥ 15 exposed contacts		< 15 exposed contacts		Total	
	n	(%)	n	(%)	n	(%)
Number of sites	20	34	39	66	59	
Likely transmission ²	7	39	7	21	14	27
Transmission could not be assessed	2	10	5	13	7	12
Total number of contacts	592	-	270	-	862	-
Median contacts per site (range)	26 (12-66)		6 (1-38)		9 (1-66)	
Contacts eligible for testing ³	575	97	257	95	832	97
Contacts tested	511	89	240	93	751	90
Contacts with a positive TB test result	43	8	29	12	72	10

1. Excludes health care-associated investigations. 2. Proportion calculated among investigations where transmission could be assessed. 3. Contacts eligible for testing are defined as contacts without a known history of TB disease or documented positive test for TB infection who were alive after diagnosis of the infectious TB case to whom they were exposed.

FIGURE 20: Contact investigations in non-household settings¹ by site type, New York City, 2019 (n=59)

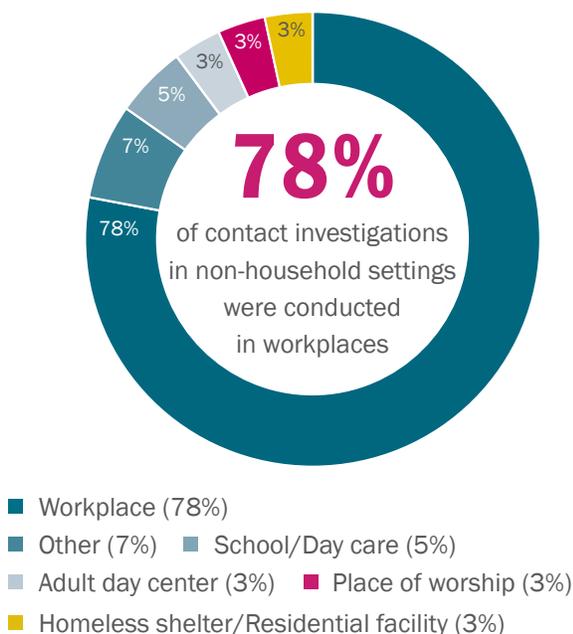
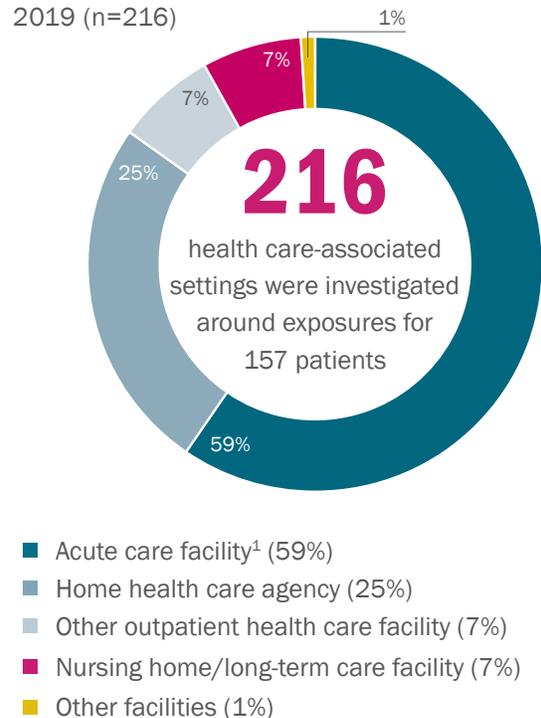


FIGURE 21: Contact investigations in health care-associated settings by site type, New York City, 2019 (n=216)

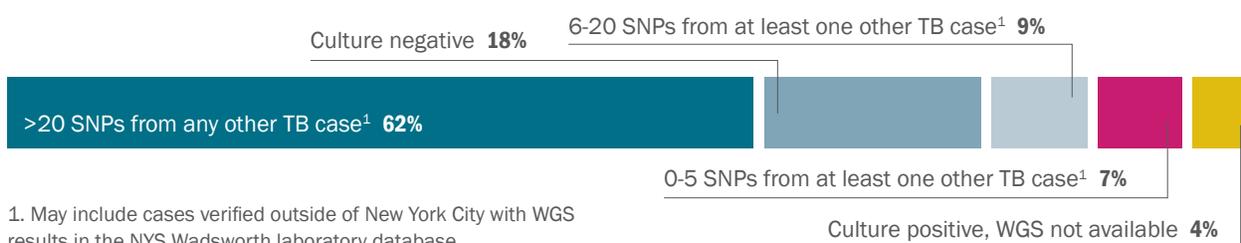


1. Includes hospitals and acute care clinics

WHOLE GENOME SEQUENCING (WGS) AND NYC CLUSTERS

The Health Department uses WGS to characterize TB strains and assess transmission. Universal WGS has been performed for culture-positive cases since 2016. Cases whose isolates are within 20 single nucleotide polymorphisms (SNP) of another case in NYC or NYS are notified to NYC by NYS Wadsworth laboratory. Notified cases are reviewed, prioritized and assigned for epidemiologic investigation. A difference of five SNPs or less between isolates is considered suggestive of possible recent transmission and prompts further investigation.

FIGURE 22: Tuberculosis cases by whole genome sequencing (WGS) availability and high quality single nucleotide polymorphism (SNP) analysis results, New York City, 2019 (n=566)



1. May include cases verified outside of New York City with WGS results in the NYS Wadsworth laboratory database.

TABLE 8: Characteristics of select high-priority whole genome sequencing-identified tuberculosis (TB) clusters,^{1,2} New York City, 2019

	Cluster A ³	Cluster B	Cluster C	Cluster D	Cluster E
Number of cases identified between Jan. 1, 2017 and Dec. 31, 2019	6	6	4	4	4
Proportion of cases among males ⁴	33%	100%	75%	50%	25%
Proportion of patients born in the United States (U.S.) ^{4,5}	100%	0%	0%	50%	100%
Median patient age in years (range) ⁴	39 (19-62)	40 (22-50)	34 (29-38)	49 (25-62)	24 (2-58)
Most common borough of residence at time of TB diagnosis (%) ⁴	Manhattan (33%) The Bronx (33%)	Manhattan (67%)	Queens (50%)	Brooklyn (100%)	The Bronx (100%)
Proportion of patients reporting history of homelessness ^{4,6}	0%	83%	0%	0%	50%
Proportion of patients reporting history of drug use or excessive alcohol use ^{4,6}	83%	83%	50%	50%	25%
Clusters in which patients reported history of transient work ^{4,6}		•	•		
Clusters in which social network links were identified among patients ⁴	•	•		•	
Clusters in which patients had links to the same neighborhood ^{4,7}	•			•	

1. Clusters include cases whose isolates have less than or equal to five single nucleotide polymorphism differences among them based on whole genome sequencing results, as well as clinically-counted cases with confirmed epidemiologic links to cluster cases. 2. Includes clusters with three or more cases identified in three years and evidence of recent, local TB transmission. 3. Includes one case counted outside of NYC. 4. Among cluster cases identified between January 1, 2017 and December 31, 2019. 5. U.S.-born includes individuals born in the U.S. and U.S. territories. 6. In the 12 months before TB diagnosis. 7. Within a 10-block radius or less.

TABLE 9: Select demographic, social and clinical characteristics of tuberculosis cases by birth in the United States (U.S.),¹ New York City, 2018-2019

Characteristics	2018						2019					
	U.S.-born ¹		Non-U.S.-born		Total ²		U.S.-born ¹		Non-U.S.-born		Total ²	
	n	%	n	%	n	%	n	%	n	%	n	%
Age group												
0-17	12	14%	11	2%	23	4%	12	13%	7	1%	19	3%
18-44	27	32%	183	39%	211	38%	21	23%	179	38%	200	35%
45-64	23	27%	135	29%	158	29%	34	37%	138	29%	173	31%
65+	23	27%	138	30%	161	29%	24	26%	150	32%	174	31%
Sex												
Female	30	35%	182	39%	212	38%	39	43%	186	39%	226	40%
Male	55	65%	285	61%	341	62%	52	57%	288	61%	340	60%
Race/ethnicity												
Non-Hispanic White	9	11%	26	6%	35	6%	15	16%	23	5%	38	7%
Non-Hispanic Black	38	45%	58	12%	96	17%	41	45%	61	13%	103	18%
Hispanic	30	35%	105	22%	136	25%	24	26%	124	26%	148	26%
Asian	5	6%	256	55%	261	47%	3	3%	232	49%	235	42%
Multiple/other	3	4%	22	5%	25	5%	6	7%	34	7%	40	7%
Time in the U.S. (at time of reporting)												
< 1 year	n/a	n/a	25	5%	25	5%	n/a	n/a	24	5%	24	5%
1-5 years	n/a	n/a	112	24%	112	24%	n/a	n/a	123	26%	123	26%
> 5 years	n/a	n/a	328	70%	328	70%	n/a	n/a	322	68%	322	68%
Borough of residence												
Manhattan	21	25%	58	12%	79	14%	16	18%	58	12%	74	13%
The Bronx	24	28%	56	12%	80	14%	22	24%	67	14%	89	16%
Brooklyn	28	33%	144	31%	173	31%	28	31%	124	26%	153	27%
Queens	9	11%	193	41%	202	37%	20	22%	207	44%	227	40%
Staten Island	3	4%	16	3%	19	3%	5	5%	17	4%	22	4%
Neighborhood poverty ³												
Low (< 10%)	9	11%	44	9%	53	10%	12	13%	38	8%	50	9%
Medium (10 to < 20%)	17	20%	212	45%	229	41%	22	24%	209	44%	232	41%
High (20 to < 30%)	28	33%	128	27%	156	28%	28	31%	144	30%	172	30%
Very High (30 to 100 %)	29	34%	78	17%	107	19%	29	32%	80	17%	109	19%
Homeless ⁴	7	8%	13	3%	20	4%	6	7%	13	3%	19	3%
Employed ^{4,5}	28	38%	187	41%	215	41%	32	41%	195	42%	227	41%
Health care worker ^{4,5}	1	4%	14	7%	15	7%	2	6%	25	13%	27	12%
Drug use ⁴	16	19%	7	1%	23	4%	19	21%	17	4%	37	7%
Excessive alcohol use ⁴	6	7%	15	3%	22	4%	4	4%	19	4%	23	4%

Characteristics	2018						2019					
	U.S.-born ¹		Non-U.S.-born		Total ²		U.S.-born ¹		Non-U.S.-born		Total ²	
	n	%	n	%	n	%	n	%	n	%	n	%
Ever respiratory smear positive ⁶	41	59%	201	54%	243	55%	44	59%	225	59%	269	59%
Sputum smear positive ⁶	39	95%	186	93%	225	93%	42	95%	211	94%	253	94%
Culture positive	58	68%	362	78%	421	77%	77	85%	385	82%	463	82%
Pulmonary only site of disease	60	71%	294	63%	355	64%	62	68%	312	66%	375	66%
Extrapulmonary only site of disease	16	19%	94	20%	110	20%	16	18%	90	19%	106	19%
Both pulmonary and extrapulmonary sites	9	11%	79	17%	88	16%	13	14%	72	15%	85	15%
Cavities present on chest x-ray ever ⁶	23	33%	70	19%	93	21%	20	27%	66	17%	86	19%
Multidrug (MDR) resistance ⁷	2	3%	11	3%	13	3%	1	1%	10	3%	11	3%
Extensive drug resistance (XDR) ⁸	0	0	0	0	0	0	0	0%	0	0	0	0%
Non-MDR isoniazid resistance ⁹	7	12%	33	9%	40	9%	4	5%	32	9%	36	8%
Non-MDR rifampin resistance ¹⁰	0	0	2	1%	2	0	1	1%	3	1%	4	1%
History of TB disease	3	4%	40	9%	43	8%	4	4%	39	8%	43	8%
HIV status												
Infected	10	12%	15	3%	25	5%	15	16%	20	4%	36	6%
Not infected	52	61%	377	81%	430	78%	60	66%	383	81%	443	78%
Refused testing	18	21%	59	13%	77	14%	11	12%	42	9%	53	9%
Not offered/done or unknown	5	6%	16	3%	21	4%	5	5%	29	6%	34	6%
Non-HIV related immunosuppression	8	9%	34	7%	42	8%	5	5%	35	7%	40	7%
Diabetes	15	18%	112	24%	127	23%	24	26%	108	23%	133	23%
Total	85	15	467	84	553	-	91	16	474	84	566	-

1. U.S.-born includes individuals born in the U.S. and U.S. territories. 2. Column sums may not equal applicable totals due to missing country of birth data. 3. Area-based poverty level is based on 2013-2017 American Community Survey data on the proportion of ZIP code residents living below the federal poverty level. Cases were assigned to a ZIP code based on their residence at TB diagnosis. 4. In the 12 months before TB diagnosis. 5. Among patients 18 years of age and older. 6. Percent is among patients with a pulmonary site of disease. 7. MDR-TB is defined as resistance to at least isoniazid and rifampin. Percent is among patients with susceptibility testing performed for isoniazid and rifampin. 8. XDR-TB is defined as resistance to at least isoniazid and rifampin plus a fluoroquinolone and a second-line injectable anti-TB medication. Percent is among patients with susceptibility testing performed for isoniazid, rifampin, any fluoroquinolone and any second-line injectable anti-TB medication. 9. Percent is among patients with susceptibility testing performed for isoniazid who did not have MDR-TB. 10. Percent is among patients with susceptibility testing performed for rifampin who did not have MDR-TB.

APPENDICES

TB REPORTING REQUIREMENTS

Medical, dental, osteopathic and other health care providers and administrators of hospitals or other institutions providing care and treatment, or their designees, including infection control practitioners, are required by the NYC Health Code §§11.03 and 11.05 to report all patients, alive or deceased, with suspected or confirmed TB disease to the NYC Health Department within 24 hours of diagnosis or clinical suspicion. Medical providers must report these patients even though microbiologists and pathologists are also required to report findings consistent with TB. Reports must be submitted using the Universal Reporting Form (URF) and must be received by the Health Department within 24 hours of diagnosis or clinical suspicion, whether sent electronically, by express or overnight mail, fax or telephone.

HEALTH CARE PROVIDERS

Health care providers in NYC are encouraged to submit reports electronically through a NYC MED account. Alternatively, providers may fax a completed URF to the Health Department's Bureau of TB Control at **844-713-0557**. Information reported on the URF should be as complete as possible. The following essential information must be included when the report is submitted to the Health Department:

- Information needed to identify and locate the individual (e.g., name, telephone, address, date of birth)
- Provider information (e.g., physician's name, reporting facility, phone number, email)
- Results of acid-fast bacilli (AFB) smear, including specimen source, date specimen obtained and accession number
- Results of radiologic exams (e.g., X-ray or imaging)
- Any treatment information
- Quantitative and qualitative results from TST or blood-based IGRA test for children younger than 5 years of age who have a positive test for TB infection

MICROBIOLOGY AND PATHOLOGY LABORATORIES

Laboratories are required to report via the NYS Electronic Clinical Laboratory Reporting System (ECLRS). Per the NYC Health Code sections §§13.03 and 13.05, the following results must be reported to the Health Department, whether confirmed or presumptive, for patients alive or deceased, within 24 hours of obtaining test results:

- AFB-positive smears (regardless of anatomic site)
- Nucleic acid amplification (NAA) test results and cultures positive for *M. tuberculosis* complex
- Results of susceptibility tests performed on *M. tuberculosis* complex cultures
- Biopsy, pathology or autopsy findings consistent with TB disease, including but not limited to presence of AFB on smear and caseating and/or necrotizing granulomas that are consistent with TB in the lung, lymph nodes or other specimens
- Any culture or NAA result associated with an AFB-positive smear (even if negative for *M. tuberculosis* complex)
- For patients with a positive TB diagnostic laboratory result, all subsequent TB diagnostic laboratory results (negative or positive) from specimens collected within one year of the most recent positive result
- Quantitative and qualitative results from blood-based IGRA tests regardless of test result or patient age

>> Health Code §13.05(a) also mandates that a portion of the initial culture be sent for DNA analysis to the NYC Public Health Laboratory (455 First Ave., Room 236; New York, NY 10016) within 24 hours of observing growth of *M. tuberculosis* complex in a culture from any specimen. A specimen submitted to the Health Department for drug susceptibility testing meets this requirement unless the Health Department notifies the submitter otherwise.

▶ **Reporting should never be delayed pending identification of *M. tuberculosis* with an NAA test or culture. Patients should be reported whenever TB is suspected, even if bacteriologic evidence of disease is lacking or treatment has not been initiated. If TB treatment is initiated after submitting the initial disease report, the provider is required to submit an updated report.**

REPORTING PATIENT FOLLOW-UP

Health Code §11.21(a)(3) requires the treating physician to report whether the patient completed treatment and the patient's treatment outcome (i.e., cured, failed, relapsed, lost, moved, refused), or whether treatment was discontinued if the patient was found not to have TB or for another reason. Physicians must assist the Health Department with evaluation and follow-up for persons suspected of having TB. Case managers contact the treating physicians to request updates and ensure that appropriate treatment and monitoring are being conducted. Health care providers must provide access to necessary paper and electronic medical records to authorized Health Department staff as requested [Health Code §11.03(e)].

Additionally, Health Code §11.21(a)(1) requires that the treating physicians or persons in charge of facilities must submit monthly clinical status reports for patients with TB disease, which must include at least:

- Name, address and telephone number(s) of the patient
- Whether treatment is still ongoing
- The clinical status and treatment being provided
- Dates and results of sputum and X-ray exams
- Any other information required by the Health Department

To facilitate mandatory monthly patient status reports, the Health Department created the "Report of Patient Services" form (TB 65). This form, or a report containing the same information, must be submitted to the patient's case manager.

When requested by the Health Department, medical providers are also required to report all information on the evaluation, testing and treatment of individuals who have been in contact with a person with TB disease. [Health Code §11.21(b)]

SUBMITTING HOSPITAL DISCHARGE AND TB TREATMENT PLANS

Health Code §11.21(a)(4) requires health care providers to submit a discharge plan to the Health Department for review and approval prior to discharging infectious TB patients from the hospital. The Hospital Discharge Approval Request Form (TB 354) must be submitted 72 hours before the planned discharge date and must be approved by the Health Department prior to discharge.



For more information and to download related forms, call 311 and ask for the BTBC Surveillance Unit or visit nyc.gov and search for TB reporting requirements. To download a URF, search for URF. To create a NYC MED account, search for NYC MED. To download forms related to hospital discharge plans and reporting patient services, search for TB reporting requirements.

IT IS MANDATORY TO REPORT PATIENTS WHO MEET ANY OF THE FOLLOWING CRITERIA:

- Positive NAA test result (e.g., Gen-Probe® Amplified™ *Mycobacterium Tuberculosis* [MTD] test, Cepheid GeneXPert® MTB/RIF, Hain Lifescience GenoType MTBDRplus, Hain Lifescience GenoType MTBDRsl) for *M. tuberculosis* complex
- Positive culture for *M. tuberculosis* complex, including: *M. tuberculosis*, *M. africanum*, *M. bovis-BCG*, *M. caprae*, *M. canetti*, *M. microti*, *M. pinnipedii*, *M. bovis*, *M. dassie*, *M. mungi*, *M. orygis*
- Biopsy, pathology or autopsy findings consistent with TB disease, including caseating or necrotizing granulomas in biopsy of lung, lymph nodes or other specimens
- Quantitative and qualitative results from blood-based IGRA tests regardless of test result or patient age
- Positive smear (from any anatomical site) for AFB
- Clinical suspicion of pulmonary or extrapulmonary TB such that the health care provider has initiated or intends to initiate isolation or treatment for TB disease with two or more anti-TB medications
- Any child younger than 5 years of age (on the day of test administration up to the day of the fifth birthday), with a positive TST or IGRA result, regardless of whether the child has received a Bacille Calmette-Guerin (BCG) vaccination. For these patients, providers must report quantitative and qualitative results from blood-based IGRA tests or induration (millimeters) for TSTs, as well as related chest imaging results and any preventive medication initiated for LTBI.

TB REPORTING DATA

FIGURE 23: Initial reporter of confirmed tuberculosis cases verified in New York City by reporter type, 2019

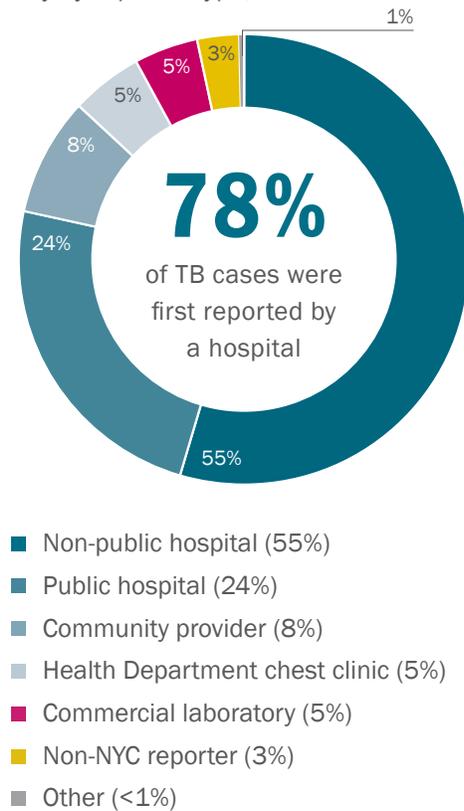


TABLE 11: Most common non-laboratory reporting facilities by number of confirmed tuberculosis cases reported, New York City, 2019

Facility	Number of cases
NYC Health+Hospitals/Elmhurst	46
New York-Presbyterian Queens	35
Maimonides Medical Center	25
New York-Presbyterian/Weill Cornell Medical Center	21
Mount Sinai Hospital	19
New York-Presbyterian/Brooklyn Methodist Hospital	18
Montefiore Medical Center - Henry and Lucy Moses Division	16
NYC Health+Hospitals/Lincoln	14
NYC Health+Hospitals/Queens	14
Long Island Jewish Medical Center	13
NYC Health+Hospitals/Bellevue	13
New York-Presbyterian/Columbia University Medical Center	13

FIGURE 24: Children younger than 5 years of age reported to the Health Department with a positive test result for tuberculosis infection¹ by reporter type, New York City, 2015-2019

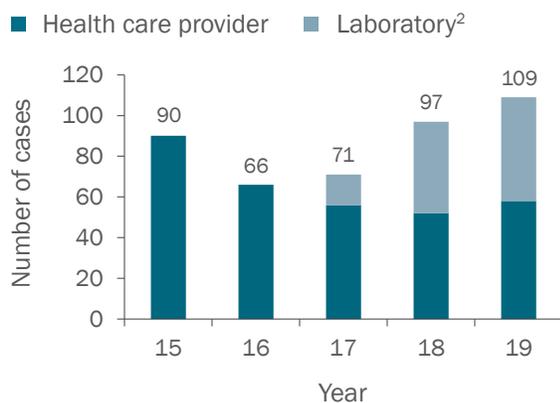


TABLE 12: Select characteristics of children younger than 5 years of age with a positive test for tuberculosis infection¹ result reported to the New York City Health Department, 2019 (n=109)

Patient characteristics	
Median patient age (range)	2 (0-4)
Received a QuantiFERON® test (%) ²	60 (55%)
Received a tuberculin skin test (%) ²	51 (47%)
Initiated treatment (%)	57 (52%)

1. Includes tuberculin skin tests, QuantiFERON®-TB Gold tests and T-SPOT.TB tests. 2. Laboratory reporting was added to the Health Code in 2017.

1. Includes tuberculin skin tests, QuantiFERON®-TB Gold tests and T-SPOT.TB tests. 2. Test type categories are not mutually exclusive.

TABLE 10: Tuberculosis (TB) cases and rates¹ by select characteristics, New York City, 1900-2019

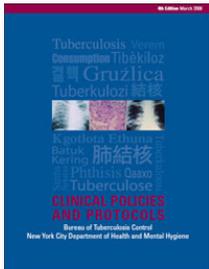
Year	Number of TB cases	Rate per 100,000	Cases with positive culture	Cases with positive sputum smear	Sputum smear positive rate per 100,000	Multidrug-resistant cases ²	Deaths attributable to TB ³	Death rate per 100,000
1900	11,997	349.0					9,630	280.2
1910	32,065	672.7					10,074	211.3
1920	14,035	249.7					7,915	140.8
1930	11,821	170.6					4,574	66.0
1940	9,005	120.8					3,680	49.4
1950	7,717	97.8					2,173	27.5
1960	4,699	60.4					824	10.6
1970	2,590	32.8					432	5.5
1980	1,514	21.4					143	2.0
1981	1,582	22.4					155	2.2
1982	1,583	22.4					168	2.4
1983	1,603	22.7					151	2.1
1984	1,573	22.2	1,485				168	2.4
1985	1,811	25.6	1,756				155	2.2
1986	2,197	31.1	2,156				186	2.6
1987	2,166	30.6	2,129				219	3.1
1988	2,281	32.3	2,205				246	3.5
1989	2,535	35.8	2,404				236	3.3
1990	3,506	47.9	3,384				256	3.5
1991	3,653	49.9	3,462	1,826	24.9	385	245	3.3
1992	3,755	51.3	3,401	1,855	25.3	437	200	2.7
1993	3,151	43.0	2,784	1,529	20.9	289	166	2.3
1994	2,941	40.2	2,433	1,280	17.5	183	133	1.8
1995	2,408	32.9	1,996	1,001	13.7	114	94	1.3
1996	2,013	27.5	1,693	873	11.9	84	67	0.9
1997	1,705	23.3	1,383	708	9.7	57	55	0.8
1998	1,528	20.9	1,232	611	8.3	38	52	0.7
1999	1,436	19.6	1,124	571	7.8	31	49	0.7
2000	1,311	16.4	1,043	516	6.4	24	44	0.5
2001	1,232	15.4	938	454	5.7	25	33	0.4
2002	1,071	13.4	819	436	5.4	29	30	0.4
2003	1,132	14.1	865	428	5.3	22	34	0.4
2004	1,036	12.9	793	395	4.9	19	31	0.4
2005	983	12.3	745	378	4.7	24	21	0.3
2006	947	11.8	705	354	4.4	24	18	0.2
2007	909	11.4	707	379	4.7	9	16	0.2
2008	886	11.1	685	339	4.2	11	18	0.2
2009	757	9.5	539	281	3.5	9	25	0.3
2010	705	8.6	511	265	3.2	11	26	0.3
2011	684	8.4	501	264	3.2	16	32	0.4
2012	652	8.0	495	271	3.3	18	15	0.2
2013	650	8.0	473	258	3.2	7	17	0.2
2014	582	7.1	454	243	3.0	10	31	0.4
2015	575	7.0	444	240	2.9	5	20	0.2
2016	556	6.8	448	225	2.8	11	21	0.2
2017	608	7.4	504	261	3.2	15	15	0.2
2018	553	6.8	421	230	2.8	13	Not available	Not available
2019	566	6.9	463	253	3.1	11	Not available	Not available

1. Rates are based on decennial census data. 2. Multidrug-resistant TB (MDR-TB) is defined as resistance to at least isoniazid and rifampin. 3. Data on TB deaths are obtained from the Health Department's Office of Vital Statistics. Deaths recorded in a given year may include cases diagnosed in a previous year.

RESOURCES FOR PROVIDERS AND THE PUBLIC

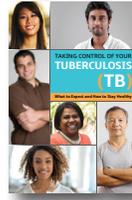
The Health Department offers a selection of culturally, technically and linguistically tailored TB education materials and other resources for patients, the general public and health care providers. To access these materials, policy updates and other information about TB and TB services in NYC, visit nyc.gov/health and search for **tuberculosis** or call **311**. For updates on TB related research, guidelines and events, please sign up for our TB newsletter, **TB ACTION NEWS**, by emailing TBoutreach@health.nyc.gov.

CLINICAL POLICIES AND PROTOCOLS



4th Edition.
Describes policies, protocols and recommendations for the prevention, treatment and management of TB. The 5th Edition will be available in 2020.

PATIENT BROCHURE



Taking Control of Your Tuberculosis (TB): What to Expect and How to Stay Healthy
General information for patients starting treatment for latent TB infection or active TB disease. Available in 18 languages.

"YOU CAN STOP TB" EDUCATIONAL POSTERS



This 11x17 poster provides basic TB information and includes illustrations with captions. Available in English, Spanish, French, Haitian Creole, Hindi, Urdu, Bengali, Tibetan, Tagalog and Chinese; available in hard copy or digital formats.

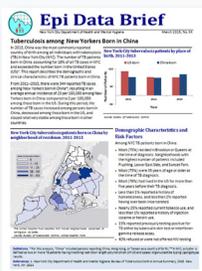
"GET TESTED"/"GET TREATED" POSTERS



These 11x17 posters highlight the benefits of TB testing and encourage evaluation and treatment for symptoms of TB disease. Available in Chinese.

»» NYC DATA RESOURCES ARE AVAILABLE ONLINE

NYC HEALTH DEPARTMENT EPI DATA BRIEFS



Epi Data Briefs are short publications that highlight data from Health Department programs and projects. To access recently published reports, visit nyc.gov/health and search for **epi data**.

NYC NEIGHBORHOOD HEALTH ATLAS



This online resource provides data on measures related to social factors and health for 188 neighborhoods. To access, visit nyc.gov/health and search for **health atlas**.

TECHNICAL NOTES

- Data for 2019 are preliminary and reflect the most complete information available as of Jan. 15, 2020.
- Data prior to 2019 have been updated since the release of the 2018 report. Data for these years reflect the final numbers and may differ from official estimates presented in previous reports.
- TB became a reportable disease on Jan. 19, 1897. From 1920-1940, only cases of pulmonary TB were reportable. Beginning in 1978 the TB case definition was amended to consider people who had verified TB disease 12 or more months before their current diagnosis as incident cases of TB disease.
- Data on patient sex are currently collected and categorized as male, female and transgender. In future reports, more expansive categories of gender identity will be presented to reflect changes in data collection.
- Age groupings have been changed from previous reports; as a result, count data for earlier years may differ from previous reports.
- In all tables presenting data by birth in the U.S, column sums may not equal applicable totals due to missing or unknown data.
- In all tables where data are presented by geography, column sums may not equal applicable totals due to missing or unknown data.
- The sum of proportions do not always equal 100% due to rounding.
- All rates presented in this report are calculated per 100,000 population. Reported rates for earlier years may differ from previous reports due to corrected data and changes in the denominators used to calculate rates. The sources of denominator data are indicated throughout the report.
- The Health Department calculates population estimates based on modified U.S. Census Bureau interpolated intercensal estimates. Data are modified to account for population undercounts in northwest Queens and southern Brooklyn because of erroneously deleted housing units and housing units mislabeled as vacant. Population estimates are updated as new data become available. Therefore, rates may differ from previously reported rates.
- U.S.-born refers to patients born in the 50 states, District of Columbia or other U.S. territories and outlying areas, including American Samoa, Baker Island, Guam, Howland Island, Jarvis Island, Johnston Atoll, Kingman Reef, Midway Island, Navassa Island, Northern Mariana Islands, Palmyra Atoll, Puerto Rico, U.S. Minor Outlying Islands, U.S. Pacific Islands, Virgin Islands and Wake Island. All others with a known country of birth are considered non-U.S.-born.
- Area-based poverty is defined using patients' ZIP code of residence at the time of TB diagnosis. Poverty level by ZIP code is based on the most recent American Community Survey five-year sample data from the American Community Survey that measures the proportion of residents living below the federal poverty level in that census tract. The federal poverty level is a measure of income used by the U.S. government to determine eligibility for subsidies, programs and benefits. The Department of Health and Human Services updates the poverty guidelines each January. Patients with addresses outside of NYC, addresses unable to be geocoded to a ZIP code or located in ZIP codes where poverty level could not be determined were not assigned to a poverty level.
- The definition of excessive alcohol use has been changed from previous reports. The current definition of excessive alcohol use is based on national definitions of binge drinking and heavy alcohol use from the Substance Abuse and Mental Health Services Administration.
- The geographic distribution of cases is presented by the 42 United Hospital Fund neighborhoods. These neighborhoods consist of adjoining ZIP codes that approximate NYC Community Planning Districts and contain an average of 200,000 individuals.
- Data presented on HIV status reflect information as collected by the Health Department. Misclassification of HIV status may occur if a patient refused to disclose known status or refused to be tested for HIV while under care for TB disease.
- Data on TB deaths are obtained from the NYC Office of Vital Statistics. Deaths recorded in a given year may include cases diagnosed in a previous year.
- Product names are provided for identification purposes only; their use does not imply endorsement by the Health Department.

NEW YORK CITY HEALTH DEPARTMENT CHEST CLINICS

Eligible patients can be referred to one of four Health Department chest clinics located throughout NYC for TB testing, radiography, sputum induction and treatment as needed. All chest clinic services, including medication, are provided at no cost to the patient and regardless of immigration or insurance status.

WASHINGTON HEIGHTS

600 W. 168th St.,
Third Floor
New York, NY 10032

212-368-4500

MORRISANIA

1309 Fulton Ave.,
First Floor
The Bronx, NY 10456

718-838-6876

CORONA

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

718-396-5134

FORT GREENE

295 Flatbush Ave. Ext.,
Fourth Floor
Brooklyn, NY 11201

718-249-1468

THE HEALTH DEPARTMENT PROVIDES A VARIETY OF TB DIAGNOSTIC SERVICES, INCLUDING:

- Testing for TB infection using the latest generation blood-based QuantiFERON®-TB Gold test and TST
- Sputum induction
- Chest radiographs
- Medical evaluation
- Treatment for TB disease and LTBI
- DOT services, including vDOT

ADDITIONAL CLINICAL SERVICES PROVIDED AT EACH CHEST CLINIC INCLUDE:

- Outpatient medical and nursing care
- Phlebotomy services
- Social services referrals
- HIV education and testing regardless of person's need for TB care
- TB evaluation for newly arrived immigrants and refugees referred by the CDC



To make an appointment or to refer a patient, call the individual chest clinic or **311**.

