

Latent Tuberculosis and Active Tuberculosis Disease Rates among the Homeless, New York, New York, USA, 1992–2006

Technical Appendix

Qualifications for Use of Data

Between January 1, 1992, and April 30, 2004, only data from which identifiers had been removed were gathered and reported under contract with New York State Department of Health (NYSDOH) Bureau of TB Control. Between May 1, 2004, and June 30, 2006, reporting requirements changed, and identified data were sent to the New York City Department of Homeless Services (NYCDHS). During the latter period, for this study we used de-identified, unlinked data as defined by the Federal Privacy and Common Rules. Neither the Privacy (HIPAA) nor the Common Rule (45 CFR 46) require Institutional Review Board review and oversight because these regulations deem studies that use anonymized data exempt [45 CFR 46.101(b) (4) and (5)] from such review and oversight.

Data Collection and Management

TB questionnaire data were compiled by using Alpha 5-version 1.0.2 software (Alpha Software Inc., Burlington, MA, USA) and EpiInfo6 for DOS (Centers for Disease Control and Prevention, Atlanta, GA, USA). The Alpha 5 files were translated into Excel format for preliminary analyses. For our study, each screening event was considered a unique observation. Consequently, persons may be counted more than once, depending on how often they were evaluated at a shelter or drop-in center. Monthly reports were generated after data were reviewed for missing or incorrect entries. If data were found to be missing, staff members at the relevant shelter sites were contacted to verify responses for accuracy.

We accepted a convincing history of a previous positive tuberculin skin test (TST) as sufficiently accurate for use in making latent tuberculosis infection (LTBI) treatment decisions).

Although seemingly rare, severe reactions, including vesiculation, ulceration, and cellulitis, have occurred in persons tested who were previously TST positive. During the study period, 2 persons experienced such reactions and required hospitalization. Both were tested because they did not recall previous positive TST results. In addition, St. Vincent's medical staff have encountered men who present with forearm keloids, sometimes multiple, because of mandated repeat TST given while they were in the correctional system. Few carried documentation of prior TST results at the time of arrest. From 1992 through 1999 we performed anergy testing with mumps virus and *Candida albicans* extracts to decrease TST false-negative results caused by cutaneous anergy. We abandoned the procedure in 1999 after the Centers for Disease Control and Prevention (Atlanta, GA, USA) determined that anergy tests lacked standardization and were unreliable (1).

Race/Ethnicity

Decisions regarding categorizations of race and ethnicity for each person were made by the persons screened. Our reports of data on race should be understood within the limitations of the methods used, and the validity of the classifications regarding race is subject to the nature of these methods.

Analytical Methods

Data were transferred from Excel (Microsoft Corp., Redmond, WA, USA) format by using Stattransfer 9.0 into Stata 10 (Circle Systems, Seattle, WA, USA). All analyses were done by using Stata 10 statistical software (StataCorp., College Station, TX, USA). For 2-group comparisons of continuous outcomes, Student *t* tests were used. We used analysis of variance (ANOVA) for comparisons with >2 groups. With >2 categorical groups, we adjusted the results by using the Bonferroni method for multiple comparisons. For modeling continuous outcomes, we used multiple linear regression, and for dichotomous outcomes (test positivity and compliance), we used multiple logistic regression. Models were developed by using all available predictors.

Demographic Characteristics

We report the distribution of characteristics in online Technical Appendix Table 4. Men made up 95.1% of the sample. The average age was 42.5 years (SD 11.9) with men being slightly younger (43.6 years vs. 42.5 years; $p < 0.001$). Fifty-eight percent of the sample were black non-Hispanic; 23.4% were Hispanic, and 12.6% were white non-Hispanic. Asians and Native Americans made up slightly more than 1.1% of the total, and 4.8% were other race/ethnicity. Black non-Hispanics were the youngest, with a mean age of 41.8 years. The mean age of Hispanics was 42.2. White non-Hispanics were the oldest group, with a mean age of 46.5 (SD 12.80), significantly older than Hispanics (42.2, SD 12.19) and others (42.4, SD 12.16).

Reference

- Centers for Disease Control and Prevention. Anergy skin testing and preventive therapy for HIV-infected persons. *MMWR Morb Mortal Wkly Rep.* 1997;46(RR-15):1–100. [PubMed](#)

Technical Appendix Table 1. Tuberculin skin test positivity by year and site, New York City, 1992–2006

Year	Positive by test				Positive by test or history			
	Site 1		All other sites		Site 1		All other sites	
	No.	%	No.	%	No.	%	No.	%
1992	258	40.1	–	–	533	58.1	–	–
1993	180	31.4	–	–	366	48.2	–	–
1994	159	25.5	–	–	326	41.2	–	–
1995	148	20.6	–	–	332	36.7	–	–
1996	211	22.7	–	–	582	44.7	–	–
1997	164	19.1	28	30.4	505	42.2	86	57.3
1998	119	16.4	95	27.1	474	43.9	356	58.2
1999	98	14.0	217	24.3	405	40.3	595	46.7
2000	113	15.3	200	21.2	393	38.6	616	45.4
2001	94	12.0	205	20.0	338	32.8	647	44.2
2002	93	12.2	229	19.4	381	36.2	703	42.5
2003	123	11.4	211	19.1	464	32.7	690	43.6
2004	82	8.0	137	12.2	392	29.2	584	37.2
2005	122	9.5	153	10.6	476	29.0	605	32.0
2006	63	9.8	95	13.3	259	30.9	277	30.8

Technical Appendix Table 2. Characteristics of those who underwent tuberculosis screenings, New York City, 1992–2006*

Characteristic	No. (%)
Race/ethnicity	
Black non-Hispanic	18,627 (58.00)
Hispanic	7,520 (23.4)
White non-Hispanic	4,060 (12.64)
Asian	315 (1.0)
Other	1,524 (4.8)
Native American	62 (0.2)
Total	32,108
Age, y	
15–24	2,042 (6.4)
25–34	6,644 (20.7)
35–44	9,733 (30.371)
45–54	8,482 (26.472)
55–64	3,939 (12.274)
≥65	1,277 (4.0)
Total	32,108
Sex	
M	30,532 (95.1)
F	1,576 (4.9)
Total	32,108
TST result	
Negative	17,368 (82.8)
Positive	3,597 (17.2)
Total	20,965
TST result by history status	
Negative	17,368 (60.4)
Positive	11,385 (39.6)
Total	28,753

*TST, tuberculin skin testing.

Technical Appendix Table 3. Multiple logistic regression model of risk factors for positive TST results or history, New York City, 1992–2006*

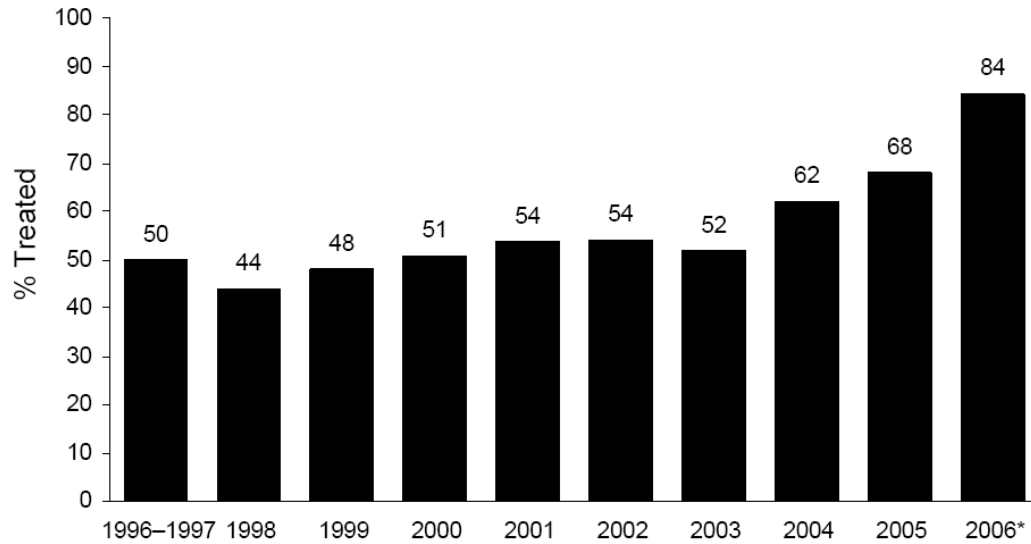
Risk factors	Adjusted OR	95% CI	p value
Female (ref)	1		
Male	2.17	1.87–2.51	<0.001
Age, y			
15–24 (ref)	1		
25–34	2.08	1.79–2.41	<0.001
35–44	3.56	3.09–4.10	<0.001
45–54	5.66	4.91–6.53	<0.001
55–64	7.67	6.60–8.92	<0.001
≥65	9.91	8.27–11.87	<0.001
Race/ethnicity			
Black (ref)	1		
Hispanic	1.03	0.97–1.09	0.371
White	0.44	0.40–0.48	<0.001
Other	0.97	0.86–1.09	0.598
Asian	3.08	2.40–3.96	<0.001
Native American	1.14	0.67–1.94	0.638
Shelter	0.97	0.90–1.06	0.545

*n = 28,753. TST, tuberculin skin testing; OR, odds ratio; CI, confidence interval; ref, reference.

Technical Appendix Table 4. Multiple logistic regression model of risk factors for noncompliance with TST reading, New York City, 2002–2006*

Risk factor	Adjusted OR	95% CI	p value
Female (ref)	1		
Male	1.09	0.89–1.33	0.41
Age, y			
15–24 (ref)	1		
25–34	0.77	0.67–0.89	<0.001
35–44	0.71	0.62–0.81	<0.001
45–54	0.71	0.62–0.82	<0.001
55–64	0.63	0.53–0.74	<0.001
≥65	0.59	0.46–0.75	<0.001
Race/ethnicity			
Asian vs all others	0.44	0.25–0.77	0.004
Black vs all others	1.08	1.00–1.16	0.049
Shelter vs drop-in center	1.06	0.94–1.20	0.324

*n = 24,238. OR, odds ratio; CI, confidence interval; ref, reference; TST, tuberculin skin testing



Technical Appendix Figure. Percentage of persons with positive tuberculin skin test by history who reported ≥ 6 months of latent tuberculosis infection treatment (January 1996 through June 2006).