

# Tuberculosis Caused by *Mycobacterium africanum*, United States, 2004–2013

## Technical Appendix

**Technical Appendix Table 1.** Characteristics of patients with tuberculosis caused by *Mycobacterium africanum* and *M. tuberculosis*, United States, 2004–2013\*

Variable	No. (%)		OR (95% CI)	p-value†
	<i>M. africanum</i> , n = 315	<i>M. tuberculosis</i> , n = 71,727		
Country of birth				
United States	39 (12.4)	28,955 (40.4)	Referent	<0.001
Other	276 (87.6)	42,633 (59.6)	4.8 (3.4–6.7)	
Country of origin				
In West Africa‡	254 (80.6)	926 (1.3)	318.4 (239.0–424.2)	<0.001
Not in West Africa	61 (19.4)	70,801 (98.7)	Referent	
Time in the United States, y§				
0–2	102 (39.5)	8,998 (23.4)	Referent	<0.001
2–5	64 (24.8)	6,106 (15.9)	0.9 (0.7–1.3)	
≥5	92 (35.7)	23,282 (60.7)	0.3 (0.3–0.5)	
Clustered case¶				
Yes	2 (1.4)	9,655 (29.0)	0.1 (0.1–0.2)	<0.001
No	139 (98.6)	26,762 (71.0)	Referent	
Race/ethnicity				
Non-Hispanic White, Asian, or other race	20 (6.4)	34,047 (47.6)	Referent	<0.001
Non-Hispanic Black, or multiracial	286 (91.7)	18,052 (25.2)	27.0 (17.1–42.5)	
Hispanic	6 (1.9)	19,443 (27.2)	0.5 (0.2–1.3)	
Age, y				
0–14	7 (2.2)	1,349 (1.9)	Referent	<0.001
15–24	55 (17.5)	8,283 (11.5)	1.3 (0.6–2.8)	
25–44	167 (53.0)	24,122 (33.6)	1.3 (0.6–2.8)	
45–64	68 (21.6)	22,297 (31.1)	0.6 (0.3–1.3)	
≥65	18 (5.7)		0.2 (0.1–0.5)	
Sex				
F	118 (37.5)	26,755 (37.3)	1.0 (0.8–1.3)	0.957
M	197 (62.5)	44,947 (62.7)	Referent	
Reported HIV status				
Negative	207 (65.7)	46,920 (65.4)	Referent	<0.001
Positive	56 (17.8)	4,610 (6.4)	2.8 (2.0–3.7)	
Unknown/not determined	52 (16.5)	20,197 (28.2)	0.6 (0.4–0.8)	
Previous diagnosis of TB				
Yes	8 (2.7)	3,266 (4.6)	0.6 (0.3–1.1)	0.107
No	292 (97.3)	67,361 (95.4)	Referent	
Primary disease site				
Pulmonary	198 (62.9)	53,350 (74.4)	Referent	<0.001
Extrapulmonary	76 (24.1)	11,227 (15.7)	1.8 (1.4–2.4)	
Pulmonary and extrapulmonary	41 (13.0)	7,117 (9.9)	1.6 (1.1–2.2)	
Primary extrapulmonary site#				
Bone	13 (17.1)	1,482 (13.2)	Referent	0.095**
Genitourinary	3 (3.9)	637 (5.7)	0.5 (0.2–1.9)	
Cervical lymph node	17 (22.4)	3,075 (27.4)	0.6 (0.3–1.3)	
Other lymph node	14 (18.4)	1,659 (14.8)	1.0 (0.5–2.1)	
Meningeal	3 (3.9)	411 (3.7)	0.8 (0.2–2.9)	
Peritoneal	6 (7.9)	661 (5.9)	1.0 (0.4–2.7)	
Pleural	5 (7.9)	1,863 (16.6)	0.3 (0.1–0.9)	
Other	15 (19.7)	1,439 (12.8)	1.2 (0.6–2.5)	
Chest radiography finding				
Abnormal, cavitory	83 (26.3)	19,249 (26.8)	0.6 (0.5–0.9)	<0.001
Abnormal, non-cavitory	158 (50.0)	41,794 (58.3)	0.5 (0.4–0.7)	
Normal	74 (23.7)	10,684 (14.9)	Referent	
Sputum smear result				
Positive	137 (50.7)	35,063 (56.4)	0.8 (0.6–1.0)	0.061
Negative	133 (49.3)	27,101 (43.6)	Referent	

Variable	No. (%)		OR (95% CI)	p-value†
	<i>M. africanum</i> , n = 315	<i>M. tuberculosis</i> , n = 71,727		
Tuberculin skin test result				
Positive	163 (80.3)	36,640 (79.8)	1.0 (0.7–1.5)	0.853
Negative	40 (19.7)	9,292 (20.2)	Referent	
Homeless in year before diagnosis				
Yes	8 (2.6)	4,561 (6.4)	0.4 (0.2–0.8)	0.006
No	304 (97.4)	66,677 (93.6)	Referent	
Resident of correction institution in year before diagnosis				
Yes	2 (0.6)	2,718 (3.8)	0.2 (0.0–0.6)	0.003**
No	313 (99.4)	68,796 (96.2)	Referent	
Resident of long-term care facility in year before diagnosis				
Yes	8 (2.5)	1,600 (2.2)	1.1 (0.6–2.3)	0.716
No	307 (97.5)	69,968 (97.8)	Referent	
Drug use				
Yes	6 (1.9)	6,193 (8.8)	0.2 (0.1–0.5)	<0.001
No	303 (98.1)	64,181 (91.2)	Referent	
Excessive alcohol use				
Yes	11 (3.5)	10,135 (14.4)	0.2 (0.1–0.4)	<0.001
No	300 (96.5)	60,383 (85.6)	Referent	
Multidrug resistance††				
Yes	2 (0.6)	1,006 (1.4)	0.5 (0.1–1.8)	0.337**
No	307 (99.4)	69,847 (98.6)	Referent	
Reason therapy stopped				
Completed treatment	271 (91.2)	57,230 (86.7)	Referent	0.005
Died during treatment	8 (2.7)	5,082 (7.7)	0.3 (0.2–0.7)	
Other reason	18 (6.1)	3,668 (5.6)	1.0 (0.6–1.7)	
Reported resistance to isoniazid††				
Resistant	25 (8.1)	6,269 (8.8)	0.9 (0.6–1.4)	0.644
Susceptible	284 (91.9)	64,658 (91.2)	Referent	
Reported resistance to rifampin††				
Resistant	2 (0.6)	1,235 (1.7)	0.4 (0.1–1.5)	0.187**
Susceptible	308 (99.4)	69,688 (98.3)	Referent	

\*Sums of counts for a variable might be less than the total counts in column headings because of missing data. OR, odds ratio.

†Determined by Pearson  $\chi^2$  test unless otherwise specified.

‡Includes Nigeria, Liberia, Sierra Leone, Guinea, The Gambia, Ghana, Mali, Senegal, Côte d'Ivoire, Togo, Cameroon, Mauritania, Niger, and Guinea-Bissau.

§Restricted to cases in foreign-born persons.

¶Restricted to cases reported after 2009, for which complete 24-locus MIRU-VNTR data were available.

#Restricted to cases with only extrapulmonary disease.

\*\*Determined by Fisher exact test.

††Reported resistance is based on results from conventional drug susceptibility testing of the initial specimen on which drug susceptibility testing was performed.

**Technical Appendix Table 2.** Unique spoligotype and 12-locus MIRU-VNTR combinations with corresponding number of cases of TB caused by *Mycobacterium africanum*, United States, 2004–2013\*

Spoligotype	MIRU-VNTR†	No.
11111100011111111111111111111111101111101111	236214333522	13
111111000111111111111111111111111111111101111	226224243521	13
1111110001111111111111111111111111111111101111	236224233422	13
11111100011111111111111110001111111111111101111	225424243522	9
111111000000000111100011111111111110001111	224424243221	8
111111000001111111100011111111111110001111	224424244221	8
111111000111111111110001111111111111101111	224424243522	7
10111110000011111111000111111111111110001111	224424243221	6
1111111000001111111100011111111111110001111	224424243221	6
1111110001111111111111111111111111101111	227224243521	5
1111111000001111111100000000000000000111	224424244221	5
1111111000001111111100001101111101110001111	224424244221	5
11111100000000011110001100111111110001111	224424243221	4
1111110001111111111111111111111111101111	225424243522	4
111111100000111111111111111111111110001111	224424244221	4
10011100011111111111111111111111011110111	236214233522	3
11111100011111111111110001111111111111100111	225124241522	3
111111000111111111111111111101110111101111	236214333522	3
11111100011111111111111111111101111100011	236214323522	3
11111110000000000001111111111111110001111	124424244221	3
11111110000011111111000001111111111110001111	224424243221	3
11111110000011111111000111111100000001111	224424243221	3
1111111000001111111100011111111111110001111	224324244221	3
100111100000111111110001111111111110001111	222424243221	2

Spoligotype	MIRU-VNTR†	No.
1011111000001111111100001111111111110001111	224414243221	2
111000000000000000000000000000000000000000001111	223424243221	2
1111000000001111111111111111111111111111101111	225424243522	2
1111110000000001110000000000000110001111	224424243221	2
1111110000001111111100000100000000000001111	222324243221	2
111111000111111111010001111111111111101111	224424243522	2
111111000111111111100011111111111111101111	224324243522	2
1111110001111111111111111111111111111101111	226224253521	2
111111000111111111111111111111111111111101111	227224243421	2
11111100011111111111111111111111111111101111	235224233422	2
111111100000000011111111111111111010001111	224424242221	2
1111111000000011110000001111111111110001111	224424234221	2
11111110000010111111000011111111111110001111	224324243221	2
111111100000111011000000111111000010001111	224224244221	2
111111100000111111000000111111111110001111	224424244221	2
111111100000111111100000000000000000001111	224424244221	2
111111100000111111110000100000000000000111	224424254221	2
1111111000001111111100001111111111110001101	224424244221	2
1111111000001111111100001111111111110001111	222424244221	2
01111110000011111111000011111111111110000111	224424244221	1
01111110000011111111000011111111111110000111	224324244221	1
01111110000011111111000011111111111110000111	224424-24221	1
1010111000001111111100001111111111110001111	224424243221	1
101101100000100111110000111111011110001101	224424244221	1
10111100000000000111000011111111110001111	224424243221	1
1011111000001111111100001111111111110000111	2244-4243221	1
1011111000001111111100001111111111110001111	224424143221	1
101111100000111111111111111111111110001111	224425244221	1
11011110000000111111111111111111110000111	224424244221	1
1101111000001111111110011111111111110001111	234424224221	1
1110000000000000000111111111111101101111	237224243511	1
111000000000111110111111111100000001101111	224325253324	1
111000000000111111111111111111111111101111	126224243521	1
111000000011111111000111111111111111101111	236224233412	1
111000000011111111000111111111111111101111	236224233422	1
1110010001111111111111111111111111101111	226224243521	1
111001100000111111111111010000000110001111	224424244221	1
1110111000001111111100001111111111111000111	224424243221	1
111011100000111111111111111111111110001111	224324244221	1
11110110000011111111000000000000010001111	224424244221	1
1111100000000000000111111111111111101111	226224243521	1
111110000011111110111111111111100011110111	225224243521	1
1111110000000001011000011111111110001111	224424243221	1
1111110000000001100000000000000110001110	223424243221	1
1111110000000001100000000000000110001111	224524243221	1
111111000000000111000011111111111000000	234424243221	1
1111110000001111111100000000000000000111	222324243221	1
1111110000001111111100000000000000000111	222424243221	1
1111110000111001111111111111110111101101	227224243521	1
11111100010011111111111111111111111101111	227224243321	1
111111000110011111111111111111110111101111	226214333522	1
111111000110011111111111111111110111101111	236214333822	1
11111100011101111100000010000111111101111	213424243522	1
11111100011101111111000111111111111101111	224424243522	1
11111100011101111111111111111111111101111	225424243522	1
11111100011101111111111111111111111101111	226224233422	1
11111100011101111111111111111111111101111	227224243521	1
11111100011110000000011011111111111001111	227224243521	1
11111100011111110000011111111111111101111	227224243521	1
11111100011111111000000100001111110101111	214324231522	1
111111000111111110001111111111111101111	226224233521	1
111111000111111111011111111111111101111	226224243521	1
1111110001111111111000111111011111101111	225424-33522	1
1111110001111111111000111000111111111101011	225424243522	1
1111110001111111111000111111101111100111	225124241522	1
1111110001111111111000111111110110101111	225424243522	1
1111110001111111111000111111111111100111	225424243522	1
11111100011111111110001111111111111101011	224424243522	1
1111110001111111111000111111111111101100	225424243522	1
111111000111111111100011111111111101111	213424273522	1
111111000111111111100011111111111101111	215424243522	1
1111110001111111111000111111111111101111	224424243722	1

Spoligotype	MIRU-VNTR†	No.
11111100011111111111111111000111111111111101111	224624243522	1
11111100011111111111111111000111111111111101111	225324243422	1
11111100011111111111111111000111111111111101111	225324243522	1
11111100011111111111111111000111111111111101111	225424233522	1
11111100011111111111111111000111111111111101111	225424243622	1
11111100011111111111111111000111111111111101111	225425243522	1
1111110001111111111111111111111111000001101111	226224243521	1
1111110001111111111111111111111111000011101111	236214233422	1
1111110001111111111111111111111111101111100011	226214333522	1
1111110001111111111111111111111111101111100011	236214323422	1
1111110001111111111111111111111111101111100011	236214333522	1
1111110001111111111111111111111111101111101111	235214233523	1
11111100011111111111111111111111111101111101111	236212333522	1
11111100011111111111111111111111111101111101111	236214233521	1
11111100011111111111111111111111111101111101111	236214333523	1
11111100011111111111111111111111111111111100111	222224243521	1
11111100011111111111111111111111111111111100111	226224243521	1
111111000111111111111111111111111111111111100111	227224243521	1
111111000111111111111111111111111111111111100111	236224233422	1
111111000111111111111111111111111111111111101101	226224243521	1
111111000111111111111111111111111111111111101101	236224233422	1
1111110001111111111111111111111111111111111101110	215224233522	1
1111110001111111111111111111111111111111111101110	236224233422	1
1111110001111111111111111111111111111111111101111	127224243321	1
1111110001111111111111111111111111111111111101111	2-5424243522	1
1111110001111111111111111111111111111111111101111	223224243521	1
1111110001111111111111111111111111111111111101111	225224243521	1
1111110001111111111111111111111111111111111101111	226224233521	1
1111110001111111111111111111111111111111111101111	226224243-21	1
1111110001111111111111111111111111111111111101111	226224243511	1
1111110001111111111111111111111111111111111101111	226224243721	1
1111110001111111111111111111111111111111111101111	227224213521	1
1111110001111111111111111111111111111111111101111	227224242321	1
1111110001111111111111111111111111111111111101111	227224243321	1
1111110001111111111111111111111111111111111101111	227224263521	1
1111110001111111111111111111111111111111111101111	23-224233422	1
1111110001111111111111111111111111111111111101111	2352-4232422	1
1111110001111111111111111111111111111111111101111	237224233422	1
1111110001111111111111111111111111111111111101111	238224233422	1
1111110001111111111111111111111111111111111101111	325224243521	1
111111100000000000000000000000000000000000000001	224424243221	1
1111111000000000000000000000000000000000000010001111	224524244221	1
1111111000000000000000000000000000000000000011111111111111111100111	124424244221	1
111111100000000111111000011111111111111111110000111	234416244221	1
111111100000001111110000111111111111111111110001111	224624243221	1
111111100000000111111111111111111111111111110000111	224424244221	1
111111100000001111111111111111111111111111110001111	224424244221	1
111111100000001111111000011111111111111111110001111	224424243221	1
111111100000101111111111111111111111111111100001111	224424254221	1
1111111000001100001111110000000001100001111	224424244221	1
1111111000001101111111111111111111111111110001111	224424253221	1
11111110000011111110000001011111111111111110001111	224224244221	1
111111100000111111100000001100000110000111	224424244221	1
1111111000001111111000000101100000110000111	225424244221	1
1111111000001111111000000101110001110000111	224424244231	1
1111111000001111111000001111111111111111110001111	224524244221	1
111111100000111111100000000000000000000111	224524244221	1
111111100000111111100000100000000010001111	224424244221	1
11111110000011111110000111110111111110001111	224424234221	1
11111110000011111110000111111000000001111	224324243221	1
1111111000001111111100001111111100010000111	224414244221	1
11111110000011111111000011111111111110000111	224424243221	1
11111110000011111111000011111111111110000111	224324244221	1
11111110000011111111000011111111111110000111	224414-44221	1
11111110000011111111000011111111111110000111	224414244221	1
11111110000011111111000011111111111110001001	223424234221	1
11111110000011111111000011111111111110001111	214424243221	1
11111110000011111111000011111111111110001111	223424354221	1
11111110000011111111000011111111111110001111	224324213221	1
11111110000011111111000011111111111110001111	224324243221	1
11111110000011111111000011111111111110001111	224325244221	1
11111110000011111111000011111111111110001111	224414243221	1
11111110000011111111000011111111111110001111	224424143221	1

Spoligotype	MIRU-VNTR†	No.
11111110000011111111000011111111111110001111	224424211221	1
11111110000011111111000011111111111110001111	225424243221	1
111111100000111111111011000000000010001111	224624244221	1
111111100000111111111111000000001010001111	234424244221	1
1111111000001111111111111010000000010001111	224614244221	1
11111110000011111111111111111111010001111	224424242221	1
111111100000111111111111111111111110001111	223424244221	1
111111100000111111111111111111111110001111	224224244221	1
111111100000111111111111111111111110001111	224324244221	1
111111100000111111111111111111111110001111	224424234221	1
111111100000111111111111111111111110001111	224424242221	1
111111100000111111111111111111111110001111	224424245221	1
111111100000111111111111111111111110001111	224524244221	1

\*MIRU-VNTR, mycobacterial interspersed repetitive unit variable number tandem repeat.

†Digits refer to number of repeats detected at the respective 12 MIRU-VNTR locus in the following order: 2, 4 (ETR D), 10, 16, 20, 23, 24, 26, 27 (QUB-5), 31 (ETR E), 39, 40.

**Technical Appendix Table 3.** Unique spoligotype and 24-locus MIRU-VNTR combinations with corresponding number of cases of tuberculosis caused by *Mycobacterium africanum*, United States, 2009–2013\*

Spoligotype	MIRU-VNTR†	No.
1111110001111111111111111111111111101111	236224233422 253463443434	7
10111110000011111111000011111111111110001111	224424243221 142–43423332	3
11111100000000001111000011111111111110001111	224424243221 142–43423332	3
11111110000011111111000011111111111110001111	224424244221 342–43423232	3
111000000000000000000000000000000000000000001111	223424243221 142–43223332	2
111111000111111111111110001111111111111101111	225424243522 354563443316	2
1111111000001111111100001101111101110001111	224424244221 142–43423332	2
11111110000011111111000011111111111110001111	222424244221 343–43423332	2
11111110000011111111000011111111111110001111	224324244221 142–43423332	2
11111110000011111111000011111111111110001111	224424243221 142–43423332	2
01111110000011111111000011111111111110000011	224424244221 342–43433333	1
01111110000011111111000011111111111110000111	224324244221 342–43423333	1
1001110001111111111111111111111110111101111	236214233522 153473443436	1
1001110001111111111111111111111110111101111	236214233522 253573443436	1
10101110000011111111000011111111111110001111	224424243221 122–43423332	1
1011011000001001111100001111111011110001101	224424244221 342–43423212	1
10111110000011111111000011111111111110000111	2244–4243221 142643423432	1
10111110000011111111000011111111111110001111	224414243221 142–43423332	1
1011111000001111111111111111111111110001111	224425244221 442–43424333	1
110111100000001111111111111111111110000111	224424244221 342–33423433	1
11100000000000000000001111111111111101101111	237224243511 253463432636	1
111000000011111111000111111111111111101111	236224233422 253463443434	1
111001000111111111111111111111111111101111	226224243521 254443453436	1
1110011000001111111111110100000000110001111	224424244221 342–33423333	1
111011100000111111111111111111111110001111	224324244221 342–43523333	1
111101100000111111110000000000000010001111	224424244221 342–43423233	1
111111000000000011100000000000000011000110	223424243221 142–43423332	1
111111000000000011100001100111111110001111	224424243221 122–43423232	1
111111000000000011100001100111111110001111	224424243221 122243423232	1
111111000000000011100001100111111110001111	224424243221 142–43423331	1
111111000000000011100001100111111110001111	224424243221 142–43423332	1
111111000000000011100001111111111110000001	234424243221 142–33423332	1
111111000000000011100001111111111110001111	224424243221 142–43423432	1
111111000000000011100001111111111110001111	224424243221 142233423332	1
11111100010011111111111111111111111101111	227224243321 264473443–36	1
1111110001110111110000001000011111111101111	213424243522 354463443436	1
11111100011101111111000111111111111101111	224424243522 254563453436	1
1111110001110111111111111111111111101111	226224233422 253463443434	1
11111100011111110000001111111111111101111	227224243521 254483443436	1
11111100011111111110111111111111111101111	226224243521 254473433436	1
1111110001111111111000111111110110101111	225424243522 354563443236	1
1111110001111111111000111111111111100111	225424243522 354563442436	1
1111110001111111111000111111111111101100	225424243522 354563443436	1
1111110001111111111000111111111111101111	215424243522 356363443436	1
1111110001111111111000111111111111101111	224324243522 354363443433	1
1111110001111111111000111111111111101111	224424243522 3545–3443436	1
1111110001111111111000111111111111101111	224424243522 354563443436	1
1111110001111111111000111111111111101111	225324243522 354563443436	1
1111110001111111111000111111111111101111	225424243522 354563433436	1
1111110001111111111000111111111111101111	225424243522 366563443436	1

Spoligotype	MIRU-VNTR†	No.
1111110001111111111111000111111111111101111	225424243622 354563433436	1
11111100011111111111111111111011101111101111	236214333522 253443443436	1
11111100011111111111111111111111101111100011	236214323422 253473443436	1
11111100011111111111111111111111101111100011	236214323522 253473443433	1
111111000111111111111111111111111101111100011	236214323522 253473443436	1
111111000111111111111111111111111101111100011	236214333522 253473443436	1
111111000111111111111111111111111101111101111	235214233523 253473443436	1
111111000111111111111111111111111101111101111	236212333522 253473443436	1
111111000111111111111111111111111101111101111	236214333522 253-43443436	1
111111000111111111111111111111111101111101111	236214333522 253-73443436	1
111111000111111111111111111111111101111101111	236214333522 253363443436	1
111111000111111111111111111111111101111101111	236214333522 253363444435	1
111111000111111111111111111111111101111101111	236214333522 253443443436	1
111111000111111111111111111111111101111101111	236214333522 253473443436	1
111111000111111111111111111111111101111101111	236214333522 254443443436	1
1111110001111111111111111111111111100111	222224243521 254373453436	1
11111100011111111111111111111111111100111	236224233422 252463443434	1
111111000111111111111111111111111111101111	127224243321 254473443436	1
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11111110000011111111111111111111110001111	224424244221 342-43423333	1

Spoligotype	MIRU-VNTR†	No.
*MIRU-VNTR, mycobacterial interspersed repetitive unit variable number tandem repeat.		
†Digits refer to number of repeats detected at the respective 24 MIRU-VNTR locus in the following order: 2, 4 (ETR D), 10, 16, 20, 23, 24, 26, 27 (QUB-5), 31 (ETR E), 39, 40, 424 (Mtub04), 577 (ETR C), 1955 (Mtub21), 2163b (QUB-11b), 2165 (ETR A), 2347 (Mtub 29), 2401 (Mtub 3), 2461 (ETR B), 3171 (Mtub 24), 3690 (Mtub 39), 4156 (QUB-4156), 4052 (QUB-26).		