

**Epidemiological Profile of Reported Tuberculosis
in Tennessee
2005**



**Tennessee Department of Health
Tuberculosis Elimination Program**

Epidemiological Profile of Reported Tuberculosis in Tennessee 2005



Tennessee Department of Health Tuberculosis Elimination Program

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Tennessee Department of Health
TB Elimination Program

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The *Epidemiological Profile of Reported Tuberculosis in Tennessee, 2005*, provides descriptive information regarding the statewide epidemiology of reported active cases of tuberculosis (TB) in Tennessee, as well as comparative data for Tennessee's regional health jurisdictions. Tennessee's health jurisdictions are comprised of seven rural regions and six metropolitan regions. Included in this report are tables and descriptions of the morbidity and mortality of active TB cases reported in 2005 in the State of Tennessee, as well as demographics, risk factors, and clinical management of reported active TB cases at both state and regional levels. Also included are brief descriptions of the Tuberculosis Epidemiologic Studies Consortium (TBESC), Tennessee's Universal Genotyping Program, and the Targeted Testing Initiative (TTI) Report. A complete slide set has been provided and should be used in conjunction with the mentioned tables and discussion for a more comprehensive understanding of the incidence of TB disease and associated events within the State of Tennessee and each of its regional health jurisdictions.

Reports of active TB cases are submitted to the Tennessee Tuberculosis Elimination Program by local, metropolitan, and regional health departments, as well as private providers, hospitals, and other health care facilities in the state. Data described in this report reflect active TB cases reported by the health jurisdictions using the Tuberculosis Information Management System (TIMS) as of April 12, 2006. Adherence to the reporting guidelines and definitions as specified in the RVCT Form Completion Instructions is assumed. This report also describes the percentage and number of patients screened with the Risk Assessment Tool (RAT), provided a TB skin test, and found to be positive for TB/latent TB infection (LTBI) using data extracted from Tennessee's Patient Tracking Billing and Management System (PTBMIS).

Recognition and thanks are extended to the TB Elimination Program field staff, central office staff, local, regional and metropolitan health departments, and the Centers for Disease Control and Prevention (CDC) for their contributions and support in controlling TB in the state.

Sincerely,

Jon Warkentin, MD, MPH
Tuberculosis Control Officer

TTBEP Program Description

The Tennessee Tuberculosis Elimination Program (TTBEP) operates within the Tennessee Department of Health, Bureau of Health Services, Communicable and Environmental Disease Services Section. The TTBEP has the primary responsibility for TB control throughout the state as well as ensuring efficient and effective surveillance, diagnostic, treatment, and prevention services. The TTBEP central office provides oversight, guidance, education, and training to the State's thirteen (13) health jurisdictions: six (6) metropolitan county health departments, and seven (7) rural regional health departments serving multi-county areas.

TTBEP provides an array of services to the private medical community, as well as public and community-based agencies and stakeholders. These services include TB-related training and education, comprehensive diagnostic and treatment programs for patients with suspected or confirmed TB disease or Latent TB Infection (LTBI), investigation of close contacts to all reported TB cases, and screening high-risk groups to identify persons with LTBI or active disease.

The TTBEP employs three priority strategies for preventing and controlling TB:

- 1) Identify and fully treat persons who have active TB disease (***Cases***).
- 2) Find and screen persons who are contacts to TB patients to determine if they are infected with *Mycobacterium tuberculosis* or have active TB, and provide appropriate treatment (***Contacts***).
- 3) Screen populations at high risk for TB infection and disease to detect infected persons, and provide latent TB infection (LTBI) therapy to prevent progression to active TB (***Targeted Testing Initiatives***).

Additional Programs

TBESC (Tuberculosis Epidemiologic Studies Consortium)

The Tuberculosis Epidemiologic Studies Consortium (TBESC) is a CDC-funded research group designed to strengthen, focus, and coordinate tuberculosis (TB) research. The TBESC is designed to build the scientific research capacities of participating sites, which include State/Metropolitan TB control programs, universities, hospitals, laboratories, and both non-profit and for-profit organizations. Tennessee was chosen as a site through a competitive selection process and has participated in TBESC since its inception in 2001. A study summary can be found in Figure 1.

Figure 1. Brief Summary of TBESC Studies

Task Order	Informal Title	Eligibility Criteria	Enrollment Period	Contact
2	Contact Investigation Study	Contact to pulmonary TB case/suspect; 6 Middle TN regions	11/2004 - 12/2006	Fernanda Maruri
8	MDR-TB Genotyping	MDR-TB case; non-MDR-TB case in genotype cluster with an MDR-TB case; Statewide	11/2006 - 12/2008	Tamara Chavez-Lindell
9	Foreign-born TB Case Study	Foreign-born TB case; Statewide	04/2005 - 12/2006	Nicole Robinson Tamara Chavez-Lindell
11	TB among African-Americans	African-American TB/LTBI cases in Nashville; Persons at risk from TB/LTBI	10/2006 - 11/2006	Tamara Chavez-Lindell
13	LTBI Treatment Barriers	LTBI patients offered treatment with INH; 5 Middle and West TN regions	12/2006 - 06/2008	Sharon Hensley, DVM

Sites are involved with designing, conducting, and evaluating programmatically relevant research concerning the identification, diagnosis, prevention, and control of active TB disease and latent TB infection. Tennessee participates in five (5) of the eighteen (18) TBESC studies funded to date by CDC. Accomplishments include the following:

- TBESC staff have worked closely with regional and metro TB staff to identify, approach, and enroll participants in research studies for which they are eligible. Appropriate procedures for patient approach have been developed with reach region and have contributed to successful enrollment of numerous participants. Regional and metro staff have also provided valuable assistance in finding records.

- Enrollment in Task Order #2, “Prospective evaluation of immunogenetic and immunologic markers for susceptibility to TB infection and progression from *M. tuberculosis* infection to active TB,” began in November 2004 and will continue through December 2006. During 2005, 15 cases were interviewed and 71 immunogenetic and immunologic specimens were collected.
- Enrollment in Task Order #9, “Enhanced surveillance to identify missed opportunities for TB prevention in foreign-born populations in the United States and Canada,” began in April 2005 and will continue through December 2006. During 2005, 16 participants from across the state were enrolled for this study.
- Phase 2 of Task Order #13, “Retrospective chart review of risk factors for acceptance of, adherence to, and toxicity from treatment for LTBI,” was carried out in Fall 2005. For this phase of the study, 299 chart abstractions of LTBI patients in 6 regions have been completed.
- Phase 3 of Task Order #13, “Retrospective chart review of risk factors for acceptance of, adherence to, and toxicity from treatment for LTBI,” began in 2006 and continue until 2009. A total of 200 participants will be enrolled in 5 health department regions.

Universal Genotyping

The implementation of the statewide TB genotyping program in 2005 has added a new dimension to the classical epidemiology of tuberculosis and has greatly enhanced the understanding of the disease’s complex transmission dynamics.

Tennessee is using genotyping for TB control by monitoring the percentage of clustered cases in the state. The most basic indicator of recent transmission is the percentage of cases that are clustered compared to the percentage that are not clustered. Isolates that have genotyping patterns that match at least one other isolate in a jurisdiction’s database are much more likely to represent recent transmission than isolates with unique genotypes. The percentage of cases that are clustered gives the TB program a rough guide to the amount of recent transmission occurring in a jurisdiction. Although the clustering percentage has its limitations, some of the uncertainty involved in using this method to estimate the frequency of recent transmission is minimized when used to monitor trends over time. This is attributed to the fact that any bias that applies to a particular TB program’s population will be relatively constant over time. The TTBEF is now monitoring the total clustering percentage in the state and comparing clustering of the US-born vs. foreign-born cases in order to determine any changes in transmission patterns. Clustering percentages for Tennessee’s TB cases reported between 2004 and 2005 can be found in Figure 2 of this report.

Figure 2. Tuberculosis Clustering Percentages, Tennessee & the United States, 2004-2005

Clustering Percentage by category	Case Counts		Total
	2005	2004	2004 +2005
Reported Cases (TIMS)	299	277	576
Total Submissions	210	191	401
# Clustered Isolates	100	101	201
TN Clustering Percentage	47.6%	52.9%	50.1%
# of US-born Submissions	169	154	323
# of US-born Clustered isolates	92	97	189
US-Born Clustering Percentage	54.4%	62.9%	58.5%
# of Foreign-born Submissions	48	30	78
# of Foreign-born Clustered Isolates	8	4	12
Foreign-born Clustering Percentage	16.7%	13.3%	15.4%

In addition to monitoring the clustering percentages within the state, Tennessee uses quarterly reports sent by the CDC to monitor the distribution of the Tennessee’s genotypes across the United States. The CDC quarterly reports describe the number and percentage of isolates with a particular PCR genotype in Tennessee and the distribution of that PCR genotype across the United States. This information is useful for prioritizing cluster investigations because it describes whether certain PCR genotypes are widely distributed across the U.S., are unique to Tennessee, or are indicative of the possibility of interstate transmission.

TTI (Targeted Testing Initiative) Report

In 2001, the Tennessee State Legislature increased the TB Elimination Program budget by \$5 million (in 2005, this budget was \$4.8 million) annually to provide persons born in countries with high TB incidence rates and other high-risk persons (i.e., HIV+, homeless, inmates, persons with certain medical conditions) with tuberculin testing, clinical evaluation, and treatment for TB or latent TB infection (LTBI). TTI efforts have been implemented in local communities to identify and establish a relationship with foreign-born, inmate, homeless, and other high-risk populations that would benefit from TB services. Two concurrent arms of the TTI have been developed. The first arm involves ensuring that TB services are provided to foreign-born and other high-risk persons already coming to the local health departments for other services (e.g. immunizations, prenatal care, STD/HIV treatment or primary care visits). The second arm involves the provision of TB services at community sites where foreign-born or other high-risk persons can be approached. Specific community sites where TTI services can be delivered include churches or other religious gatherings, factories, grocery stores, restaurants, community centers, and residential sites such as apartment complexes.

To monitor TTI activities, the TTI Report was created and describes the percentage and number of patients who are screened with the Risk Assessment Tool (RAT), provided a TB skin test, test positive for TB/LTBI, and patients who are closed out when LTBI treatment is either completed, discontinued, or not initiated. Data are stratified according to risk group, including high-risk, low-risk and foreign-born. This report is provided to Metropolitan and rural Regional Health Offices on a quarterly basis.

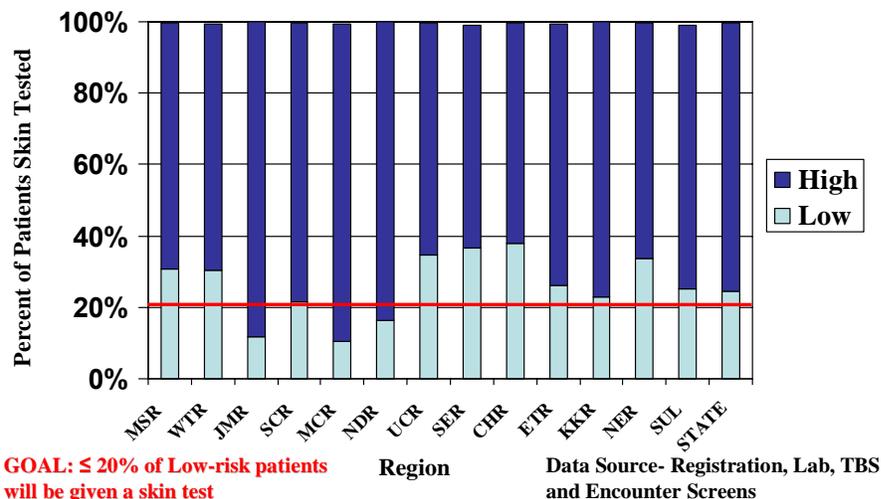
In 2005, 45,029 patients were screened with the TTBEp's RAT, 30,333 were provided a TB skin test, and approximately 2,220 had a positive TB skin test recorded. Of the 45,029 patients who were screened with the RAT, 29,968 (66.5%) were at high risk for LTBI or developing active TB disease. Approximately 9,000 (20%) of all high-risk patients screened were foreign-born. Seventy-five percent of all patients provided with a TB skin test were high-risk, and approximately 9% of these patients tested positive for LTBI/TB. This percentage increased to 24% for foreign-born patients from countries with high incidence of TB and no additional risk factors. Less than two percent of low-risk patients tested positive for LTBI/TB.

Primary indicators measured by the TTI report are listed below:

1.) Percentage of Patients Tested by Risk Group:

In 2005, 24.7% of patients who were screened and determined to be at low risk for TB/LTBI were given a TB skin test. TTBEp objective is to administer a TB skin test to no more than 20% of low-risk patients, since testing of low-risk patients can lead to false positive results. To ensure that TB resources are allocated to populations at greatest risk for TB/LTBI, TTBEp discourages skin testing of low-risk patients.

Figure 3: Percent of TTI Patients Receiving a TB Skin Test by Risk Group
January 1-December 31, 2005

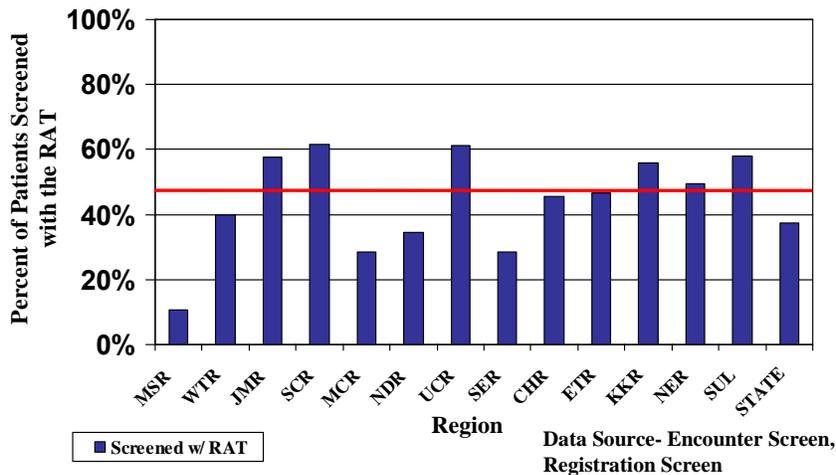


2.) Percentage of Foreign-Born Patients Screened with the Risk Assessment Tool (RAT)

Since a primary focus of the TTI program is to screen, educate, test and treat patients from countries with high rates of TB, it is important to monitor the percentage of new foreign-born patients being screened and educated for TB/LTBI. Of all newly registered foreign-born patients who have at least one encounter with any health department program, at least 50% should be screened with the RAT. In 2005, only 37.5% of newly registered foreign-born patients were screened with the RAT. Considering that procedures of public health programs other than the TTBEp influence the number of foreign-born patients screened, it is important that TB program

staff continue to extend their targeted testing efforts to health department programs such as STD, WIC, etc., that serve many foreign-born patients.

**Figure 4: Percentage of Foreign-born Patients Screened with the RAT
January 1-December 31, 2005**



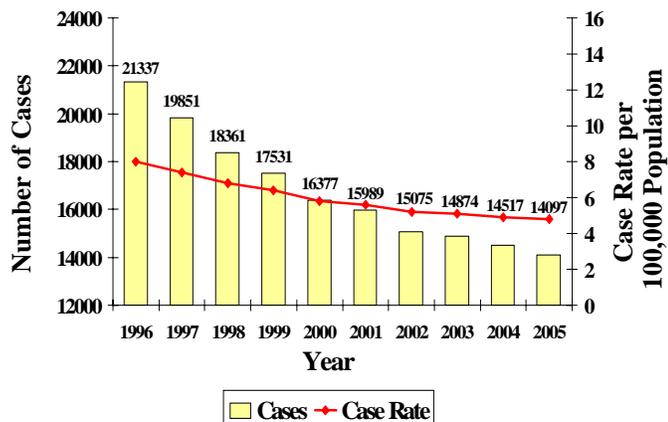
GOAL: >50% of all FB who register w/ HD and receive 1 encounter will be screened with the RAT

TTBEP will continue to provide the TTI/LTBI report to Regional and Metropolitan TB programs through 2006. In the future, LTBI treatment initiation and completion rates will be examined.

Epidemiologic Summary of TB in the United States

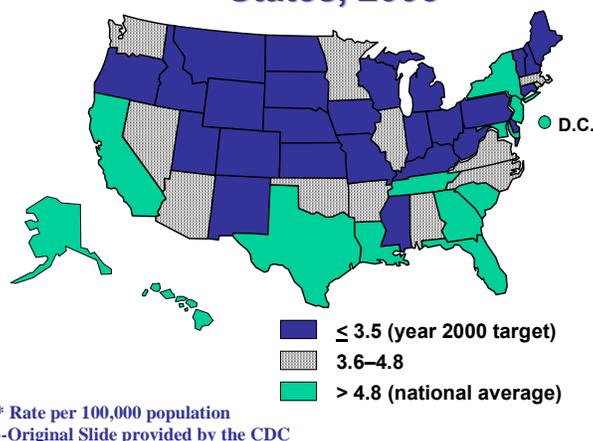
The United States has experienced a continued decrease in the incidence of reported tuberculosis disease since the mid-1990s, after having experienced a resurgence in the late 1980s and early 1990s. (Figure 5)

Figure 5. Tuberculosis Cases and Case Rates for the United States, 1995-2004



In 2005, the United States reported 14,097 cases of TB disease and a case rate of 4.8 cases per 100,000 population. This is the lowest national case rate observed since the CDC began formally collecting TB case data in 1953, at which time the case rate was 52.6 cases per 100,000 population. As depicted in Figure 6, the incidence of TB disease reported in the United States in 2005 was largely concentrated in the Southeastern States, in addition to such high incidence states as California, New York, and Texas.

Figure 6. TB Case Rates,* United States, 2005



† Figure 1 and Figure 2 provided by the Centers for Disease Control and Prevention.

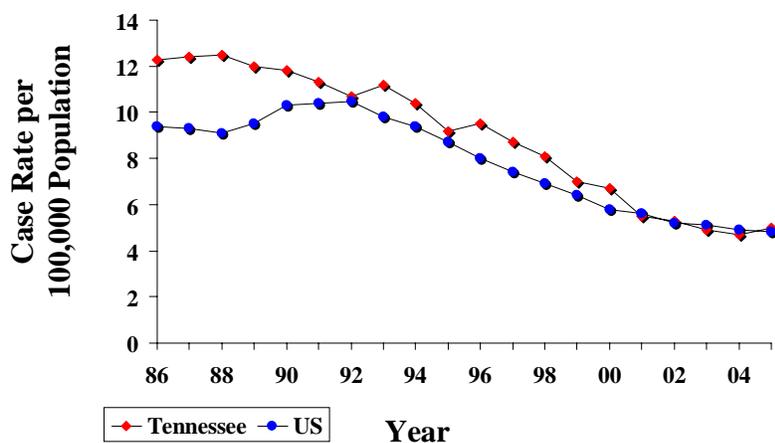
The United States has seen a steady increase in the proportion of reported cases born in a country other than the United States. Between 2000 and 2005, the proportion of foreign-born cases reported increased from 46% to 55%. This suggests a need for improved tuberculosis surveillance, prevention programs, and the facilitation of targeted testing programs in states with an increased disease incidence in their foreign-born populations.

TB Morbidity

TB Morbidity

In 2005, the State of Tennessee reported 299 cases of tuberculosis, ranking Tennessee 12th in the nation for the highest total incidence of TB disease. (The case definitions and reporting guidelines can be found in Appendix 1 and 2, respectively) The State of Tennessee reported a case rate for 2005 of 5.0 cases per 100,000 population, which is higher than the national case rate of 4.8 cases per 100,000. As Figure 7 demonstrates, Tennessee reported a case rate lower than that of the national average since 2001. In 2005, however, Tennessee's case rate increased slightly, demonstrating the necessity of persistent TB control efforts even during a period of apparent decline nationally.

**Figure 7. Tuberculosis Case Rates
Tennessee and United States, 1986-2005**



Several regional health jurisdictions experienced a similar increase. For example, Memphis/Shelby County, the Mid-Cumberland Region, Nashville/Davidson County, Knoxville/Knox County, and the Northeast Tennessee Region all experienced an increase in case rates of TB disease. On the other hand, other reporting areas experienced a decrease in the incidence of TB disease, including the South Central, Upper Cumberland, and East Tennessee Regions, in addition to Sullivan County which reported no cases in 2005. The greatest increase was experienced in the Mid-Cumberland Region with 21 additional incident cases, compared to a considerable drop in TB incidence in 2004 (19 total cases reported). However, the number of cases reported in the Mid-Cumberland region in 2005 is more consistent with previous years. The greatest decline was seen in the Upper Cumberland Region, which saw 8 fewer incident cases in 2005 compared to 2004. Within the State of Tennessee, Memphis/Shelby County and Nashville/Davidson County (the two largest of the 6 metropolitan reporting areas) have continued to see a relatively high incidence of TB disease in 2005 with case rates of 9.9 and 11.5 cases per 100,000 population respectively in 2005. Nashville/Davidson County had seen a decline in the incidence rates of TB disease, from 10.9 in 2003 to 9.3 cases per 100,000 population in 2004. However, in 2005, the reporting area experienced a surge of 21 additional cases compared to 2004, increasing the disease incidence rate to 11.5 cases per 100,000 population. The incidence of TB disease in Memphis/Shelby County in 2005 was consistent with that of 2004, and suggests that the metropolitan reporting area is still experiencing a persistent gradual increase in TB disease incidence (9.4 and 9.9 cases per 100,000 population in 2004 and 2005, respectively). (See Table 1, page 11).

Table 1. Tuberculosis Cases and Morbidity Rates*: Tennessee & Reporting Areas, 2004-2005

Reporting Area	2004			2005		
	Cases	Case Rates	Population Estimates**	Cases	Case Rates	Population Estimates**
Tennessee	277	4.7	5,900,962	299	5.0	5,962,959
Memphis/Shelby County †	85	9.4	908,175	90	9.9	909,035
West Tennessee Region	17	3.3	519,194	17	3.3	521,543
Jackson/Madison County †	4	4.2	94,397	5	5.3	94,916
Mid-Cumberland Region	19	2.0	927,771	40	4.2	956,328
Nashville/Davidson County †	53	9.3	572,475	66	11.5	575,261
South Central Region	16	4.4	361,898	12	3.3	366,262
Upper Cumberland Region	13	4.1	317,775	5	1.6	320,756
Southeast Region	14	4.6	307,508	13	4.2	309,925
Chattanooga/Hamilton County †	15	4.8	310,371	14	4.5	310,935
East Tennessee Region	20	2.9	696,257	13	1.8	705,032
Knoxville/Knox County †	6	1.5	400,061	10	2.5	404,972
Northeast Tennessee Region	9	2.7	332,582	14	4.2	335,278
Sullivan County †***	6	3.9	152,498	0	0	152,716

† Indicates metropolitan reporting areas.

* Per 100,000 population.

** Population estimates are for July of the respective year and from the US Census Bureau.

*** Sullivan County had no reported cases of Tuberculosis in 2005.

Demographics

Demographics

Gender

Sixty-six percent of the reported tuberculosis cases in Tennessee in 2005 were male, which is consistent with previous years. This same trend is seen throughout the reporting areas, with the exception of Northeast Tennessee which had an equal distribution of male and female cases reported. (See Table 2, page 16)

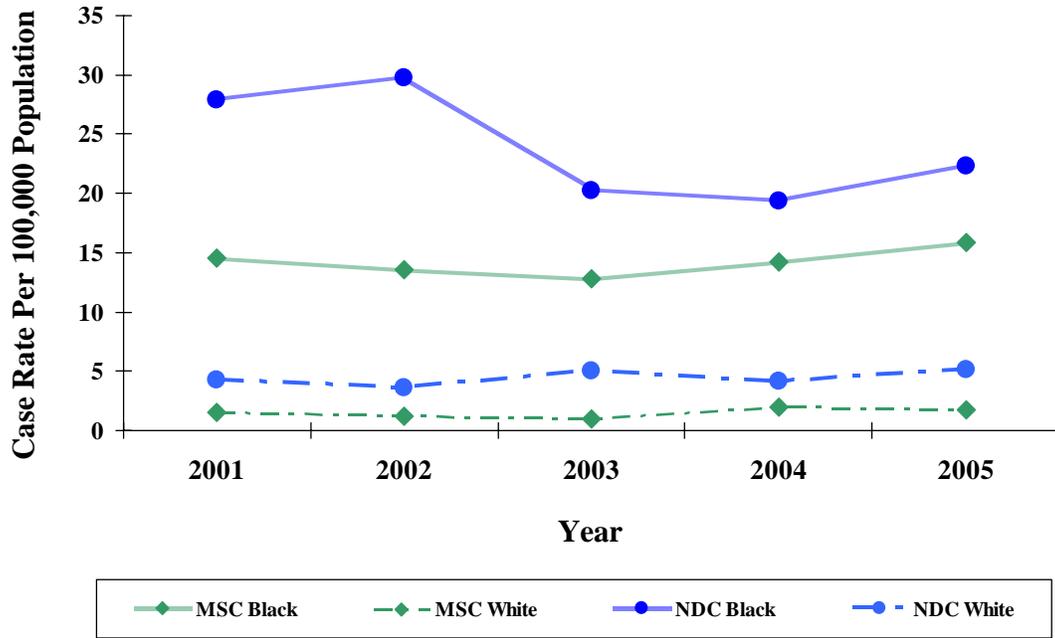
Age

Eighty-one percent (241 cases) of Tennessee's tuberculosis cases reported in 2005 were aged greater than 24 years, with the greatest proportion of cases reported between the ages of 25-44 years (30%). The remaining 56 cases were aged 24 years or less, and represented nearly a fifth (19%) of the total cases reported in 2005. Compared to 2004, Tennessee experienced a 30% increase in the number of younger cases reported, most of whom were aged between 15-24 years. The frequency of cases reported in 2005 aged 5 years or less was consistent with that seen in 2004. Sixty-seven percent of the cases reported aged 24 years or less were reported in either Memphis/Shelby County (31%) or Nashville/Davidson County (36%). Cases aged 25 years or greater are more evenly distributed across the state, with greater proportions of eastern regions' cases falling into these age groups. (See Table 3, page 17)

Race/Ethnicity

Using self-reported information, Tennessee reported 46% of the tuberculosis cases in 2005 as Black Non-Hispanic, 37% as White Non-Hispanic, and 12% as Hispanic of any race. Of those Black Non-Hispanic cases, 54% were from Memphis/Shelby County (74 cases) and 25% were from Nashville/Davidson County (35 cases). An effort to minimize the disparity between Whites and Blacks is necessary, especially in our largest metropolitan areas: Memphis/Shelby County and Nashville/Davidson County have Black Non-Hispanic cases rates of 15.9 cases per 100,000 population and 21.3 cases per 100,000 population, respectively. Figure 8 shows that the case rates of patients identified as Black Non-Hispanic are considerably larger in both of these metropolitan areas than the case rates for patients identified as White Non-Hispanic. Similarly, a larger proportion of cases reported as Black Non-Hispanic, than any other group reported in Chattanooga/Hamilton County in 2005. All other regions reported most of their cases as White Non-Hispanic except for the Jackson/Madison County, which reported 60% of their 2005 cases as Hispanic of any race. The proportion of cases reported as being of Hispanic ethnicity has remained fairly constant between 2000 and 2005. However, cases reported as being Hispanic ethnicity were more evenly distributed throughout the state in 2005 compared to previous years. Since 2000, Tennessee has seen a slight increase in the proportion of cases identified as Asian/Pacific Islander, and relatively few cases identified as American/Indian or Alaskan Native (less than 1% of cases reported in 2002, and 1% in 2005). The Mid-Cumberland Region reported 5 cases identified as Asian/Pacific Islander, in addition to 3 cases reported each from Memphis/Shelby County and the Southeast Region (23% of their total cases), 2 cases reported from Nashville/Davidson County, and 1 case reported from Knoxville/Knox County. (See Table 4, page 18)

Figure 8. Non-Hispanic White & Non-Hispanic Black Tuberculosis Case Rates, Memphis/Shelby & Nashville/Davidson Counties, 2001-2005



Population estimates are from the US Census Data and represent estimates at midpoint of each year. MSC=Memphis Shelby County and NDC=Nashville/Davidson County.

Table 2. Distribution of Tuberculosis Cases by Gender: Tennessee & Reporting Areas, 2005

Reporting Area	Total Cases	Male		Female	
		N	(%)	N	(%)
Tennessee	299	198	(66)	101	(34)
Memphis/Shelby County†	90	59	(66)	31	(34)
West Tennessee Region	17	14	(82)	3	(18)
Jackson/Madison County †	5	4	(80)	1	(20)
Mid-Cumberland Region	40	24	(60)	16	(40)
Nashville/Davidson County †	66	44	(67)	22	(33)
South Central Region	12	7	(58)	5	(42)
Upper Cumberland Region	5	3	(60)	2	(40)
Southeast Region	13	8	(62)	5	(38)
Chattanooga/Hamilton County †	14	11	(79)	3	(21)
East Tennessee Region	13	9	(69)	4	(31)
Knoxville/Knox County †	10	8	(80)	2	(20)
Northeast Tennessee Region	14	7	(50)	7	(50)
Sullivan County †***	0	NA	NA	NA	NA

† Indicates metropolitan reporting areas

*** Sullivan County had no reported cases of Tuberculosis in 2005.

N/A indicates that the frequency (N) and relative frequency (%) are not applicable or incalculable.

Table 3. Distribution of Tuberculosis Cases by Age Group: Tennessee & Reporting Areas, 2005

Reporting Area	All Ages	Age Groups											
		Under 5		5-14		15-24		25-44		45-64		65+	
		N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
Tennessee	299	11	(4)	10	(3)	37	(12)	90	(30)	85	(29)	66	(22)
Memphis/Shelby County †	90	4	(4)	5	(6)	9	(10)	34	(38)	26	(29)	12	(13)
West Tennessee Region	17	--	--	1	(6)	4	(24)	6	(35)	2	(11)	4	(24)
Jackson/Madison County †	5	--	--	--	--	3	(60)	1	(20)	--	--	1	(20)
Mid-Cumberland Region	40	1	(2)	1	(2)	2	(5)	11	(28)	12	(30)	13	(33)
Nashville/Davidson County†	66	5	(8)	2	(3)	14	(21)	17	(25)	23	(35)	5	(8)
South Central Region	12	--	--	--	--	--	--	3	(25)	3	(25)	6	(50)
Upper Cumberland Region	5	--	--	--	--	2	(40)	1	(20)	--	--	2	(40)
Southeast Region	13	--	--	--	--	--	--	6	(46)	2	(15)	5	(39)
Chattanooga/Hamilton County †	14	--	--	1	(7)	1	(7)	6	(43)	4	(29)	2	(14)
East Tennessee Region	13	--	--	--	--	--	--	1	(8)	4	(31)	8	(61)
Knoxville/Knox County †	10	--	--	--	--	2	(20)	1	(10)	5	(50)	2	(20)
Northeast Tennessee Region	14	1	(7)	--	--	--	--	3	(21)	4	(29)	6	(43)
Sullivan County †***	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

† Indicates metropolitan reporting areas.

-- Indicates that the frequency (N) and relative frequency (%) of the event equals zero.

*** Sullivan County had no reported cases of Tuberculosis in 2005.

N/A indicates that the frequency (N) and relative frequency (%) are not applicable or incalculable.

Table 4. Distribution of Tuberculosis Cases by Hispanic Ethnicity and Non-Hispanic Race: Tennessee & Reporting Areas, 2005

Reporting Area	Race/Ethnicity												
	All Ages	White Non-Hispanic		Black Non-Hispanic		American Indian/Alaskan Native		Asian/Pacific Islander		Hispanic Of Any Race		Not Indicated	
		N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
Tennessee	299	110	(37)	138	(46)	2	(1)	14	(4)	35	(12)	--	--
Memphis/Shelby County †	90	7	(8)	74	(82)	2	(2)	3	(3)	4	(5)	--	--
West Tennessee Region	17	11	(65)	4	(23)	--	--	--	--	2	(12)	--	--
Jackson/Madison County †	5	1	(20)	1	(20)	--	--	--	--	3	(60)	--	--
Mid-Cumberland Region	40	18	(45)	9	(23)	--	--	5	(12)	8	(20)	--	--
Nashville/Davidson County †	66	18	(27)	35	(53)	--	--	2	(3)	11	(17)	--	--
South Central Region	12	9	(75)	3	(25)	--	--	--	--	--	--	--	--
Upper Cumberland Region	5	4	(80)	--	--	--	--	--	--	1	(20)	--	--
Southeast Region	13	8	(61)	--	--	--	--	3	(23)	2	(15)	--	--
Chattanooga/Hamilton County †	14	3	(21)	8	(58)	--	--	--	--	3	(21)	--	--
East Tennessee Region	13	13	(100)	--	--	--	--	--	--	--	--	--	--
Knoxville/Knox County †	10	5	(50)	3	(30)	--	--	1	(10)	1	(10)	--	--
Northeast Tennessee Region	14	13	(93)	1	(7)	--	--	--	--	--	--	--	--
Sullivan County †***	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

† Indicates metropolitan reporting areas

-- Indicates that the frequency (N) and relative frequency (%) of the event equals zero.

*** Sullivan County had no reported cases of Tuberculosis in 2005.

N/A indicates that the frequency (N) and relative frequency (%) are not applicable or incalculable.

Associated Risk Factors

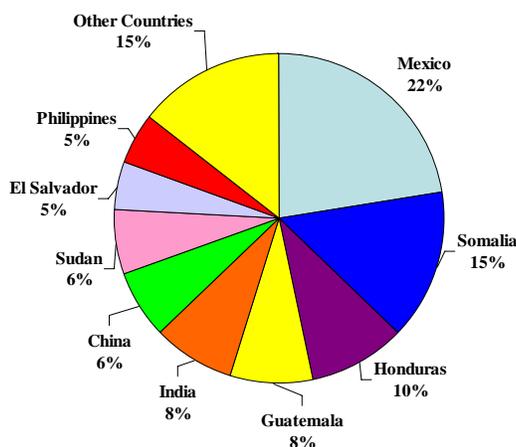
Risk Factors

Tennessee's TB Elimination Program considers the following to be major risk factors that could increase a patient's risk of developing TB disease: foreign-born status; HIV-positive; homeless in the year prior to TB diagnosis; residing in a correctional facility or long term care facility at the time of TB diagnosis; using injection or non-injection drugs in the year prior to TB diagnosis; and excessive alcohol use in the year prior to TB diagnosis. Of the 299 TB cases reported in Tennessee in 2005, 132 (44%) reported having at least one identified risk factor, which represents a decrease from the frequency reported in 2004 (53%). However, the number of reported cases in 2005 having three or more risk factors increased from 6% (17 cases) in 2004 to 8% (23 cases) in 2005. Of those cases reporting 3 or more risk factors, 52% (12 cases) were reported in Nashville/Davidson County and 26% (6 cases) were reported from Memphis/Shelby County. (See Tables 5-8, pages 23-26)

Foreign-Born

Over the past ten years, Tennessee has seen a dramatic increase in the relative frequency of foreign-born TB cases, with more than a fifth of the state's TB cases (21%) reported as foreign-born in 2005 compared to only 7% of the cases identified as being foreign-born in 1996. More notably, between 2004 and 2005 there was a 31% increase in the number of foreign-born cases reported. Of reported foreign-born cases in 2005, 22% were born in Mexico and 15% were born in Somalia. (Figure 9) Forty percent of all the foreign-born cases were reported from Nashville/Davidson County and 23% were reported from the Mid-Cumberland Region, representing 38% (25 cases) and 37% (15 cases) of the cases reported in these two jurisdictions, respectively. Of the 85 cases Memphis/Shelby County reported in 2005, 7% (6 cases) were identified as foreign-born, representing 9% of the total foreign-born cases reported statewide. Sixty percent (3 cases) of the cases reported in Jackson/Madison County were foreign-born. Both the Southeast Region and Chattanooga/Hamilton County each reported 8% of the total foreign-born cases reported, representing 39% and 36% of the cases reported in these two jurisdictions, respectively. (See Table 6, page 24)

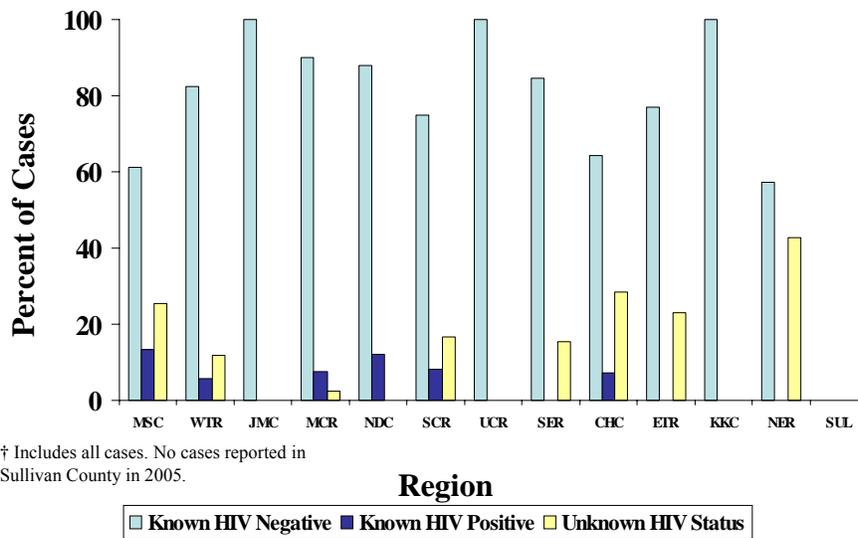
Figure 9. Countries of Birth for Foreign-born Tuberculosis Cases Tennessee, 2005



HIV

Eighty-six percent of Tennessee’s reported TB cases in 2005 had a known positive or negative HIV status, and the remaining 14% had an unknown HIV status (43 cases). Nine percent (26 cases) of all the reported TB cases in 2005 were HIV-positive. HIV/TB co-morbid cases were reported from Memphis/Shelby, Nashville/Davison, and Chattanooga/Hamilton counties, as well as in the West, Mid-Cumberland, and the South Central Regions. Of the 66 total cases reported in Nashville/Davidson County, 8 cases (12%) had HIV/TB co-morbidity, while 58 cases (88%) had a documented negative HIV status. Memphis/Shelby County had the greatest proportion of cases identified with HIV co-morbidity, as well as the greatest number of individuals whose HIV status was unknown. Regions in eastern Tennessee, including the Northeast Region, the East Tennessee Region, and Chattanooga/Hamilton County, also reported several cases without a known HIV status: 3 cases (23%), 6 cases (43%), and 4 cases (29%), respectively. (See Table 7, page 25 and Figure 10)

Figure 10. Tuberculosis Cases By HIV Status† Tennessee Regions, 2005



Homelessness

“Homelessness,” for TB reporting purposes, refers to those patients who were homeless during the year prior to TB diagnosis, not necessarily referring to those residing in a homeless shelter, or homeless at the time of TB diagnosis or during TB treatment. Eleven percent (32 cases) of the cases reported in 2005 in Tennessee reported being homeless during the year prior to TB diagnosis. Of those, 50% were reported in Nashville/Davidson County and 25% in Memphis/Shelby County. The remaining homeless cases were reported in Chattanooga/Hamilton County (3 cases), the Mid-Cumberland Region (2 cases), Knoxville/Knox County (2 cases), and the South Central Region (1 case). Of Nashville/Davidson County’s total cases, nearly one-quarter of reported cases (24%) were identified as being homeless during the year prior to TB diagnosis, demonstrating an increase from 2004. (See Table 8, page 26)

Correctional Facilities

Patients identified as “residing in a correctional facility” refer to those cases who resided in either a jail or a prison at the time of TB diagnosis. In 2005, 4% (13 cases) of Tennessee’s TB cases resided in a correctional facility at the time of TB diagnosis. Memphis/Shelby County contributed approximately 46% of those cases (6 cases). The West Tennessee Region contributed 4 cases, which represented 24% of the region’s total cases reported in 2005. Nashville/Davidson County reported 5% (3 cases) of its total cases as residing in a correctional facility at the time of TB diagnosis. (See Table 8, page 26)

Long Term Care Facility

Patients identified as “residing in a long term care facility” refer to those cases who resided in such a facility at the time of TB diagnosis. In 2004, 4% (13 cases) of the cases reported in Tennessee resided in a long term care facility at the time of TB diagnosis. Four of the 13 cases (31%) reported in the Southeast Region resided in a long term care facility at the time of TB diagnosis. The West Tennessee Region and the Mid-Cumberland Region each reported 2 cases residing in a long term care facility at the time of TB diagnosis. (See Table 8, page 26)

Drug and Alcohol Use

“Injection drug use” and “non-injection drug use,” as well as “excessive alcohol use,” refer to usage occurring during the year prior to TB diagnosis. (Please refer to Appendix 1 for RVCT Form Completion Instructions). In 2005, Tennessee reported no injection drug use among TB cases, and non-injection drug use in 12% (37 cases) of its cases. The majority (51%) of the cases reported with non-injection drug use were reported in Nashville/Davidson County, representing almost a third (29%) of the jurisdiction’s total cases. Memphis/Shelby County reported nearly a third of the cases with non-injection drug use (30%). Patients identified with excessive alcohol use in Tennessee in 2005 comprised 19% (57 cases) of the total cases. Of those 19 cases (33%) were reported in Nashville/Davidson County, which represents 29% of the cases reported in that jurisdiction. Memphis/Shelby County contributed 17 cases, or 30% of all cases reported in Tennessee in 2005 who were identified as having used excessive alcohol in the year prior to TB diagnosis. These cases represented 19% of Memphis/Shelby County’s total cases. The remaining cases reported with excessive alcohol use were distributed among several other reporting areas. (See Table 8, page 26)

Table 5. Distribution of Tuberculosis Cases by Number of Risk Factors Reported*: Tennessee & Reporting Areas, 2005

Reporting Area	Total Cases	No Risk Factors		1 or 2 Risk Factors		3 or More Risk Factor	
		N	(%)	N	(%)	N	(%)
Tennessee	299	144	(48)	132	(44)	23	(8)
Memphis/Shelby County†	90	51	(56)	33	(36)	6	(7)
West Tennessee Region	17	8	(47)	7	(41)	2	(12)
Jackson/Madison County†	5	2	(40)	3	(60)	--	--
Mid-Cumberland Region	40	19	(47)	21	(53)	--	--
Nashville/Davidson County†	66	17	(26)	37	(56)	12	(18)
South Central Region	12	9	(75)	3	(25)	--	--
Upper Cumberland Region	5	3	(60)	2	(40)	--	--
Southeast Region	13	2	(15)	11	(85)	--	--
Chattanooga/Hamilton County†	14	4	(29)	8	(57)	2	(14)
East Tennessee Region	13	13	(100)	--	--	--	--
Knoxville/Knox County†	10	4	(40)	5	(50)	1	(10)
Northeast Tennessee Region	14	12	(86)	2	(14)	--	--
Sullivan County† ***	0	NA	NA	NA	NA	NA	NA

† Indicates metropolitan reporting areas

* Risk factors include foreign-born, HIV co-morbidity, homelessness in year prior to diagnosis, residing in a correctional or long term care facility at time of TB diagnosis, using injection or non injection drugs in year prior to TB diagnosis, and excessive alcohol use in year prior to TB diagnosis.

-- Indicates that the frequency (N) and relative frequency (%) of the event equals zero.

*** Sullivan County had no reported cases of Tuberculosis in 2005.

N/A indicates that the frequency (N) and relative frequency (%) are not applicable or incalculable.

Table 6. Distribution of Tuberculosis Cases by Foreign Born Status: Tennessee & Reporting Areas, 2005

Reporting Area	Total Cases	US Born Cases		Foreign Born Cases	
		N	(%)	N	(%)
Tennessee	299	235	(79)	64	(21)
Memphis/Shelby County†	90	84	(93)	6	(7)
West Tennessee Region	17	16	(94)	1	(6)
Jackson/Madison County†	5	2	(40)	3	(60)
Mid-Cumberland Region	40	25	(63)	15	(37)
Nashville/Davidson County†	66	41	(62)	25	(38)
South Central Region	12	12	(100)	--	--
Upper Cumberland Region	5	4	(80)	1	(20)
Southeast Region	13	8	(62)	5	(39)
Chattanooga/Hamilton County†	14	9	(64)	5	(36)
East Tennessee Region	13	13	(100)	--	--
Knoxville/Knox County†	10	7	(70)	3	(30)
Northeast Tennessee Region	14	14	(100)	--	--
Sullivan County† ***	0	NA	NA	NA	NA

† Indicates metropolitan reporting areas

-- Indicates that the frequency (N) and relative frequency (%) of the event equals zero.

*** Sullivan County had no reported cases of Tuberculosis in 2005.

N/A indicates that the frequency (N) and relative frequency (%) are not applicable or incalculable.

**Table 7. Distribution of Tuberculosis Cases by HIV Status:
Tennessee & Reporting Areas, 2005**

Reporting Area	Total Cases	Known Negative HIV Status		Known Positive HIV Status		Unknown HIV Status*	
		N	(%)	N	(%)	N	(%)
Tennessee	299	230	(77)	26	(9)	43	(14)
Memphis/Shelby County†	90	55	(61)	12	(13)	23	(26)
West Tennessee Region	17	14	(82)	1	(6)	2	(12)
Jackson/Madison County†	5	5	(100)	--	--	--	--
Mid-Cumberland Region	40	36	(90)	3	(8)	1	(2)
Nashville/Davidson County†	66	58	(88)	8	(12)	--	--
South Central Region	12	9	(75)	1	(8)	2	(17)
Upper Cumberland Region	5	5	(100)	--	--	--	--
Southeast Region	13	11	(85)	--	--	2	(15)
Chattanooga/Hamilton County†	14	9	(64)	1	(7)	4	(29)
East Tennessee Region	13	10	(77)	--	--	3	(23)
Knoxville/Knox County†	10	10	(100)	--	--	--	--
Northeast Tennessee Region	14	8	(57)	--	--	6	(43)
Sullivan County† ***	0	NA	NA	NA	NA	NA	NA

† Indicates metropolitan reporting areas

* Unknown HIV status refers to indeterminate results, patients who refused testing, patients who were not offered testing, unknown results of tests completed, and unknown and missing.

-- Indicates that the frequency (N) and relative frequency (%) of the event equals zero.

*** Sullivan County had not reported cases of Tuberculosis in 2005.

N/A indicates that the frequency (N) and relative frequency (%) are not applicable or incalculable.

Table 8. Distribution of Tuberculosis Cases by Risk Factor: Tennessee & Reporting Areas, 2005

Reporting Area	Risk Factor												
	All Cases	Homelessness ¹		Correctional Facility ²		Long Term Care Facility ³		Injection Drug Use ¹		Non-Injection Drug Use ¹		Excessive Alcohol Use ¹	
		N	(%)*	N	(%)*	N	(%)*	N	(%)*	N	(%)*	N	(%)*
Tennessee	299	32	(11)	13	(4)	13	(4)	--	--	37	(12)	57	(19)
Memphis/ Shelby County †	90	8	(9)	6	(7)	1	(7)	--	--	11	(12)	17	(19)
West Tennessee Region	17	--	--	4	(24)	2	(12)	--	--	2	(12)	4	(24)
Jackson/ Madison County †	5	--	--	--	--	--	--	--	--	--	--	--	--
Mid-Cumberland Region	40	2	(5)	--	--	2	(5)	--	--	--	--	4	(10)
Nashville/ Davidson County †	66	16	(24)	3	(5)	1	(2)	--	--	19	(29)	19	(29)
South Central Region	12	1	(8)	--	--	--	--	--	--	--	--	2	(17)
Upper Cumberland Region	5	--	--	--	--	--	--	--	--	1	(20)	--	--
Southeast Region	13	--	--	--	--	4	(31)	--	--	1	(8)	2	(15)
Chattanooga/ Hamilton County †	14	3	(21)	--	--	1	(7)	--	--	1	(7)	5	(36)
East Tennessee Region	13	--	--	--	--	--	--	--	--	--	--	--	--
Knoxville/ Knox County †	10	2	(20)	--	--	--	--	--	--	2	(20)	3	(30)
Northeast Tennessee Region	14	--	--	--	--	1	(7)	--	--	--	--	1	(7)
Sullivan County †***	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

† Indicates metropolitan reporting areas

* Relative Frequencies (%) are mutually exclusive and therefore may not add up to 100%

¹ Refers to patients identified having these risk factors during year prior to TB diagnosis

² Refers to those patients who resided in a correctional facility at the time of TB diagnosis

³ Refers to those patients who resided in a long term care facility at the time of TB diagnosis

-- Indicates that the frequency (N) and relative frequency (%) of the event equals zero.

*** Sullivan County had no reported cases of Tuberculosis in 2005.

N/A indicates that the frequency (N) and relative frequency (%) are not applicable or incalculable.

Clinical Management

Clinical Management

Site of Disease

Sixty-nine percent (207 cases) of the tuberculosis cases reported in Tennessee in 2005 were identified as having only pulmonary TB disease. Patients identified as having only extra-pulmonary disease comprised 23% (67 cases) of the total cases reported in 2005. The remaining 8% of the reported cases had both pulmonary and extra-pulmonary tuberculosis disease. These statewide percentages are similar to those of Tennessee's reporting areas in 2005, with the exception of Chattanooga/Hamilton County which reported 50% of the region's cases with only pulmonary disease, 43% with only extra-pulmonary disease, and 7% with both pulmonary and extra-pulmonary disease. (See Table 9, page 32)

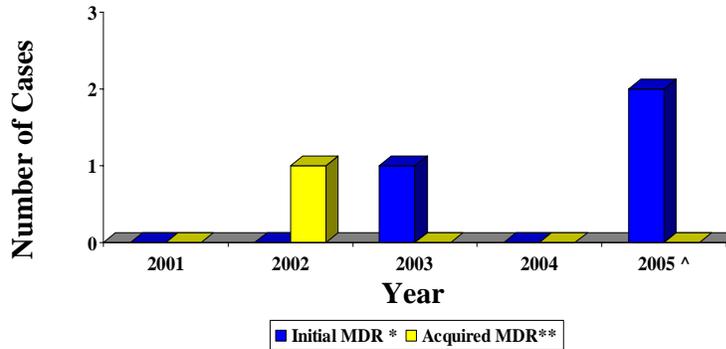
Tuberculosis Case Classification

Tuberculosis cases are classified as culture-positive cases (from any sample), sputum smear-positive cases, clinical cases, or provider-verified cases. (See Appendix 1 for Case Definitions and link to Case Verification/Classification Criteria in the Calculated Variables portion of the TIMS Documentation.) In 2005, 80% of Tennessee's reported cases were culture-positive. This distribution was consistent across all of the health jurisdictions, with percentages of culture-positive cases ranging from 60% to 100%. Tennessee reported no cases classified as sputum smear-positive. Seventeen percent (50 cases) of Tennessee's cases reported in 2005 were reported as clinical cases, of which 42% (21 cases) were reported in Memphis/Shelby County. Three percent (10 cases) of total cases reported in 2005 were provider-verified. Of those, forty percent were reported in Nashville/Davidson County, and 20% were reported in the West Tennessee Region. (See Table 10, page 33)

Multi-Drug Resistance

Tuberculosis drug resistance can only be determined from the growth of viable *Mycobacterium tuberculosis* cultures, and therefore is only described of culture-positive TB cases. Multi-drug resistance (MDR) refers to *M. tuberculosis* organisms that are resistant to both Isoniazid (INH) and Rifampin (RIF). MDR can be described as either "initial MDR," referring to patients whose infections were initially resistant to both INH and RIF, or "acquired MDR," referring to patients whose *M. tuberculosis* developed resistance to both INH and RIF during treatment. Tennessee reported no cases in 2004 having either initial MDR or acquired MDR. (Figure 11) However, in 2005 Tennessee reported two initial MDR cases, both from the Mid-Cumberland Region. No 2005 cases have reported acquired MDR status, however, it should be noted that data for final drug susceptibilities for 2005 cases are preliminary at the time of this report's publication. As patients complete treatment, acquired MDR statistics may change, especially for those cases whose treatment lasts more than 12 months or who are non-compliant with TB therapy. (See Table 11, page 34)

**Figure 11. Multi-Drug Resistance (MDR)
of TB Cases
Tennessee, 2001-2005**



^ 2005 Acquired MDR data are preliminary.

* Initial MDR refers to those patients who were culture positive and that had initial drug susceptibility testing and who were found to have TB resistant to both INH and RIF.

** Acquired MDR refers to those patients who were alive at diagnosis and who were not initially found to have MDR TB, but developed MDR-TB during therapy.

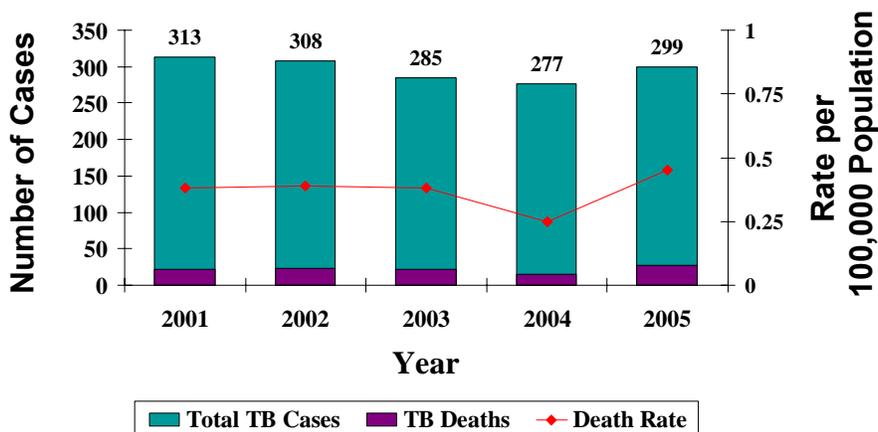
Use of Directly Observed Therapy

Due to the length of TB treatment, the 2005 case management and treatment completion data are preliminary at the time of this report’s publication, and therefore, such data are reported for only 2004. The State of Tennessee endorses the use of directly observed therapy (DOT) for the treatment of all TB cases to promote treatment completion. As a result, there has been a steady increase in the use of DOT since 2001. Tennessee reported 97% (269 cases) of its 2004 cases alive at diagnosis. Of those, 62% (167 cases) were treated with strict DOT. (Refer to Appendix 1 for RVCT Form Completion Instructions.) Thirty-six percent (96 cases) of the reported cases alive at diagnosis in 2004 were treated with a combination of Self-administered Therapy (SAT) and DOT, and 1% (2 cases) of the cases alive at diagnosis reported were treated with strict SAT. Jackson/Madison County and West Tennessee Region each reported 1 case treated with strict SAT, representing 25% and 6% of their total cases, respectively. Of those cases treated with both DOT and SAT, 65% (62 cases) were reported in Memphis/Shelby County, which represented 78% of Memphis/Shelby County’s total cases that were reported as alive at diagnosis. The Southeast Region reported 57% of its cases alive at diagnosis as treated with both DOT and SAT, contributing 8% of the total cases treated using such methods. The South Central Region and Nashville/Davidson County each contributed 7 cases who were treated with both SAT and DOT (7% of the total cases treated with DOT and SAT), representing 44% and 13% of their cases alive at diagnosis, respectively. The Mid-Cumberland and East Tennessee Regions, as well as Knoxville/Knox County, each reported 100% of their cases treated by strict DOT in 2004. With the exception of Memphis/Shelby County and the Southeast Region, the majority of cases reported in 2004 who were alive at diagnosis were treated with strict DOT. Four 2004 Tennessee cases were reported with “unknown” use of directly observed therapy, including 2 cases in both Memphis/Shelby County and Nashville/Davidson County. Misunderstanding of the definition and reporting of “strict DOT” played a role in this report year’s percentages. This issue has been addressed and will likely be reflected in a change in the proportion of cases treated with strict DOT in future reports. (See Table 12, page 35)

Mortality

The frequency of death attributed to TB has remained relatively constant since 2000. However, in 2005, death attributed to TB increased, especially compared to the decline seen in 2004, as illustrated in Figure 12. In 2005, 2% (7 cases) of reported TB cases were dead at the time of TB diagnosis, and 5% all of TB cases reported died of any cause during therapy. Death of TB cases due to any cause has declined in recent years; however, this trend is not consistent with deaths attributed to TB as reported on death certificates. This discrepancy is concerning and is currently being investigated. The proportion of cases that were dead at the time of TB diagnosis in 2005 is consistent with previous years. However, the proportion of cases who died during TB therapy decreased. It is necessary to note that deaths occurring during treatment are preliminary for 2005, as many patients are currently completing treatment. This number may change and will be more accurately reflected in next year's report. Jackson/Madison County experienced no mortality of their TB cases between 2003 and 2005. In addition, Nashville/Davidson County, the Upper Cumberland Region, and Chattanooga/Hamilton County also reported no cases in 2005 having either been found dead at diagnosis or having died sometime during their therapy. Over the past three years, Memphis/Shelby County experienced greater mortality of TB cases than most other regions, with the exception of the Northeast Tennessee Region in 2005, which reported 43% of their cases as dead at diagnosis or died during therapy (2 and 4 cases, respectively). (See Table 13, page 32)

**Figure 12. Tuberculosis Mortality Rates
Tennessee, 2001-2005**



Note: 2005 data are preliminary.

¹Includes cases where TB was specified on death certificate in 2005, but not necessarily reported in TN as a TB case. (N=10)

²TB deaths per Tennessee's population in specified year.

Treatment Completion

Treatment completion is critical not only to ensure appropriate patient care, but to help prevent further TB transmission to others. Treatment completion rates are calculated in Tennessee in two ways: by assessing completion during the treatment period (within 12 months when indicated), or treatment completion at any time. (Please see Appendix 4 for Calculation Methods.)

In 2004, 85% of patients who were alive at the time of TB diagnosis and who were started on treatment completed treatment within twelve months if indicated to do so by their physician. Overall, 93% (222 cases) of all patients eligible to complete treatment completed anytime. The remaining 7% (17 cases) had not completed treatment by April 12, 2006, when the data were extracted from TIMS for this report. Jackson/Madison County, the South Central, Southeast, and Northeast Tennessee Regions, and Knoxville/Knox County all reported 100% of their 2004 cases completing treatment within 12 months. The West Tennessee, Mid-Cumberland, and Upper Cumberland Regions all reported having 100% of their cases complete treatment anytime, with large majorities having completed within 12 months. The remaining regions all reported having cases that did not complete treatment. Of the 7% (17 cases) not completing treatment, 59% (10 cases) were reported in Memphis/Shelby County. Nashville/Davidson County contributed 3 cases (17%) of the 2004 cases that did not complete treatment. East Tennessee Region contributed 2 cases (12%) of the 2004 cases that did not complete treatment. Chattanooga/Hamilton and Sullivan Counties reported 1 case each that did not complete treatment, contributing to an additional 12% of the cases not completing treatment. Of the 17 cases that did not complete treatment, 5 cases were lost to follow-up, 4 refused treatment, 1 case moved, and 7 cases either had incomplete information reported or information was unknown. (See Table 14, page 37)

Table 9. Distribution of Tuberculosis Cases by Site of Disease: Tennessee & Reporting Areas, 2005

Reporting Area	All Cases	Only Pulmonary Disease		Only Extra-Pulmonary Disease		Both Pulmonary & Extra-Pulmonary Disease	
		N	(%)	N	(%)	N	(%)
Tennessee	299	207	(69)	67	(23)	25	(8)
Memphis/Shelby County†	90	58	(65)	22	(24)	10	(11)
West Tennessee Region	17	12	(70)	3	(18)	2	(12)
Jackson/Madison County†	5	4	(80)	--	--	1	(20)
Mid-Cumberland Region	40	32	(80)	7	(18)	1	(2)
Nashville/Davidson County†	66	44	(67)	17	(26)	5	(7)
South Central Region	12	9	(75)	2	(17)	1	(8)
Upper Cumberland Region	5	3	(60)	2	(40)	--	--
Southeast Region	13	9	(70)	2	(15)	2	(15)
Chattanooga/Hamilton County†	14	7	(50)	6	(43)	1	(7)
East Tennessee Region	13	12	(92)	1	(8)	--	--
Knoxville/Knox County†	10	8	(80)	2	(20)	--	--
Northeast Tennessee Region	14	9	(64)	3	(22)	2	(14)
Sullivan County† ***	0	NA	NA	NA	NA	NA	NA

† Indicates metropolitan reporting areas

-- Indicates that the frequency (N) and relative frequency (%) of the event equals zero.

*** Sullivan County had no reported cases of Tuberculosis in 2005.

N/A indicates that the frequency (N) and relative frequency (%) are not applicable or incalculable.

Table 10. Distribution of Tuberculosis Cases by Tuberculosis Case Classification: Tennessee & Reporting Areas, 2005

Reporting Area	All Cases	Culture Positive*		Sputum Smear Positive		Clinical Case		Provider Verified	
		N	(%)	N	(%)	N	(%)	N	(%)
Tennessee	299	239	(80)	--	--	50	(17)	10	(3)
Memphis/Shelby County†	90	69	(77)	--	--	21	(23)	--	--
West Tennessee Region	17	12	(70)	--	--	3	(18)	2	(12)
Jackson/Madison County†	5	3	(60)	--	--	2	(40)	--	--
Mid-Cumberland Region	40	33	(83)	--	--	7	(17)	--	--
Nashville/Davidson County†	66	49	(74)	--	--	13	(20)	4	(6)
South Central Region	12	10	(84)	--	--	1	(8)	1	(8)
Upper Cumberland Region	5	4	(80)	--	--	--	--	1	(20)
Southeast Region	13	12	(92)	--	--	--	--	1	(8)
Chattanooga/Hamilton County†	14	13	(93)	--	--	1	(7)	--	--
East Tennessee Region	13	13	(100)	--	--	--	--	--	--
Knoxville/Knox County†	10	9	(90)	--	--	1	(10)	--	--
Northeast Tennessee Region	14	12	(86)	--	--	1	(7)	1	(7)
Sullivan County†***	0	NA	NA	NA	NA	NA	NA	NA	NA

† Indicates metropolitan reporting areas

* Culture positive cases refers to call cases whose positive culture was obtained from a sputum sample or from another specimen type.

-- Indicates that the frequency (N) and relative frequency (%) of the event equals zero.

*** Sullivan County had no reported cases of Tuberculosis in 2005.

N/A indicates that the frequency (N) and relative frequency (%) are not applicable or incalculable.

Table 11. Distribution of Tuberculosis Cases by Culture-Positive and MDR* Status: Tennessee & Reporting Areas, 2005

Reporting Area	Total Cases	Culture Positive Cases ¹		Initial MDR Cases ²	
		N	(%)	N	(%)
Tennessee	299	239	(80)	2	(1)
Memphis/Shelby County†	90	69	(77)	--	--
West Tennessee Region	17	12	(71)	--	--
Jackson/Madison County†	5	3	(60)	--	--
Mid-Cumberland Region	40	33	(83)	2	(6)
Nashville/Davidson County†	66	49	(74)	--	--
South Central Region	12	10	(83)	--	--
Upper Cumberland Region	5	4	(80)	--	--
Southeast Region	13	12	(92)	--	--
Chattanooga/Hamilton County†	14	13	(93)	--	--
East Tennessee Region	13	13	(100)	--	--
Knoxville/Knox County†	10	9	(90)	--	--
Northeast Tennessee Region	14	12	(86)	--	--
Sullivan County†***	0	NA	NA	NA	NA

† Indicates metropolitan reporting areas

* MDR refers to Multi drug resistance; defined as tuberculosis resistant to both INH and RIF

¹ Refers to all cases whose positive culture was obtained from a sputum sample or from some other sample.

² Refers to those patients who were culture positive and that initial drug susceptibility testing and who were found to have tuberculosis resistant to both INH and RIF. No acquired MDR has been reported.

*** Sullivan County had no reported cases of Tuberculosis in 2005.

-- Indicates that the frequency (N) and relative frequency (%) of the event equals zero.

N/A indicates that the frequency (N) and relative frequency (%) are not applicable or incalculable.

Table 12. Distribution of Tuberculosis Cases by Use of Directly Observed Therapy: Tennessee & Reporting Areas, 2004*

Reporting Area	All Cases	Cases Alive at Diagnosis		SAT Only ¹		DOT Only ²		Both DOT & SAT		Unknown	
		N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
Tennessee	277	269	(97)	2	(1)	167	(62)	96	(36)	4	(2)
Memphis/Shelby County†	85	80	(94)	--	--	16	(20)	62	(78)	2	(2)
West Tennessee Region	17	17	(100)	1	(6)	14	(82)	2	12	--	--
Jackson/Madison County†	4	4	(100)	1	(25)	2	(50)	1	(25)	--	--
Mid-Cumberland Region	19	19	(100)	--	--	19	(100)	--	--	--	--
Nashville/Davidson County†	53	53	(100)	--	--	44	(83)	7	(13)	2	(4)
South Central Region	16	16	(100)	--	--	9	(56)	7	(44)	--	--
Upper Cumberland Region	13	12	(92)	--	--	10	(83)	2	(17)	--	--
Southeast Region	14	14	(100)	--	--	6	(43)	8	(57)	--	--
Chattanooga/Hamilton County†	15	15	(100)	--	--	10	(67)	5	(33)	--	--
East Tennessee Region	20	19	(95)	--	--	19	(100)	--	--	--	--
Knoxville/Knox County†	6	5	(83)	--	--	5	(100)	--	--	--	--
Northeast Tennessee Region	9	9	(100)	--	--	8	(89)	1	(11)	--	--
Sullivan County†	6	6	(100)	--	--	5	(83)	1	(17)	--	--

† Indicates metropolitan reporting areas

* 2005 treatment completion data cannot be calculated until 2007 and therefore 2004 data are reported.

¹ Refers to Self Administered Therapy

² Refers to Directly Observed Therapy

-- Indicates that the frequency (N) and relative frequency (%) of the event equals zero.

Table 13. Distribution of Tuberculosis Cases by Mortality* Status: Tennessee & Reporting Areas, 2003-2005

Reporting Area	2003					2004					2005 **				
	All Cases	Dead At Diagnosis		Died During Therapy		All Cases	Dead At Diagnosis		Died During Therapy		All Cases	Dead At Diagnosis		Died During Therapy	
		N	(%)	N	(%)		N	(%)	N	(%)		N	(%)	N	(%)
Tennessee	285	13	(5)	29	(10)	277	8	(3)	30	(11)	299	7	(2)	14	(5)
Memphis/ Shelby County †	81	4	(5)	2	(3)	85	5	(6)	7	(8)	90	2	(2)	3	(3)
West Tennessee Region	12	--	--	1	(8)	17	--	--	4	(24)	17	1	(6)	1	(6)
Jackson/ Madison County †	4	--	--	--	--	4	--	--	--	--	5	--	--	--	--
Mid- Cumberland Region	35	1	(3)	2	(6)	19	--	--	1	(5)	40	--	--	1	(3)
Nashville/ Davidson County †	62	3	(5)	5	(8)	53	--	--	5	(9)	66	--	--	--	--
South Central Region	16	--	--	4	(25)	16	--	--	6	(38)	12	--	--	2	(17)
Upper Cumberland Region	7	--	--	2	(29)	13	1	(8)	1	(8)	5	--	--	--	--
Southeast Region	12	1	(8)	2	(17)	14	--	--	--	--	13	2	(15)	1	(8)
Chattanooga/ Hamilton County †	13	--	--	2	(15)	15	--	--	2	(13)	14	--	--	--	--
East Tennessee Region	24	3	(13)	4	(17)	20	1	(5)	1	(5)	13	--	--	1	(8)
Knoxville/Knox County †	7	--	--	1	(14)	6	1	(17)	--	--	10	--	--	1	(10)
Northeast Tennessee Region	12	1	(8)	4	(33)	9	--	--	3	(33)	14	2	(14)	4	(29)
Sullivan County †***	0	NA	NA	NA	NA	6	--	--	--	--	0	NA	NA	NA	NA

† Indicates metropolitan reporting areas.

* Death is of all causes, not just Tuberculosis.

** 2005 data is preliminary.

*** Sullivan County had no reported cases of Tuberculosis in 2003 or 2005.

-- Indicates that the frequency (N) and relative frequency (%) of the event equals zero.

N/A indicates that the frequency (N) and relative frequency (%) are not applicable or incalculable.

Table 14. Distribution of Tuberculosis Cases by Treatment Completion: Tennessee & Reporting Areas, 2004*

Reporting Area	Total Cases	Completed Treatment in 12 Months or Less ¹		Completed Treatment Anytime ^{1,2}	
		N	(%)	N	(%)
Tennessee	277	202	(85)	222	(93)
Memphis/Shelby County†	85	54	(74)	63	(86)
West Tennessee Region	17	11	(85)	13	(100)
Jackson/Madison County†	4	4	(100)	4	(100)
Mid-Cumberland Region	19	17	(94)	18	(100)
Nashville/Davidson County†	53	41	(85)	45	(94)
South Central Region	16	10	(100)	10	(100)
Upper Cumberland Region	13	10	(91)	11	(100)
Southeast Region	14	12	(100)	14	(100)
Chattanooga/Hamilton County†**	15	12	(92)	12	(92)
East Tennessee Region	20	15	(83)	16	(89)
Knoxville/Knox County†	6	5	(100)	5	(100)
Northeast Tennessee Region	9	6	(100)	6	(100)
Sullivan County†	6	5	(83)	5	(83)

† Indicates metropolitan reporting areas

* Due to the length of tuberculosis treatment, 2005 treatment completion data cannot be calculated until 2007 and therefore 2004 treatment completion data are reported.

¹ Calculation excludes cases that were dead at diagnosis and that died during therapy.

² Calculation excludes cases with rifampin (RIF) resistance, and cases that were less than 15 years of age with meningeal, bone, joint or military tuberculosis disease.

Appendices

**Appendix I: Case Definition* & RVCT Form Completion Instructions
& Calculated Variables Websites**

A clinically verified case of TB is a case that meets *all* of the following criteria:

- A positive tuberculin skin test;

And

- Other signs and symptoms compatible with TB, such as an abnormal, unstable (worsening or improving) chest x-ray, or clinical evidence of current disease;

And

- Treatment with two or more anti-tuberculosis medications;

And

- Complete diagnostic evaluation

The laboratory criteria for the diagnosis of TB are as follows:

- Isolation of *M. tuberculosis* (culture) from a clinical specimen;

Or

- Demonstration of *M. tuberculosis* from a clinical specimen by nucleic acid amplification test;

Or

- Demonstration of acid-fast bacilli (smear) in clinical specimen when culture has not been or cannot be obtained.

* Case definition was taken from the Report of Verified Cases of Tuberculosis (RVCT) instructions produced by the CDC located in Appendix SUR I of the TIMS User's Guide.

RVCT Form Completion Instructions (SUR I) and Calculated Variables (SUR IV)

<http://ftp.cdc.gov/pub/Software/TIMS/Documentation/>

Appendix 2: Reporting Guidelines



TUBERCULOSIS ELIMINATION PROGRAM
STATE OF TENNESSEE
DEPARTMENT OF HEALTH
CORDELL HULL BUILDING, FIRST FLOOR
425 5th AVENUE NORTH
NASHVILLE, TENNESSEE 37243

December 1, 2006

Dear Colleague:

I would like to make you aware of the current **requirements for reporting tuberculosis (TB)** to the Tennessee Department of Health:

Effective July 1, 2004, all persons with known or suspected active TB of all forms, including pulmonary and/or extrapulmonary disease, must be reported to the Tennessee Department of Health within 12 hours by phone (T.C.A. 68-9-201; Chapter 1200-14-1.02,1.03(1) of the Rules and Regulations of the Tennessee Department of Health). This verbal report should include the name, age, sex, race, and address of the patient. Written notification providing the same information must also be submitted within one week, preferably using forms provided by the Department. Persons to report include patients who you treat or consider treating for active TB.

Early notification of TB suspects and cases enables the Department of Health to ensure appropriate treatment of TB suspects and cases and to provide all patients with essential services including counseling and education regarding TB disease and treatment, “client-centered” case management, free treatment under directly observed therapy, and monitoring for toxicity and compliance throughout therapy. Early notification also enables the Department of Health to initiate a contact investigation promptly to identify additional persons with active TB or latent TB infection, thus preventing further spread of disease.

Providers should report TB cases and suspects directly to the Regional Health Office TB Clinic designated for the county where the patient resides. Please note that Health Department TB Clinic providers can provide consultation if you are considering the possibility of TB and whether or not to initiate isolation and treatment. For your convenience, a map showing the regional divisions that should be used for reporting purposes is attached,

as well as contact names, phone and fax numbers for each Regional Office. **Updated forms** for written notification are available on-line at <http://www2.state.tn.us/health/Downloads/ph-1600.pdf>

Please remember to “***THINK TB***” when evaluating persons with compatible clinical findings, especially those with known TB risk factors such as foreign-birth, HIV, substance abuse, homelessness, immunosuppressive treatment or conditions (i.e., chemotherapy, steroids, or TNF- α blocking agents such as infliximab (Remicade[®]), and residence or employment in correctional facilities or long-term care facilities). A list of TB risk factors and other **TB-related resources** can be obtained at the following websites:

<http://www2.state.tn.us/health/CEDS/TB/index.htm>
<http://www.cdc.gov/nchstp/tb/default.htm>

If you have any questions regarding this notice, please contact your Regional Health Office or the Tennessee Department of Health at (615)741-7247.

Thank-you for working with us to protect the public’s health.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Jon V. Warkentin', with a large, stylized initial 'J'.

Jon V. Warkentin, M.D., M.P.H.
TB Control Officer & Medical Director
TB Elimination Program
Tennessee Department of Health
1st Floor, Cordell Hull Building
425 5th Avenue N.
Nashville, TN 37243



TUBERCULOSIS ELIMINATION PROGRAM
STATE OF TENNESSEE
DEPARTMENT OF HEALTH
CORDELL HULL BUILDING, FIRST FLOOR
425 5th AVENUE NORTH
NASHVILLE, TENNESSEE 37243

January 1, 2007

Re: Public Health Reporting and HIPAA (revised from a memo dated September 2004)

To Whom It May Concern:

The Tuberculosis (TB) Elimination Program, as part of the Communicable and Environmental Disease Services Section of the Tennessee Department of Health, conducts surveillance for tuberculosis in its capacity as a public health authority as defined by the Health Insurance Portability and Accountability Act (HIPAA), Standards for Privacy of Individually Identifiable Health Information: Final Rule (Privacy Rule) [45 CFR §164.501].

Pursuant to 45 CFR § 164.512(b) of the Privacy Rule, covered entities such as your organization may disclose, without individual authorization, protected health information to public health authorities "...authorized by law to collect or receive such information for the purpose of preventing or controlling disease, injury, or disability, including, but not limited to, the reporting of disease, injury, vital events such as birth or death, and the conduct of public surveillance, public health investigations, and public health interventions...".

The authority to conduct surveillance, which may include examination of medical records, comes from the Communicable Diseases Rules of the Tennessee Code Annotated, Chapter 1200-14-1. "Medical records shall be made available when requested, for inspection and copying of, by a duly authorized representative of the Department while in the course of investigating a reportable disease under these regulations." (1200-14-1-.15)

The Privacy Rule provides that covered entities "... may rely, if such reliance is reasonable under the circumstances, on a requested disclosure as the minimum necessary for the stated purposes when making disclosures to public officials that are permitted under 45 CFR §164.512, if the public official represents that the information requested is the minimum necessary for the stated purpose(s)." The information being requested represents the minimum necessary to carry out the

public health purposes of the TB Elimination Program pursuant to 45 CFR §1643514(d) of the Privacy Rule.

The requirement to provide the Tennessee Department of Health with information regarding notifiable diseases, and the authority to do so without patient authorization, does not release covered entities from the requirement to account for those disclosures. The Centers for Disease Control (CDC) published in the April 11, 2003, Morbidity and Mortality Weekly Report (MMWR) the following provisions covering "Accounting for Public Health Disclosures":

...where the covered entity has, during the accounting period, made multiple disclosures to the same recipient for the same purpose, the Privacy Rule provides for a simplified means of accounting. In such cases, the covered entity need only identify the recipient of such repetitive disclosures, the purpose of the disclosure, and describe the PHI routinely disclosed. The date of each disclosure need not be tracked. Rather, the accounting may include the date of the first and last such disclosure during the accounting period, and a description of the frequency or periodicity of such disclosures.

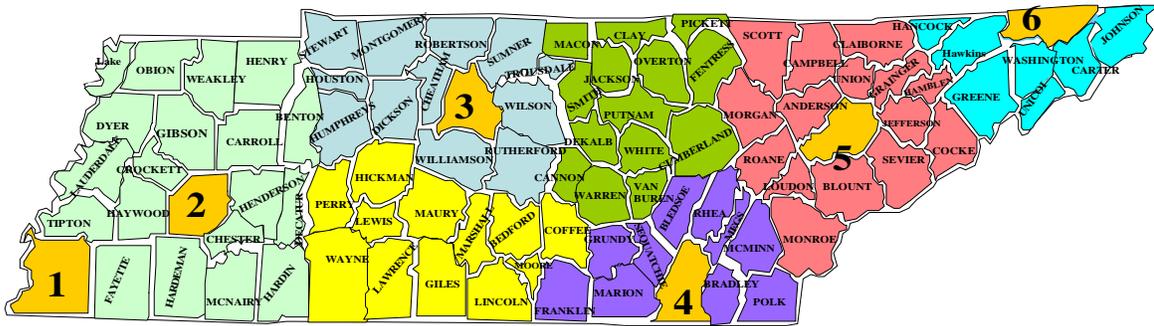
Thank you and your institution for continuing to work so diligently with the Tennessee Department of Health TB Elimination Program to ensure the safety and health of all Tennesseans. If you have any questions, please feel free to call the TB Elimination Program at 615-741-7247.

Sincerely,

A handwritten signature in blue ink, appearing to read "Jon V. Warkentin". The signature is stylized with large loops and a long horizontal stroke at the end.

Jon V. Warkentin, M.D., M.P.H.
TB Control Officer & Medical Director
TB Elimination Program
Tennessee Department of Health
1st Floor, Cordell Hull Building
425 5th Avenue N.
Nashville, TN 37243

County Map of Tennessee



Metropolitan and Regional Reporting Jurisdictions

- **Metro Reporting Jurisdictions**
 - 1. Memphis/Shelby County
 - 2. Jackson/Madison County
 - 3. Nashville/Davidson County
 - 4. Chattanooga/Hamilton County
 - 5. Knoxville/Knox County
 - 6. Sullivan County
- West Tennessee Region
- Mid Cumberland Region
- South Central Region
- Upper Cumberland Region
- Southeast Tennessee Region
- East Tennessee Region
- North East Tennessee Region

Appendix 4: Revised Calculation Methods used for Treatment Completion Rates

Calculation Methods: Treatment Completion of Therapy for 1 Year or Less Where Indicated & Anytime

Denominator:

Take the total # of cases counted for the specified time period _____
(Typically a cohort year)

Subtract the # of cases that were dead at diagnosis _____

Subtract the # of cases that died during treatment _____

TX Completion Anytime Denominator 1 _____

From Denominator 1,
Subtract the # of cases with rifampin resistance _____

Subtract the # of cases that are <less than 15 years old
With meningeal (60), bone & joint (30), or miliary TB (50) _____

TX Completion within 12 Months Denominator 2 _____

* Note that denominator includes those who were lost, refused tx, moved, etc.

Numerator:

TX Completion Anytime, Numerator 1:

From denominator 1,
Subtract the # of cases that were: _____

Moved (2) _____ Lost (3) _____ Refused (4) _____

Not TB, Other, Unknown, Blank (5, 7, 9, blank) _____

Numerator 1: _____

TX Completion within 12 Months, Numerator 2:

From denominator 2,
Subtract the # of cases that were: _____

Moved (2) _____ Lost (3) _____ Refused (4) _____

Not TB, Other, Unknown, Blank (5, 7, 9, blank) _____

Subtract the # of cases that completed tx in > 52.143 weeks _____

* In excel spread sheet, after you remove the previously mentioned cases, add a column called 'time in weeks', which should be formatted in general format. In the first cell in type in the following formula that should reflect the following: =sum (stopther-rxdate)/7. For the stop therapy date and the rx date, you will need to click on the corresponding cells to add them in the formula.

Numerator 2: _____

Divide each numerator by the denominator and multiply by 100 for %.

Tx Completion Anytime= $\frac{\text{NUM 1}}{\text{DEN 1}} * 100$ Tx Completion w/n 12 Months= $\frac{\text{NUM 2}}{\text{DEN 2}} * 100$

=

=

Tuberculosis Fact Sheet - 2005

Worldwide:

- At least one person is infected with tuberculosis (TB) each second.
- Someone dies of TB disease every ten seconds.
- One-third of the world's population is infected with TB.
- TB accounts for more than one-quarter of all preventable adult deaths in developing countries.

US Data:

- In 2005, the number of active TB cases reported in the U.S. fell to an all-time low of 14,097 cases, with a rate of 4.8 cases per 100,000 population.
- While this is the lowest U.S. TB case rate ever recorded, the decline in 2005 (4%) was one of the smallest in more than a decade.
- Slightly more than half of all TB cases (55%) in the U.S. were among foreign-born individuals, who were nearly nine times more likely to have active TB than U.S.-born individuals.

Tennessee Data:

- In 2005, 299 cases of active TB were reported in the state of Tennessee, indicating an increase of 7.4% in total TB cases for the State of Tennessee from 2004. This is the highest increase in active TB cases Tennessee has seen in over a decade. The TB case rate for 2005 was 5.0 cases per 100,000 population, which was above the national TB case rate of 4.8.
- More males were reported with active TB in Tennessee than females: in 2005, 198 cases (66.2%) were male, and 101 (33.8%) were female.
- In 2005, the age group with the largest percentage of reported TB cases in Tennessee was the 25-44 year-old age group (30.1%), followed by those aged 45-64 years (28.4%), those aged 65 years or older (22.1%), and lastly, the 0-24 year-old age group (19.4%).

- There were 11 active TB cases age 0-4 years (3.7%) and 10 cases age 5-14 years (3.3%). Most children with TB disease were infected by an adult with active TB disease which was undiagnosed and untreated.
- The racial/ethnic breakdown of Tennessee's active TB cases reported in 2005 was as follows: Non-Hispanic Black, 46.1% (138); Non-Hispanic White, 36.8% (110); Hispanic, 11.7% (35); Asian/Pacific Islander 4.7% (14); American Indian/Alaskan Native, 0.7% (2).
- Persons born outside of the U.S. comprised 17.6% of the TB cases reported in Tennessee in 2004, a proportion that grew to 21.4% in 2005 (roughly a 30% increase). Distribution by country of origin of the 64 foreign-born TB cases was as follows: Mexico (22%), Somalia (15%), Honduras (10%), India (8%), Guatemala (8%), China (6%), Sudan (6%), El Salvador (5%), the Philippines (5%); other countries represented 15% of the total foreign-born cases in 2005.
- In 2005, 10.7% of TB cases reported in Tennessee were identified as being homeless.
- In 2005, 4.4% of TB cases reported in Tennessee were residents of a correctional facility at time of diagnosis.
- In 2005, 4.4% of TB cases reported in Tennessee were residents of a long-term care facility at the time of diagnosis.
- Nineteen percent of TB cases reported in 2005 reported excessive alcohol use.
- Twelve percent of TB cases reported in 2005 reported non-injection drug use, while no cases reported having used injection drugs.
- The percentage of TB cases co-infected with HIV in 2005 was 8.7%. Of these, 53.9% are between the ages of 25 and 44 years.

