

2012 Tuberculosis Statistics For North Carolina

State of North Carolina
Department of Health and Human Services
Division of Public Health
Communicable Disease Branch
Tuberculosis Control Program

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Department of Health and Human Services • Aldona Z. Wos, M.D., Secretary
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HIGHLIGHTS

While tuberculosis in the United States decreased from 4.2 to 3.2 per 100,000 between 2008 and 2012, the North Carolina rate went from 3.6 to 2.2. The 2012 North Carolina rate per 100,000 was a 14 percent drop from 2011.

Demographics:

- North Carolina ranked as the 29th highest state for TB case rates in the United States in 2012. This can be viewed as significant progress; in 1980, North Carolina was ranked as the 3rd highest state for case rate.
- The number of TB cases in 2012 was 211. Since 1980, TB cases in North Carolina have decreased by more than 4 percent per year. As a result, the total number of cases in 2012 was less than 20 percent of the total number of cases for 1980 (211 cases compared to 1066 cases).
- In 2012, 41 percent of all cases were located in five counties: Mecklenburg (30), Guilford (17), Wake (16), Forsyth (12), Robeson (13) and Durham (10). The case rate was higher than the state rate in all of these counties except Wake County. There were 45 counties with no TB cases in 2012.
- The number of Asians with TB decreased by 12 percent between 2008 and 2012; the case rate for Asians decreased from 25 to 23 per 100,000 population.
- The number of African-Americans with TB decreased by 48 percent from 2008 to 2012. The case rate for African-Americans decreased from 6.4 to 3.2 per 100,000 population.
- The number of Hispanics with TB decreased from 85 cases in a year to 42 between 2008 and 2012; the rate during this same time period decreased from 13 to 5.1 per 100,000 population. Of the 284 total Hispanic cases between 2008 and 2012, 147 (52%) were located in six counties: Mecklenburg (42), Wake (37), Forsyth (23), Buncombe (17), Durham (16). And Duplin (13).
- The number of cases from 2008 to 2012 decreased for every age group with the greatest percentage decrease being in ages 5 to 14 (50 percent decrease between 2008 and 2012). Rates for both males and females declined about 37% during this five year period.

Risk Factors:

- About one-half of all 2012 TB cases in North Carolina have at least one of the following risk factors: being born in a country with a higher TB incidence than the U.S. (“foreign born”); homeless within past year; resident of a long-term care or correctional facility; HIV co-infected; excessive alcohol user; non-injecting or injecting drug user; or health care worker. Ten percent have two or more of these risk factors.
- The percent of cases that are foreign born increased from 37 percent to 46 percent between 2008 and 2012. Fifty percent of all foreign-born cases of TB in 2012 came from four countries: Mexico (22%); Vietnam (13%); India (9%), and Bhutan (4%). For the five year period from 2008 to 2012, there were a total of 535 foreign-born cases. Of these, 322 cases came from five countries: Mexico (182), Vietnam (54), India (50), Honduras (36), and the Philippines (32). Of the total, 315 cases resided in five counties: Mecklenburg (91), Wake (80), Guilford (73), and Forsyth (31). For 2012

pediatric cases (0 to 14 years), 20 percent were foreign-born and another 44 percent had one or both parents who were foreign born.

- TB cases with excessive alcohol use reported increased from 12 percent in 2008 to 13 percent in 2012. Most of the people who reported excessive alcohol use are non-Hispanic U.S. born.
- Homeless cases decreased from 5% percent in 2008 to 3% percent in 2012.
- Reporting of HIV status for TB cases has increased significantly from 2000 to 2012. Since November 2007, the standard of care has been to offer HIV testing as part of routine screening. Patients are informed that HIV testing is part of the screening and may decide to “opt-out” of that test. Before this standard of care was official, N.C. TB nurse consultants trained local health department staff to encourage HIV testing for TB suspects/cases. Consequently, the number of cases where HIV status is unknown has decreased greatly. In 2000, there were 133 persons for whom HIV testing was not offered, not known, done but no result, or refused by the patient. In 2012, there were two persons who refused HIV testing and three persons who died shortly after diagnosis, and one person for whom venipuncture was attempted but not successful.

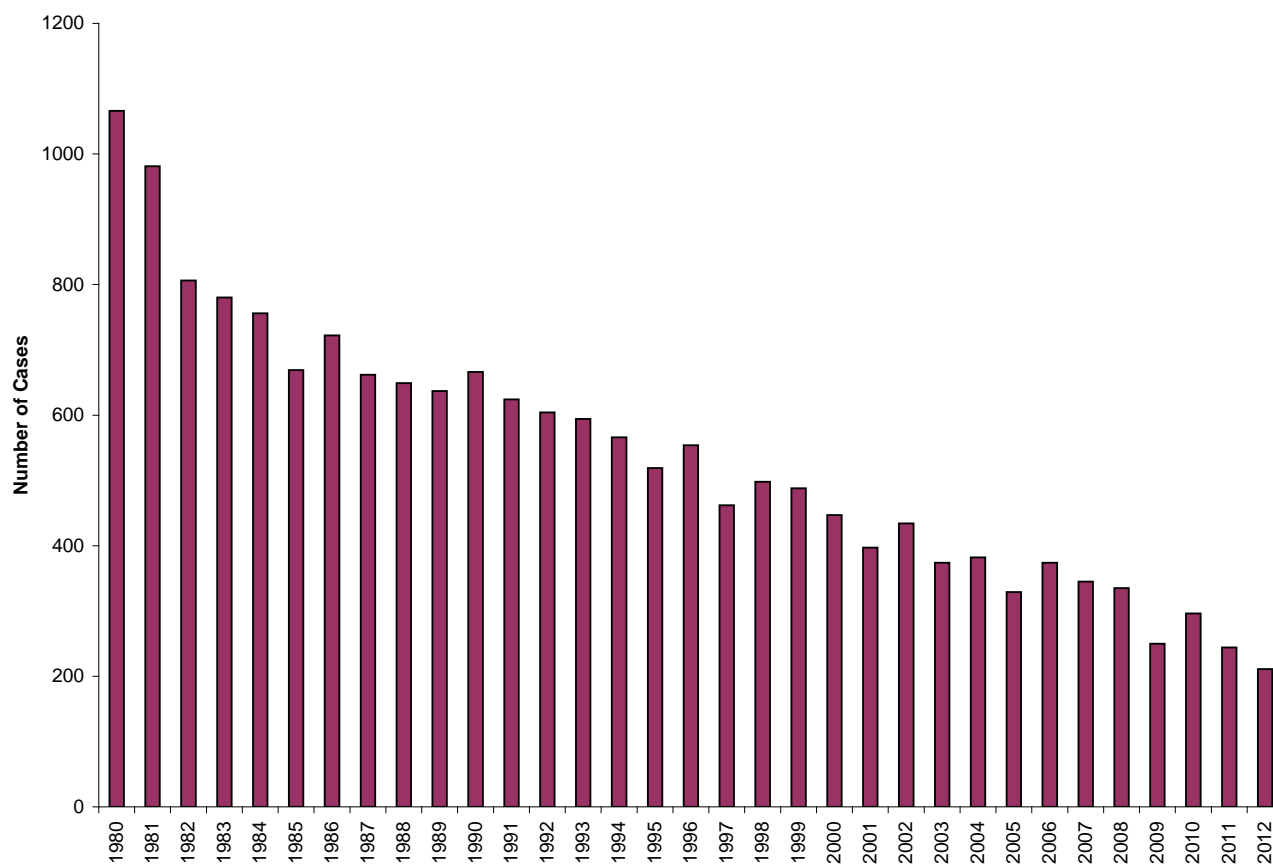
Clinical data:

- Mortality of tuberculosis cases during treatment greatly decreased from 2002 to 2011. The number of cases where death occurred during treatment was 44 in 2002 and 11 by 2011. Additionally, there were 15 people dead at diagnosis in 2002 and four in 2011.
- Previous diagnosis of tuberculosis decreased from 24 cases in 2003 to eight cases in 2012.
- The single major site of disease for TB cases in 2012 was predominately pulmonary (149), followed by pleural (14) and lymphatic: cervical (12).
- The number of cases resistant to INH in North Carolina was 13 in 2008 and 15 in 2012; the percentage of cases increased from 5 percent to 7 percent. Between 2008 and 2012, the number of MDR cases has ranged from one to two cases per year.
- In 2011, all cases that were begun on treatment were on totally directly-observed therapy (DOT). The percentage of 2011 cases that completed therapy in one year (when expected to complete therapy in one year) was 93 percent with another 6 percent completing after one year. Three cases moved out of the country and it is unknown whether they completed treatment.

DEMOGRAPHICS

DEMOGRAPHIC CHARACTERISTICS

Figure 1. Reported TB Cases in N.C.: 1980 - 2012



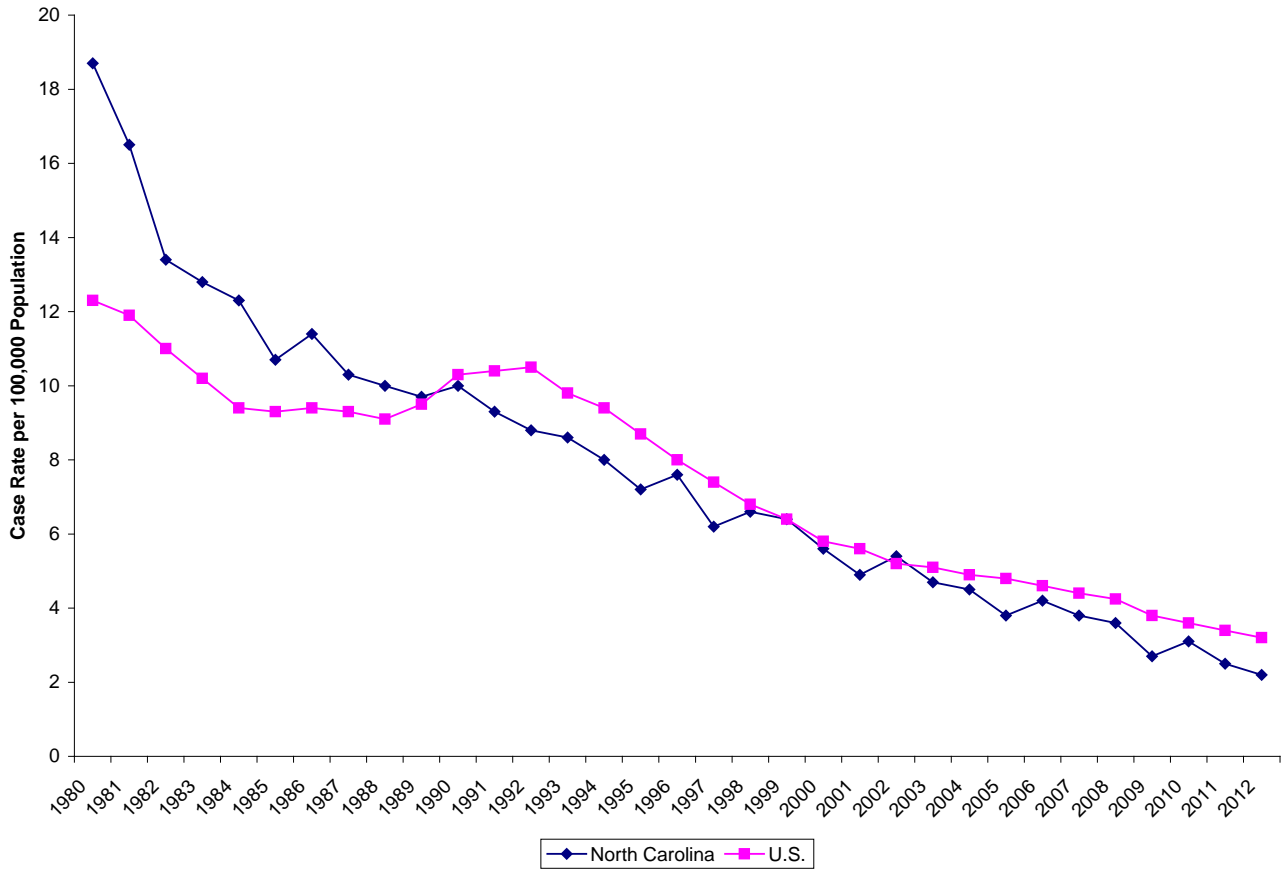
DATA SOURCE: NC Electronic Data Surveillance System (NC EDSS) and Tuberculosis Information Management System (TIMS)

As can be seen from Figure 1, the total number of cases in North Carolina for 2012 is less than 20 percent of the total number of cases in 1980 (211 cases compared to 1066). On average, the numbers have declined more than 4 percent per year. TB incidence in North Carolina decreased 37 percent between 2008 and 2012, down from 345 cases to 211 cases. The number of cases reported in North Carolina decreased from 244 to 211 between the reporting years 2011 and 2012 – the total number of cases in 2012 was 14 percent lower than the total number of cases in 2011.

Both U.S. and N.C. TB Case Rates have dropped significantly since 1980. [Figure 2] With the exception of two years (1999 and 2002), the TB case rate has been lower in N.C. than in the U.S. since 1990.

The number of cases has declined sharply in North Carolina in the past five years and the state is ranked as 29th highest for case rates in 2012. [Table 1] North Carolina has the 12th largest number of cases among the 50 states.

Figure 2. TB Rates for N.C. and the U.S.: 1980 - 2012



DATA SOURCE: Annual surveillance reports published by CDC.

Table 1: N.C. and U.S. Case Rate and N.C. Ranking in U.S. by Case Rate 2008-2012

Year	Case Rate and Rank by Case Rate 2008-2012		
	Rates		Rank
	USA	North Carolina	
2008	4.2	3.6	20
2009	3.8	2.7	26
2010	3.6	3.1	19
2011	3.4	2.5	24
2012	3.2	2.2	29

DATA SOURCE: Annual surveillance reports published by CDC.

Table 1 provides a statistical overview and Table 2 provides a demographic overview of reported cases and case rates in N.C. from 2008 through 2012. Table 10 (Page 27) provides TB cases and rates by county. Figures 4, 5, and 6 provide information about the percent of cases by gender, age, and race/ethnicity.

Figure 3 on the following page is a map of 2012 cases in N.C. by county of residence.

Figure 3. North Carolina 2012 Tuberculosis Cases by County

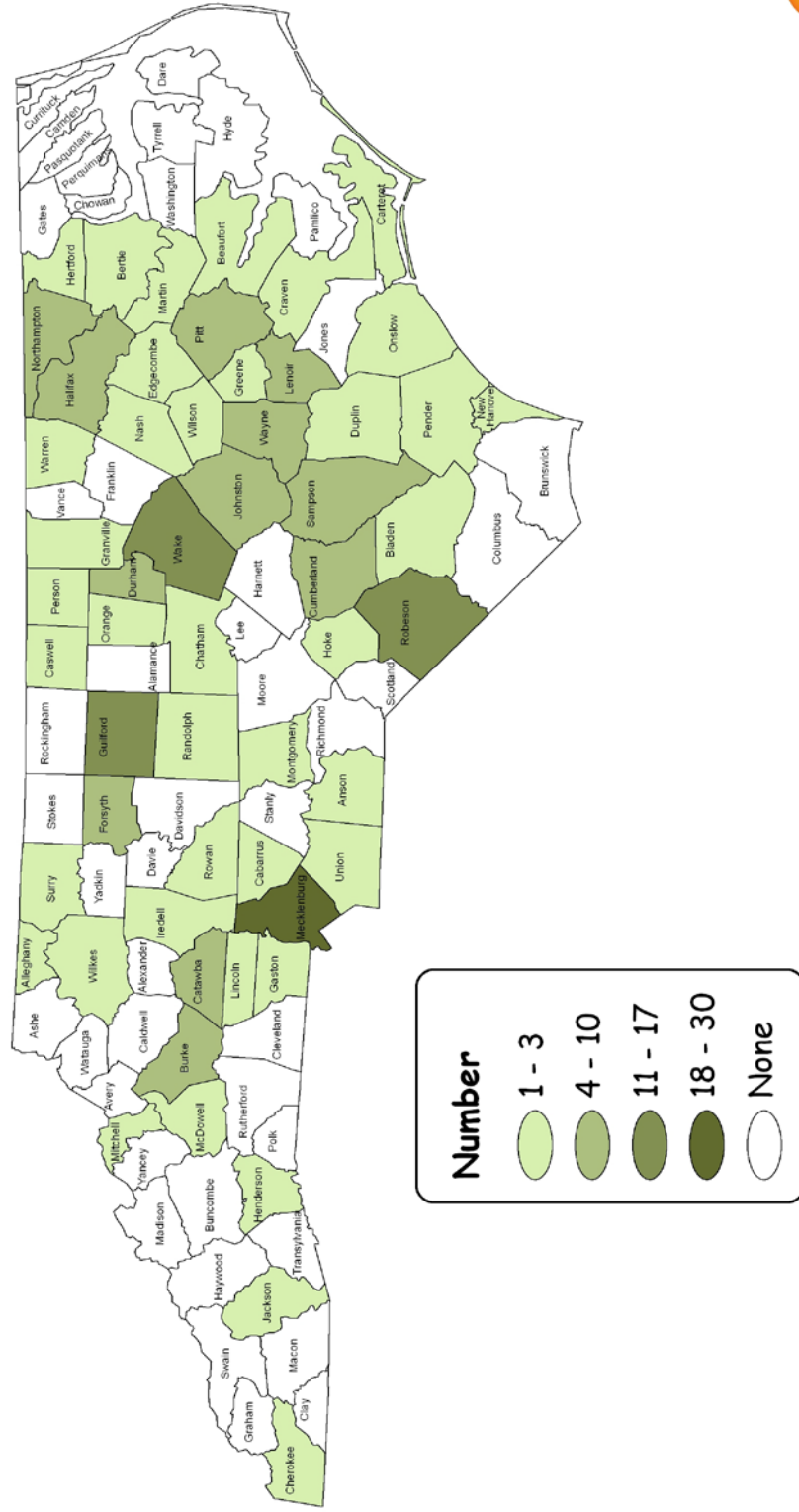


Table 2 provides a demographic overview of reported cases and case rates in N.C. from 2008 through 2012. Table 9 provides TB incidence (cases) and rates by county. Figures 4, 5, and 6 provide information about the percent of cases by gender, age, and race/ethnicity. TB cases in North Carolina decreased between 2008 and 2012 from 335 to 211 – a 37 percent decrease. There were 18 percent more cases in 2010 than in 2009. In 2012, the percentage of cases for all racial groups remained fairly consistent with the percentages for 2011 with the exception of blacks (decrease from 38 to 32 percent) and Asians (increase from 17 to 23 percent). Numbers for all races decreased over the five years with the exception of persons who were Asian (48 in 2012 compared with 43 in 2008). The decrease in cases was greater for blacks (48 percent fewer cases in 2012 compared with 2008) than for whites (43 percent fewer cases in 2012 compared with 2008). The number of cases decreased or remained the same for every age group.

North Carolina rates per 100,000 population decreased by 39 percent from 2008 to 2012 (from 3.6 to 2.2 per 100,000). The case rate for Black/African-Americans decreased from 6.4 in 2008 to 3.2 by 2012, which is a 50 percent decrease. While rates for Asians have fluctuated over the five years, rates for Asians decreased from 24.6 in 2008 to 22.7 in 2012. Annual case rates among Hispanics decreased from 13 in 2008 to 5.1 in 2012. Rates for ages 5 to 14 decreased from 0.6 to 0.3 resulting in a 50 percent decrease. The rates for males decreased from 4.7 to 2.8, which is a 40 percent decrease. During the same time period, rates for females decreased by 38 percent (from 2.6 to 1.6 per 100,000).

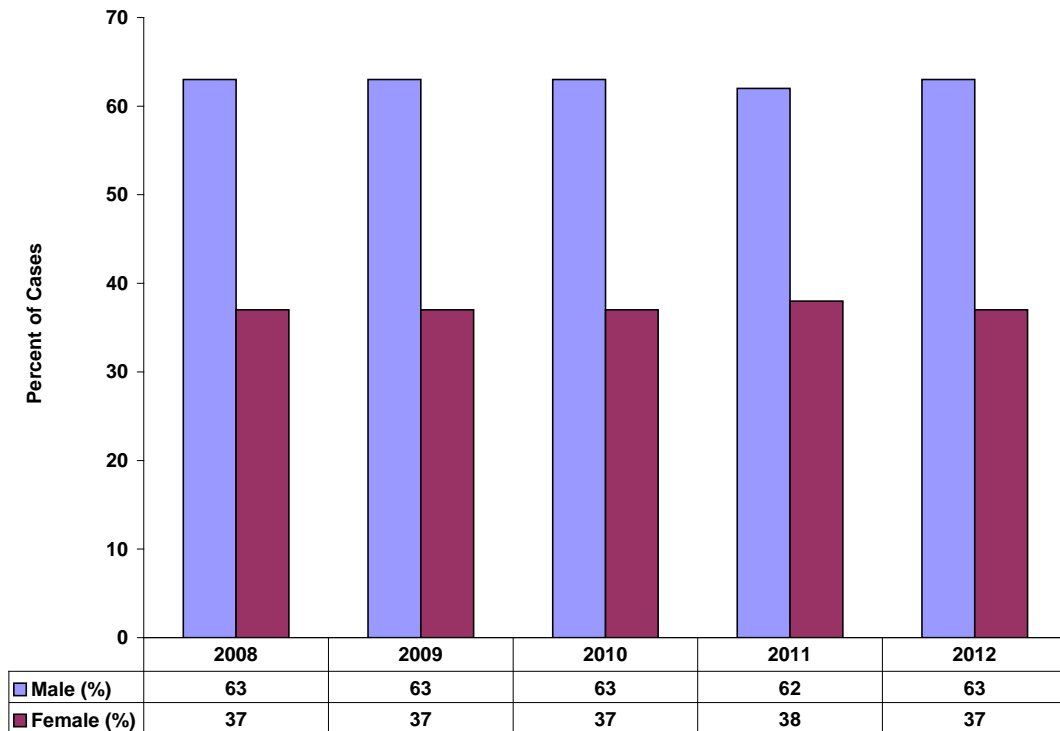
Table 2		NORTH CAROLINA TB CASE REPORTS AND CASE RATES FOR 2008-2012*									
Year		2008		2009		2010		2011		2012	
VARIABLES		#	Rate	#	Rate	#	Rate	#	Rate	#	Rate
Cases		335	3.6	250	2.7	296	3.1	244	2.6	211	2.2
SEX											
Male		212	4.7	157	3.4	187	4.0	151	3.2	133	2.8
Female		123	2.6	93	1.9	109	2.2	93	1.9	78	1.6
RACE											
White‡		141	2.1	103	1.5	111	1.7	88	1.3	81	1.2
Black/African-American		129	6.4	107	5.3	113	5.5	93	4.5	67	3.2
Asian		43	24.6	29	16.1	55	26.3	42	20.1	48	22.7
Amer. Indian/Alaska Native		9	7.9	6	5.1	5	4.1	7	5.7	5	4.8
Hawaiian/Other Pac. Isl.		0	0	0	0	5	75.7	1	15.1	0	0
Multi-Racial		13	12.6	5	4.4	7	3.4	13	6.3	10	4.9
ETHNICITY											
Hispanic		85	13.0	54	7.8	56	7.0	47	5.9	42	5.1
Non-Hispanic		250	2.9	196	2.2	240	2.7	197	2.2	169	1.9
AGE											
0- 4		19	2.0	9	1.4	20	3.2	11	1.7	11	1.8
5-14		8	0.6	9	0.7	4	0.3	4	0.3	4	0.3
15-24		30	2.4	30	2.3	36	2.7	25	1.9	25	1.9
25-44		119	4.6	78	3.0	86	3.3	79	3.1	72	2.8
45-64		91	3.8	82	3.4	80	3.2	69	2.8	54	2.1
>65		68	6.0	42	3.6	70	5.7	56	4.5	45	3.5

*Data source: NC EDSS TB Surveillance - Demographic Data Report. Rates are per 100,000.

‡Includes White Hispanic and White Non-Hispanic.

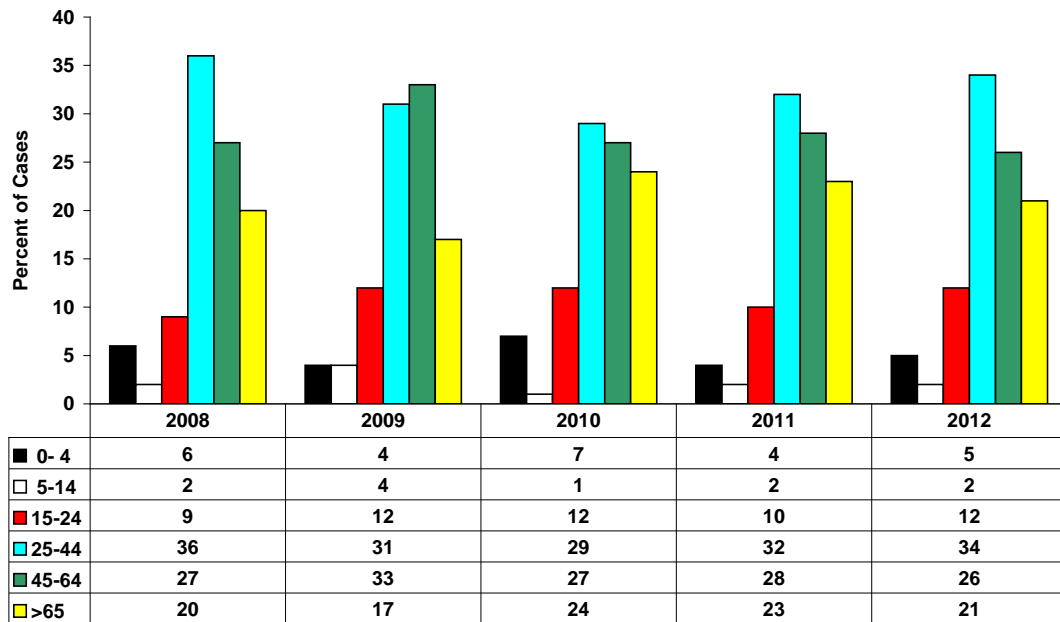
†Denominators for computing rates for the state were obtained from the Annual Estimates of the Population for the United States and Puerto Rico for 2008 and 2009. For 2010, 2011, and 2012 the source is: U.S. Census Bureau, Summary File 1, Table PCT12. 2012 estimates are not yet available at the time this report is issued so the denominator is the same for 2011 and 2012.

Figure 4. N.C. TB Cases by Gender: 2008 – 2012



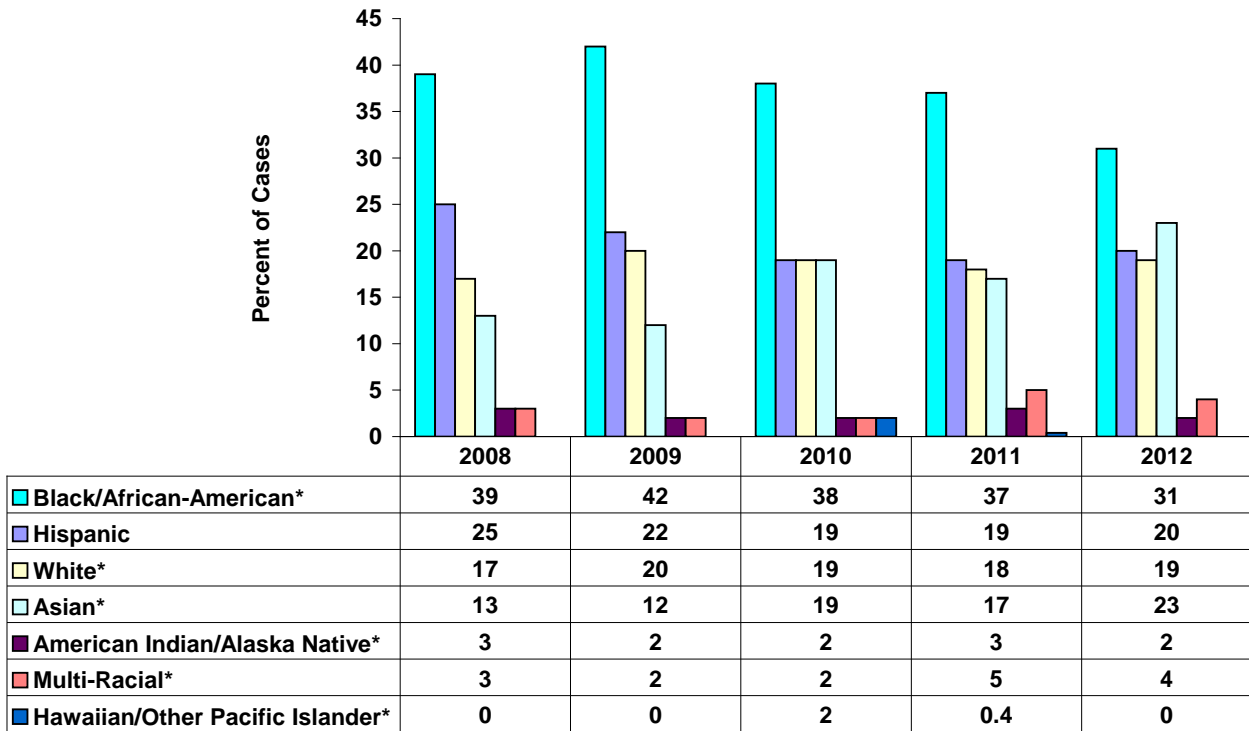
DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

Figure 5. N.C. TB Cases by Age Group: 2008 – 2012



DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

Figure 6. N.C. TB Cases by Race and Ethnicity: 2008 – 2013



* Does not include Hispanics

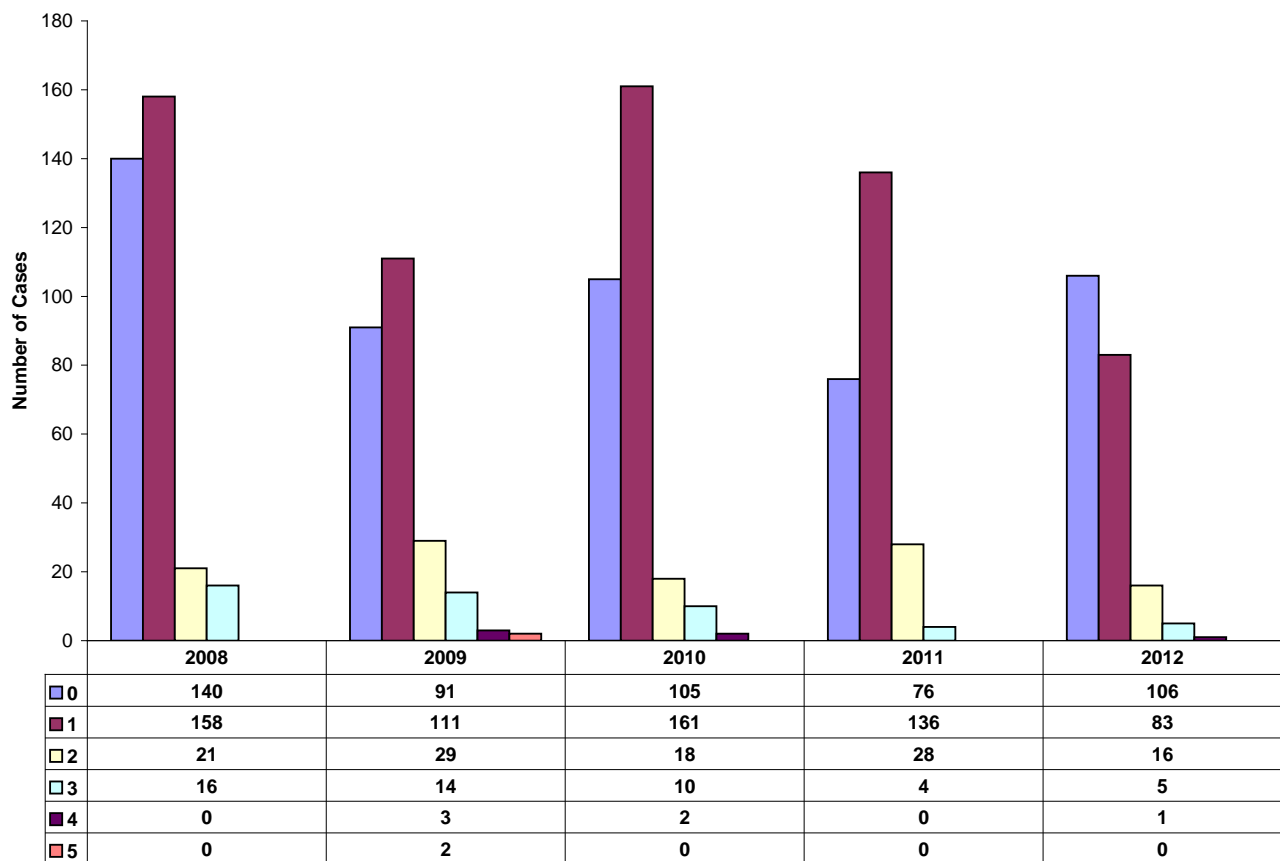
DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

RISK FACTORS

RISK FACTORS FOR TB

There are several risk factors commonly associated with increased incidence of TB. These include: being foreign-born; excessive alcohol use; non-injecting and/or injecting drug use; being homeless; being a resident of a long-term care facility or a correctional facility; being co-infected with HIV; and being a health-care worker. This section describes N.C. TB cases regarding these factors. As can be seen from Figure 7, about 50 percent of the 2012 cases have one or more risk factors. In 2012, approximately 10 percent of the cases have two or more risk factors.

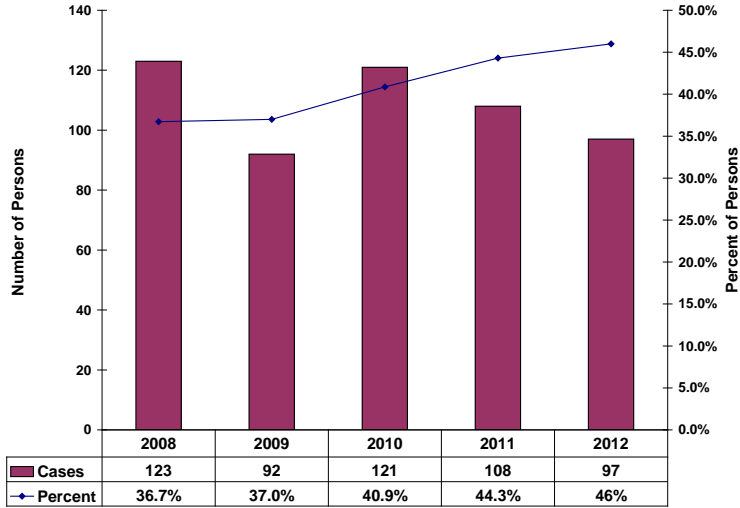
Figure 7. N.C. TB Cases by Number of Risk Factors: 2008 – 2012



DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

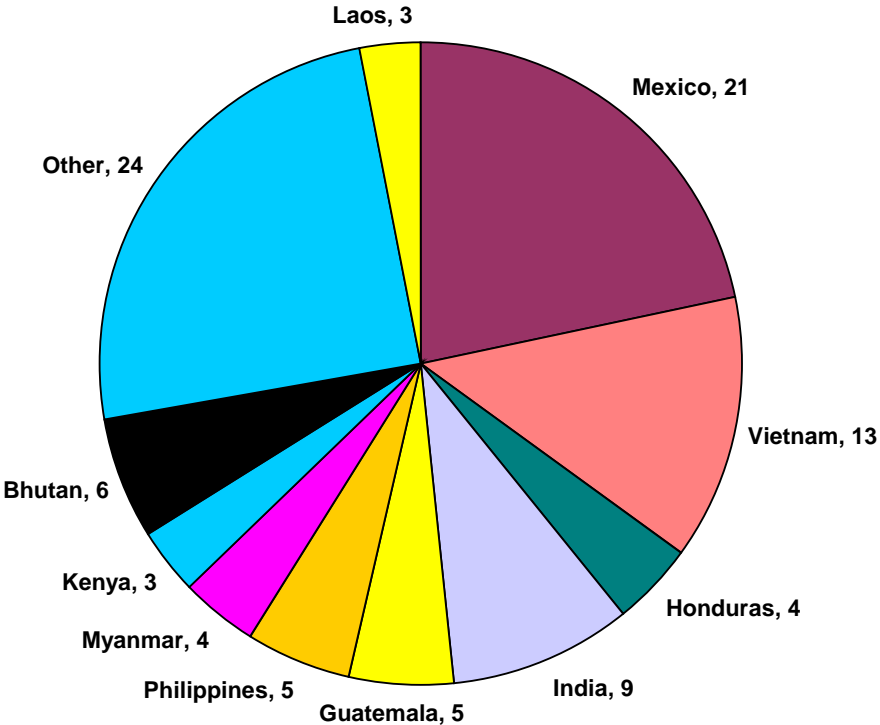
Foreign Born: The number of foreign-born cases in 2012 was 10 percent lower than the number in 2011 (108 cases in 2011 and 97 in 2012). [See Figure 8.] North Carolina has a lower percentage of foreign-born TB cases in comparison to the U.S. average. The most common countries of origin of foreign-born cases in 2012 were Mexico (22%), Vietnam (13%), and India (9%). [See Figure 9.]

Figure 8. N.C. Foreign-Born TB Cases: 2008 – 2012



DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

Figure 9. Countries of Origin for 2012 Foreign-born TB Cases in N.C.



DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

Pediatric Cases by Foreign-Born Status: An examination of 2012 pediatric cases by country of origin indicates that 20 percent (3 of 15) are foreign born. Of those who were U.S. born, six of those under age 5 had foreign born parents (referred to in the table below as foreign-born associated) for a total of 64 percent (7 of 11) either foreign-born or with foreign-born parents. Of those 5 to 14 years old, 100 percent (4 of 4) were foreign-born or had foreign-born parents.

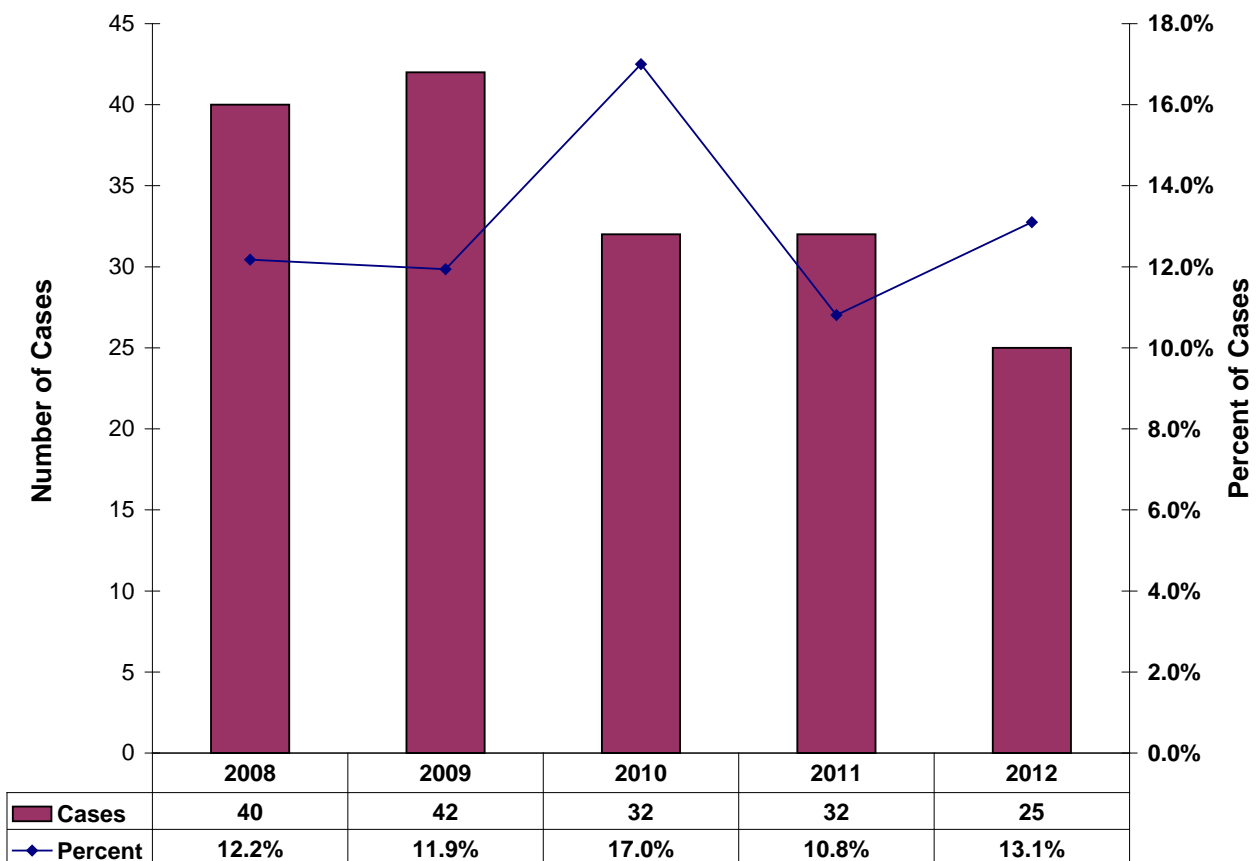
Table 3: Pediatric Cases by Foreign-Born Status

TABLE 3	2011			2012		
	U.S.	FOREIGN-BORN ASSOCIATED	FOREIGN BORN	U.S.	FOREIGN-BORN ASSOCIATED	FOREIGN BORN
0 – 4 YEARS	8	2	1	4	6	1
5 – 14 YEARS	0	0	4	0	2	2
TOTAL	8	2	5	4	8	3

DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

Excessive Alcohol Use: The number of TB cases with reported excessive alcohol use between 2008 and 2012 decreased by 38 percent, while the proportion they represent among cases reported in these years remained about stable. (12% v. 13%.) [See Figure 10.] In 2012, 80 percent of this group was U.S. born. Sixteen percent were foreign-born Hispanics, and 4 percent were foreign-born non-Hispanics. [See Table 4.]

Figure 10. N.C. TB Cases with Excess Alcohol Use: 2008 - 2012



DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

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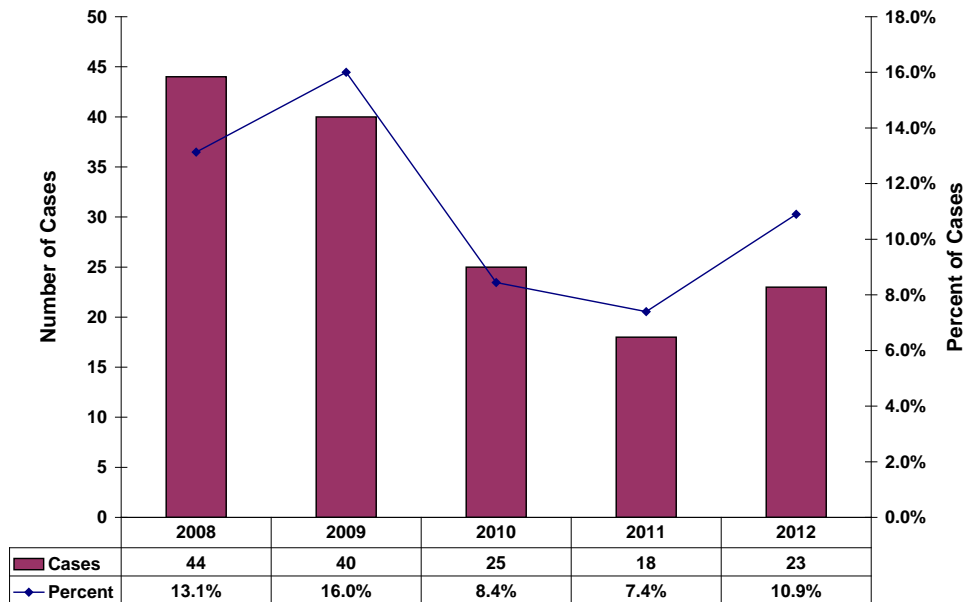
Table 4: Alcohol Use by Ethnicity and Foreign-Born Status 2008-2012

Year	2008		2009		2010		2011		2012	
	Foreign Born	US Born	Foreign Born	US Born	Foreign Born	US Born	Foreign Born	US Born	Foreign Born	US Born
Hispanic	6	2	7	3	3	2	4	0	4	0
Not Hispanic	2	29	0	30	5	32	1	27	1	20
Ethnicity Unknown	0	3	0	0	0	0	0	0	0	0
TOTAL	42		40		42		32		25	

DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

Non-Injecting Drug Use: Non-injecting drug use has been reported for approximately 7 to 16 percent of N.C. TB patients for several years. [See Figure 11.]

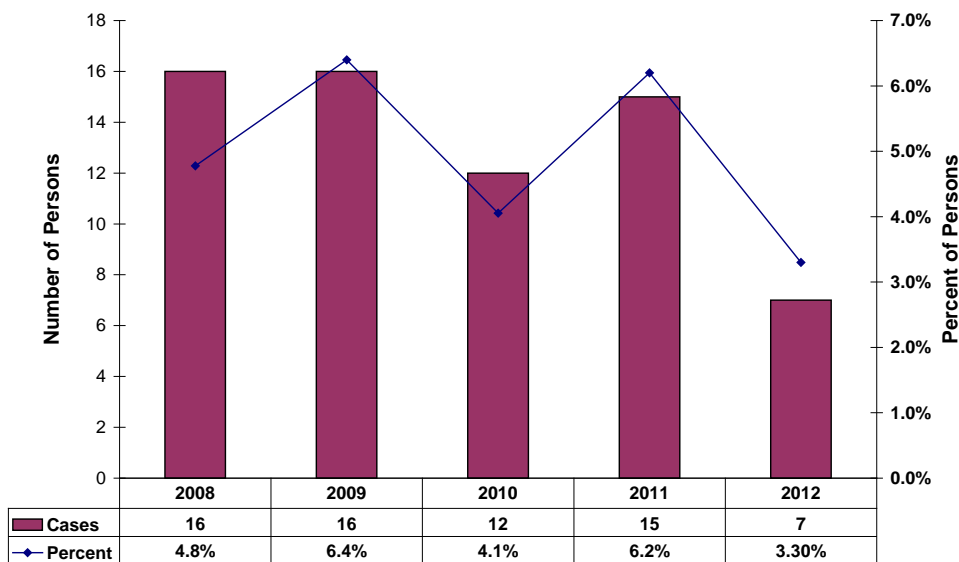
Figure 11. N.C. TB Cases with Known Non-Injecting Drug Use: 2008 – 2012



DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

Injecting Drug Use: IDU is not a significant problem for TB cases in North Carolina. It has been reported in only 0 to 2 percent of TB cases in the years 2008-2012. No cases were reported in 2012. [See Figure 12.]

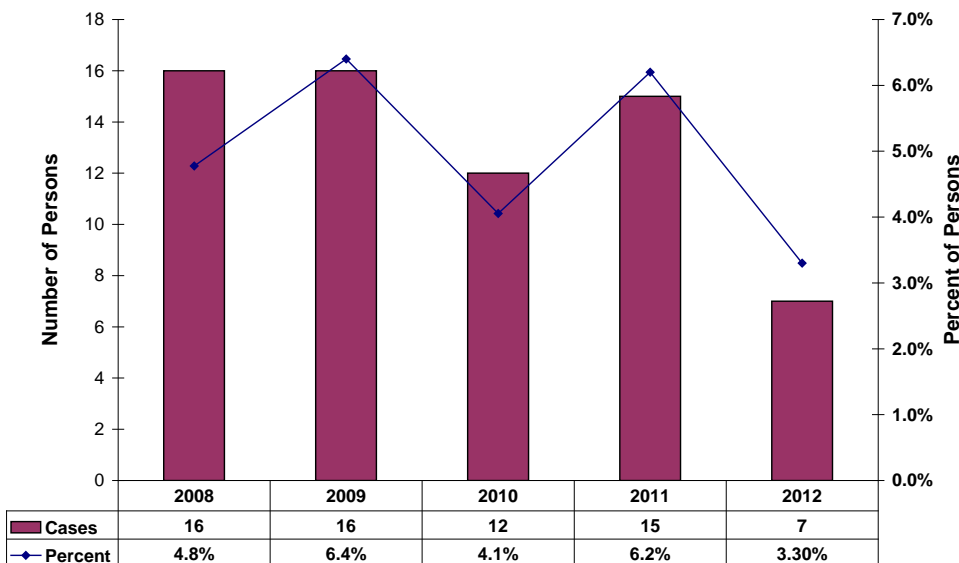
Figure 12. N.C. TB Cases with Known Injecting Drug Use: 2008 – 2012



DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

Homeless: The number of reported homeless TB cases decreased from 2011 to 2012. The percentage is generally between 4 and 6 percent. [See Figure 13.]

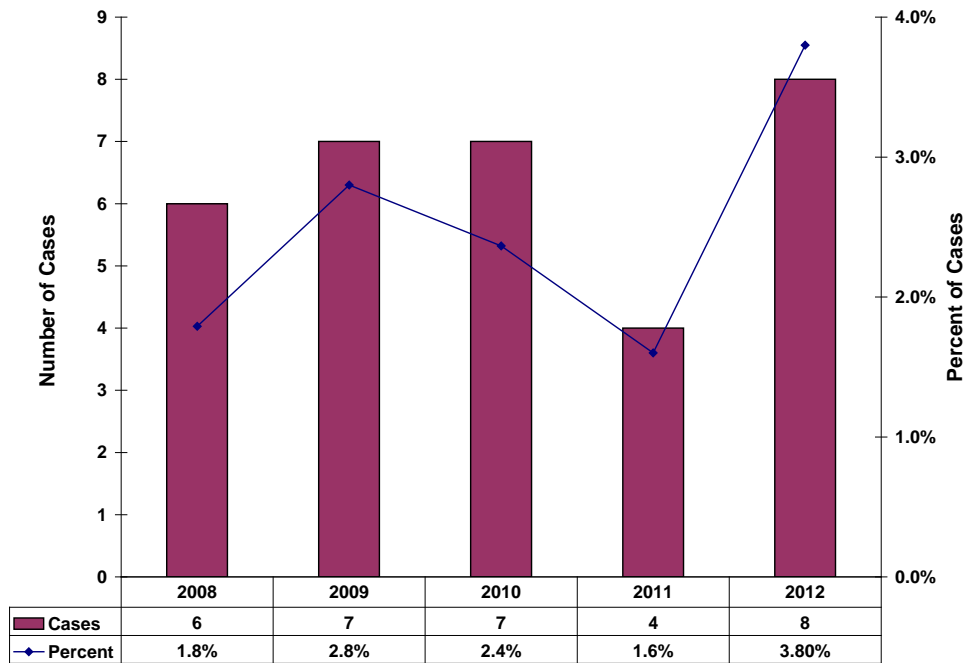
Figure 13. N.C. TB Cases Homeless in Year Prior to Diagnosis: 2008 - 2012



DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

Long Term Care Facilities: The number of TB cases diagnosed in Long Term Care Facilities from 2008 to 2012 remained fairly low (between four and eight cases per year). [See Figure 14.]

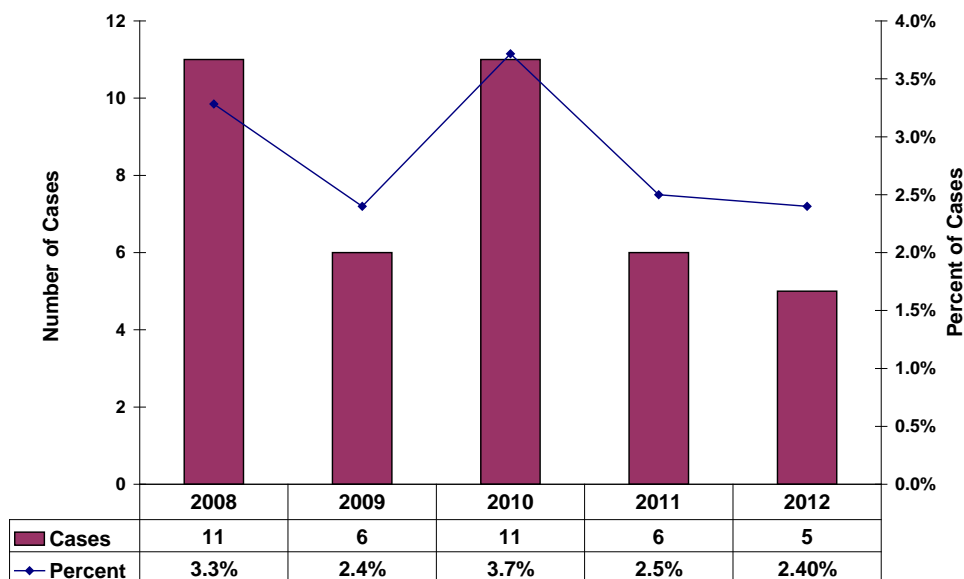
Figure 14. N.C. TB Cases That Were Residents of a Long-Term Care Facility at Time of Diagnosis: 2008 – 2012



DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

Correctional Facilities: The percentage of cases diagnosed in correctional facilities is usually around 2 to 4 percent of the total cases. [See Figure 15.]

Figure 15. N.C. TB Cases Residing in Correctional Facility at Time of Diagnosis: 2008 - 2012

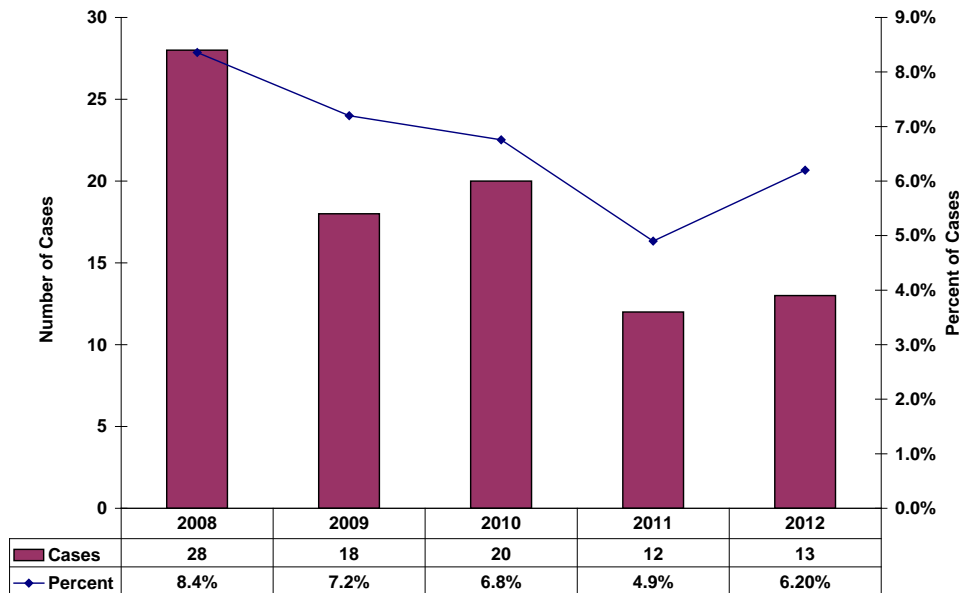


DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS);

2012 Tuberculosis Statistics for North Carolina, Tuberculosis Control Program, N.C. Division of Public Health July 2013

HIV Status: Worldwide, co-morbidity of HIV and TB is the single largest contributor to mortality where TB disease is a factor. Figure 16 shows the number and percentage of N.C. cases reported between 2008 and 2012 that had HIV infection. Table 5 presents the distribution of HIV and TB co-morbidity by age. In 2012, all co-infected cases were between the ages of 25 and 64.

Figure 16. N.C. TB Cases with HIV Infection: 2008 – 2012



DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

Table 5: TB Cases with HIV Infection by Age Group 2008 - 2012

Table 5	TB Cases with HIV Infection by Age Group 2008 - 2012*				
Age Group	2008	2009	2010	2011	2012
0-4	0	0	0	0	0
5-14	1	0	0	0	0
15-24	2	0	0	0	0
25-44	17	8	12	5	6
45-64	7	10	7	7	7
≥65	1	0	1	0	0

*DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

Table 6 and Figure 17 show the progress that has been made in North Carolina with respect to standard of care and HIV status—almost all cases are offered HIV testing and are accepting the offered HIV test. Since November 2007, the standard of care has been to offer HIV testing as part of routine screening. Patients are informed that HIV testing is part of the screening and may decide to “opt-out” of that test. Before this practice went into effect, N.C. TB nurse consultants spent a lot of time training in local health departments to encourage HIV testing. Consequently, the number of cases where HIV status is unknown has decreased greatly over the past 10 years. Fewer patients refuse testing (down from 18.1 percent in 2000 to 0.9% refusing in 2012) and there are fewer patients who are not being

offered testing (down from 10.7 percent in 2000 to less than 1 percent in 2011). The patient not offered testing in 2011 died two weeks into treatment and there was not an opportunity to offer HIV testing.

Table 6: Reported HIV Results 2008 – 2012

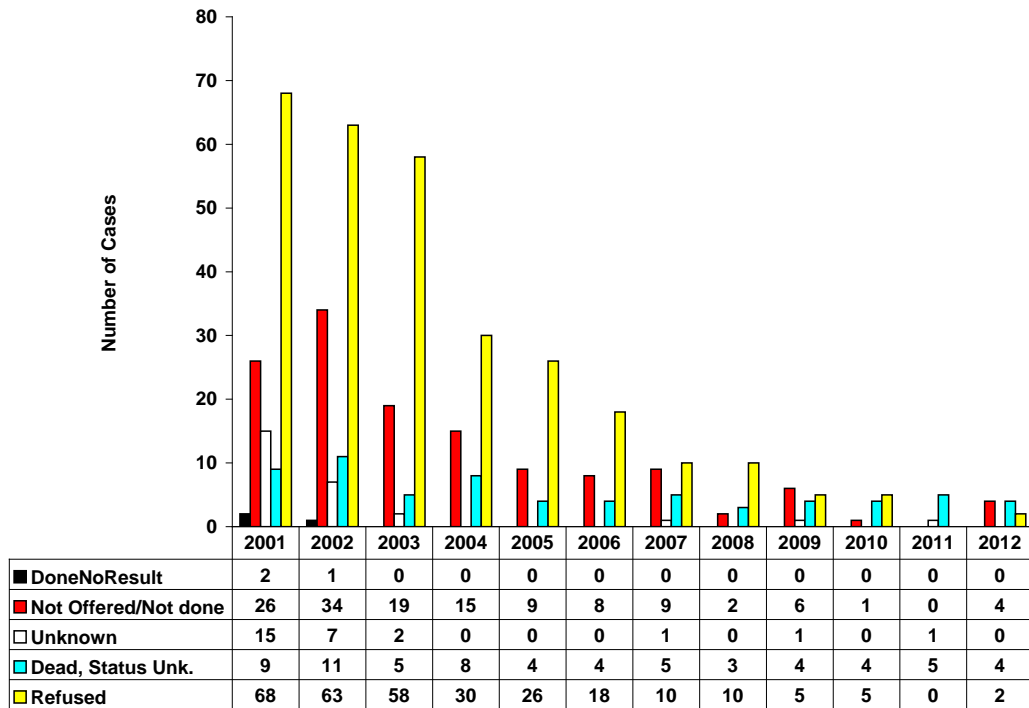
Table 6	Reported HIV Results 2007 – 2011				
Status	2008	2009	2010	2011	2012
Negative	290	217	266	226	188
Positive	28	18	20	12	13
Refused	11	5	5	0	2
Not Offered	3	6	1*	0	3*
Tested No Result	0	0	0	0	1**
Unknown	0	1	0	1*	0
Dead and Status Unknown	3	4	4	5	4

DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

- These patients died shortly after starting treatment or while still in hospital and there was not an opportunity to offer HIV testing.

** An attempt was made to test but they were unable to obtain blood for testing.

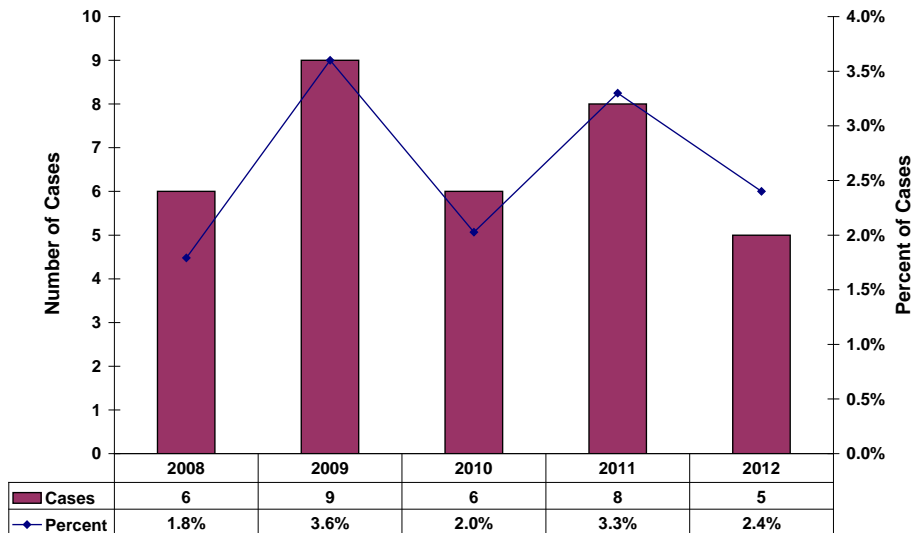
Figure 17: N.C. TB Cases with Unknown HIV Status: 2001 - 2012



DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

Occupation: The occurrence of TB in persons identified as healthcare workers remains an area that receives close scrutiny and intensive investigation. Figure 18 does NOT indicate TB exposure in health care settings, but rather is an indication of persons who, given their occupation, might represent a risk of acquisition or transmission in healthcare settings. The percent of cases is generally around 2 percent.

Figure 18. N.C. Health Care Workers with TB Disease: 2008 - 2012



DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

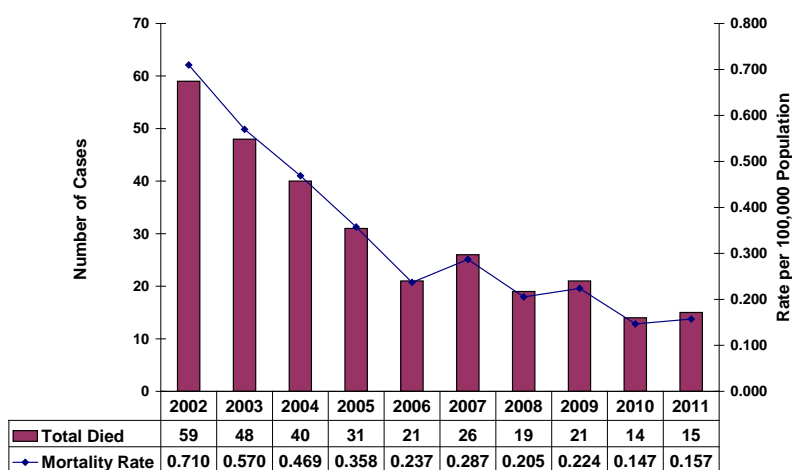
CLINICAL DATA

CLINICAL DATA FOR NORTH CAROLINA

Mortality of TB Cases in NC

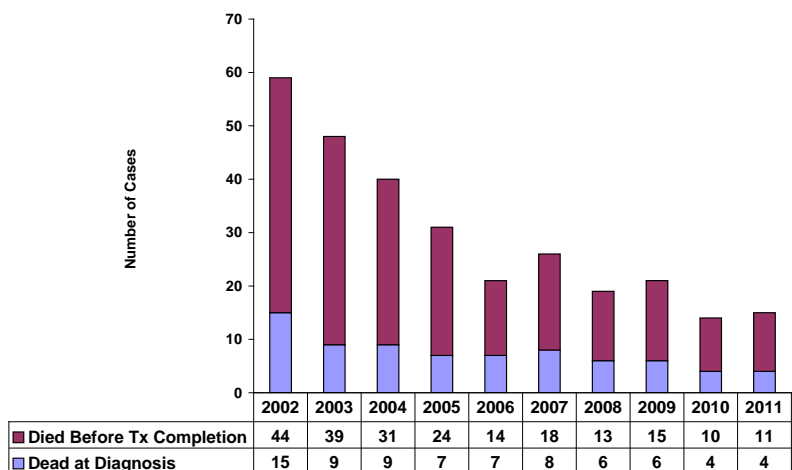
As can be seen from Figures 19 and 20, mortality of TB cases from diagnosis to treatment completion has decreased over the past several years. In 2002, there were 59 deaths (15 dead at diagnosis and 44 who died before completion of treatment); by 2011, there were 14 deaths (four dead at diagnosis and 10 who died before completion of treatment). Prompt diagnosis and treatment is the key to reducing the “dead at diagnosis” category, and close coordination with primary care physicians to address comorbidities may decrease the number who die before the end of treatment, though more research is needed to better understand the characteristics of those in the two categories. Both categories have decreased over time.

Figure 19. N.C. TB Case Mortality and Rates: 2002 – 2011



DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

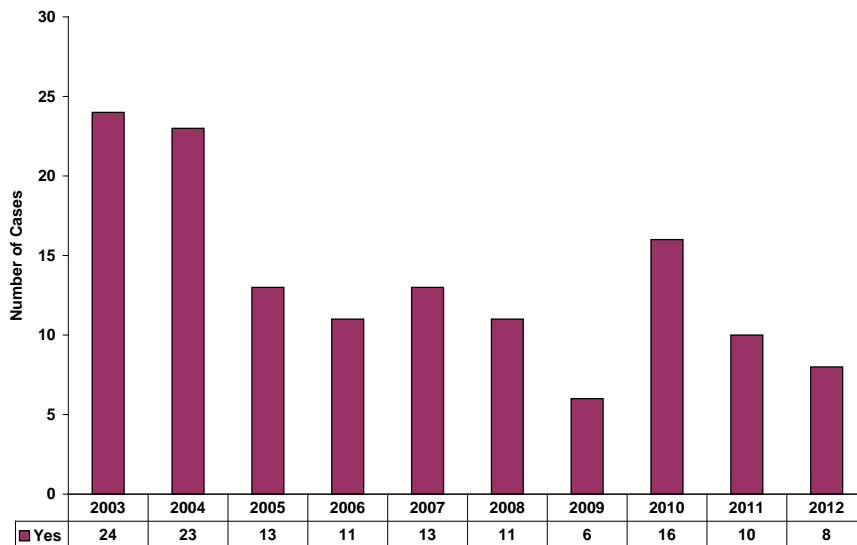
Figure 20. Timing of Death among TB Cases in N.C.: 2002 – 2011



DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

Previous Diagnosis of TB: The number of TB patients who had a previous diagnosis of TB decreased from 24 cases in 2003 to eight cases in 2012.

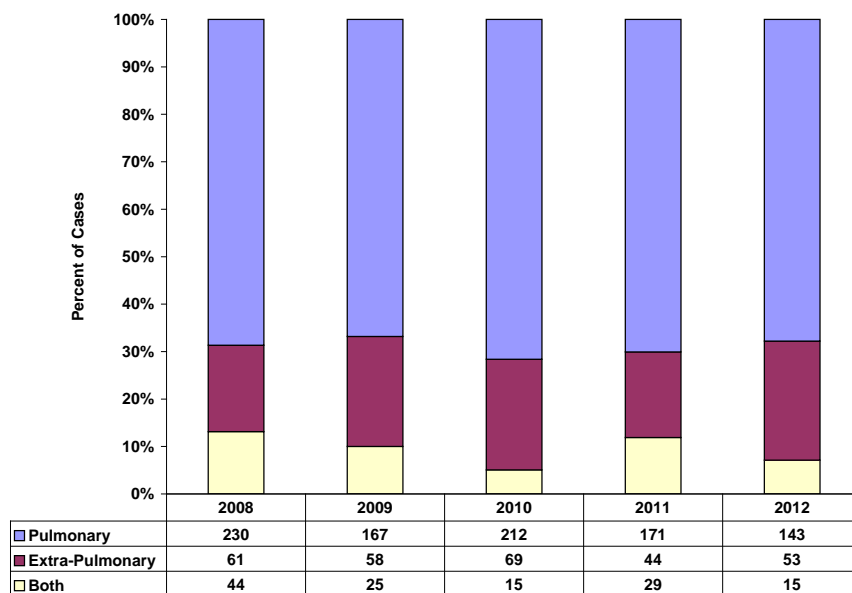
Figure 21. Previous Diagnosis of TB for TB Patients in N.C.: 2003 - 2012



DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

Site of TB Disease: Figure 22 shows the number and percentage of Pulmonary, Extra-pulmonary and combinations of both Pulmonary and Extra-pulmonary sites of TB disease for years 2008 through 2012. These percentages have remaining very similar during this time period. Table 7 provides a more detailed breakout for the major disease sites.

Figure 22. Major Site of Disease for TB Patients in N.C.: 2008 -2012



DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

Table 7. Site of Disease for N.C. TB Patients: 2008 - 2012

Site	2008	2009	2010	2011	2012
Bone/Joint	13	4	10	2	3
Bone/Joint, Other	N/A	0	0	1	1
Genitourinary	2	5	2	2	4
Genitourinary, Meningeal	N/A	0	0	1	0
Lymphatic: Axillary	N/A	0	0	3	1
Lymphatic: Cervical	15	14	12	5	12
Lymphatic: Intrathoracic	2	0	0	1	3
Lymphatic: Intrathoracic, Meningeal	N/A	0	0	1	0
Lymphatic: Intrathoracic, Other	N/A	0	1	0	0
Lymphatic: Other	7	2	11	2	4
Lymphatic: Other, Peritoneal	N/A	1	0	0	0
Lymphatic: Unknown	N/A	0	0	0	1
Meningeal	5	2	5	10	2
Meningeal, Other	N/A	0	1	0	0
Miliary	11	N/A	N/A	N/A	N/A
Other	11	7	11	2	4
Peritoneal	1	3	2	11	2
Pleural	13	13	11	1	14
Pleural, Bone and/or Joint	N/A	0	1	1	0
Pleural, Lymphatic: Axillary	N/A	0	0	0	1
Pleural, Lymphatic: Cervical	N/A	0	1	0	0
Pleural, Lymphatic: Unknown	N/A	0	0	0	1
Pleural, Other	N/A	2	1	0	0
Pleural, Peritoneal	N/A	1	0	0	1
Pulmonary	255	178	212	171	143
Pulmonary, Bone and/or Joint	N/A	3	0	2	1
Pulmonary, Bone and/or Joint, Meningeal, Other	N/A	1	0	0	0
Pulmonary, Genitourinary	N/A	1	1	0	0
Pulmonary, Lymphatic: Axillary	N/A	0	0	1	0
Pulmonary, Lymphatic: Cervical	N/A	4	2	4	1
Pulmonary, Lymphatic: Cervical, Bone and/or Joint	N/A	0	1	0	0
Pulmonary, Lymphatic: Cervical, Lymphatic, Other	N/A	0	0	0	1
Pulmonary, Lymphatic: cervical, Genitourinary, Other	N/A	0	1	0	0
Pulmonary, Lymphatic: Intrathoracic	N/A	0	1	1	0
Pulmonary, Lymphatic: Intrathoracic, Lymphatic: Other	N/A	0	0	0	1
Pulmonary, Lymphatic: Other	N/A	1	1	3	0
Pulmonary, Lymphatic: Unknown	N/A	0	0	1	0
Pulmonary, Meningeal	N/A	1	2	0	2
Pulmonary, Meningeal, Other	N/A	0	0	2	0
Pulmonary, Other	N/A	4	1	4	3
Pulmonary, Peritoneal	N/A	1	1	0	0
Pulmonary, Pleural	N/A	2	4	10	5
Pulmonary, Pleural, Lymphatic: Intrathoracic	N/A	0	0	1	0
Pulmonary, Pleural, Lymphatic: Intrathoracic, Lymphatic, Unknown	N/A	0	0	0	1

DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS). Due to a change in data collection methods, the 2009 forward, those data are more detailed than the 2008 data. The 2008 data include only one site and the 2009 – 2012 data include multiple sites. Also, miliary is not included as a site beginning in 2009.

TB Drug Susceptibility/Resistance Testing: Drug susceptibility testing is routinely performed on newly reported, culture-positive TB cases. In any given year, zero to three cases are reported without associated susceptibility testing. In 2012, 169 of 170 culture-proven cases of TB have drug susceptibility results or pending results. Drug resistance to isoniazid (INH) in North Carolina increased from 13 cases (5%) in 2008 to 15 cases (9%) in 2012. Between 2008 and 2012 the number of Multi-Drug Resistant (MDR) cases has ranged from one to two cases per year. In 2011, there were 88 MDR cases (1.2%) in the U.S. The U.S. and North Carolina have similar case percentages for both INH and MDR resistance although N.C. percentages are generally lower.

Table 8. First-Line Primary TB Drug Resistance in N.C. Patients: 2008-2012

Table 8 Year	First-Line Primary TB Drug Resistance Over Time 2008-2012*									
	2008		2009		2010		2011		2012	
	#	%	#	%	#	%	#	%	#	%
INH ¹	13	5	12	6	15	5	13	7	15	9
MDR (INH & RIF) ²	2	1	1	0	1	0	2	1	1	0.6
**Total Positive Cultures	249		197		216		183		169	

*DATA SOURCE: NC EDSS.

**Total positive cultures with susceptibility results known.

¹Includes INH and any other drugs except Rifampin (RIF). Resistance may have been found at either initial or final testing.

²Includes INH, RIF and any other drugs. Resistance may have been found at either initial or final testing.

A closer look at drug resistance by foreign-born and U.S.-born status reveals that there are differences between the two groups. While over the period 2008-2012 the percentage of foreign-born persons with drug resistance is higher overall than for U.S. born persons (15.9% v. 10.2%), the rate of MDR in North Carolina is greater (six times as high) in foreign-born cases as compared with U.S.-born persons. (1.8% vs. 0.3%.)

Table 2. Comparison of Drug Resistance in US-Born and Foreign-Born Patients: 2008 – 2012 (Years Combined)

Table 9	Drug Resistance by US and Foreign-born – 2008 – 2012 (years combined)			
	Foreign born		US	
	#	%	#	%
INH ¹	29	7.4	34	5.6
INH & SM ²	5	1.3	5	0.8
MDR (INH & RIF) ³	7	1.8	2	0.3
Any Other Drug Resistance	21	5.4	21	3.4
Total Drug Resistance	62	15.9	62	10.2
No Drug Resistance	327	84.1	549	89.8

*Data source: NC EDSS.

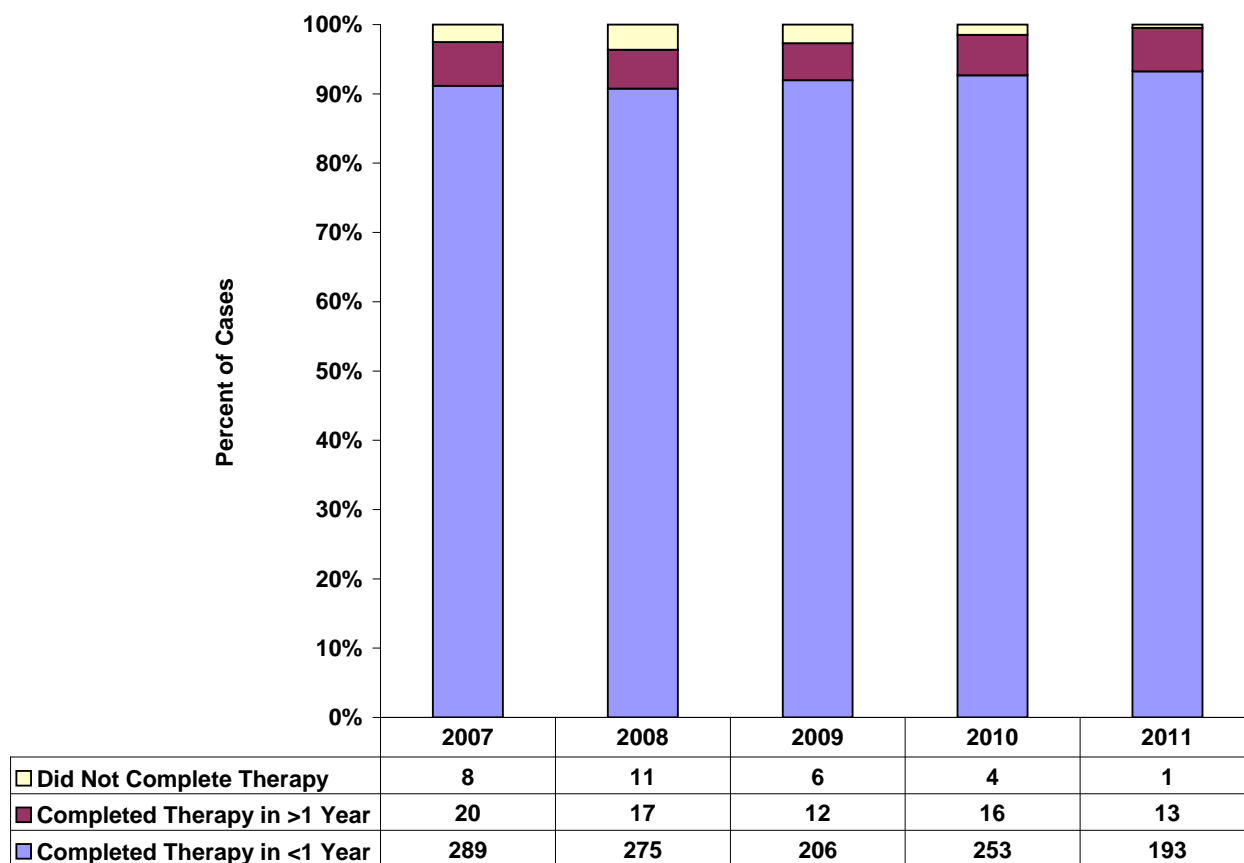
¹Includes INH and any other drugs except Streptomycin (SM) or RIF. Resistance may have been found at either initial or final testing.

²Includes INH, SM and any other drugs except RIF. Resistance may have been found at either initial or final testing.

³Includes INH, RIF and any other drugs including SM. Resistance may have been found at either initial or final testing.

Completion of Therapy: Completion of therapy within one year remained between 90 and 92 percent between 2002 and 2004; however, in 2005 and 2006, there was a drop to 85 percent. In 2006, North Carolina passed legislation requiring all TB cases be placed on Directly Observed Therapy (DOT). This was expected to increase the percentage of cases completing therapy within one year. Although some of our cases are not total DOT, if they were on DOT for more than 26 weeks they are considered to meet the DOT criterion. When discounting cases that had died either by the time of diagnosis or before treatment completion, 96.4% of patients were on DOT in 2010. The percentage of 2011 cases that completed therapy in one year was 93 percent, with another 6 percent completing after one year. In 2011, for cases taking longer than 12 months to complete, one or more of the following reasons were provided: bone or joint disease (4); slow response (3); culture converted after two months (3); non-adherent, doses added to regimen (2); treatment deviation (2); MD did not order PZA (2); clinically indicated (1); RIF or Rifabutin not tolerated (1); cavitary disease (1); lost to follow-up (1); PZA not tolerated other than hepatotoxicity (1); and disseminated TB (1). Only one case did not complete treatment.

Figure 23. Patients Completing Therapy in N.C.: 2007 -- 2011



DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

This includes all patients alive at diagnosis and who did not die during treatment. Patients with any rifampin-resistant TB or meningeal TB, and children aged 14 or younger with disseminated TB are excluded.

SUPPLEMENTAL TABLES

Table10: TB Cases and Case Rates by County 2008-2012*

	2008		2009		2010		2011		2012	
COUNTY	CASES	RATE	CASES	RATE	CASES	RATE	CASES	RATE	CASES	RATE
Alamance	4	2.7	5	3.3	5	3.3	2	1.3	0	0
Alexander	0	0	0	0	0	0	0	0	0	0
Alleghany	0	0	0	0	0	0	0	0	1	9.2
Anson	3	11.6	0	0	1	3.9	0	0	1	3.8
Ashe	0	0	0	0	0	0	0	0	0	0
Avery	0	0	0	0	0	0	0	0	0	0
Beaufort	2	4.3	0	0	1	2.1	4	8.4	1	2.1
Bertie	0	0	0	0	2	10	0	0	3	14.5
Bladen	1	3	1	3.1	2	6.0	3	9.0	2	5.7
Brunswick	3	3	5	4.7	0	0	1	0.9	0	0
Buncombe	7	3	6	2.6	2	0.8	1	0.4	0	0
Burke	0	0	2	2.2	1	1.1	0	0	7	7.7
Cabarrus	4	2.4	1	0.6	1	0.6	2	1.1	2	1.1
Caldwell	2	2.5	2	2.5	2	2.4	0	0	0	0
Camden	0	0	0	0	0	0	1	10	0	0
Carteret	3	4.6	1	1.6	1	1.5	2	3.0	3	4.4
Caswell	1	4.2	1	4.3	0	0	0	0	1	4.3
Catawba	1	0.6	4	2.5	2	1.3	2	1.3	7	4.5
Chatham	2	3.3	2	3.1	1	1.5	0	0	1	1.5
Cherokee	0	0	0	0	1	3.7	0	0	1	3.7
Chowan	0	0	0	0	1	6.6	1	6.6	0	0
Clay	0	0	0	0	0	0	0	0	0	0
Cleveland	1	1	1	1.0	1	1.0	0	0	0	0
Columbus	0	0	2	3.7	1	1.8	1	1.8	0	0
Craven	4	4.1	5	5.1	3	3.0	1	1.0	1	1.0
Cumberland	8	2.5	9	2.9	6	1.9	11	3.4	5	1.5
Currituck	0	0	0	0	0	0	0	0	0	0
Dare	0	0	1	2.9	0	0	0	0	0	0
Davidson	3	1.9	3	1.9	0	0	3	1.8	0	0
Davie	0	0	0	0	0	0	0	0	0	0
Duplin	4	7.4	4	7.5	6	11.0	3	5.5	2	3.3
Durham	15	5.8	12	4.4	14	5.2	9	3.4	10	3.6
Edgecombe	6	11.4	2	3.9	2	3.7	1	1.9	3	5.4
Forsyth	16	4.6	8	2.2	11	3.1	12	3.4	6	1.7
Franklin	0	0	1	1.7	2	3.2	1	1.6	0	0
Gaston	4	2	1	0.5	2	1.0	0	0	3	1.4
Gates	0	0	0	0	0	0	0	0	0	0
Graham	1	12	0	0	0	0	0	0	0	0
Granville	1	1.8	0	0	1	1.7	0	0	1	1.7
Greene	4	18.6	2	9.7	6	28.2	3	14.1	2	9.3

COUNTY	2008		2009		2010		2011		2012	
	CASES	RATE	CASES	RATE	CASES	RATE	CASES	RATE	CASES	RATE
Guilford	21	4.5	21	4.4	31	6.3	22	4.5	17	3.4
Halifax	4	7.1	2	3.7	5	8.9	1	1.8	4	7.4
Harnett	4	3.7	3	2.6	5	4.2	0	0	0	0
Haywood	0	0	1	1.8	1	1.7	0	0	0	0
Henderson	4	3.8	3	2.9	10	9.4	3	2.8	1	0.9
Hertford	1	4.1	1	4.3	2	8.3	3	12.5	1	4.1
Hoke	2	4.6	3	6.6	1	2.2	1	2.2	1	2.0
Hyde	1	18	1	19.2	0	0	0	0	0	0
Iredell	2	1.3	1	0.6	0	0	1	0.6	2	1.2
Jackson	0	0	2	5.4	1	2.6	0	0	2	4.9
Johnston	10	6.2	7	4.2	5	3.0	1	0.6	4	2.3
Jones	0	0	0	0	0	0	0	0	0	0
Lee	0	0	1	1.7	4	6.4	2	3.2	0	0
Lenoir	4	6.8	2	3.5	6	10.3	2	3.4	8	13.5
Lincoln	0	0	0	0	0	0	1	1.3	1	1.3
Macon	1	2.9	1	3.0	0	0	0	0	0	0
Madison	0	0	0	0	0	0	0	0	0	0
Martin	2	8.2	1	4.3	0	0	0	0	1	4.2
McDowell	1	2.2	0	0	1	2.2	2	4.4	1	2.2
Mecklenburg	44	5	33	3.6	40	4.3	37	4.0	30	3.1
Mitchell	0	0	0	0	0	0	0	0	1	6.5
Montgomery	3	10.7	1	3.6	3	10.5	5	17.5	1	3.6
Moore	0	0	2	2.3	3	3.3	2	2.2	0	0
Nash	3	3.2	0	0	1	1.0	1	1.0	3	3.1
New Hanover	4	2.1	3	1.5	4	2.0	5	2.5	1	0.5
Northampton	1	4.6	0	0	0	0	1	4.8	4	18.7
Onslow	3	1.7	4	2.3	3	1.7	3	1.7	1	0.5
Orange	7	5.4	1	0.8	3	2.3	3	2.3	2	1.4
Pamlico	0	0	0	0	0	0	0	0	0	0
Pasquotank	1	2.4	0	0	1	2.3	0	0	0	0
Pender	0	0	2	3.8	0	0	1	1.9	2	3.7
Perquimans	0	0	0	0	0	0	0	0	0	0
Person	2	5.2	1	2.7	0	0	1	2.6	1	2.5
Pitt	6	3.9	6	3.8	6	3.6	7	4.2	5	2.9
Polk	0	0	2	10.4	0	0	0	0	0	0
Randolph	0	0	0	0	1	0.7	1	0.7	2	1.4
Richmond	3	6.3	1	2.2	3	6.3	1	2.1	0	0
Robeson	20	15.1	16	12.3	12	9.0	7	5.2	13	9.6
Rockingham	3	3.2	1	1.1	2	2.1	3	3.2	0	0
Rowan	3	2.2	3	2.1	2	1.4	3	2.2	3	2.2
Rutherford	1	1.6	1	1.6	0	0	0	0	0	0
Sampson	7	10.6	5	7.8	6	9.1	6	9.1	4	6.3

	2008		2009		2010		2011		2012	
COUNTY	CASES	RATE	CASES	RATE	CASES	RATE	CASES	RATE	CASES	RATE
Scotland	4	10.6	0	0	0	0	5	13.4	0	0
Stanly	0	0	1	1.7	2	3.2	0	0	0	0
Stokes	0	0	0	0	0	0	1	2.1	0	0
Surry	2	2.7	0	0	1	1.3	0	0	2	2.7
Swain	0	0	0	0	0	0	0	0	0	0
Transylvania	1	3.2	0	0	1	3.2	1	3.2	0	0
Tyrrell	0	0	0	0	0	0	0	0	0	0
Union	7	3.8	1	0.5	0	0	2	1.0	1	0.5
Vance	0	0	0	0	0	0	0	0	0	0
Wake	40	4.7	22	2.5	37	4.1	29	3.2	16	1.7
Warren	0	0	0	0	1	5.0	0	0	1	4.9
Washington	0	0	0	0	0	0	0	0	0	0
Watauga	1	2.2	1	2.2	0	0	0	0	0	0
Wayne	3	2.6	8	7.0	8	6.8	9	7.7	7	5.6
Wilkes	2	2.9	1	1.5	1	1.5	3	4.4	1	1.4
Wilson	7	8.8	3	3.8	5	6.2	4	5.0	1	1.2
Yadkin	0	0	0	0	0	0	0	0	0	0
Yancey	0	0	0	0	0	0	0	0	0	0
North Carolina	335	3.6	250	2.7	296	3.1	244	2.5	211	2.2

* DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

Table 11: Foreign-Born TB Cases by Country of Origin 2008-2012

Foreign-Born TB Cases by County 2008-2012*						
Year	2008	2009	2010	2011	2012	Total Cases 2008 – 2012
Afghanistan	0	0	0	1	1	2
Argentina	1	0	0	0	0	1
Bangladesh	0	0	0	1	0	1
Bhutan	1	0	5	3	6	15
Bosnia & Herzegovina	0	0	1	0	0	1
Cambodia	1	3	3	1	1	9
China	2	1	1	4	1	9
Colombia	0	1	2	1	0	4
Congo	1	0	0	3	1	5
Costa Rica	1	0	0	0	0	1
Cote d'Ivoire	0	0	0	1	0	1
Denmark	0	0	1	0	0	1
Ecuador	0	0	0	1	2	3
Egypt	0	0	0	0	1	1
El Salvador	0	2	4	1	1	8
Eritrea	0	0	0	2	0	2
Ethiopia	3	1	2	2	2	10
Faeroe Islands	0	0	0	1	0	1
Ghana	2	1	0	0	0	3
Grenada	0	0	1	0	0	1
Guatemala	3	7	1	6	5	22
Guinea	0	0	1	0	0	1
Haiti	2	1	1	2	2	8
Honduras	11	2	7	8	4	32
Hong Kong (China)	0	0	1	0	0	1
India	11	6	12	7	9	45
Indonesia	1	0	0	1	0	2
Iran	0	1	0	0	0	1
Jamaica	0	0	1	0	2	3
Jordan	0	1	0	0	0	1
Kenya	3	2	1	4	3	13
Korea Republic of	3	1	2	1	0	7
Kuwait	0	1	0	0	0	1
Laos	0	2	4	1	3	10
Liberia	0	0	1	2	1	4

Foreign-Born TB Cases by County 2008-2012*						
Year	2008	2009	2010	2011	2012	Total Cases 2008 – 2012
Malaysia	0	1	0	0	0	1
Mexico	41	33	31	23	21	149
Micronesia, Federated States of	0	0	2	1	0	3
Morocco	0	1	0	0	0	1
Myanmar	2	0	5	5	4	16
Nepal	0	0	1	0	1	2
Netherlands	0	1	0	0	0	1
Niger	0	0	1	0	0	1
Nigeria	0	3	0	0	2	5
Pakistan	2	1	0	1	1	5
Peru	1	1	0	2	0	4
Philippines	7	4	10	6	5	32
Puerto Rico	0	1	0	0	0	1
Russian Federation	0	0	0	2	0	2
Rwanda	0	0	0	0	1	1
Senegal	1	1	1	0	0	3
Somalia	1	0	2	0	1	4
Spain	0	0	1	0	0	1
Sudan	1	1	0	2	0	4
Syria Arab Republic	0	0	0	0	1	1
Taiwan	1	0	0	0	0	1
Tanzania	0	0	0	1	0	1
Thailand	1	0	1	0	1	3
Turkmenistan	1	0	0	0	0	1
Ukraine	2	0	0	0	0	2
Vietnam	11	10	14	10	13	58
Yemen	0	0	0	0	1	1
Zimbabwe	0	1	0	0	0	1
Total	118	92	121	107	97	535

DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)

*Does not include persons born in U.S. territories.

Table 12: Hispanic TB Cases by County 2008-2012

Hispanic TB Cases by County 2008-2012						
County	2008	2009	2010	2011	2012	Total Cases 2008 - 2012
Alamance	3	2	2	2	0	9
Alexander	0	0	0	0	0	0
Alleghany	0	0	0	0	1	1
Anson	0	0	0	0	0	0
Ashe	0	0	0	0	0	0
Avery	0	0	0	0	0	0
Beaufort	0	0	0	0	0	0
Bertie	0	0	1	0	0	1
Bladen	0	1	0	1	0	2
Brunswick	0	2	0	0	0	2
Buncombe	2	2	0	0	0	17
Burke	0	0	0	0	5	5
Cabarrus	3	0	0	1	2	6
Caldwell	0	2	0	0	0	2
Camden	0	0	0	0	0	0
Carteret	0	0	0	0	0	0
Caswell	0	0	0	0	0	0
Catawba	1	0	1	1	1	4
Chatham	1	1	0	0	1	3
Cherokee	0	0	0	0	1	1
Chowan	0	0	0	0	0	0
Clay	0	0	0	0	0	0
Cleveland	0	0	0	0	0	0
Columbus	0	0	0	0	0	0
Craven	0	1	0	0	0	1
Cumberland	1	1	0	0	0	2
Currituck	0	0	0	0	0	0
Dare	0	0	0	0	0	0
Davidson	1	2	0	1	0	4
Davie	0	0	0	0	0	0
Duplin	2	3	4	2	1	12
Durham	4	2	3	4	3	16
Edgecombe	1	0	0	0	0	1
Forsyth	9	4	5	2	3	23

Hispanic TB Cases by County 2008-2012						
County	2008	2009	2010	2011	2012	Total Cases 2008 - 2012
Franklin	0	0	0	0	0	0
Gaston	1	0	0	0	0	1
Gates	0	0	0	0	0	0
Graham	0	0	0	0	0	0
Granville	0	0	1	0	0	1
Greene	0	0	0	0	0	0
Guilford	1	3	2	2	1	9
Halifax	0	0	0	0	0	0
Harnett	2	1	0	0	1	4
Haywood	0	0	0	0	0	0
Henderson	0	0	2	1	0	3
Hertford	0	0	0	0	0	0
Hoke	0	0	0	0	0	0
Hyde	0	1	0	0	0	1
Iredell	1	0	0	0	0	1
Jackson	0	1	1	0	1	3
Johnston	4	1	1	0	2	8
Jones	0	0	0	0	0	0
Lee	0	1	2	1	0	4
Lenoir	1	0	0	1	4	6
Lincoln	0	0	0	0	0	0
Macon	1	0	0	0	0	1
Madison	0	0	0	0	0	0
Martin	0	0	0	0	0	0
McDowell	1	0	0	1	0	2
Mecklenburg	12	5	11	11	3	42
Mitchell	0	0	0	0	1	1
Montgomery	0	0	1	2	0	3
Moore	0	1	0	0	0	1
Nash	0	0	0	0	0	0
New Hanover	2	1	0	2	1	6
Northampton	0	0	0	0	0	0
Onslow	1	0	0	0	0	1
Orange	4	0	0	0	0	4
Pamlico	0	0	0	0	0	0
Pasquotank	0	0	0	0	0	0

Hispanic TB Cases by County 2008-2012						
County	2008	2009	2010	2011	2012	Total Cases 2008 - 2012
Pender	0	1	0	1	1	3
Perquimans	0	0	0	0	0	0
Person	2	0	0	1	0	3
Pitt	0	1	2	0	1	4
Polk	0	1	0	0	0	1
Randolph	0	0	0	1	0	1
Richmond	0	0	0	1	0	1
Robeson	0	1	2	0	0	3
Rockingham	0	0	1	0	0	2
Rowan	2	1	1	1	1	6
Rutherford	0	0	0	0	0	0
Sampson	4	1	0	2	2	9
Scotland	0	0	0	0	0	0
Stanly	0	0	0	0	0	0
Stokes	0	0	0	0	0	0
Surry	0	0	0	0	0	0
Swain	0	0	0	0	0	0
Transylvania	0	0	0	0	0	0
Tyrrell	0	0	0	0	0	0
Union	1	0	0	0	0	3
Vance	0	0	0	0	0	0
Wake	14	8	11	3	1	37
Warren	0	0	0	0	0	0
Washington	0	1	0	0	0	1
Watauga	0	0	0	0	0	0
Wayne	0	0	0	0	1	1
Wilkes	0	0	0	0	0	0
Wilson	3	1	2	2	0	8
Yadkin	0	0	0	0	0	0
Yancey	0	0	0	0	0	0
North Carolina	85	54	56	47	42	284

DATA SOURCE: North Carolina Electronic Disease Surveillance System (NC EDSS)