

TUBERCULOSIS 2005

Cases = 146

Crude Incidence Rate per 100,000 population = 2.3 (U.S. 2005 = 4.8)

Race and Ethnicity-specific Incidence Rates per 100,000 population ¹

White, not Hispanic or Latino = 0.9

Black or African-American = 8.0

Hispanic or Latino, all races = 14.5

Asian = 42.3

Hawaiian Native or other Pacific Islander = 49

American Indian or Alaska Native = N/A

Gender-specific Incidence Rates per 100,000 population

Male = 3.1

Female = 1.8

Tuberculosis (TB) is an airborne disease caused by a group of bacteria that is collectively referred to as the *Mycobacterium tuberculosis* (MTB) complex. The five species in this complex are *M. tuberculosis*, *M. bovis*, *M. africanum*, *M. canettii*, and *M. microti*. General symptoms may include a prolonged productive cough, blood-tinged sputum, night sweats, fever, fatigue, and weight loss. TB usually affects the lungs, but can also affect other parts of the body like the brain, kidneys, or spine. TB bacteria are aerosolized when a person who has TB of the lungs or larynx coughs, sneezes, laughs, or sings. Another person inhales the droplet nuclei that are formed. Individuals who become infected but do not become ill are considered to have latent TB infection (LTBI) and cannot transmit the infection to others. Approximately 10% of infected individuals will progress to active disease at some point in their lives.

During 2005, there were 146 new cases of tuberculosis reported to the Indiana State Department of Health. Figures 1a and 1b show long-term and 6-year trends, respectively. TB was reported by 37 of the 92 counties. According to the 2000 census, the three most populous counties (Marion, Lake, and Allen counties) accounted for 54% of all new cases. This year, Kosciusko County experienced an increase number of tuberculosis cases, reporting ten cases up from four cases in 2004. All of those cases were linked either epidemiologically or through matching genotypes from positive cultures. In addition, Allen County continued to identify cases linked to an outbreak in 2003. In 2005, Allen County reported seventeen cases of tuberculosis, a decrease from the twenty-three cases reported the previous year.

The introduction of anti-TB chemotherapy has led to a long-term decline in the number of deaths as well as the number of new cases. However, deaths still occur from the disease. The number of TB-related deaths is shown in Figure 2. Patients who died after sputum culture conversion to negative and those who demonstrated significant clinical improvement but died from other causes were excluded.

¹ Incidence rates based on 2000 census

Figure 1a.

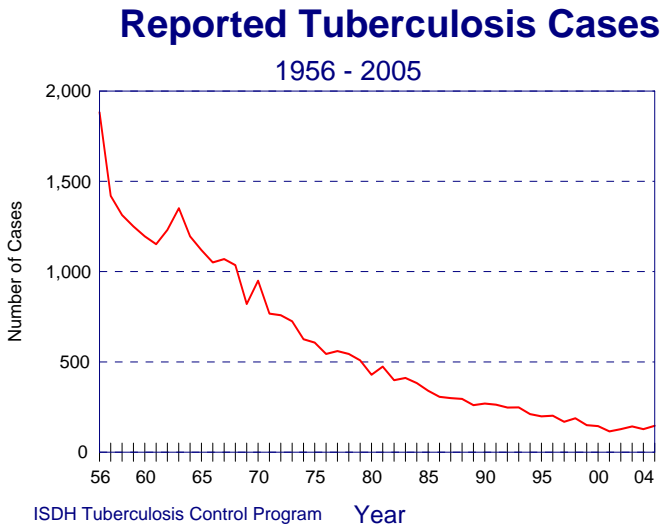


Figure 1b.

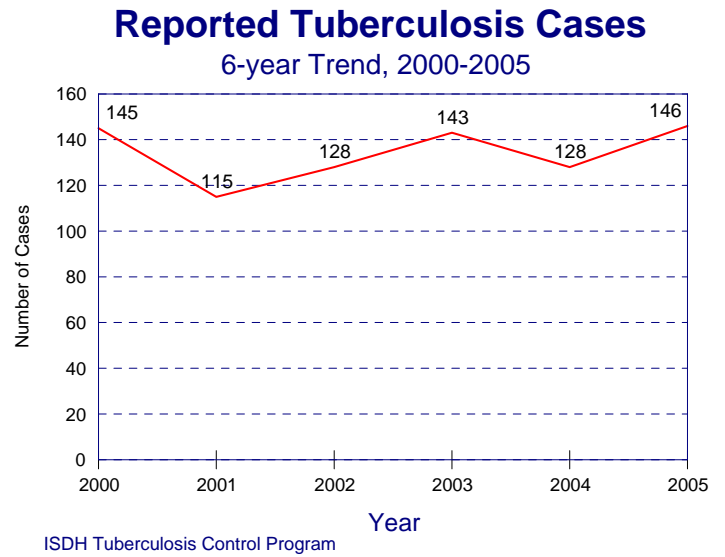
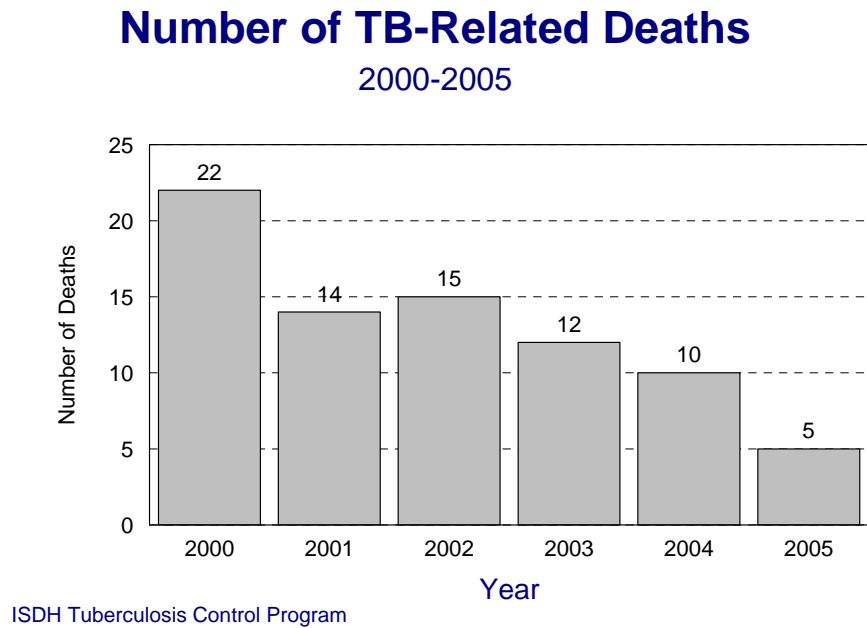


Figure 2.



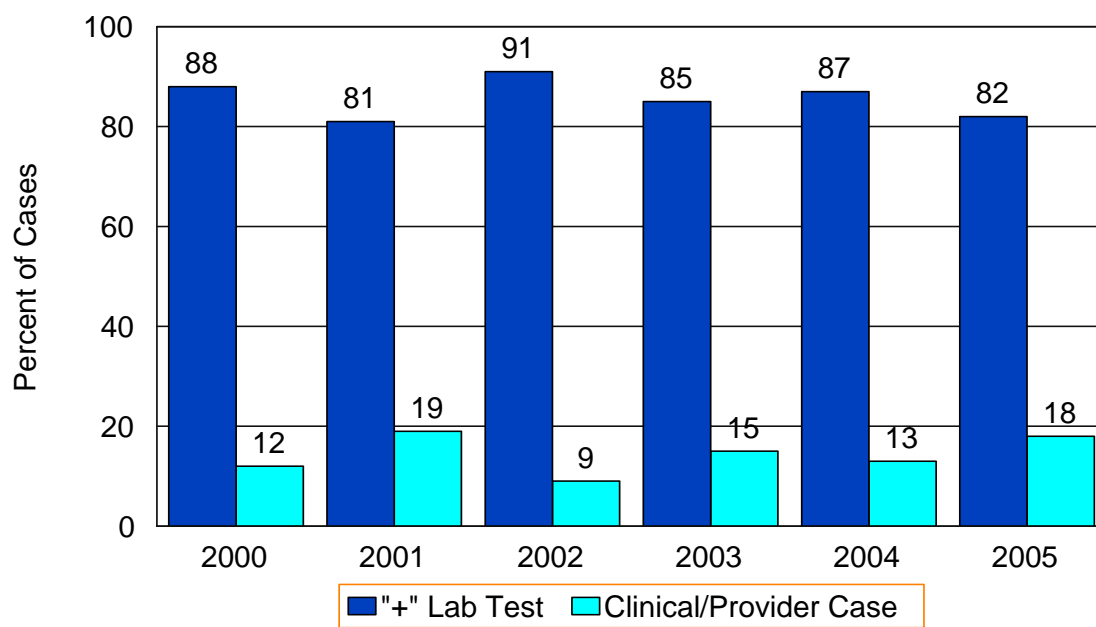
A diagnosis of TB is verified using the Centers for Disease Control and Prevention’s “Case Definitions for Infectious Conditions Under Public Health Surveillance.” TB cases must meet the case definition for either a laboratory or a clinical diagnosis. A laboratory diagnosis is confirmed when *M. tuberculosis* complex has been: (1) isolated from a culture or has been demonstrated in a clinical specimen by a nucleic acid amplification (NAA) test approved by the FDA (must be accompanied by a culture for identification), or (2) acid fast bacilli (AFB) are seen when a culture has not or cannot be obtained (used primarily to aid in a post-mortem diagnosis).

A clinical diagnosis is confirmed when all of the following criteria are met after a completed medical evaluation: (1) a positive tuberculin skin test, (2) signs and symptoms compatible with current TB disease (e.g., an abnormal, unstable chest x-ray) or clinical evidence of current disease (e.g., cough, night sweats, weight loss, hemoptysis), and (3) current treatment with two or more anti-TB drugs. This category includes culture-negative pulmonary TB, extra-pulmonary TB where cultures would not grow or were not obtained, and children in whom obtaining specimens is difficult and invasive procedures are not warranted. Figure 3 shows the percentage of TB cases by case definition.

Figure 3.

TB Classification by Case Definition

2000-2005



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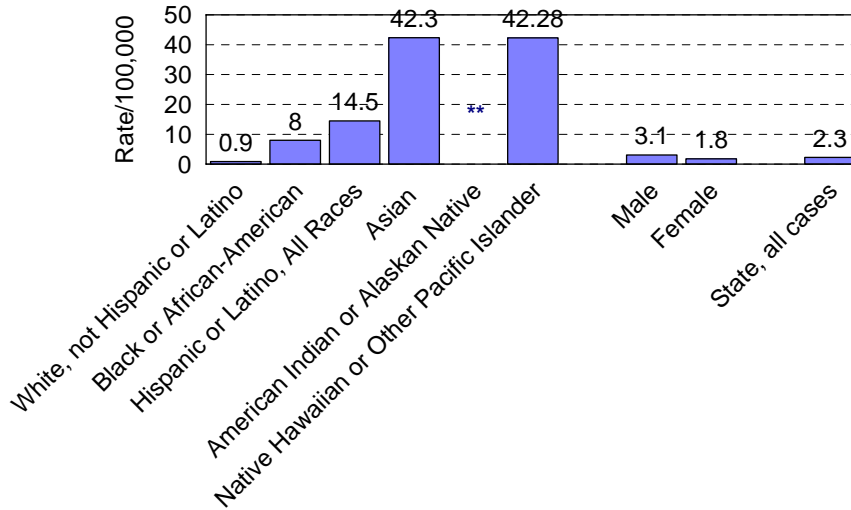
The percentages of new cases by age, sex, race, and ethnicity are as follows:

Category:	Percentage of all new cases:
Male	62
Female	38
White, not Hispanic or Latino	34
Black or African-American	28
Hispanic or Latino	21
Asian	17
American Indian or Alaska Native	N/A
Hawaiian Native or other pacific Islander	< 1

Figure 4 shows case rates per 100,000 population by race, ethnicity, and sex.

Figure 4.

Reported 2005 Tuberculosis case rate by Race, Ethnicity, and Sex



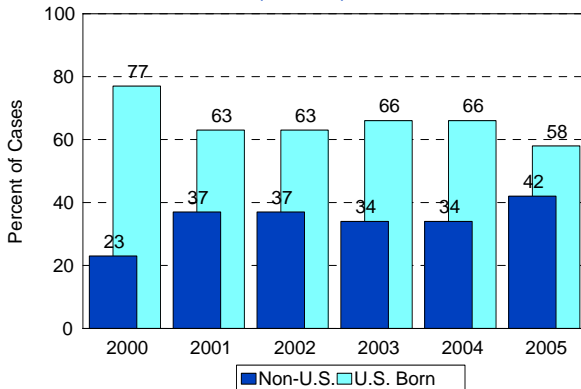
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** None reported or statistically insignificant

Persons born in high-prevalence countries continue to make up a large proportion of TB cases. In 2005, 61 of the 146 reported TB patients (42%) were born in countries with a high burden of TB (Figure 5). Figure 6 represents the distribution of TB cases by world region. Figure 7 represents the length of time persons were living in the US prior to TB diagnosis.

Figure 5.

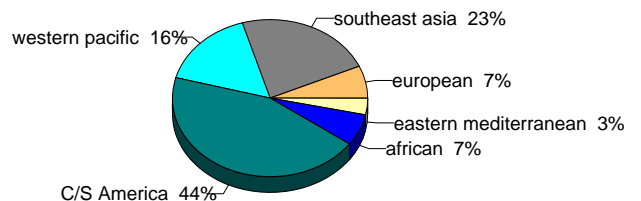
Reported Tuberculosis Cases U.S. vs. non US-born (n=146)



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Figure 6.

Non-U.S. Born TB Cases Reported in 2005 by World Region (n=61)

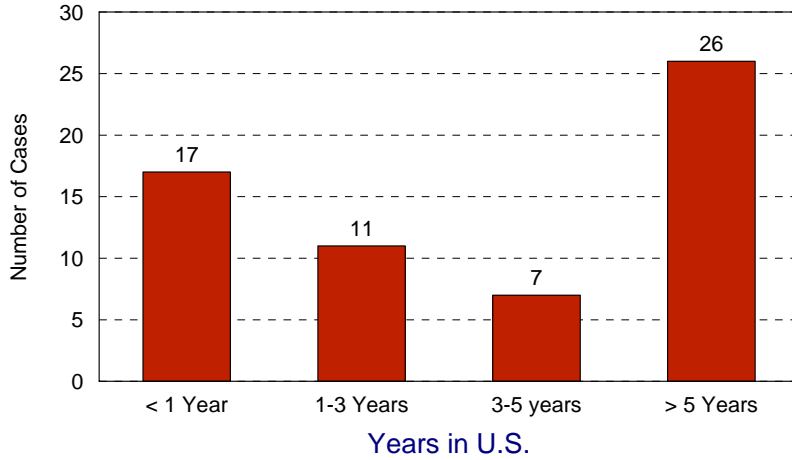


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Figure 7.

Length of Time in the U.S. Prior to Diagnosis

2005 Reported cases (n=61)



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The number and percentages of 2005 reported cases by age group:

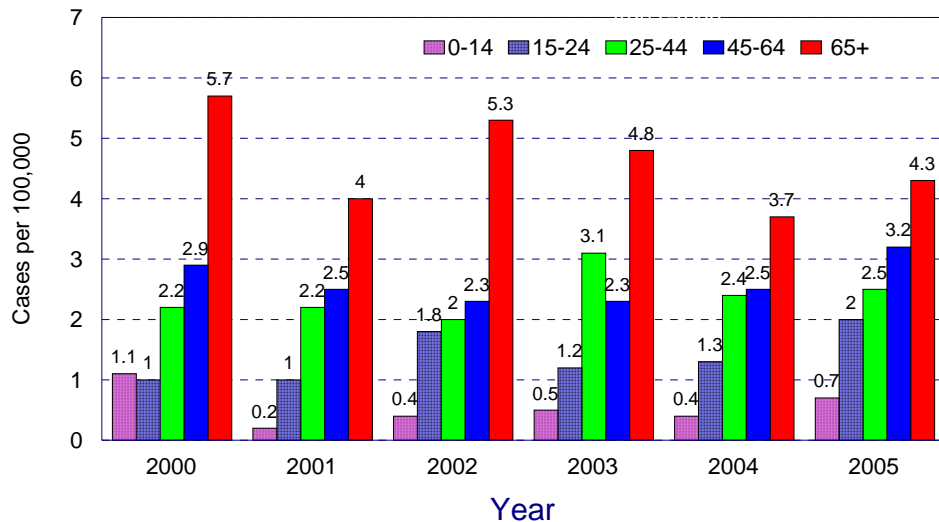
Age Group:	Numbers of new cases	Percentage of all new cases:
< 15 years	9	6
15-24 years	18	12
25-44 years	44	30
45-64 years	43	30
≥ 65 years	32	22

Case rates by age group are shown in Figure 8.

Figure 8.

Tuberculosis Case Rates by Age Group

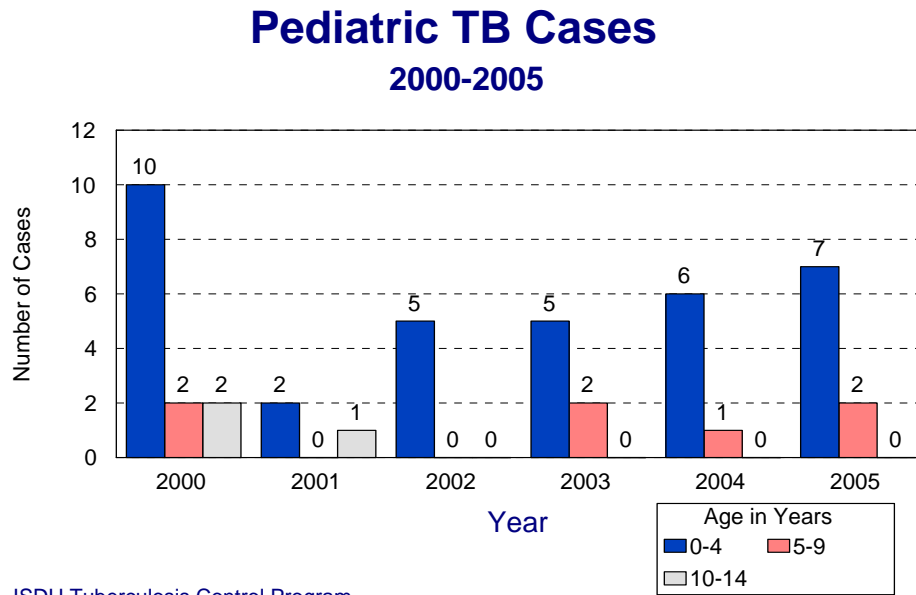
2000-2005



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The numbers of pediatric cases by age group are shown in Figure 9.

Figure 9.



HIV disease is the most significant risk factor for progression to active disease. The percentage of patients according to HIV status is shown in Table 1. The number of cases co-infected with TB and HIV is shown in Figure 10. HIV counseling and testing is recommended for all adult patients with TB, or suspected of having TB.

Table 1.

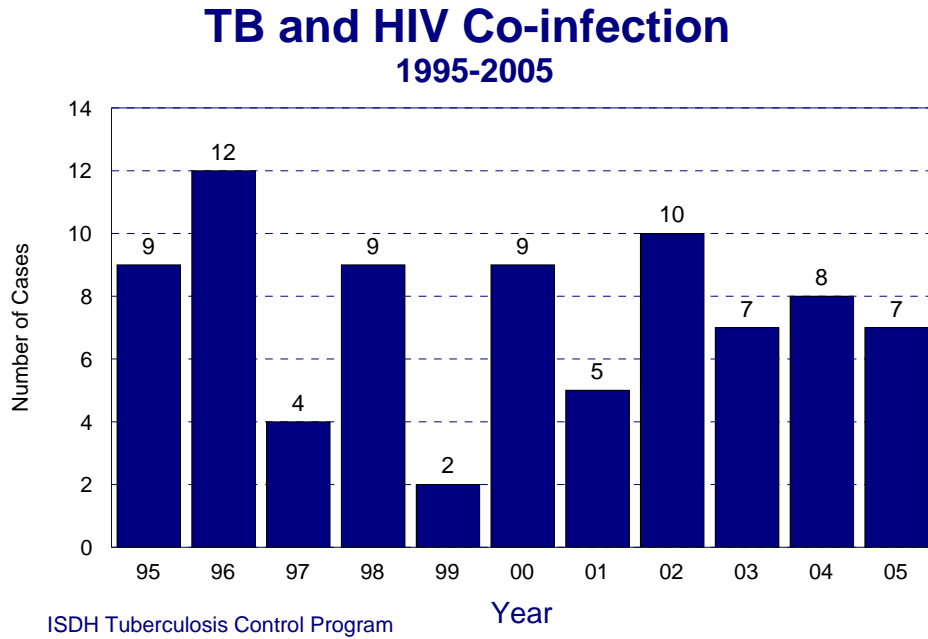
HIV Counseling and Testing

Number and percent of adult patients reported in 2005
offered counseling and testing

Status	Age group 25-44 (n=44)	All adult cases ≥15 years of age (n=137)
Tested, results known	36 (81%)	78 (57%)
Patient refused	2 (5%)	13 (9%)
Test not offered	6 (14%)	46 (34%)

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Figure 10.



Other risk factors associated with TB exposure or progression to active disease are excess alcohol use, homelessness, illicit drug use (injecting and non-injecting), and residence in a high-risk congregate setting. The numbers of persons reported with these risk factors at the time of diagnosis are shown in Table 2. A person may have multiple risk factors.

Table 2.

Reported Tuberculosis Cases in 2005 with Selected Exposure and Medical Risk Factors* (n=146)

Risk Factor	Number of Cases	Percent of Cases
Excess alcohol use	38	26
Injection drug use	9	6
Non-injection drug use	21	14
Homelessness	5	3
Resident of long-term care facility	4	3
Resident of correctional facility	4	3

*at the time of diagnosis

Occupation is another variable used to detect trends. These data are shown in Table 3. The “not employed” category includes retired persons, children, and students.

Table 3.

Reported Tuberculosis Cases in 2005 by Selected Occupation*

Occupation	Number of Cases	Percent of Cases
Not Employed In Last 2 Years	87	60
Other occupations	52	36
Migrant agricultural worker	0	0
Health care worker	6	4
Correctional facility employee	1	1

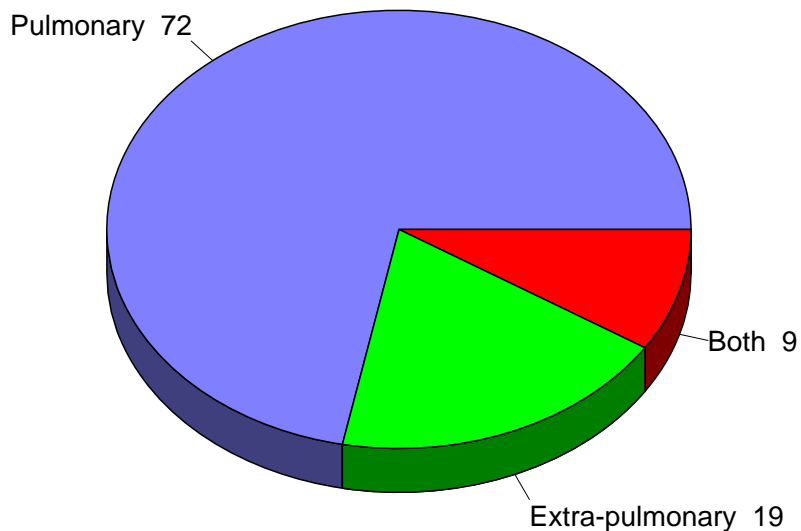
2005 (n=146)

*at the time of diagnosis

The number of TB cases classified by the site of disease is shown in Figure 11.

Figure 11.

Reported 2005 TB Cases by Site of Disease Percentage of all cases reported (n=146)

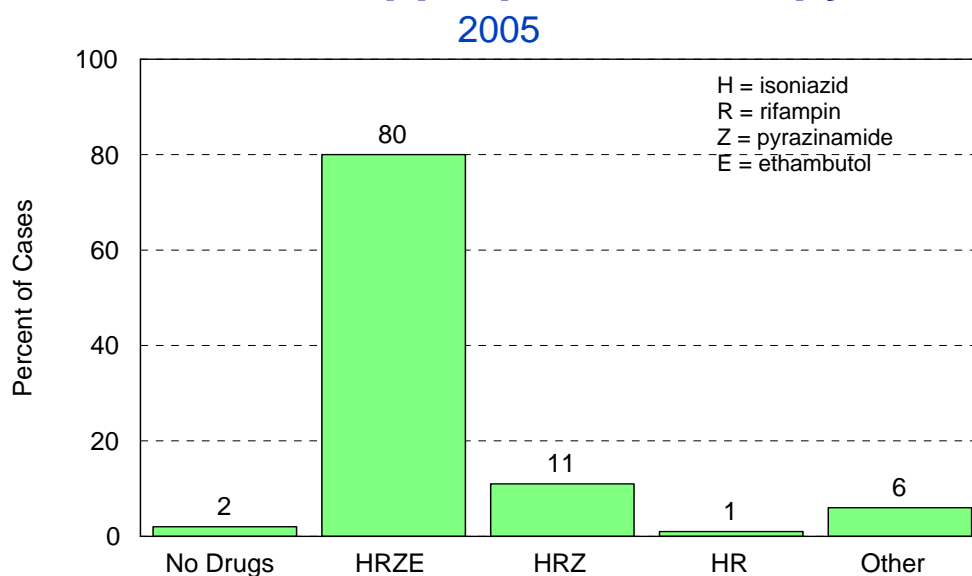


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The Indiana State Department of Health recommends the treatment guidelines set by the American Thoracic Society and the Centers for Disease Control and Prevention. Since 1991, these guidelines have recommended that four drugs be used in the initial treatment phase. Unless contraindicated, all patients should begin therapy on the preferred regimen containing isoniazid (INH), rifampin (RIF), pyrazinamide (PZA), and ethambutol (EMB). The percentage of patients who were started on the recommended four-drug regimen is shown in Figure 12.

Figure 12.

Percent of Cases Reported During 2005 Started on Appropriate Therapy



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Drug susceptibility testing is routinely performed on all culture-positive isolates. On rare occasions, such as specimen contamination, drug susceptibility testing cannot always be performed.

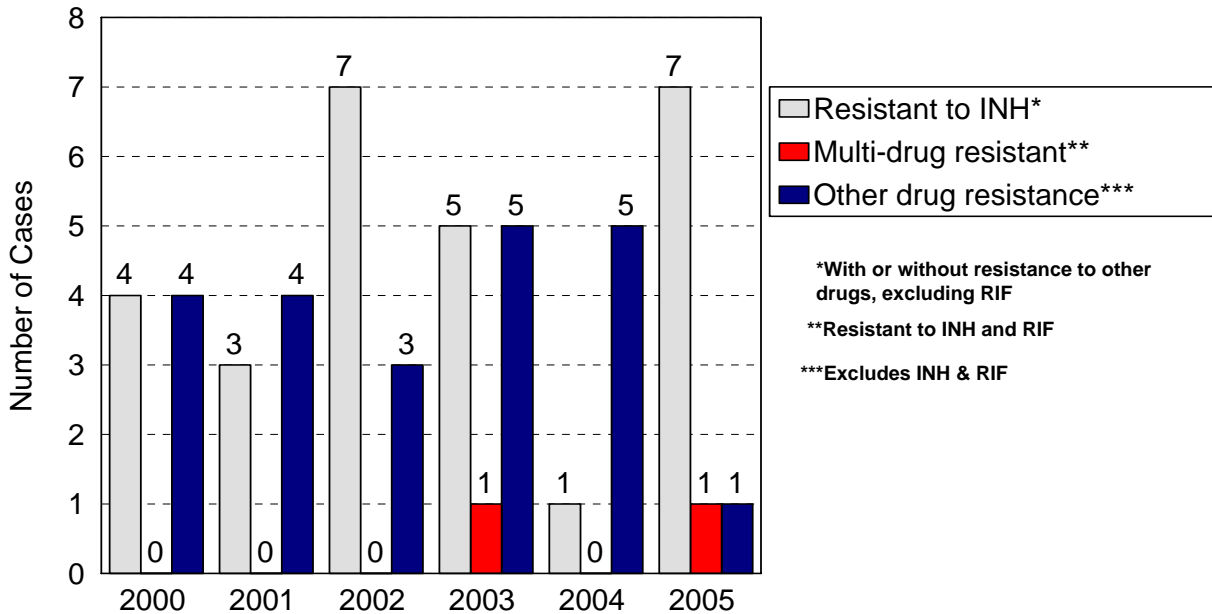
Drug susceptibility testing was performed on specimens submitted by 118 individuals in 2005. Of these, a total of 9 persons were resistant to one, or more, of the four standard first line medications. Seven persons were resistant to INH, with or without resistance to other first-line drugs, excluding RIF. One person was resistant to both INH and RIF and the last was resistant to EMB and PZA.

Multi-drug resistant (MDR) TB is defined as resistance to both INH and RIF. MDR-TB is of particular public health concern since these two drugs are the most effective agents. If the organism is resistant to them, less effective and more expensive second-line drugs must be added, with the treatment period having to be extended from the usual 6 to 9 months to 18 to 24 months. No cases of MDR-TB were reported among Indiana counted cases for 2004. One MDR case that was diagnosed outside the U.S. spent less than two months in Indiana. The number of drug resistant cases is shown in Figure 13.

Figure 13.

TB Cases with Drug Resistance

2000-2005



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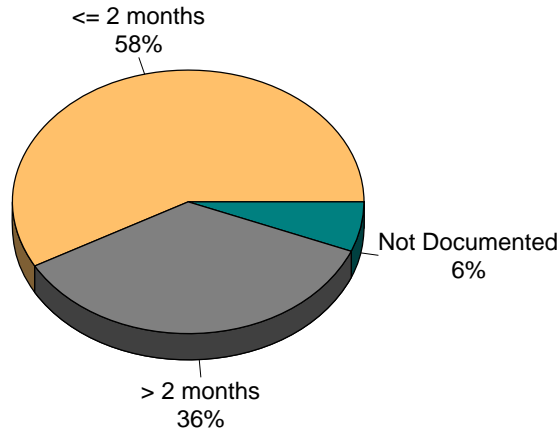
Besides drug resistance, inadequate response to therapy and failure to follow the treatment regimen are the major reasons for having to extend the treatment period. Sputum culture conversion data are collected to measure response to therapy. The absence of documentation of culture conversion is most commonly due to inadequate patient follow-up and is addressed with the local health departments. Patients whose sputum cultures have not become negative after two months of treatment may require a longer course of therapy. Those whose symptoms have not improved or are still culture-positive after four months of therapy are classified as treatment failures and should be re-evaluated for drug resistance, as well as failing to adhere to the treatment regimen if they are not on directly observed therapy. The proportion of patients who convert their sputum cultures to negative in two months or less is shown in Figure 14. The most recent year with complete data is 2003.

Directly observed therapy (DOT) is the most effective way to assure that the patient is complying with the prescribed treatment regimen. DOT is a strategy proven to ensure completion of therapy, with the added benefit of preventing acquired drug resistance. DOT is the best practice and the standard of care in Indiana and should be used for all patients. Every effort must be made to initiate DOT when the patient is first started on therapy. Cohort year 2003 is the most recent period with complete DOT data (Figure 15).

Figure 14.

Sputum Culture Conversion*, 2003

Elapsed time from start of therapy until the first consistently negative culture



*sputum culture-positive, alive at the time of diagnosis, and began treatment; excludes those who died before completing 2 months of therapy and were still culture-positive

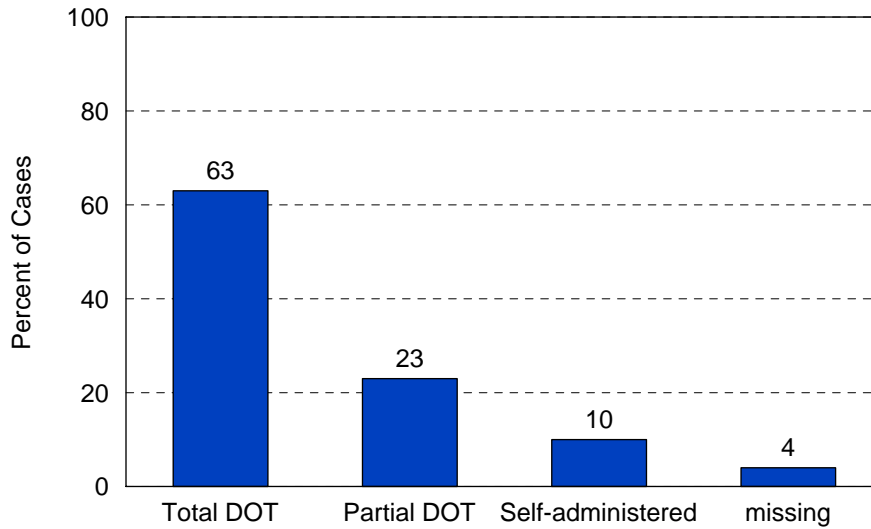
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Figure 15.

Use of Directly Observed Therapy

2005

Of cases that completed therapy (n=79)



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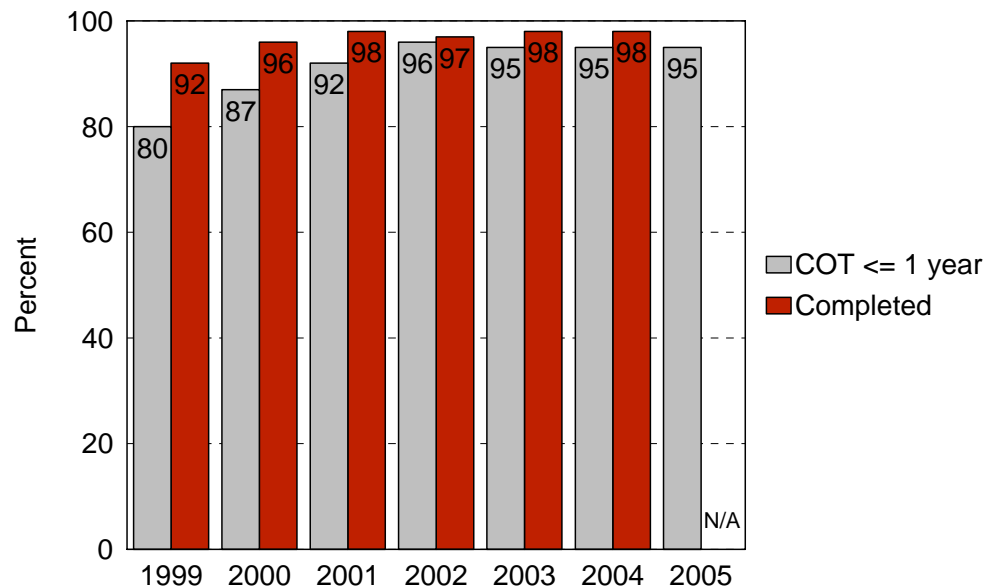
The first priority of TB elimination efforts is to ensure completion of therapy. Indiana's goal is to have at least 90% of all patients complete treatment within one year. The completion of therapy index is based on the number of patients for whom treatment for one year or less is indicated. Exclusions from the rate calculations are those who were dead at the time of diagnosis, patients who died before completing therapy, patients who were never started on therapy, and patients with multi-drug resistant disease. Therapy is considered to be incomplete for those patients who were reported as moved, uncooperative or refused, or lost to follow-up.

The current data are for those patients in cohort year 2004. Figure 16 shows the percentage of patients who completed therapy in one year or less, and the total completion rate for all patients.

Figure 16.

Completion of Therapy

1999-2003



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Figure 17 shows the counties that reported 5 or more cases of TB in 2004. The total number for the state is based on persons (1) whose primary residence was in Indiana at the time of diagnosis, and (2) who were verified as having TB disease in a given year. Persons counted in another state and immigrants and refugees who are diagnosed and begin treatment abroad are excluded. Foreign visitors (i.e., students, tourists, etc.) and certain other categories of non-U.S. citizens who are diagnosed in Indiana but who remain in the U.S. for less than 90 days of treatment are also excluded.

The aggregate number of cases by region is shown in Figure 18. This grouping uses a slightly modified version of the map used to display the state's bioterrorism preparedness districts. Figure 19 shows the number of cases per county from 2000-2005.

Figure 17.

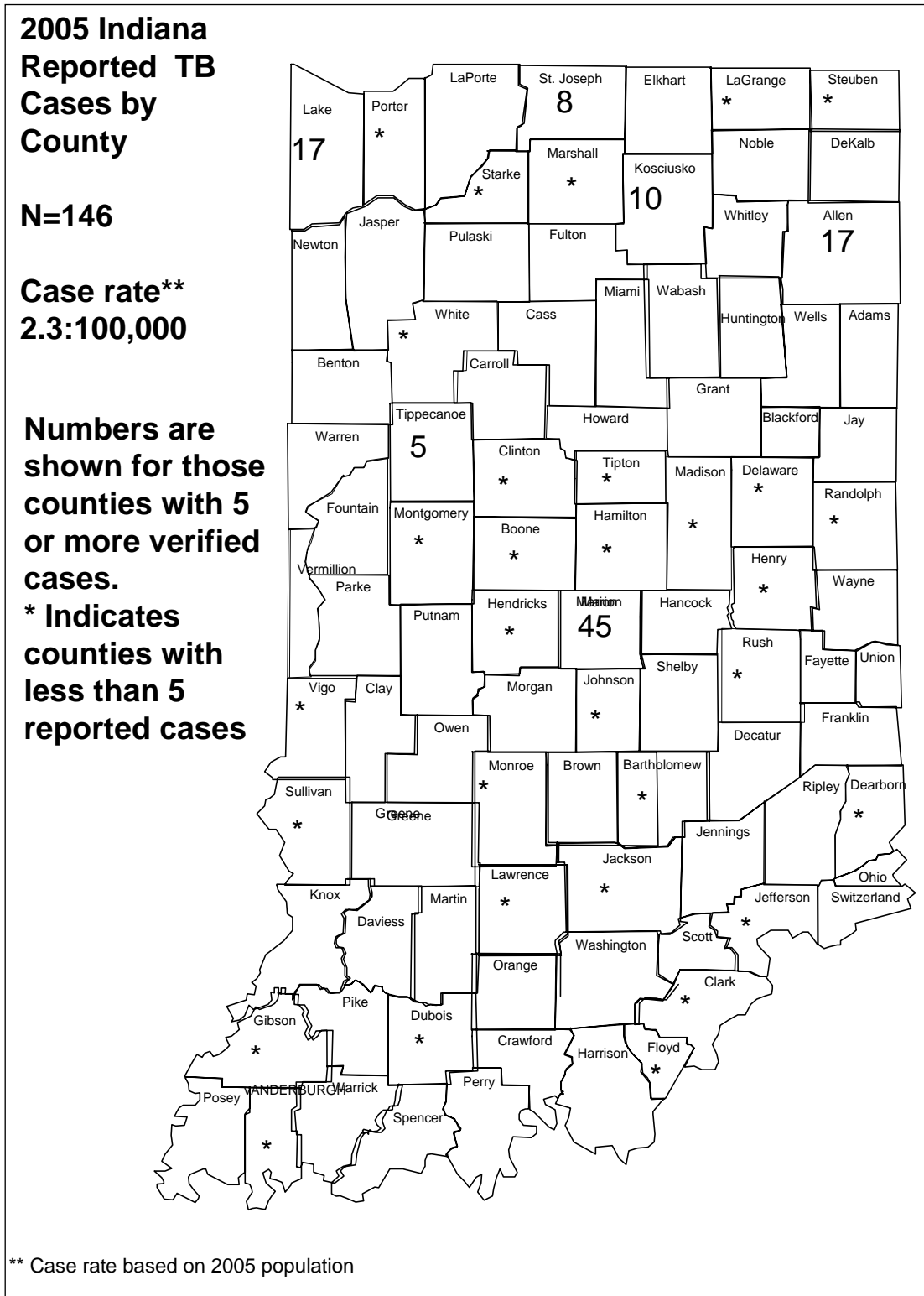


Figure 18.

Aggregate Case Counts Grouped by Multi-County Regions

2005 total = 146

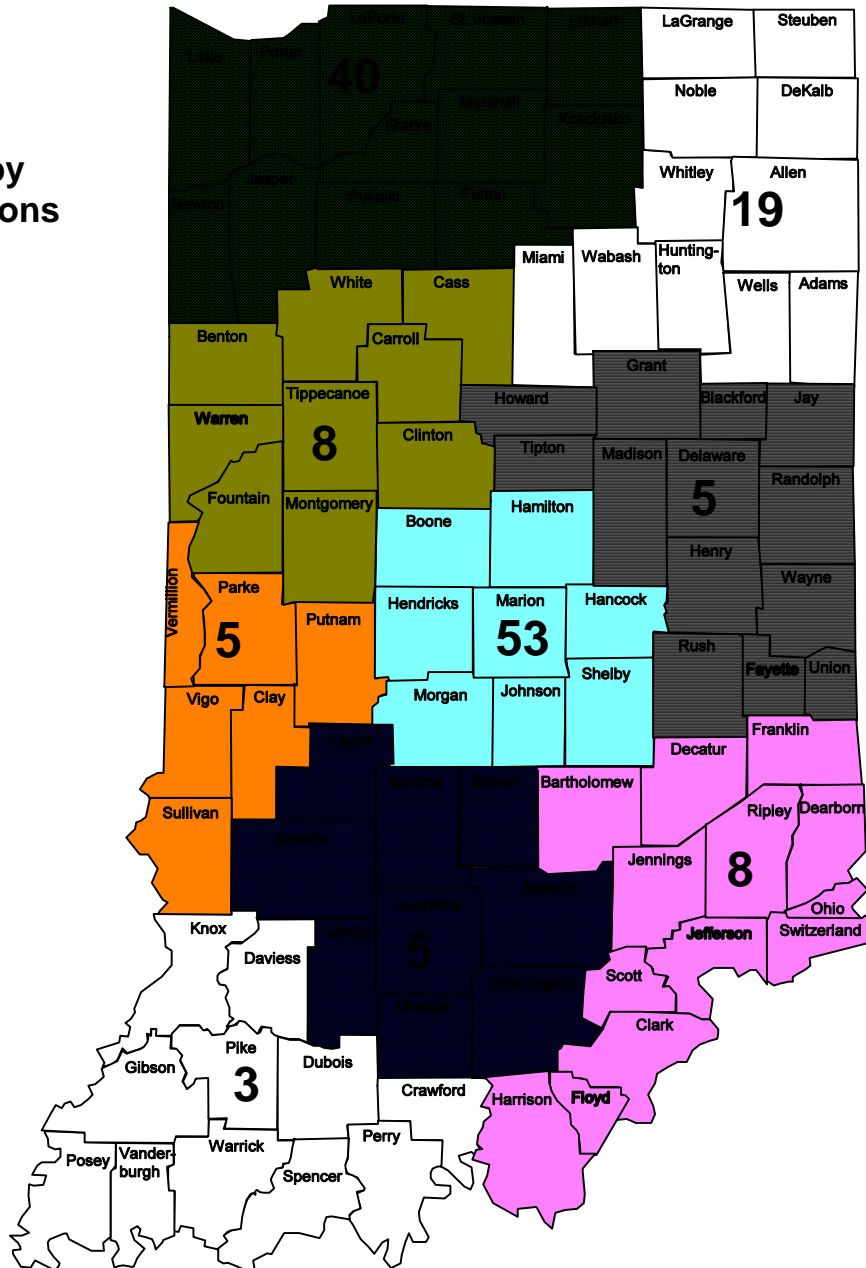
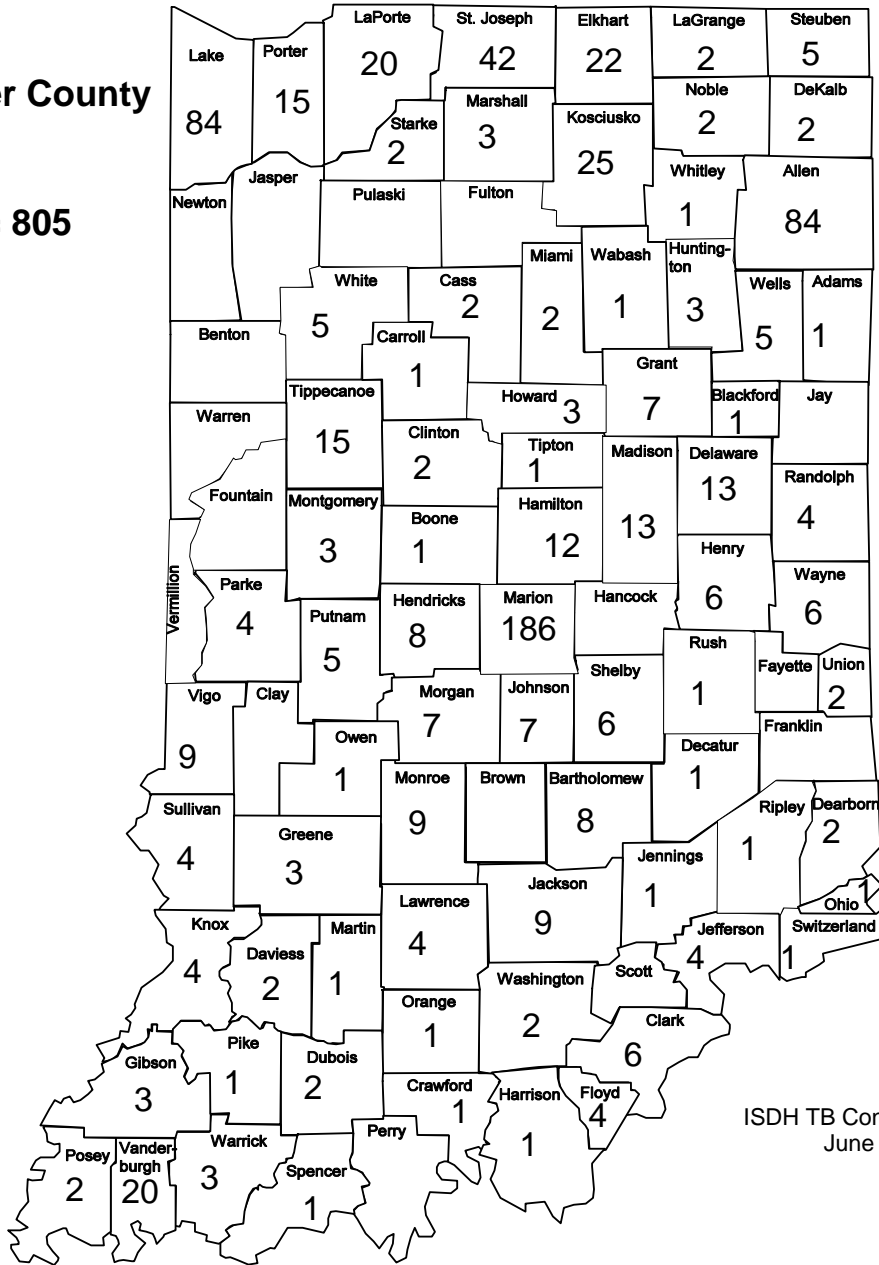


Figure 19.

**TB Cases per County
2000-2005**

State Total = 805



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June 2006