TUBERCULOSIS 2004

Cases = 128
Crude Incidence Rate per 100,000 population = 2.1 (U.S. 2003 = 5.1)
Race and Ethnicity-specific Incidence Rates per 100,000 population
White, not Hispanic or Latino = 0.9
Black or African-American = 8.0
Hispanic or Latino, all races = 8.7
Asian = 28.9
Hawaiian Native or other Pacific Islander = n/a
American Indian or Alaska Native = 5.3

Gender-specific Incidence Rates per 100,000 population
Male = 2.6
Female = 1.6

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 2004, there were 128 new cases of tuberculosis reported to the Indiana State Department of Health. Figures 1a and 1b show long-term and 5-year trends, respectively. TB was reported by 34 of the 92 counties. The three most populous counties accounted for 53% of all new cases. A tuberculosis outbreak continued in Allen County in 2004, where 22 new cases were reported. Eleven of those cases were linked either epidemiologically or through matching genotypes from positive cultures.

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.

Figure 1a.

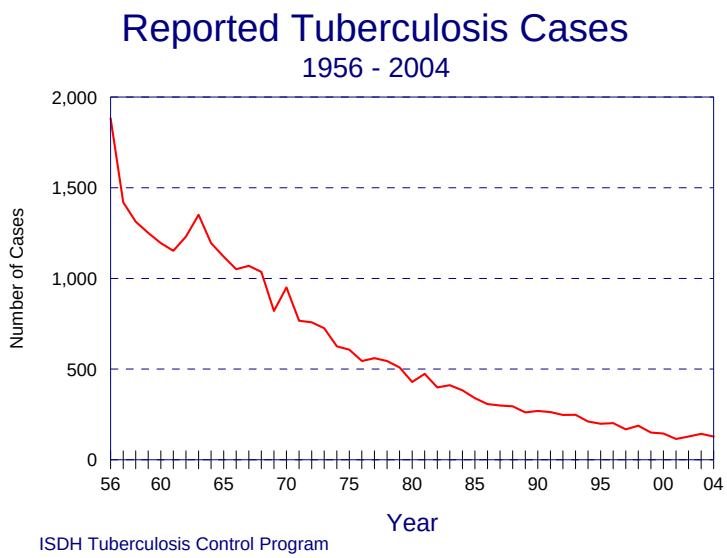


Figure 1b.

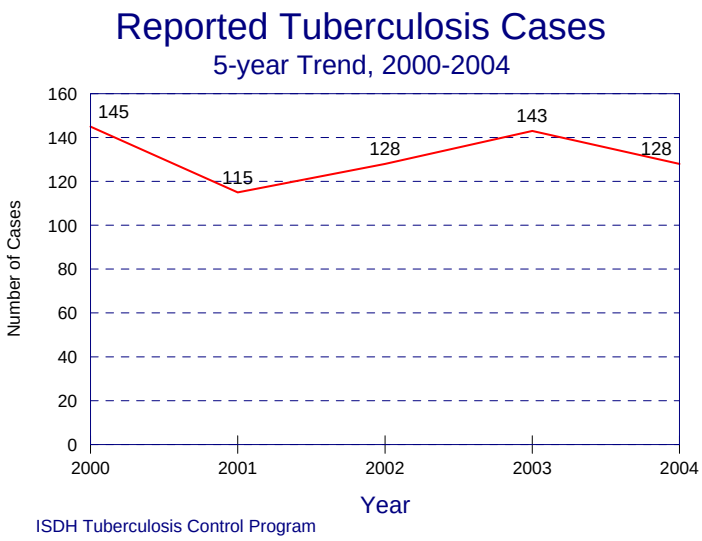
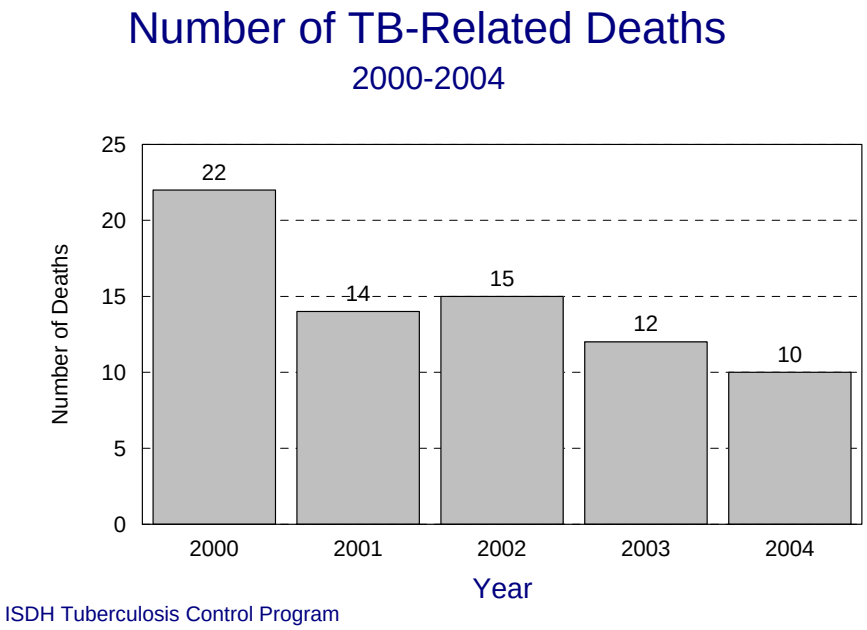


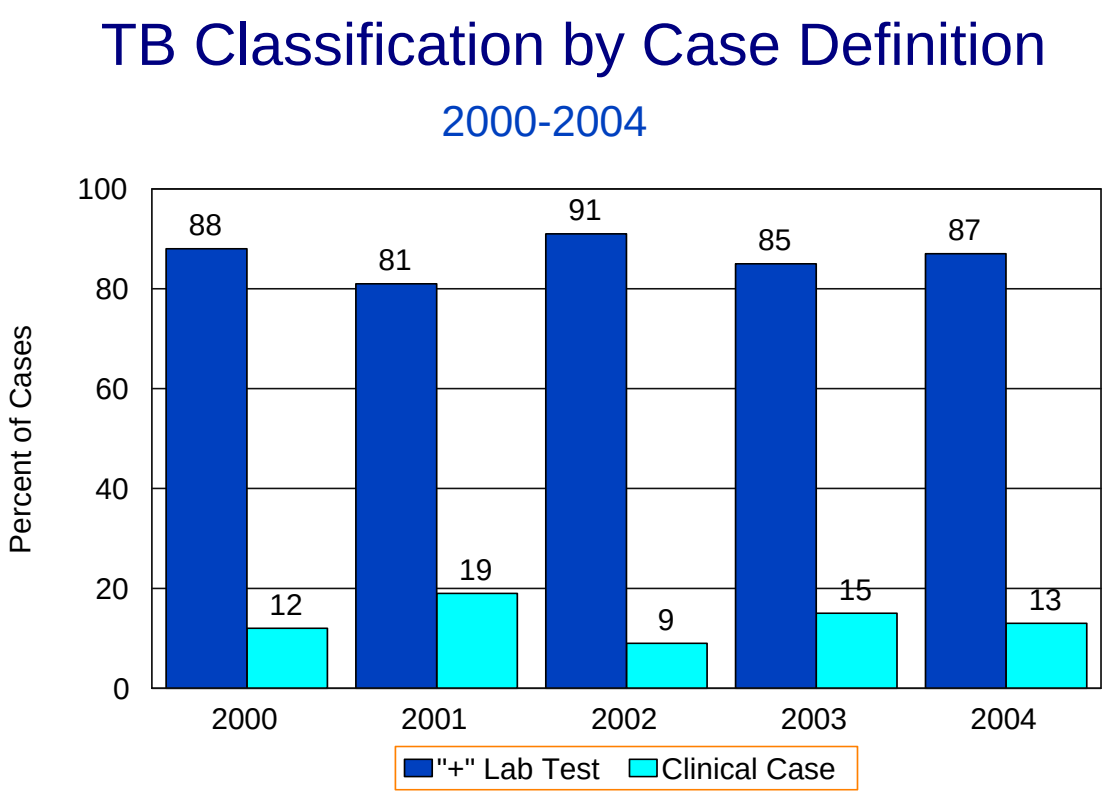
Figure 2.



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.



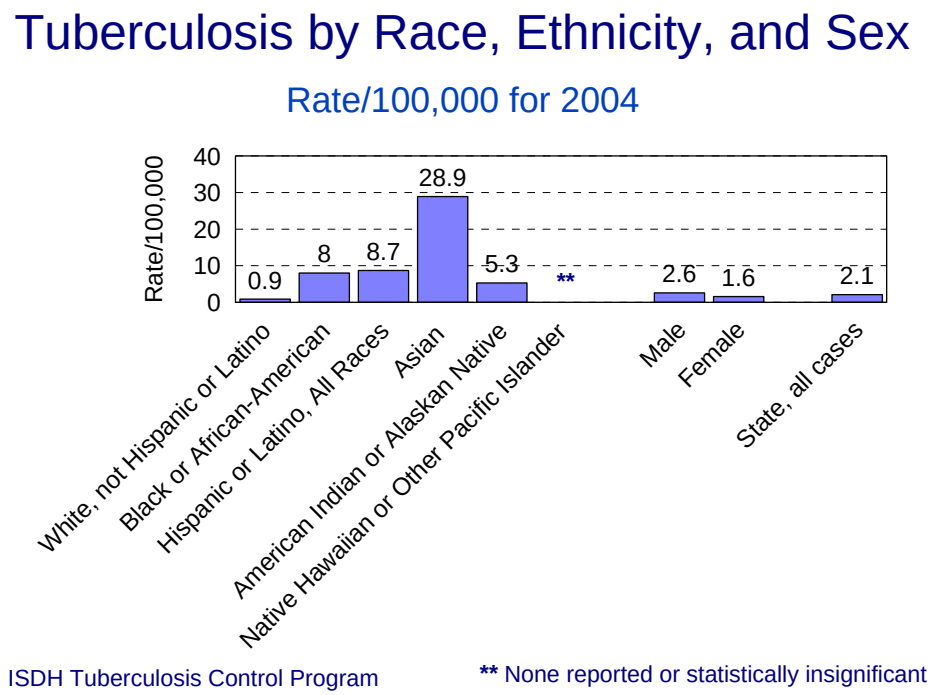
ISDH Tuberculosis Control Program

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

Category:	Percentage of all new cases:
Male	61
Female	39
White, not Hispanic or Latino	37
Black or African-American	33
Hispanic or Latino	15
Asian	14
American Indian or Alaska Native	< 1

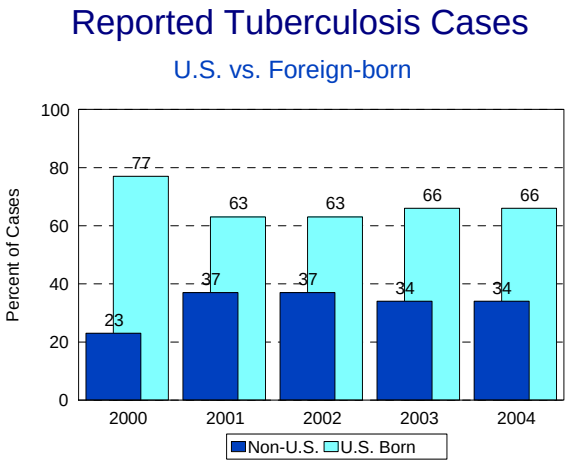
Figure 4 shows case rates per 100,000 population by race, ethnicity, and sex.

Figure 4.



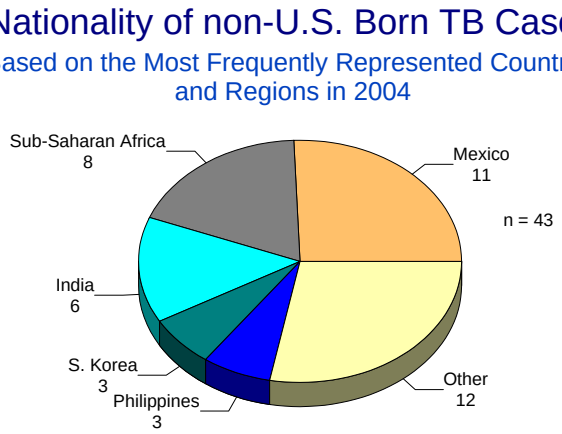
Foreign-born persons from high-prevalence countries continue to make up a large proportion of TB cases. In 2004, 43 of the 128 new TB patients (34%) were born in countries with a high burden of TB (Figure 5). Countries and world regions that represent the largest numbers of foreign-born TB cases are shown in Figure 6. Figure 7 shows the length of time they were in the United States when the diagnosis of TB was made.

Figure 5.



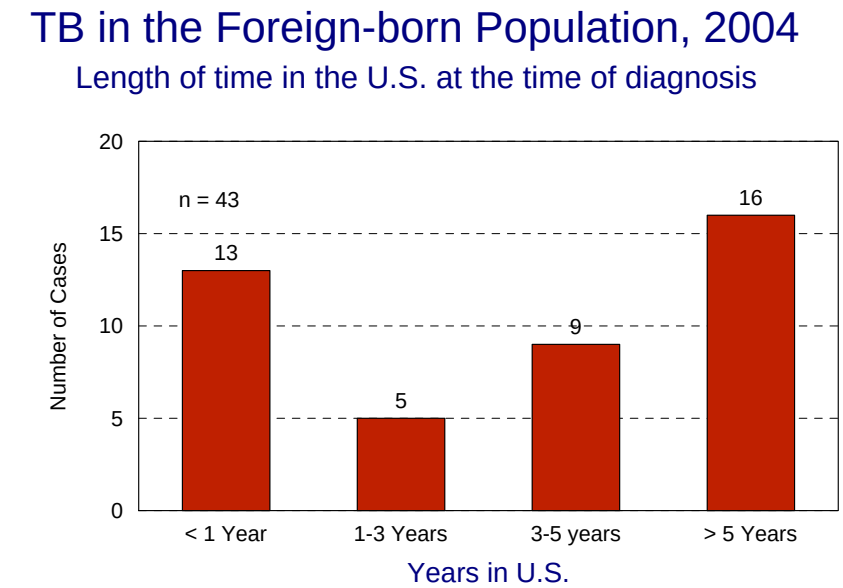
ISDH Tuberculosis Control Program

Figure 6.



ISDH Tuberculosis Control Program

Figure 7.



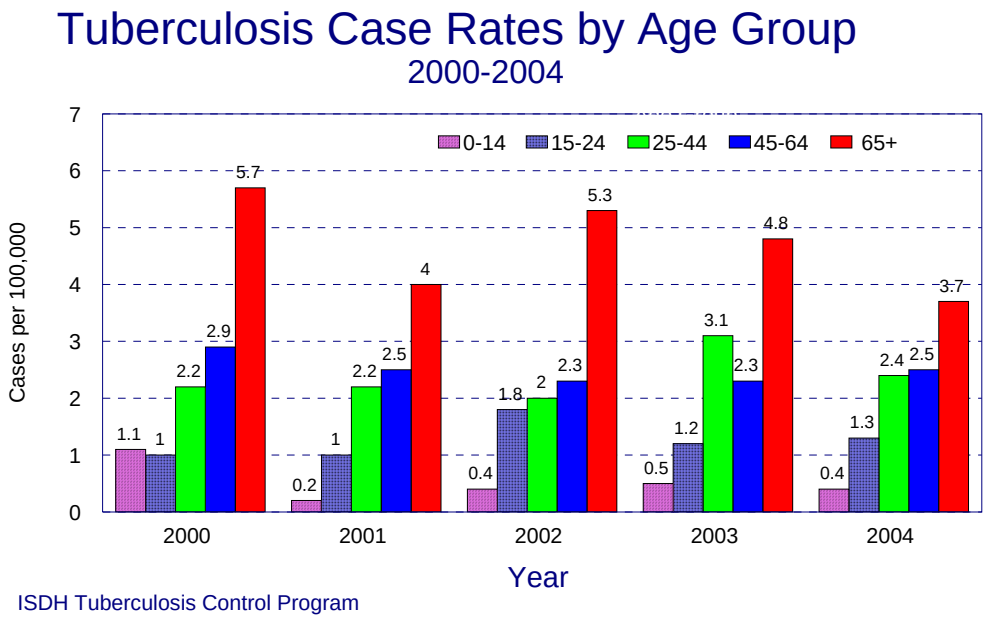
ISDH Tuberculosis Control Program

The percentages of new cases by age group are as follows:

Age Group:	**Percentage of all new cases:**
< 15 years	6
15-24 years	9
25-44 years	35
45-64 years	27
≥ 65 years	23

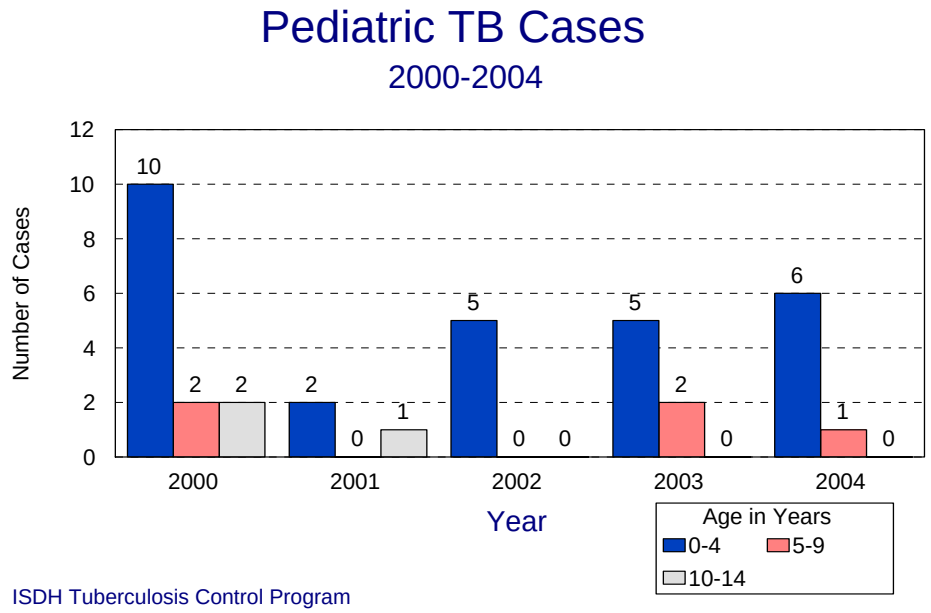
Case rates by age group are shown in Figure 8.

Figure 8.



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.

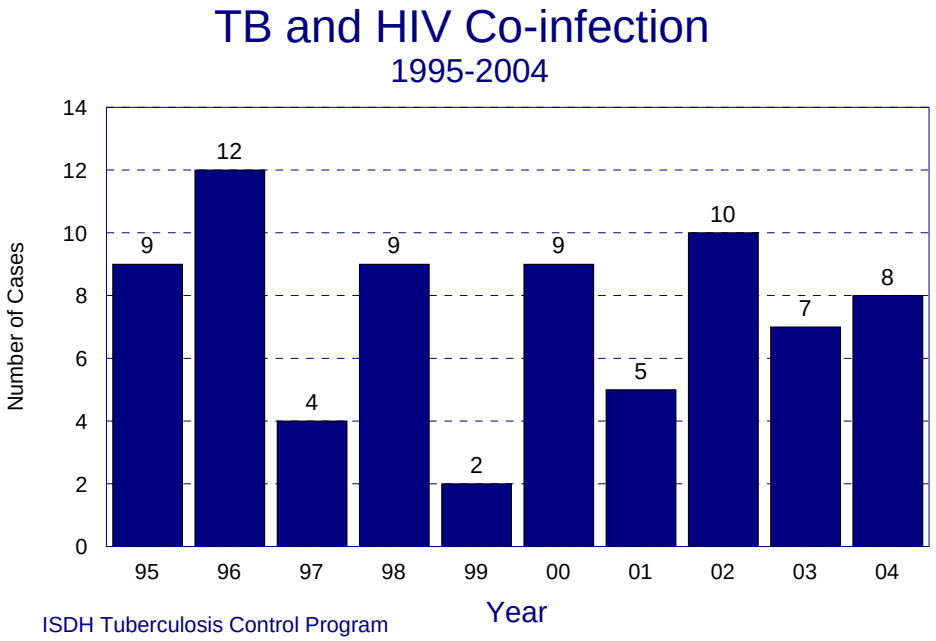
HIV Counseling and Testing

Percentage of adult patients offered counseling and testing

Status	Age Group 25-44	All Adult Cases (>= 15 years of age)
Tested, results known	71	51
Patient refused	7	7
Test not offered	22	42

ISDH Tuberculosis Control Program

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

with Selected Exposure and Medical Risk Factors*

Risk Factor	Number of Cases	Percent of Cases
Excess alcohol use	36	28
Injection drug use	5	4
Non-injection drug use	14	11
Homelessness	5	4
Resident of long-term care facility	3	2
Resident of correctional facility	3	2

2004 (n=128) *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

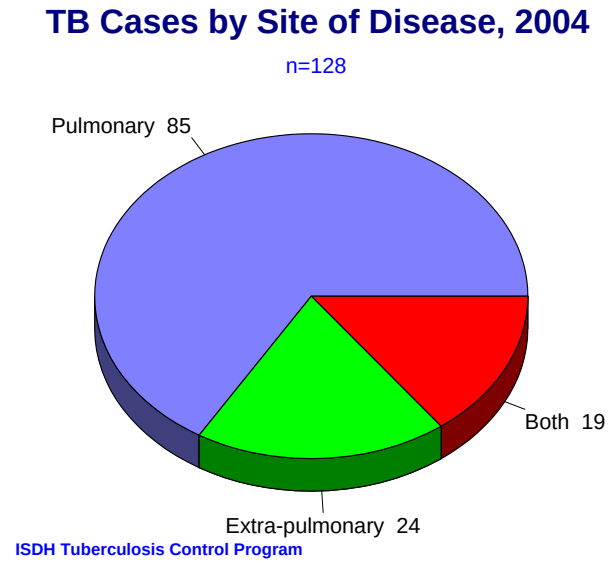
by Selected Occupation*

Occupation	Number of Cases	Percent of Cases
Not Employed In Last 2 Years	81	63
Other occupations	44	34
Migrant agricultural worker	0	0
Health care worker	3	2
Correctional facility employee	0	0

2004 (n=128) *at the time of diagnosis

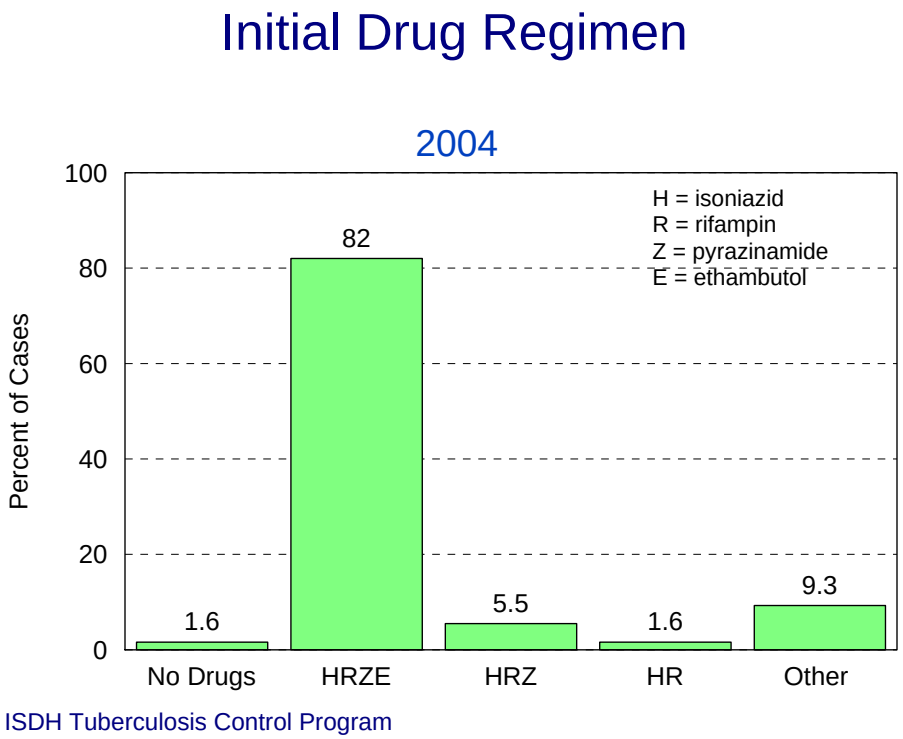
The number of TB cases classified by the site of disease is shown in Figure 11.

Figure 11.



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.

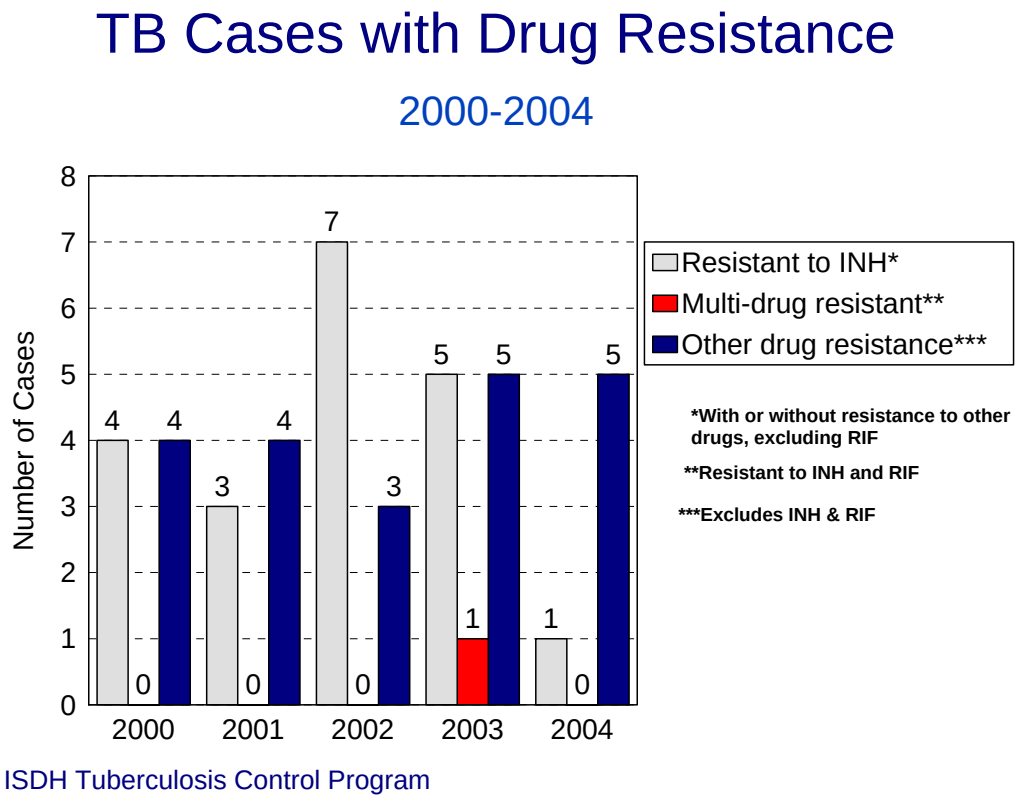
Figure 12.



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 all isolates in 2004. Of these, < 1% (1/109) were resistant to INH, with or without resistance to other first-line drugs, excluding RIF. 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.

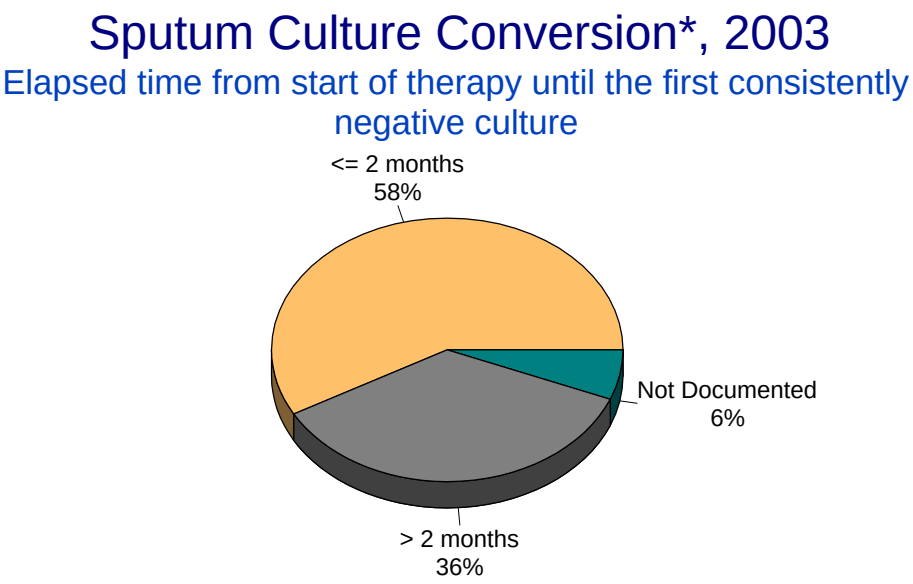
Figure 13.



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).

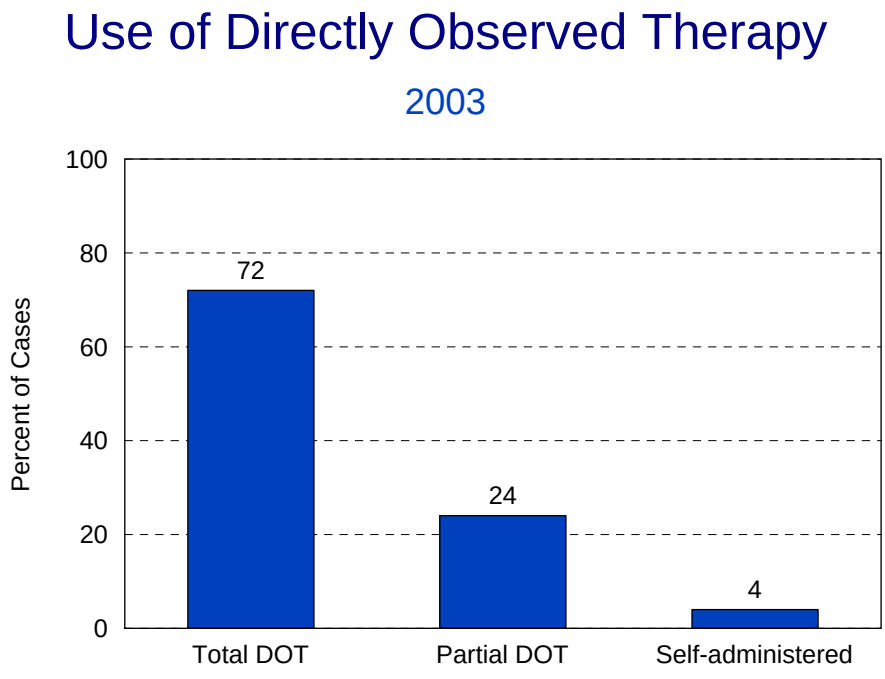
Figure 14.



*sputum culture-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

ISDH Tuberculosis Control Program

Figure 15.

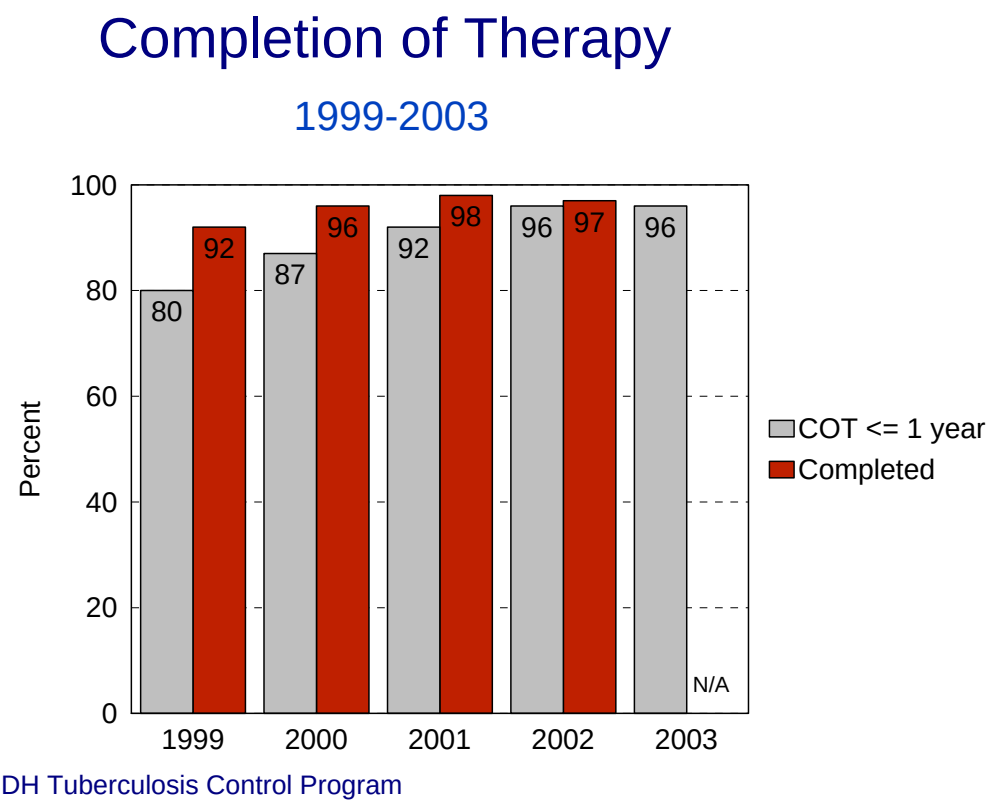


ISDH Tuberculosis Control Program

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 2003. 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.

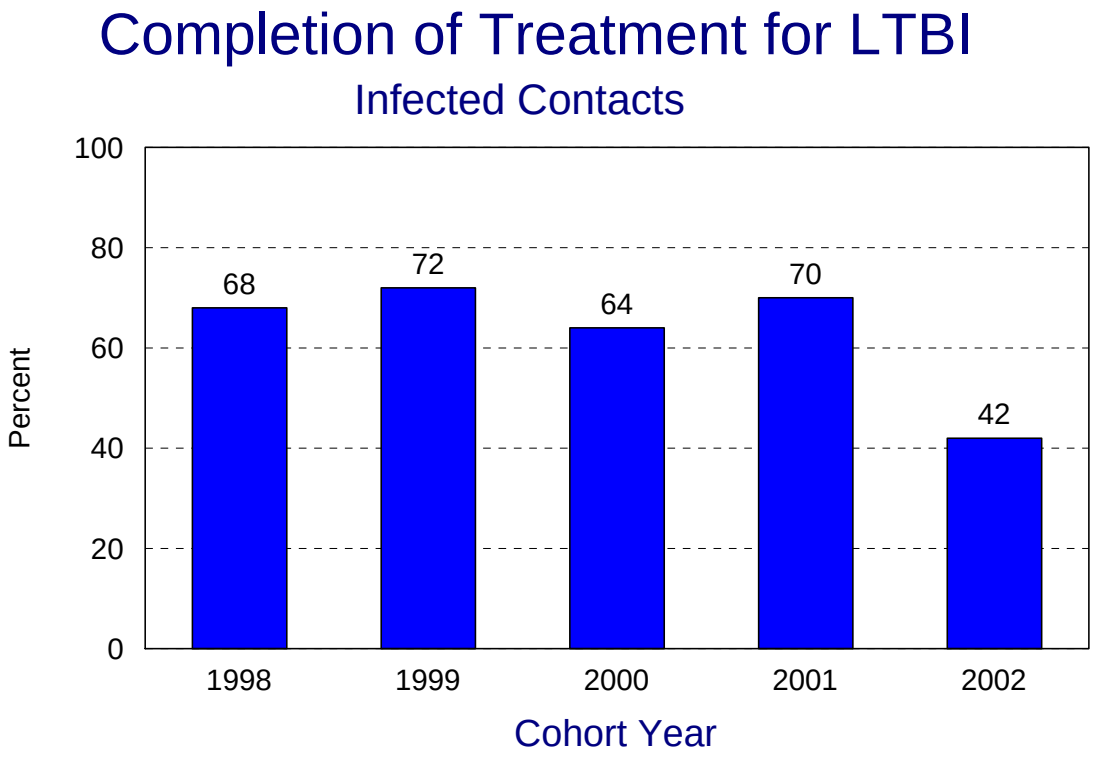


The second priority is to identify close contacts to patients with active pulmonary or laryngeal TB and to encourage treatment for those who are infected. People in this group are at a much higher risk of progressing to active disease than those with latent TB infection (LTBI) who were not close contacts. Contact investigations should be initiated within three working days for sputum smear-positive cases that have a high degree of suspicion for TB. Contact investigations must be performed for all cases of laryngeal and sputum culture-positive pulmonary TB. Persons in the following categories who have LTBI are also at high risk for developing active disease once infected and should be treated regardless of their age: (1) individuals who have been infected within the last two years; (2) injection drug users; (3) persons known or suspected of having HIV infection; (4) persons with certain other medical conditions; (5) persons with a chest x-ray suggestive of previous TB who received inadequate treatment or were not treated; and (6) persons from countries where TB is common.

Isoniazid for nine months is the preferred course of treatment for LTBI, regardless of age or HIV status. INH for six months is an acceptable alternative for adults if nine months of treatment is not possible. Rifampin for four months is an effective alternate regimen. Rifampin and pyrazinamide for two months is no longer recommended for general use due to occurrences of hepatitis requiring hospitalization and several deaths.

The most recent year with final completion of treatment data for infected contacts is for cohort year 2002 and is shown in Figure 17.

Figure 17.



ISDH Tuberculosis Control Program

Figure 18 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. There were 17 of these "not counted" cases in 2004.

The aggregate number of cases by region is shown in Figure 19. This grouping uses a slightly modified version of the map used to display the state's bioterrorism preparedness districts. Figure 20 shows the number of cases per county from 2000-2004.

Figure 18.

Counties with 5 or more verified cases of TB in 2004

State = 128

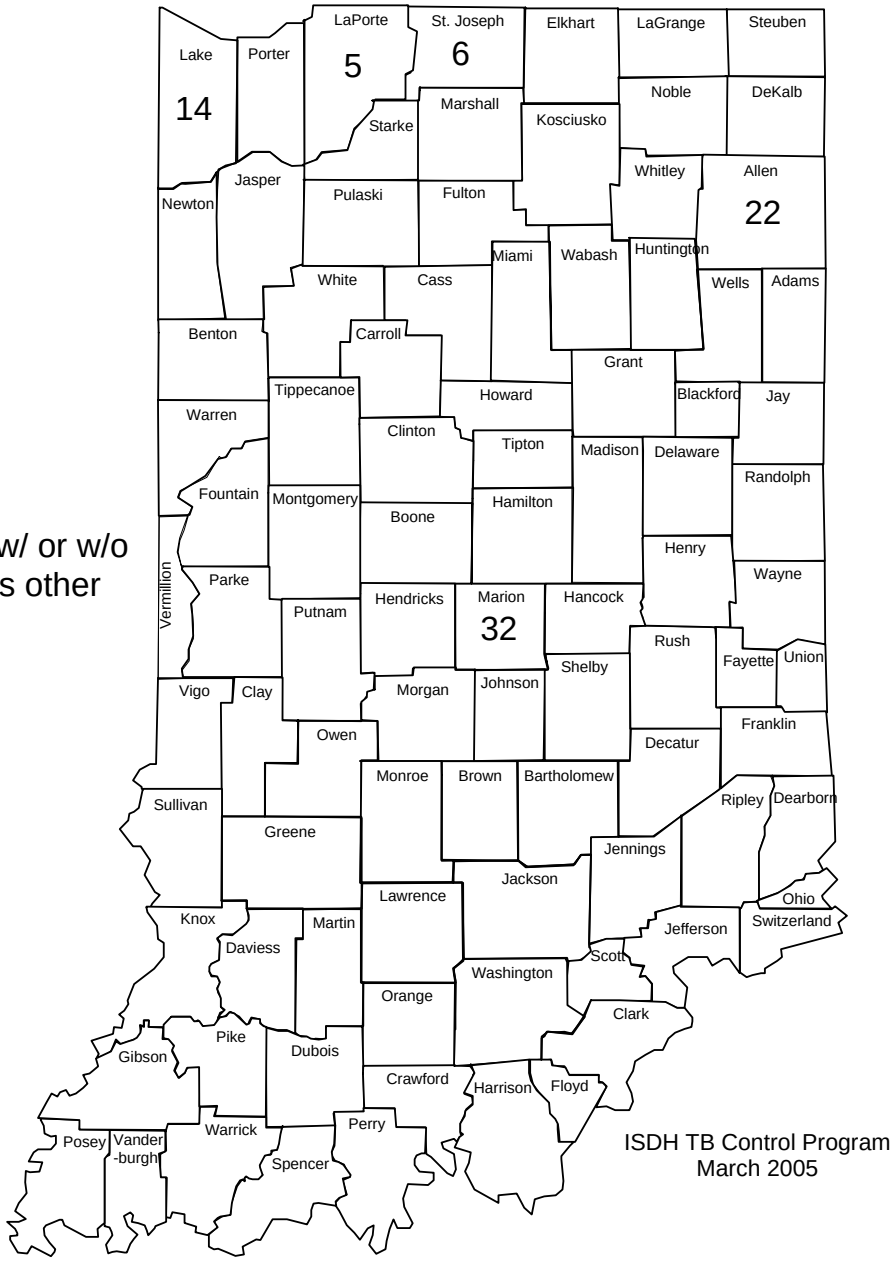
Case Rate = 2.1/100,000

Drug-resistant TB Cases:

Resistant to INH, w/ or w/o resistance to drugs other than RIF=1

Resistant to INH and RIF= 0

Resistant to other drugs = 5



ISDH TB Control Program
March 2005

Aggregate Case Counts Grouped by Multi-County Regions

2004 total = 128

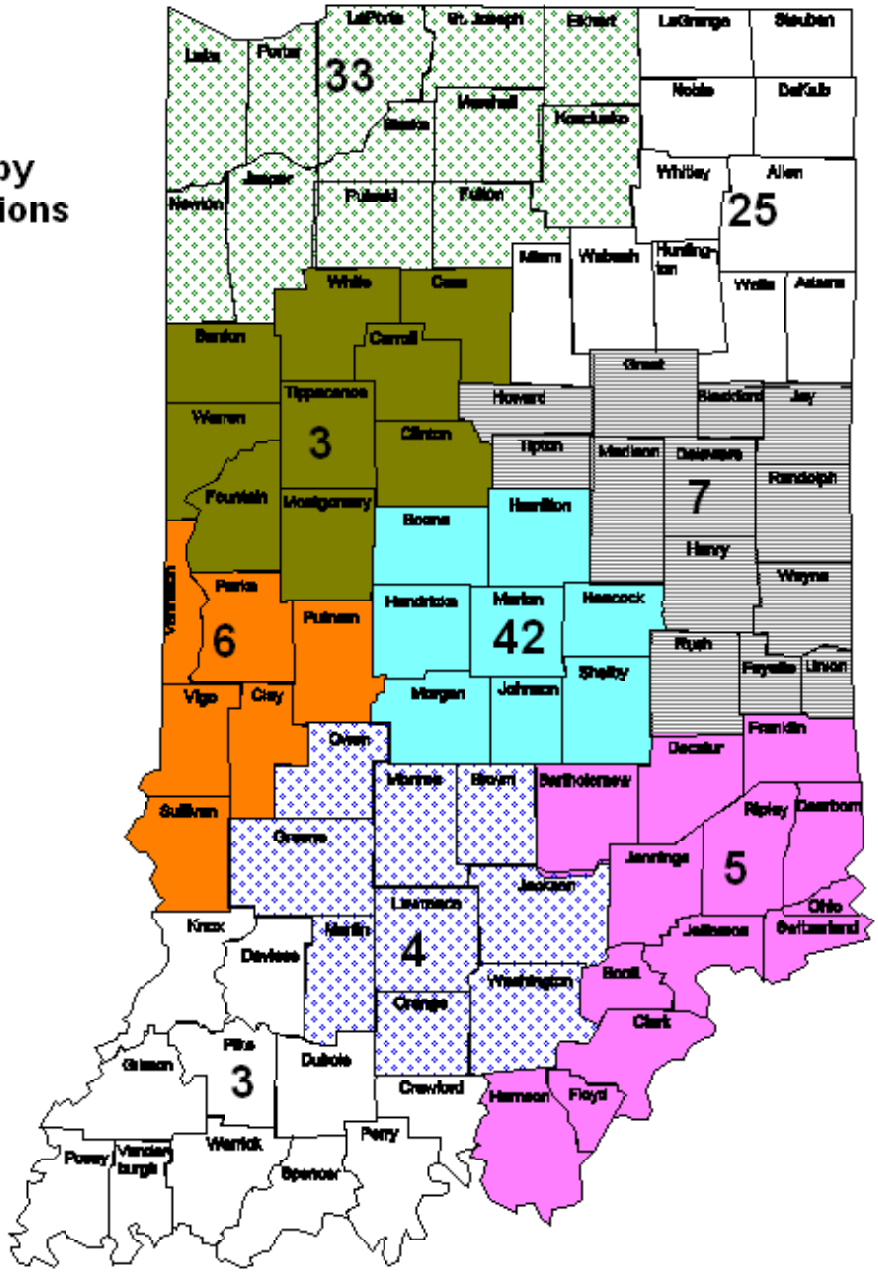
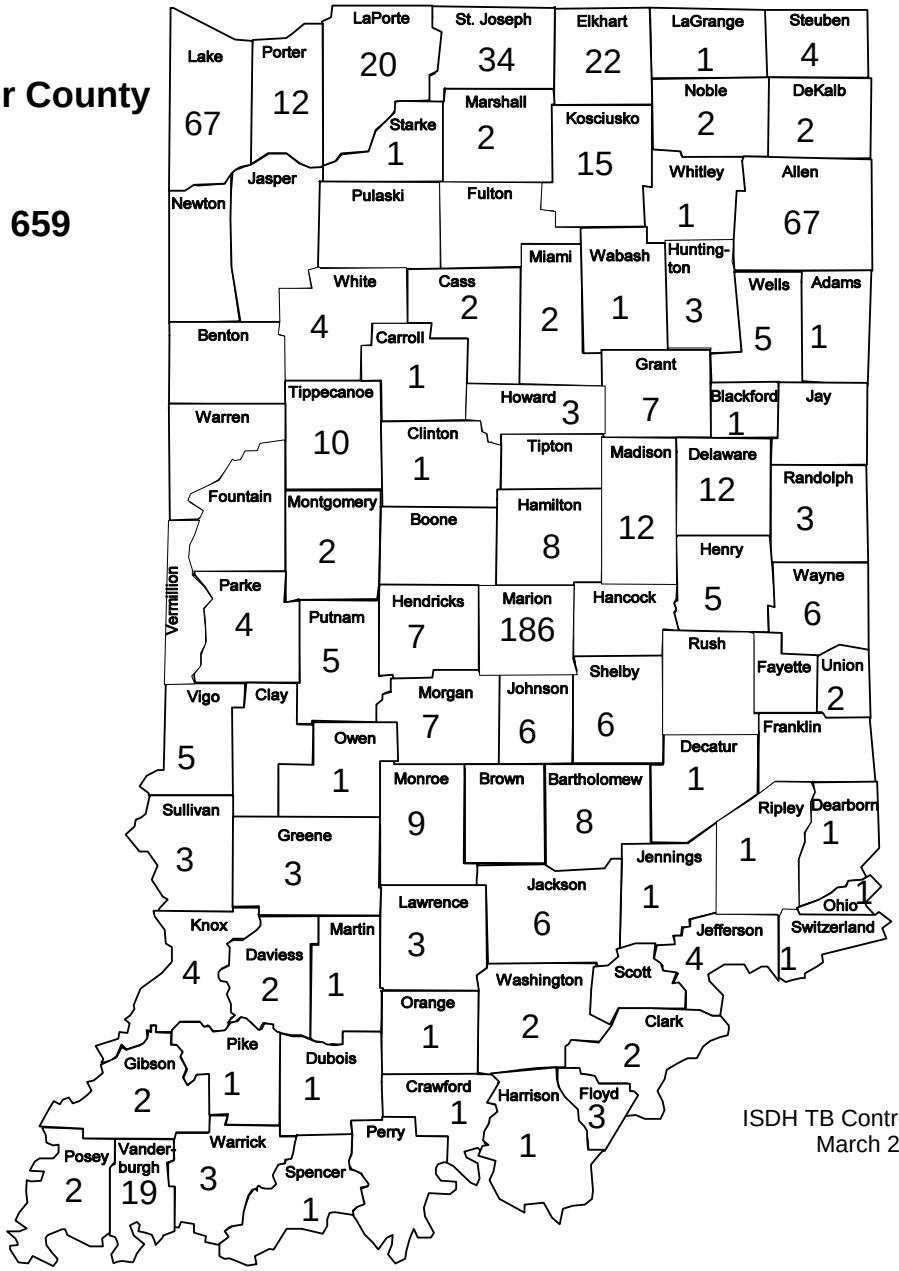


Figure 20.

TB Cases per County 2000-2004

State Total = 659



ISDH TB Control Program
March 2005