TUBERCULOSIS 2002

Cases = 128
Crude Incidence Rate per 100,000 population = 2.1
Race and Ethnicity-specific Incidence Rates per 100,000 population
White, not Hispanic or Latino = 1.0
Black or African-American = 7.0
Hispanic or Latino = 10.3
Asian = 27.8
Hawaiian Native or other Pacific Islander = n/a
American Indian or Alaska Native = n/a

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 which 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*, the last of which does not cause disease in humans. 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 2002, 128 new cases of TB were reported to the Indiana State Department of Health (ISDH). Figures 1a. and 1b. show long-term and 5-year trends, respectively. New cases increased by 11% from 2001, due primarily to (1) continued transmission among two different groups of social contacts, (2) an unusually high rate among persons ≥ 85 years of age, and (3) a trend of increasing numbers of cases among the foreign-born over the last four years. TB was reported by 33 (36%) of the 92 counties. Seven counties accounted for 67% of all cases.

Although the use of anti-TB chemotherapy has led to a long-term decline in the number of new cases, deaths still occur from the disease. From 1998 through 2002, an average of 17 people died with TB each year in Indiana. No patients were dead at the time of diagnosis in 2002. A post-mortem diagnosis of TB suggests that there was either a delay in the patient seeking treatment or a failure to diagnose TB when the patient sought medical attention. Disease transmission is likely to have occurred during this time because these patients have been infectious for a much longer period of time than those who were alive at the time of diagnosis.

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.

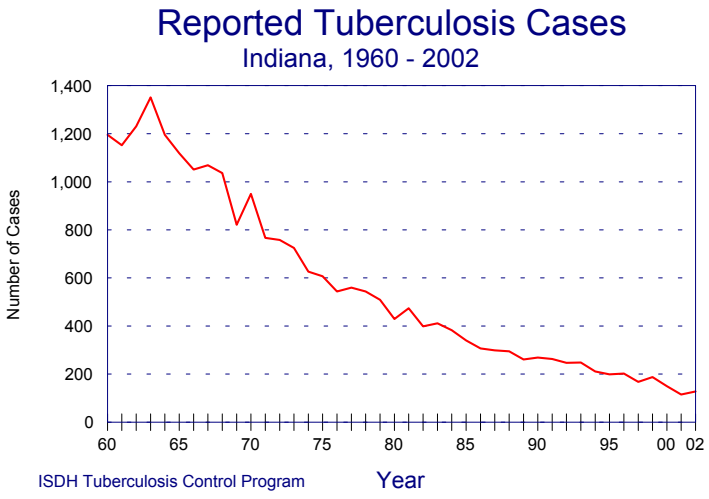


Figure 1b.

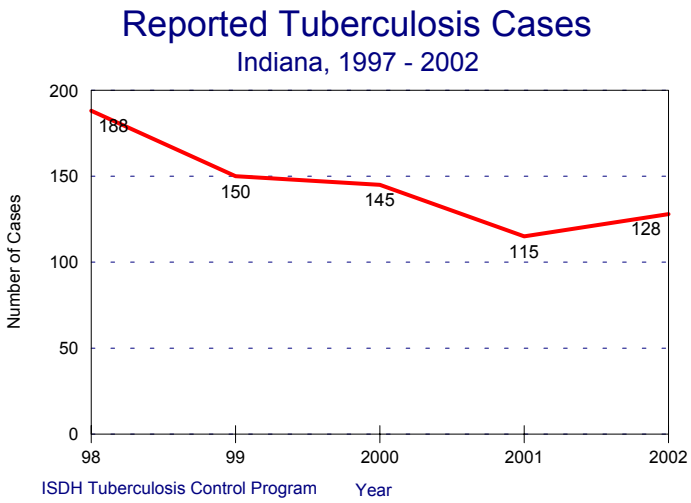
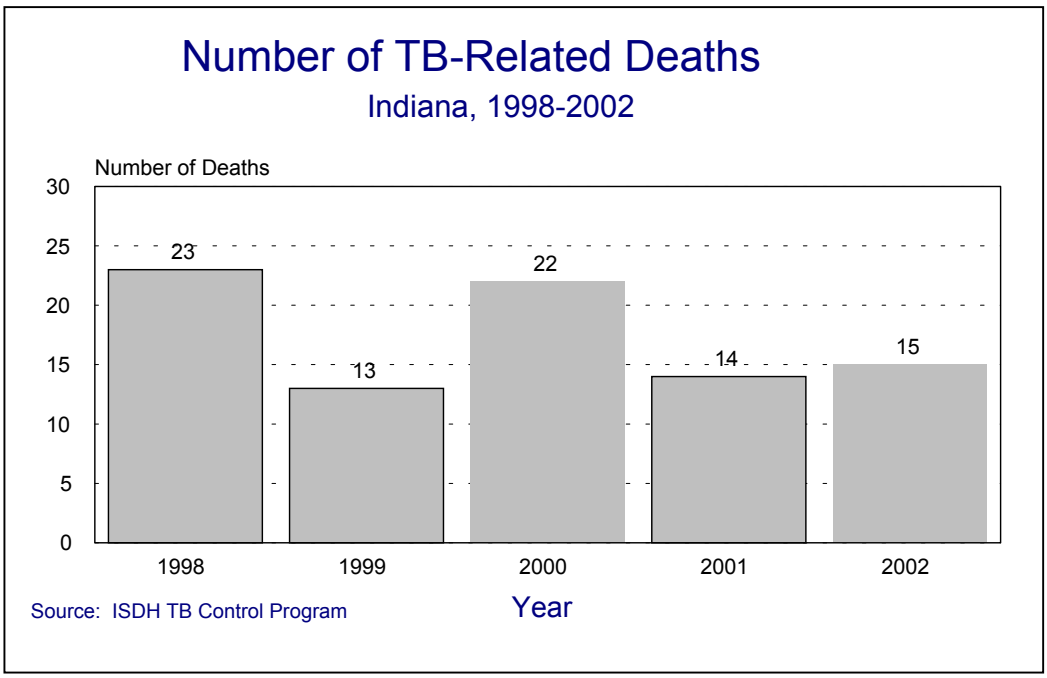


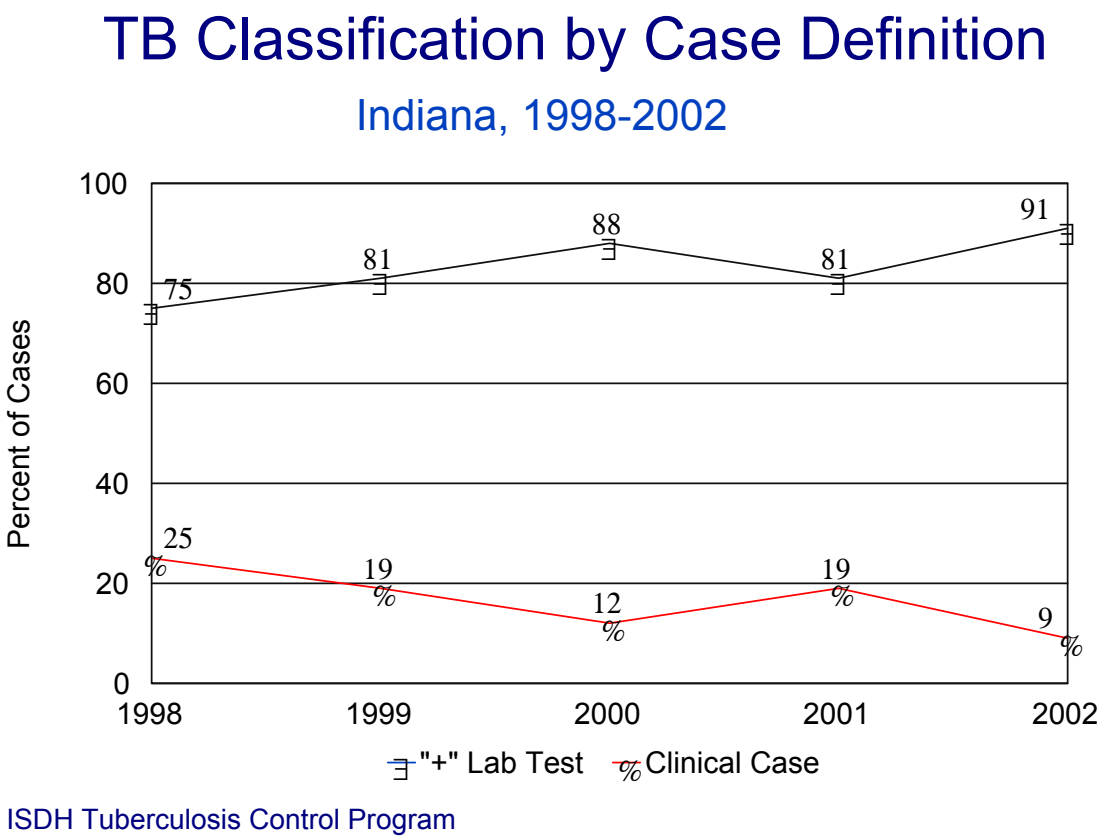
Figure 2.



A diagnosis of TB is verified using the Centers for Disease Control and Prevention's (CDC) "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).

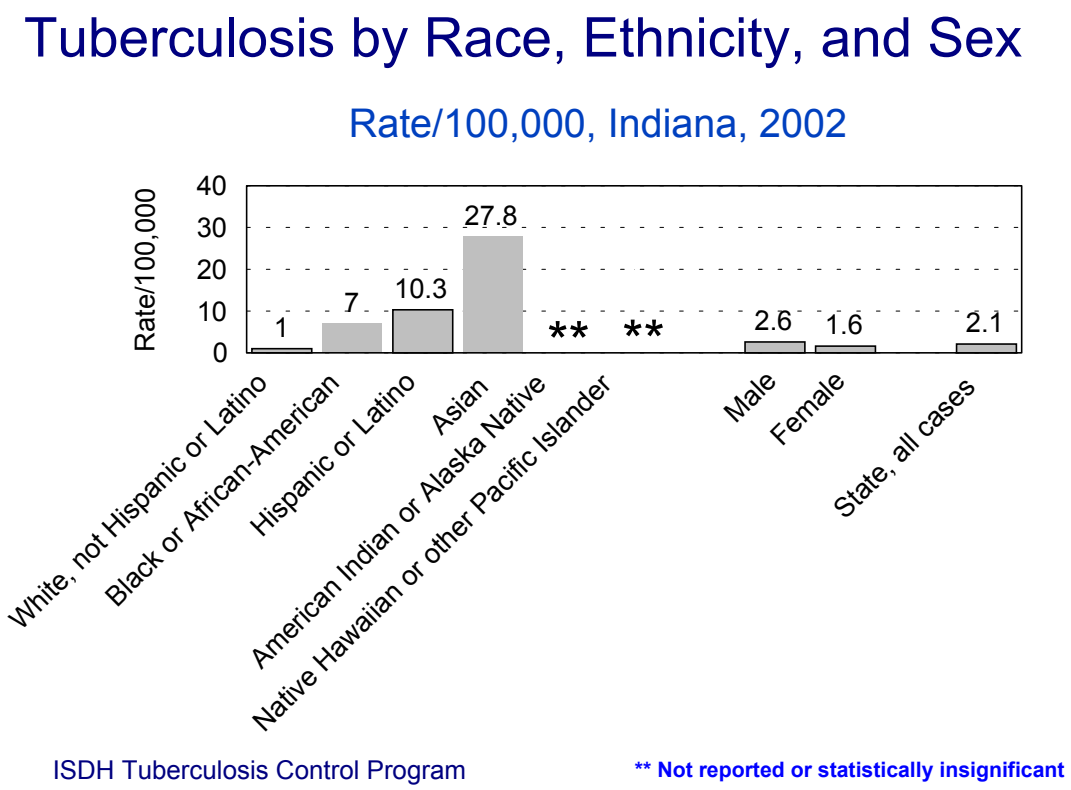
A clinical diagnosis is confirmed when all of the following criteria are met after a completed medical evaluation: a positive tuberculin skin test, signs and symptoms compatible with current TB disease (e.g., an abnormal, unstable chest x-ray) or clinical evidence of current disease (e.g., cough, night sweats, weight loss, hemoptysis), and 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 reported TB cases by case definition.

Figure 3.



In 2002, males made up 62% and females made up 38%, respectively, of all newly diagnosed TB cases. Percentages of new cases by race and ethnicity are as follows: white, not Hispanic or Latino (41%), black or African-American (28%), Hispanic or Latino (17%), and Asian (14%). Figure 4 shows case rates per 100,000 population by race, ethnicity, and sex.

Figure 4.



Foreign-born persons from high-prevalence countries have made up an increasingly larger proportion of TB cases over the last four years. In 2002, 37% (47/128) of TB patients emigrated from countries with a high burden of TB (Figure 5). Countries and regions that represent the largest numbers of foreign-born TB cases are shown in figure 6.

Figure 5.

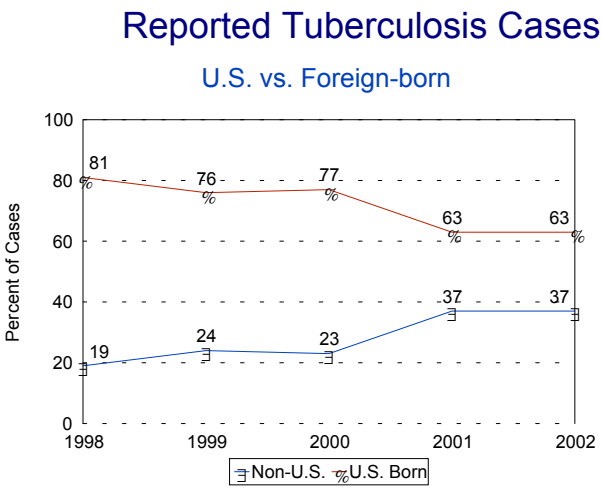


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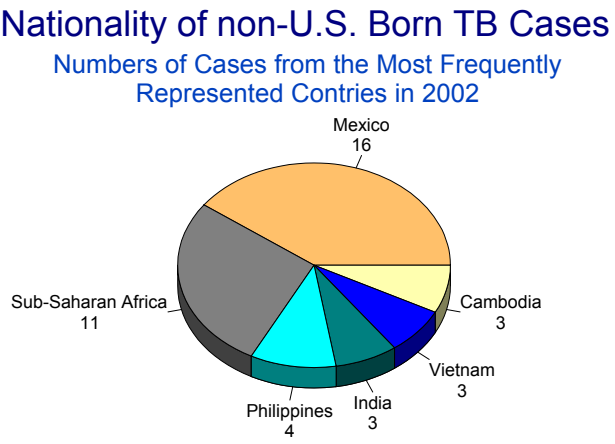
Figure 6.



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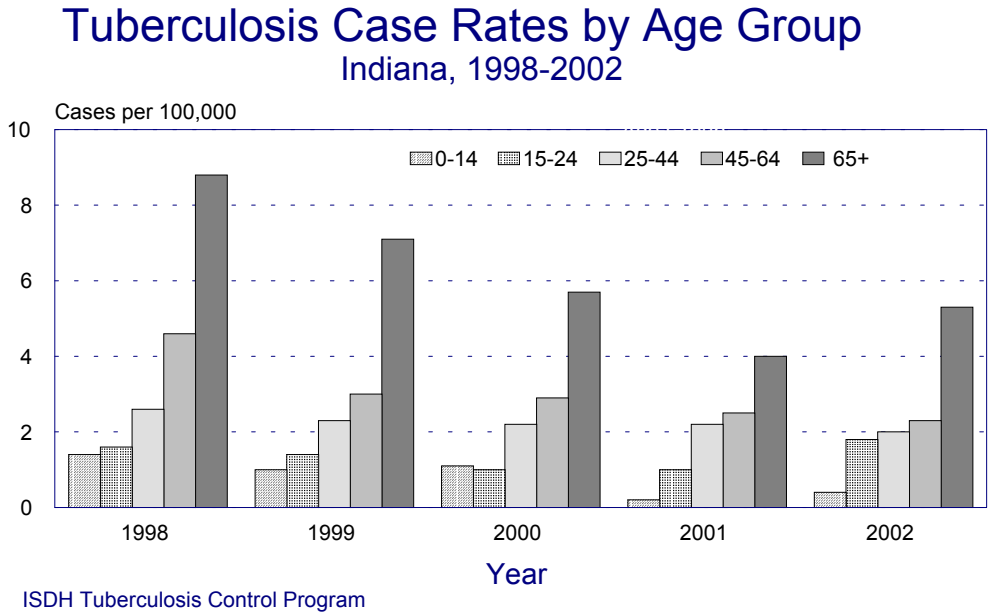
The over-65 age group made up the largest percentage of TB cases. Case rates by age group are shown in figure 7. In 2002, 31.3% of the cases occurred in those who were over age 65, with a case rate of 5.3 per 100,000; 24.2% were age 45-64 with a case rate of 2.3. The age group of 25-44 made up 28.1% of all cases and had a case rate of 2.0. The 15-24 age group made up 12.5% of all cases, with a case rate of 1.8, while 3.9% were under the age of 14 for a case rate of 0.4.

Figure 7.



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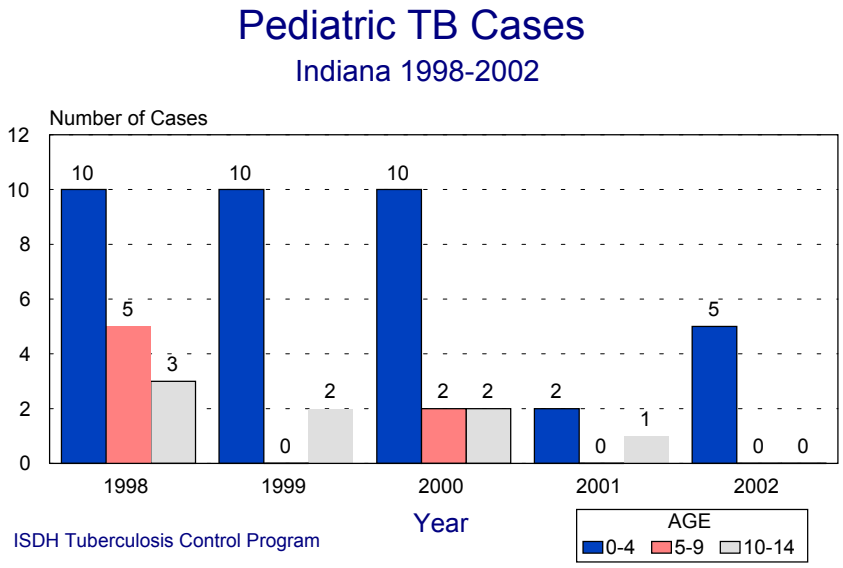
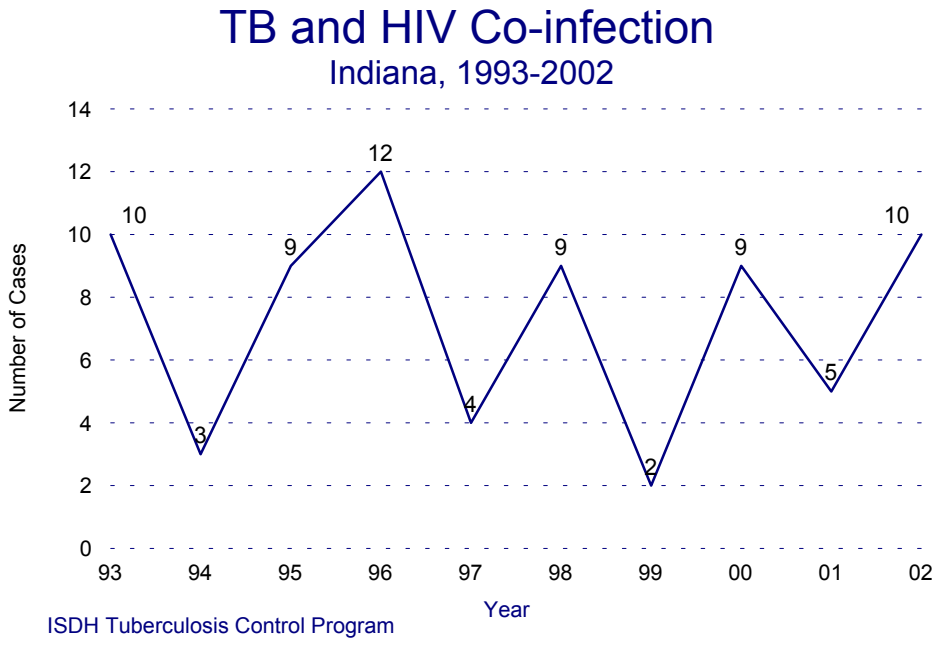
Five children under the age of 15 were diagnosed in 2002 (Figure 8). All were ≤ 4 years of age. TB in young children represents recent transmission, usually from an adult household contact.

Figure 8.



HIV disease is the most significant risk factor for progression to active disease. In 2002, there were ten individuals diagnosed with both TB and HIV (Figure 9). HIV status was known for 48.4% of the cases. HIV testing was not offered for 38.3% of the patients, while 13.3% refused to be tested. Current guidelines recommend HIV counseling and testing for all patients with TB.

Figure 9.



Other risk factors associated with TB exposure or progression to active disease are excess alcohol use, homelessness, illicit drug use (injecting and non-injecting), residence or employment in a high-risk congregate setting, or employment as a health care worker (HCW) serving high-risk clients. The numbers of persons reported with these risk factors are shown in Table 1.

Table 1.
Number of Reported Tuberculosis Cases
with Selected Exposure and Medical Risk Factors, 2002 (n=128)

Risk Factor	Number of Cases	Percent
Excess alcohol use	24	19
Injection drug use	5	4
Non-injection drug use	9	7
Homelessness	7	5
LTC resident	4	3
Health care worker	3	2
Prison/Jail employee	0	N/A
Prison inmate	0	N/A

Occupation is another variable used to detect trends. These data are shown in table 2. The "not employed" category includes retired persons, children, and students.

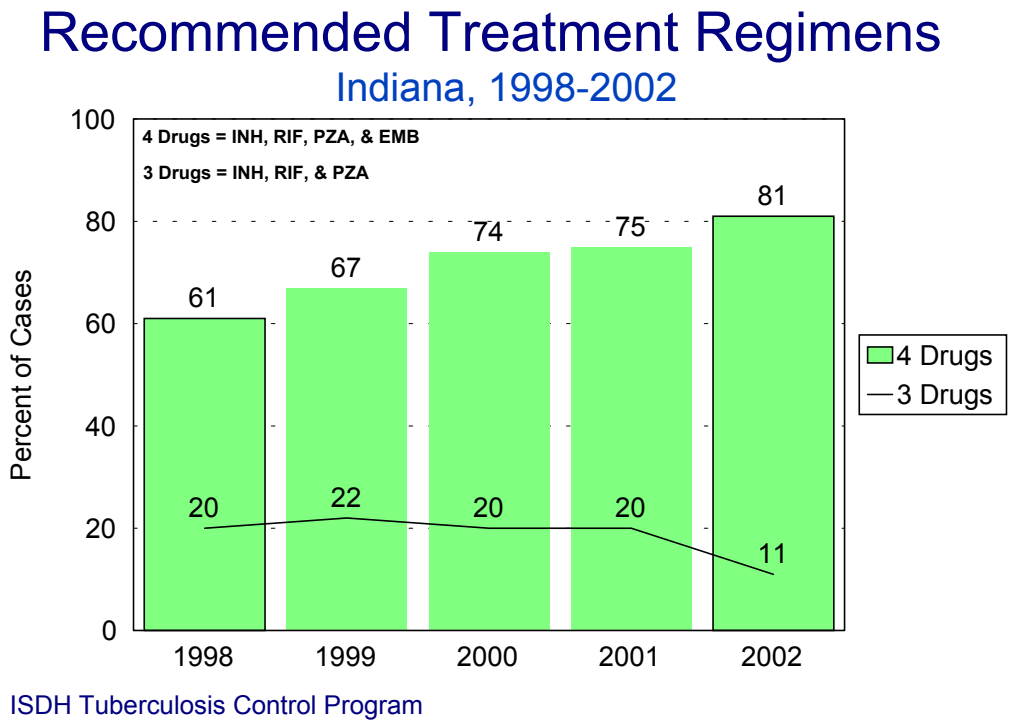
Table 2.
Number of Reported Tuberculosis Cases
by Selected Occupations, 2002 (n=128)

Occupation	Number of Cases	Percent
Not employed in the last 2 years	74	58
Other occupations	51	40
Migrant agricultural worker	0	N/A
Health care worker	3	2
Corrections worker	0	N/A
Unknown	0	N/A

Of the 128 cases reported in 2002, 69% (88/128) were exclusively pulmonary. Another 5% (6/128) were both pulmonary and extra-pulmonary. Pulmonary cases are the main public health concern because these individuals transmit the disease to others. To break this cycle of transmission, appropriate therapy must be initiated and continued for the duration of the treatment period. ISDH recommends and supports the treatment guidelines set by the American Thoracic Society and the Centers for Disease Control and Prevention (ATS/CDC). Since 1991, these guidelines have recommended that four drugs be used in the initial regimen. Figure 10 shows the impact of those guidelines on the prescribing practices of physicians.

In 2002, 81% (104/128) of all patients began therapy on the preferred regimen containing isoniazid (INH), rifampin (RIF), and pyrazinamide (PZA), with ethambutol (EMB) included until drug susceptibility results were available. The percentage of patients who were started on INH, RIF, and PZA was 11% (14/128).

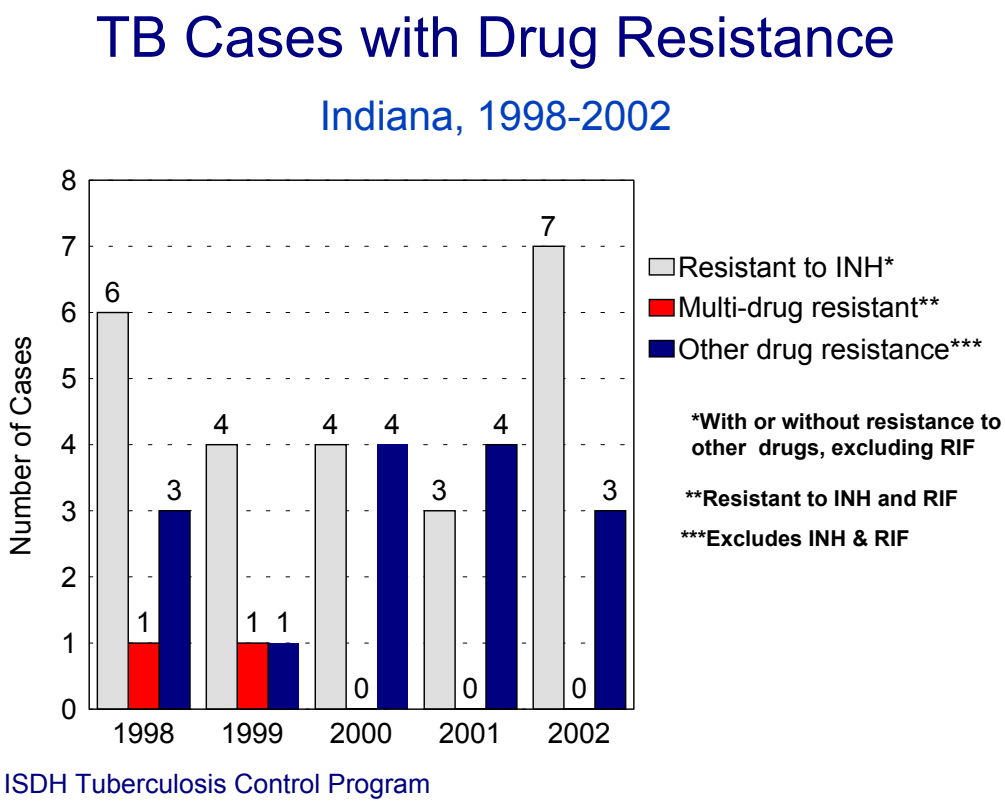
Figure 10.



Drug susceptibility testing was performed on all 116 culture-positive isolates. Of these, 6% (7/116) 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 6-9 months to 18-24 months. There were no cases of MDR-TB reported for 2002.

INH-resistant TB is curable with the remaining three first-line drugs. Close and careful monitoring of these patients is necessary to prevent additional drug resistance. The number of drug resistant cases is shown in Figure 11.

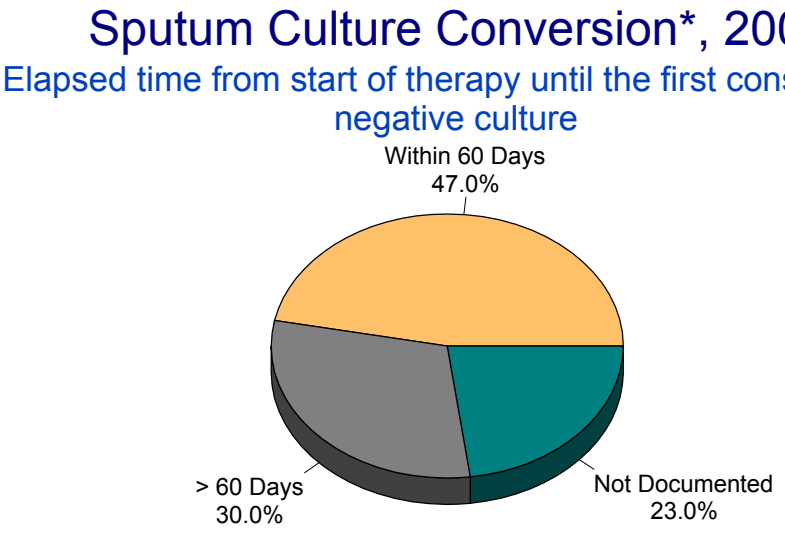
Figure 11.



Besides drug resistance, inadequate response to therapy and non-compliance are 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 will 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 within 60 days is shown in Figure 12.

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 anti-TB medications. Cohort year 2001 is the most recent period with complete DOT data (Figure 13).

Figure 12.



*sputum culture-positive patients alive at the time of diagnosis who began treatment;

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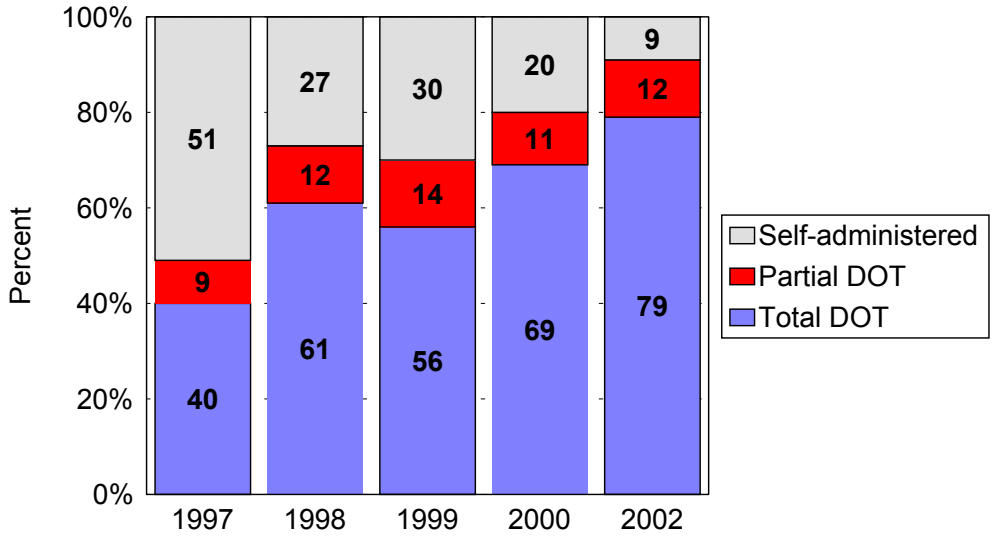
Figure 13.



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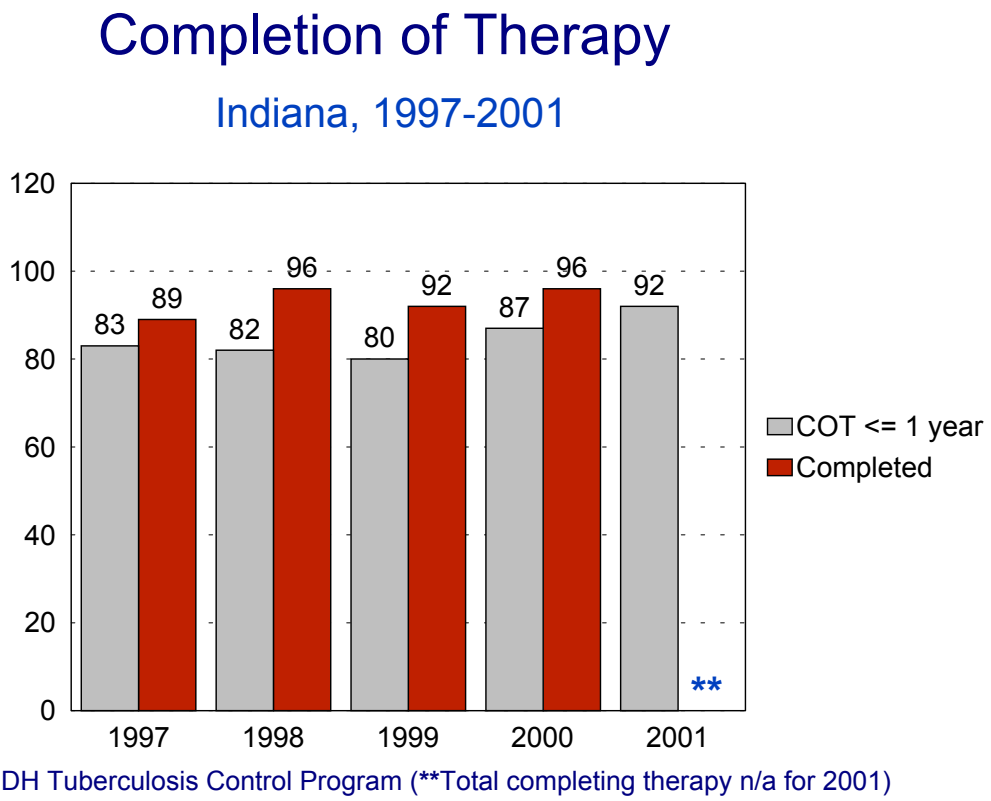
The first priority of TB elimination efforts is to ensure completion of therapy. Indiana's goal is to have at least 90% of all patients complete treatment within one year. The completion of therapy index is based on the number of patients for whom treatment for one year or less is indicated. Exclusions 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 2001. The completion rate for that year was 92%, as shown in Figure 14. Data are not currently available for those who took longer than one year to finish treatment, due to (1) disease relapses occurring less than one year after being discharged from medical supervision; (2) treatment failure; (3) medical complications with chemotherapy; and (4) non-compliance.

Figure 14.



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.

INH 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 if nine months of treatment is not possible. RIF for 4 months and RIF and PZA for two months are alternate regimens. RIF/PZA regimens should be used with caution and only in circumstances where the preferred regimen is not feasible. The most recent year with final completion of treatment data for infected contacts is for cohort year 2000, and is shown in figure 15.

Figure 15.

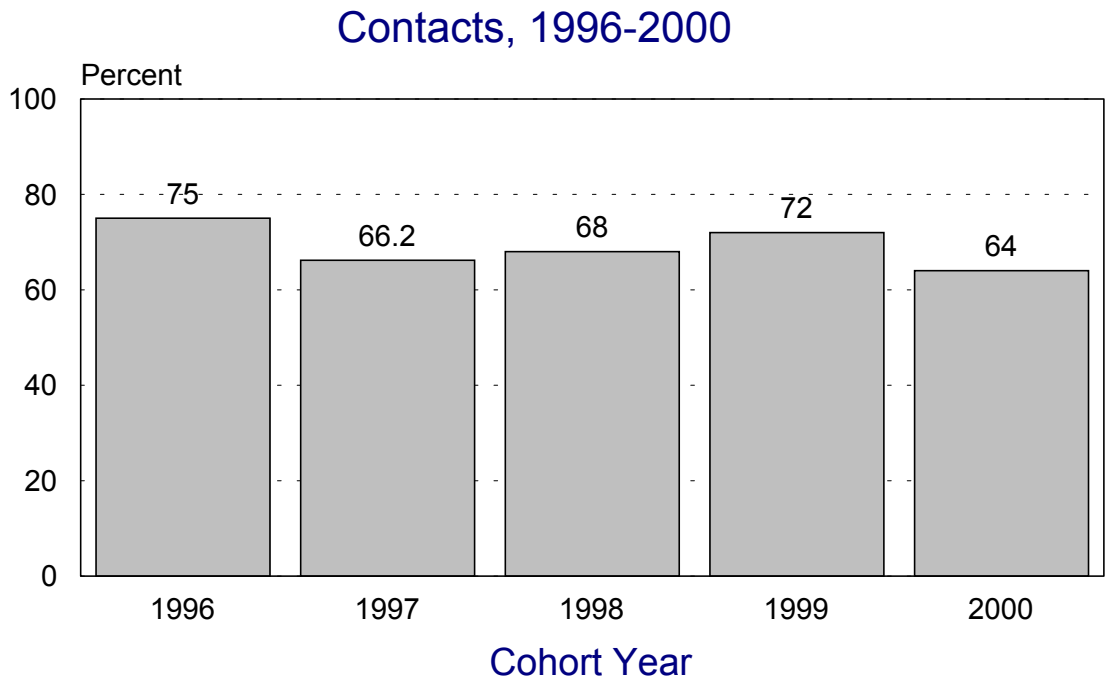


Figure 16 shows the counties that reported 5 or more cases of TB in 2002. The total number for the state is based on persons who had an Indiana address at the time of diagnosis and who were verified as having TB disease in 2002. Persons counted in another state and immigrants and refugees who are diagnosed and begin treatment abroad are excluded. Foreign visitors (i.e., students, tourists, etc.) 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 2002.

Figure 16.

Counties with 5 or more verified cases of TB in 2002

State = 128

Case Rate = 2.1/100,000

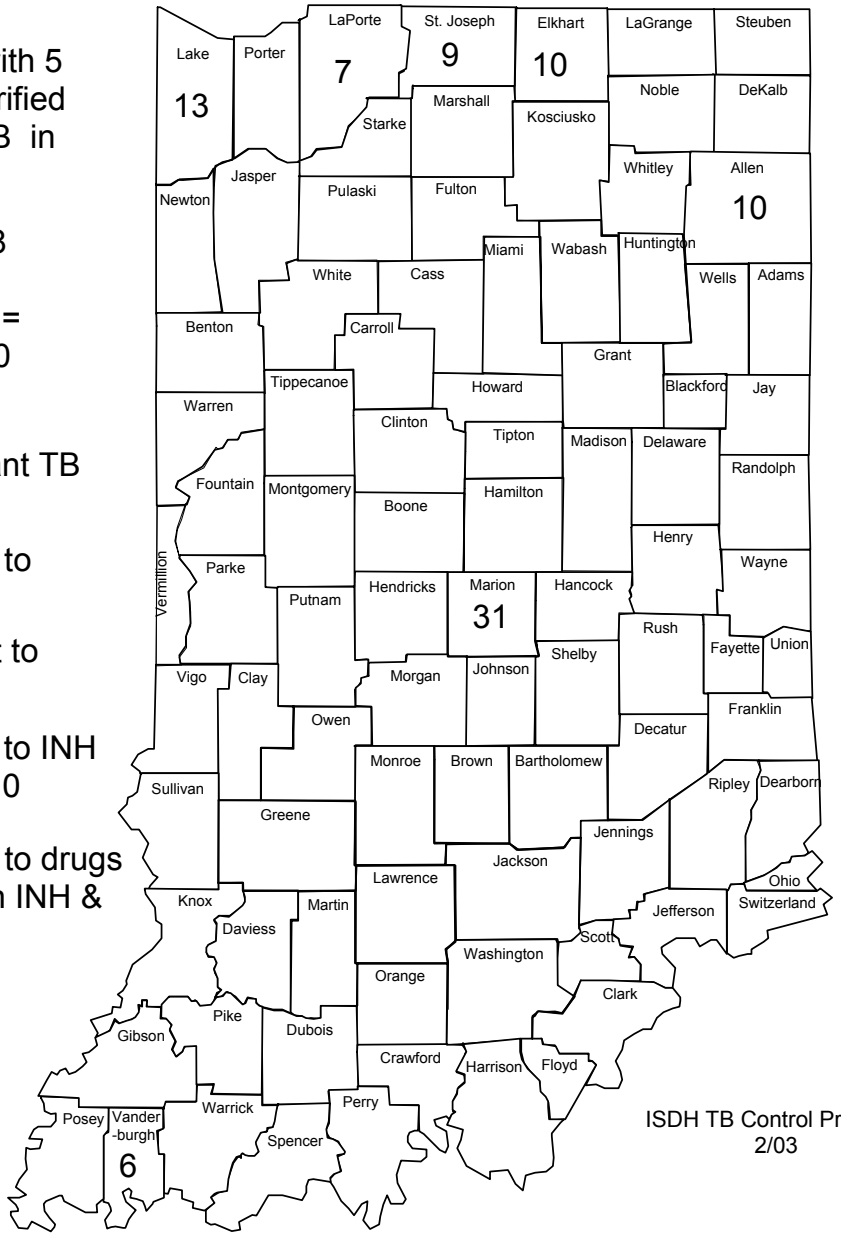
Drug-resistant TB Cases:

Resistant to INH= 7

Resistant to RIF=0

Resistant to INH and RIF= 0

Resistant to drugs other than INH & RIF = 3



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