

INDIANA TUBERCULOSIS CONTROL PROGRAM 2011 ANNUAL REPORT



Mycobacterium tuberculosis
<http://www.lookfordiagnosis.com>

Glossary

Case fatality rate: the ratio of the number of deaths caused by a specified disease to the number of diagnosed cases of that disease.

Clinical case confirmation: A clinical diagnosis is confirmed when **all** of the following criteria are met upon medical evaluation: (1) a positive tuberculin skin test (TST) or interferon-gamma release assay (IGRA), (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.

Cluster: a group of patients with LTBI or TB that is linked by epidemiologic, location or genotyping data. A genotyping cluster is two or more cases with isolates that have an identical genotyping pattern.

Comorbid: the coexistence of two or more disease processes.

Culture: Growth of microorganisms in the laboratory performed for detection and identification in sputum or other body fluids and tissues.

Culture conversion: wherein sputum culture-positive results convert to sputum culture-negative.

Directly observed therapy (DOT): adherence-enhancing strategy in which a health care worker or other trained person watches a patient swallow each dose of medication. DOT is the standard care for all patients with TB disease and is a preferred option for patients treated for LTBI.

Endemic: present in a community at all times but in relatively low frequency.

Extrapulmonary TB: TB disease in any part of the body other than the lungs. The presence of extrapulmonary disease does not exclude pulmonary TB disease.

Genotype: the DNA pattern of *Mycobacterium tuberculosis* used to discriminate different strains.

Hemoptysis: the coughing up of blood or bloody sputum from the lungs or airway.

Immunocompetent: Capable of developing an immune response; possessing a normal immune system.

Incidence: the extent or rate of occurrence, especially the number of new cases of a disease in a population over a period of time.

Isolate: a population of microorganisms that has been obtained in pure culture.

Laboratory case confirmation: laboratory diagnosis is confirmed when: (1) *M. tuberculosis* complex has been 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).

Latent tuberculosis infection (LTBI): infection with *M. tuberculosis* in which symptoms or signs of disease have not manifested.

Lost to follow-up: patients who at one point in time were actively participating in treatment but have become lost (either by error in a computer tracking system or by being unreachable) at the point of follow-up. These patients can become lost for many reasons: without properly informing the healthcare provider, they may have opted to withdraw from treatment; they may have moved away from the healthcare provider, or become ill and unable to communicate or are deceased.

Miliary TB: a serious form of TB disease sometimes referred to as disseminated TB. A dangerous and difficult form to diagnose of rapidly progressing TB disease that extends throughout the body. Uniformly fatal if untreated; in certain instances it is diagnosed too late to save a life.

Mycobacterium bovis: see *Mycobacterium tuberculosis*.

Mycobacterium tuberculosis: the namesake member organism of the *M. tuberculosis* complex and the most common causative agent of TB disease in humans. In certain instances, the species name refers to the entire *M. tuberculosis* complex, which includes *M. bovis* and *M. africanus*, *M. microti*, *M. canettii*, *M. caprae*, and *M. pinnipedii*.

Multi-drug resistance: strains of *M. tuberculosis* that are resistant to at least isoniazid and rifampin.

Outbreak: unusually high occurrence of a disease or illness in a population or area. Three or more cases are required for an occurrence of tuberculosis to be classified as an outbreak.

Pulmonary TB: TB disease that occurs in the lungs.

Provider diagnosis case confirmation: in which a case does not meet criteria for laboratory nor clinical confirmation but the TB Program counts as a TB case based upon physician assessment and as determined by TB Medical Consultant and TB Controller.

Resistance: the ability of certain strains of mycobacteria, including *M. tuberculosis*, to grow and multiply in the presence of drugs that ordinarily kill or suppress them. Such strains are referred to as drug-resistant strains and cause drug resistant-TB disease.

Sputum: mucus containing secretions coughed up from inside the lungs. Sputum is different from saliva or nasal secretions, which are unsatisfactory for detecting TB disease.

EXECUTIVE SUMMARY

The mission of the Indiana State Department of Health's Tuberculosis and Refugee Health Division is to decrease tuberculosis incidence within the state of Indiana and to progress towards its elimination by providing technical assistance and support, education, policy development and surveillance in collaboration with local health departments, medical providers and the Centers for Disease Control and Prevention (CDC) in the care of those infected and affected by tuberculosis.

Our vision is that by 2015 the incidence rate of tuberculosis among U.S.-born residents of Indiana will not exceed 0.5 per 100,000 as the result of the initiative and collaboration of all local health departments, health care providers, and the CDC.

During 2011, there were 100 new cases of tuberculosis (TB) reported to the Indiana State Department of Health – this represents an 11% increase from the previous year. However, TB cases have declined from 1,883 reported in 1956 to an all-time low of 90 cases reported in 2010 (see Figures 1a and 1b). In 2011, TB cases were reported by over one third of Indiana's 92 counties (n=34). Indiana's three most populous counties (Marion, Lake, and Allen) accounted for nearly half (n=44, 44%) of all new cases. Marion County's reported cases decreased in 2011 to 30 cases vs. 34 cases in 2010; Lake County reported 11 TB cases in 2011 vs. four in 2010; Allen County's caseload was reduced to three reported cases in 2011 vs. six in 2010. Marion and Lake Counties exhibited higher incidence rates than the overall statewide rate (1.5 per 100,000): Lake County, 2.2 per 100,000; Marion County, 3.3 per 100,000.

High risk populations for TB infection include children and persons with HIV comorbidity. Pediatric cases decreased from nine in 2010 to seven in 2011 (Figure 6); six cases in 2010 and 2011 reported HIV as a comorbid condition.

Since TB is endemic in other parts of the world, being born outside the US is a risk factor for acquiring TB infection. In fact, 60% of all TB cases in the US in 2010 occurred among people born in other countries¹ but in Indiana individuals born in the United States continue to make up a higher percentage of TB cases (n=57, 57% US born vs. n=43, 43% foreign-born) (Figure 10). Of those non-U.S. born cases, nearly 20% (n=8, 18.6%) were born in India (Figure 11). The highest incidence (21.5 per 100,000) of tuberculosis cases occurred among Indiana's population of Asian descent; the lowest incidence occurred among those who identified as White (1.0 per 100,000).

Overall, resistance to TB drugs was more common in 2011 (Figure 19): six cases were resistant to isoniazid (three cases in 2010), nine cases were resistant to drugs other than isoniazid or rifampin (six in 2010) and two cases were multi-drug resistant in 2011 (zero in 2010).

Thirteen new genotype clusters were confirmed in 2011. Indiana had only one TB outbreak in 2011 along with the ongoing outbreak among the homeless population (genotype cluster IN_0074). This cluster includes 21 cases, two of which were added in 2011. The two main epidemiological links to IN_0074 are chronic homelessness and residence in Marion County, Indiana.

SUMMARY STATISTICS

Table 1

	Indiana	United States (2010)
Number of tuberculosis cases	100	11,182
Tuberculosis deaths (per 100,000)	0.1	0.2 (2009)
Laboratory case confirmation	77%	75%
Site of disease: pulmonary	76%	78%
Incidence rate (per 100,000)	1.5	3.6
US-born	0.8	1.6
Foreign-born	15.1	18.1
White	1.0	2.0
Black	4.1	6.8
Asian	21.5	22.2
Hispanic/Latino (all races)	3.8	6.5
Male	1.7	61405.1
Female	1.4	38594.9
Correctional facility resident *	4.0%	4.7%
Long-term care facility resident *	3.0%	2.6%
Excess alcohol use **	16.0%	12.5%
Injecting drug use **	5.0%	1.6%
Non-injecting drug use **	11.0%	7.0%
Homeless **	9.0%	5.6%
Known HIV test results 25-44 y/o	76%	73%
HIV positive	6%	9%
Isoniazid resistance	6.0%	8.3%
Multi-drug resistance	2.0%	1.3%
Initial drug regimen I, R, Z, E ***	84%	84.2%
Directly observed therapy	80% (2010)	56.5% (2008)
Therapy completed	96% (2010)	92.7% (2008)
Therapy completed ≤ 1 year	97% (2010)	84.6% (2008)
Therapy stopped: adverse event	1% (2010)	0%
Therapy stopped: moved	0%	2.3% (2008)
Therapy stopped: lost	1%	2.5% (2008)
Therapy stopped: refused	2.5%	0.6% (2008)
Therapy stopped: died	1%	6.7% (2008)

* at time of diagnosis

** within the past year

*** I = isoniazid, R = rifampin, Z = pyrazinamide, E = ethambutol

Population data derived from 2010 US census data, except where noted²

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Tuberculosis is an airborne disease caused by a group of bacteria that is collectively referred to as the *Mycobacterium tuberculosis* (MTB) complex. General symptoms may include a prolonged productive cough, blood-tinged sputum, night sweats, fever, fatigue and weight loss. TB usually affects the lungs (pulmonary TB) but can also affect other parts of the body such as the brain, kidneys or spine (extrapulmonary TB). TB bacteria are aerosolized when a person who has pulmonary TB or TB affecting the larynx coughs, sneezes, laughs, or sings; another person may become infected if he 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. Latent infection may progress to a case of active tuberculosis infection; approximately 10% of immunocompetent individuals with latent infection will progress to active disease during their lifetime.

The introduction of anti-TB chemotherapy has led to a long-term decline in the number of new cases (see Figures 1a and 1b) as well as a reduction in the TB case fatality rate. Indiana's case fatality rate since 2007 is shown in Figure 2.

Figure 1a

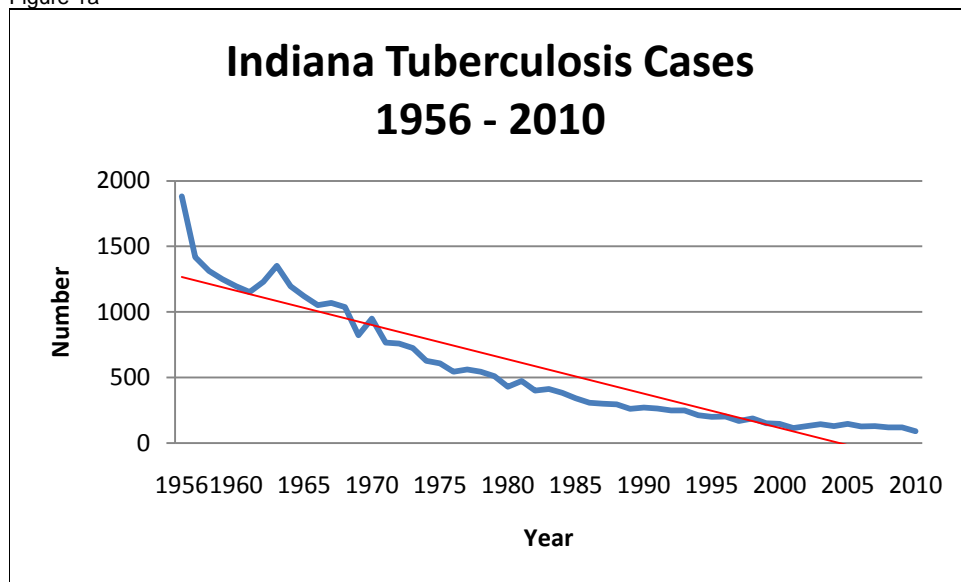


Figure 1b

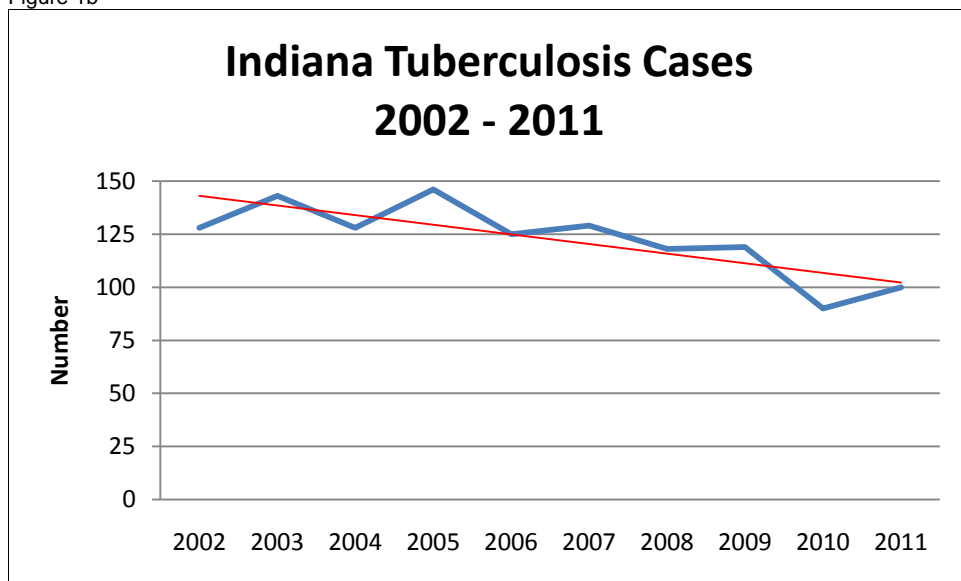
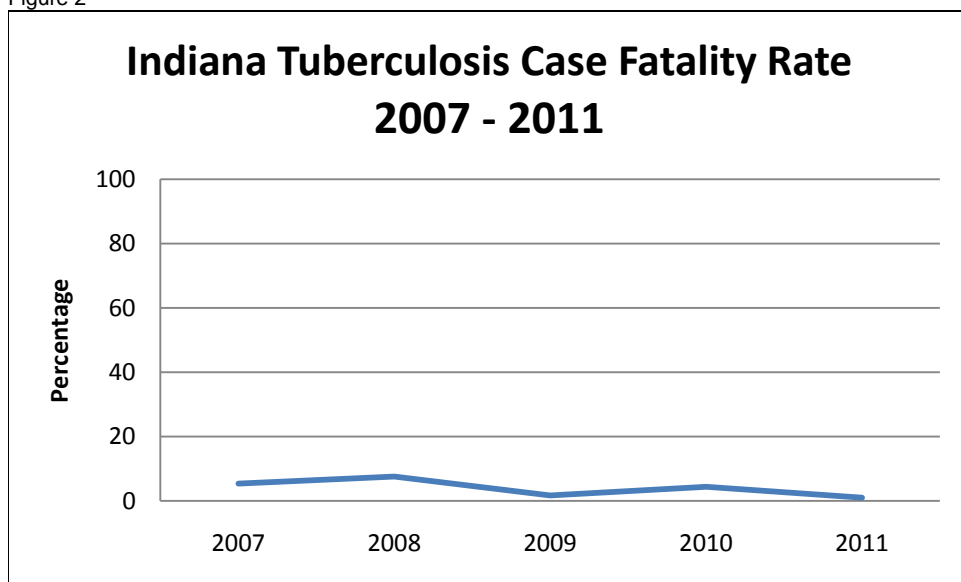


Figure 2

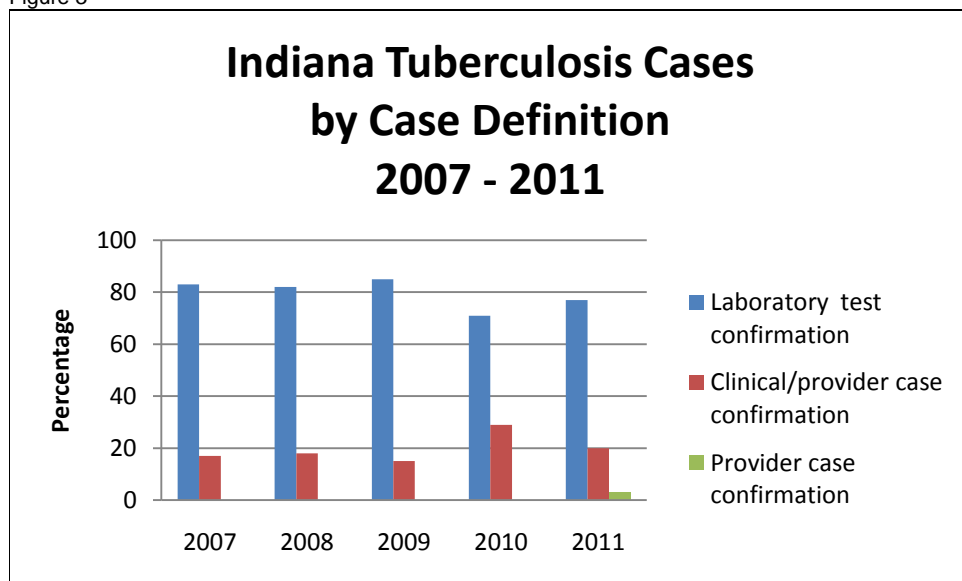


A diagnosis of TB is verified using the CDC's "Case Definitions for Infectious Conditions under Public Health Surveillance" publication. TB cases must meet the case definition for a laboratory, clinical, or provider diagnosis. A laboratory diagnosis is confirmed when: (1) *M. tuberculosis* complex has been 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 upon medical evaluation: (1) a positive tuberculin skin test (TST) or interferon-gamma release assay (IGRA),

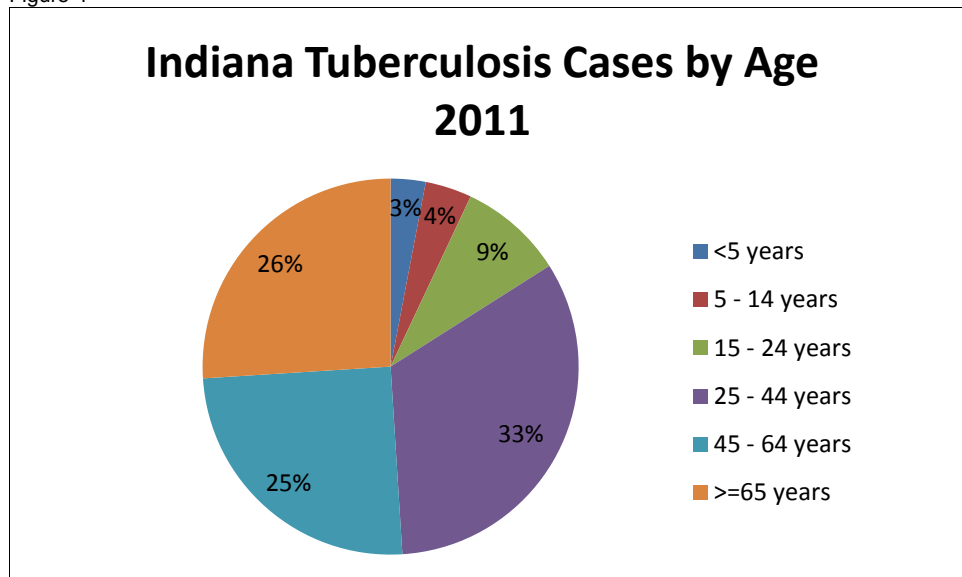
(2) signs and symptoms compatible with current TB disease (e.g., an abnormal, unstable chest x-ray) or clinical evidence of current disease (e.g., cough, night sweats, weight loss, hemoptysis), and (3) current treatment with two or more anti-TB drugs. This category includes cases of culture-negative pulmonary TB, extrapulmonary TB in which cultures did not grow or were not obtained, and in pediatric cases for whom obtaining specimens is difficult and invasive procedures are not warranted. Laboratory verification of case status in 2010 accounted for 71% of cases but has risen to 77% (n=77) in 2011 (see Figure 3). The third manner in which a TB case may be diagnosed is by provider diagnosis in which a medical provider diagnoses the case as TB based upon his evaluation. (NOTE: provider case confirmation was not calculated as separate category until 2011.)

Figure 3



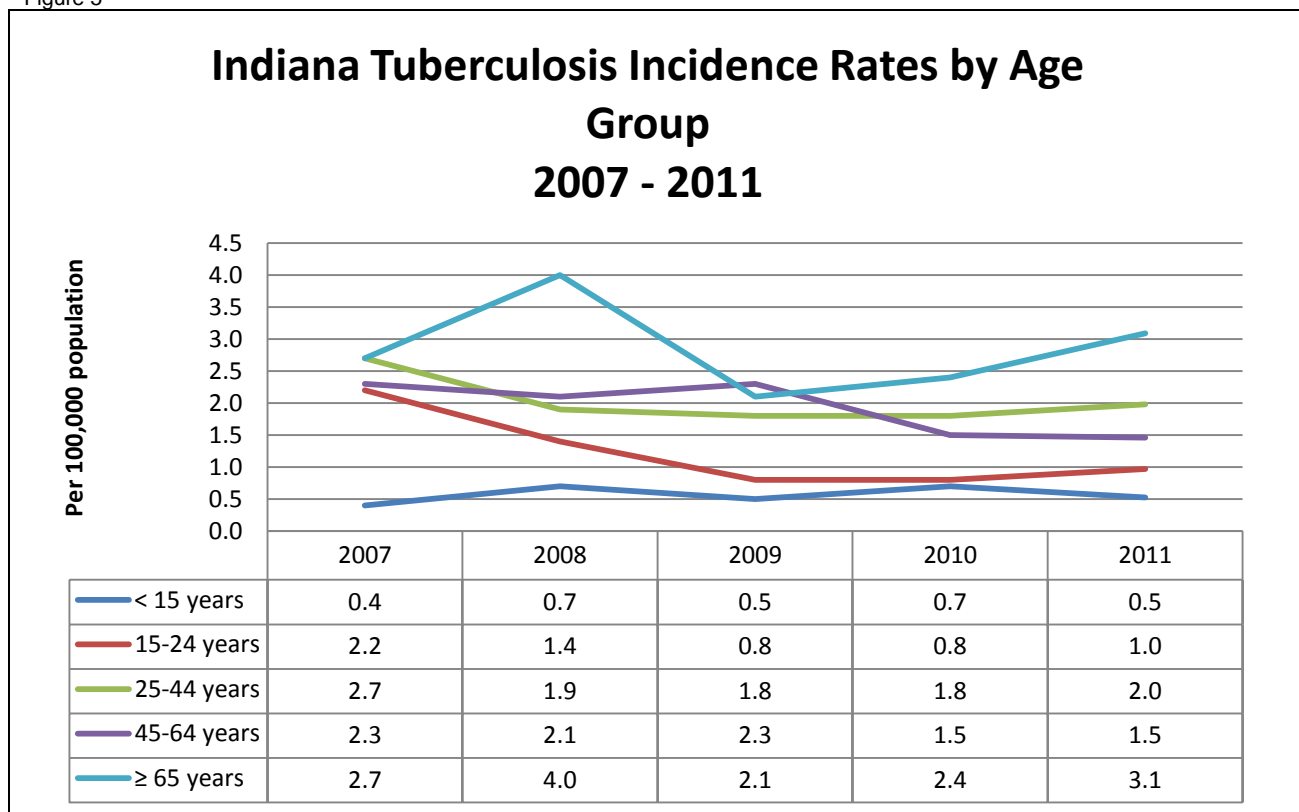
In 2011, over three quarters of diagnosed TB cases were adults aged 25 years to 65 years or greater (n=84, 84%) (Figure 4).

Figure 4



Age disparity is evident in the ≥ 65 year age group for 2011: 26% (n=26) of TB cases were reported in this age group, yet this group makes up only 13% of Indiana's total population. In 2011, the incidence of tuberculosis decreased for the <15 years age group (0.5 per 100,000), remained constant for the 45 – 64 years age group (1.5 per 100,000), and increased for the 15 – 24 years age group (1.0 per 100,000) and for the >65 years age group (3.1 per 100,000). Figure 5 illustrates age group incidence trends for 2007 – 2011.

Figure 5

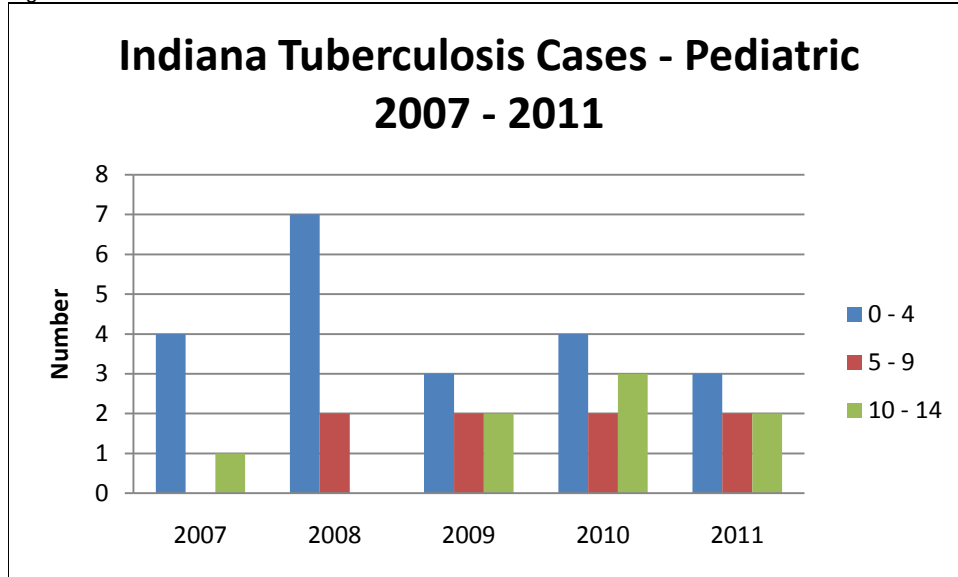


The number of pediatric tuberculosis cases in Indiana decreased for the 0 – 4 (n=3) and 10 – 14 (n=2) age groups and remained constant for the 5 – 9 (n=2) age group (see Figure 6). The incidence rate for pediatric TB cases <5 years of age was 0.69 per 100,000 which meets Indiana's 2011 goal of 1.5 per 100,000 cases. Pediatric cases provide important information regarding ongoing transmission in a community because TB infection in children indicates that (1) TB was transmitted relatively recently, (2) the person who transmitted TB to the child may still be infectious, (3) other people in the household or community have likely been exposed to TB and could develop TB disease.



http://www.doctorswithoutborders.org/images/2011/47354_kenya.jpg

Figure 6



The distribution of TB among White, Black, and Asian peoples of Indiana also illustrates racial disparity. Fifty-four percent ((n=54, 54%) of the TB disease burden in 2011 was borne by White-identified persons yet census data show that 84% of the Hoosier population is White; Indiana's Black population is 9% but Black persons accounted for 24% (n=24) of TB disease. The most serious disparity is seen among Asian peoples of Indiana who bore 22% (n=22) of the TB disease burden yet account for only 2% of the overall Hoosier population (see Figure 7); all of the Asian cases were born outside the US. In terms of objectives established for 2011, the incidence rate for Black people was 4.1 per 100,000 which exceeds the 3.5 per 100,000 goal. (NOTE: Although American Indian/Alaska Native and Hawaiian Native/Other Pacific Islander are racial categories which are collected by the CDC and by Indiana TB Control Programs, in 2011 no TB case was classified in either of these categories.)

Figure 7

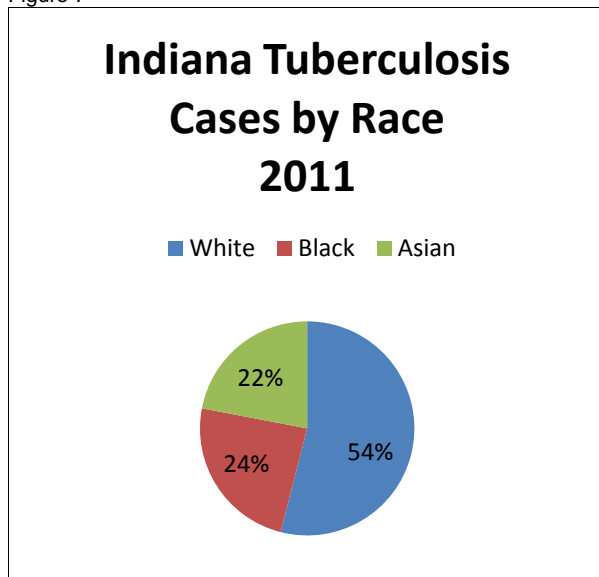
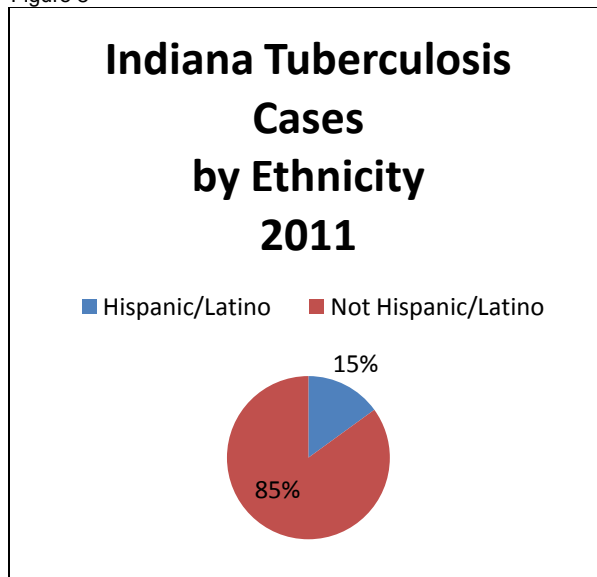


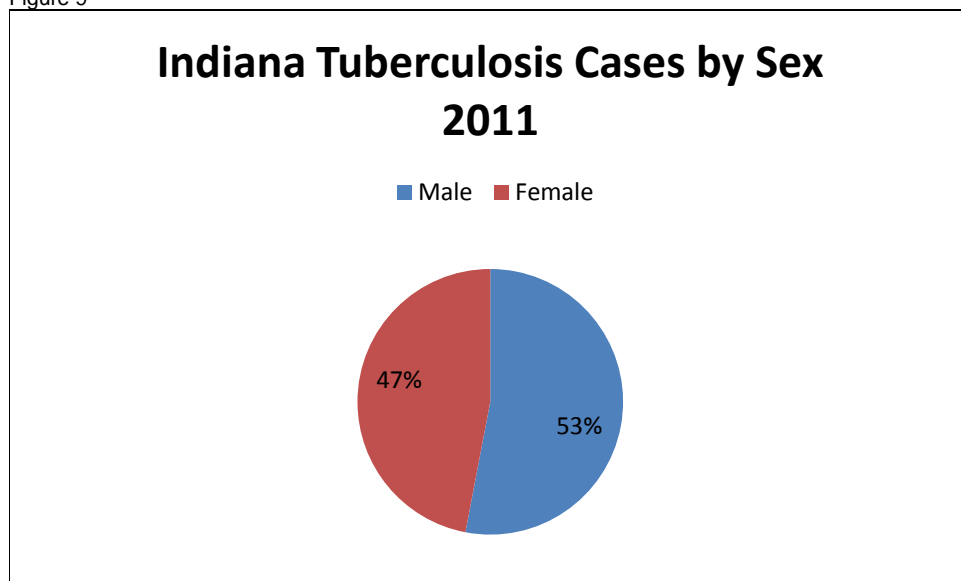
Figure 8



Disparity is also found in Indiana's Hispanic/Latino population. Although 6% of Indiana's population identifies as Hispanic/Latino, 15% (n=15) of 2011's cases were of Hispanic/Latino ethnicity (see Figure 8). Of the 15 Hispanic/Latino individuals, 40% (n=6) were US born.

Tuberculosis cases in Indiana in 2011 were split nearly evenly between males (n=53, 53%) and females (n=47, 47%) (see Figure 9).

Figure 9

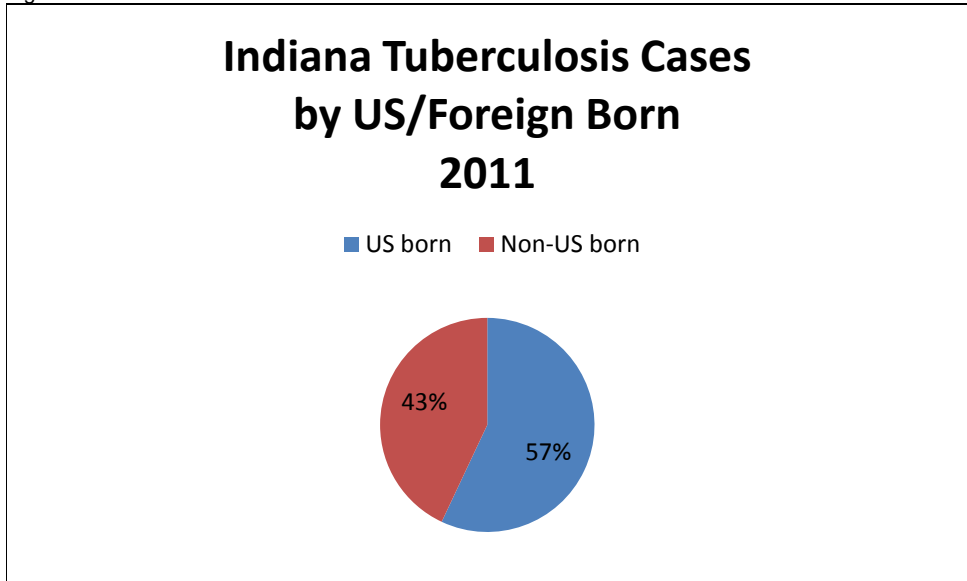


U.S. born TB cases continue to outnumber foreign born cases in Indiana (see Figure 10) yet the incidence rate for foreign born persons (15.1 per 100,000) is nearly 20 times as high as for those born in the US (0.8 per 100,000). For 2011, Indiana's incidence rate goal for US- born individuals was 1.0 per 100,000 and 18.5 per 100,000 for foreign-born individuals. The actual incidence rates for 2011 are 0.8 per 100,000 for US-born and 15.1 for foreign-born people.



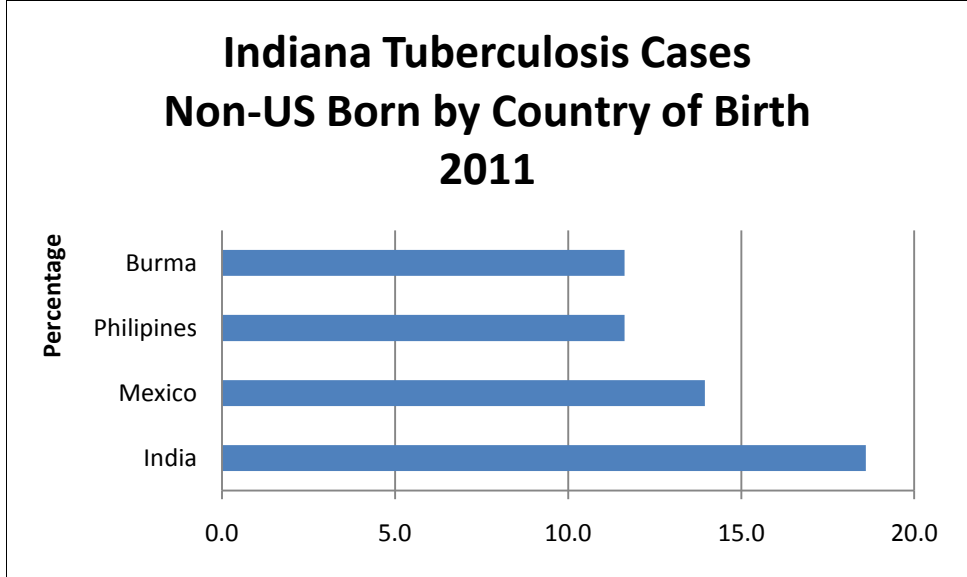
<http://www.nlm.nih.gov/exhibition/visualculture/tuberculosis.html>

Figure 10



Of the 2011 TB cases born outside the US, 18.6% (n=8) were from India. The countries with the highest percentages of 2011 TB cases are illustrated in Figure 11. (Note: only countries of origin with ≥5 cases are included in this analysis; 18 other countries of origin made up the TB disease burden for non-US born persons.)

Figure 11



Distribution of TB cases by age group and US vs. foreign birth for 2011 is shown in Figure 12. TB disease was more common among US-born persons in the pediatric age group (<15 years) and in the older age groups (≥45 years). In the young adult (15 – 24 years) age group, 100% (n=9) of the cases were foreign-born and nearly 60% (n=19, 58%) of the 25 – 44 years old cases were foreign-born.

Figure 12

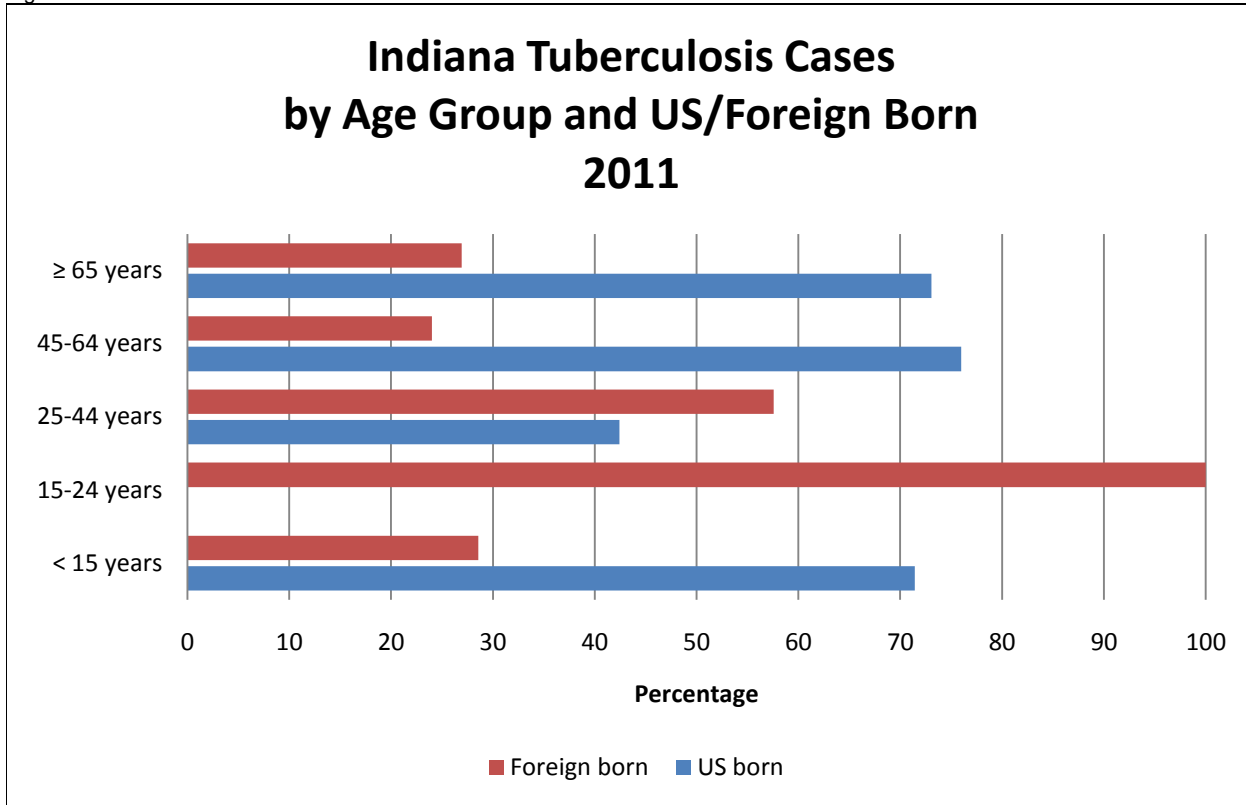
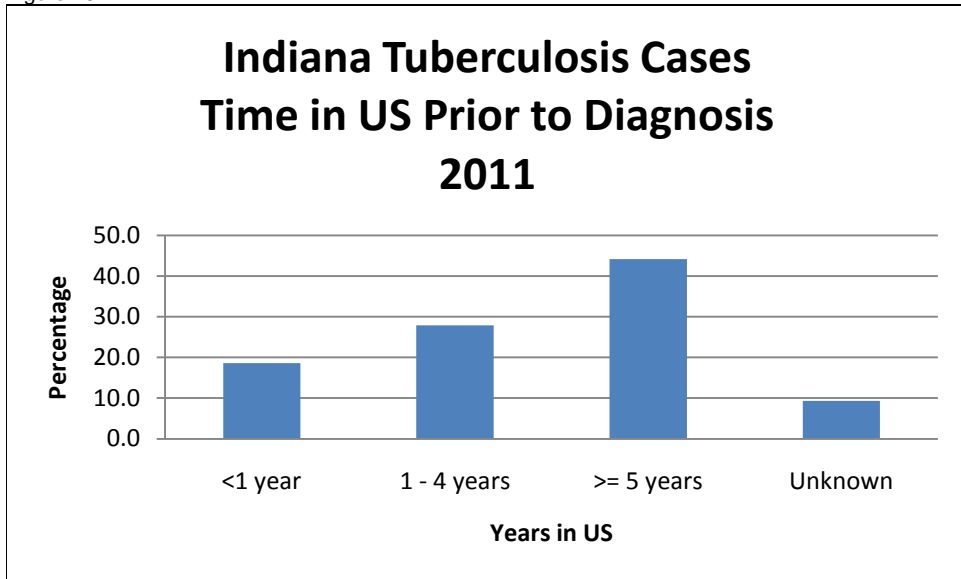


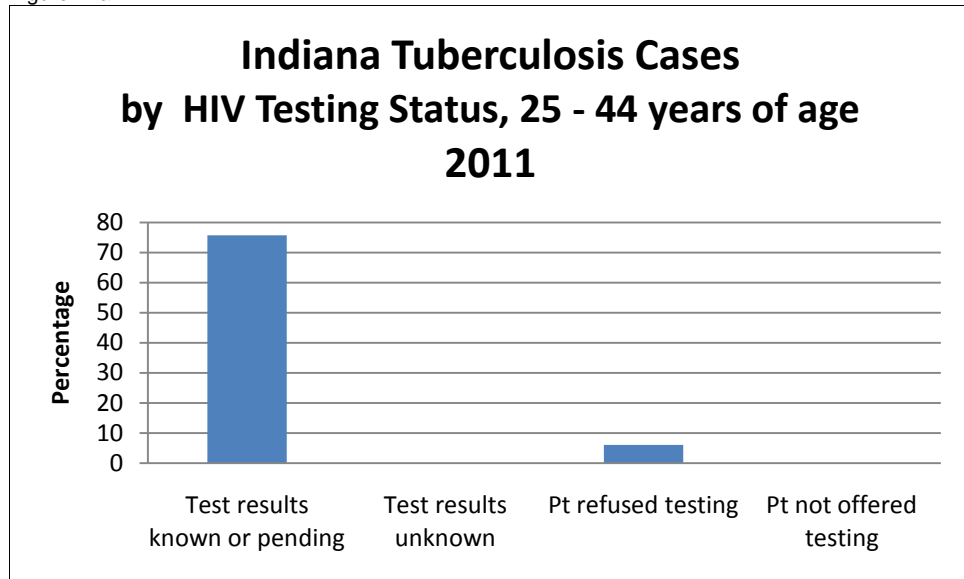
Figure 13 represents the length of time foreign-born persons were living in the U.S. prior to TB diagnosis.

Figure 13



HIV status variables are shown in Figure 14a and 14b for the 25 – 44 years age group and for all TB cases greater than 15 years of age for 2011. Indiana’s target for 2011 was 68.5% for “known HIV status”; this goal was achieved for both groups (n=25, 76% for the 25 – 44 year olds, n=68, 73% for all of those over age 15). For the 25 – 44 year age group, known HIV status decreased from 2010 by nearly 10% (2010, 84%; 2011, 76%). The percentage of patients who refused testing decreased from 9% in 2010 to 6% (n=2) in 2011; the proportion of those not offered testing dropped to 0% in 2011 vs. 6% in 2010.

Figure 14a

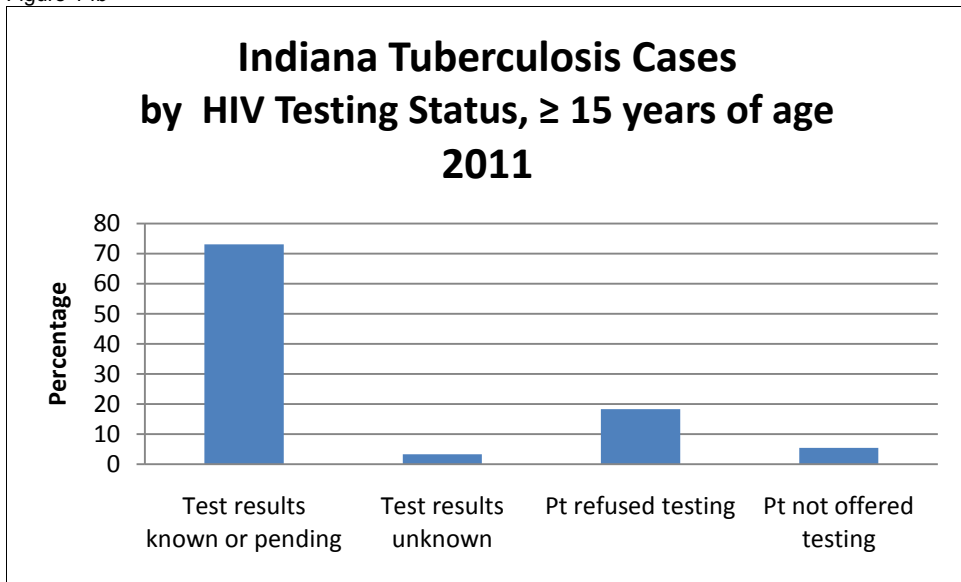


<http://pakmed.net/college/forum/?p=36060>

The proportion of known HIV status for all cases greater than 15 years of age remained static at 73% for 2010 and 2011 while the percentage of those who refused testing tripled – from 6% in

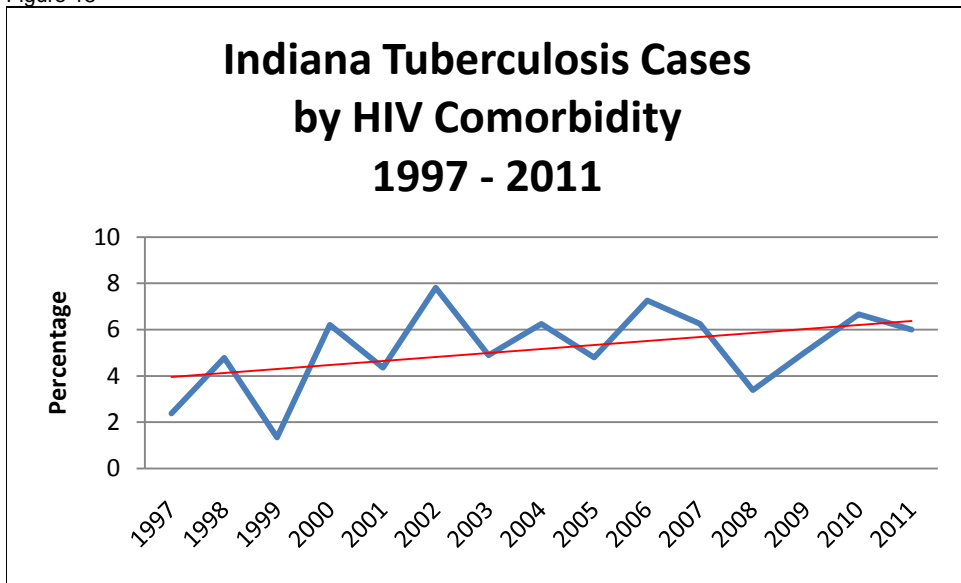
2010 to 18% (n=17) in 2011. The proportion for patients not offered testing decreased dramatically from 21% in 2010 to 5% (n=5) in 2011. Unknown HIV testing results represented 0% of the 25 – 44 year age group; the proportion for the over 15 age group was 3% (n=3) (this variable was not reported in 2010).

Figure 14b



The percentage of people infected simultaneously with TB and HIV has remained under 10% of TB cases from 1997 – 2011 (see Figure 15). Comorbid TB infection and HIV infection is an AIDS-defining condition³. Even though TB is one of the leading causes of death for those infected with HIV, TB can be effectively treated even if HIV infection is present⁴.

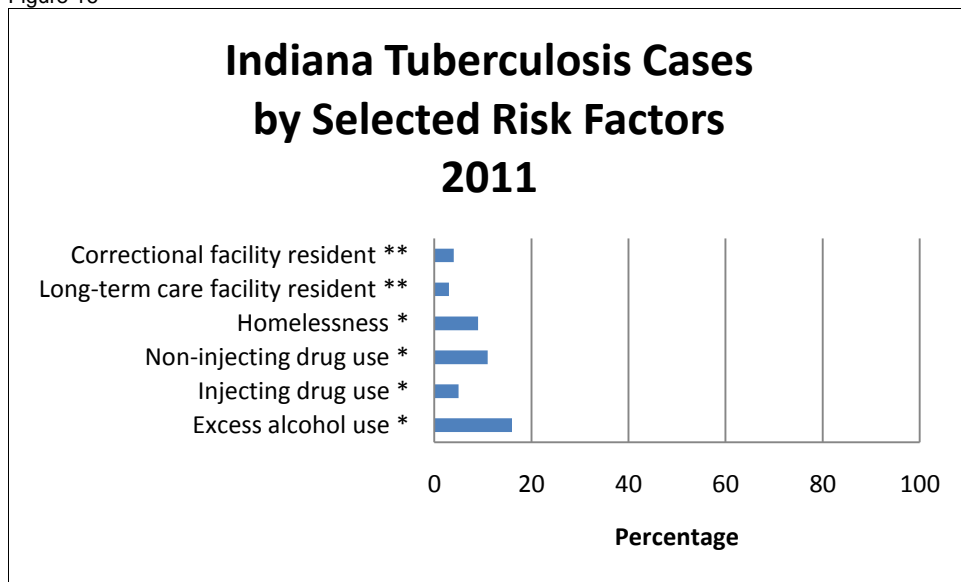
Figure 15



Other risk factors for progression to active disease include excessive use of alcohol, illicit drug use (injection and non-injection), homelessness, and residence in a high-risk congregate setting

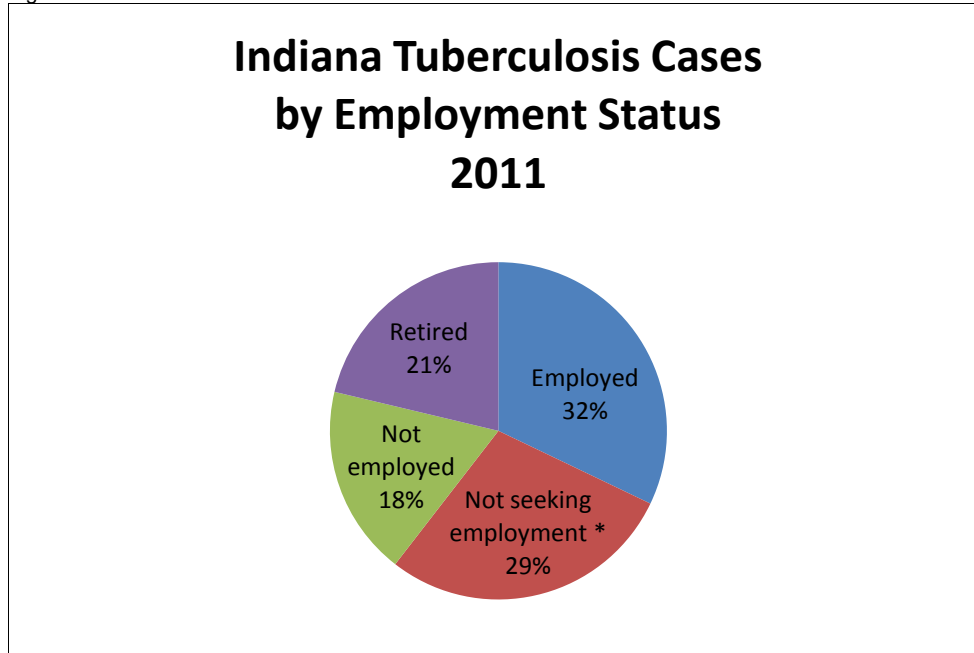
(e.g., long-term care facilities and jails). Figure 16 illustrates the percentage of TB cases with selected risk factors for 2011. The most common risk factor present was excess alcohol use at 16% (n=16) which is a reduction from 22% in 2010. Injecting drug use slightly decreased (n=5, 5%) from 5.56% in 2010 while non-injecting drug use rose in 2011 to 11% (n=11) compared to 10% in 2010. The percentage of those reporting a history of homelessness within the past year dropped from 14.44% in 2010 to 9% (n=9) in 2010. The percentage of long-term care facility residents increased slightly to 3% (n=3) from 2.22% in 2010 and those cases who were correctional facility residents at the time of diagnosis decreased slightly to 4% (n=4) vs. 4.44% in 2010.

Figure 16



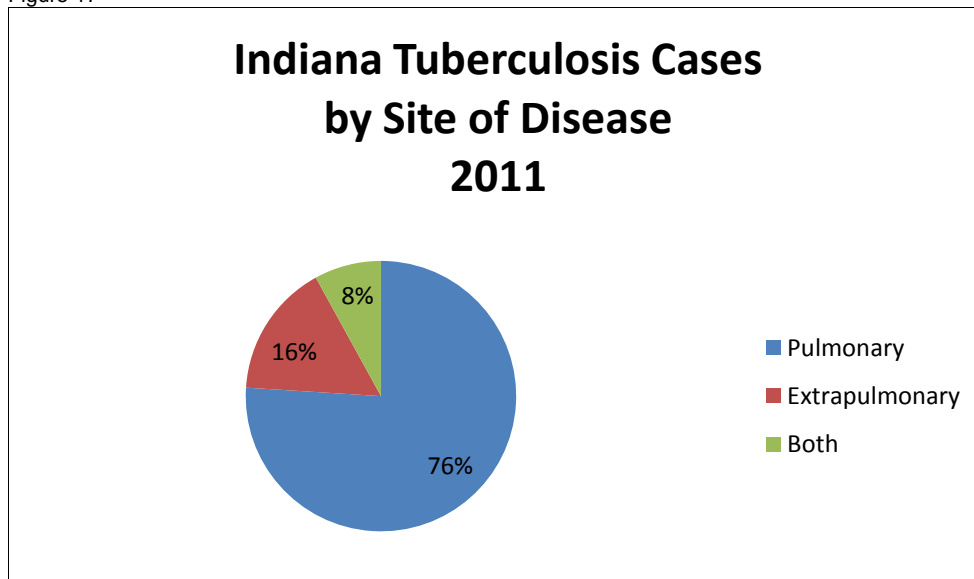
Indiana 2011 TB cases by employment category are shown in Figure 16 (n=99). Some changes from 2010 were dramatic: the percentage of those not employed in 2011 decreased by more than half (n=18, 18.2% vs. 37.76% in 2010); those not seeking employment (e.g., students, homemakers, disabled persons) rose from 16.67% in 2010 to 28.3% (n=28) in 2011 and the proportion of retirees increased from 13.3% in 2010 to 21.2% (n=21) in 2011. The percentage of those employed remained static at 32% in 2010 and 2011 (n=32).

Figure 16



The percentage of TB cases classified by the site of disease is shown in Figure 17. Pulmonary cases and extrapulmonary cases declined by 2% in 2011 (pulmonary n=76, 76%; 2010 n=70, 78%; 2011 extrapulmonary n=16, 16%, 2010 n=16, 18%). Conversely, cases classified as both pulmonary and extrapulmonary doubled from 4% (n=4, 4%) in 2010 to 8% (n=8, 8%) in 2011.

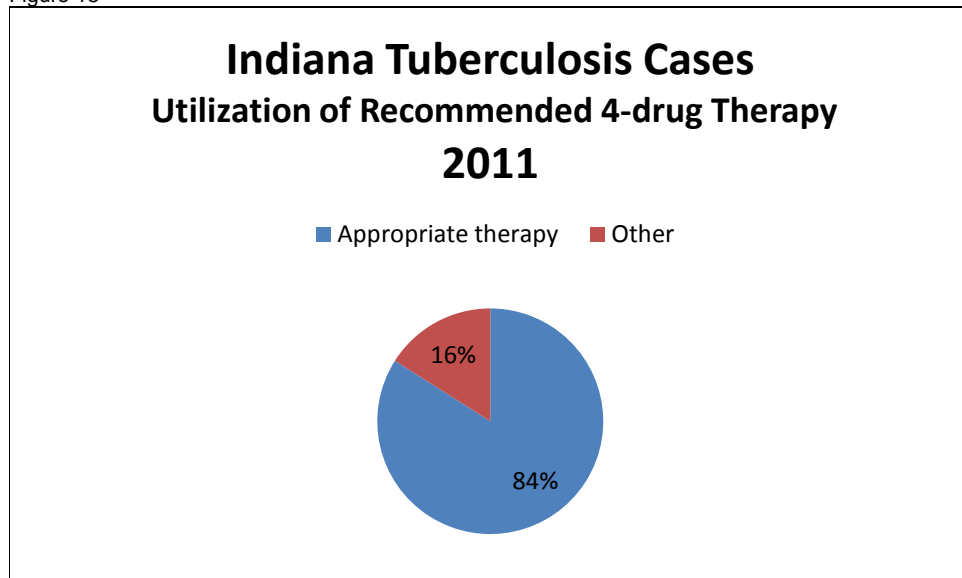
Figure 17



The Indiana State Department of Health endorses the treatment guidelines established by the American Thoracic Society and the CDC. Since 1991, these guidelines have recommended that four drugs be used in combination in the initial treatment phase. Unless contraindicated, all patients should begin therapy on the preferred regimen consisting of isoniazid (INH), rifampin (RIF), pyrazinamide (PZA), and ethambutol (EMB). In 2011, 84% (n=84) of patients began

treatment on the recommended four-drug regimen; this does not meet 2011 goal of 88.5% of patients beginning on this regimen. The percentage of patients who were started on the recommended four-drug regimen is shown in Figure 18.

Figure 18

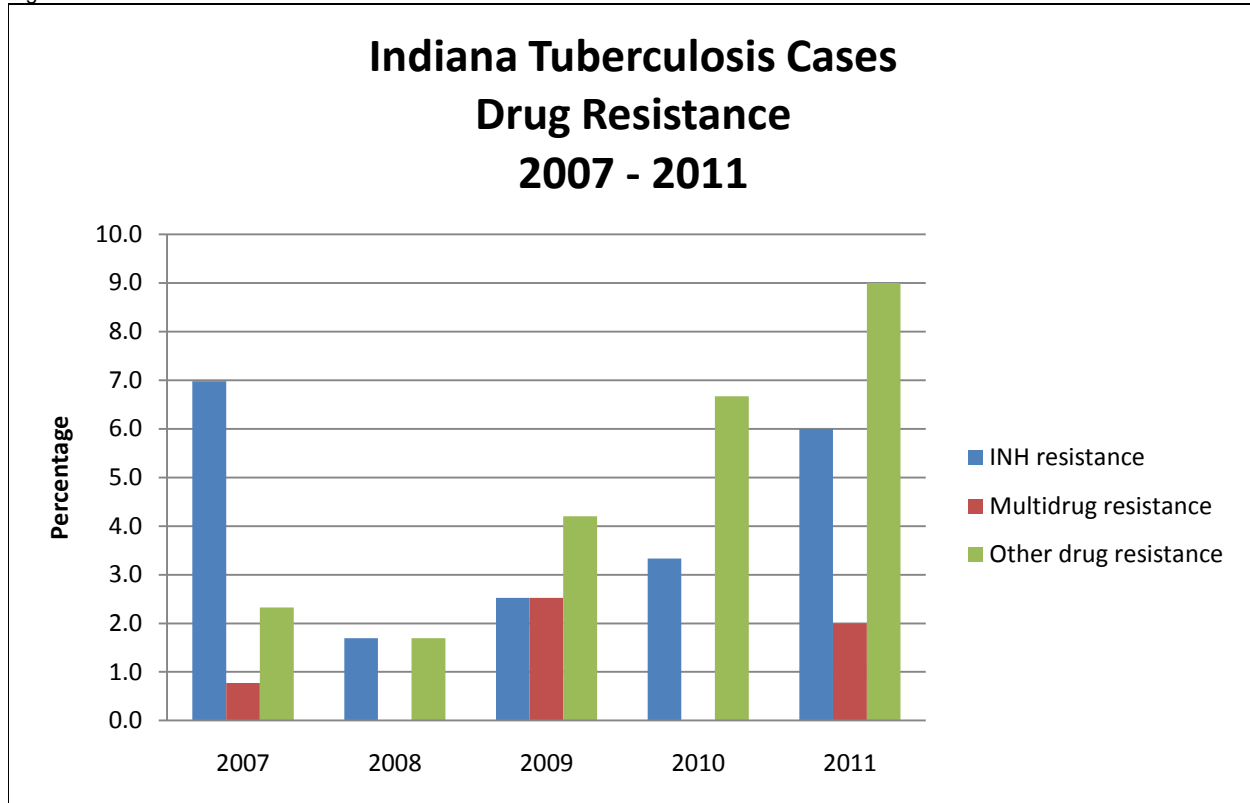


Drug susceptibility testing is routinely performed on all culture-positive isolates. Of the 50 culture-positive cases reported during 2011, drug susceptibility testing was performed on 49 (98%) of the specimens submitted; this proportion exceeds the 97.5% goal set by Indiana. In 2011, drug resistance increased in all metrics: 6% (n=6) resistant to INH vs. 3.3% (n=3) in 2010; 2% (n=2) classified as multi-drug resistant (resistant to both INH and RIF) vs. 0% (n=0) in 2010; 9% (n=9) resistant to other drugs (excluding INH and RIF) vs. 6.7% (n=6) in 2010 (see Figure 19).



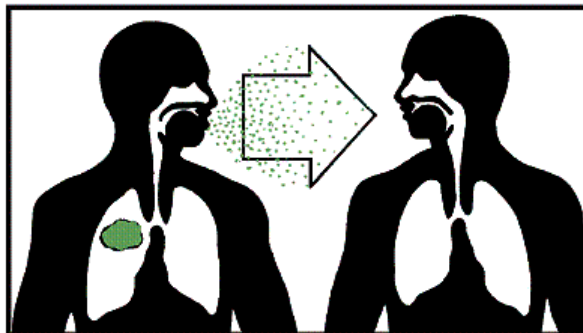
http://www.sciencephoto.com/image/432994/530wm/F0043228-Tuberculosis_resistance_to_some_drugs-SPL.jpg

Figure 19



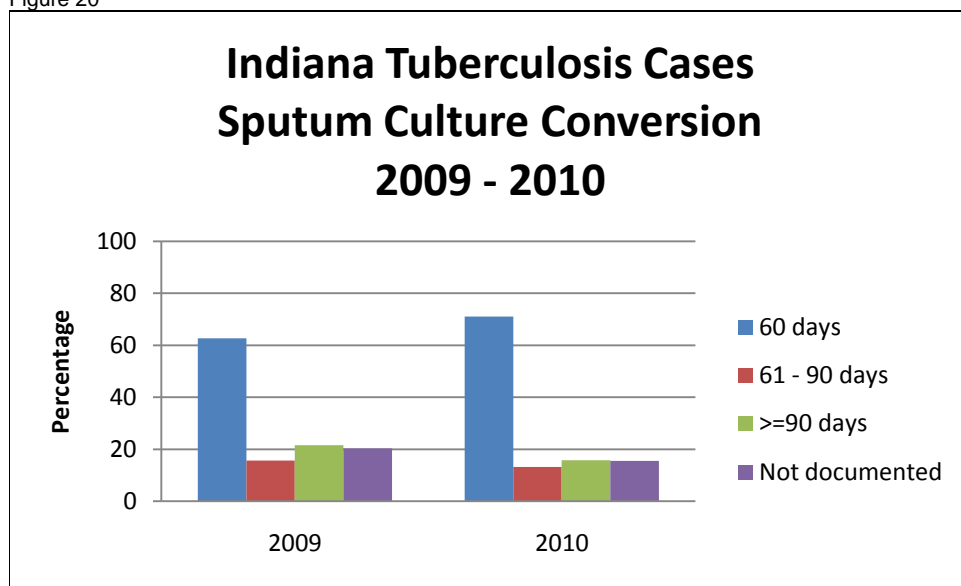
Drug resistance, inadequate response to therapy and failure to follow the treatment regimen are the most common reasons to extend the treatment period beyond 12 months.

Culture conversion data are collected to measure response to therapy and to determine length of treatment. Patients whose cultures have not converted to negative after two months of treatment may require a longer course of therapy. Those whose symptoms have not improved or who 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 for failing to adhere to the treatment regimen if not on a directly observed therapy (DOT) regimen. In 2010, culture conversion was reported for 70% (n=27) of Indiana TB cases which exceeded the 2010 goal of 53.5% of patients undergoing culture conversion; this proportion also exceeded the 63% (n=32) of patients undergoing culture conversion in 2009. Figure 20 illustrates culture conversion data for 2009 and 2010 (2009 is the most recent year for which reliable data are available; 2011 data is incomplete and will be reported in 2012.)



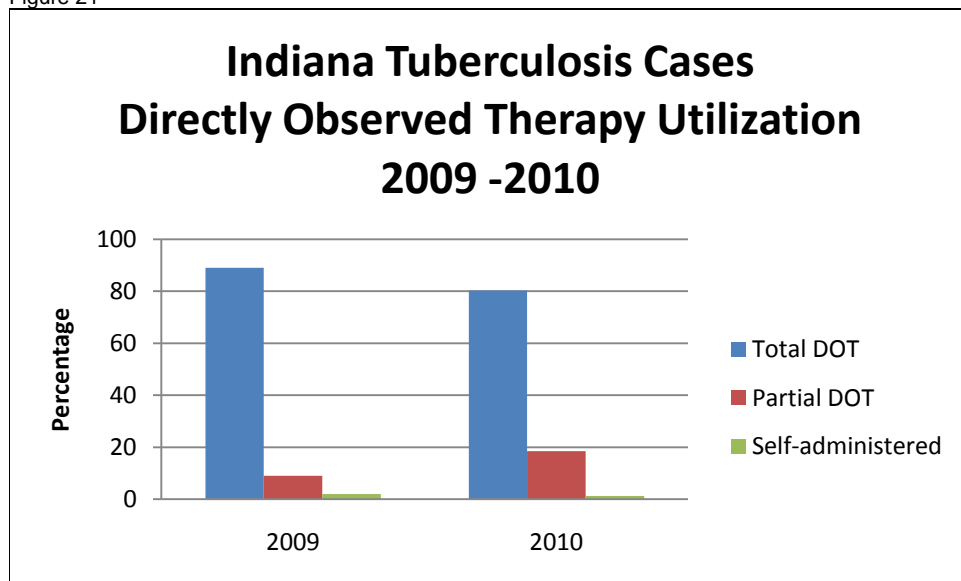
<http://www.dosomething.org/tipsandtools/11-facts-about-tuberculosis>

Figure 20



Directly observed therapy (DOT) is the most effective way to ensure that a patient is complying with the prescribed treatment regimen. Since DOT is a strategy proven to ensure completion of therapy with the added benefit of preventing acquired drug resistance, it is the standard of medical care in Indiana. Every effort must be made to incorporate DOT when therapy is initiated. DOT data for 2009 and 2010 are presented in Figure 21 (2009 is the most recent period for which complete DOT is available; 2011 data is incomplete and will be reported in 2012).

Figure 21



The first priority of TB elimination efforts is to ensure Completion of Therapy (COT). Indiana's goal of having at least 90.2% of all patients complete treatment within one year was achieved in 2010 with 96% (n=78) completing therapy within one year's time. 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 calculations are those patients who were dead at the time of diagnosis, patients who died before completing therapy, patients who were never started on therapy,

patients with rifampin resistance, patients with multi-drug resistance, pediatric cases with miliary disease, pediatric case with positive blood cultures, and all meningeal cases. Therapy is considered to be incomplete for those patients who moved out of the area, those who are uncooperative or who refused therapy, or those who are lost to follow-up. Figure 22 shows the proportion of patients who completed therapy and those who completed therapy in one year or less.

Figure 22

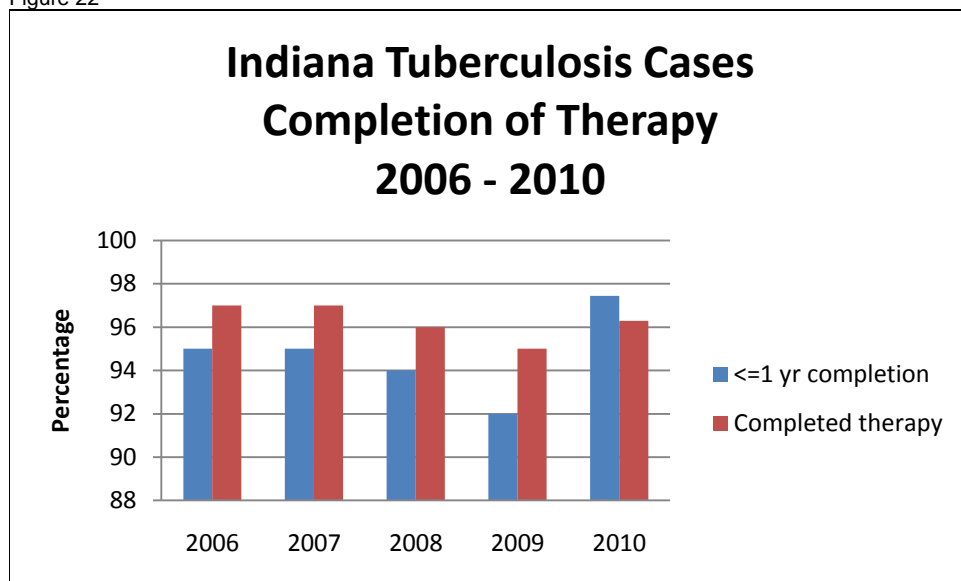
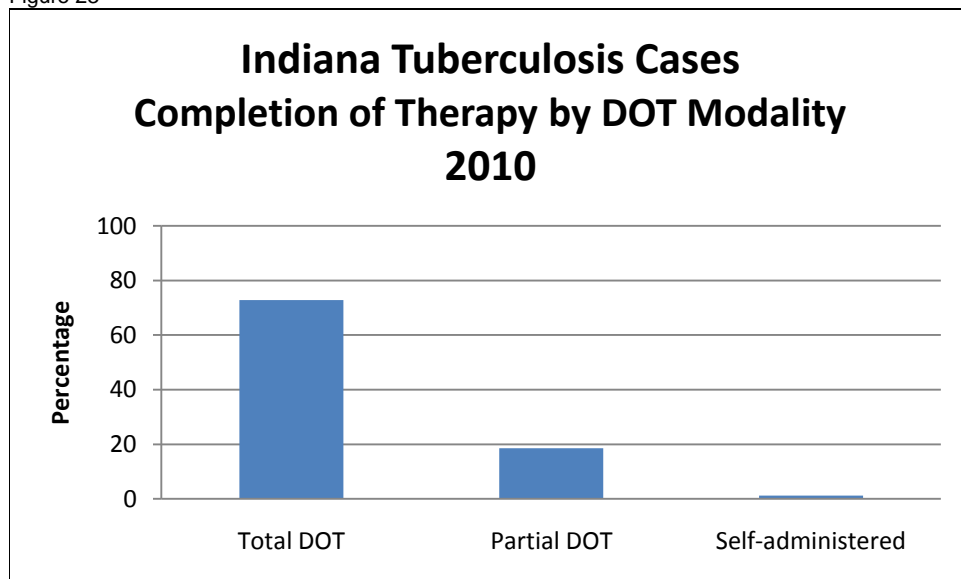


Figure 23 shows how closely total DOT is linked with completion of therapy. Of the 81 cases in 2010 who completed therapy, 73% (n=59) who were on total DOT completed therapy while 19% (n=15) of those on partial DOT completed therapy and only 1% (n=1) who were on a self-administration regimen completed therapy.

Figure 23



To eliminate the transmission of TB in Indiana, contact investigations must be focused on those at highest risk and records of these investigations must be completed and returned to the TB program in a timely manner. Each contact with a positive TB screening test must be followed through medical evaluation, initiation of treatment and completion of treatment. In 2010 the CDC began soliciting data on newly infected contacts because recently infected contacts have a higher risk of developing active TB disease within the first two years of exposure⁵. This is one reason that completing a thorough contact investigation is crucial in the prevention of TB disease. A Contact Investigation Summary for the past five years is presented in Table 2.

Table 2

National Objective	2006	2007	2008	2009	2010
Number of cases reported	125	129	118	119	90
Contact investigation:					
1) Contacts will be identified for at least 90% of newly reported sputum AFB smear-positive TB cases	93%	98%	100%	100%	97%
2) At least 95% of contacts to sputum AFB smear-positive TB cases will be evaluated for infection and disease	75%	60%	48%	54%	66%
3) At least 75% of infected contacts who are started on treatment for latent TB will complete therapy.	70%	71%	69%	67%	70%

Figure 24 (see page 21) shows the incidence in counties that reported five or more cases of TB in 2011. The total number for the state is based on persons whose primary residence was in Indiana at the time of diagnosis and 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. In numeric terms, the five counties with the most cases included Marion (n=30), Lake (n=11), Johnson (n=6), Hendricks (n=5) and Grant (n=<5).

Figure 25 (see page 24) shows the incidence rate per county for the past 10 years. During this time period, ten counties did not have a reported case of TB: Newton, Benton, Warren, Pulaski, Jasper, Brown, Hancock, Jennings, Posey, and Ohio. In fact, only nine of the 92 counties had enough cases to allow calculation of stable rates (>20 cases). These data clearly illustrate the challenge of ensuring a knowledgeable public health workforce when doctors and nurses in certain areas of the state may seldom see a TB case.

In order to reduce Indiana's U.S. born incidence rate to 0.5 per 100,000 by 2015, we must continue to include TB in diagnosis differentials, treat appropriately using direct observed therapy and improve our contact investigation strategies and activities.

TB Elimination: Together We Can

Figure 24

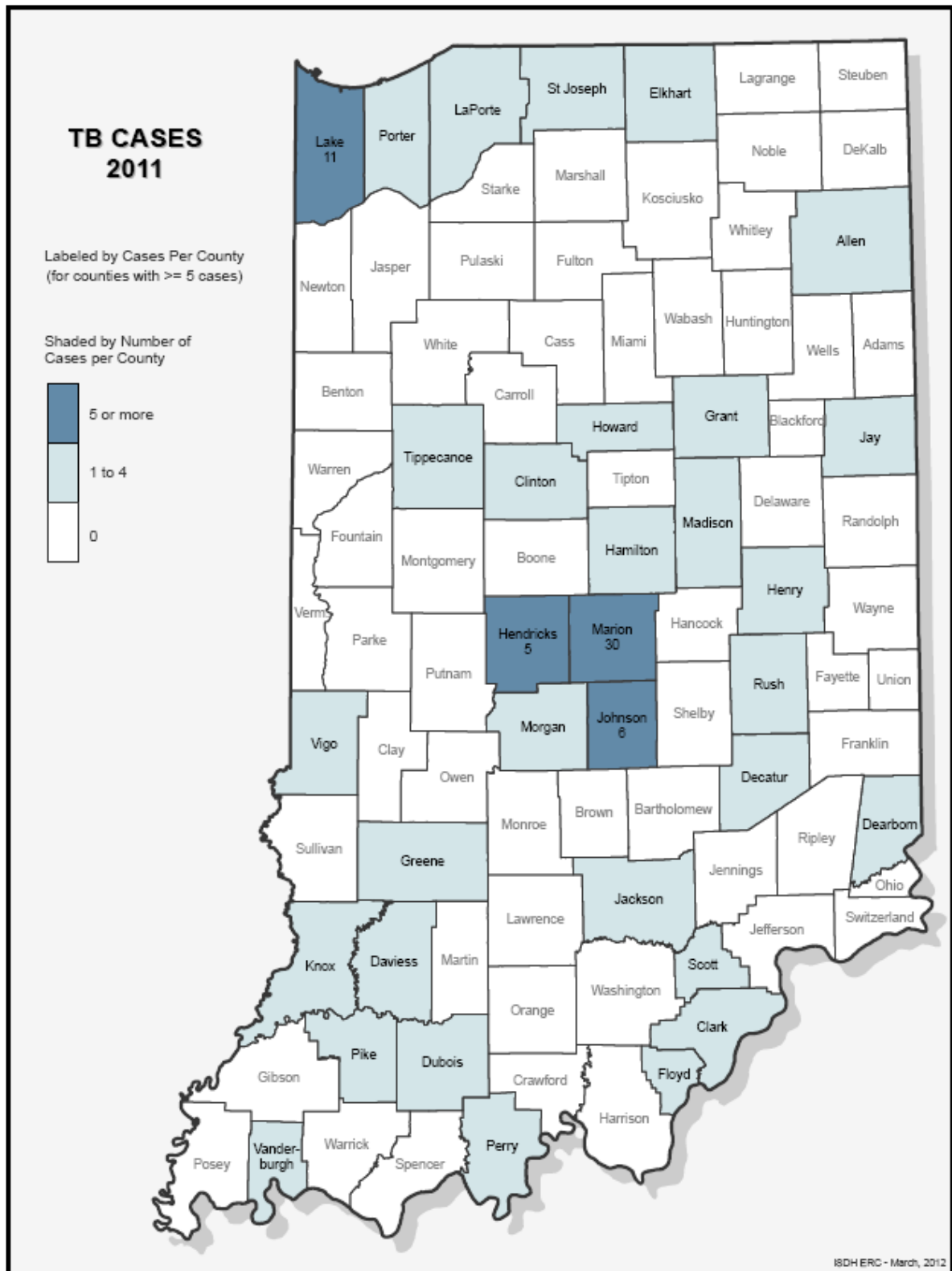
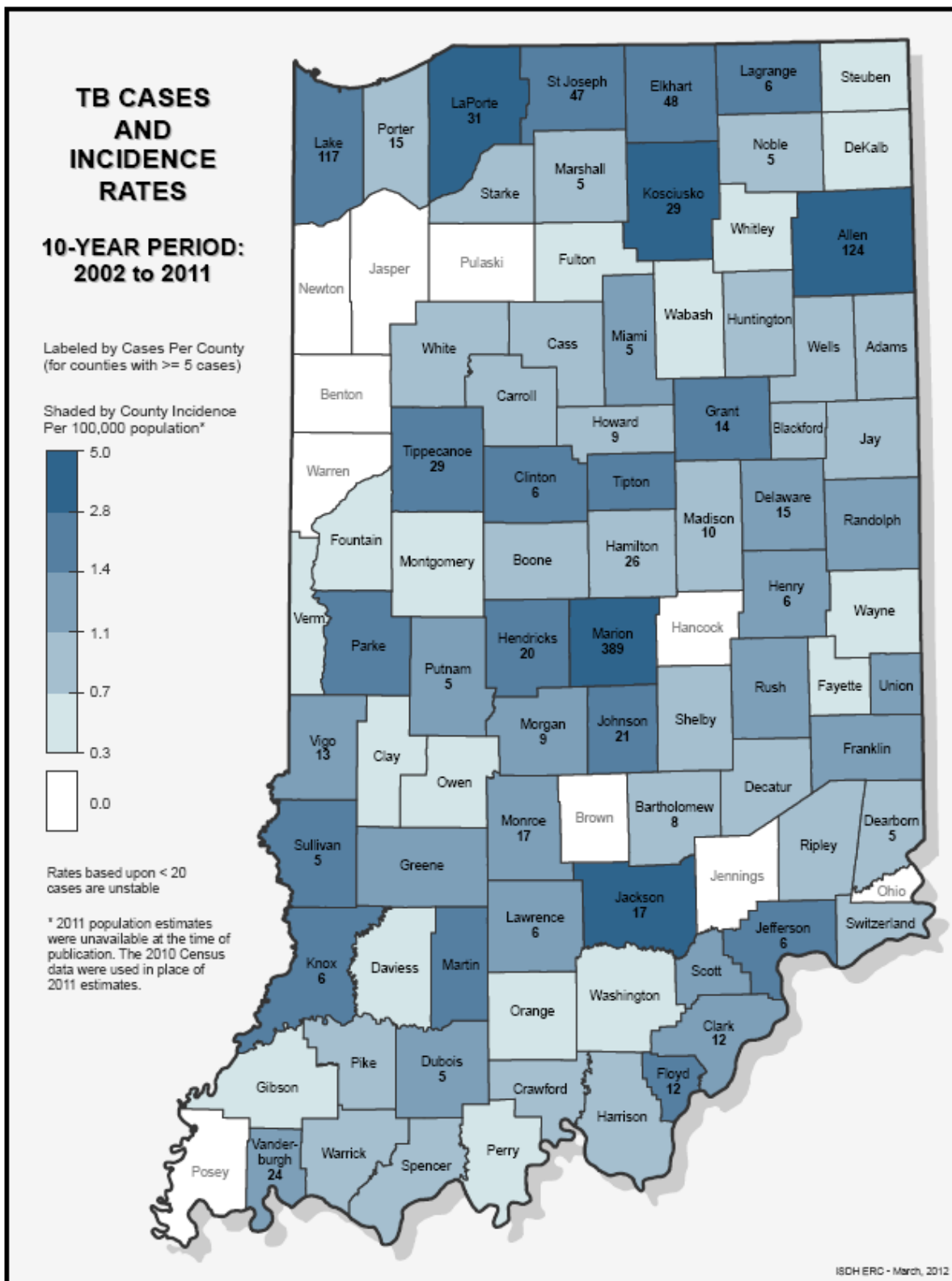


Figure 25



Notes

1 The Centers for Disease Control and Prevention, Global Tuberculosis. Retrieved February 28, 2010 from <http://www.cdc.gov/tb/topic/globaltb/default.htm>

2 US Census Bureau, <http://www.census.gov/>

3 US Department of Health and Human Services. Centers for Disease Control and Prevention National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention Division of Tuberculosis Elimination. 2008. Self-study Modules on Tuberculosis: Epidemiology of Tuberculosis.

4 US Department of Health and Human Services. Centers for Disease Control and Prevention National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention Division of Tuberculosis Elimination. 2012. TB and HIV Coinfection. Retrieved February 29, 2012 from <http://www.cdc.gov/tb/topic/TBHIVcoinfection/default.htm>

5 CDC. Guidelines for the Investigation of Contacts of Persons with Infectious Tuberculosis. MMWR 2005;54(No. RR-15):11

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