



**HEALTHY**  
**CHICAGO**

CHICAGO DEPARTMENT OF PUBLIC HEALTH

# HEALTHY CHICAGO REPORTS

---

---

**Tuberculosis Annual Surveillance Report**  
**2016**

# CHICAGO DEPARTMENT OF PUBLIC HEALTH

## **Julie Morita, MD**

Commissioner, Chicago Department of Public Health

## **Theodore Bonau, MPH**

Epidemiologist III,  
Tuberculosis Control Program

## **Kathy Ritger, MD, MPH**

Medical Director,  
Tuberculosis Control Program

### **Copyright Information**

All materials contained in this report are in the public domain and may be used and reprinted without special permission; citation as to source, however, is appreciated.

### **Suggested Citation**

Chicago Department of Public Health. Tuberculosis Surveillance Report, 2016. Chicago, IL: 2016.

### **Chicago Department of Public Health**

Making Chicago a safer and healthier place by working with community partners to promote health, prevent disease, reduce environmental hazards and ensure access to health care for all Chicagoans.

### **Tuberculosis Program**

Chicago Department of Public Health  
2160 W Ogden Avenue  
Chicago, IL 60612

# Table of Contents

Abbreviations, Acronyms and Definitions .....	4
Executive Highlights .....	5
Technical Notes .....	17

## LIST OF TABLES

Table 1. Number and Rates of Reported Tuberculosis Cases, Chicago, Illinois, and United States, 2012-2016.....	6
Table 2. Number and Proportion of Tuberculosis Cases by Selected Characteristics, Chicago, 2012-2016 .....	9
Table 3. Co-morbidities of Tuberculosis Cases, Chicago, 2012-2016 .....	12
Table 4. Map Key - Chicago Community Areas .....	16

## LIST OF FIGURES

Figure 1. Trends in the Number and Rates of Reported Tuberculosis Cases, Chicago and United States, 1993-2016.....	6
Figure 2. Map of Reported Tuberculosis Cases by Chicago Community Area, 2016.....	7
Figure 3. Average Rate Map of Tuberculosis by Chicago Community Area, 2012-2016.....	8
Figure 4. Average, Range, and Trend of Age at Report of Tuberculosis Cases, Chicago, 1993-2016.....	9
Figure 5. Tuberculosis Cases by Race and Ethnicity Proportions, Chicago, 2012-2016 .....	10
Figure 6. Place of Birth for Tuberculosis Cases, Chicago, 1993-2016 .....	10
Figure 7. Tuberculosis Cases by Site of Disease, Chicago, 2012-2016.....	11
Figure 8. Tuberculosis Drug Resistance, Chicago, 2012-2016 .....	11
Figure 9. Tuberculosis Cases Co-infected with HIV, Chicago, 2012-2016 .....	12
Figure 10. Percent Completion of Treatment within One Year, Chicago, 1993-2016 .....	13
Figure 11. Mode of TB Therapy, Chicago, 2012-2016.....	13
Figure 12. Risk Factors for TB, Chicago, 2012-2016 .....	14
Figure 13. Mortality, Chicago, 2016.....	14
Figure 14. Individual Persons Serviced by CDPH TB Program, Chicago, 016 .....	15

## Abbreviations, Acronyms & Definitions

**Cavitary/Cavitation:** TB infection involving the upper lobes of the lung that causes destruction of the lung tissue, forming enlarged air spaces (cavities).

**CDPH:** Chicago Department of Public Health. Jurisdiction includes all areas within the city limits of Chicago, Illinois.

**CDC:** Centers for Disease Control and Prevention.

**DOT:** Directly observed therapy, is a World Health Organization endorsed strategy to improve treatment adherence by requiring health care workers to observe and record patients taking each dose of medicine.

**Extrapulmonary:** TB infection occurs outside of the lungs of the affected person.

**HIV:** Human immunodeficiency virus.

**INH:** Isoniazid, an antibiotic used as a first-line drug for the prevention and treatment of LTBI and active TB.

**LTBI:** Latent tuberculosis infection, is an infection with *M. tuberculosis* without active tuberculosis disease.

**MDR:** Multi-drug resistant tuberculosis, a form of tuberculosis infection caused by *M. tuberculosis* that is resistant to first-line anti-tuberculosis drugs, isoniazid and rifampin.

***M. tuberculosis:*** *Mycobacterium tuberculosis*, is a rod-shaped bacterium that causes tuberculosis infection.

**Pulmonary:** TB infection occurs in the lungs of the affected person.

**Race/Ethnicity:** For this report, persons identified as White, Black, Asian, or of other races are all non-Hispanic. Persons identified as Hispanic may be of any race.

**Rates:** Rates are expressed as the number of cases reported per 100,000 population.

**TB:** Tuberculosis, infectious disease caused by *M. tuberculosis*.

**XDR:** Extensively drug-resistant tuberculosis, a form of tuberculosis infection caused by *Mycobacterium tuberculosis* that is resistant to isoniazid, rifampin, and any fluoroquinolone and at least one of three injectable second-line anti-tuberculosis drugs.

## Executive Summary

### Tuberculosis in Chicago

Reported incident cases of TB in Chicago have been on a steady decline since 1993. Between 1993 and 2016, Chicago has seen an 83% decrease in reported TB cases from 798 to 135 per year, respectively. In 2016, there were 135 incident TB cases reported in Chicago producing a citywide rate of 5.0 cases per 100,000 population. In 1993, the rate of TB in Chicago was 28.7 cases per 100,000 population, nearly 3 times that of the United States rate, which was 9.7. The rate gap between the United States and Chicago has steadily decreased since and in 2016, Chicago's citywide rate of 5.0 cases per 100,000 population was greater than that of the United States overall, 3.0 cases per 100,000 population.

### Age

In 2016, 30% of incident TB cases were diagnosed both in persons aged 45-64 and 65 or greater, respectively. Diagnosed incident TB disease in children increased four-fold relatively rare in Chicago with only one case (<1%) in 2015 occurring in persons aged 0-14.

### Race and Ethnicity

Non-Hispanic African-American and Hispanic residents of Chicago have seen relatively stability in TB cases over the last five years, accounting for 28% and 32% of TB cases in 2016, respectively. In 2016, Non-Hispanic whites accounted for 8% of reported incident cases which was a decrease from 13% in 2015. Of the remaining reported cases in 2016, Non-Hispanic Asians accounted for 32% of cases.

### Country of Birth

With TB transmission remaining high in many countries, reported incident cases in Chicago are now largely diagnosed in foreign-born persons. In 2008, TB cases in foreign-born persons surpassed cases in US-born persons for the first time in Chicago, and this percentage has been on the incline since, accounting for 68% of reported cases in 2016. Mexico was the most common foreign country of origin in 2016, with 25% of foreign-born persons reporting it as their country of birth, followed by the Philippines (14%), India (13%), and China (8%).

### HIV

Nationally, HIV co-infection with TB has been on the decline since the early 90's, when nearly half of reported TB cases were HIV positive persons. Despite these reductions, HIV infection remains a strong risk factor for TB infection. In 2016, the proportion of HIV co-infection with incident TB in Chicago was 5%, slightly below the national estimate of 6% for the same year.

### Risk Factors for TB

More than one in four persons diagnosed with TB in Chicago in 2016 reported substance use, up from one in five in 2015. Alcohol was the most commonly used substance, with 20% reporting heavy drinking. Cases among homeless persons increased from 5% in 2015 to over 10% in 2016.

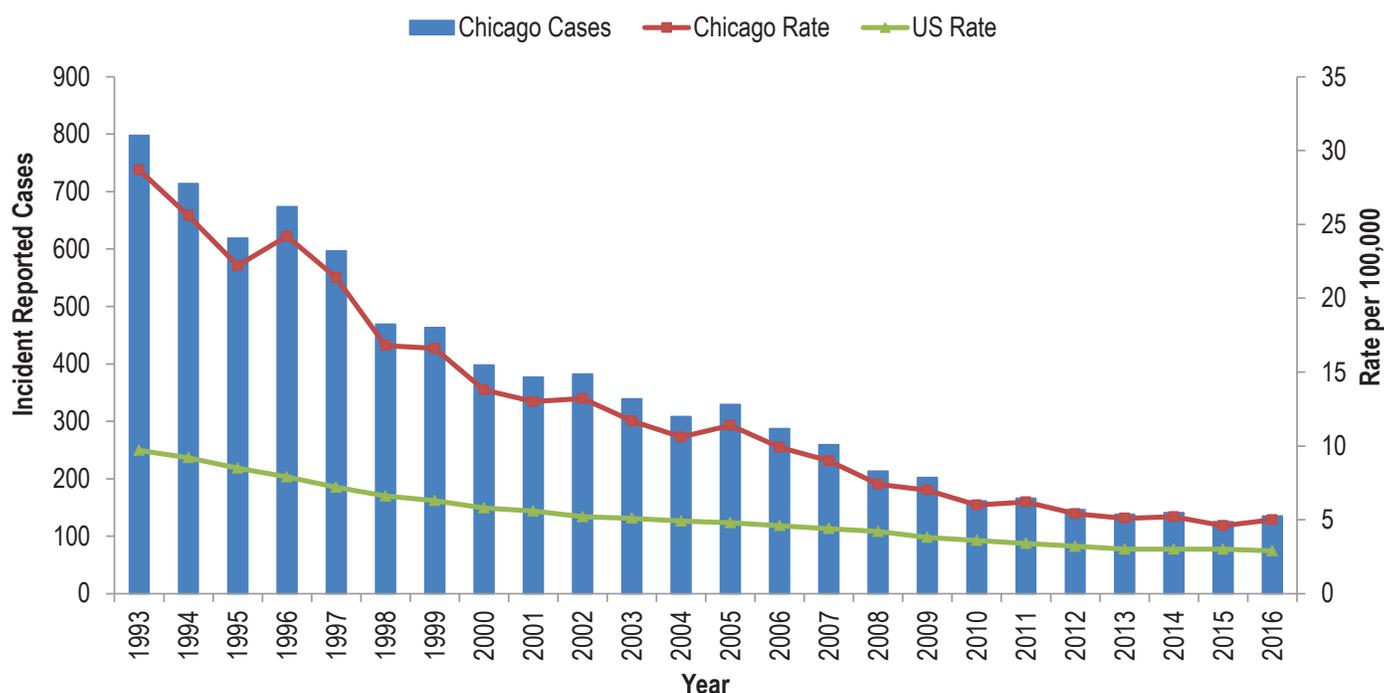
# Tuberculosis Incidence

**Table 1. Number and rates (per 100,000 population) of reported tuberculosis cases, 2012-2016**

Area	2012		2013		2014		2015		2016		5-Year Median	
	No.	Rate	No.	Rate								
Chicago	146	5.4	138	5.1	141	5.2	124	4.6	135	5.0	138	5.1
Illinois	347	2.7	327	2.5	320	2.5	343	2.7	342	2.7	342	2.7
United States	9,940	3.2	9,562	3.0	9,406	3.0	9,563	3.0	9,287	2.9	9,562	3.0

▲ **Table 1.** In 2016, there were 135 incident TB cases reported in Chicago producing a citywide rate of 5.0 per 100,000 population. Chicago’s citywide rate was more than one and a half times that of both Illinois and the United States. Between 2015 and 2016, Chicago experienced a 9% increase of incident TB cases.

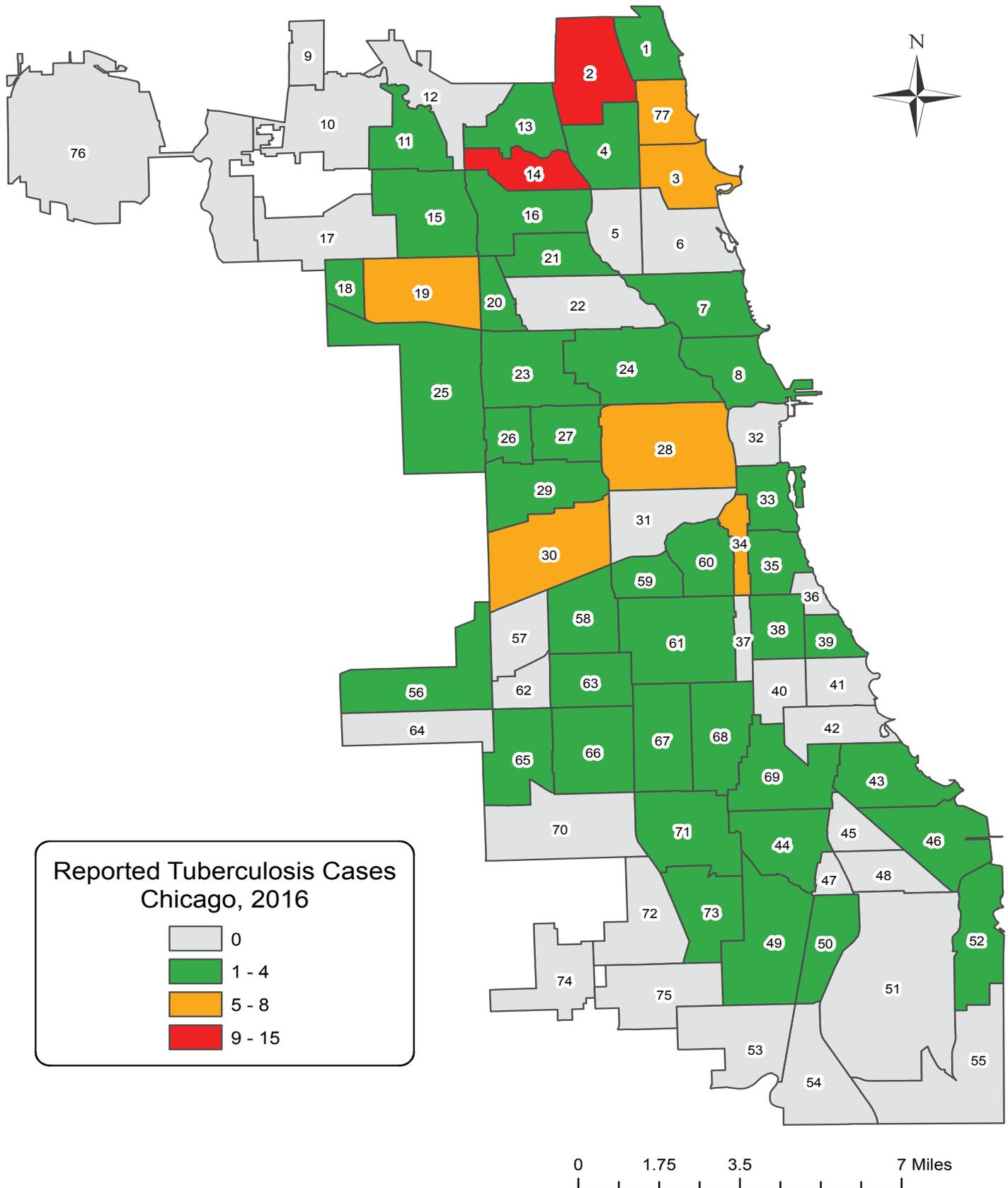
**Figure 1. Trends in the number of reported tuberculosis cases, 1993-2016**



▲ **Figure 1.** Incident cases of TB in Chicago have been on the decline since 1993. Between 2006 and 2016, Chicago has seen a 57% decrease in TB from 287 to 135 reported incident cases respectively. In 1993 the rate of TB in Chicago per 100,000 people was nearly 3 times that of the United States rate, 28.7 compared to 9.7. The rate gap between the United States and Chicago has steadily decreased since and in 2016, Chicago’s citywide rate per 100,000 people 5.0 compared to 2.9 for the United States overall.

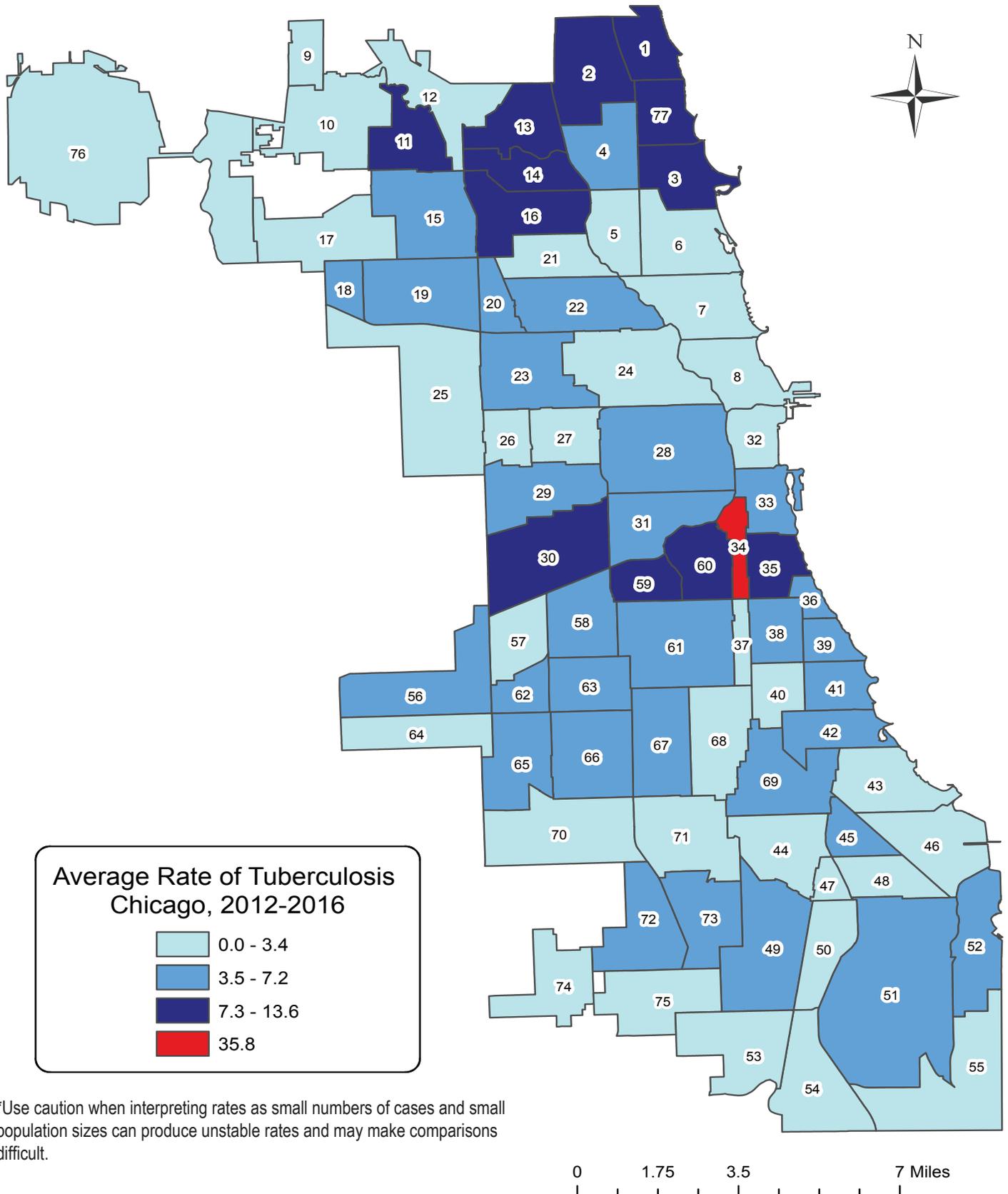
# Chicago Community Area Tuberculosis Cases

Figure 2. Reported tuberculosis cases, Chicago, 2016



# Chicago Community Area Tuberculosis Rates

**Figure 3.** Average rate of tuberculosis (per 100,000 population) by Chicago Community Area, 2012-2016\*

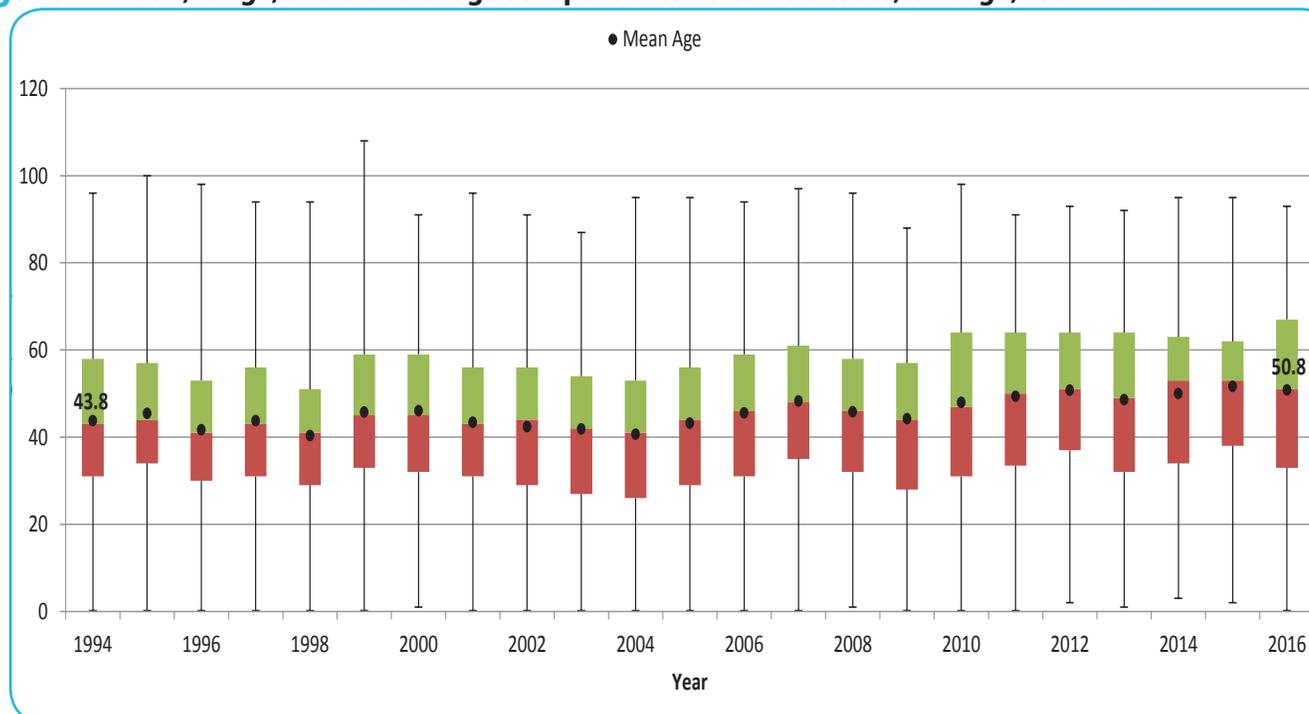


## Characteristics of Tuberculosis Cases

**Table 2. Number and proportion of tuberculosis cases by selected characteristics, Chicago, 2012-2016**

Characteristic	2012		2013		2014		2015		2016		5- Year Total	
	No.	(%)	No.	(%)								
<b>Age Group (Years)</b>												
<5	1	(0.7)	3	(2.2)	1	(0.7)	1	(0.8)	4	(3.0)	10	(1.5)
5-14	2	(1.4)	3	(2.2)	0	(0.0)	0	(0.0)	0	(0.0)	5	(0.7)
15-24	9	(6.2)	12	(8.7)	12	(8.5)	7	(5.6)	12	(8.9)	52	(7.6)
25-44	45	(30.8)	36	(26.1)	42	(29.8)	36	(29.0)	38	(28.1)	197	(28.8)
45-64	59	(40.4)	50	(36.2)	53	(37.6)	50	(40.3)	41	(30.4)	253	(37.0)
>64	30	(20.5)	34	(24.6)	33	(23.4)	30	(24.2)	40	(29.6)	167	(24.4)
<b>Sex</b>												
Male	94	(64.4)	77	(55.8)	93	(66.0)	79	(63.7)	85	(63.0)	428	(62.6)
Female	52	(35.6)	61	(44.2)	48	(34.0)	45	(36.3)	50	(37.0)	256	(37.4)
<b>Race</b>												
Black	44	(30.1)	44	(31.9)	48	(34.0)	33	(26.6)	39	(28.9)	208	(30.4)
Asian	42	(28.8)	37	(26.8)	39	(27.7)	37	(29.8)	43	(31.9)	198	(28.9)
White	59	(40.4)	55	(39.9)	54	(38.3)	54	(43.5)	53	(39.3)	275	(40.2)
Other	1	(0.7)	2	(1.4)	0	(0.0)	0	(0.0)	0	(0.0)	3	(0.4)
<b>Ethnicity</b>												
Non-Hispanic	101	(69.2)	92	(66.7)	101	(71.6)	85	(68.5)	92	(68.1)	471	(68.9)
Hispanic	45	(30.8)	46	(33.3)	40	(28.4)	39	(31.5)	43	(31.9)	213	(31.1)
<b>Total</b>	<b>146</b>	<b>(100.0)</b>	<b>138</b>	<b>(100.0)</b>	<b>141</b>	<b>(100.0)</b>	<b>124</b>	<b>(100.0)</b>	<b>135</b>	<b>(100.0)</b>	<b>684</b>	<b>(100.0)</b>

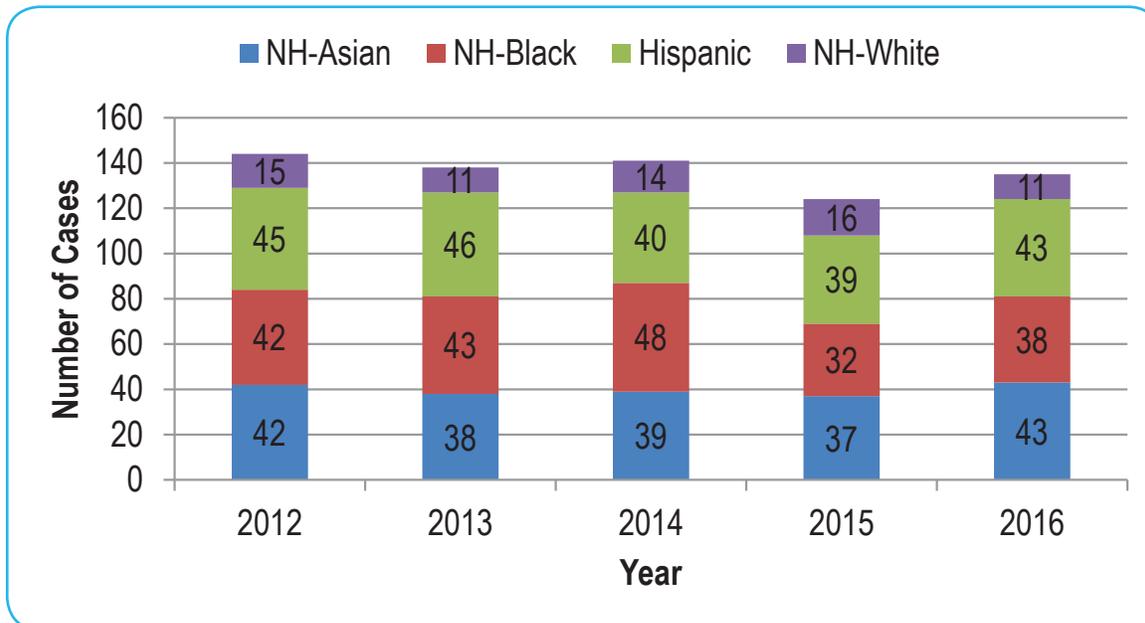
**Figure 4. Mean, range, and trend of age at report of tuberculosis cases, Chicago, 1994-2016**



▲ **Figure 4.** Half of the reported TB cases from 2016 were between the ages of 33 and 67, with a range of 0 to 93 years old. Between 1994 and 2016, there has been a significant trend of increasing mean age of reported TB cases, with a mean of 43.8 and 50.8 years, respectively.

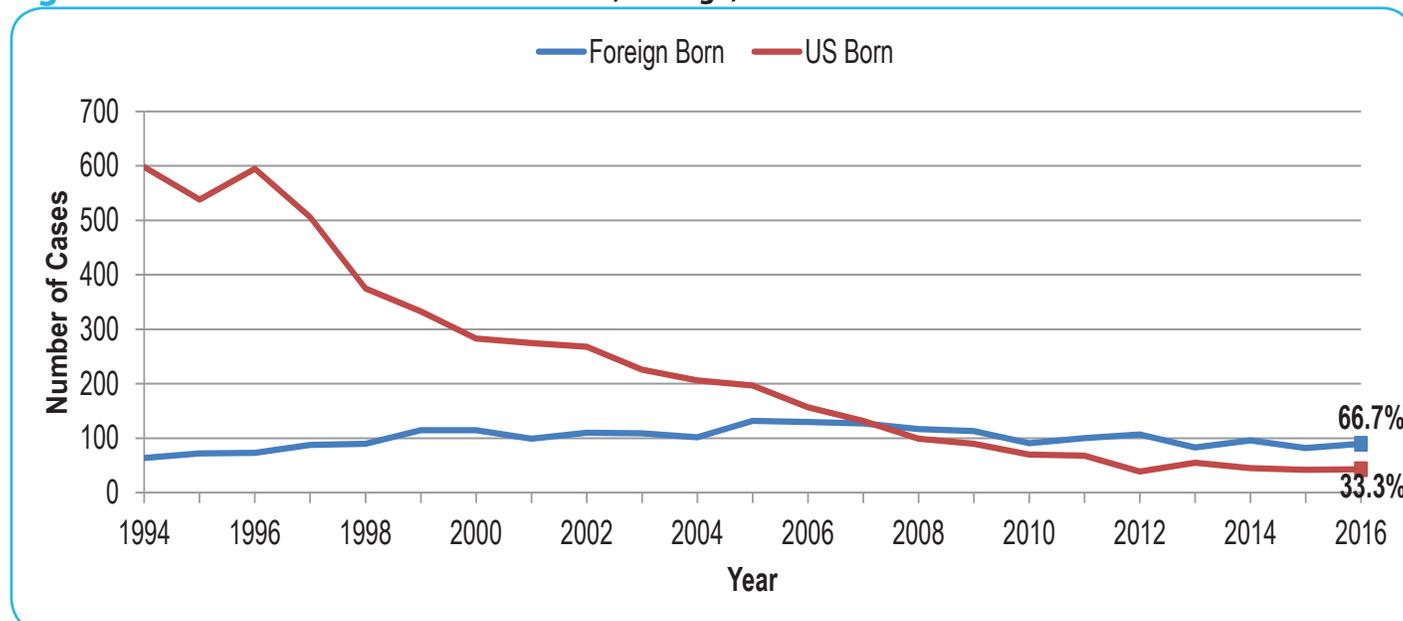
## Race, Ethnicity, and Country of Origin

**Figure 5. Tuberculosis cases by race and ethnicity proportions, Chicago, 2012-2016**



▲ **Figure 5.** In 2016, Hispanics accounted for 32% of reported TB cases. Non-Hispanic (NH) Blacks residents of Chicago have seen a marked decrease over the last five years, comprising of 35% of cases in 2011 to less than 28% in 2016. Of the remaining reported cases in 2015, NH-Asians and NH-Whites accounted for 32% and 8%, respectively.

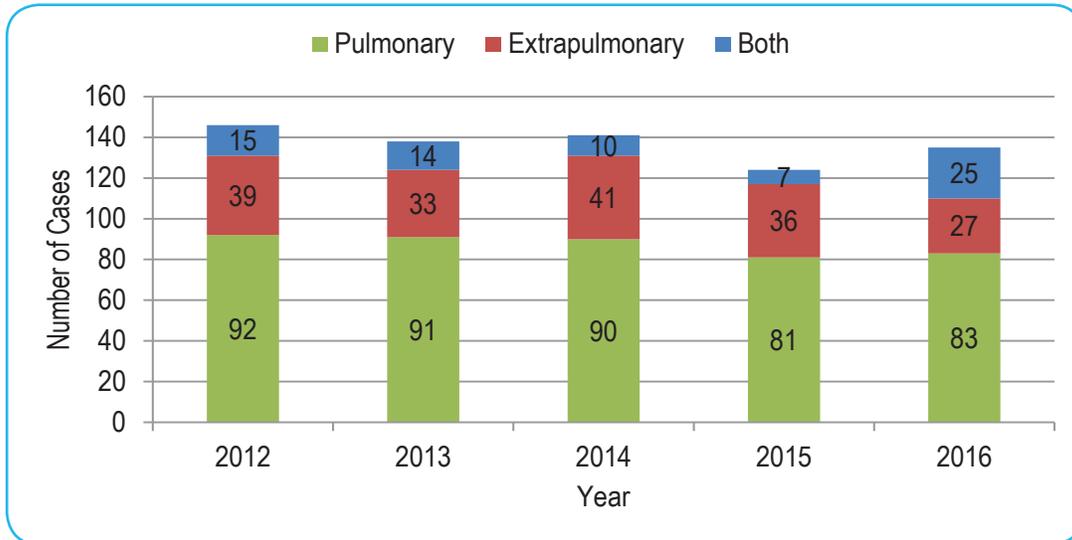
**Figure 6. Place of birth for tuberculosis cases, Chicago, 1994-2016**



▲ **Figure 6.** 2008 was the first year in Chicago that the number of reported TB cases in those who are foreign-born surpassed that of US-born cases. In 2016, 2 out of 3 TB cases were among foreign-born persons (N=92). Mexico was the most common foreign country of origin accounting for 25% of all foreign-born cases, followed by the Philippines (14%), India (13%), and China (8%).

## Tuberculosis Site of Disease

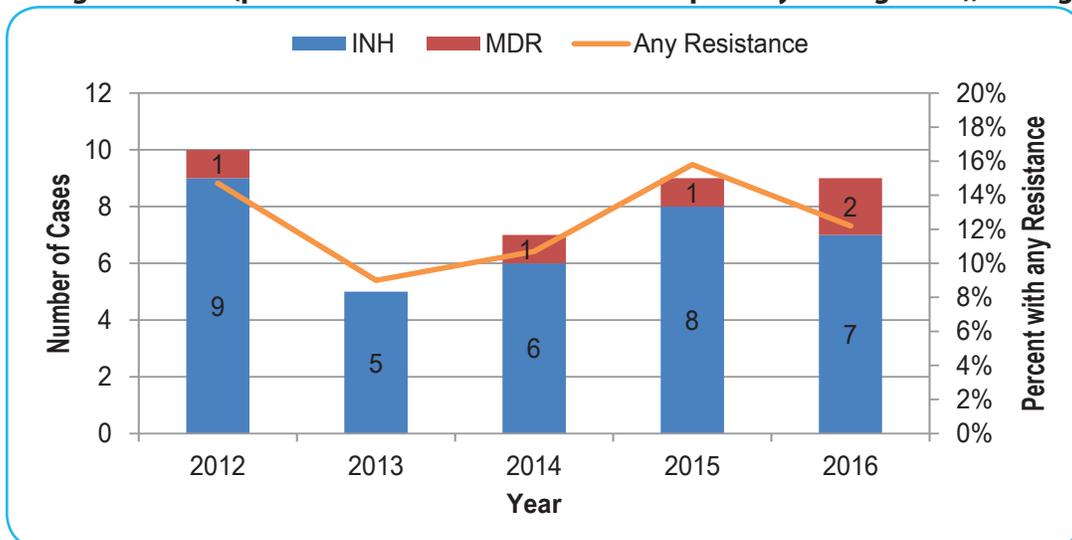
**Figure 7. Tuberculosis cases by site of disease, Chicago, 2012-2016**



▲ **Figure 7.** In 2016, 61% of Chicago’s reported TB cases were pulmonary followed by 20% with extrapulmonary and 19% with both pulmonary and extrapulmonary site of disease. Among the 108 pulmonary cases (including both), 57 (53%) were sputum-smear positive and 55 (51%) had cavitation/s on their chest x-rays. Cavitory disease and sputum-smear positivity are strong indicators of TB infectiousness.

## Tuberculosis Drug Resistance

**Figure 8. TB drug resistance (percent is of TB cultures with susceptibility testing done), Chicago, 2012-2016**



▲ **Figure 8.** In 2016 among TB cases with susceptibility testing results (N=115), two were multi-drug resistant (1.7%), 7 were isoniazid resistant (6.1%) and 14 were resistant to at least one anti-TB drug (12.2%). Since 2011, there have been 7 MDR cases and one XDR case.

## Tuberculosis Co-morbidities

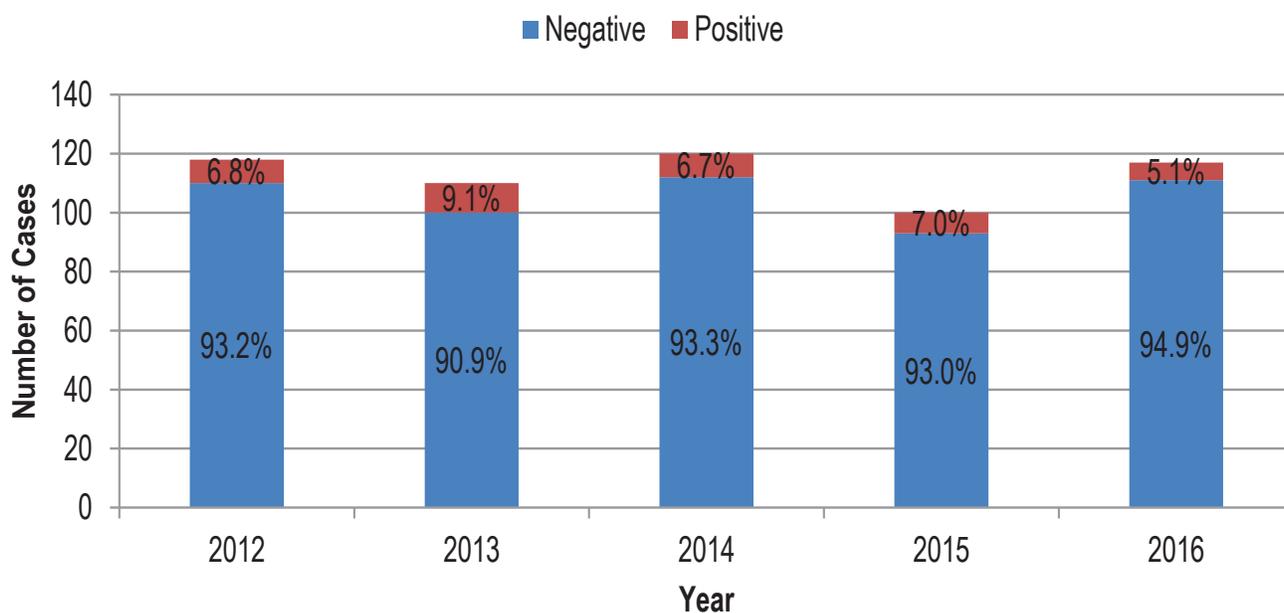
**Table 3. Co-morbidities of tuberculosis cases, Chicago, 2012-2016**

Year	HIV Co-infection (% of tested)		Diabetes		Immuno-compromised (Not HIV)		End-Stage Renal Disease	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
2012	8	(6.8%)	23	(15.8%)	9	(6.2%)	3	(2.1%)
2013	10	(9.1%)	17	(12.3%)	13	(9.4%)	2	(1.5%)
2014	8	(6.7%)	26	(18.4%)	6	(4.3%)	3	(2.1%)
2015	7	(7.0%)	34	(27.4%)	6	(4.8%)	0	(0.0%)
2016	6	(5.1%)	27	(20.0%)	7	(5.2%)	8	(5.9%)
<b>Total</b>	<b>39</b>	<b>(6.9%)</b>	<b>127</b>	<b>(18.6%)</b>	<b>41</b>	<b>(6.0%)</b>	<b>16</b>	<b>(2.3%)</b>

▲ **Figure 9.** More than one in four of TB cases reported in 2015 also suffered from diabetes which is 1.7 times higher than the national estimate of 16%. Additionally, 5% of 2016 TB cases were immuno-compromised not attributed to HIV infection and 6% had end-stage renal disease.

## Tuberculosis and HIV

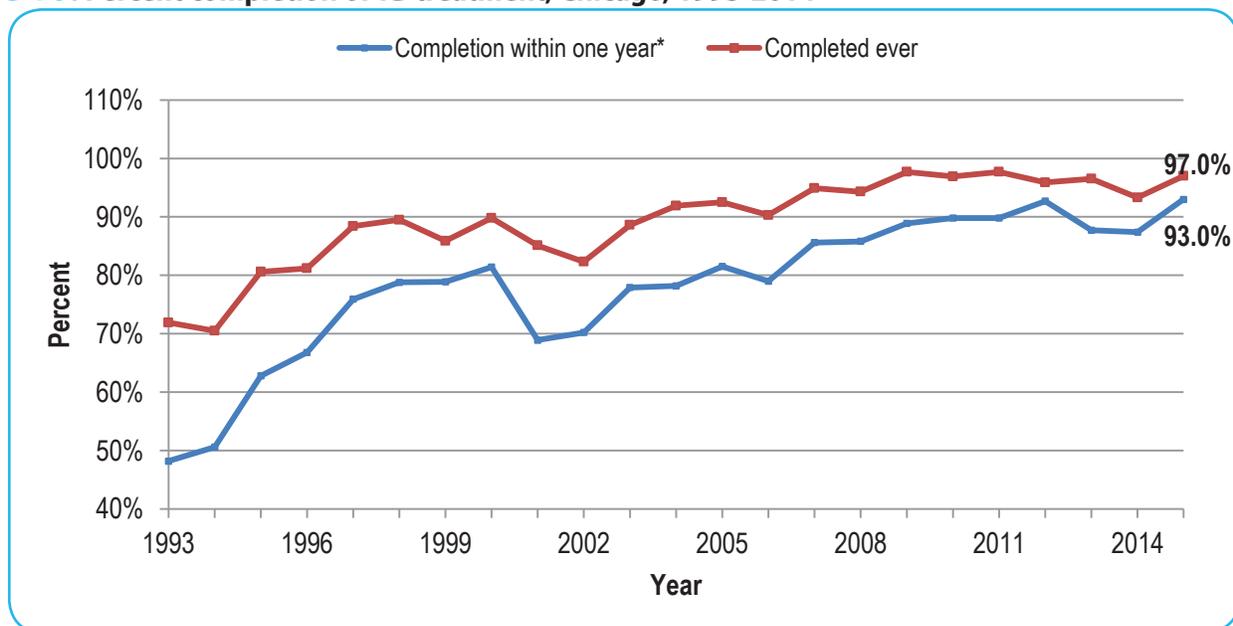
**Figure 9. Tuberculosis cases co-infected with HIV (among those tested for HIV), Chicago, 2012-2016**



▲ **Figure 9.** In 2016, the proportion of HIV co-infection with TB in Chicago was 5.1%, slightly below national estimates of 6% for the same year. Since the early 1990's, HIV co-infection has been on the steady decline both in Chicago and the United States, however HIV infection still remains a significant risk factor for TB.

## Tuberculosis Treatment Completion

**Figure 10. Percent completion of TB treatment, Chicago, 1993-2014**

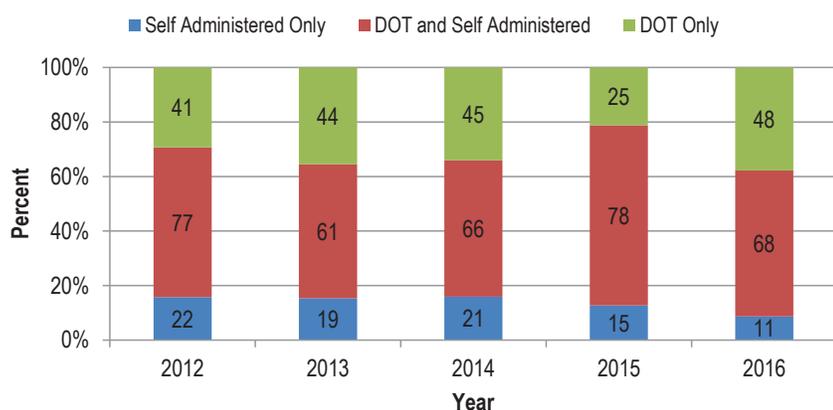


\* Patients who died during or before treatment or who moved out of the country are excluded. Patients with resistance to rifampin, meningeal TB, TB of the bone or skeletal system, TB in the central nervous system and children with disseminated TB were also excluded due to expected longer duration of treatment. Treatment duration varies based on clinical presentations of each individual patient and the nature of their TB disease.

▲ **Figure 10.** In 2015, 93% of eligible cases completed treatment within one year. Since 1993, treatment completion within a year for those eligible has drastically increased from less than half to greater than 90% between 1993-2014. Overall treatment completion has also increased from 71.9% in 1993 to 97.0% in 2015.

## Directly Observed Therapy

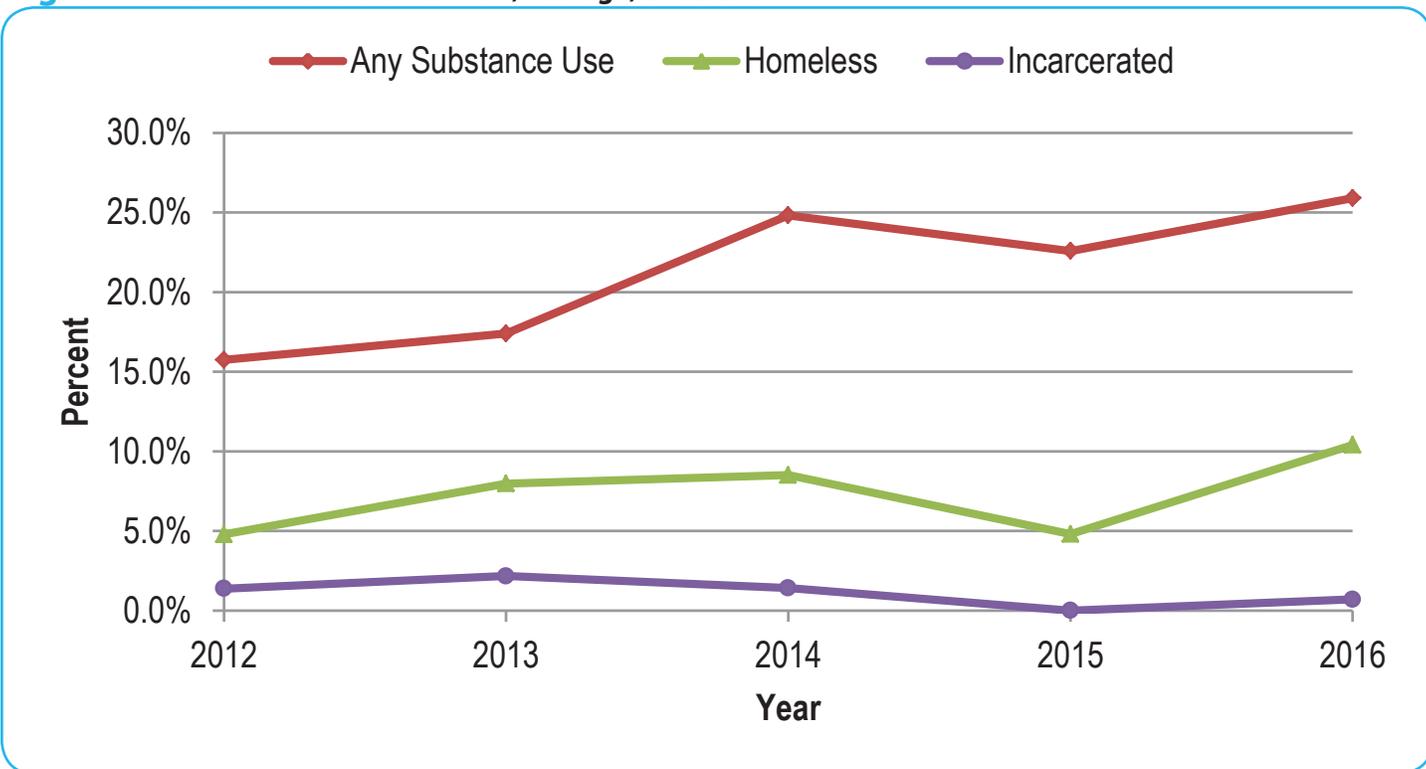
**Figure 11. Mode of TB Therapy, Chicago, 2011-2015**



◀ **Figure 11.** Directly observed therapy is the standard of care for treatment of TB. CDPH's TB program prioritizes patients to receive DOT based on infectiousness and risk factors for treatment adherence. In 2016, 91% of TB cases received either DOT only (38%) or a combination of both DOT and self-administered therapy (53%).

## Risk Factors and Tuberculosis

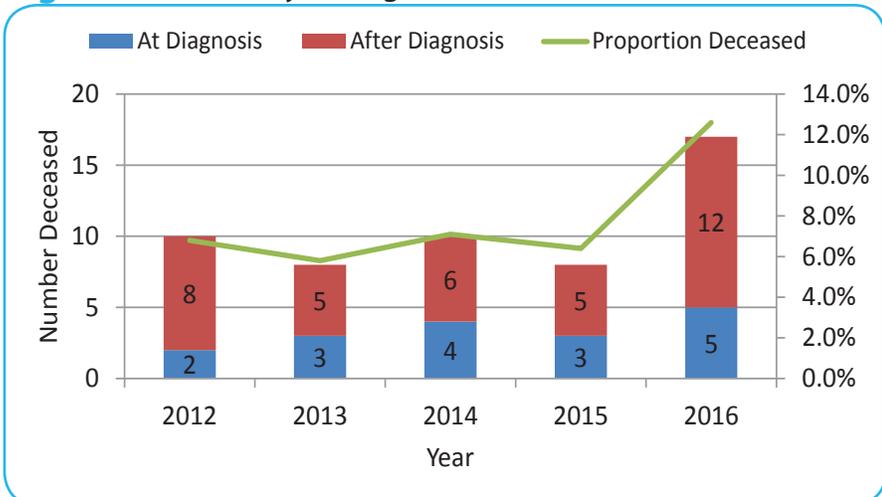
**Figure 12.** Risk factors for TB disease, Chicago, 2012-2016



▲ **Figure 12.** More than one in 4 of TB cases reported substance use in 2016 (N=35). Among those, alcohol was the most commonly used substance. Cases among homeless persons have risen from 5% in 2015 to over 10% in 2016.

## Mortality

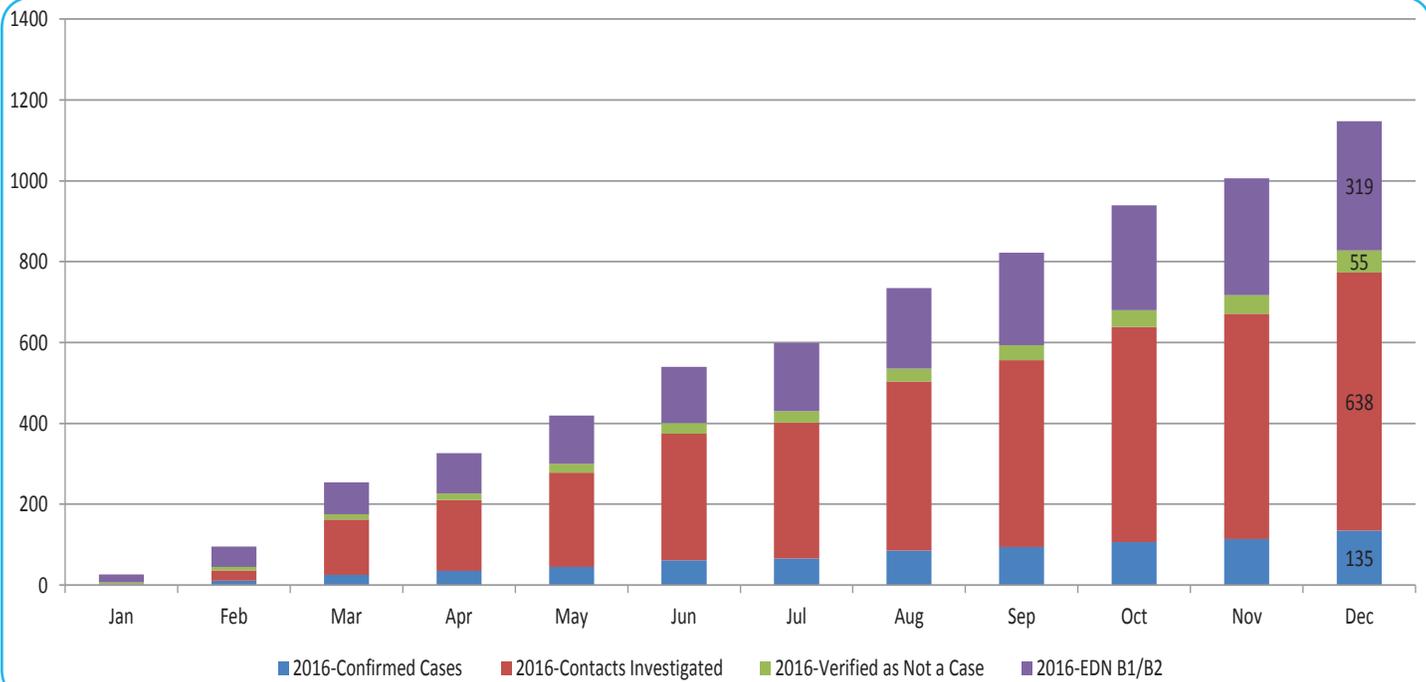
**Figure 13.** Mortality, Chicago, 2012-2016



◀ **Figure 13.** There were 17 deaths from TB in 2016, which was a 5-year high. This was a 50% increase from 2015 with 8 deaths.

## Individual Persons Serviced

**Figure 14. Individual Persons Serviced by CDPH TB Program, Chicago, 2016**



▲ **Figure 14.** In 2016 the CDPH TB Unit serviced 1,147 unique persons in the city of Chicago. Of those serviced, 12% were incident TB cases (N=135), 56% were individuals identified in contact investigations (N=638), 28% were refugees or immigrants (N=319) and the remaining 5% (55) were suspects determined not a case or interjurisdictional transfers from other areas.

## Chicago Community Areas

**Table 4. Map Key- Chicago Community Areas**

Ref #	Chicago Community Area	Ref #	Chicago Community Area
1	Rogers Park	40	Washington Park
2	West Ridge	41	Hyde Park
3	Uptown	42	Woodlawn
4	Lincoln Square	43	South Shore
5	North Center	44	Chatham
6	Lake View	45	Avalon Park
7	Lincoln Park	46	South Chicago
8	Near North Side	47	Burnside
9	Edison Park	48	Calumet Heights
10	Norwood Park	49	Roseland
11	Jefferson Park	50	Pullman
12	Forest Glen	51	South Deering
13	North Park	52	East Side
14	Albany Park	53	West Pullman
15	Portage Park	54	Riverdale
16	Irving Park	55	Hegewisch
17	Dunning	56	Garfield Park
18	Montclair	57	Archer Heights
19	Blemond Cragin	58	Brighton Park
20	Hermosa	59	McKinley Park
21	Avondale	60	Bridgeport
22	Logan Square	61	New City
23	Humboldt Park	62	West Elsdon
24	West Town	63	Gage Park
25	Austin	64	Clearing
26	West Garfield Park	65	West Lawn
27	East Garfield Park	66	Chicago Lawn
28	Near West Side	67	West Englewood
29	North Lawndale	68	Englewood
30	South Lawndale	69	Greater Grand Crossing
31	Lower West Side	70	Ashburn
32	Loop	71	Auburn Gresham
33	Near South Side	72	Beverly
34	Armour Square	73	Washington Heights
35	Douglas	74	Mount Greenwood
36	Oakland	75	Morgan Park
37	Fuller Park	76	O'Hare
38	Grand Boulevard	77	Edgewater
39	Kenwood		

## Technical Notes

Data presented in this report come from Illinois' National Electronic Disease Surveillance System (I-NEDSS). Data as are of June 2017.

Percentages may not sum to 100 due to rounding.

Age is calculated based on date TB case was reported to CDPH.

### Tuberculosis Case Definitions:

#### 1. Laboratory case definition

- a. Isolation of *M. tuberculosis* complex from a culture of a clinical specimen, using an FDA-approved test  
**or**
- b. Demonstration of *M. Tuberculosis* from a clinical specimen using FDA-approved nucleic acid amplification test (NAAT). (A positive test means that the probe detected ribosomal RNA from the *M. tuberculosis* complex in the clinical specimen.)

#### 2. Clinical case definition

- a. Full diagnostic evaluation
  - i. Tuberculin skin test (TST) or interferon gamma release assay (IGRA) test
  - ii. Chest X-ray/imaging
  - iii. Clinical specimens for culture/NAAT
  - iv. Risk factor evaluation: host factors (e.g., documented immunosuppression) and environmental factors (e.g., contact to active case, born in country with endemic TB, travel to endemic country)
- and**
- b. Lab test indicative of infection
  - i. Positive TST and/or
  - ii. Positive IGRA or
  - iii. Negative TST or IGRA with reason for not positive (immunosuppression)
- and**
- c. Signs or symptoms compatible with TB disease  
**and**
- d. Improvement of signs or symptoms after treatment with two or more anti-TB drugs

**For more information on tuberculosis in Chicago, please visit  
our website at:**

**[http://www.cityofchicago.org/city/en/depts/cdph/provdrs/clinic/svcs/tb\\_prog.html](http://www.cityofchicago.org/city/en/depts/cdph/provdrs/clinic/svcs/tb_prog.html)**

