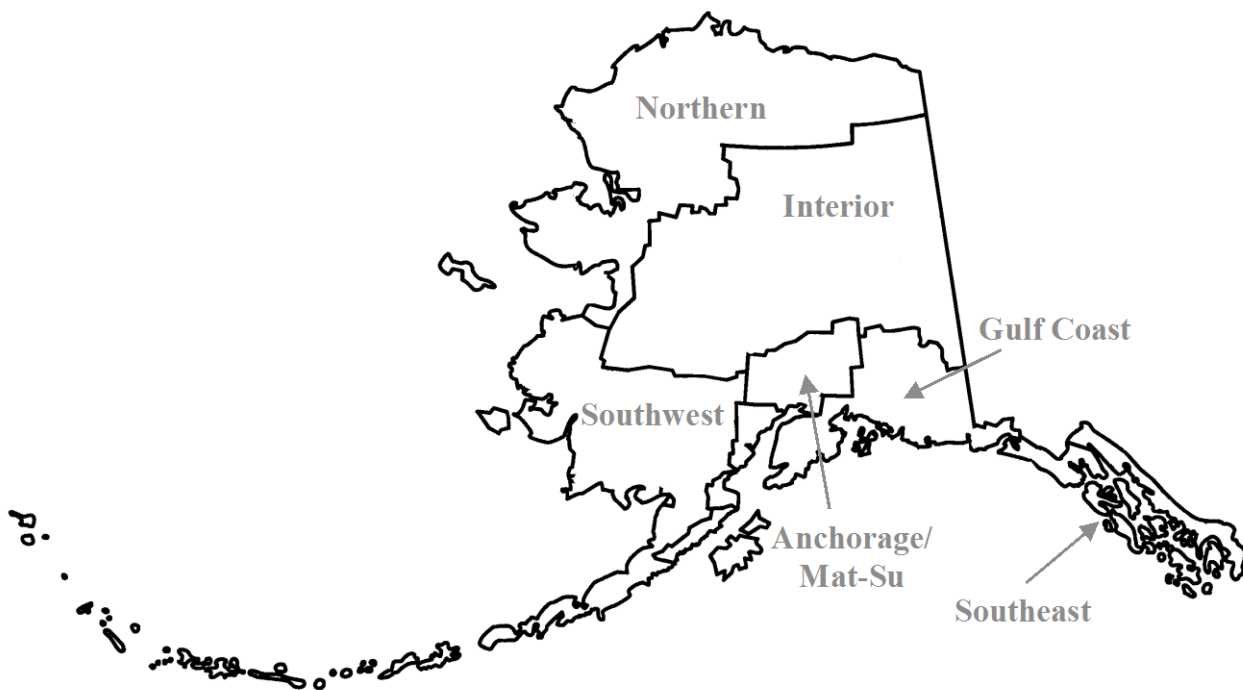


# Tuberculosis in Alaska

## 2015 Annual Report



### **STATE OF ALASKA**

Department of Health and Social Services  
Division of Public Health  
Section of Epidemiology

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## **Executive Summary**

In 2015, Alaska reported 68 confirmed cases of tuberculosis (TB), or 9.2 cases per 100,000 people. Southwest and Northern regions continue to record the highest rates in the state, and the Alaska Native population continues to bear a disproportionate burden. There are numerous unique challenges in Alaska which continue to contribute to high rates of disease. A historically very high rate of TB in the mid-20<sup>th</sup> century has led to large numbers of latently infected individuals in rural regions of the state. Many of these regions are roadless and suffer from limited healthcare infrastructure. Social challenges in these areas, such as household crowding, and the great distances sometimes required to receive medical care can facilitate the transmission of TB.

In spite of these ongoing challenges, notable successes and improvements in TB control occurred in 2015: A transition to a risk-based school screening system has resulted in marked cost-savings to the state and decreased unnecessary TB testing for low risk children. Continued adoption of shorter course treatment for latent infection with a three-month isoniazid and rifapentine regimen has led to improved treatment completion. A focus on enhanced contact investigations will lead to improved outcomes for individuals at high risk for TB infection and disease. An interactive training module for community-based directly observed therapy aides was created. Finally, much progress was made in 2015 with regards to the state's electronic TB program area module, which will improve all facets of case management.

In 2015, the number of reported cases of TB in the United States increased for the first time in decades. A shift towards identifying and successfully treating individuals at high risk for latent TB infection (LTBI) has been discussed as a strategy to improve TB rates, as the effectiveness of traditional approaches seems to have plateaued. In the coming years, it will be important for Alaska to not only continue the current TB control efforts but also move towards a more systematic approach towards LTBI surveillance and treatment.

## Summary Statistics

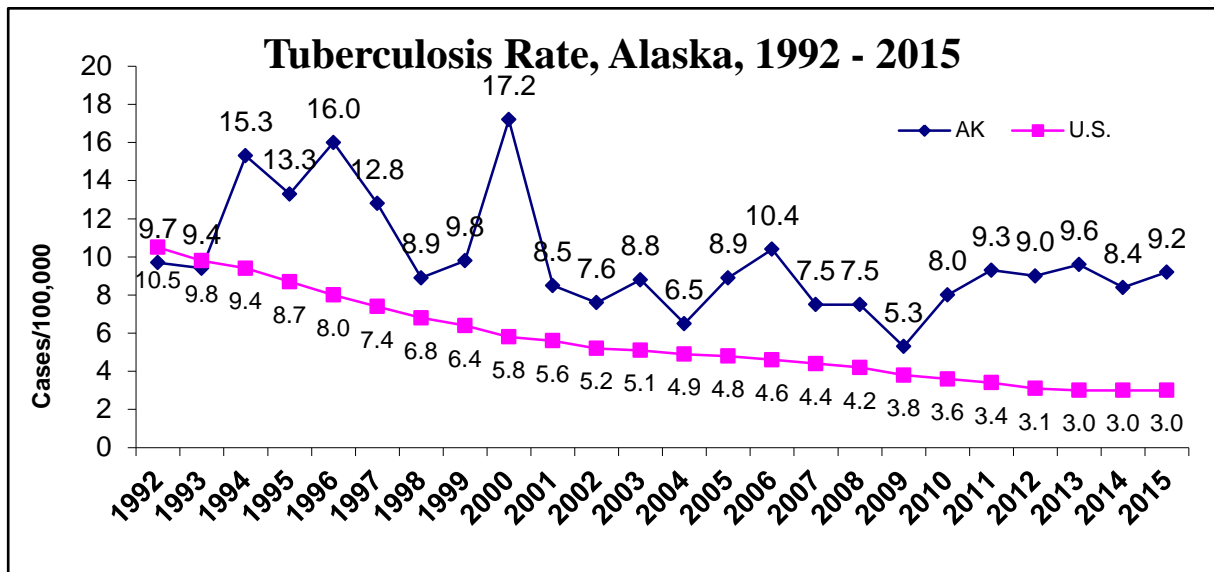
	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015*</b>
No. of TB cases	57	67	66	71	62	68
Alaska population	710,231	722,190	732,298	736,399	736,337	737,625
Alaska case rate (per 100,000)	8.0	9.3	9.0	9.6	8.4	9.2
USA case rate (per 100,000)	3.6	3.4	3.2	3.0	3.0	3.0
Alaska population 0-14 years	170,398	158,322	158,865	159,860	159,846	158,116
No. 0-14 yrs old (% total) (cases/100,000)	3 (5%) (1.8)	6 (9%) (3.8)	9 (14%) (5.7)	9 (13%) (5.6)	2 (3%) (1.3)	13 (19%) (20.4)
No. foreign born (% total)	10 (18%)	16 (24%)	12 (18%)	16 (23%)	12 (19%)	8 (12%)
No. homeless in Anchorage (cases/100,000)	6 (150)	12 (300)	2 (50)	5 (125)	8 (200)	9 (82)
No. with isoniazid-resistant TB	1	7	2	4	5	11
No. with multiple drug resistant TB (MDR-TB)*	1	4	1	0	1	0
No. offered HIV testing (% of total)	47 (82%)	58 (87%)	55 (83%)	62 (87%)	58 (94%)	54 (79%)
No. TB cases infected with HIV	1	1	0	0	0	0
No. drug use (IV & non-IV) (% total)	6 (11%)	11 (16%)	15 (23%)	7 (10%)	6 (10%)	14 (21%)
No. excessive alcohol use (% total) aged >14	24 (44%)	29 (48%)	30 (52%)	21 (35%)	25 (42%)	21 (40%)

*\*Some 2015 data are incomplete*

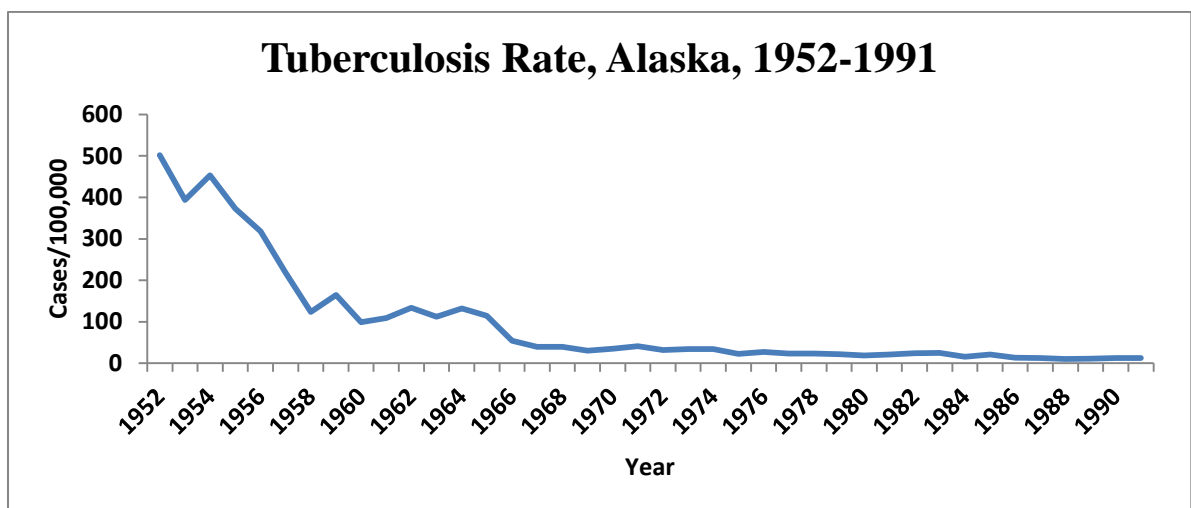
## Trends in Tuberculosis

### *Incidence of Tuberculosis*

In 2015, 68 cases of tuberculosis (TB) were reported to the Alaska Tuberculosis Program for an incidence of 9.2 cases per 100,000 population. This represents a 10% increase from the prior year. The United States tuberculosis incidence was again 3.0 cases per 100,000 in 2015, with a slight increase in cases reported nationally for the first time in two decades.



Historically, Alaska experienced some of the highest rates of TB morbidity and mortality seen anywhere in the world, at any time, in the early and mid-20<sup>th</sup> century. Great progress was made in rapidly reducing the burden of disease seen during this time, as noted in the figure below, and much of the TB activity in Alaska today is related to this legacy and ongoing challenges in Alaska of health care infrastructure and geography.



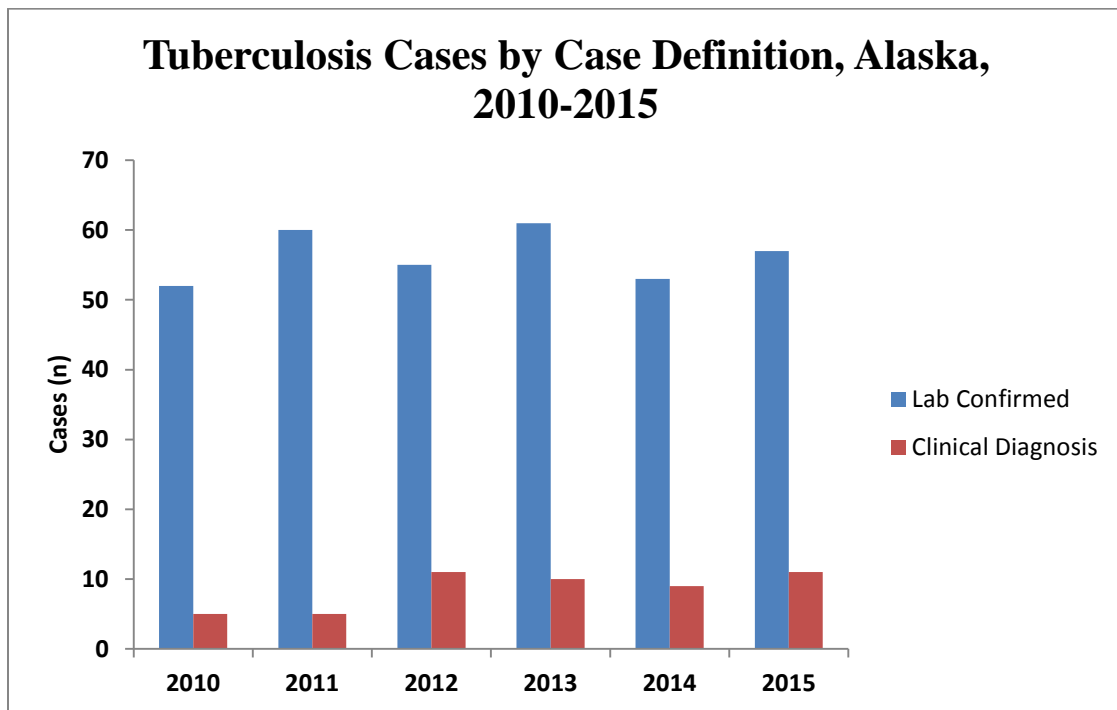
Alaska was one of 28 states and the District of Columbia that had a higher incidence of tuberculosis in 2015 compared to 2014.

Alaska was one of nine reporting areas with a tuberculosis rate that exceeded the national average. The states and district with the highest TB rates are listed below.

<b>States and district with the highest incidence of tuberculosis, 2015</b>			
<b>State or District</b>	<b>Number Cases</b>	<b>Incidence of TB</b>	<b>Population</b>
Alaska	68	9.2	737,625
Hawaii	127	8.9	1,431,603
District of Columbia	33	4.9	672,228
California	2,137	5.5	39,144,818
Texas	1,334	4.9	27,469,114

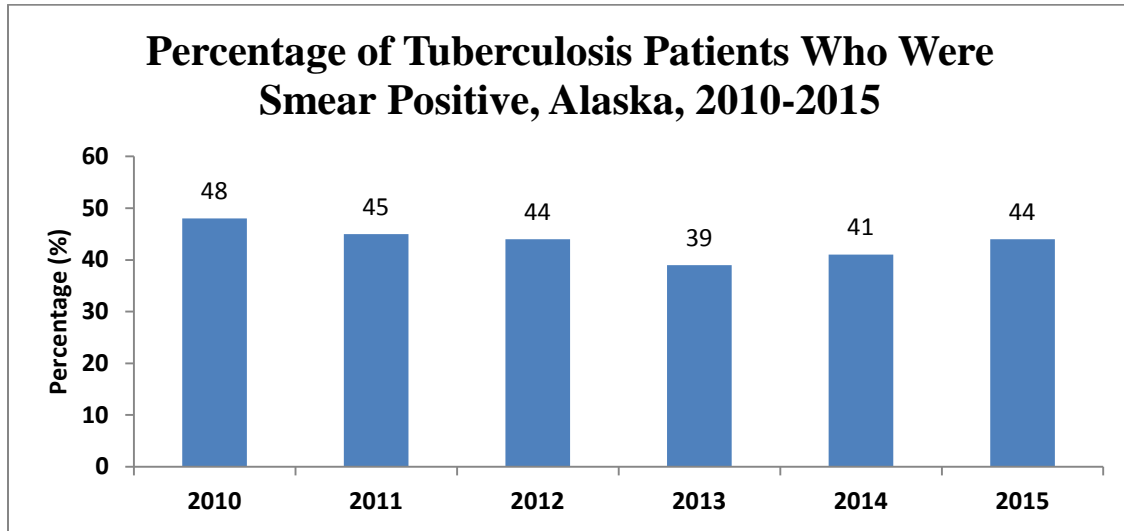
### ***Tuberculosis by Case Definition***

Cases of TB disease can be classified as either a laboratory confirmed case or a clinical case, based on CDC definitions. Laboratory confirmed cases include those with isolation of *Mycobacterium tuberculosis* from a clinical specimen, demonstration of M. tuberculosis with nucleic acid amplification, or demonstration of acid-fast bacilli when a culture is not possible or is falsely negative. While clinical cases lack laboratory confirmation, they must include certain criteria such as signs and symptoms of TB, treatment with two or more TB medications, a completed diagnostic evaluation, and either tuberculin skin test or interferon gamma release assay results. The vast majority of TB cases in Alaska are laboratory confirmed, with between 5 and 11 clinical cases diagnosed each year from 2010-2015.



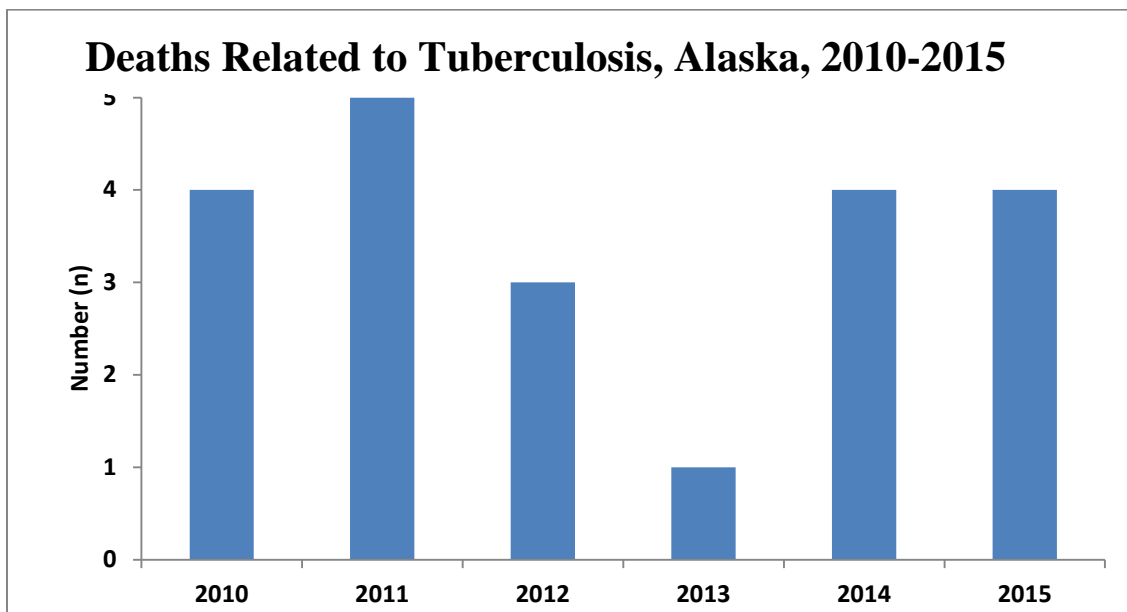
### ***Smear Status***

Individuals suspected of having TB disease will have sputum specimens sent to the laboratory to look for the bacteria that cause TB, and the specimens will be monitored for growth of TB bacteria for six weeks. Those with initial positive smears upon examination are considered to be more infectious than those with negative smears. From 2010-2015, between 39-48% of TB cases had positive smears.



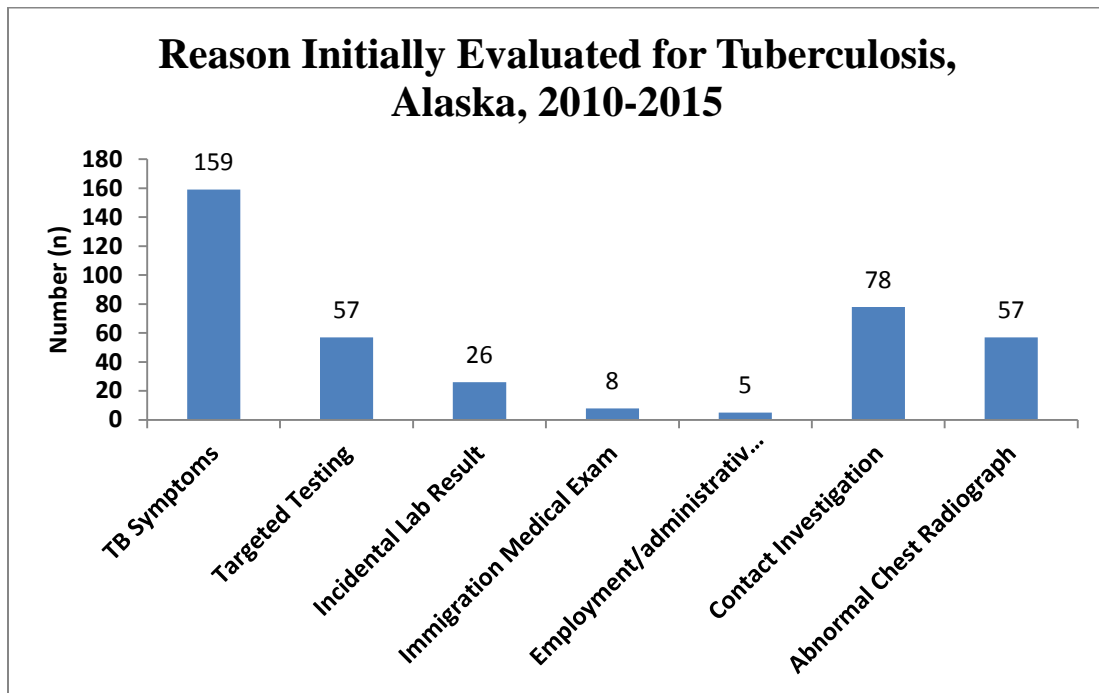
### ***Death due to Tuberculosis***

Although there are very few, most years in Alaska there are deaths attributable to TB. While individuals with TB may also die from unrelated causes, 21 deaths determined to be related to TB occurred from 2010-2015 in Alaska.



### ***Reason for Initial Evaluation***

Individuals diagnosed with TB disease in Alaska are most frequently initially evaluated for TB due to TB symptoms such as cough, fever, weight loss or night sweats, while another large proportion of TB cases are identified as part of contact investigations. Targeted testing for individuals with risk factors for TB (such as being from a country with high rates of TB), and following up abnormal radiographs which might have been obtained for other reasons are other common ways that individuals with TB are first evaluated.

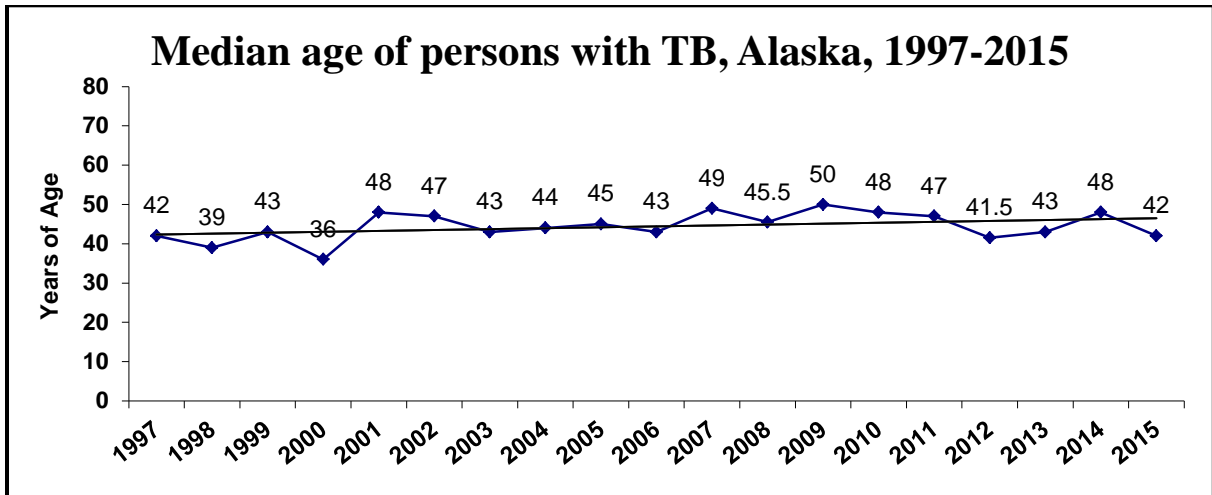




## Demographics of TB in Alaska

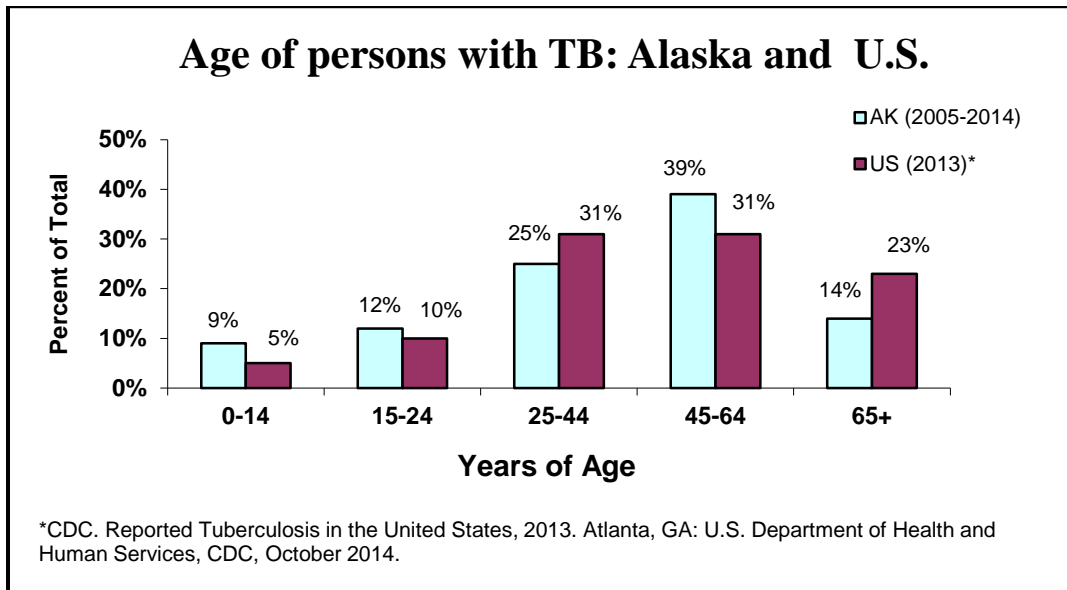
### *Age*

In 2015, the mean age of persons with TB was 42 years; the median age was 47 years. Since 1997, the median age has increased.



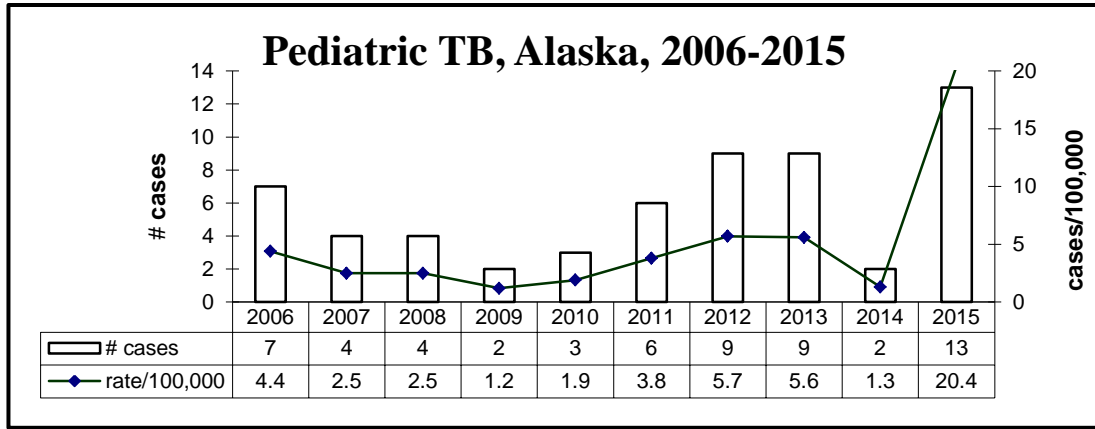
### *Pediatric TB*

The proportion of TB cases under 15 years of age is greater in Alaska compared to the U.S. overall, but this trend is less apparent when looking at age data from 2005 to 2014. The median age of persons with TB in Alaska is similar to that of the United States overall.



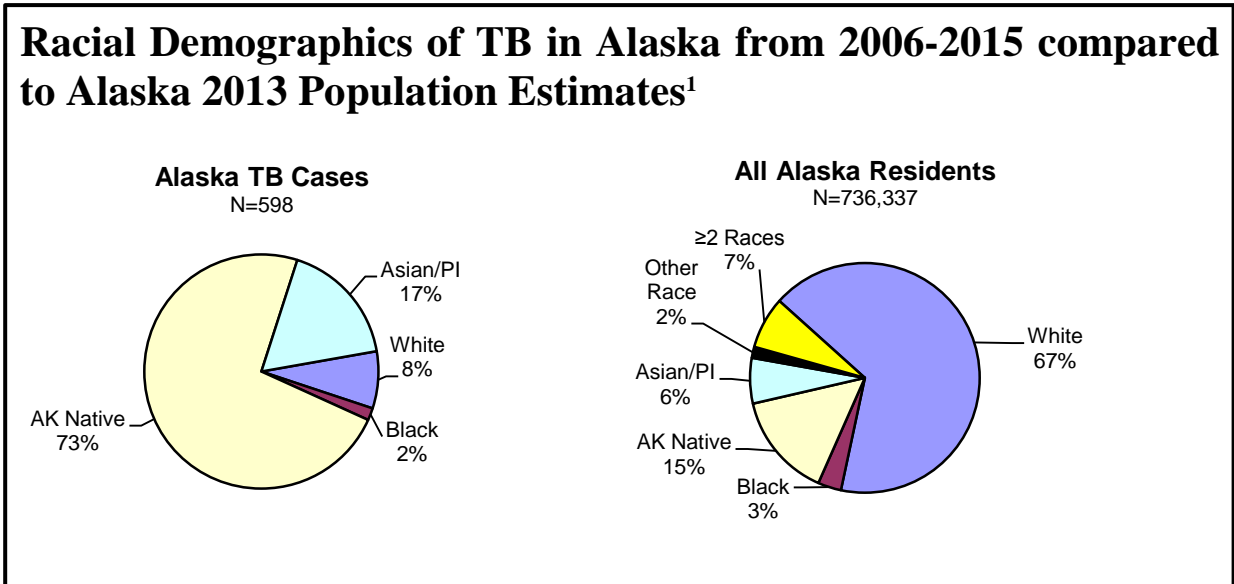
For the purposes of this report, a child is anyone less than 15 years of age. In 2015 thirteen children were diagnosed and treated for tuberculosis, a rate of 20.4 cases per 100,000

children. The rate of pediatric TB in Alaska has ranged from a high of 20.4 cases per 100,000 to a low of 1.2 cases per 100,000 children over the past 10 years. The mean rate over the past 10 years, 2006 – 2015, was 4.9 cases/100,000 children.



### Race

Between 2006 and 2015, a total of 598 cases of TB were reported to the Alaska TB Program. Alaska Native and Asian/Pacific Islanders continue to bear a disproportionate burden of TB in Alaska. Seventy percent (411) of TB cases were Alaska Native, although this group represents only ~15% of the general population. Nineteen percent (114 cases) were Asian or Pacific Islanders compared with ~6% of the general population. Only 9% (53 cases) of TB cases were white and 2% (11 cases) were African American.

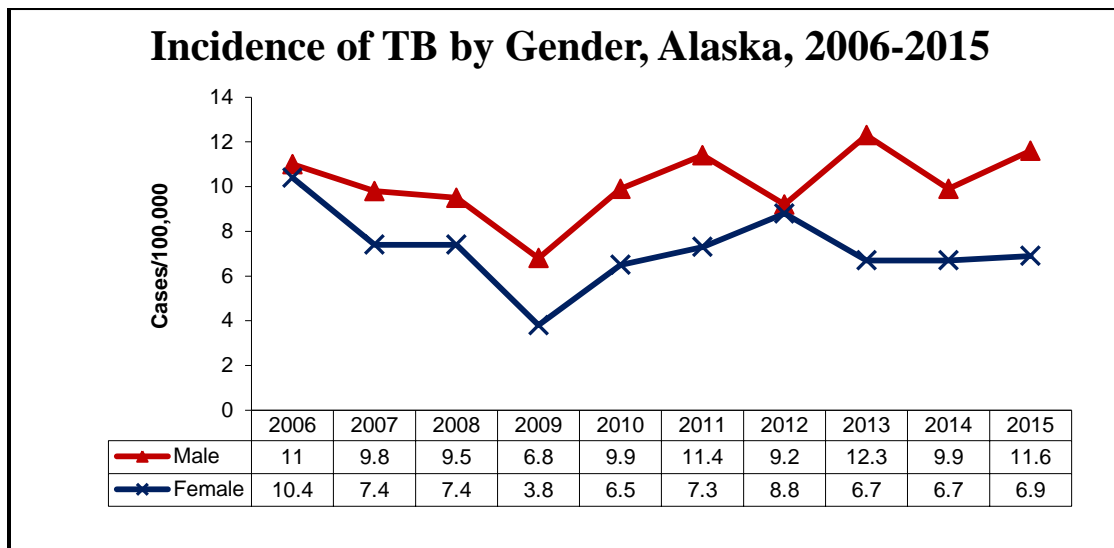


<sup>1</sup> <http://www.labor.state.ak.us/research/pop/popest.htm>

<b>Cases and rates of tuberculosis by race from 2008-2015</b>																
<b>Race</b>	<b>2008</b>		<b>2009</b>		<b>2010</b>		<b>2011</b>		<b>2012</b>		<b>2013</b>		<b>2014</b>		<b>2015</b>	
	Cases / Rate	Cases / Rate	Cases / Rate	Cases / Rate	Cases / Rate	Cases / Rate	Cases / Rate	Cases / Rate	Cases / Rate	Cases / Rate	Cases / Rate	Cases / Rate	Cases / Rate	Cases / Rate	Cases / Rate	
White	5	1.0	2	0.4	5	1.2	7	1.5	4	0.8	4	0.8	2	0.4	3	0.6
Black	2	6.6	1	3.2	2	6.5	1	4.3	1	3.0	0	0	0	0	0	0
Alaska Native	33	27	25	20	41	33	47	38	52	43	54	44	47	38	56	48
Asian/Pacific Islander	10	26	9	23	9	23	12	32	8	15	13	23	13	23	9	17
Total	50	7.3	37	5.3	57	8.0	67	9.3	66	9.0	71	9.6	62	8.4	68	9.2

**Gender**

In 2015, 65% of TB case-patients were male. Over the past 10 years, 62% of 598 cases were male and 38% were female.



**Homelessness**

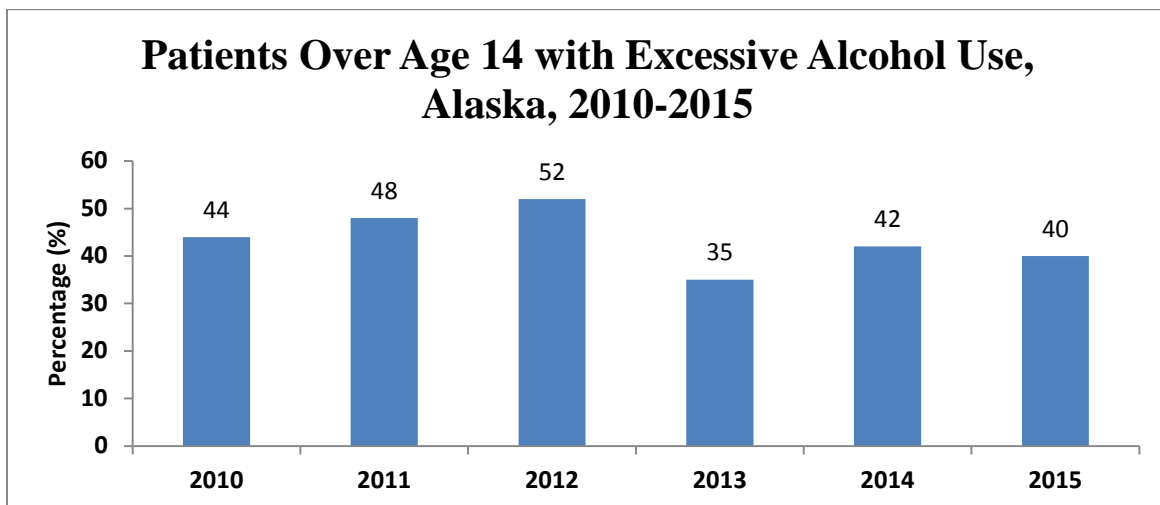
In 2015, 9 of 68 (13%) TB case-patients were reported to be homeless. Six cases were from Anchorage, while two homeless persons were from the Northern region, and one from the Southwest region. Estimated total homeless persons from 10/1/2014 to 9/30/2015 in Anchorage were 7,372 (2015 Annual Homeless Assessment Report), providing a rate of 82 homeless persons with TB per 100,000.

<b>Number and Location of Homeless Persons with TB, 2008-2015</b>								
Location	2008	2009	2010	2011	2012	2013	2014	2015
Anchorage/MatSu Region	8	3	7	12	2	5	8	6
Northern Region	1	1	4	1	2	1	3	2
Southwest Region	2	0	1	0	2	1	2	1
Southeast Region	1	0	0	2	0	0	0	0
Gulf Coast Region	0	0	0	0	0	0	0	0
Interior Region	0	0	0	0	0	0	1	0
<b>Statewide Total</b>	12	4	12	15	6	7	14	9
%TB cases homeless	24%	11%	21%	22%	10%	10%	23%	13%

There had been a decline in new tuberculosis cases among homeless persons in Anchorage from 2006 to 2009, and the years 2010 and 2011 showed a resurgence, with outbreak clusters noted in 2010 and 2011. TB screening for homeless individuals is an ongoing challenge. A high proportion of homeless people have long-standing latent TB infection. Therefore TB skin testing is not useful for measuring ongoing TB transmission in shelters and other organizations that serve this population. Symptom screening coupled with sputum tests have become the tools of choice in this population. The Municipality of Anchorage Department of Health and Human Services performs targeted TB screening among the homeless population on a regular basis.

### ***Excessive Alcohol Use***

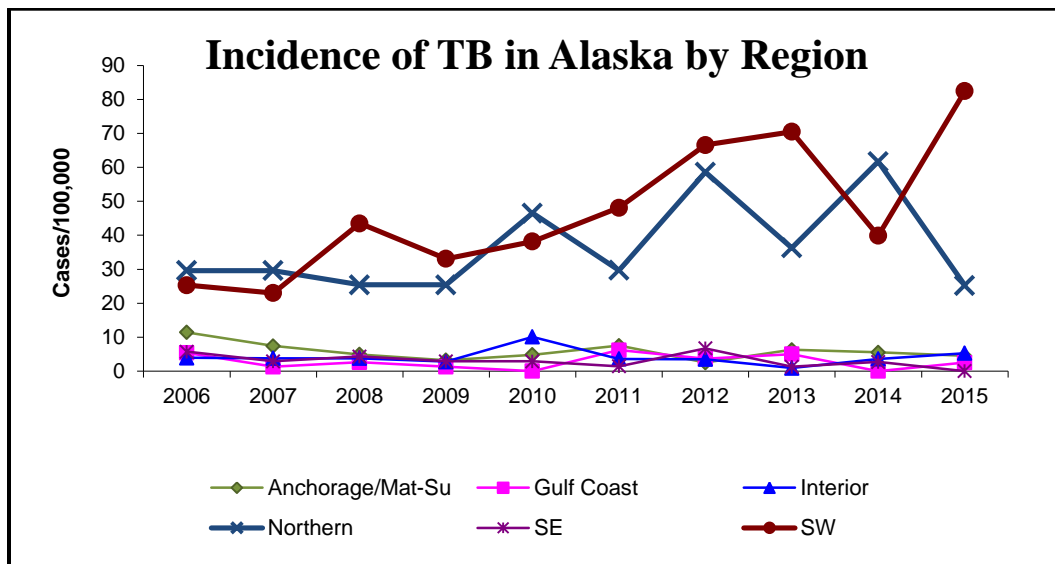
Heavy alcohol use is associated with TB. Both a pathogenic impact on the immune system and social links likely play a role in this association. Poorer outcomes such as death during treatment, treatment interruptions, and poorer culture conversion have been associated with excessive alcohol use. Nationally, approximately 15% of TB patients have excessive alcohol use documented. In Alaska, between 35-52% of individuals diagnosed with TB from 2010-2015 had excessive alcohol use documented.



### Regional trends

The incidence of tuberculosis is not evenly distributed throughout the state. The highest rates are found in the Northern and Southwest regions of the state, which also have relatively higher proportions of Alaska Native residents. The six regions of the state are shown in the map on the title page of this document.

<b>Number and incidence of TB cases by region, Alaska, 2010-2015</b>						
<b>Region</b>	<b>2010</b> (cases/100,000)	<b>2011</b> (cases/100,000)	<b>2012</b> (cases/100,000)	<b>2013</b> (cases/100,000)	<b>2014</b> (cases/100,000)	<b>2015</b> (cases/100,000)
Anch/Mat-Su	18 ( 4.8)	29 ( 7.5)	10 ( 2.5)	25 ( 6.3)	22 ( 5.5)	18 ( 4.5)
Gulf Coast	0 ( 0.0)	5 ( 6.2)	3 ( 3.7)	4 ( 5.0)	0 ( 0.0)	2 ( 2.5)
Interior	11 (10.1)	4 ( 3.6)	4 ( 3.5)	1 ( 0.9)	4 ( 3.6)	6 ( 5.3)
Northern	11 (46.5)	8 (29.7)	16 (58.6)	10 (36.3)	17 (61.7)	7 (25.2)
Southeast	2 ( 2.9)	1 ( 1.4)	5 ( 6.7)	1 ( 1.3)	2 ( 2.7)	0 ( 0.0)
Southwest	15 (38.2)	20 (48.1)	28 (66.6)	30 (70.5)	17 (39.9)	35 (82.5)
STATE TOTAL	57 ( 8/0)	67 ( 9.3)	66 ( 9.0)	71 (9.6)	62 ( 8.4)	68 ( 9.2)



The Northern Region includes the North Slope, Maniilaq and Norton Sound areas. The Norton Sound area usually reports the greatest number of TB cases for this region. In 2015, the incidence of TB in the Northern Region was 25.2 cases per 100,000 population, a decrease from a rate of 61.7 the previous year.

The Southwest Region includes the Yukon-Kuskokwim (Y-K) Delta, Bristol Bay, and the Eastern Aleutian and Aleutian-Pribilof Islands. While this region has had the highest rate of

TB in Alaska for the previous three years and decreased to 39.9 cases per 100,000 in 2014, in 2015 the rate increased to 82.5. Small, rural village-based outbreaks continue to pose an ongoing challenge to TB control in Alaska.

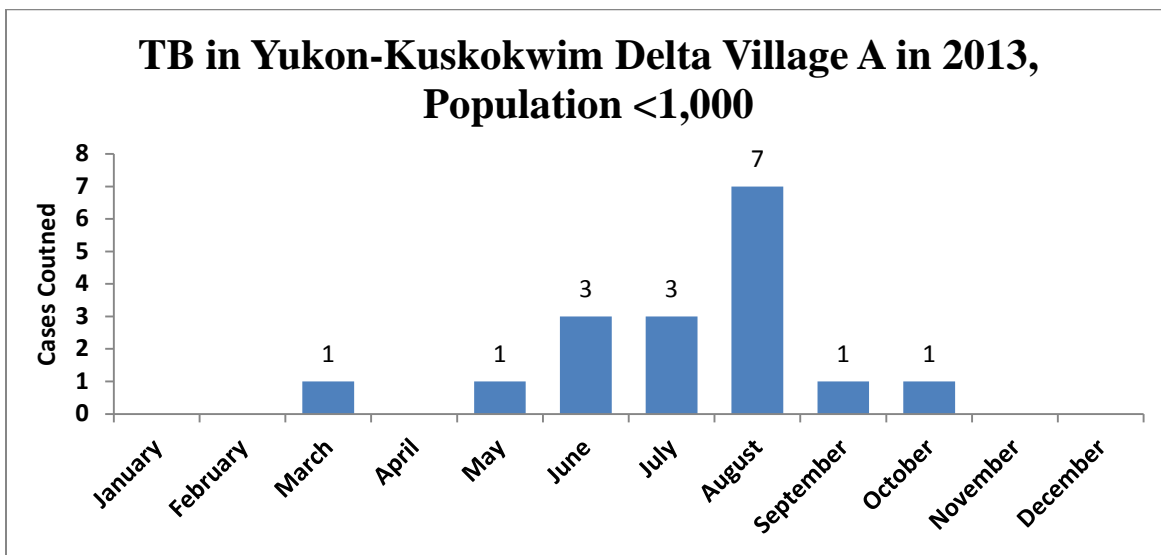
### ***Village and community outbreaks***

#### **RURAL VILLAGE OUTBREAKS:**

All isolates grown at the Alaska State Public Health Laboratory are sent to CDC for genotyping. The descriptions of notable village-based outbreaks below include genotyping (and GENTYPE) information.

#### **Village A**

The single largest YK Delta village outbreak for many years occurred in 2013. A total of 17 cases of active TB were detected in this village of less than 1,000 people in 2013. One case had compatible symptoms and was PCR positive, but smear and culture negative. The remaining 16 case-patients had positive cultures (four gastric, 12 sputa), and all shared GENTYPE G13072. Ages ranged from under 5 to over 70 years of age, and 13 of the case-patients were male. Two additional TB cases with matching G13072 GENTYPE were identified in 2014 from this and a neighboring village, with no cases reported in 2015.



#### **Village B**

Village B is located in the YK Delta Region and until 2009 had no TB activity since 1991 when a single case was reported. The last outbreak occurred in 1987, when 11 cases of TB were reported. After 19 years without any TB, a single case was reported in 2009, followed by four cases in 2010. More than 2.5% of this community had active TB. Of four isolates available for testing, all were genotype cluster AK\_0017 (PCR00015) Two more cases with this genotype were discovered in this village in 2011. In 2012, four further cases with this GENTYPE (G10422) were identified in Alaska, two from this village, one from Anchorage

and one from a village in the Northern Region with travel reported to the Southwest, although no direct contact to known active TB cases. In 2013, four new active TB cases with G10422 were reported, one from Village B. In 2014, one further case with matching GENTYPE was discovered in village B, with another in a neighboring village. After multiple village-wide assessments, no further cases were identified in 2015.

### **Village C**

In 2013, six TB cases were reported from a village of under 700, Village C, in the Northern Region, all with GENTYPE G11428. One case involved a patient who was successfully treated in 2009. While two cases were reported in 2010, 2011 and 2012 in Village D, six cases were reported in the town which serves as the hub for the village in 2012 with matching GENTYPE. The only other matching GENTYPE for Alaska is from a case-patient from another Northern village with no documented contact. Six further cases were detected in 2014 with matching GENTYPE in village C, with four matching cases detected in the hub town. Ongoing focused screening continues in this village, and three further cases were identified in 2015.

### **Village D**

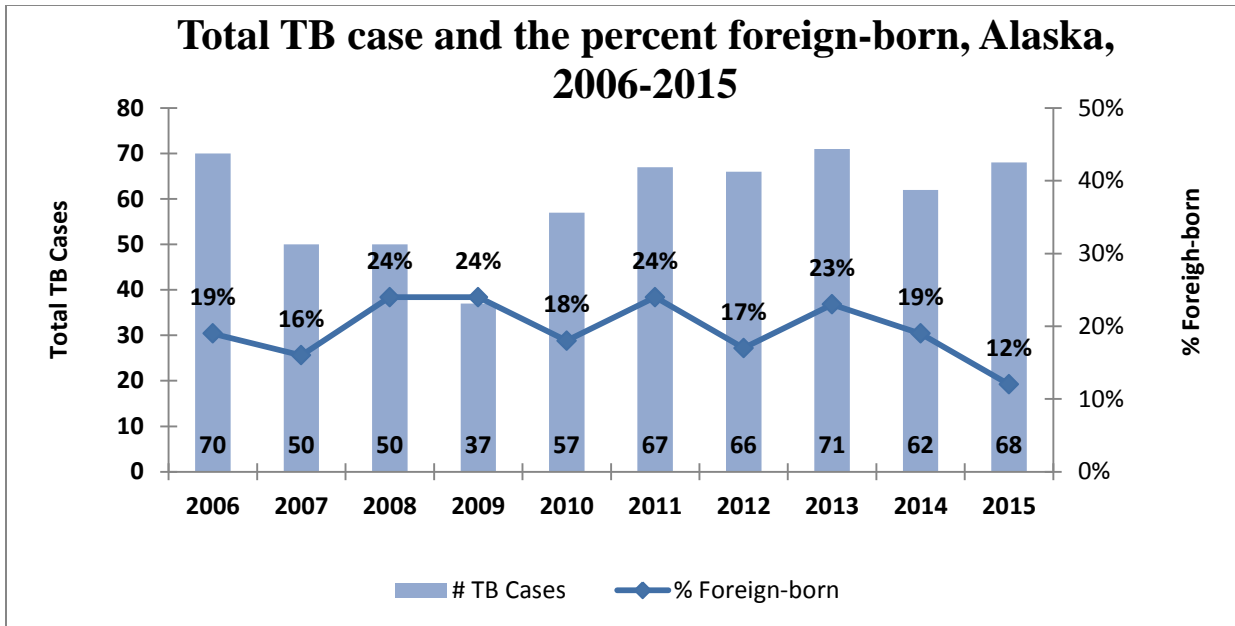
Prior to 2015, the last confirmed case of TB in village D, a village in the Southwest Region of under 700 persons, was in 1985. In January of 2015, an adult female and infant from Village D were diagnosed with TB with GENTYPE G08423, a GENTYPE previously seen predominantly in Anchorage homeless persons. Subsequent contact investigations in village D identified eight further cases of TB in this village, all with the same GENTYPE, for a rate of over 1,400 per 100,000 persons.

### **Village E**

After no TB cases detected since 2011, Village E, a village of under 800 in the Southwest Region, experienced an outbreak of TB in 2015. In February, TB was diagnosed in a young man from this village. Subsequent village-wide contact investigations identified an additional nine cases of TB in 2015. All of these cases with specimens available have been isoniazid-resistant, with the same GENTYPE (15522) not seen elsewhere in Alaska.

### ***Foreign-born persons with TB***

In 2015, 8 (12%) of 68 TB cases were in foreign-born individuals, compared to 12 (19%) in 2014, 16 (23%) in 2013 and 11 (17%) in 2012. Five individuals were from the Philippines, two individuals were from Korea, and one from India. In comparison, nationally 66% of all TB case-patients were foreign-born in 2014.



Between 2010 and 2015, 70 foreign-born persons were diagnosed with tuberculosis in Alaska, representing 18% of total TB cases. They originated from 19 different countries. The Philippines was the country of origin for the majority of foreign-born TB cases with 35 (49%).

<b>Country of Origin for TB Cases Foreign-born, &gt;1 Case: 2010-2015</b>	
Country of Origin	TB Cases (%)
Philippines	35 ( 49%)
Laos	9 ( 13%)
Korea, Republic of	7 ( 10%)
Mexico	4 ( 6%)

***Non-pulmonary tuberculosis***

In 2015, five individuals had extra-pulmonary TB only (two meningeal, one each in bone, pericardium, and colon), three had both pulmonary and extra-pulmonary disease (involving the pleura, bone, and genitourinary tract), and the remaining 60 individuals had pulmonary TB only. In the past ten years, approximately 10% of all TB cases involved an extra-pulmonary site.

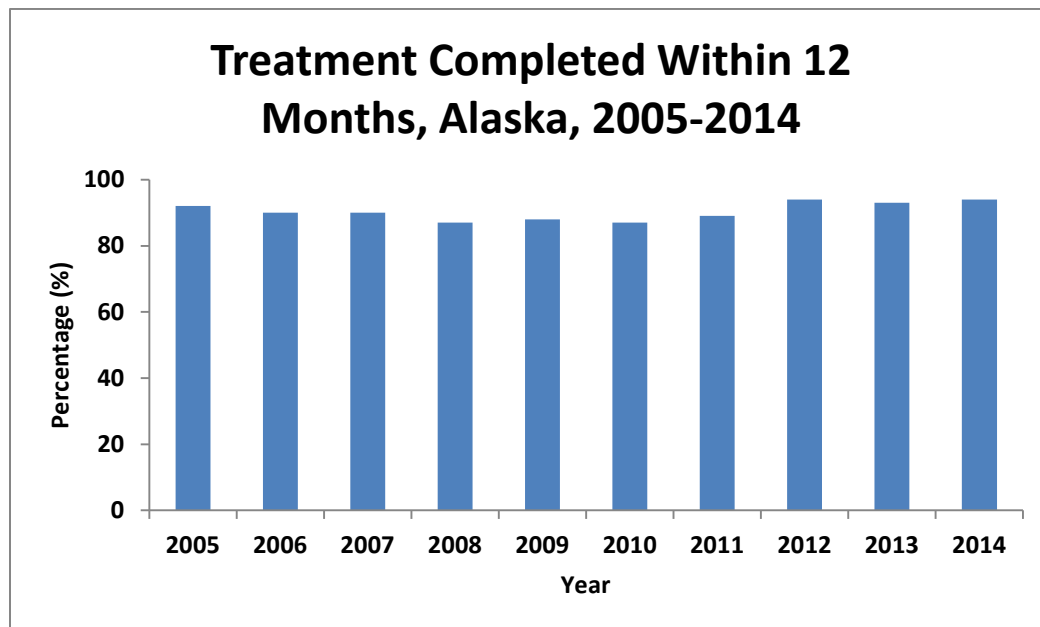


<b>Body site of non-pulmonary TB, Alaska, 2006-2015</b>											
Site	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Lymphatic: cervical	3	2	2	1	2	1	2		2		15
Genitourinary				1	1			1		1	4
Pleural	2	1	1			1		2	1	1	9
Lymphatic: intrathoracic				1			1				2
Bone/Joint		1			1	1		1	2	2	8
Pericardium					1					1	2
Meningeal				1		1				2	4
Other			1		1	1	1	1			5
Lymphatic: other							2		1		3
Ear & mastoid cells				1							1
Eye and Ear			1								1
Peritoneal						1					1
Gastrointestinal/Colon										1	1
Subcutaneous tissue	1										1
<b>Total for year</b>	<b>6</b>	<b>4</b>	<b>5</b>	<b>5</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>5</b>	<b>6</b>	<b>8</b>	<b>57</b>

## Treatment Indicators

### *Completion of Treatment*

For individuals without multidrug resistant TB, completion of therapy within 12 months is a priority, and most individuals complete therapy within 6 months. It is not unusual for the treatment period to be extended because patients develop adverse reactions to medications, requiring an alternative regimen. On other occasions, patients are non-compliant or lost to follow-up, often due to alcohol abuse. State public health law has not been particularly effective in helping us to assure treatment of non-compliant patients. Analysis of completion rates excludes those who died before completion of treatment, or those for whom treatment longer than 12 months was indicated.



### *Contact Investigation*

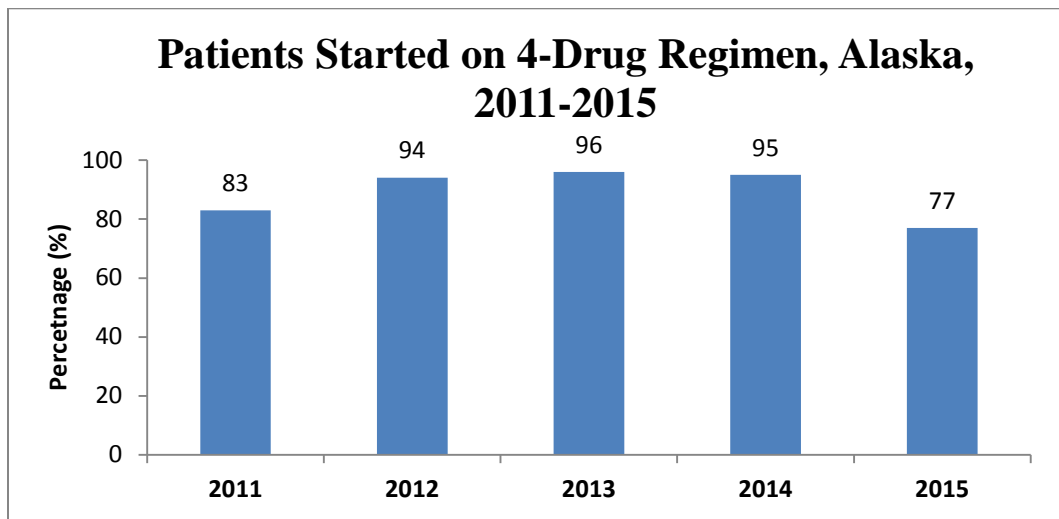
There are many challenges to identifying and locating contacts in remote Alaska, many times in villages only accessible by small aircraft. Improving our identification of contacts to active TB cases, and improving the percentage of contacts that complete therapy for latent TB infection, is a priority for the Alaska TB program. We are encouraging increased use of the 12 week isoniazid and rifampine regimen for treatment of latent TB infection, and anticipate increased completion rates among contacts identified.

<b>Alaska Contact Investigation Measures by Year, 2010-2015</b>						
<b>Year</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
Total Cases	57	67	66	71	62	68
Percentage of smear positive TB cases with contacts identified	96%	97%	100%	96%	100%	89%
Percentage of contacts evaluated for TB infection and disease	88%	87%	86%	90%	83%	64%
Percentage of infected contacts started on therapy	57%	79%	74%	80%	60%	75%
Percentage of contacts who completed therapy	59%	67%	72%	82%	67%	67%

***Recommended Initial Therapy***

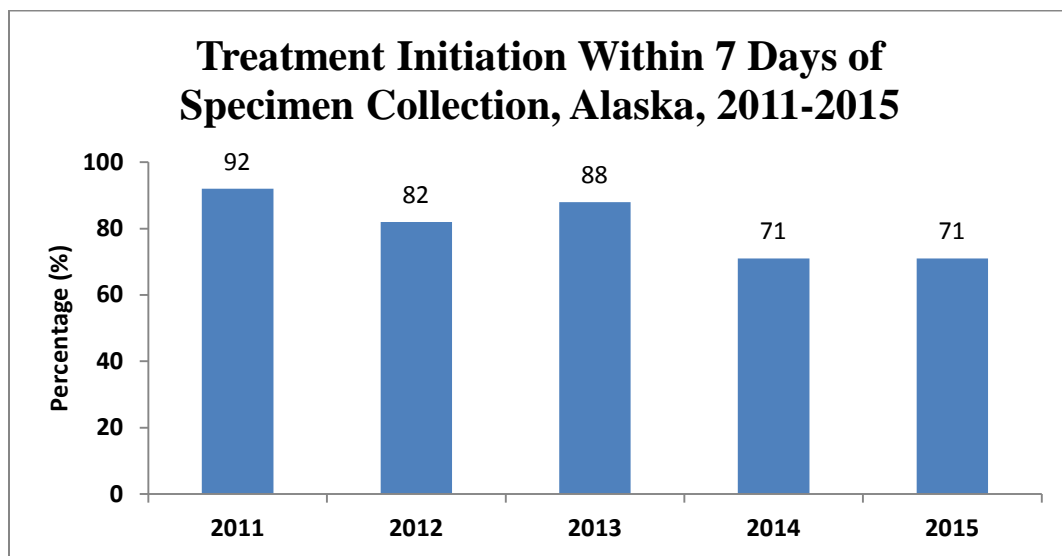
Public health nurses and providers in Alaska accept the standard four-drug regimen as the standard of care for treatment of TB disease. In cases where the TB patient is epidemiologically linked to another case with known susceptibilities, the patient may be started on a 3-drug regimen as ethambutol would not be necessary as a guard against resistant organisms.

While numbers for 2015 are still preliminary, over 94% of patients in each of the past three years have started on a four drug regimen.



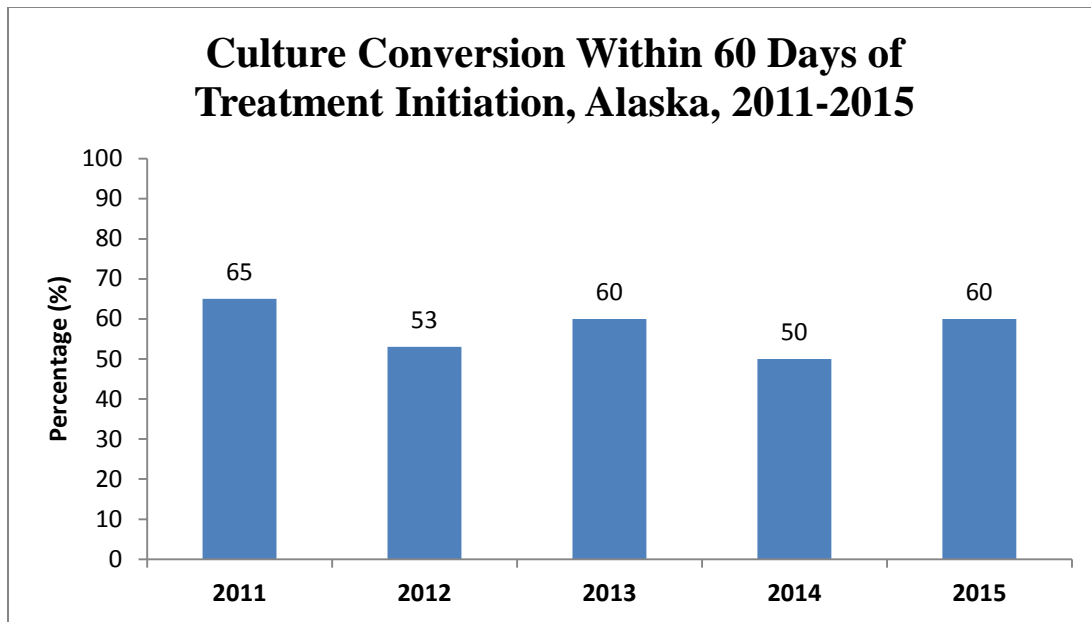
### ***Treatment Initiation***

With the unique challenges of vast geography and limited health care infrastructure that TB control in Alaska faces, getting individuals diagnosed with TB started on therapy quickly will always be a challenge. Specimens from rural Alaska may take up to 7 days (sometimes longer) to arrive at the Alaska State Public Health Laboratory, and occasionally the collection date is not written on the specimen container or requisition slip. Many specimens are collected in remote villages with community health aides (CHAs) serving as health care providers, and there is a high turn-over rate for CHAs. Education about collection and labeling of sputum specimens is an ongoing challenge. Additionally, getting medications to remote villages can sometimes take days as well. In spite of these challenges, the majority of individuals diagnosed with TB in Alaska initiate treatment within seven days.



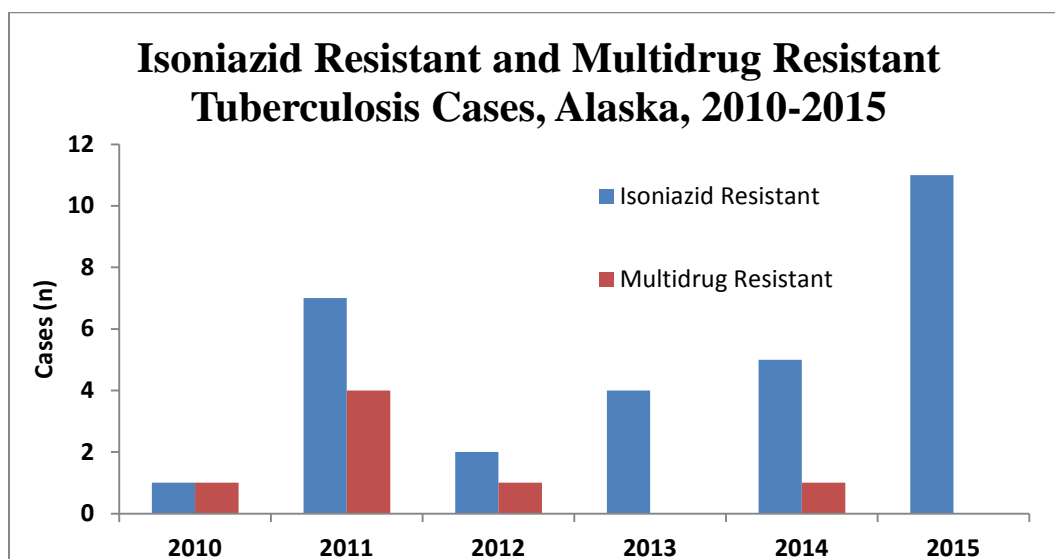
### ***Sputum Culture Conversion***

Ideally, individuals with TB disease who are culture positive will demonstrate conversion to negative cultures within sixty days of treatment initiation. Extensive disease requiring an extended treatment regimen, delays in obtaining sputum because of remote location or failure to request sputum, and poorly compliant patients continue to play significant roles in delays of documented culture conversion. Over the past five years, between 50-65% of culture positive cases documented culture conversion within sixty days. Continuing to emphasize communication between providers, collaboration between agencies, and clearly identifying roles and responsibilities will be critical in improving these numbers.



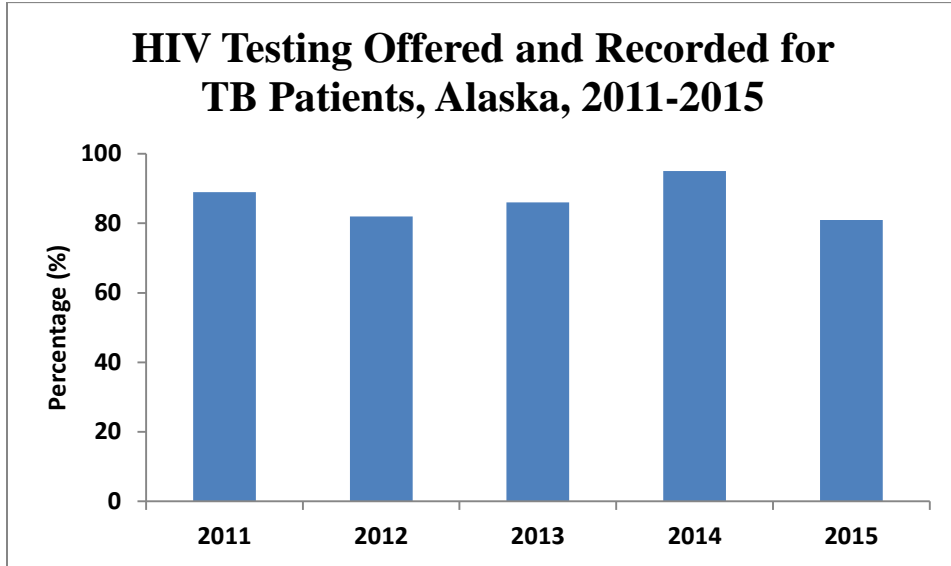
### ***Drug Resistance***

Alaska had eleven isoniazid resistant cases of TB in 2015, and no multi-drug resistant (MDR) cases. One village in Alaska, which has recently experienced an outbreak of TB, has a single isoniazid resistant strain which is responsible for all TB from this village, accounting for the high number of isoniazid resistant cases in 2015. Since 2010, Alaska has had a total of seven confirmed MDR TB cases, one each in 2010, 2012, 2014, and four in 2011. Two of the MDR cases in 2011 were from the same household with one of these cases foreign-born. The other two cases of MDR TB in 2011 were isolated cases in foreign-born individuals. The one case of MDR TB in 2012 was from an individual whose only other risk factor for TB was spending less than 10 months volunteering at various sites in a former Russian republic country just prior to illness, and the case from 2014 was in a foreign born individual from Southeast Asia.



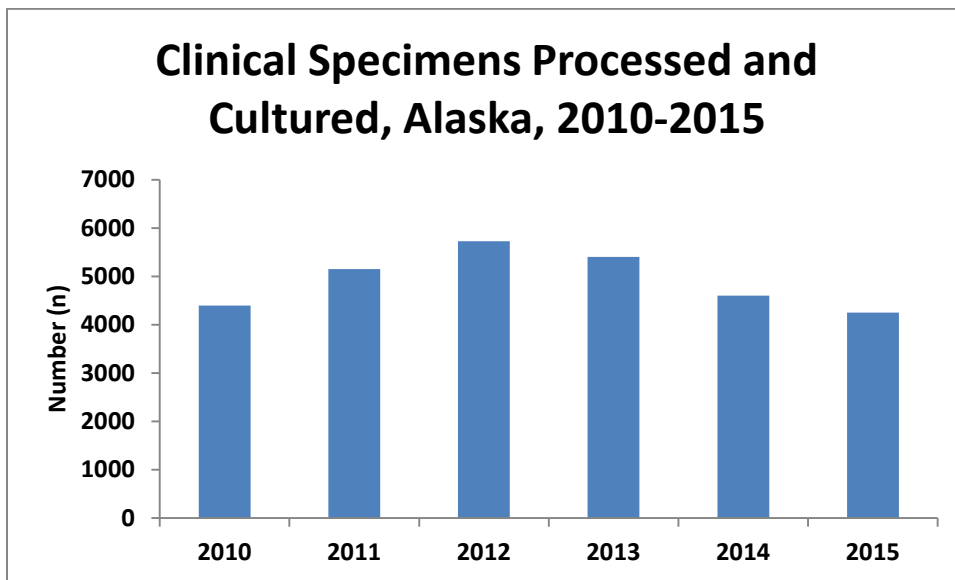
***Known HIV Status***

There has been overall acceptance of HIV testing by both providers and TB patients, and there are few barriers to HIV testing, even in the most remote parts of the state. There has only been one Alaskan co-infected with TB and HIV in the past 5 years.

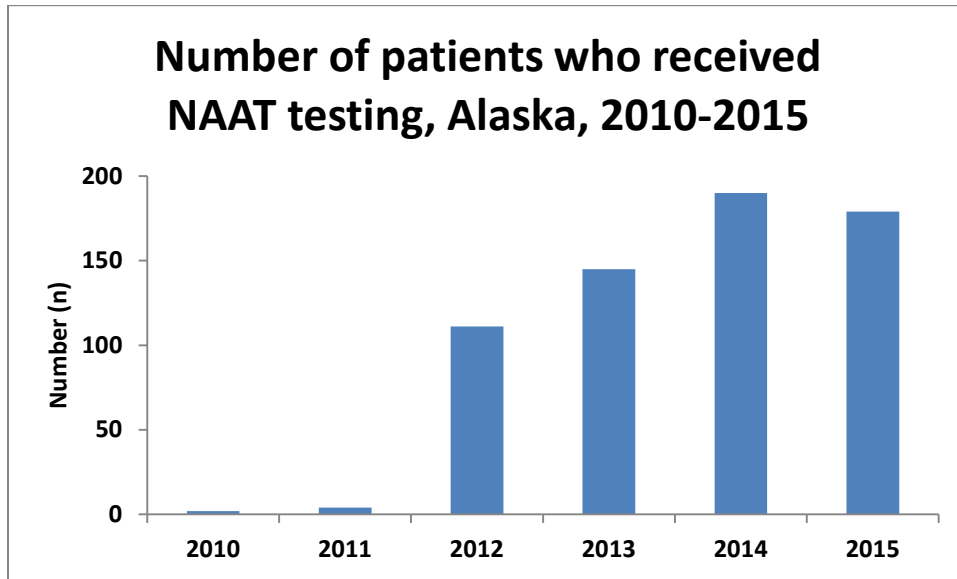


***Laboratory Testing***

The Alaska State Public Health Laboratory (ASPHL) is capable of processing patient samples, identifying mycobacteria, performing first-line drug susceptibilities, and performing nucleic acid amplification testing (NAAT) on specimens. All cultures are sent to CDC laboratories for genotyping.



ASPHL developed and validated in-house NAAT testing in 2011, and this test has proved invaluable in rapidly identifying TB DNA in specimens. They currently process close to 200 specimens per year.



## **Resources and Links**

### ***State of Alaska***

TB Control Program Website

<http://dhss.alaska.gov/dph/Epi/id/Pages/tb.aspx>

TB Control Program Annual Report

[http://dhss.alaska.gov/dph/Epi/id/Documents/01-Internal/TB\\_Report\\_2015.pdf](http://dhss.alaska.gov/dph/Epi/id/Documents/01-Internal/TB_Report_2015.pdf)

Section of Epidemiology TB Bulletins

<http://epibulletins.dhss.alaska.gov/Bulletin/DisplayClassificationBulletins/39>

TB Control Program World TB Day Webinar

<https://attendee.gotowebinar.com/recording/1988952037062514945>

Alaska TB Control Manual

[http://dhss.alaska.gov/dph/Epi/id/Documents/01-Internal/TB\\_Manual.pdf](http://dhss.alaska.gov/dph/Epi/id/Documents/01-Internal/TB_Manual.pdf)

### ***Centers for Disease Control and Prevention***

Main TB Website

<https://www.cdc.gov/tb/>

National TB Indicators Project

<http://www.cdc.gov/tb/publications/factsheets/statistics/ntip.htm>

TB Glossary of terms

<https://www.cdc.gov/tb/topic/basics/glossary.htm>