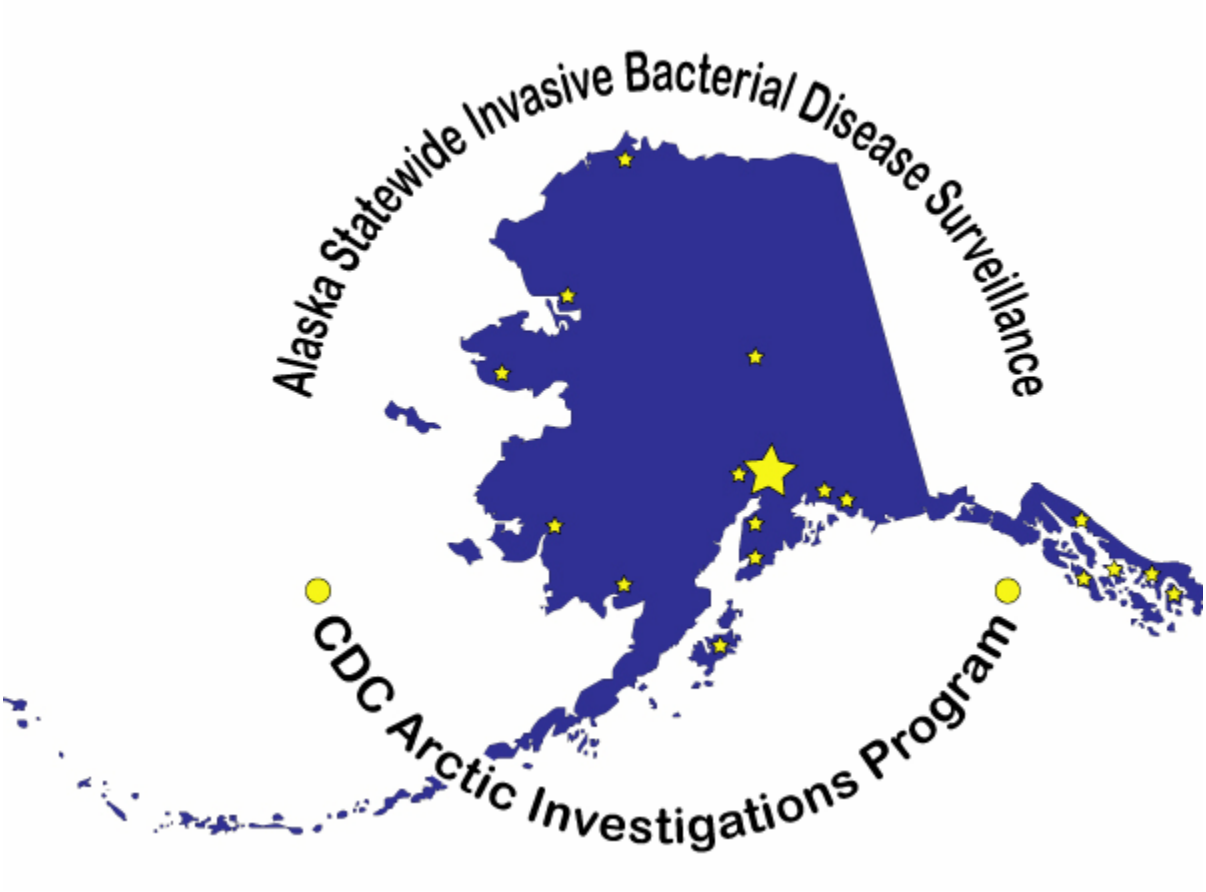

Surveillance of Invasive Bacterial Disease in Alaska – 2000

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Alaska Statewide Invasive Bacterial Disease

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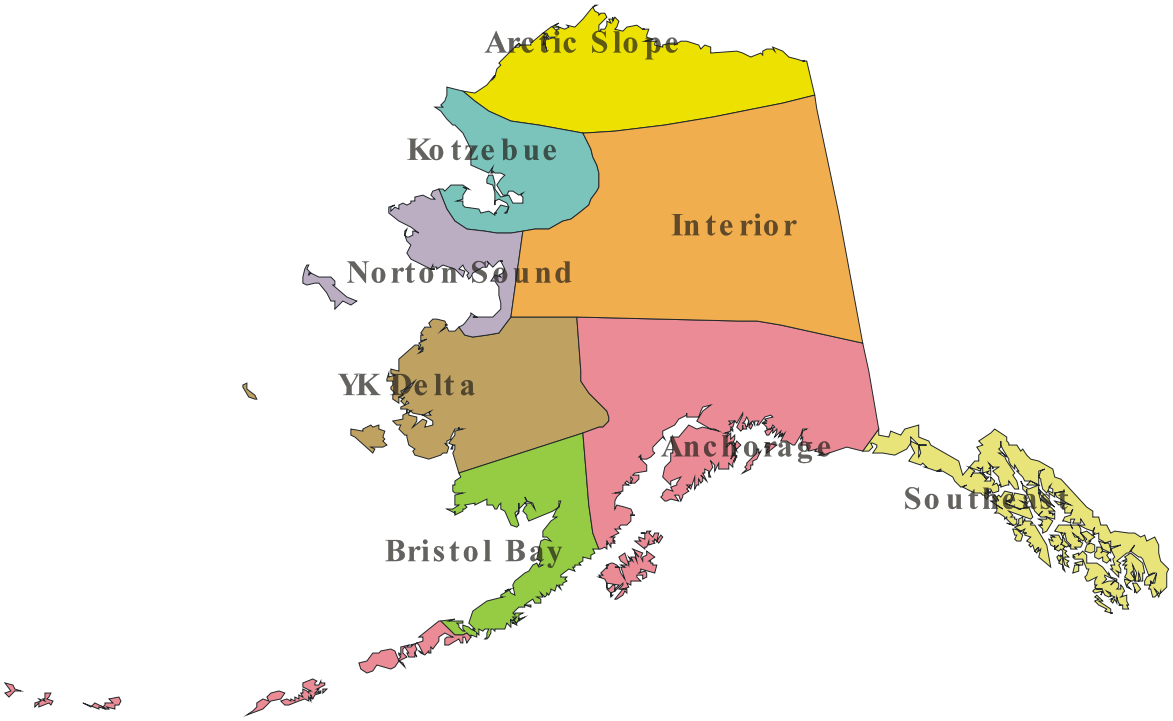
Summary

The Centers for Disease Control and Prevention's Arctic Investigations Program (AIP) in Anchorage, Alaska, maintains a statewide surveillance system for invasive diseases caused by *Streptococcus pneumoniae*, *Haemophilus influenzae, Neisseria meningitidis,* and Groups A and B Streptococci. Laboratories throughout the state are requested to send to AIP any isolates of these organisms recovered from a blood culture, CSF, or other normally sterile site. Isolate identification is confirmed and, when appropriate, serotyped and tested for antimicrobial susceptibility. The objectives of this system are to provide information on disease rates within the state, monitor the emergence of antimicrobial resistance, and to monitor the effectiveness of implemented vaccine programs, such as the 23-valent pneumococcal polysaccharide vaccine, the 7-valent pneumococcal conjugate vaccine and *Haemophilus influenzae* type b vaccines.

Invasive Bacterial Disease Surveillance Regions – Alaska, 2000



In 2000, the total number of cases of invasive disease caused by these organisms reported to AIP were 125 *S. pneumoniae*, 16 *H. influenzae*, 9 *N. meningitidis*, 18 Group A Strep and 18 Group B Strep. Alaska Native populations had higher rates of disease than non-Native populations in all invasive disease except those caused by Group B Strep. Rates of invasive pneumococcal disease were highest in the YK Delta and Kotzebue regions; *H. influenzae* rates were highest in Bristol Bay and Norton Sound. Rates for each organism by region are presented in the following table.

Surveillance Organisms Reported by Region – Alaska, 2000

Region	*S. pneumoniae* n (rate*)	*H. influenzae* n (rate*)	*N. meningitidis* n (rate*)	Group A Strep n (rate*)	Group B Strep n (rate*)
Anchorage	69 (17.1)	9 (2.2)	7 (1.7)	12 (3.0)	15 (3.7)
Arctic Slope	1 (15.8)	0 (0)	0 (0)	1 (15.8)	0 (0)
Bristol Bay	1 (13.4)	2 (26.8)	1 (13.4)	0 (0)	0 (0)
Interior	14 (14.5)	2 (2.1)	1 (1.0)	2 (2.1)	3 (3.1)
Kotzebue	6 (75.3)	0 (0)	0 (0)	0 (0)	0 (0)
Norton Sound	2 (21.7)	2 (21.7)	0 (0)	0 (0)	0 (0)
Southeast	8 (11.0)	0 (0)	0 (0)	1 (1.4)	0 (0)
YK Delta	24 (102.5)	1 (4.3)	0 (0)	2 (8.5)	0 (0)
Total	125 (19.9)	16 (2.6)	9 (1.4)	18 (2.9)	18 (2.9)

*Cases per 100,000

Introduction

AIP conducts statewide surveillance of invasive *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Neisseria meningitidis*, and Groups A and B *Streptococcus*. This program is part of a passive, laboratory-based surveillance system in which laboratories from all hospitals throughout the state are encouraged to participate. The population included in the AIP surveillance is the State of Alaska, a total of 626,932 persons *(Census 2000)*. Case detection occurs year-round as participating laboratories send isolates recovered from sterile sites to the AIP lab in Anchorage, accompanied by basic demographic and clinical information on the cases. Materials and forms for isolate shipment and data collection are provided to each lab by AIP. At year-end, AIP asks that each laboratory review their records and provide information on any cases that may have been overlooked. In 2000, 21 of the 25 labs in Alaska participated in the invasive disease surveillance system, either by sending isolates to the AIP lab throughout the year, conducting year-end record reviews, or both.

AIP defines a case of invasive *Streptococcus pneumoniae, Haemophilus influenzae*, *Neisseria meningitidis*, or Groups A and B *Streptococcus* as an isolate of the bacteria from a normally sterile site, including blood, cerebrospinal fluid, pleural fluid, peritoneal fluid or joint fluid that has been taken from a resident of Alaska. In addition, for Group A *Streptococcus*, isolates are requested from deep tissue infections such as might be collected from surgical debridement of cases of necrotizing fascitis.

Invasive Pneumococcal Disease

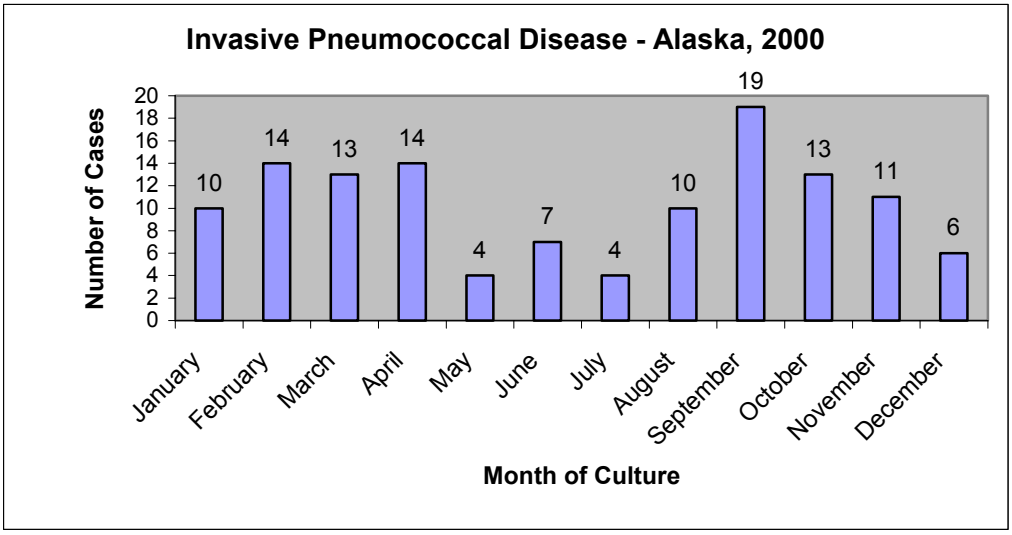
Overall Incidence

Between January 1 and December 31, 2000, AIP received a total of 110 pneumococcal isolates. An additional 15 cases were detected through year-end follow up with participating labs throughout the state, for a total of 125 cases of invasive pneumococcal disease. The result is an overall invasive pneumococcal case rate of 19.9/100,000 persons per year for the state of Alaska in the year 2000. The Alaska rate is similar to the Active Bacterial Core Surveillance (ABCs) 2000 national projected rate of 20.7/100,000 (*Active Bacterial Core Surveillance (ABCs) Report Emerging Infections Program Network Streptococcus pneumoniae, 2000)*. ABCs is a surveillance system operated in 9 states and covers a population of over 30 million persons.

Seasonality

Invasive *Streptococcus pneumoniae* cases were identified in every month of 2000. Nineteen cases occurred in the month of September, the highest number of cases occurring in any 1-month period in 2000. The September cases occurred in 9 different communities and included 10 different serotypes. Infected individuals ranged in age from infancy to 65 years. Of note, 13 of the 19 cases occurred in the time period

September 20 – 29. Four of the infections identified during this month resulted in death, producing a case-fatality rate of 21% for September. Thirty-one percent of all cases of pneumococcal-related mortality in 2000 were identified in September.



Race

Although the Alaska Native population comprises only 17% of the state population *(Census 2000: Alaska Natives 108,187, non-Natives 518,745)*, 47% of all reported *S. pneumoniae* cases occurred among this group in 2000. A total of 59 cases occurred among Alaska Natives, resulting in an age-adjusted rate for Alaska Natives of 55.3/100,000 persons per year. In contrast, 53% of cases occurred among the non-Native population, for a non-Native age-adjusted rate of 5.9/100,000 persons per year (66 cases). The age-adjusted rate ratio of disease for the Alaska Native population compared with the non-Native population is 9.4.

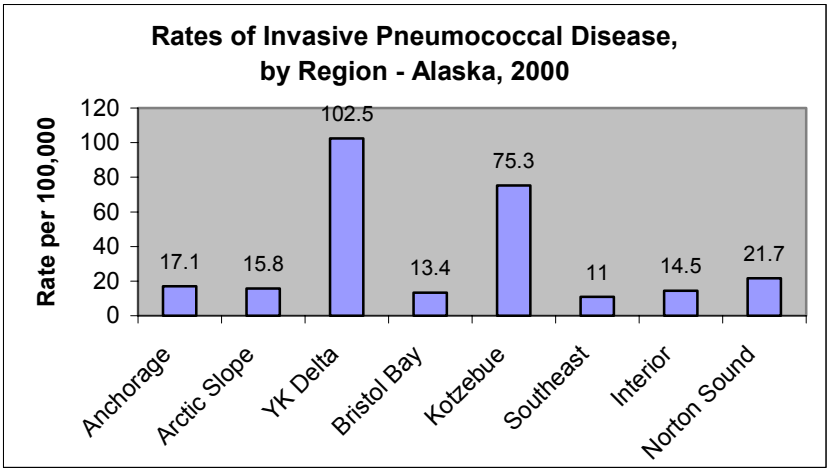
Invasive *Streptococcus Pneumoniae* Cases, by Race - Alaska, 2000

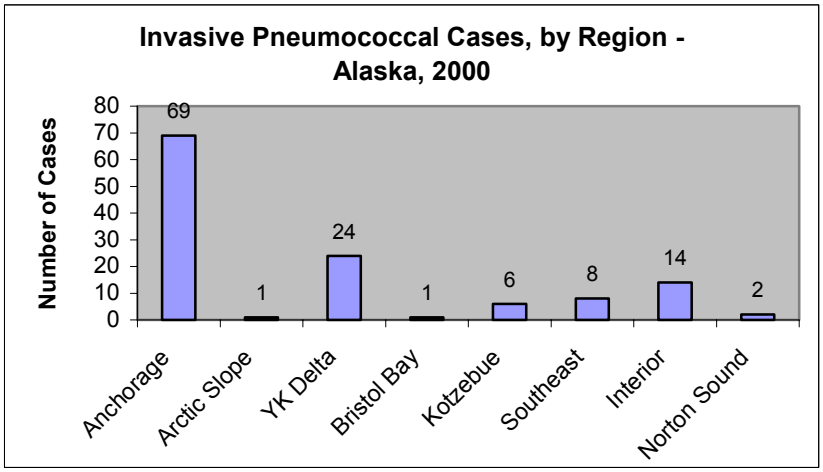
Race*	Cases No. (%)	Age Adjusted Rate	% Male	Deaths No. (%)
Alaska Native	59 (47%)	55.3	56%	1 (8%)
Non-Native	66 (53%)	5.9	53%	12 (92%)
Total	125 (100%)	19.9	54%	13 (100%)

*Race was unknown for 11 cases, they were included in the non-Native group.

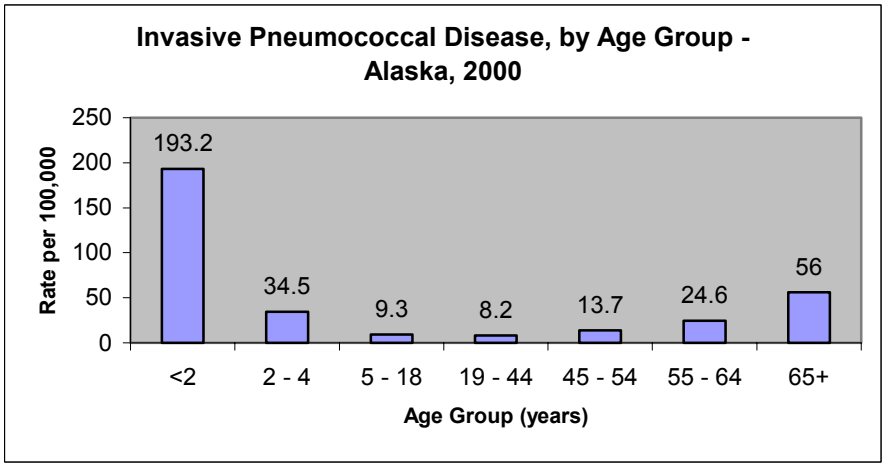
Region

Most cases of invasive pneumococcal disease (69) were reported in the Anchorage area, however, rates of disease are highest in the YK Delta and Kotzebue, 102.5/100,000 persons per year and 75.3/100,000 persons per year respectively.

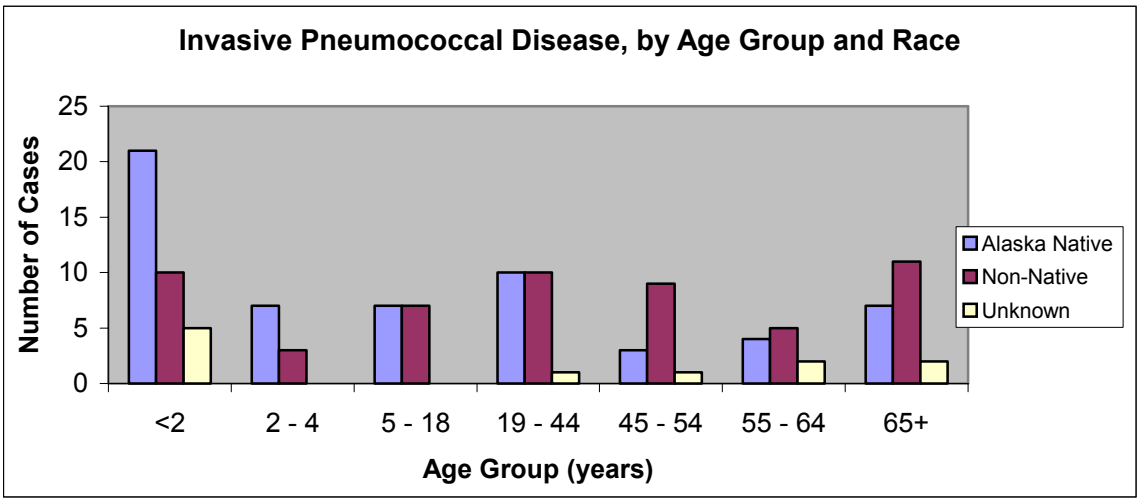

Rates of Invasive Pneumococcal Disease, by Region - Alaska, 2000
Rate per 100,000
120
100
80
60
40
20
0
17.1
15.8
102.5
13.4
75.3
11
14.5
21.7
Anchorage
Arctic Slope
YK Delta
Bristol Bay
Kotzebue
Southeast
Interior
Norton Sound

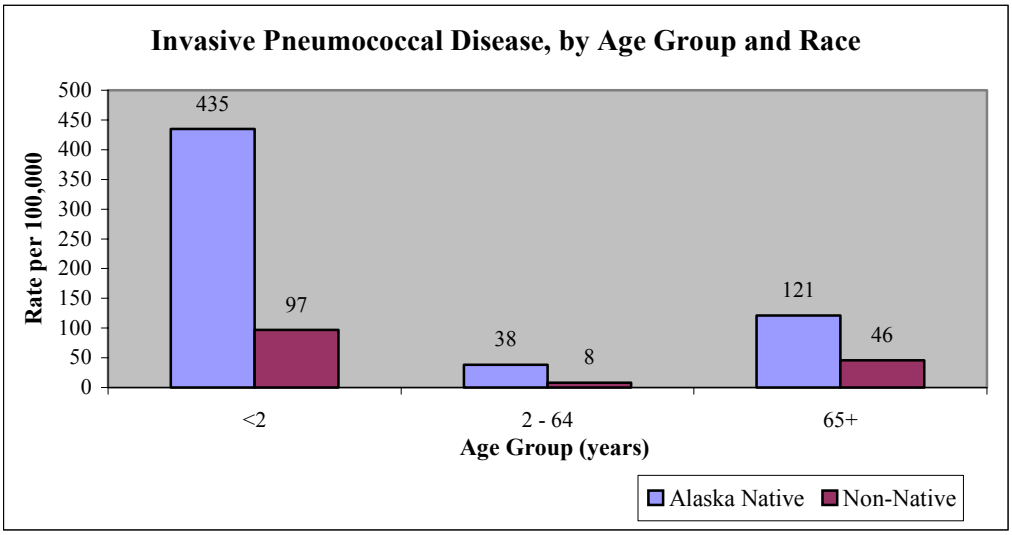

Invasive Pneumococcal Cases, by Region - Alaska, 2000
Number of Cases
80
70
60
50
40
30
20
10
0
69
1
24
1
6
8
14
2
Anchorage
Arctic Slope
YK Delta
Bristol Bay
Kotzebue
Southeast
Interior
Norton Sound

Age


Invasive Pneumococcal Disease, by Age Group - Alaska, 2000
Rate per 100,000
250
200
150
100
50
0
193.2
34.5
9.3
8.2
13.7
24.6
56
<2
2 - 4
5 - 18
19 - 44
45 - 54
55 - 64
65+
Age Group (years)

Cases occurred in all age groups and ranged from 25 days to 98 years of age. Almost half of all invasive pneumococcal disease in Alaska occurred among the high-risk age groups, those under the age of 2 and those greater than 65 years. Overall, 29% of cases occurred among children <2 years.



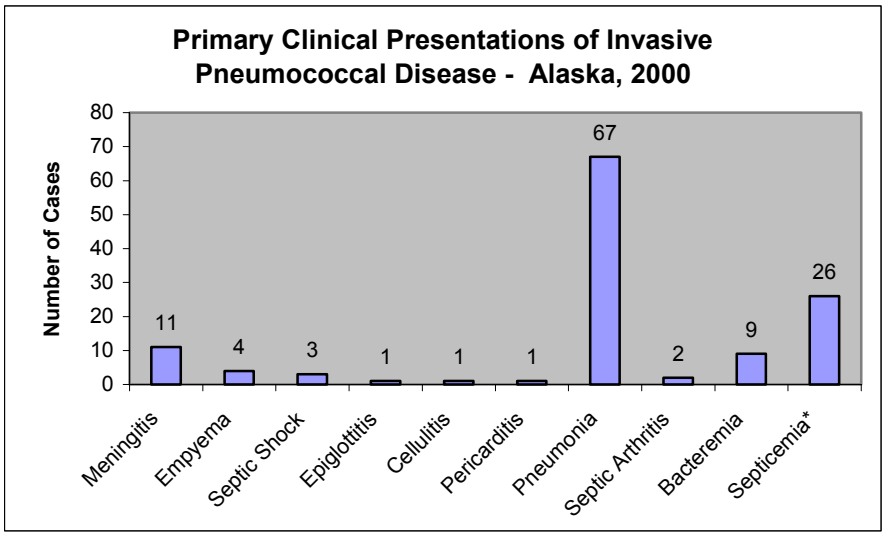


Sex

The rate of invasive pneumococcal disease for males was 21.0/100,000 persons per year (68 cases). For females, the rate of invasive pneumococcal disease was slightly lower at 18.8/100,000 persons per year (57 cases).

Census 2000 data: Male population 324,112, Female population 302,820

Clinical Presentation



*Septicemia of unknown focus

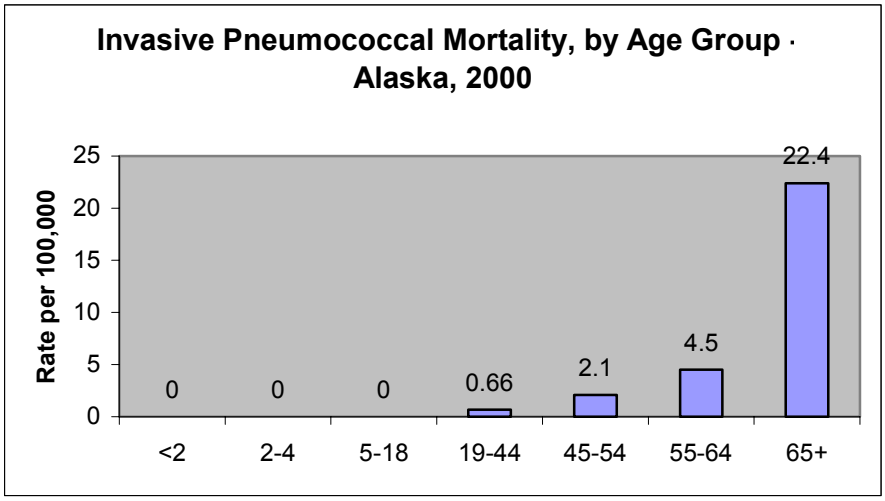
The primary clinical presentation was determined by a review of the discharge diagnoses indicated in each patient's chart. In cases with multiple discharge diagnoses, the most serious diagnosis related to the pneumococcal infection was recorded as the primary clinical. In 13 cases, a secondary pneumococcal-related presentation was noted: 12 patients experienced pneumonia and 1 patient experienced septic arthritis in addition to the primary presentation.

Primary Clinical Presentations of Invasive Pneumococcal Disease in Alaska, 2000

Presentation	No. Cases (%)	% Male	No. Deaths
Meningitis	11 (9%)	55%	1
Empyema	4 (3%)	50%	1
Septic Shock	3 (2.4%)	0%	1
Pericarditis	1 (0.8%)	100%	-
Epiglottitis	1 (0.8%)	0%	-
Cellulitis	1 (0.8%)	0%	-
Pneumonia	67 (54%)	54%	5
Septic Arthritis	2 (1.6%)	50%	-
Bacteremia	9 (7%)	58%	1
Septicemia (unknown focus)	26 (20%)	58%	4
Total	**125**	**54%**	**13**

The most frequent source of a positive culture was blood, which was used to identify 92% of the 125 cases. CSF was the positive site for 5.6% of cases and 1 case each was identified through a positive culture of pleural fluid and joint fluid. One additional case was identified from an unspecified sterile site.

Mortality



In 2000, the overall case-fatality rate for *S. pneumoniae* in the state of Alaska was 10.4% (13 deaths out of 125 cases). The non-Native case-fatality rate was 18% (12 deaths), compared with the case-fatality rate for Alaska Natives of 1.7% (1 death). The case-fatality rate for adult non-Native cases was 29%, or 12 of 41 cases. The relative risk of dying while infected with invasive *Streptococcus pneumoniae* for non-Native adults, compared with Alaska Native adults was 2.8 after adjusting for age.

The highest mortality occurred in the 65+ year old age group, in which 61.5% of all pneumococcal deaths occurred. Together, 92% of the mortality occurred among those over the age of 45. No deaths were reported in those under the age of 18 years.

Serotype

Serotyping of invasive pneumococcal isolates is performed at AIP using internationally standardized methods. Serotype identification is based on the organism's polysaccharide capsule which is a principle virulence factor for pneumococci. This information provides a way to subtype organisms and to determine if the infection was due to a type that could be prevented by use of one of the two available pneumococcal vaccines. Serotyping was performed on 110 of the 125 pneumcoccal cases detected in Alaska in 2000.

Invasive Pneumococcal Serotype Distribution, by Race and Age Group – Alaska, 2000

		Alaska Native				Non-Native*			
Serotype	Total N (%)	<2	2-18	>18	All Ages	<2	2-18	>18	All Ages
14	19 (17.3)	9	1	-	10	3	1	5	9
04	13 (11.8)	2	5	3	10	-	-	3	3
07F	10 (9.1)	-	-	2	2	-	3	5	8
09V	9 (8.2)	2	1	1	4	1	1	3	5
19F	7 (6.4)	-	2	-	2	3	-	2	5
03	6 (5.5)	-	-	3	3	-	-	3	3
01	5 (4.5)	-	1	1	2	-	2	1	3
22A	1 (0.9)	1	-	-	1	-	-	-	0
22F	5 (4.5)	-	-	1	1	1	-	3	4
06A	4 (3.6)	1	-	-	1	1	-	2	3
18C	4 (3.6)	-	1	-	1	-	2	1	3
06B	4 (3.6)	-	-	-	0	4	-	-	4
23F	3 (2.7)	-	1	-	1	-	-	2	2
11A	2 (1.8)	-	-	1	1	-	-	1	1
16F	2 (1.8)	-	-	1	1	-	-	1	1
19A	2 (1.8)	1	-	-	1	1	-	-	1
09N	1 (0.9)	-	-	-	0	-	-	1	1
10A	1 (0.9)	-	-	-	0	-	-	1	1
13	1 (0.9)	-	-	-	0	-	-	1	1
15A	1 (0.9)	1	-	-	1	-	-	-	0
17F	1 (0.9)	-	-	1	1	-	-	-	0
20	1 (0.9)	-	-	1	1	-	-	-	0
33F	1 (0.9)	-	-	1	1	-	-	-	0
35B	1 (0.9)	-	-	-	0	-	-	1	1
35F	1 (0.9)	-	1	-	1	-	-	-	0
38	1 (0.9)	-	-	-	0	-	-	1	1
NT*	4 (3.6)	2	-	2	4	-	-	-	0
Total	**110**	**19**	**13**	**18**	**50**	**14**	**9**	**37**	**60**

*Includes 11 cases for which race is unknown
**Non-typeable isolates

Vaccine Serotypes

Two vaccines are licensed for prevention of pneumococcal disease. The 23-valent polysaccaride vaccine is recommended in Alaska for all persons 55 years and older, and for persons over age 2 who are at higher risk for pneumococcal disease. Revaccination is recommended after 6 years. In 2001, the pneumococcal conjugate vaccine was included in the Alaska childhood vaccination schedule. This vaccine provides protection against the 7 most common pneumococcal serotypes causing invasive disease among children (types 4, 6B, 9V, 14, 18C, 19F, 23F). The tables below show the proportion of invasive infections from 2000 that were due to serotypes found in these vaccines.

Proportion of Invasive Isolates Contained in the PCV7 Vaccine, by Age Group and Race – Alaska, 2000

Age (yrs)	Alaska Native (%)*	Non-Native (%)*	Total (%)**
<2	13 (76%) of 17	11(79%) of 14	24 (77%) of 31
2-4	5 (83%) of 6	2 (67%) of 3	7 (78%) of 9
5+	10 (43%) of 23	18 (43%) of 43	28 (43%) of 66
Total	28 (61%) of 46	31 (52%) of 60	59 (56%) of 106

*The percentage of isolates with a serotype in the PCV7 vaccine, out of all isolates for that age and racial group.
**The percentage of isolates with a serotype in the PCV7 vaccine, out of the total number of isolates for that age group (total n=106).

Potentially Vaccine Preventable Invasive Illness

	< 2 years	2 – 4	5 - 54	55 - 64	65+	**Total**
PCV7	24 (77%)	7 (78%)	17 (45%)	5 (56%)	6 (32%)	**59 (56%)**
Ps23V	27 (87%)	9 (100%)	36 (95%)	8 (89%)	14 (74%)	**94 (89%)**
Total	31	9	38	9	19	**106**

Note: The number in parentheses is the percentage of cases with a serotype in the indicated vaccine, out of all isolates successfully serotyped in that age group.

Vaccination Status

Pneumococcal vaccine status was known for 58 of the 125 cases; 13 cases (10%) did receive a pneumococcal vaccine prior to illness and 45 cases (36%) had no record of a pneumococcal vaccine. Vaccine status is not known for 67 cases (54%).

Of the 13 confirmed to have received a pneumococcal vaccine, 11 were Alaska Native and 2 non-Native. Seven vaccine recipients were from the Anchorage area, 4 were from the YK Delta, 1 from Bristol Bay and 1 from the Interior. Ages of vaccine recipients ranged from 4 months to 94 years, however 11 of the 13 vaccine recipients were over the age of 35. It is unknown if these individuals received the 7-valent or 23-valent vaccine.

Three (23%) of the 13 deaths due to *S. pneumoniae* were due to serotypes found in the PCV7 vaccine. However, none of these occurred in persons in the age group for which vaccine is recommended. Eight (61%) of the fatal cases were due to serotypes contained within the 23 valent polysaccharide vaccine; 5 of these occurred in persons in the age group eligible for this vaccine. Vaccination status was known for only 1 of the 13 deaths.

Invasive *Streptococcus pneumoniae* Serotypes of Fatal Cases – Alaska, 2000

Serotype	Deaths (%)	Frequency of Serotype
03	3 (50%)	6
04	1 (8%)	13
06A	2 (50%)	4
09V	1 (11%)	9
11A	1 (50%)	2
13	1 (100%)	1
19F	1 (14%)	7
20	1 (100%)	1
35B	1 (100%)	1
38	1 (100%)	1
Total	13 (12%)	109

Overall, 62% of all pneumococcal-related mortality was potentially vaccine preventable with the use of the 23-valent polysaccharide vaccine in persons over 2 years old.

Potentially Vaccine Preventable Deaths

	< 2 years	2 – 4	5 - 54	55 - 64	65+	**Total**
PCV7	-	-	-	1 (50%)	2 (25%)	**3 (23%)**
Ps23V	-	-	3 (100%)	1 (50%)	4 (50%)	**8 (62%)**

Note: The number in parentheses is the percentage of cases with a serotype in the indicated vaccine, out of the number of deaths that occurred in that age group.

Serotype by Region

Serotype	Anchorage	YK Delta	Bristol Bay	Kotzebue	Southeast	Interior	Norton Sound
01	3	1					1
03	4	2					
04	4	2		6	1		
06A	1	1			2		
06B	3					1	
07F	4					6	
09N						1	
09V	5	3				1	
10A	1						
11A	1					1	
13	1						
14	7	7			4		1
15A		1					
16F	2						
17F		1					
18C	3				1		
19A	2						
19F	6					1	
20	1						
22A		1					
22F	4					1	
23F		1				2	
33F	1						
35B	1						
35F	1						
38	1						
Non-typeable		3	1				
Total	56	23	1	6	8	14	2

Serotype 14

Serotype 14 was the most frequently occurring serotype in the YK Delta, Southeast and Anchorage regions. In the Southeast region, it was responsible for 50% of all reported cases. In the YK Delta and Anchorage regions, 30% and 13%, respectively, of invasive pneumococcal isolates received by AIP were determined to be serotype 14.

Additionally, serotype 14 was the most common type found among young children. Children under 2 years of age infected with invasive *Streptococcus pneumoniae* had a relative risk of 3.7 of being infected with serotype 14 compared with cases 2 years and older. Sixty-three percent of serotype 14 isolates were found in this age group.

Serotype 14 by Age Group

	Proportion infected with Serotype 14	Percentage with Serotype 14
Under 2 years	12/33	36%
2 years and older	7/72	10%

Kotzebue:
All 6 isolates received from the Kotzebue region were of serotype 04. Four of the cases occurred between September 6 and October 16, 2000 (one case occurred in March, the other in late July).

Interior

Forty-three percent (6 of 14 cases) of reported invasive pneumococcal cases from the Interior region were of serotype 07F. Two isolates were determined to be serotype 23F and the remaining 12 were all of different serotypes.

Associated Medical Conditions

The presence of one or more associated medical conditions was reported in 58% of invasive pneumococcal cases in 2000. Data on associated medical conditions was unavailable for 8% (10 cases). Excessive alcohol use was indicated for 31% of adult cases (19 years and older), and smoking and excessive alcohol use were reported together for 18% of adult patients (11 cases). Injection drug use was reported in 3 cases (5% of adult cases). Chronic lung disease was reported as a risk factor for 21 cases, or 17%.

Associated Medical Conditions Identified in Invasive Pneumococcal Cases in Alaska, 2000*

Associated Medical Condition	No. Cases (%), N=125	No. Adult Cases (%), N=65
Diabetes	13 (10%)	13 (20%)
Cigarette smoking	25 (20%)	25 (38%)
Chronic lung disease	21 (17%)	14 (22%)
Alcohol abuse	20 (16%)	20 (31%)
Immunosuppressive treatment	6 (5%)	5 (8%)
Injection drug use	3 (2%)	3 (5%)
Cigarette smoking only	8 (6%)	8 (12%)

*More than one risk factor was identified in several cases.

Twenty-five (38%) of the 65 adult cases were known cigarette smokers. According to the 2000 BRFSS survey, the rate of smoking in the state of Alaska for persons aged 18 and older in 2000 was 25% (*MMWR, December 14, 2001, Vol.50, No. 49*).

Invasive Pneumococcal Cases with Known Cigarette Smoking Status, by Age and Race

Age (yrs)	Alaska Native	Non-Native
	Smokers (%)*	Smokers (%)*
19-44	6 (60%)	4 (40%)
45-54	0 (0%)	5 (56%)
55-64	4 (100%)	3 (100%)
65+	0 (0%)	3 (30%)
Total	10(43%)	15 (39%)

*Percent of cases in age/racial group

Antibiotic Resistance

Susceptibility testing was performed on 106 isolates. Of these, 23% showed decreased susceptibility to penicillin. Decreased susceptibility to trimethoprim/sulfamethoxazole (TMP-sulfa) was found in 32% of the 106 isolates and 21% demonstrated a decreased susceptibility to erythromycin. Little or no resistance was discovered to ofloxacin, chloramphenicol, vancomycin, clindamycin, or rifampin.

Cut points from the Minimum Inhibitory Concentration (MIC) Interpretive Standards were used to determine if an isolate was 'susceptible', 'intermediate', or 'resistant' to the antibiotic being tested (*National Committee for Clinical Laboratory Standards (NCCLS) MIC Testing, Supplemental Tables, M100-S10 (M7), January 2000)*. The MIC Interpretive Standards definitions of 'susceptible', 'intermediate', and 'resistant' can be found in the appendix.

Antibiotic Resistance in Invasive *Streptococcus pneumoniae* Isolates – Alaska, 2000

Antibiotic	Susceptible	Intermediate	Resistant	I + R	Total Tested
Penicillin	81 (76.4%)	11 (10.3%)	14 (13.2%)	25 (23.6%)	106
TMP-sulfa	72 (67.9%)	4 (3.8%)	30 (28.3%)	34 (32.1%)	106
Erythromycin	84 (79.2%)	0	22 (20.8%)	22 (20.8%)	106
Ofloxacin	106 (100%)	0	0		106
Chloramphenicol	104 (98%)	0	2 (2%)	2 (2%)	106
Vancomycin	106 (100%)	0	0		106
Clindamycin	35 (97%)	0	1 (3%)	1 (3%)	36
Rifampin	103 (100%)	0	0		103

Serotypes found in the PCV7 vaccine are more likely to be nonsusceptible to penicillin and erythromycin than non-vaccine serotypes. One potential benefit of the vaccine is an anticipated decline in antibiotic resistance among circulating pneumococci.

PCV7 Serotypes and Resistance to Selected Antibiotics - Alaska, 2000

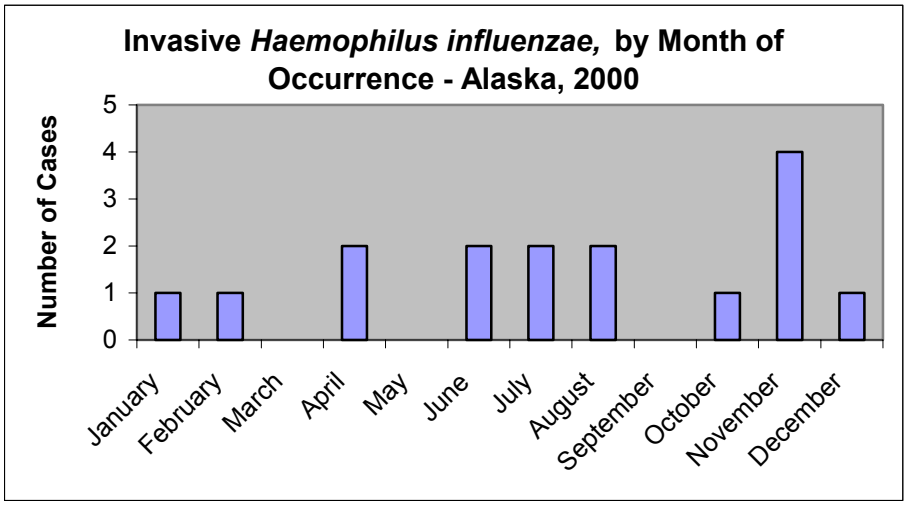
Serotype	Penicillin			Erythromycin	
	Resistant # (%)	Intermediate +Resistant # (%)	Total	Resistant # (%)	Total
04	0 (0%)	0 (0%)	13	0 (0%)	13
6B	1 (33%)	2 (66%)	3	2 (66%)	3
9V	4 (44%)	7 (78%)	9	3 (33%)	9
14	7 (37%)	9 (47%)	19	13 (72%)	19
18C	0 (0%)	0 (0%)	4	0 (0%)	4
19F	2 (29%)	2 (29%)	7	2 (29%)	7
23F	0 (0%)	1 (33%)	3	2 (67%)	3
Total	**14 (24%)**	**21 (36%)**	**58**	**22 (38%)**	**58**

Invasive *Haemophilus influenzae*

Overall Incidence

A total of 16 cases of invasive *Haemophilus influenzae* were reported to AIP in 2000, resulting in an overall rate for the state of Alaska in 2000 of 2.6/100,000 persons per year. The 2000 Alaska rate is more than twice the ABCs national projected rate of 1.2/100,000 (*Active Bacterial Core Surveillance (ABCs) Report Emerging Infections Program Network Haemophilus influenzae, 2000*). However, in a relatively small population, one year trends are subject to wide variability. A fair comparison with national rates should be made using multiple years of data. There were 4 invasive *Haemophilus influenzae*-related deaths in Alaska in 2000, resulting in a case-fatality rate of 25%, and an overall *Haemophilus influenzae* mortality rate of 0.6/100,000 persons per year for Alaska. In contrast, the 2000 ABCs national projected mortality rate for invasive *Haemophilus influenzae* is 0.2/100,000 persons per year.

Seasonality



Race

Invasive *Haemophilus influenzae* Cases, by Race

Racial Group	Cases No. (%)	Rate*	% Male	Deaths
Alaska Native	10 (63%)	9.2	50%	2
Non-Native**	6 (38%)	1.2	0%	2
Total	16 (100%)	2.6	31%	4

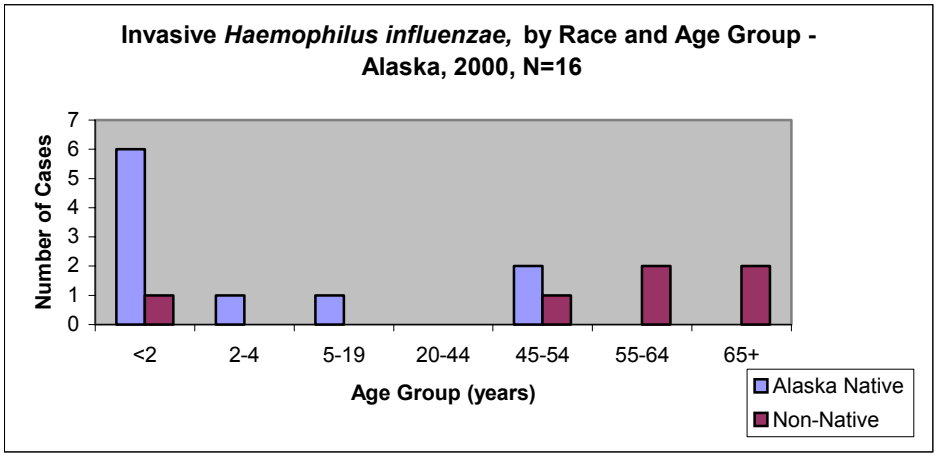
Rate per 100,000 population: population figures calculated from Census 2000 data:*
Alaska Native: 108,187, Non-Natives: 518,745
**Unknown race (n=1) included in Non-Native group

Sixty-three percent of invasive *Haemophilus influenzae* cases occurred among the Alaska Native population. The rate ratio of disease for the Alaska Native population, compared with the non-Native population, is 7.6, 95% CI (2.68, 24.65).

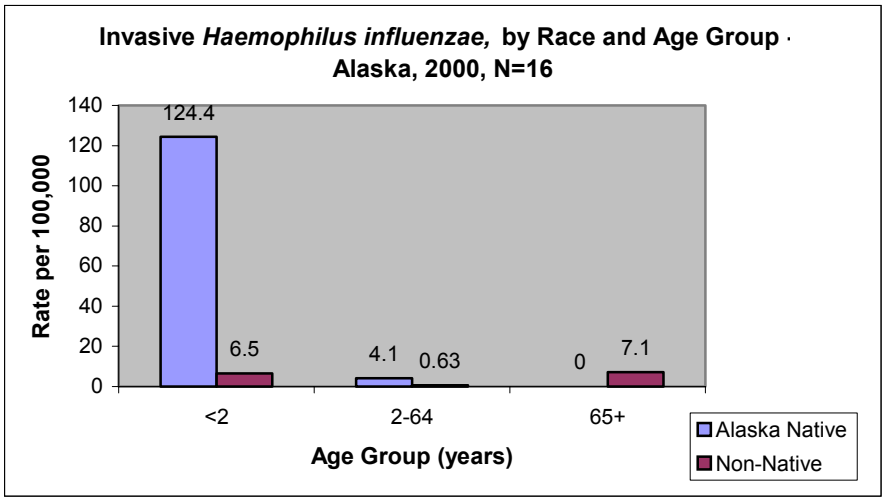
Region

Residents of Anchorage accounted for 38% (6 cases) of invasive *Haemophilus influenzae* in 2000. One case each occurred in the following communities located throughout the state of Alaska: Fairbanks, Soldotna, Kwetheluk, Seward, Homer, Dillingham, New Stuyahok, Tok, Brevig, and Little Diomede.

Age



Invasive *Haemophilus influenzae* cases ranged in age from infancy to 80 years. Dramatically more disease occurred among Alaska Native children under 2 years of age. The Alaska Native rate for children <2 was 124.4/100,000, compared with a rate of 6.5/100,000 for non-Native children of the same age.



Sex

In 2000, the rate of invasive *Haemophilus influenzae* in females in Alaska was more than twice that of males, 3.63/100,000 compared with 1.54/100,000 for Alaska males (11 female cases, 5 male cases).

Clinical Presentation

The primary clinical presentation was determined by a review of the discharge diagnoses indicated in each patient's chart. In cases with multiple discharge diagnoses, the most serious *Haemophilus influenzae*-related diagnosis was recorded as the primary clinical presentation.

Pneumonia was the most common primary clinical presentation, occurring in 9 (56%) of the invasive *Haemophilus influenzae* cases in 2000. Meningitis and septicemia of unknown focus were each diagnosed in

3, or 19%, of cases. One patient presented with septic arthritis. This patient also presented with osteomyelitis. No other cases were diagnosed with a secondary invasive *Haemophilus influenzae*-related syndrome.

Primary Clinical Presentations of Invasive *Haemophilus influenzae* – Alaska, 2000

Primary Presentation	Cases No. (%)	Deaths
Meningitis	3 (19%)	-
Pneumonia	9 (56%)	2
Septic Arthritis	1 (6%)	-
Septicemia	3 (19%)	2
Total	16 (100%)	4

Haemophilus influenzae was isolated from blood samples in 14 of 16 cases (88%). Two cases were identified through the isolation of *Haemophilus influenzae* from cerebrospinal fluid.

Mortality

Four patients died due to infection with invasive *Haemophilus influenzae*, resulting in a case-fatality rate for the state of Alaska in 2000 of 25% (4 deaths out of 16 cases). The overall invasive *Haemophilus influenzae*-related mortality rate for Alaska is 0.6/100,000 persons per year – three times the national projected mortality rate of 0.2/100,000 (*Active Bacterial Core Surveillance (ABCs) Report Emerging Infections Program Network Haemophilus influenzae, 2000 (preliminary))*.

Those who died ranged from newborn to 69 years old. Two cases resulting in death (50%) were residents of Anchorage, one case was from rural South Central and the other from the rural Bristol Bay area. Two cases were non-Native and two were Alaska Native. One associated medical condition was identified for each of 3 cases: alcoholism, diabetes, and chronic lung disease. The only male case, a newborn Alaska Native, had no known associated medical conditions. Antibiotic susceptibility testing was performed on 3 of the isolates; no antibiotic resistance was detected. Serotyping was also performed on the 3 isolates: 1 was serotype B, the other 2 were non-typeable.

Serotype

Serotyping is performed on all isolates sent to AIP. The bacterial capsule forms the basis for typing and is the major virulence factor. Type B is historically more prevalent and invasive, but due to routine childhood vaccination has decline by more than 90% since the 1980's. Continued surveillance is important to evaluate vaccine effectiveness and to monitor for the emergence of non-vaccine types.

Serotypes of Invasive *Haemophilus influenzae* Cases, by Race - Alaska, 2000

Serotype	Alaska Native	Non-Native	Unknown	Total (%)
B	6	3	-	9 (56%)
E	-	1	-	1 (6%)
F	1	-	1	2 (13%)
NT*	3	1	-	4 (19%)
Total	10	5	1	16 (100%)

*Non-typeable isolates

Serotypes of Invasive *Haemophilus influenzae* Cases, by Age Group - Alaska, 2000

Age Group	B (rate)*	Non-B (rate)	Non-Type** (rate)	Unknown	Total (rate)
<2	5 (24.7)	-	2 (9.9)	-	7 (34.6)
2-64	3 (0.5)	2 (0.4)	1 (0.2)	1 (0.2)	7 (1.2)
65+	1 (2.9)	1 (2.9)	-	-	2 (5.9)
Total	9 (1.4)	3 (0.5)	3 (0.5)	1 (0.2)	16 (2.55)

*Rate per 100,000 population
**Non-typeable isolates

Antibiotic Resistance

Antibiotic susceptibility testing for chloramphenicol, ceftriaxone, and trimethoprim/sulfamethoxazole was performed on 15 isolates (94% of cases) at the AIP laboratory in Anchorage, Alaska. No resistance was detected to chloramphenicol and ceftriaxone. One isolate (7%) demonstrated resistance to trimethoprim/sulfamethoxazole.

Antibiotic Resistance of Invasive *Haemophilus influenzae* Isolates - Alaska, 2000

Antibiotic	Susceptible	Intermediate	Resistant
Chloramphenicol	15 (100%)	-	-
Ceftriaxone	15 (100%)	-	-
TMP/sulfa	14 (93%)	-	1 (7%)

Summary of Invasive *Haemophilus influenzae* Case Characteristics, Alaska 2000

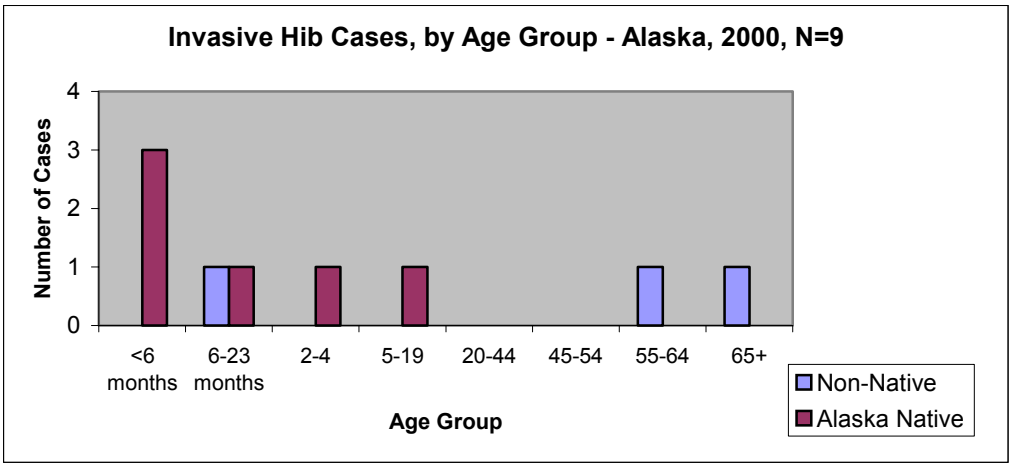
Gender	Age (years)	Race	Anchorage /Other	Site of Isolation	Primary Clinical Presentation	Other Hi Presentations	Serotype	Associated Medical Conditions	Outcome
Male	1 day	AK Native	Other	Blood	Septicemia	-	NT	-	Death
Female	0.3	AK Native	Other	CSF	Meningitis	-	B	-	
Female	0.3	AK Native	Other	CSF	Meningitis	-	B	-	
Male	0.4	AK Native	Other	Blood	Pneumonia	-	B	Chronic lung disease	
Male	0.6	AK Native	Anchorage	Blood	Septicemia	-	B	-	
Male	0.8	AK Native	Other	Blood	Meningitis	-	NT*	-	
Female	1	Non-Native	Other	Blood	Septic Arthritis	Osteomyelitis	B	-	
Female	4	AK Native	Other	Blood	Pneumonia	-	B	Imm tx**	
Male	13	AK Native	Anchorage	Blood	Pneumonia	-	B	-	
Female	53	AK Native	Anchorage	Blood	Pneumonia	-	F	Cigarette smoking + chronic lung disease + alcohol	
Female	54	AK Native	Anchorage	Blood	Septicemia	-		Alcohol	Death
Female	55	Non-Native	Other	Blood	Pneumonia	-	NT	Chronic lung disease	Death
Female	57	Unknown	Other	Blood	Pneumonia	-	F	Smoking + Chronic lung disease	
Female	62	Non-Native	Anchorage	Blood	Pneumonia	-	B	Cigarette smoking	
Female	69	Non-Native	Anchorage	Blood	Pneumonia	-	B	Diabetes	Death
Female	80	Non-Native	Other	Blood	Pneumonia	-	E	Cigarette smoking + Chronic lung disease	

*Non-typeable isolates

**Immunosuppressive treatment

Haemophilus influenzae **Type B (Hib)**

The most common serotype of invasive *Haemophilus influenzae* in 2000 was serotype B, accounting for 56% of all reported cases. The rate of *Haemophilus influenzae* type B (Hib) in Alaska was 1.4/100,000 persons per year, significantly higher than the ABCs national projected rate of 0.1/100,000 persons per year (*Active Bacterial Core Surveillance (ABCs) Report Emerging Infections Program Network Haemophilus influenzae, 2000*). However, in a relatively small population, one year trends are subject to wide variability. A fair comparison with national rates should be made using multiple years of data. Among children under 2 years of age diagnosed with invasive *Haemophilus influenzae*, 71% were infected with serotype B.



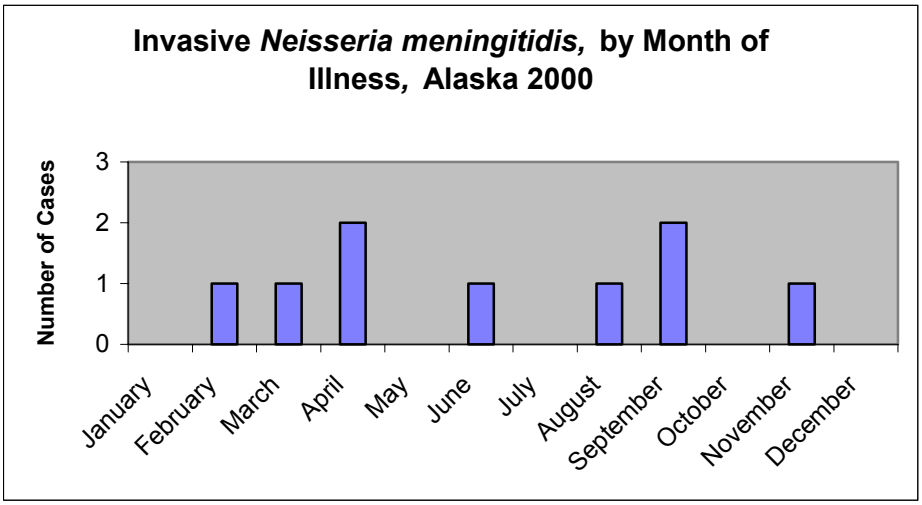
One-third of reported Hib cases in Alaska in the year 2000 occurred among the non-Native population, for an overall Hib rate for non-Natives of 1.2/100,000 persons per year. In contrast, the rate of invasive Hib disease among the Alaska Native population in 2000 was 2.8/100,000 persons per year. The rate ratio of disease for the Alaska Native population compared with the non-Native population is 2.3.

Invasive *Neisseria meningitidis*

Overall Incidence

A total of 9 cases of invasive *Neisseria meningitidis* were reported to AIP in Anchorage, Alaska in 2000, resulting in an overall rate for the state of Alaska in 2000 of 1.4/100,000 persons per year. The Alaska rate is almost twice the ABCs 2000 national projected rate of 0.8/100,000 (*Active Bacterial Core Surveillance (ABCs) Report Emerging Infections Program Network Neisseria meningitidis, 2000*). There were no invasive *Neisseria meningitidis*-related deaths in Alaska in 2000. The ABCs National projected *Neisseria meningitidis*-related mortality rate is 0.1/100,000 persons per year for 2000. However, in a relatively small population, one year trends are subject to wide variability. A fair comparison with national rates should be made using multiple years of data.

Seasonality



Race

Invasive *Neisseria meningitidis*, by Race

Racial Group	Cases No. (%)	Rate*	% Male
Alaska Native	3 (33%)	2.8	67%
Non-Native**	6 (67%)	1.2	83%
Total	9 (100%)	1.4	78%

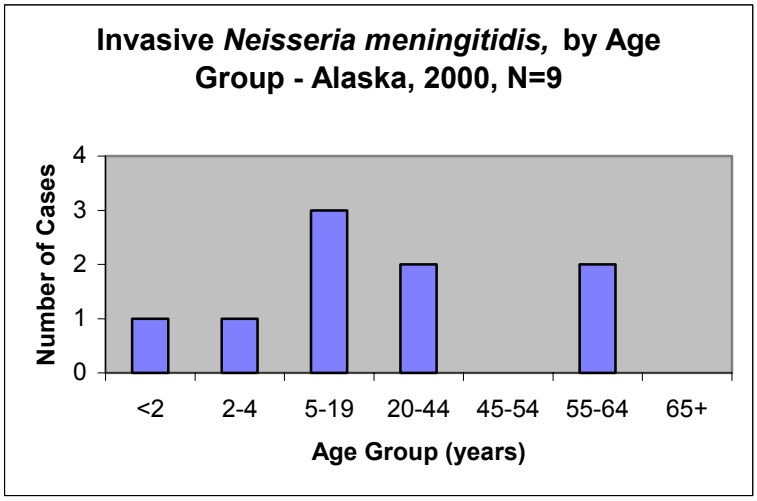
*Rate per 100,000 population: population figures calculated from Census 2000 data: Alaska Native: 108,187, non-Native: 518,745
**Unknown race (n=1) included in non-Native group

The relative risk of disease for Alaska Native population compared with the non-Native population is 2.4, 95% CI (0.60, 9.59).

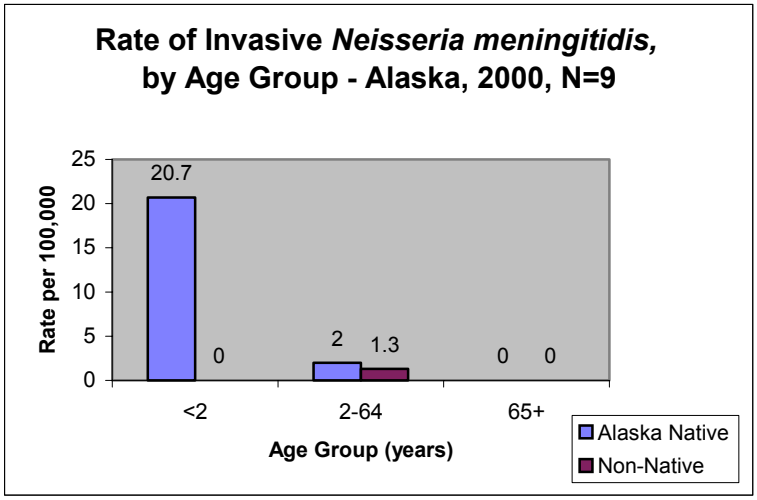
Region

Residents of Anchorage accounted for 56% (5 cases) of invasive *Neisseria meningitidis* in 2000. The remaining 4 cases occurred in 4 separate communities.

Age



Invasive *Neisseria meningitidis* cases ranged in age from 1 year to 64 years old. Fifty-six percent of cases (5 of 9 cases) occurred among children under 14 years of age. No cases were reported among Alaskans over 65.



Sex

In 2000, the rate of invasive *Neisseria meningitidis* in males in Alaska was 4 times that of females, 2.66/100,000 compared with 0.66/100,000 for Alaska females (7 male cases, 2 female cases).

Mortality

There were no *Neisseria meningitidis*-related deaths reported in Alaska in 2000.

Clinical Presentation

The primary clinical presentation was determined by a review of the discharge diagnoses indicated in each patient's chart. In cases with multiple discharge diagnoses, the most serious diagnosis related to the *Neisseria meningitidis* infection was recorded as the primary clinical presentation. In cases with multiple discharge

diagnoses, the most serious *Neisseria meningitidis*-related diagnosis was recorded as the primary clinical presentation.

Meningitis was the most common primary clinical presentation, occurring in 5, or 56%, of the invasive *Neisseria meningitidis* cases in 2000. Septicemia of unknown focus was diagnosed in 2, or 22%, of cases. One patient each was diagnosed with septic shock and bacteremia. One patient that presented with meningitis was also diagnosed with pneumonia. No other cases were diagnosed with a secondary invasive *Neisseria meningitidis*-related syndrome.

Primary Clinical Presentations of Invasive *Neisseria meningitidis* – Alaska, 2000

Primary Presentation	Cases No. (%)
Meningitis	5 (56%)
Septic Shock	1 (11%)
Bacteremia	1 (11%)
Septicemia	2 (22%)
Total	9 (100%)

Neisseria meningitidis was isolated from blood samples in 6 of 9 cases (67%). Three cases were identified through the isolation of *Neisseria meningitidis* from cerebrospinal fluid.

Summary of Invasive *Neisseria meningitidis* Case Characteristics – Alaska, 2000

Gender	Age	Race	Anchorage /Other	Site of Isolation	Primary Clinical Presentation	Other NM Presentations	Associated Medical Conditions
Female	1	AK Native	Other	Blood	Septicemia	-	-
Male	2	Non-Native	Other	CSF	Meningitis	-	-
Male	7	Non-Native	Anchorage	Blood	Sepsis/Septic Shock	-	-
Male	12	AK Native	Anchorage	Blood	Meningitis	Pneumonia	-
Male	13	AK Native	Other	CSF	Meningitis	-	-
Male	22	Non-Native	Other	Blood	Meningitis	-	Alcohol + cigarette smoking
Female	23	Non-Native	Anchorage	CSF	Meningitis	-	-
Male	55	Non-Native	Anchorage	Blood	Septicemia	-	Diabetes
Male	64	Non-Native	Anchorage	Blood	Bacteremia	-	Cigarette smoking

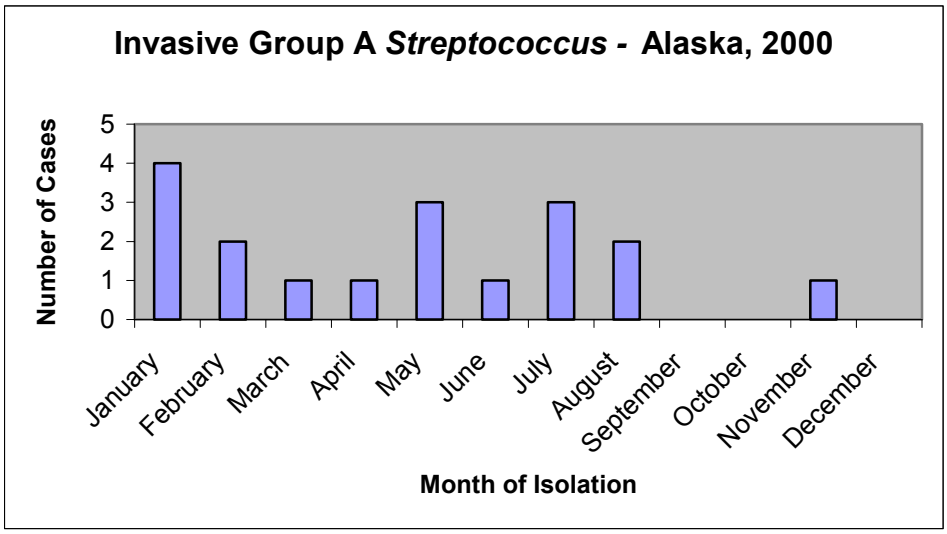
Invasive Group A *Streptococcus*

Overall Incidence

In the year 2000, a total of 18 cases of invasive Group A *Streptococcus* (GAS) were reported to AIP resulting in an overall rate of invasive GAS for the State of Alaska in 2000 of 2.9/100,000 persons per year. This is slightly lower than the ABCs 2000 national projected rate of 3.2/100,000 persons per year (*Active Bacterial Core Surveillance (ABCs) Report Emerging Infections Program Network group A streptococcus, 2000).* However, in a relatively small population, one year trends are subject to wide variability. A fair comparison with national rates should be made using multiple years of data. There was 1 invasive GAS-related death in Alaska in 2000, resulting in a case-fatality rate of 5.5%, and an overall GAS mortality rate of 0.16/100,000 persons per year for Alaska.

Seasonality

Ninety-four percent of invasive GAS cases were identified in the first 8 months of 2000; 17 cases occurred between January and August 2000.



Race

A total of 10 cases of invasive GAS were reported in the Alaska Native population in 2000, resulting in a case rate of 9.2/100,000 for this population. In contrast, the rate of invasive GAS among non-Natives for the same time period is 1.6/100,000 (8 cases).

Invasive GAS Cases, by Race - Alaska, 2000

Racial Group	Cases No. (%)	Rate*	% Male	Deaths
Alaska Native	10 (56%)	9.24	50%	-
Non-Native	8 (44%)	1.54	63%	1
Total	18 (100%)	2.9	63%	1

*Rate per 100,000 population: population figures calculated from Census 2000 data: Alaska Native: 108,187, non -Native: 518,745

Region

Anchorage carried the bulk of the invasive GAS burden in Alaska in 2000, 61% of cases (11) occurred among residents of that city. The remaining 7 cases occurred in 7 other Alaska cities and villages.

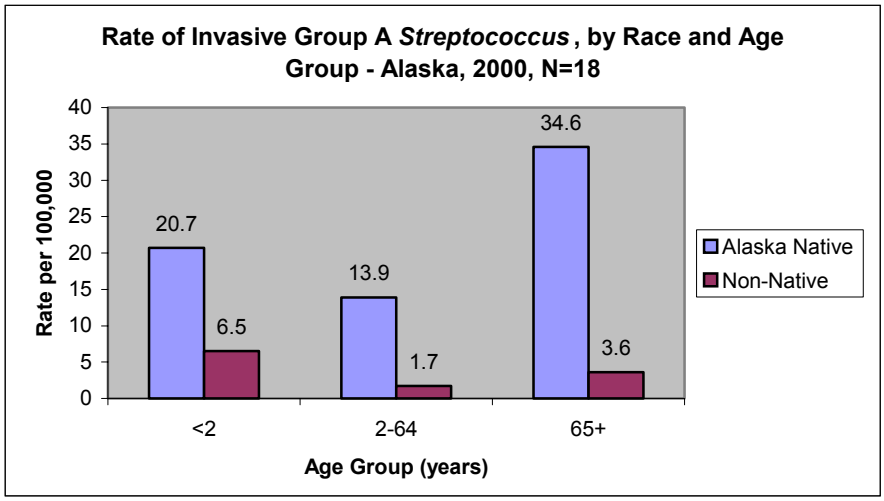
Sex

In 2000, the rate of invasive GAS among males was 3.3/100,000 (10 cases). For females, the rate of invasive GAS was slightly lower at 2.5/100,000 (8 cases).

Age

Cases ranged in age from 6 months to 77 years, with 50% occurring between the ages of 19 – 44. Seventeen percent of cases occurred among individuals in the 45 – 54 year old age group. No cases were reported in children 5 – 18 years old.

The highest rates of disease occurred among AK Natives under the age of 2 years and those over the age of 65 years.



Clinical Presentation

The primary clinical presentation was determined by a review of the discharge diagnoses indicated in each patient's chart. In cases with multiple discharge diagnoses, the most serious GAS-related diagnosis was recorded as the primary clinical presentation.

Of the 18 cases identified in 2000, 5 experienced multiple GAS-related presentations. In addition to the primary presentation, 2 cases were diagnosed with cellulitis, 1 with pneumonia and 1 additional diagnosis was unspecified. The patient who died was diagnosed with secondary endocarditis and septic arthritis, as well as the primary diagnosis of sepsis/septic shock.

Primary Clinical Presentations of Invasive GAS – Alaska, 2000

Primary Presentation	Cases No. (%)
Empyema	1 (5.5%)
Septic Shock	1 (5.5%)
Cellulitis	4 (22.5%)
Peritonitis	1 (5.5%)
Osteomyelitis	1 (5.5%)
Pneumonia	2 (11%)
Septic Arthritis	2 (11%)
Bacteremia	1 (5.5%)
Septicemia	4 (22.5%)
Other	1 (5.5%)
Total	18

GAS was identified in blood samples of 78% of cases (14). The remaining cases were identified through pleural fluid (1), joint fluid (2), and one unspecified sterile site.

Associated Medical Conditions

The most common associated medical conditions identified among the 18 Alaska GAS cases in 2000 were reported alcohol abuse (4 cases, 22%) and immunosuppressive treatment (4 cases, 22%). No associated medical conditions were indicated for 50% of cases (9).

Associated Medical Conditions Identified in Invasive GAS Cases in Alaska, 2000

Associated medical condition	No. Cases*
Diabetes	1
Cigarette smoking	3
Chronic lung disease	1
Alcohol abuse	4
Immunosuppressive treatment	4
Injection drug use	1
No associated medical conditions noted	9

*More than 1 associated medical condition was identified in 5 cases

Mortality

In 2000, the overall case fatality rate for invasive GAS in the state of Alaska was 5.5%, or one death out of a total of 18 cases.

Summary of Invasive Group A Streptococcus Case Characteristics – Alaska, 2000

Gender	Age	Race	Anchorage /Other	Site of Isolation	Primary Clinical Presentation	Other GAS Presentations	Associated Medical Conditions	Outcome
Female	6 months	AK Native	Anchorage	Blood	Septicemia	-	-	-
Male	2	Non-Native	Anchorage	Blood	Bacteremia	-	-	-
Male	2	Non-Native	Anchorage	Pleural fluid	Other	-	-	-
Female	20	AK Native	Other	Blood	Septicemia	-	Cigarette Smoking + Imm Tx	-
Female	22	AK Native	Anchorage	Blood	Pneumonia	Cellulitis	Alcohol + Inj Drug	-
Male	23	AK Native	Other	Joint fluid	Osteomyelitis	Other	Cigarette Smoking + Alcohol	-
Female	26	AK Native	Anchorage	Blood	Cellulitis	-	Imm Tx	-
Female	27	Non-Native	Other	Blood	Peritonitis	-	-	-
Male	30	AK Native	Anchorage	Joint fluid	Cellulitis	-	-	-
Female	32	Non-Native	Anchorage	Blood	Septic Shock	Endocarditis, Septic Arthritis	Imm Tx*	Death
Male	39	AK Native	Anchorage	Blood	Septic Arthritis	-	Cigarette Smoking + Alcohol	-
Female	44	Non-Native	Other	Blood	Cellulitis	-	Imm Tx	-
Male	47	Non-Native	Anchorage	Blood	Septicemia	-	-	-
Male	51	Non-Native	Anchorage	Blood	Septicemia	-	Alcohol	-
Male	52	AK Native	Other	Blood	Septic arthritis	Cellulitis	-	-
Female	57	AK Native	Anchorage	Blood	Cellulitis	-	-	-
Male	74	Non-Native	Other	Blood	Pneumonia	-	Chronic Lung Dx + Diabetes	-
Male	77	AK Native	Other	Unspecified sterile site	Empyema	Pneumonia	-	-

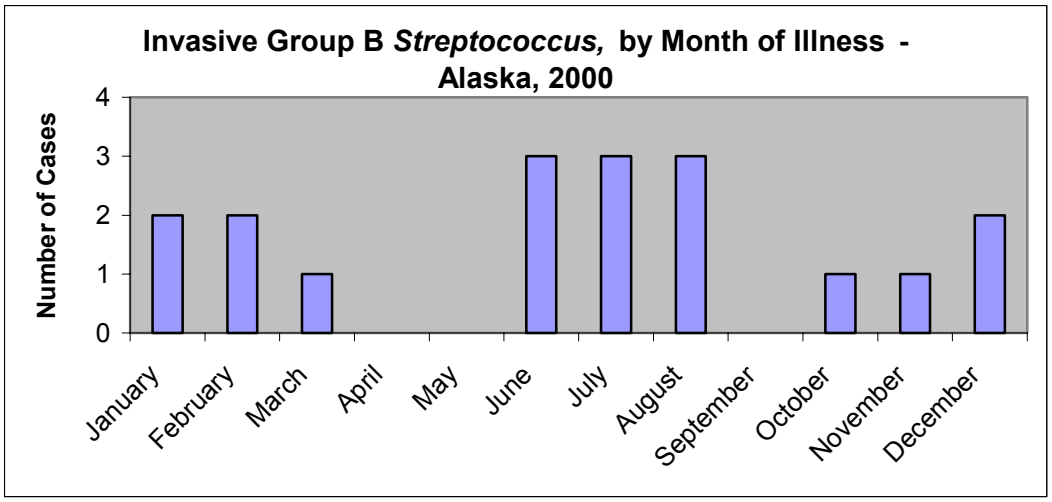
*Immunosuppressive treatment

Invasive Group B *Streptococcus*

Overall Incidence

A total of 18 cases of invasive Group B *Streptococcus* (GBS) were reported to AIP in 2000, resulting in an overall rate for the state of Alaska in 2000 of 2.9/100,000 persons per year. This is lower than the rate of 6.9/100,000 found in the CDC ABCs areas in 2000 and the national projected rate of 6.8/100,000 (*Active Bacterial Core Surveillance (ABCs) Report Emerging Infections Program Network group B streptococcus, 2000*). However, in a relatively small population, one year trends are subject to wide variability. A fair comparison with national rates should be made using multiple years of data. There were 2 invasive GBS-related deaths in Alaska in 2000, resulting in a case-fatality rate of 11%, and an overall GBS mortality rate of 0.3/100,000 persons per year for Alaska.

Seasonality



Fifty-percent of all reported invasive GBS cases occurred in the summer months of June, July, and August.

Race

GBS Cases by Race – Alaska, 2000

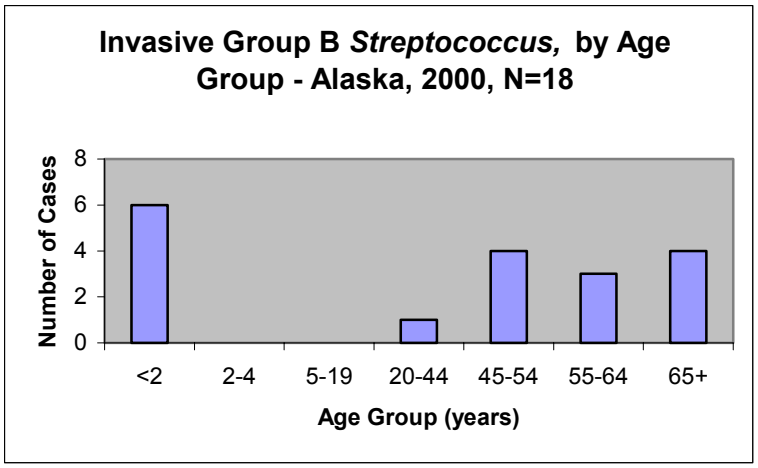
Racial Group	Cases No. (%)	Rate*	% Male	No. Deaths
Alaska Native	3 (17%)	2.8	66%	-
Non-Native	15 (83%)	2.9	9%	2
Total	18	2.9	17%	2

*Rate per 100,000 population: population figures calculated from Census 2000 data: Alaska Native: 108,187, non-Native: 518,745
**Unknown race (n=2) included in non-Native group

Region

Invasive GBS cases were identified in 8 Alaska communities. Half of all reported cases occurred in residents of Anchorage. Two cases each were reported in Wasilla and Fairbanks. The remaining 5 cases occurred in 5 separate communities.

Age

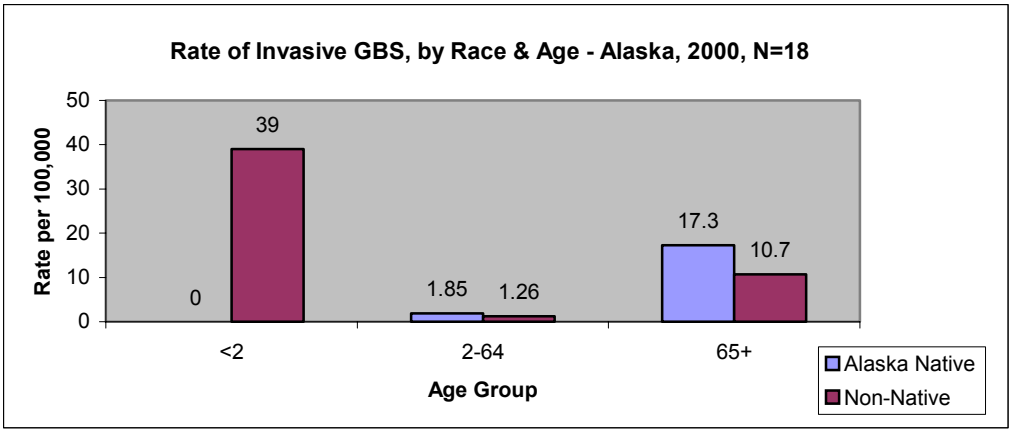


Non-Native children under 2 years of age carried the bulk of the invasive GBS burden in Alaska in 2000. One-third of all reported cases occurred in this age and racial group, resulting in a rate of 39/100,000 for non-Native children less than 2 years of age. There were no cases reported in Alaska Native children less than 2 years of age, and no cases in any children from 2 – 20 years of age. The rate of invasive GBS for both the Alaska Native and non-Native populations between 2- 65 years is less than 2/100,000 in 2000.

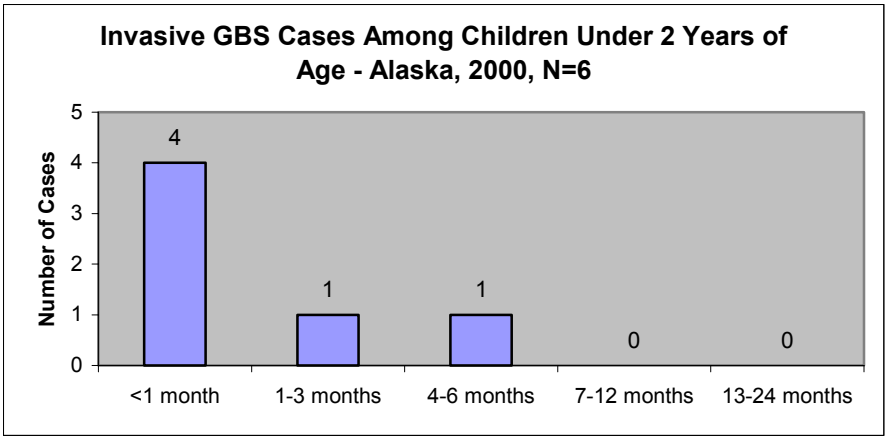
Rate of Invasive GBS, by Race and Age, Alaska 2000

	<2 years Rate* (no.)	**2 – 64 years** Rate (no.)	**65+ years** Rate (no.)
Alaska Native	0	1.85 (2)	17.3 (1)
Non-Native	39.0 (6)	1.26 (6)	10.7 (3)

*Rate per 100,000 population: population figures calculated from Census 2000 data: Alaska Native: 108,187, non-Native: 518,745
**Unknown race (n=2) included in non-Native group



*Number indicated above the bar is the rate of invasive GBS for each age and racial group per 100,000 population.



Sex

The rate of invasive GBS for Alaska females in 2000 was 1.98/100,000 (6 cases). The rate of invasive GBS for males was 3.7/100,000 (12 cases).

Clinical Presentation

The primary clinical presentation was determined by a review of the discharge diagnoses indicated in each patient's chart. In cases with multiple discharge diagnoses, the most serious diagnosis related to the GBS infection was recorded as the primary clinical presentation. Septicemia of unknown focus was the most common primary clinical presentation, occurring in 8, or 44%, of the invasive GBS cases in 2000. Cellulitis occurred in 4, or 22%, of cases. The remaining patients presented with pneumonia, peritonitis, meningitis, and bacteremia.

Primary Clinical Presentations of Invasive GBS – Alaska, 2000

Primary Presentation	Cases No. (%)	Deaths
Bacteremia	1 (6%)	-
Meningitis	1 (6%)	-
Peritonitis	2 (11%)	1
Cellulitis	4 (22%)	-
Pneumonia	2 (11%)	-
Septicemia	8 (44%)	1
Total	18 (100%)	2

Two cases were diagnosed with an additional GBS-related presentation. One patient with cellulitis also presented with osteomyelitis and one patient with a primary diagnosis of pneumonia also presented with cellulitis.

Group B *Streptococcus* was isolated from blood samples in 15 of 18 cases (83%). One case each was identified through the isolation of the GBS bacteria from cerebrospinal fluid, peritoneal fluid, and tissue.

Mortality

Two of 18 cases died due to infection with invasive GBS, for an overall case fatality rate of 11%. The overall GBS-related mortality rate for Alaska is 0.3/100,000, less than half that projected as the national mortality rate of 0.7/100,000 (*Active Bacterial Core Surveillance (ABCs) Report Emerging Infections Program Network group B streptococcus, 2000*). However, year to year rates in a small population are likely to vary widely and multiple years would be needed to make a fair comparison.

Associated Medical Conditions

The presence of one or more associated medical conditions was noted in 33% of reported invasive GBS cases in 2000. One associated medical condition was identified in 5 of 6 cases and 3 (diabetes, alcohol use, and cigarette smoking) were reported for 1 case. Data were unavailable for 1 case.

Summary of Invasive Group B *Streptococcus* Case Characteristics – Alaska, 2000

Gender	Age (Years)	Race	Anchorage /Other	Site of Isolation	Primary Clinical Presentation	Other GBS Presentations	Associated Medical Conditions	Outcome
Female	1 day	Non-Native	Anchorage	Blood	Septicemia	-	-	-
Male	1 day	Non-Native	Anchorage	Blood	Septicemia	-	-	-
Male	1 day	Non-Native	Other	Blood	Pneumonia	-	-	-
Female	10 days	Non-Native	Anchorage	CSF	Meningitis	-	-	-
Male	0.1	Non-Native	Other	Blood	Septicemia	-	-	-
Female	0.5	Non-Native	Other	Blood	Septicemia	-	-	-
Male	43	Non-Native	Other	Peritoneal fluid	Peritonitis	-	Alcohol	Death
Male	46	Non-Native	Anchorage	Blood	Septicemia	-	-	-
Female	49	Non-Native	Anchorage	Blood	Cellulitis	-	-	-
Male	49	AK Native	Other	Joint Fluid	Cellulitis	Osteomyelitis	-	-
Male	50	Non-Native	Other	Blood	Septicemia	-	Alcohol	Death
Male	55	AK Native	Anchorage	Blood	Peritonitis	-	Diabetes + alcohol + smoking	-
Male	59	Non-Native	Other	Blood	Cellulitis	-	Diabetes	-
Male	62	Non-Native	Anchorage	Blood	Septicemia	-	Chronic lung disease	-
Male	66	Non-Native	Other	Blood	Cellulitis	-	Diabetes	-
Female	76	AK Native	Anchorage	Blood	Septicemia	-	-	-
Female	78	Non-Native	Other	Blood	Bacteremia	-	Unknown	-
Male	86	Non-Native	Anchorage	Blood	Pneumonia	Cellulitis	-	-

Appendix

MIC Interpretive Standards Definitions:

NCCLS provides recommended interpretive categories for various Minimum Inhibitory Concentration values (cut points) for each organism which are defined as follows:*

1. **Susceptible (S):**

   The "susceptible" category implies that an infection due to the strain may be appropriately treated with the dosage of antimicrobial agent recommended for that type of infection and infecting species, unless otherwise contraindicated.

2. **Intermediate (I):**

   The "intermediate" category includes isolates with antimicrobial agent MICs that approach usually attainable blood and tissue levels and for which response rates may be lower than for susceptible isolates. The "intermediate" category implies clinical applicability in body sites where the drugs are physiologically concentrated (e.g., quinolones and β-lactams in urine) or when a high dosage of a drug can be used (e.g., β-lactams). The "intermediate" category also includes a buffer zone which should prevent small, uncontrolled technical factors from causing major discrepancies in interpretations, especially for drugs with a narrow pharmacotoxicity margins.

3. **Resistant (R):**

   Resistant strains are not inhibited by the usually achievable systemic concentrations of the agent with normal dosage schedules and/or fall in the range where specific microbial resistance mechanisms are likely (e.g., β-lactamases) and clinical efficacy has not been reliable in treatment studies.

* NCCLS, MIC Testing, Supplemental Tables, M100-S10 (M&), January 2000, p.9.