COVID-19 Social Distancing:
Lessons from Alaska Flu and RSV Epidemics

New Provider Webinar
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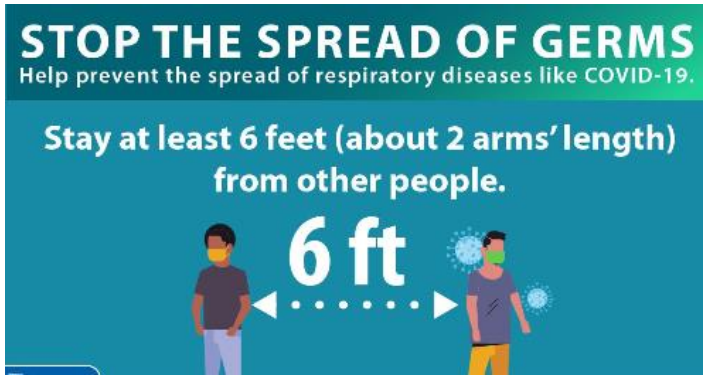


History of Respiratory Disease in Alaska

1918-19

- Pandemic Flu epidemic and other epidemics led to thousands of deaths and decimated entire Alaska Native villages

1950s

- Alaska had one of the highest rates of TB – 700/100,000

1960s.

- Measles and pertussis respiratory infections - half of infant deaths.
- Postneonatal Infant mortality rate in YK Delta, 1962 - 5.6%
- Respiratory infections drove high rates of bronchiectasis

Today

- Many older Alaska Native adults have residual lung disease
- TB rates still higher than the US
- RSV and Childhood bronchiectasis rates are decreasing but still very high

Vaccine-Preventable Disease Success, Alaska

- **BEFORE VACCINES:**
  - Hib meningitis and sepsis – 40-80 cases/year in children.
  - Hepatitis A – Alaska-wide epidemics with up to 4,000 cases.
  - Hepatitis B –10% of Alaska Natives infected in some regions.
  - Measles outbreaks contributed to high infant mortality.

- **BECAUSE OF VACCINES:**
  - 0-2 cases of Hib per year.
  - No hepatitis A epidemics since vaccine.
  - Alaska Natives have the lowest rate of Hepatitis B in the U.S.
  - No measles cases in Alaska since 2000!

Harpaz. J Infect Dis 2000;181;413-8; Singleton, McMahon,et al. VACCINE 2010;28:6298-304; CDC unpublished, State of Alaska Section of Epidemiology unpublished.

1918 Spanish Flu in Alaska

- 1918 Spanish flu claimed over 25 million lives worldwide
- Some of the most severely affected communities in the world were in Labrador Samoa and Alaska.
- AK Vital statistics reports nearly 3,000 deaths – per capita more people died from Spanish Flu than anywhere else in the world except Samoa.
- In Alaska, mortality was as high as 38% among affected populations.
- Whole communities were abandoned
- Thousands of Alaska Native people died, leaving many orphans behind.
- The Bureau of Education opened orphanages to care for these homeless children, at Kanakanak, and White Mountain.

COMPASS: *Other points of view*

Flu nearly wiped out Bristol Bay communities

By TIM TROLL

For the last year newspaper headlines have suggested the H1N1 flu may blossom into a worldwide epidemic.

We Alaskans have been here before.

Ninety years ago, headlines in the Seward Gateway in the spring of 1919 boldly announced: Flu Hits Westward — Many Die. The "Flu" was an especially deadly strain of H1N1 known as the Spanish Flu that claimed millions worldwide. "Westward" was Bristol Bay.

Word about the flu came to Bristol Bay by special messenger who traveled by dog team down from the Yukon River in December of 1918. The messenger was dispatched by the territorial governor to warn Dr. L.H. French at the government hospital at Kanakanak, near Dillingham.

Dr. French ordered a general quarantine. All travel into and out of the villages was restricted. Health officers were appointed in each village to enforce the quarantine. School and church services were suspended.

By mid January of 1919 the doctor wrote he was confident that isolation and the measures taken would be effective. There was no sign of the influenza as April came.

Village residents pressed to have the restrictions lifted so they could travel to attend Russian Orthodox Easter services in the larger towns. It is not clear whether Dr. French lifted the restrictions or they were ignored. A travelling Russian priest is believed to have

Photo by Sue Brown French courtesy Tim Troll

Nurses Rhoda Ray and Mary Conley with infants rescued from 1919 Spanish Flu.

Ninety years ago, headlines in the Seward Gateway in the spring of 1919 boldly announced: Flu Hits Westward — Many Die.

of supplies and additional doctors and nurses. The warden noted, however, this effort was an embarrassing failure as most of the doctors and nurses dispatched to help were too preoccupied with collecting souvenirs or too disgusted to help the Natives.

In contrast, he observed that the heroic efforts of two hospital nurses Mary Conley and Rhoda Ray virtually saved the local Native population:

These two nurses ... have been working practically night and day for weeks on end — doing all the janitor's work, the cooking for the entire hospital, all the nursing and caring for a number of children and babies whose parents were either dead or dying — getting up, in fact, at six a.m. and continuing steadily on duty until 11 p.m., and getting up thereafter during the night to attend to babies and sick persons urgently demanding attention.

Also accorded praise, the warden noted, were the canneries, which showed "a more noble strain" than the government. Canneries

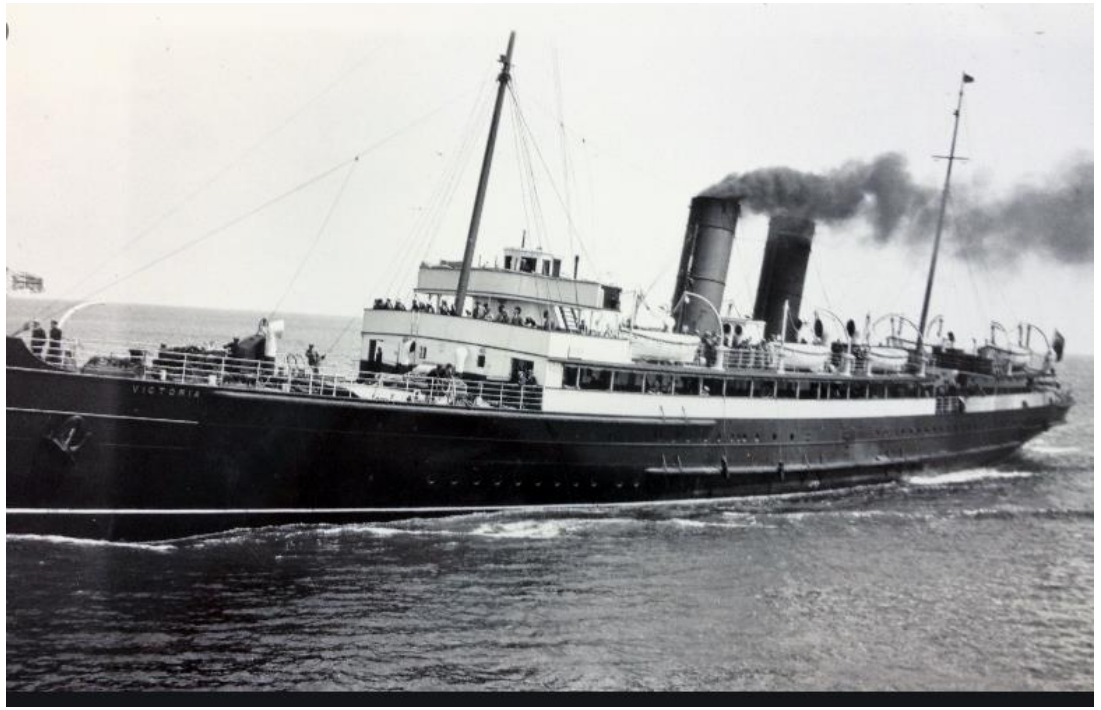
1918 Pandemic Flu

- This truly was as close to extinction as people experienced," Ringsmuth said. "What's shocking to me is that very few people are talking about this as the anniversary arrives … This was a demographic game-changer. Before, there were more native people than neo-Americans."
- You tend to think it was the old people, the young, the weak, but it [wasn't],"Ringsmuth said. "It killed the 30-year-olds, the strongest part of the community

This historical photograph shows doctor Linus Hiram French with orphans of the Spanish flu epidemic in 1919. (Photo courtesy of Tim Troll)

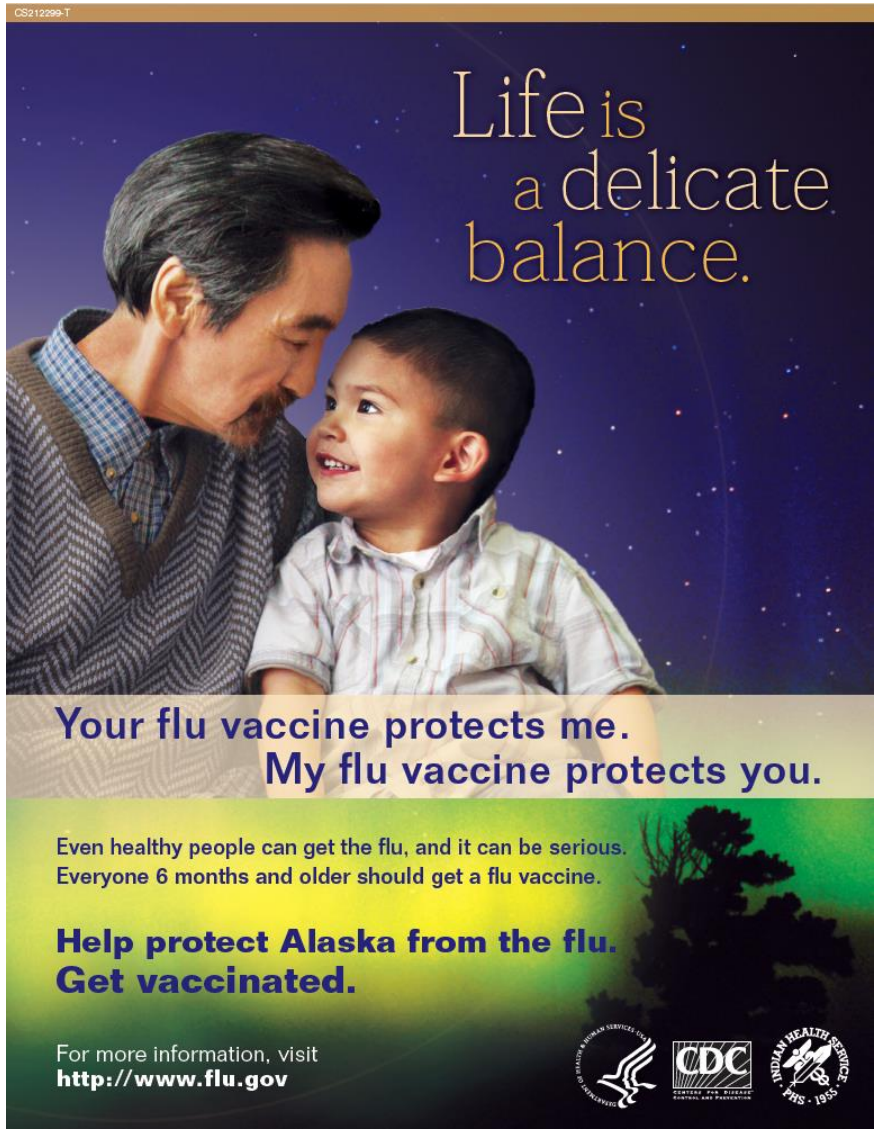
How did the Spanish Flu Spread in Alaska?

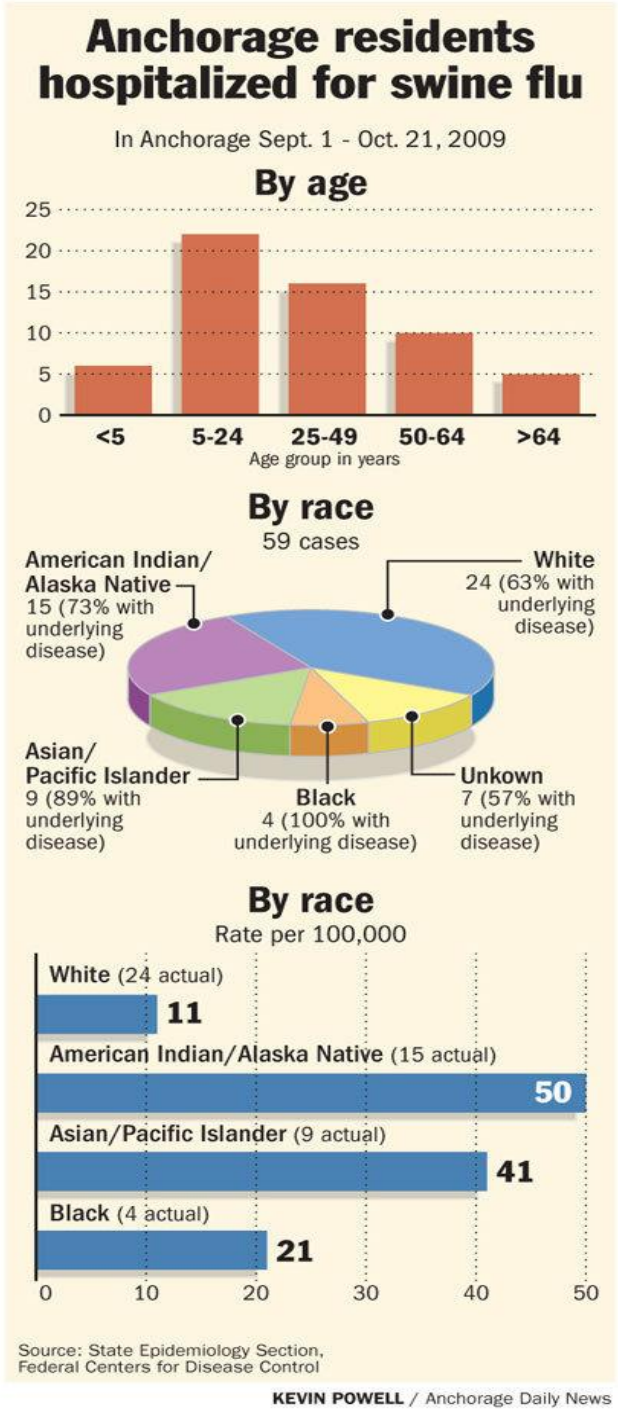
- Historians believe it was likely carried by steamships and barges from Seattle.
- The pandemic seeped into the state from the coasts.
- In October 1918, the S.S. Victoria docked in Nome, and the men on board unknowingly delivered mail carrying the virus, according to a 2015 Senior Voice article by Alaska historian Laurel Downing Bill



Influenza in Alaska Native people

- Alaska Natives at high risk for flu morbidity and mortality
- Much of the risk is explained by other risk factors (heart disease, diabetes) and household conditions (crowding, lack of piped water
- Influenza/pneumonia in top 10 causes of death for AI/AN people

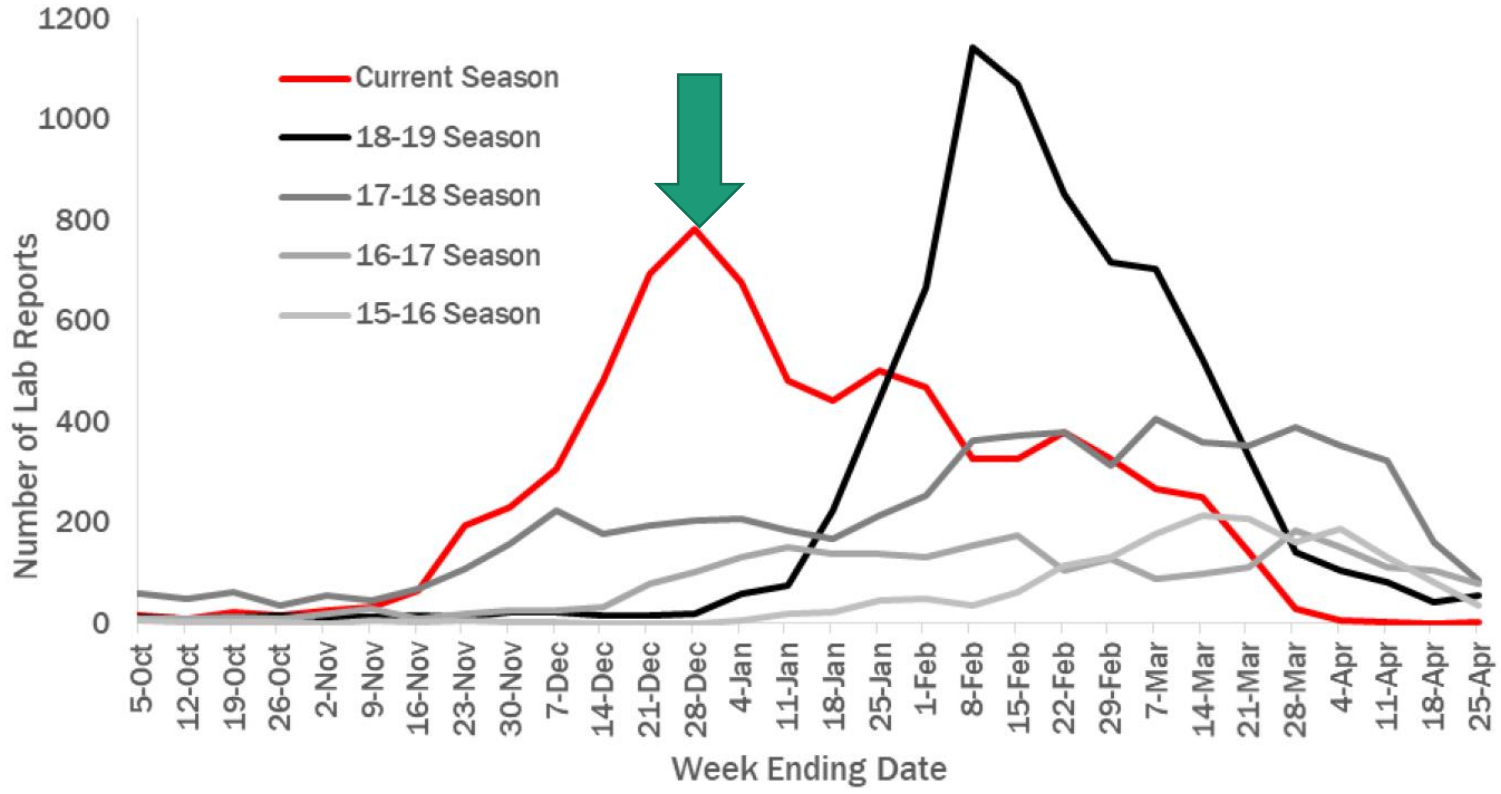




2009 H1N1 Pandemic

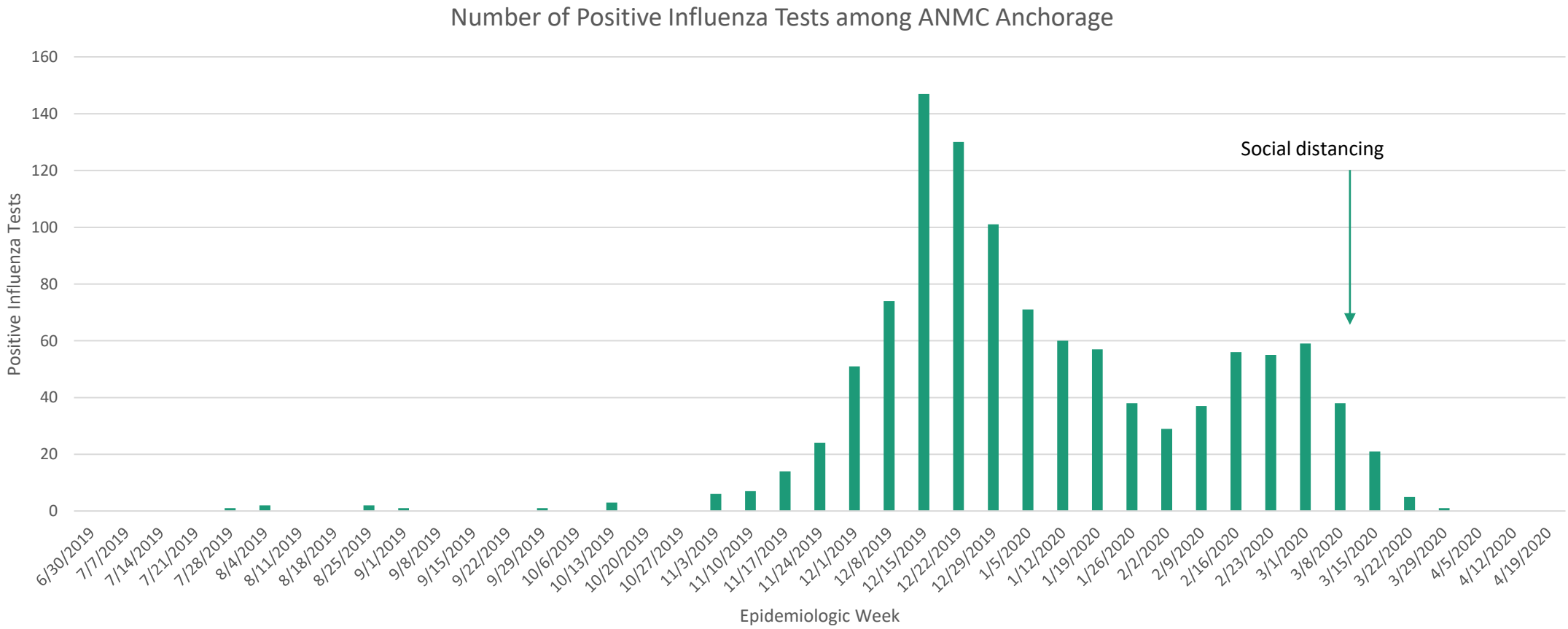
- 2009 H1N1 complications high in Alaska Native people
  - hospitalization rate was 4 times higher than white Anchorage residents,
  - H1N1 death rate 4 times higher in AI/AN people,
  - relatively healthy young adults and children affected

5 year Alaska Flu Snapshot 5/1/2020



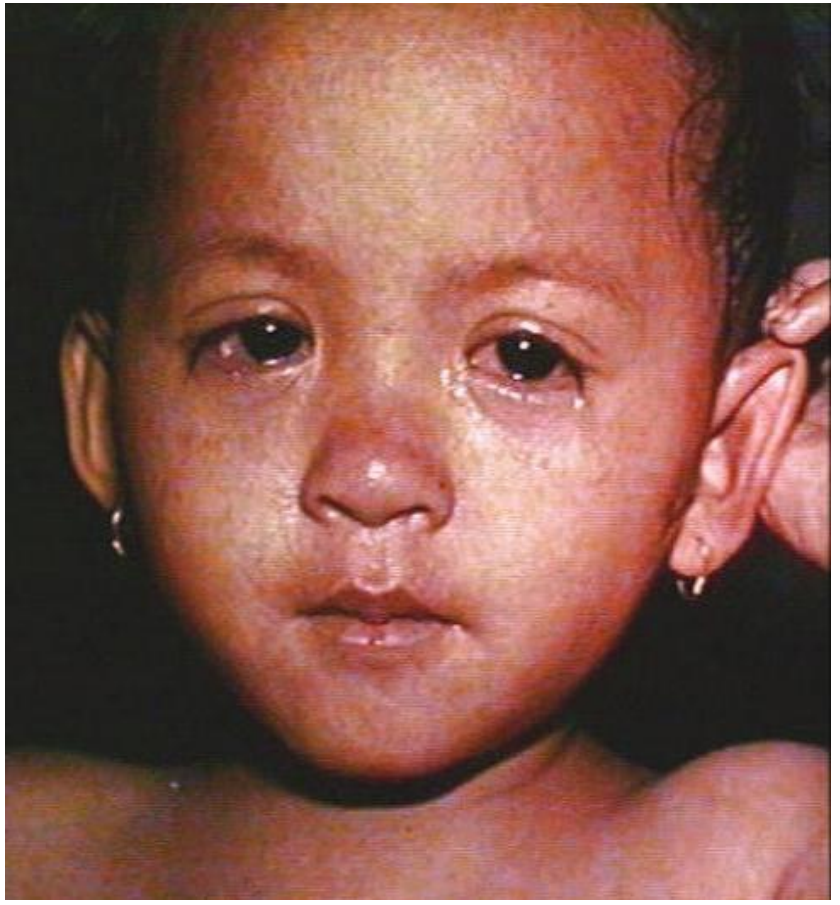
Flu positives dropped to nearly zero end of March. Flu often goes into May in Alaska.

ANMC – Did Social distancing have an impact?



ANMC flu positives by week, 2019-20 through 4/26/2020

Lessons from Measles Outbreaks



Measles is the first vaccine-preventable disease to breakthrough when immunization rates decline.

Measles transmissibility is much higher than SARS CoV-2

Measles Outbreak in a Pediatric Practice: Airborne Transmission in an Office Setting **Pediatrics, Volume 75, April 1, 1985, 676-683.**

> "The three other children who contracted measles were never in the same room with the source patient; one of the three arrived at the office one hour after the source patient had left."

Imported Measles with Subsequent Airborne Transmission in a Pediatrician's Office -- Michigan CDC MMWR August 12, 1983 / 32(31);401-3

"the other three arrived in the office 60-75 minutes after Patient A left. Only one of these four children used the same examining room as Patient A"

Why Fear Measles?

Measles is the most contagious vaccine preventable disease

- You can get measles from a person who is not in the same room
- 90% of susceptible people will get clinical measles if exposed to a case
- An Amish group of people went to Philippines and returned to Ohio – spreading measles to about 300 people

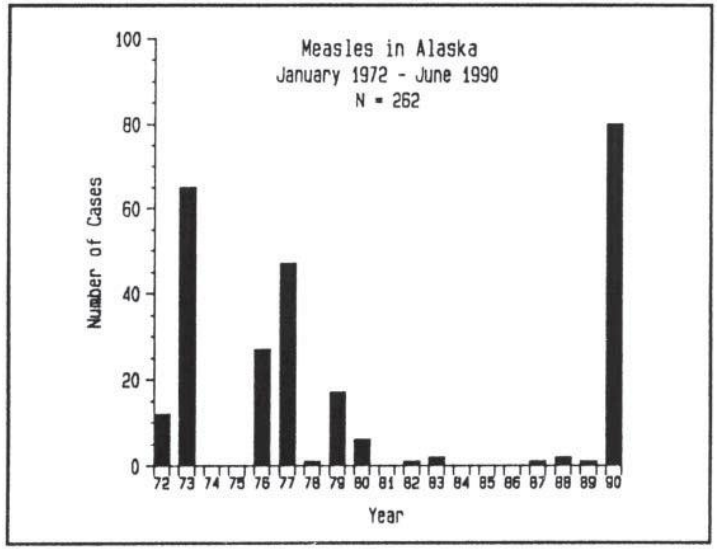
Measles is the most deadly of childhood rash/febrile illness

- 20 million cases/year – down 77% from 2000
- 5-8 million deaths/year – down 78% from 2000

1990 Statewide Outbreak

1990 – measles outbreak spread statewide with 80 cases:

- 3 unimmunized children exposed in Ketchikan clinic
- The 3 transmitted measles to 11 children in daycare
- 4 were hospitalized at Ketchikan General Hospital and infected 10 others.
- 2 returned to their villages and transmitted to others
- 1 transferred to Anchorage hospital; infected northern/western Alaskans, including Arctic Slope



http://www.epi.hss.state.ak.us/bulletins/docs/b1990_11.pdf

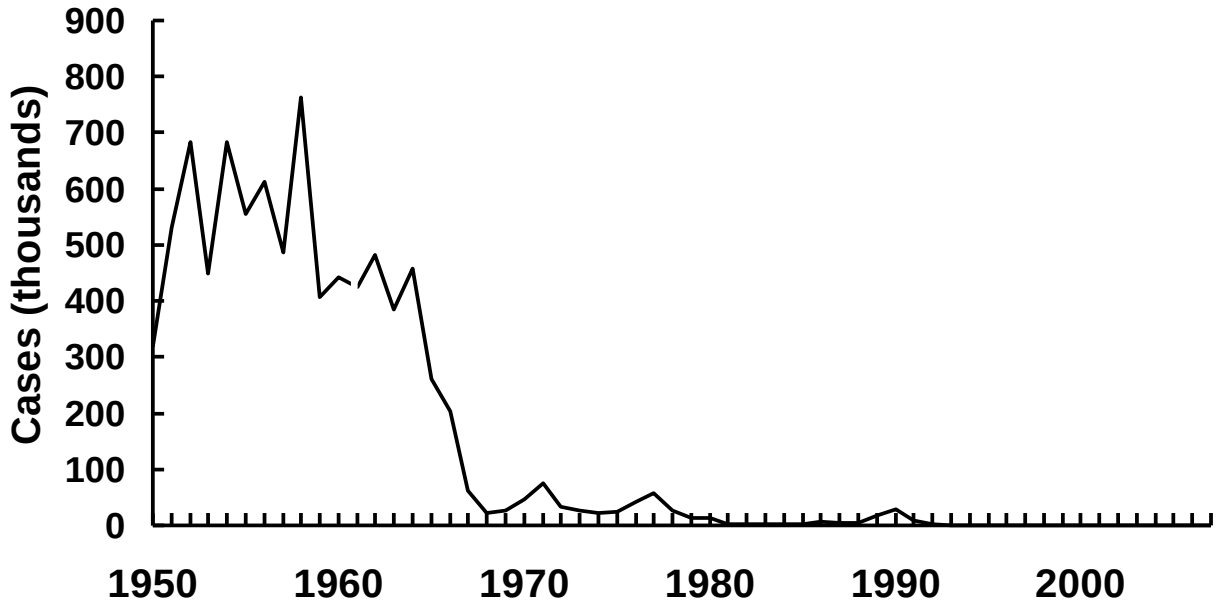
Measles History in the U.S.

- **Before measles vaccine, the United States experienced:**
  - 3-4 million cases of measles
  - 48,000 measles hospitalizations
  - 1,000 cases of permanent brain damage from measles encephalitis
  - 500 reported deaths from measles

- **Measles vaccine is effective**
  - 93%-95% have lifelong immunity after 1st dose in persons 1 year or older
  - 97%-99% have lifelong immunity after 2nd dose, routinely given at 4-5 yrs

- **Measles vaccine led to U.S. elimination of measles in 2000; however, every year there are dozens of imported cases of measles from travelers**

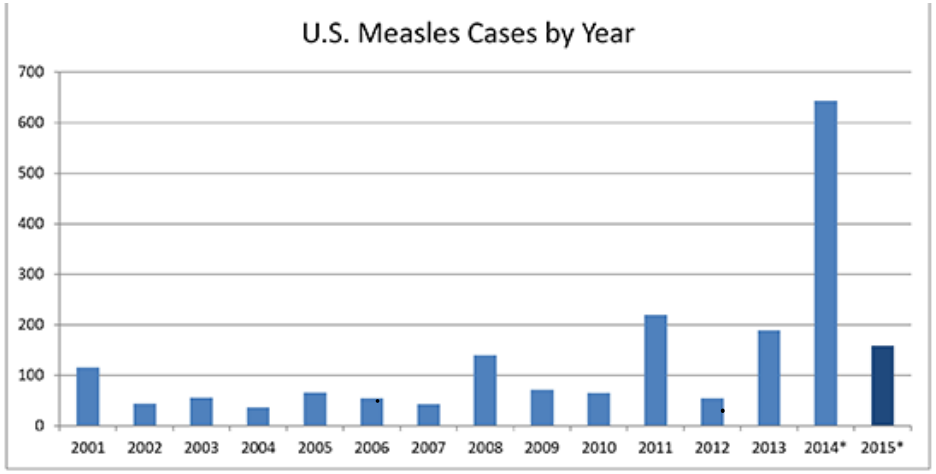
Measles – U.S., 1957-2010



- Measles cases dramatically decreased after measles vaccine
- Measles was eliminated from the United States in 2000 after 2 dose recommendation and school laws
- ~100 cases/year continued to occur in the United States in 2000-2013 because of travelers from other countries

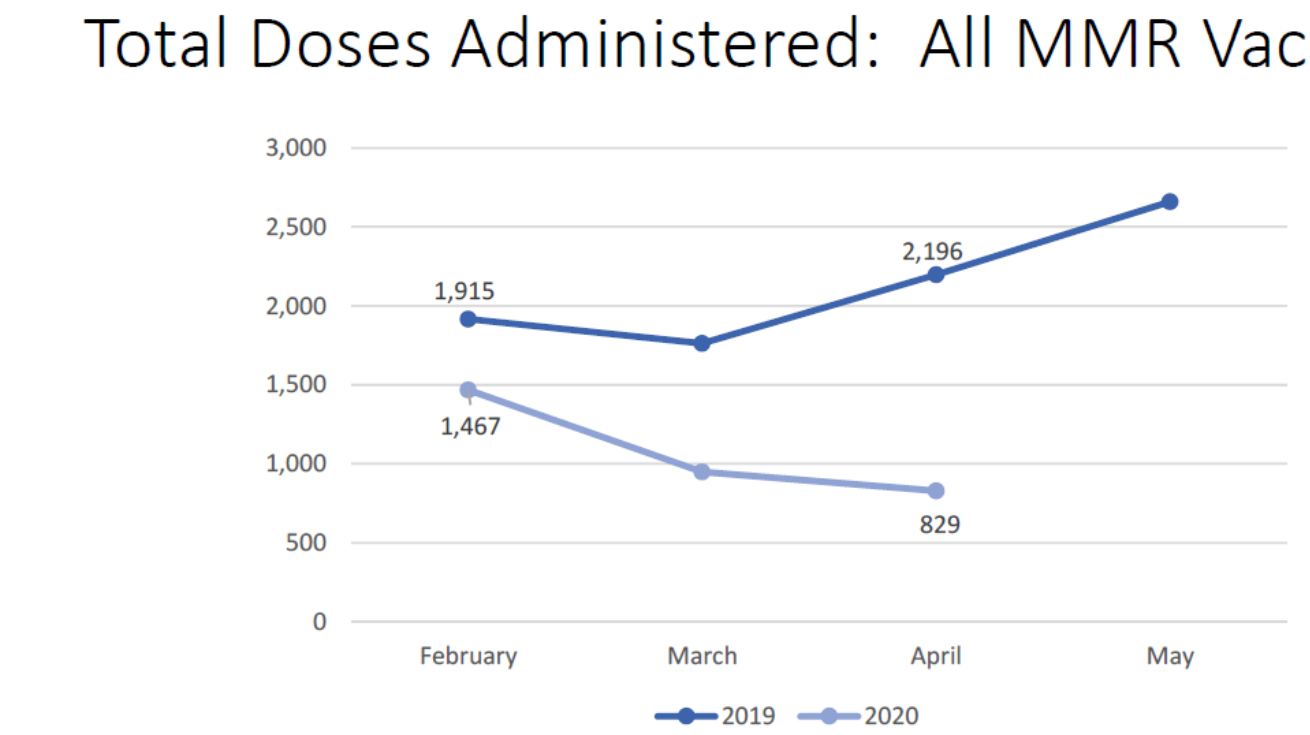
Rise in U.S. Measles Cases, 2014-15

- In 2014, a group of Amish people brought measles back from Philippines.
- In 2015, 127 measles cases linked to a multi-state outbreak from one Disneyland visitor.



*Provisional data reported to CDC's National Center for Immunization and Respiratory Diseases

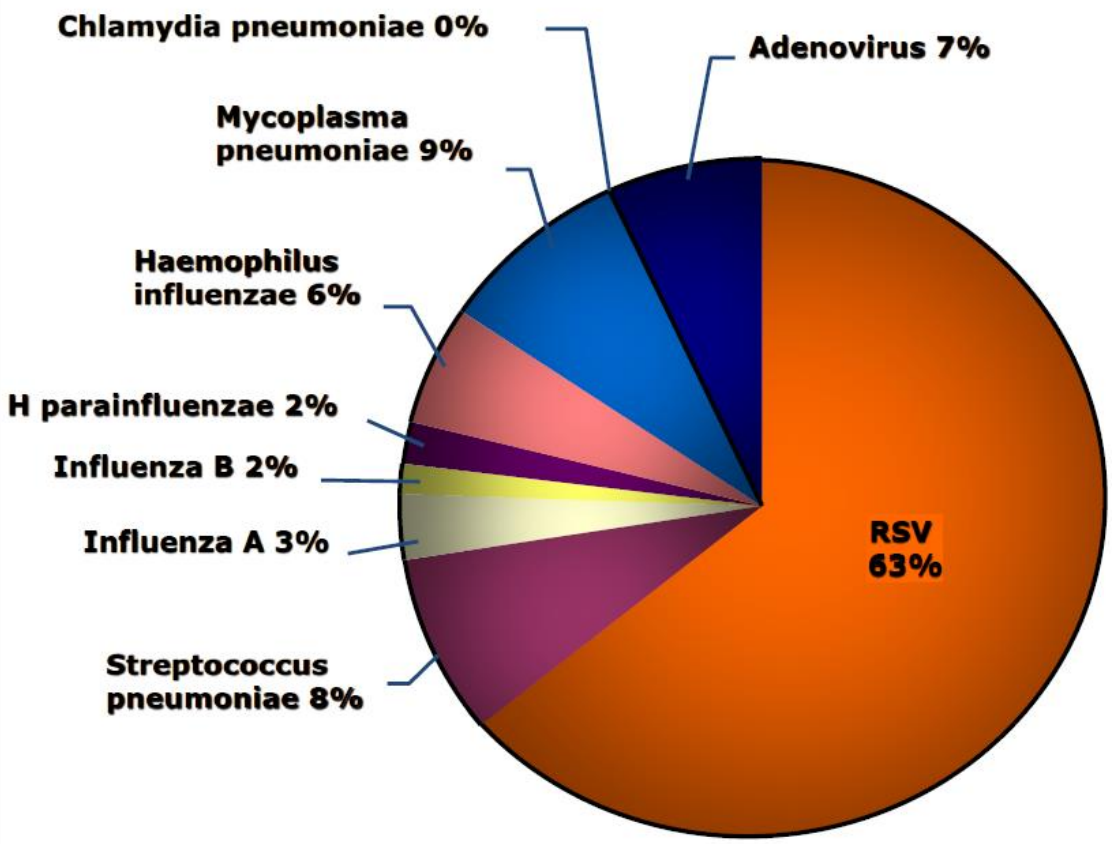
MMR vaccination with COVID-19: Low immunization rates could contribute to a measles resurgence



Data Source: VacTrAK (Alaska's Immunization Information System)

RSV: Worldwide Impact on Children

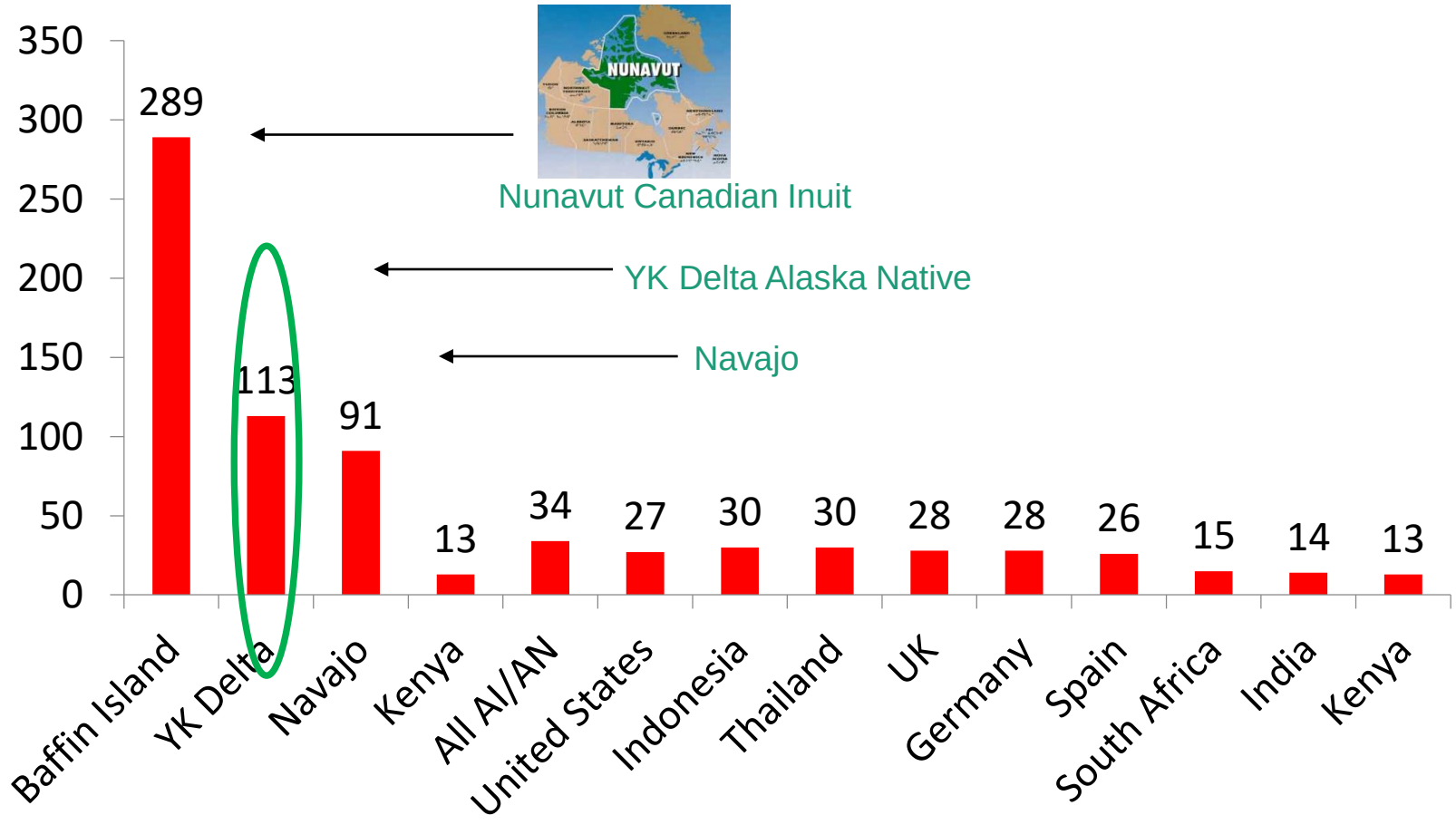
- In children>60% of acute respiratory infection is due to RSV
- RSV is the main cause of pneumonia and bronchiolitis in children
- RSV is the single most common cause of hospitalization in infants



Piedimonte & Perez, PIR 2014

Global estimates of severe RSV:

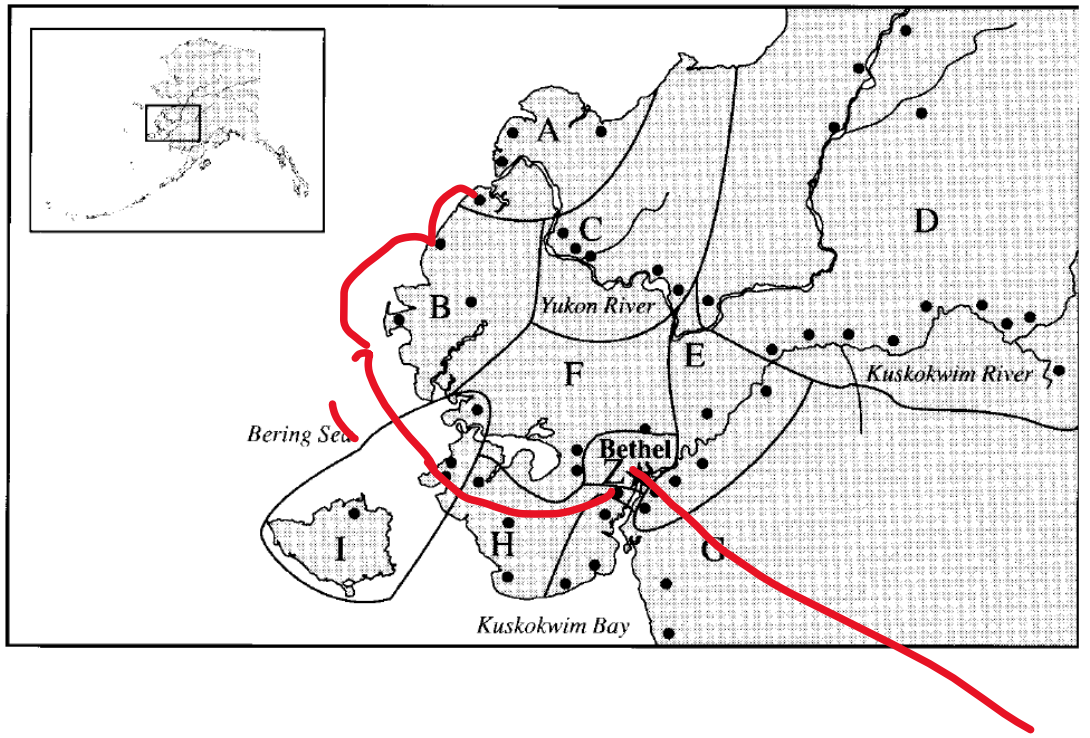
Rate of Severe or Hospitalized RSV/1000 infants/yr



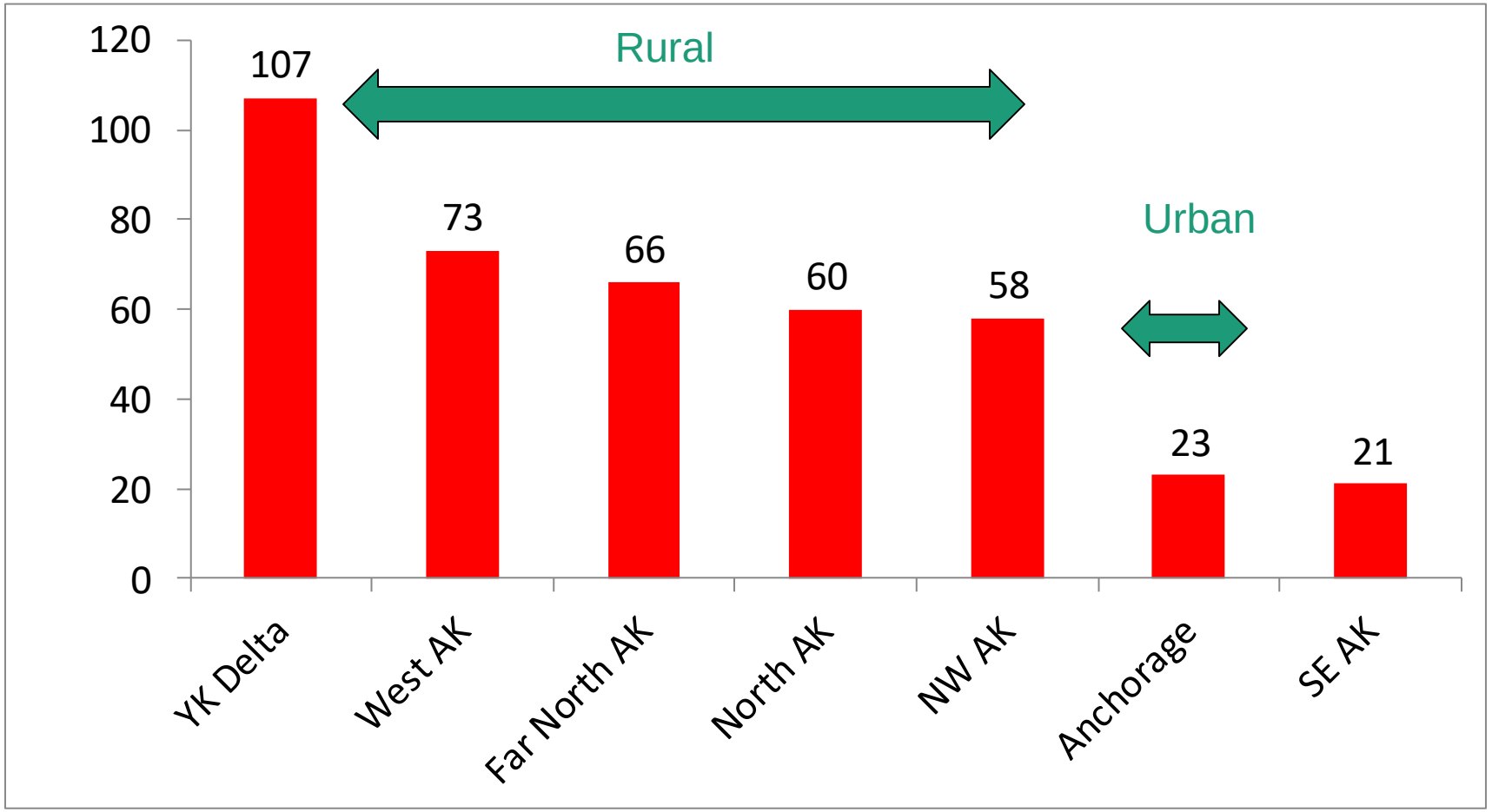
Nair H et al. Global burden of RSV…Lancet 2010;375:1545-55;
Banerji. PIDJ Cost of hospitalization for RSV in Canadian Inuit Pediatr Infect Dis 2009;28:.

RSV: Lessons in Transmission in Alaska

- In October 1994-Jan 1995, 25% of YK infants were hospitalized with RSV.
- RSV was spread by air travel, from Bethel, to the coast and then up the coast along lines of air travel
- Once in villages, RSV spread rapidly. 4 infants from Hooper Bay were hospitalized at ANMC in the same room!



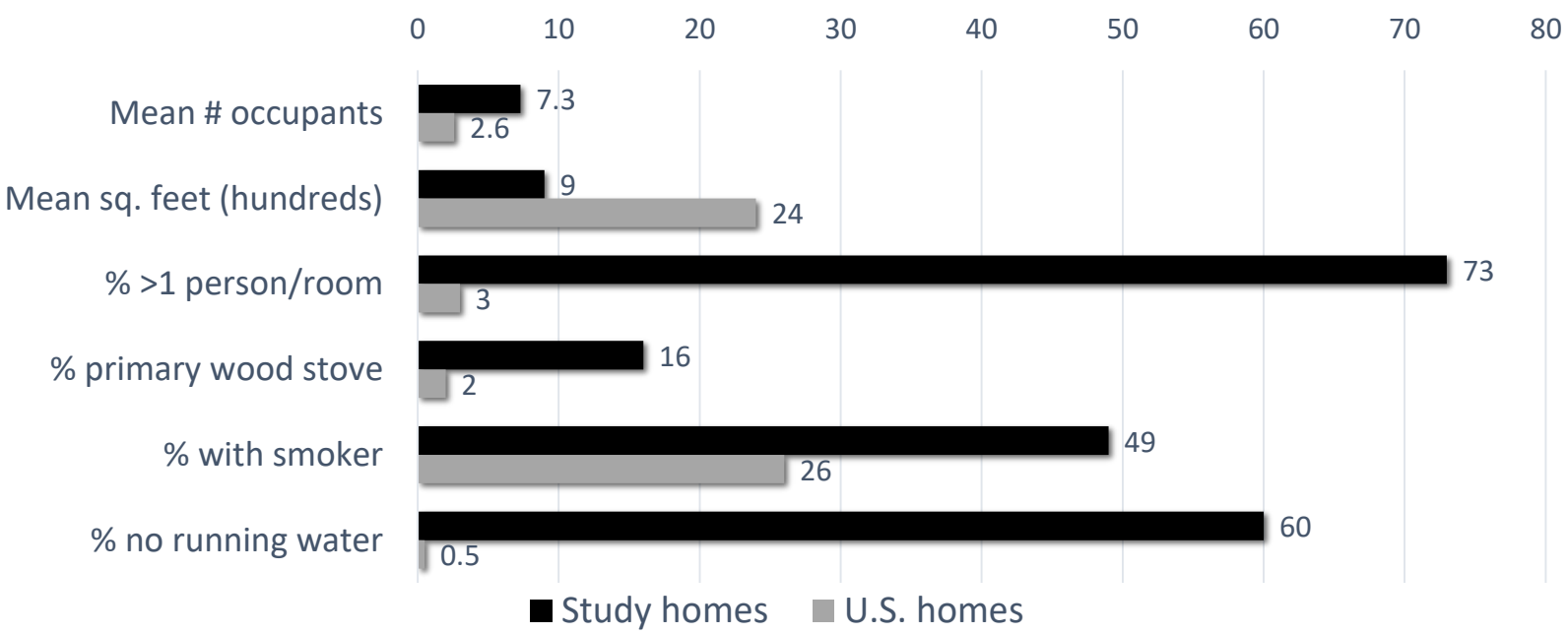
RSV Hospitalization Rate/1000/yr:
Alaska Native infants by region, 2002-2008



Unpublished data, Singleton RJ, AIP-CDC, from IHS NIPRS data

Housing in rural Alaska Native communities compared with U.S. general population

Healthy Homes study in YK Delta and Bristol Bay homes compared with U.S. data from 2008-2012 Census, American Community Survey

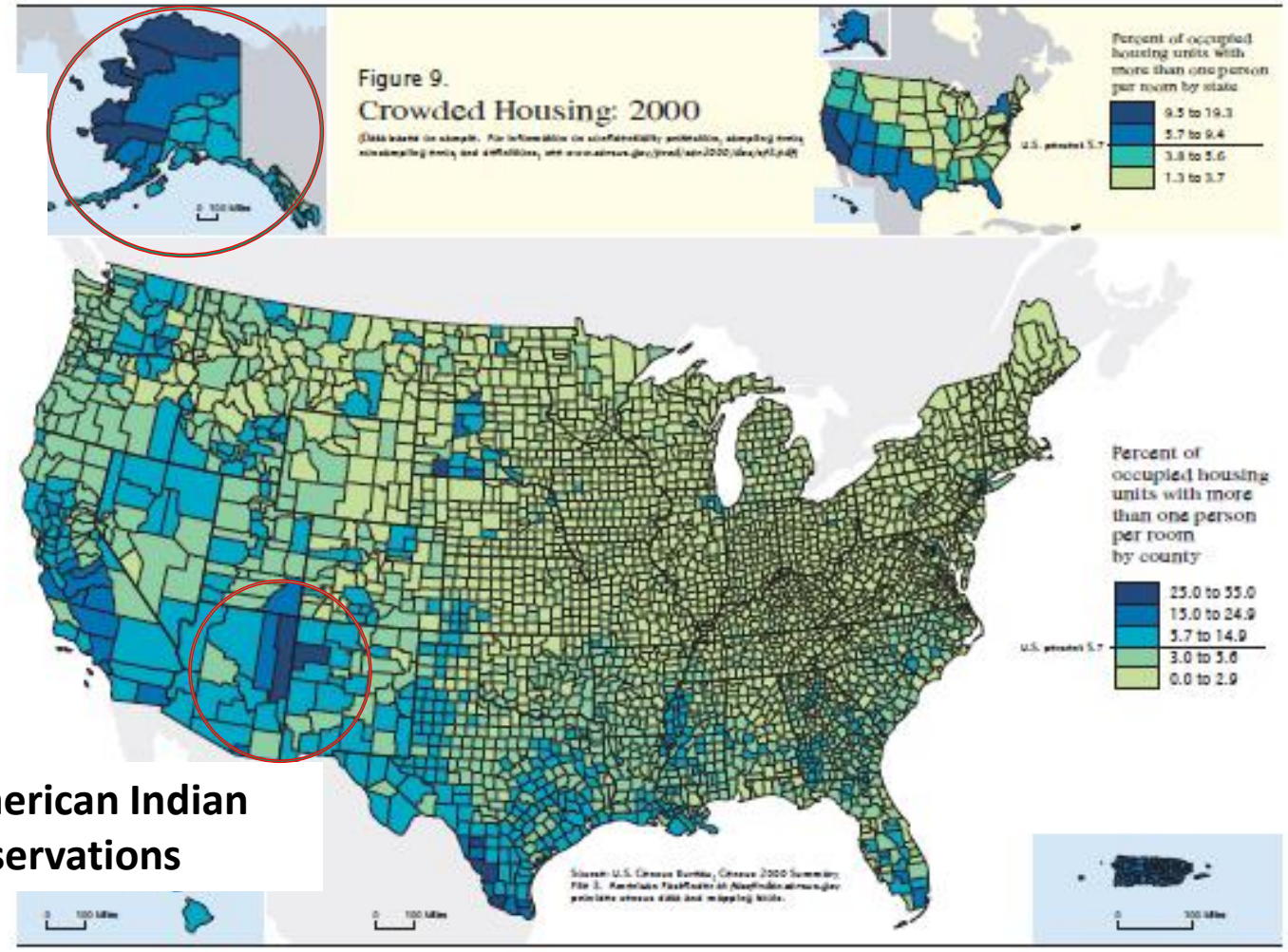


Singleton R, Salkoski AJ et al. Housing characteristics and indoor air quality…Indoor Air 2017

Household crowding in the U.S. 2000 census data: high crowding rates in rural Alaska

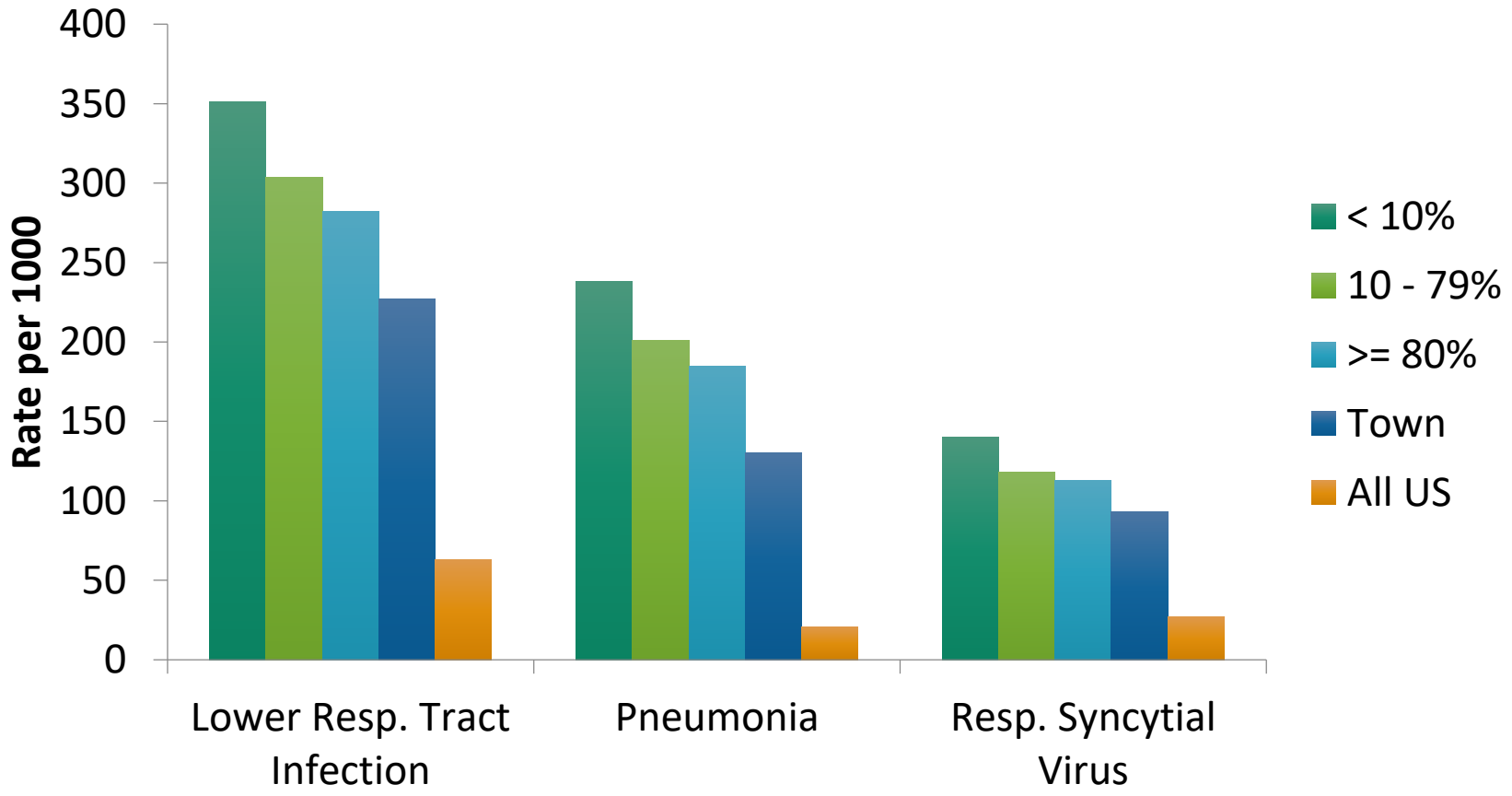
Alaska Native Villages

American Indian Reservations



Structural and Occupancy Characteristics of Housing: 2000. Census 2000 brief. US Census Bureau,

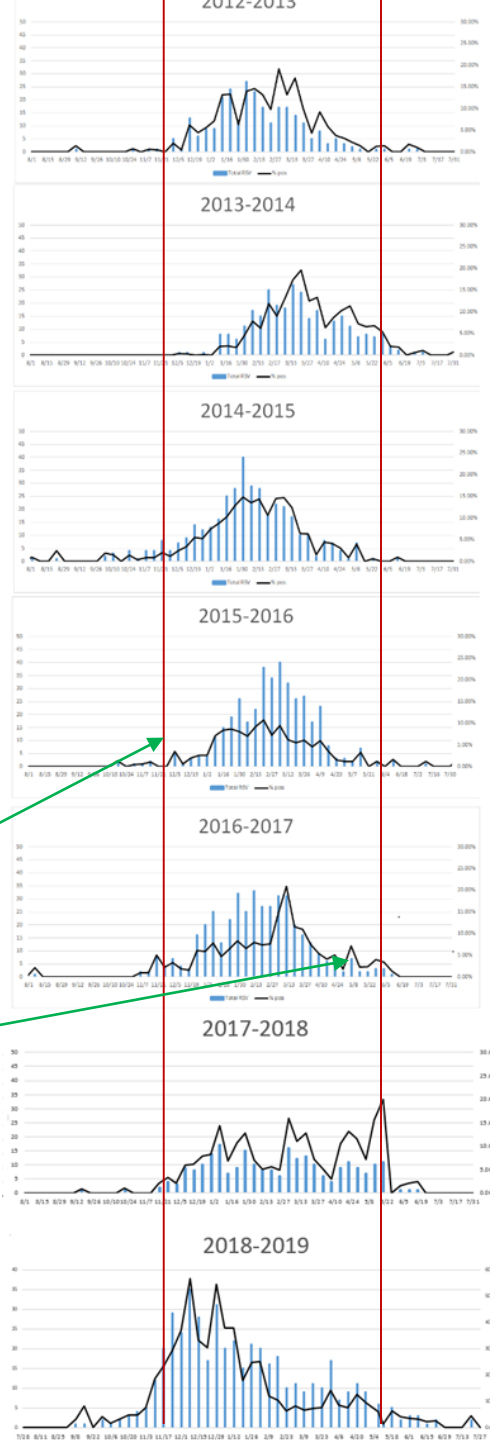
The importance of water: hospitalization rates among Alaska Native infants 1999-2004 by rates of plumbed water



Hennessy TW et al. In-home water service and the risk of respiratory tract,. AJPH 2008.

RSV positives, Alaska State Virology Laboratory, 2012-2018

Variation in statewide RSV Season year to year

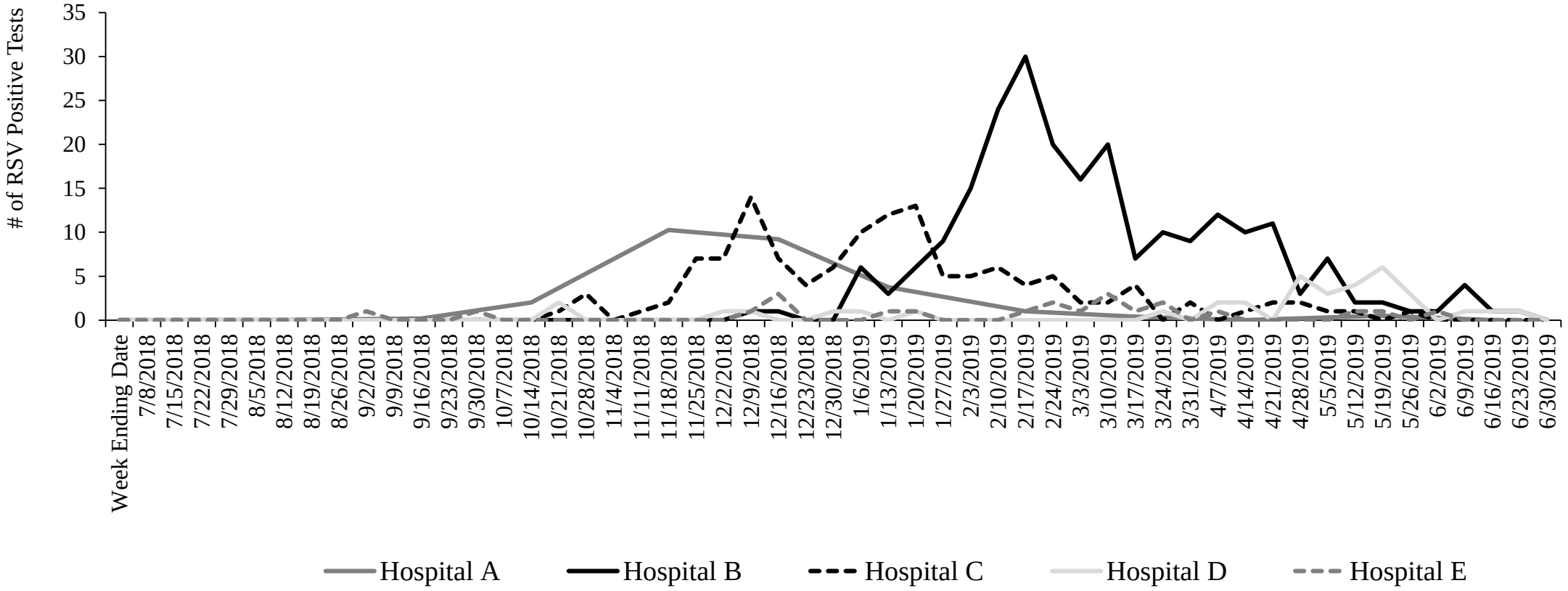


Synagis start

Synagis end

Courtesy of Jayme Parker MSPH, AVSL manager

RSV positives in 5 Alaska hospitals, 7/18-6/19



Significant variation in RSV Season across Alaska

RSV Studies in American Indian/Alaska Native children

YK Delta

- Prospective lab surveillance, 1993-96
- Passive Surveillance 1997-2016
- RSV follow-up study, 1993-96 ---1999-2001
- Retrospective Palivizumab evaluation,1998-01

Navajo/ White Mountain Apache

- Prospective lab surveillance 1997-2000
- Motavizumab trial, 2004-2010

Future horizons in infant RSV prevention

- **Maternal vaccine**
  - Studies on vaccine in pregnancy to protect infant to 3-6 months.
  - First vaccine (Novovax) didn’t meet endpoint

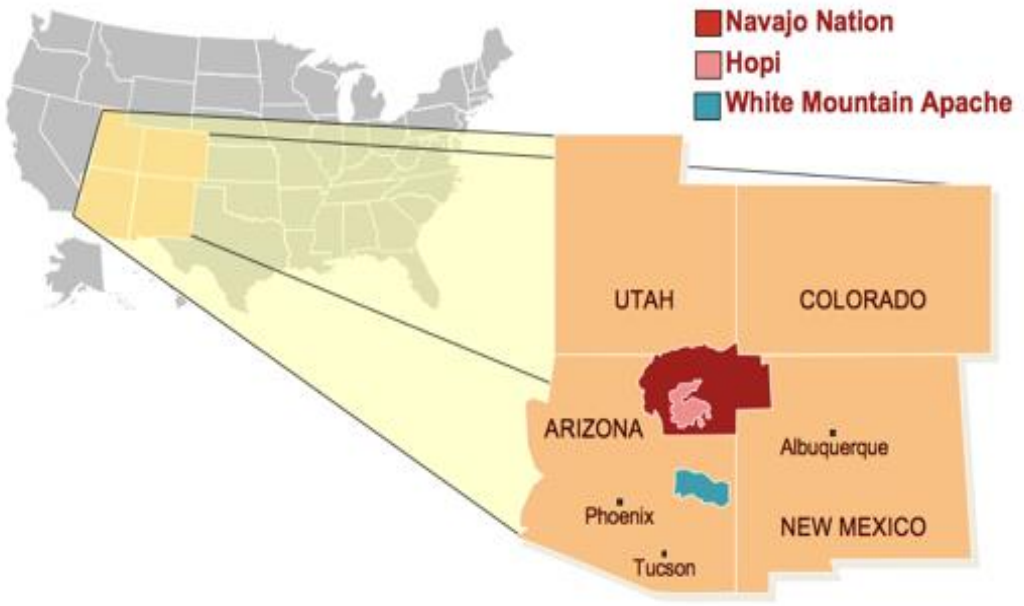
- **Enhanced monoclonal antibody (stronger Synagis®)**
  - Phase 3 studies on promising stronger Synagis®
  - One shot at the beginning of the RSV season to protect all young infants.

RSV Surveillance in Native American children & pregnant women (RSV SuNA)

- Plan: Active surveillance for RSV and other respiratory pathogens in Navajo Area, White Mountain Apache, YK Delta and Anchorage children <5 and pregnant women hospitalized with respiratory illness.
  - Year 2-5 include outpatient surveillance in some sites for <5 year olds and pregnant women with respiratory illness. We're applying to expand to all ages to include COVID surveillance
- Dates: November 2019-June 2024
- Investigators: Johns Hopkins, Navajo Area, ANTHC, YKHC
- Purpose: to establish baseline estimates of the burden of RSV infections and impact of future RSV monoclonal/vaccines.

Started November 25th on YKDRH and ANMC inpatient wards

RSV SuNA Setting



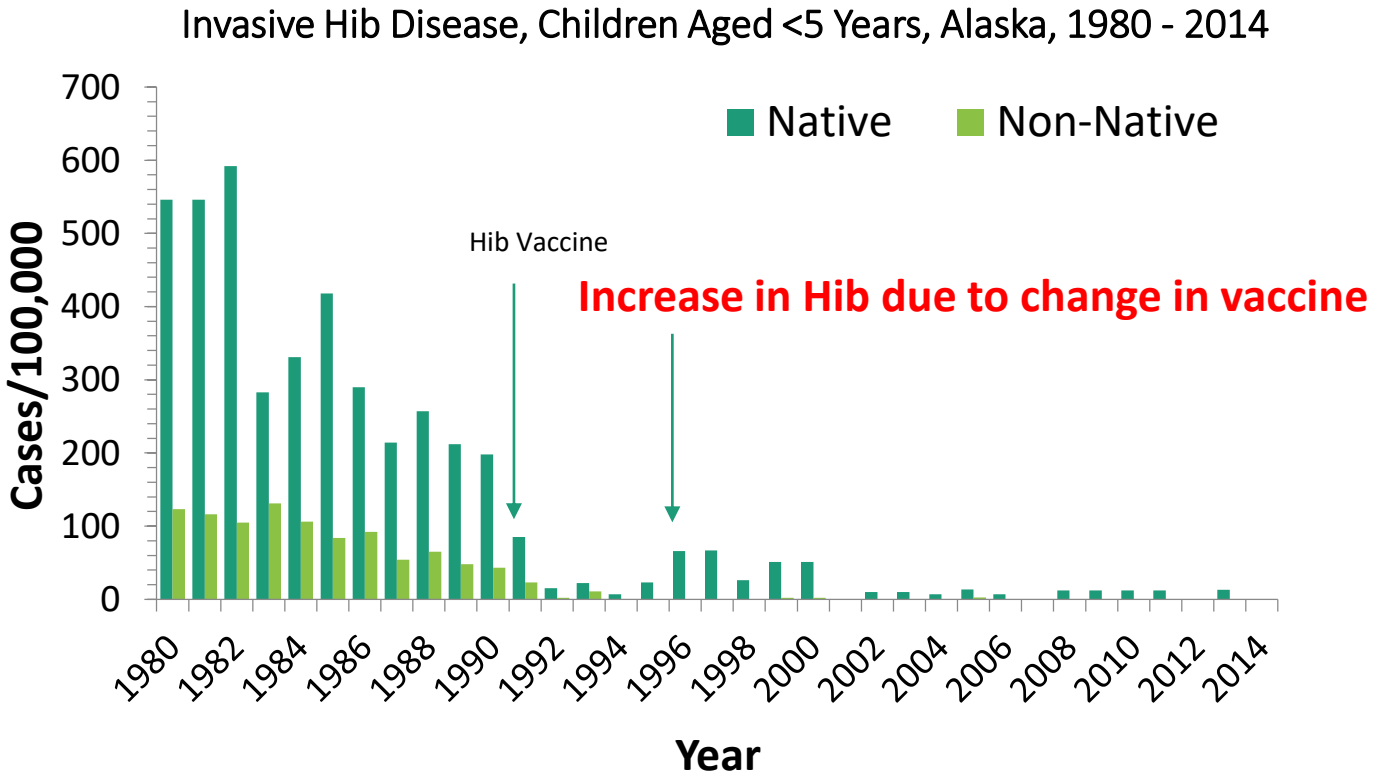
Southwest: Navajo/Apache

Alaska: YK Delta/Anchorage

RSV SuNA Aim 1: Importance of Surveillance

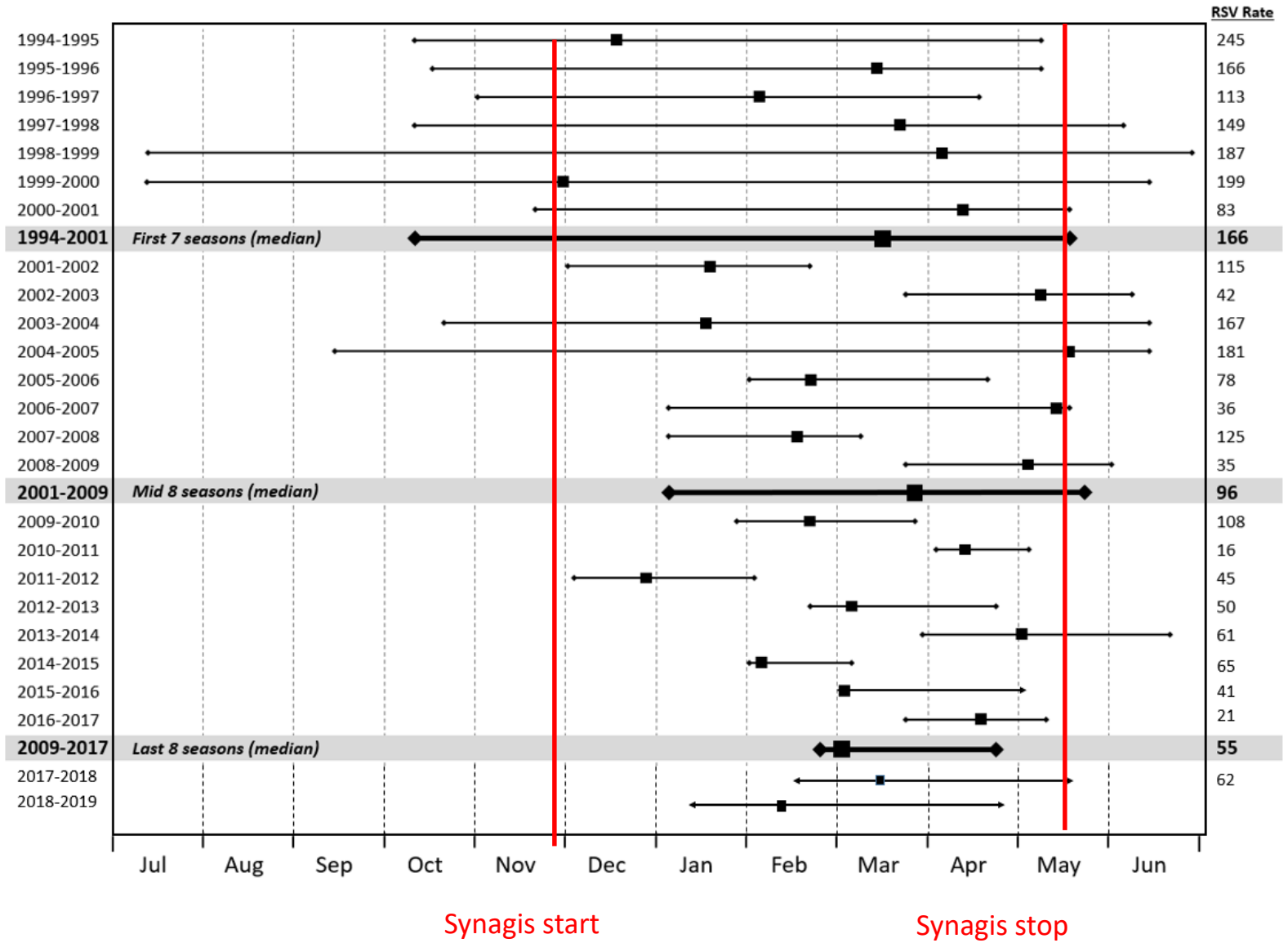
Determine age-specific incidence of RSV-associated hospitalizations and outpatient visits among American Indians/Alaska Natives (AI/AN) children <5 years and pregnant women

Surveillance Example:
Hib surveillance in Alaska before and after Hib vaccine



RSV SuNA Aim: Evaluate RSV Seasonality:

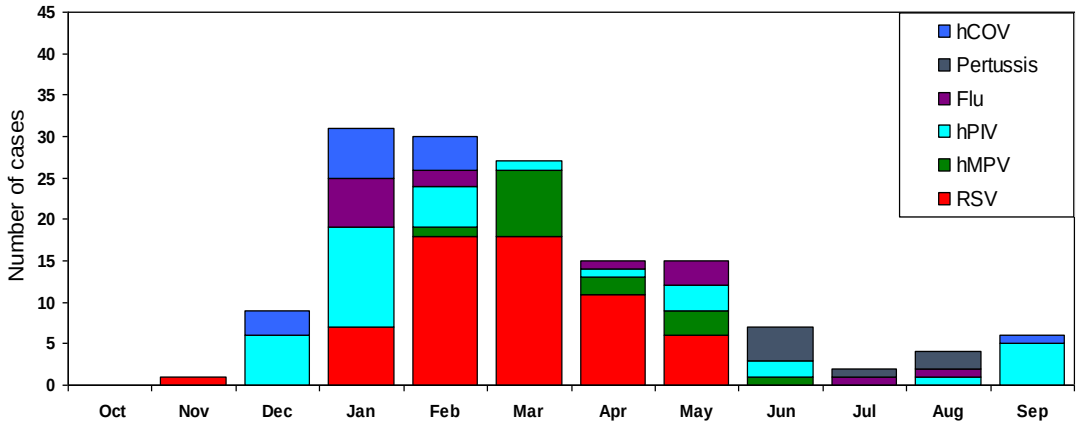
RSV season onset, offset, peak week, 26 years of RSV surveillance, YK Delta



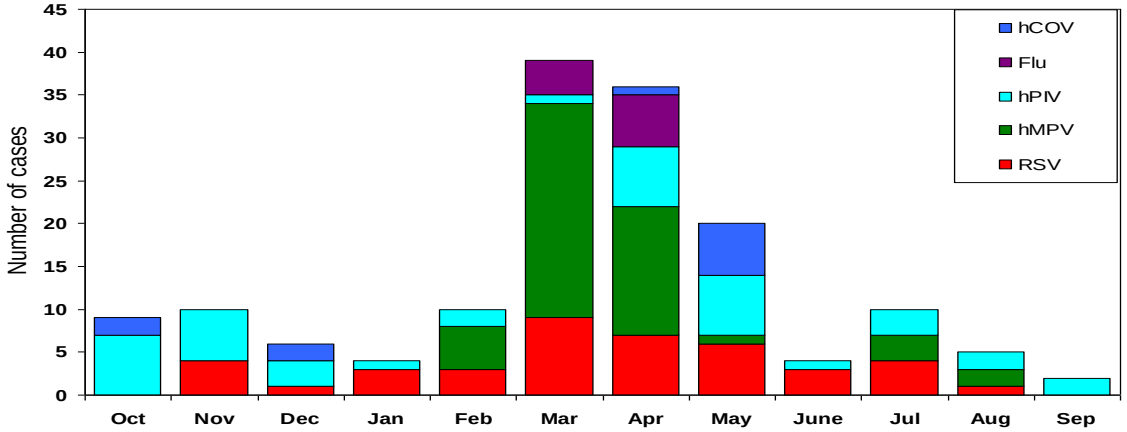
RSV SuNA Aim: Evaluate other respiratory Viruses

Respiratory Virus Surveillance 2005-2007, YK Delta

- RSV was the most common virus associated with respiratory hospitalization
- Metapneumovirus was 2nd most common virus followed by parainfluenza
- Rhinovirus was found in 44% of hospitalizations and 33% of healthy control children
- Rhino and Entero and Corona were not significantly associated with respiratory hospitalization.



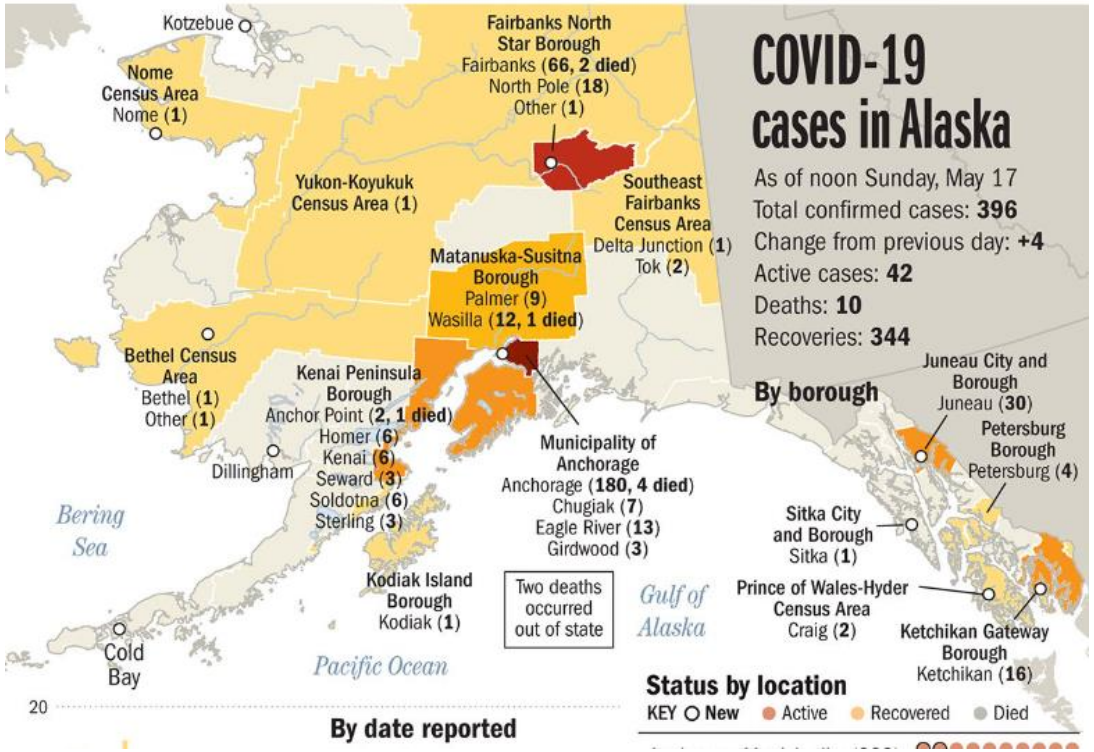
YK hospitalized children, Oct 2005-Sep 2006



YK hospitalized children, Oct 2005-Sep 2007

COVID-19 in Alaska and Navajo

Alaska



Navajo

The **Navajo Nation**, which sprawls over parts of Arizona, **New Mexico**, and **Utah**, reported 90 new cases of coronavirus Sunday, bringing the total number of cases on the huge reservation to 4,002. The total number of deaths as of Sunday was 140.

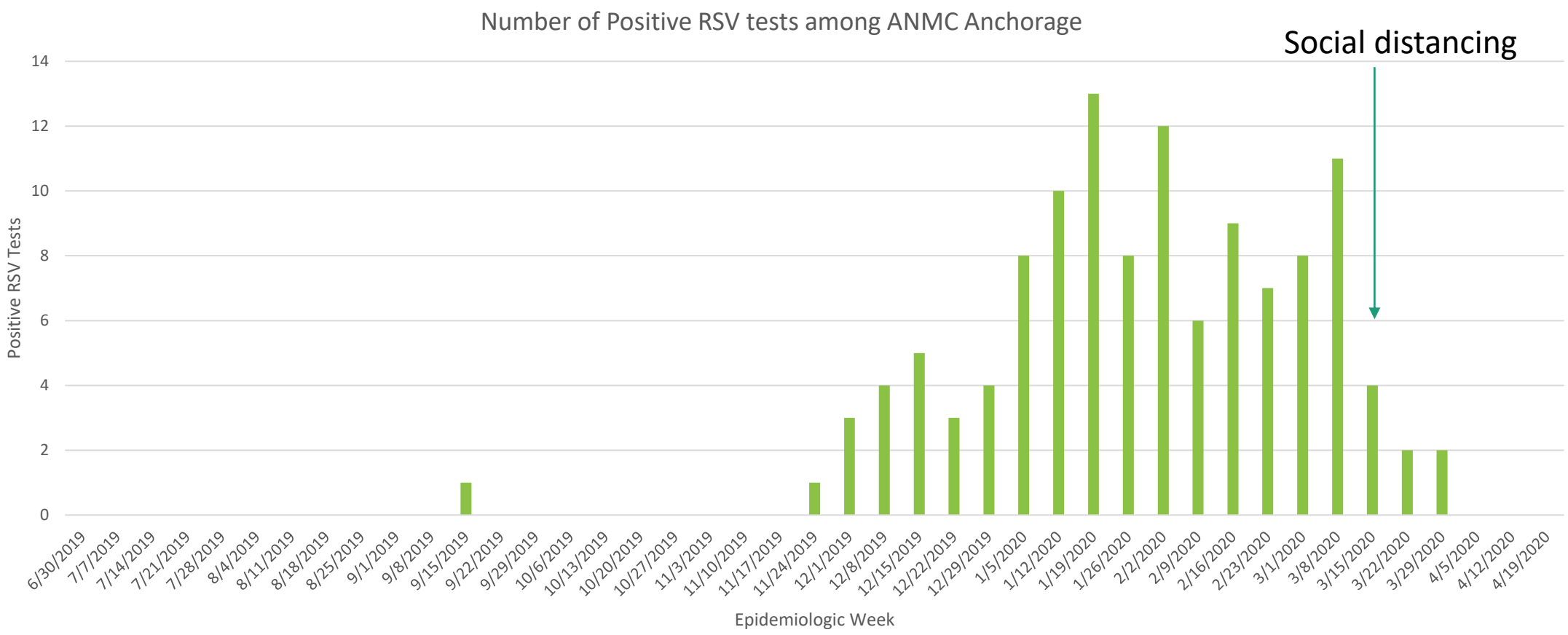
Transmission of SARS CoV-2 in Navajo

- The Navajo Nation has the 3rd highest per capita COVID rate in the U.S.
- A basketball player returning to a small community, and spread through church and community gatherings were the first transmission of COVID
- On 5/5/2020 Jonathan Nez, said that out of the more than 20,250 Navajo people tested for the coronavirus, 3,245 have tested positive for COVID-19. "We have 103 deaths on the Navajo Nation," in a population of 175,000.
- On 5/19/2020 over 4000 Navajo people have tested positive

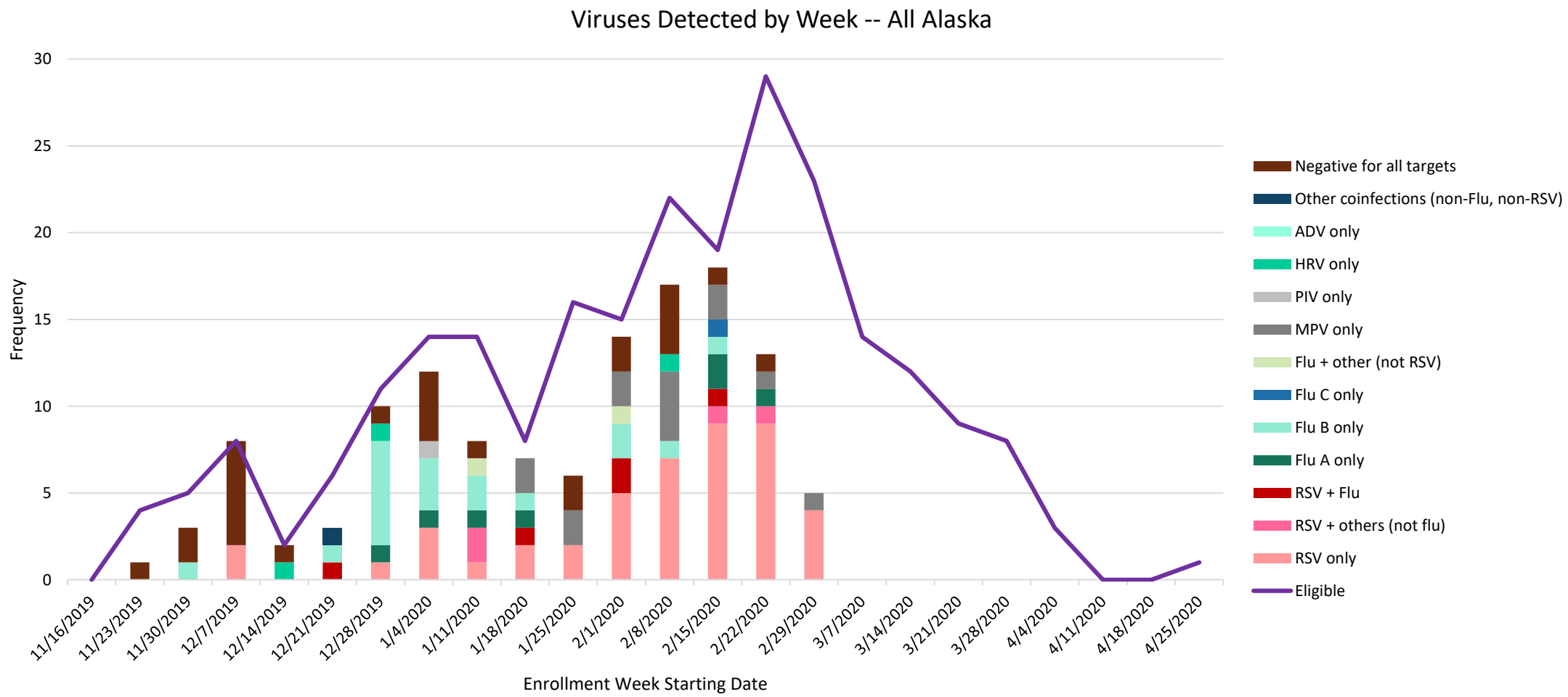
What have we learned through RSV SuNA

- 171 enrollees
- 5 pregnant women – most in December hospitalized with Flu B
- Large peak in RSV hospitalizations in YK children Feb/March
- Dramatic decrease in pediatric respiratory hospitalizations after COVID social distancing.

RSV at ANMC, 2020



RSV SuNA Results: Eligibles 11/19/2019-5/1/2020 & Viruses detected by week 11/19/2019-3/1/2020



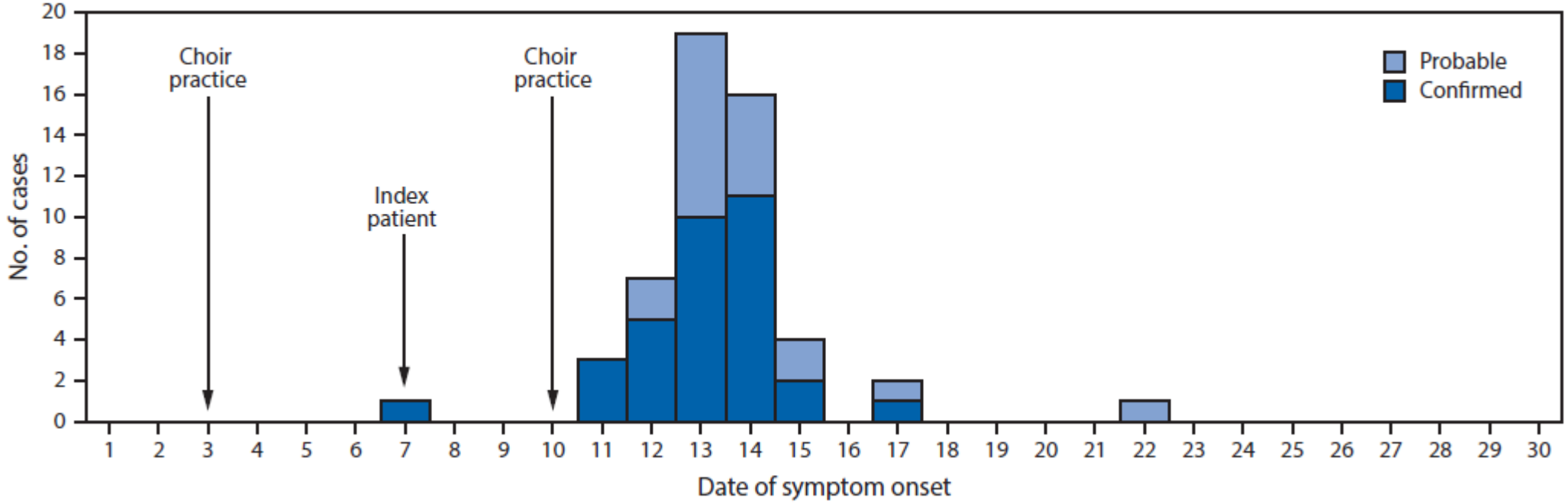
Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Early Release / Vol. 69
May 12, 2020

Super-spreading Events!

High SARS-CoV-2 Attack Rate Following Exposure at a Choir Practice — Skagit County, Washington, March 2020

Lea Hamner, MPH[1]; Polly Dubbel, MPH[1]; Ian Capron[1]; Andy Ross, MPH[1]; Amber Jordan, MPH[1]; Jaxon Lee, MPH[1]; Joanne Lynn[1]; Amelia Ball[1]; Simranjit Narwal, MSc[1]; Sam Russell[1]; Dale Patrick[1]; Howard Leibrand, MD[1]

FIGURE. Confirmed* and probable† cases of COVID-19 associated with two choir practices, by date of symptom onset (N = 53) — Skagit County, Washington, March 2020



Alaska Super-spreading events

- Dance Festivals
  - Large RSV Outbreak in 2000s associated with Dance Festival
- Basketball Games
- Cruise Ships
- Fishing!

Factors contributing to Superspreading Events

1. Agent
2. Place
3. Activity
4. Person

Place

Population density

Number of susceptible individuals

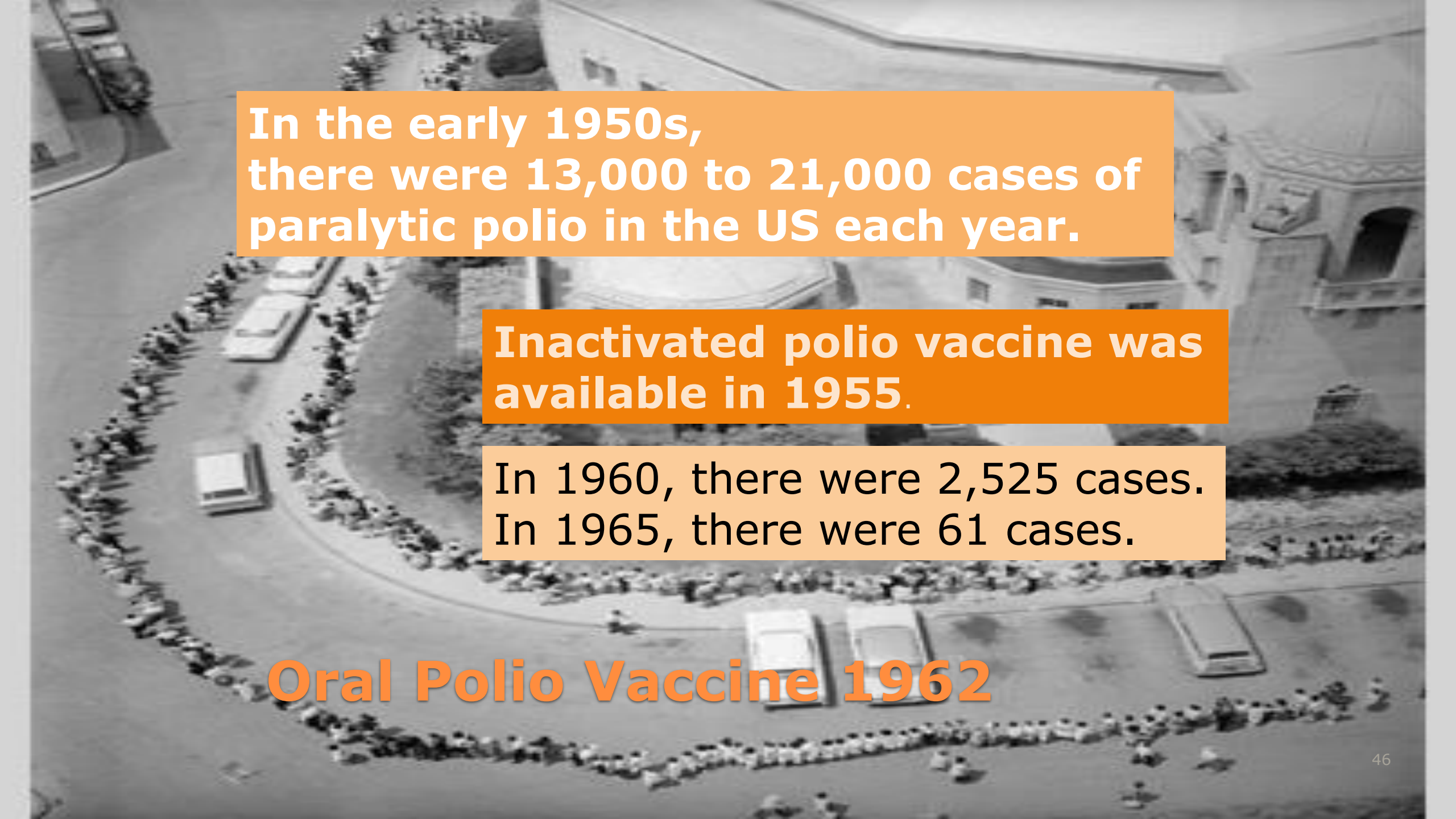
Indoor vs Outdoor

- Japanese study found the odds that a primary case transmitted COVID-19 in a closed environment was 18.7 times greater compared to an open-air environment (95% confidence interval [CI]: 6.0, 57.9).
  - Seven of the 110 cases (6.4%) were SSE
  - Article: Closed environments facilitate secondary transmission of coronavirus disease 2019, Nishiura et al
- Review of 7,324 cases in China – only 1 was related to an outdoor conversation (Indoor transmission of SARS-CoV02 Qian, Miao, et al)

Summary

- American Indian/Alaska Native populations have had high disease rates in epidemics.
- Social distancing has delayed SARS-CoV-2 transmission in rural Alaska; in contrast, Navajo has experienced a high rate of mortality.
- An effective vaccine could be effective in the long-term.

Remember how effective polio vaccine was!



**In the early 1950s,
there were 13,000 to 21,000 cases of paralytic polio in the US each year.**

Inactivated polio vaccine was available in 1955.

In 1960, there were 2,525 cases.
In 1965, there were 61 cases.

Oral Polio Vaccine 1962

Questions?