Progress Controlling Vaccine Preventable Disease in Alaska Native People

Alaska Immunization Conference

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ANTHC Immunization Program

Rosalyn Singleton MD MPH ris2@cdc.gov, 729-3418

Herd Immunity, Alaska Style

When enough children are vaccinated in a community, then a disease doesn't spread. This is known as "community" or "herd immunity"

Picture from Marci Custer

Background: Alaska Native People

- 60% live outside of cities, in small, remote villages
- Access to most villages only by air
- Per capita income and in-home running water are lower in these areas, and household crowding indices are higher
- These factors have been associated with increased risk for vaccine-preventable disease

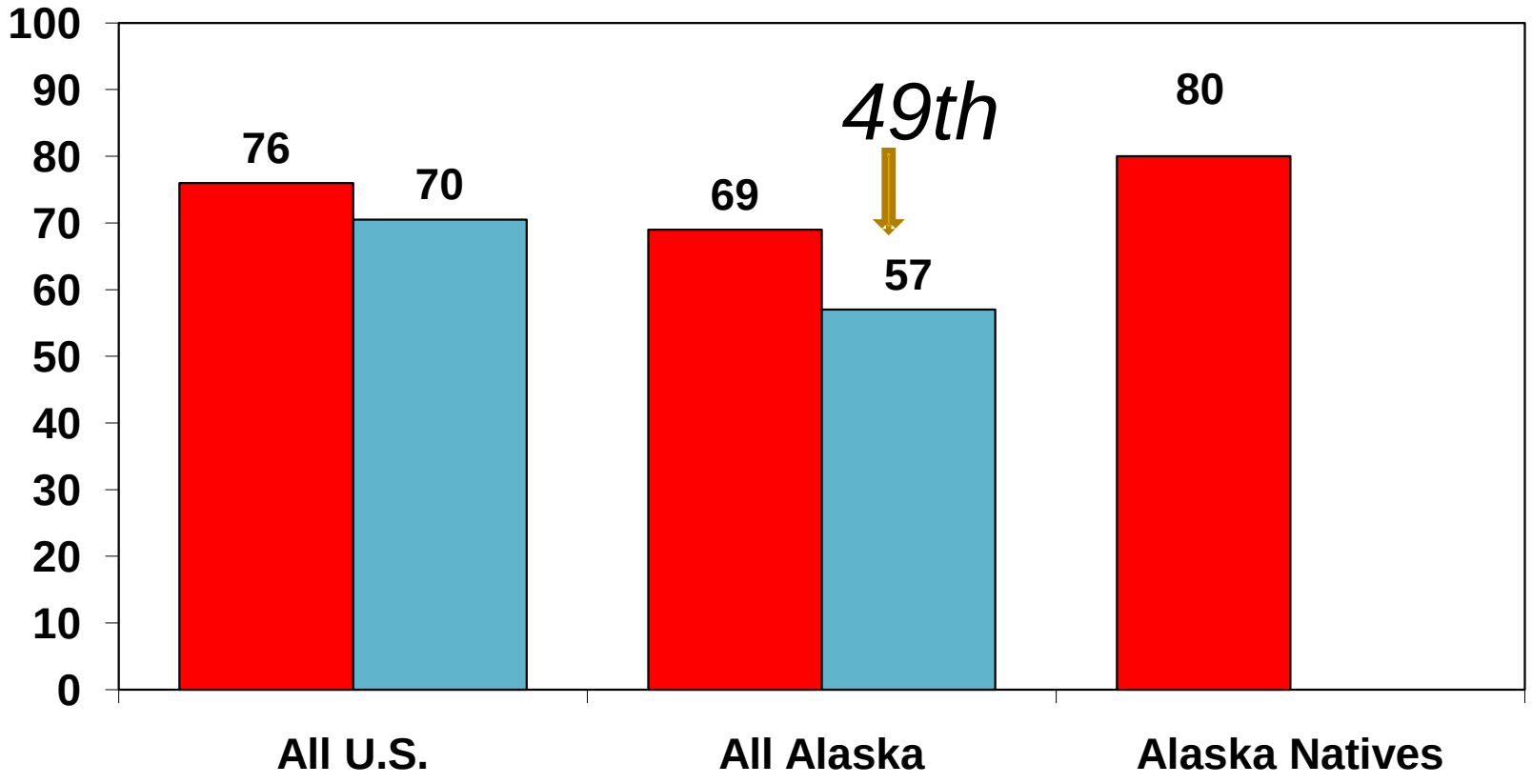
Measles and Pertussis Mortality

- In 1960-62, the **post-neonatal death rate** (1-11 month olds) in YK Delta infants was 5.6 per 100, or **5.6%**.
- Nearly half of these infant deaths were caused by **measles** or **pertussis**.
- The postneonatal death rate (1-11 months) decreased 10-fold between 1960-62 and 1980-81 – partly due to measles and pertussis vaccines.
- Since instituting the 2 dose measles requirement in Alaska, we have not had any outbreaks of measles in Alaska.

Lum et al, Public Health Rep 1986;101:309-14

Vaccine Coverage Rates:

US, Alaska, Alaska Native children*



4-3-1-3-3-1 = 4DTaP 3polio 1MMR 3Hib 3HepB1Var in children 19-35 months old

4-3-1-0-3-1-4 = 4DTaP 3 polio 1 MMR 3 Hep B 1 Var 4 PCV

* National Immunization Survey 2009. Alaska Native data locally obtained.

Diphtheria

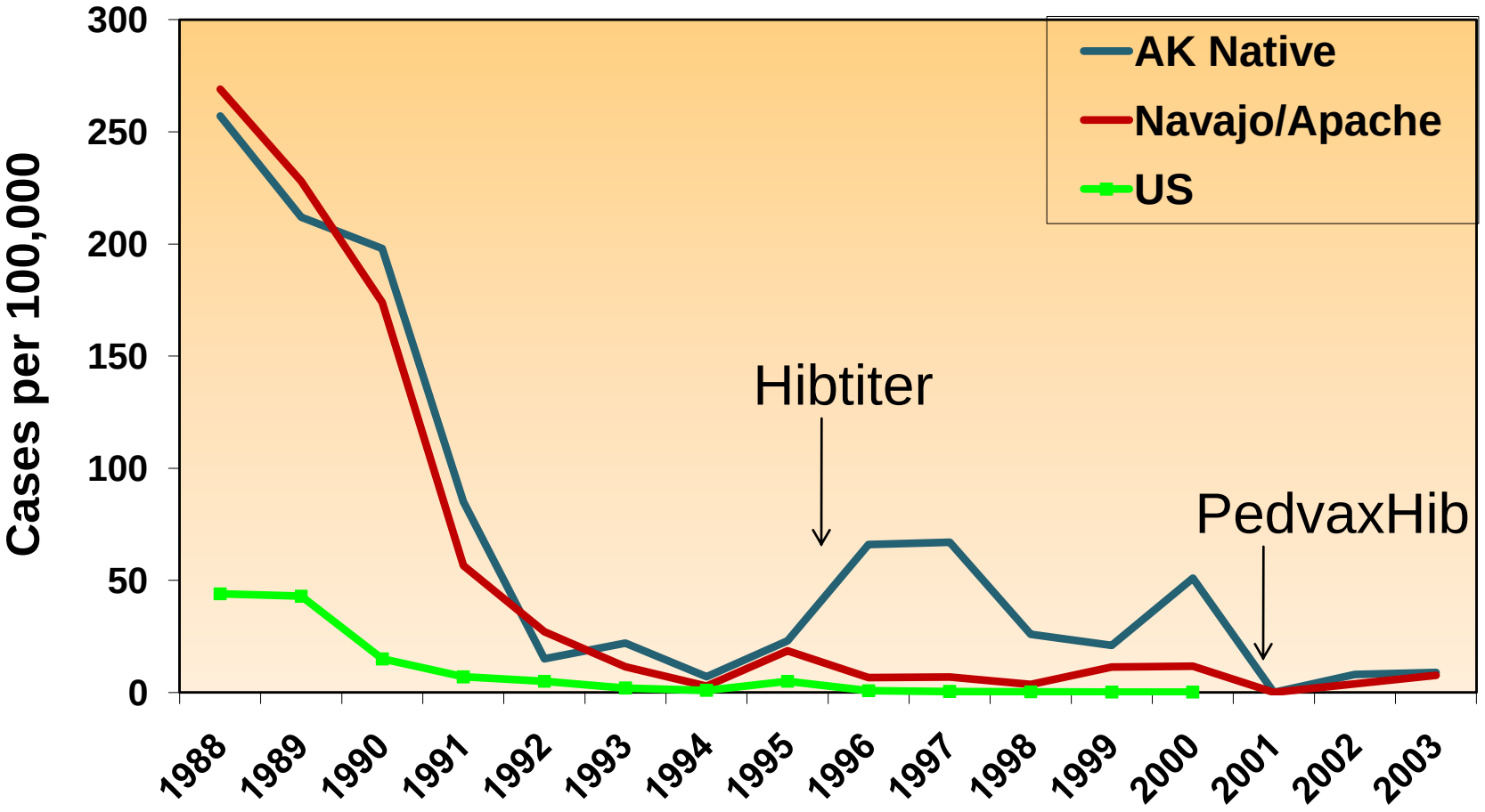
- In 1925 a diphtheria epidemic threatened icebound Nome. The nearest serum was in Anchorage..
- A Pony Express-type relay of dog teams rushed the vaccine from Nenana to Nome…
- Gunnar Kaasen drove the final two legs behind lead dog Balto, through hurling 80 mph winds…
- The serum arrived in time to prevent the epidemic and save hundreds of lives.

Haemophilus influenzae (Hib)

- **Unique Aspects in Alaska Natives before Hib vaccine**
  - 5-10 times higher rate of disease
  - Younger peak age (4-6 months)

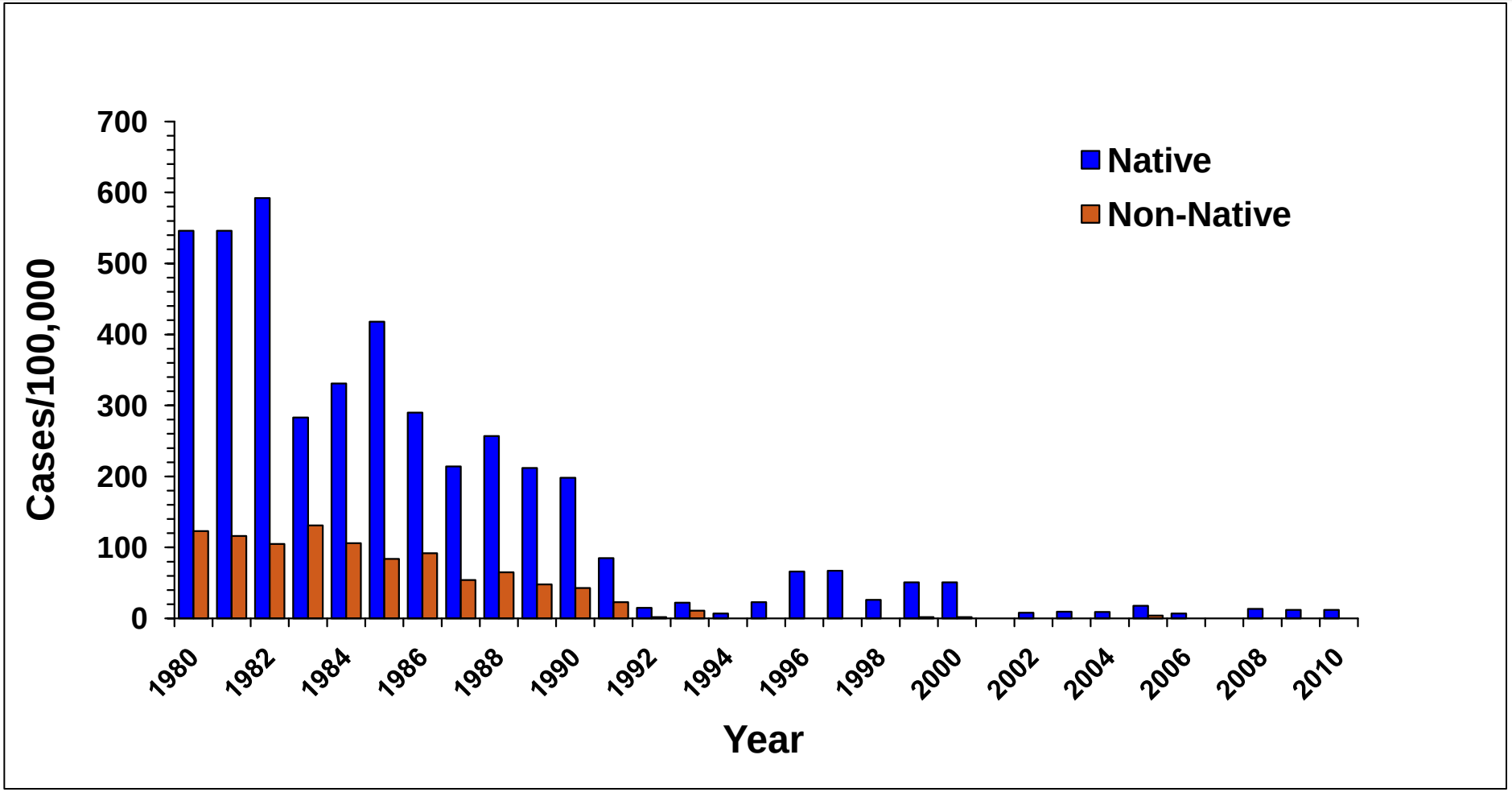
- **Unique Recommendations in Alaska**
  - We use PRP-OMP (PedvaxHIB®) because of it's unique ability to produce protective antibodies after 1 dose.

Decline in Hib Disease:
US, Navajo/ Apache, AK Native,1988-2003



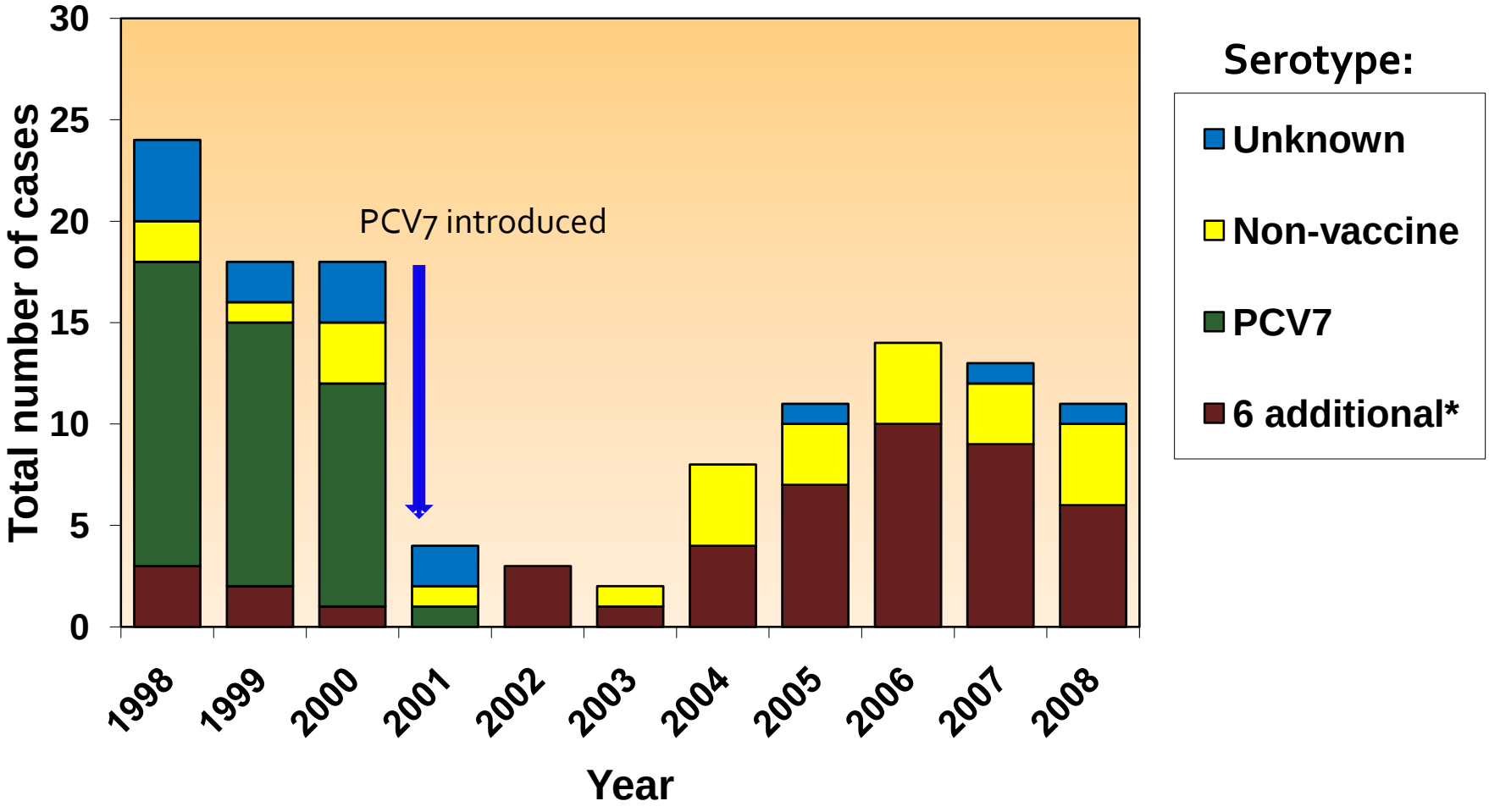
Millar EV, et al. Clin Infect Dis 2005; 40:823-30, CDC, AIP-CDC

Invasive Hib Disease, Children Aged <5 yrs, Alaska, 1980-2010



Singleton, Pediatrics 2006 & CDC unpublished data

Invasive Pneumococcal Disease Cases, YK Delta children <5 yrs, 1998-2008



* 6 additional serotypes in PCV13

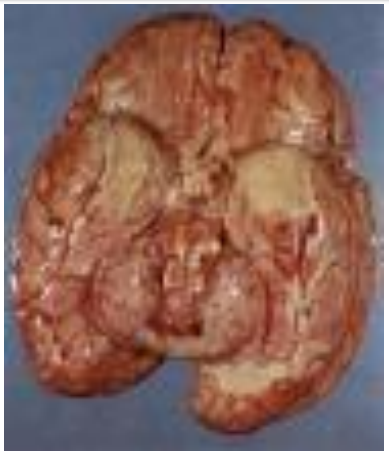
Recent consequences of delayed vaccination

- Hib meningitis death – 14 month old
  - had delayed booster dose because ill
- Hib meningitis, Severe brain damage – 2 mo old
  - 2 month old - delayed first vaccine because of mild illness
- Hib pneumonia – 14 month old
  - parents had refused all vaccines
- Pneumococcal meningitis - 9 month old
  - foster parents delayed vaccines – worried about autism
- Hepatitis A in a mother
  - unvaccinated 15 month old child had traveled to Africa

Pneumococcus

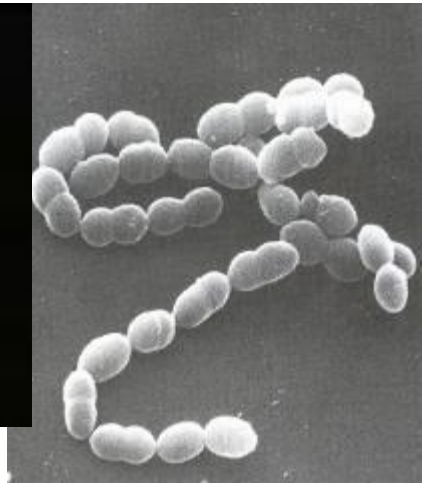
- Main cause of serious infections:
  - Bacterial meningitis
  - Blood infections
  - Pneumonia
- One of main cause of Ear Infections

pneumonia



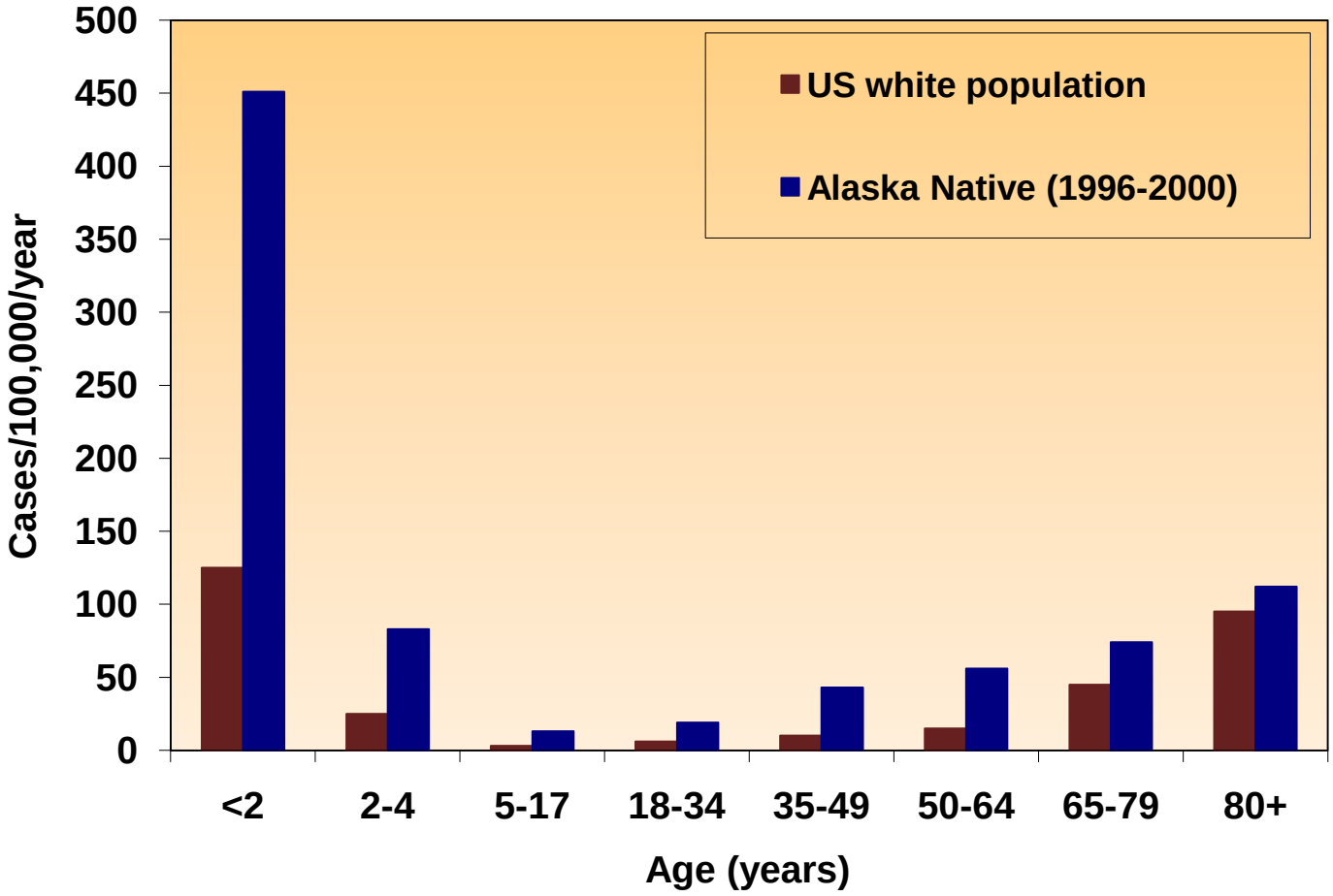
fatal meningitis

ear infection



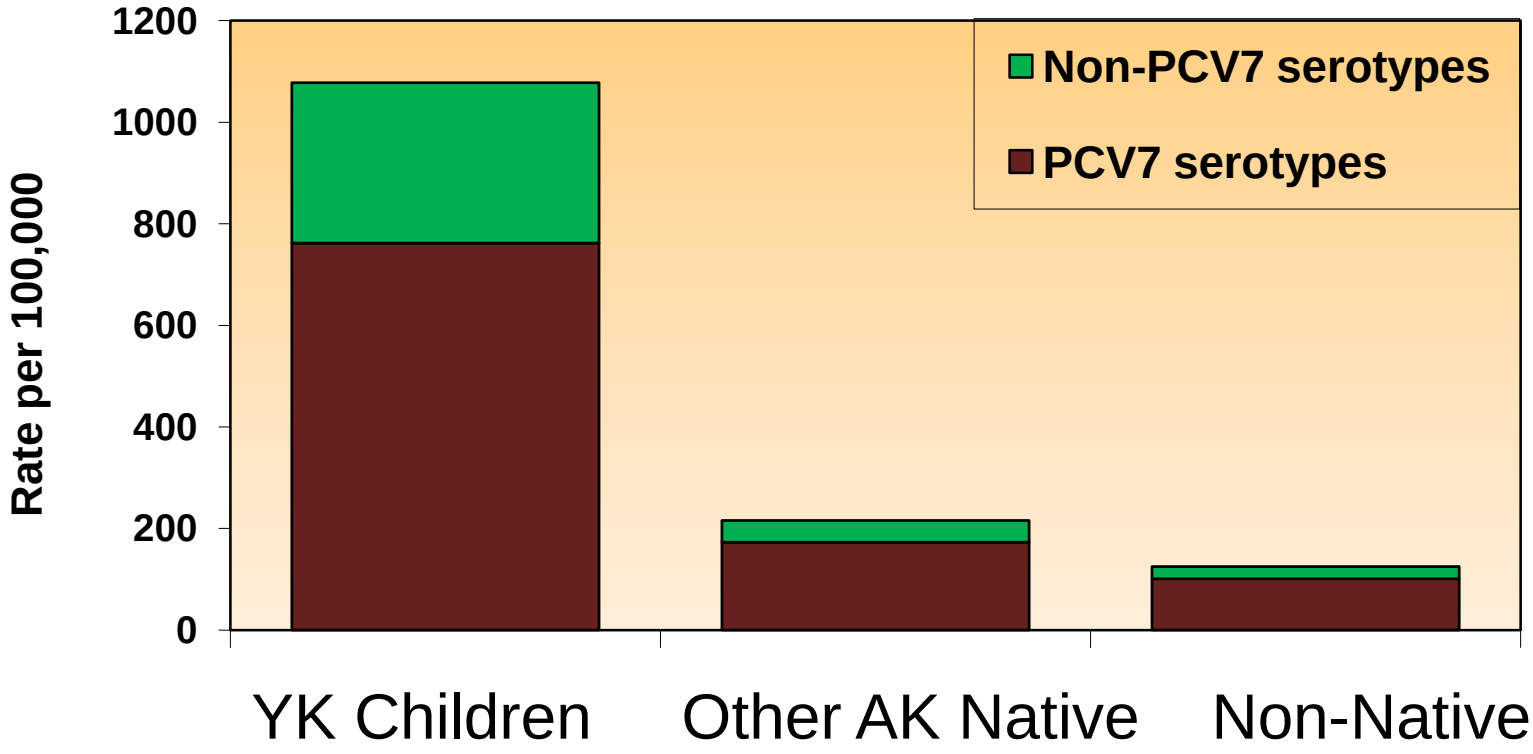
Pneumo bacteria

Rates of Invasive Pneumococcal Disease US white population, Alaska Natives, 1996-2000



Invasive Pneumococcal Disease (IPD): YK children aged <2 yrs, before PCV7, 1995-2000

- 10 times higher than in non-Native Alaskans
- 73% caused by serotypes in 7 valent pneumococcal conjugate vaccine (PCV7)

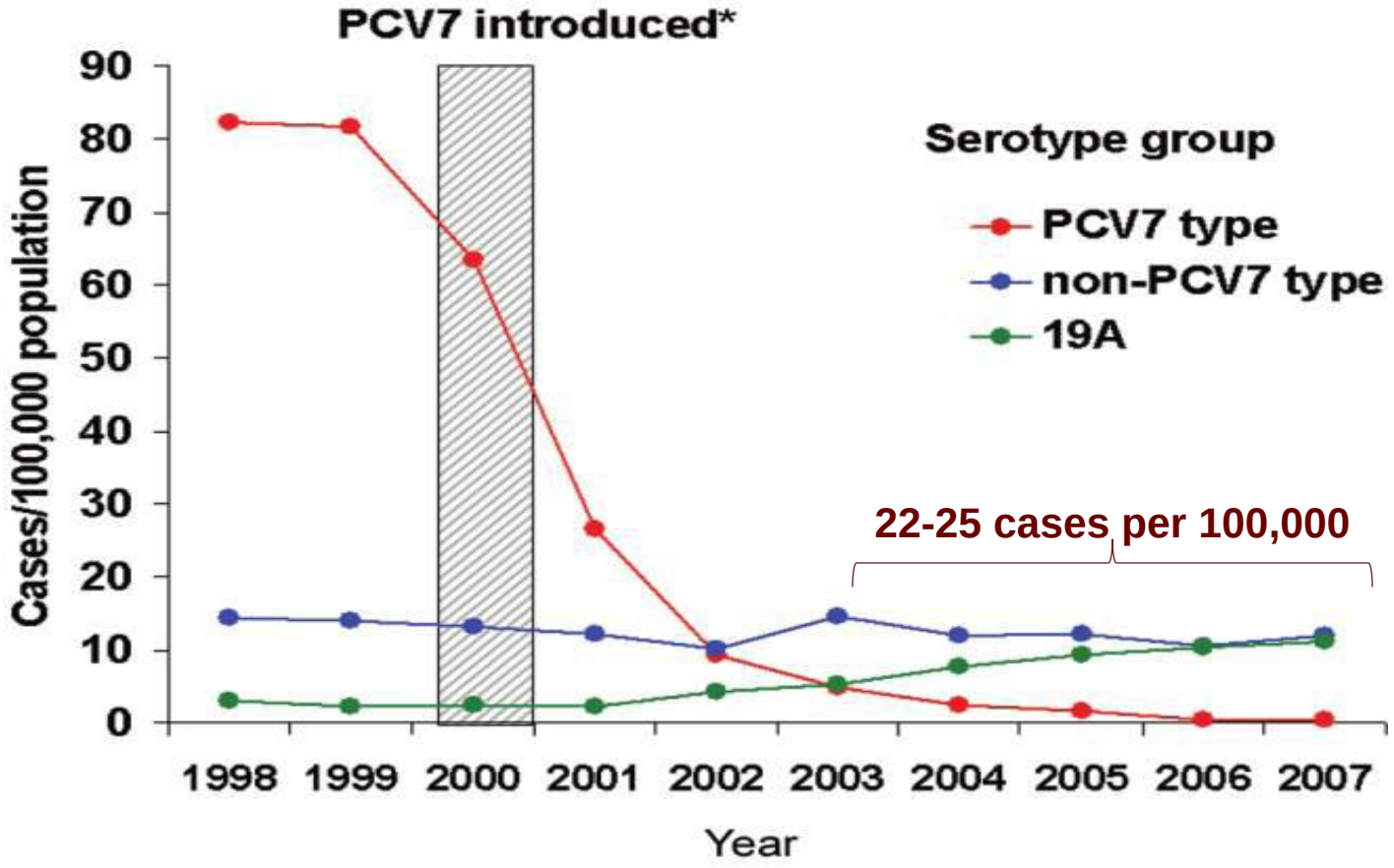


AIP-CDC surveillance, Wenger et al, PIDJ, 2010

PCV7 vaccine Impact in US children < 5 years old

All Serotypes: -76% (-79,-73)

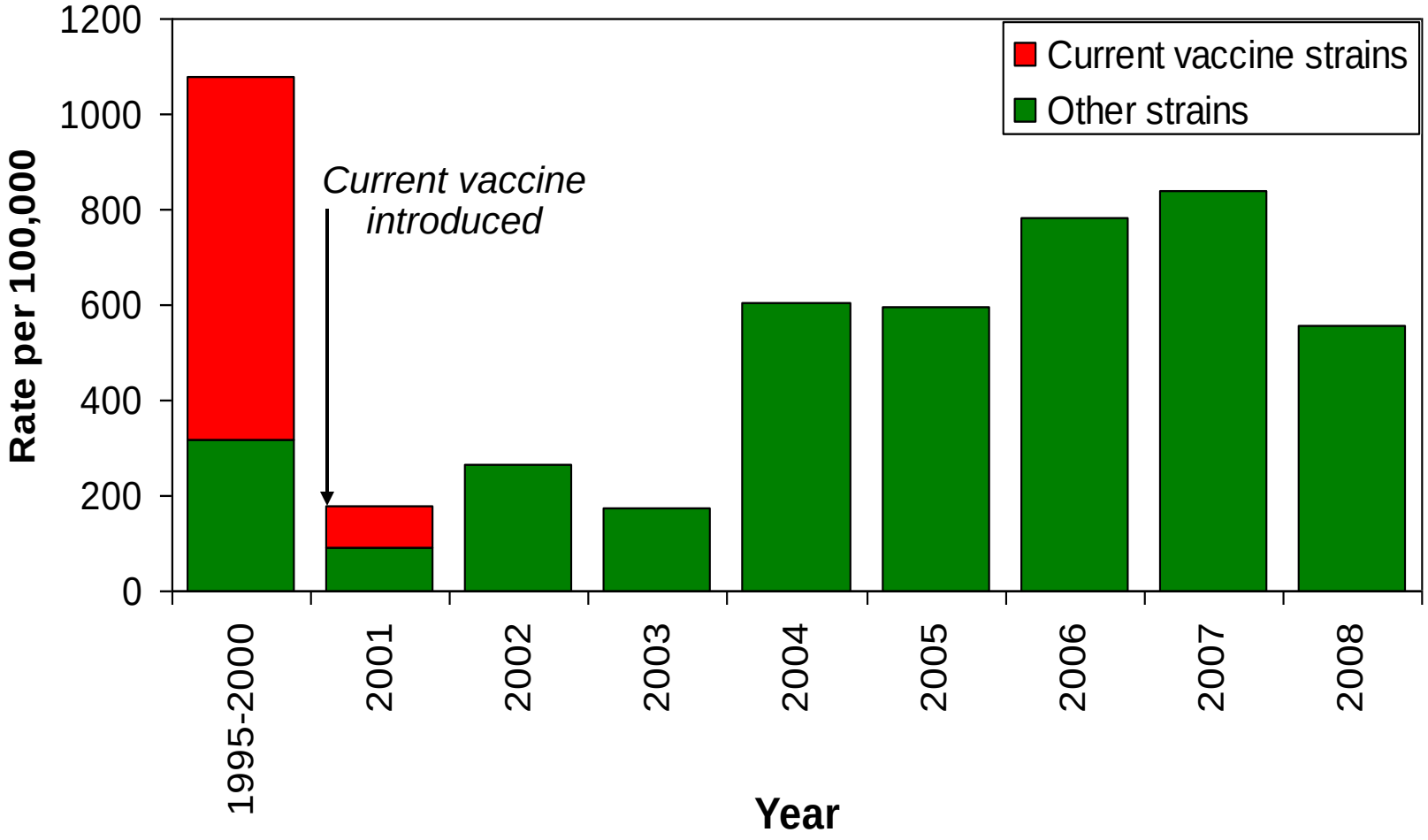
PCV7 Types: -100% (-100,-99)



Pilishvili T. et al. JID 2010; 201:32-41

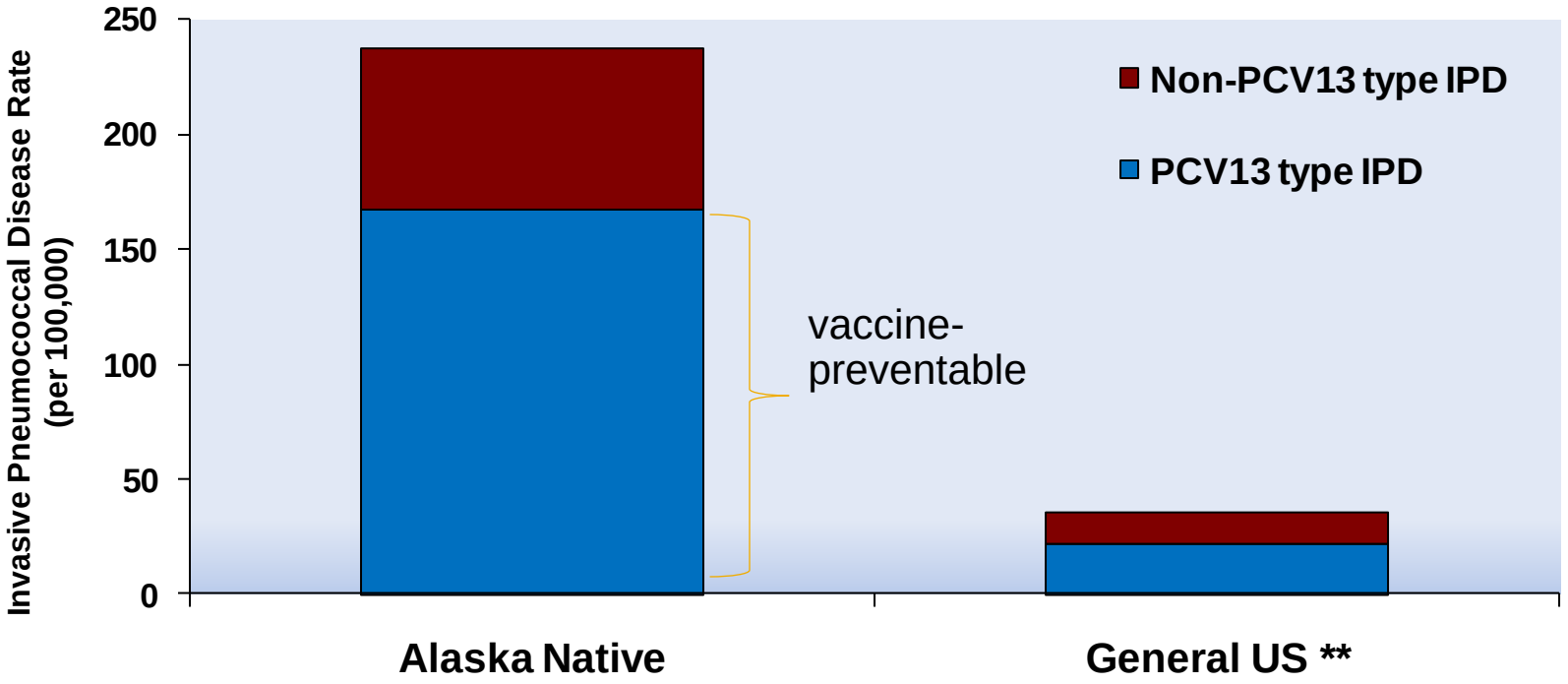
Invasive Pneumococcal Disease

YK Delta Children less than 2 yrs old, by year



Unpublished Pneumococcal surveillance data, Arctic Investigations Program-CDC

IPD in the PCV13 serotypes, Alaska Native vs. US children <2 years 2006-8



¾ of pneumococcal infections in Alaska Native children are covered by new PCV13 (Prevnar 13) vaccine licensed in Feb 2010

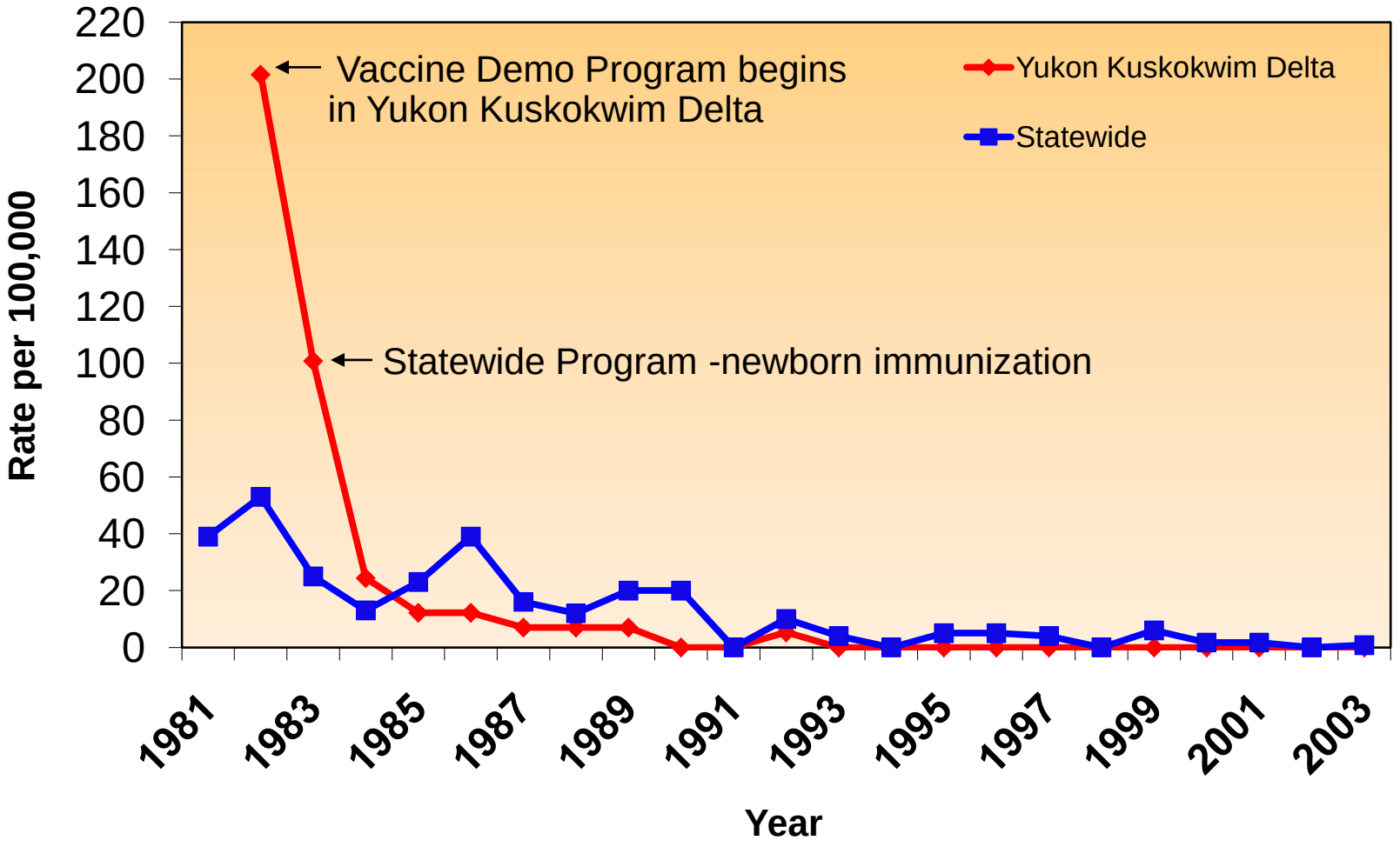
Hepatitis B in Alaska Native persons

- Before Vaccine :
  - 6% had been infected
  - 1500 hepatitis B carriers
  - Incidence 50 times the general U.S.
- Vaccination strategies
  - universal infant & catch-up vaccination starting in 1983
- Post-Vaccine Rate:
  - declined from 250 to <0.4/ 100,000
  - lowest hepatitis B rate any US ethnicity.

Harpaz. Elimination of new Hepatitis B infections. J Infect Dis 2000;181;413-8

Symptomatic Hepatitis B Incidence

AK Native Persons 1981- 2003



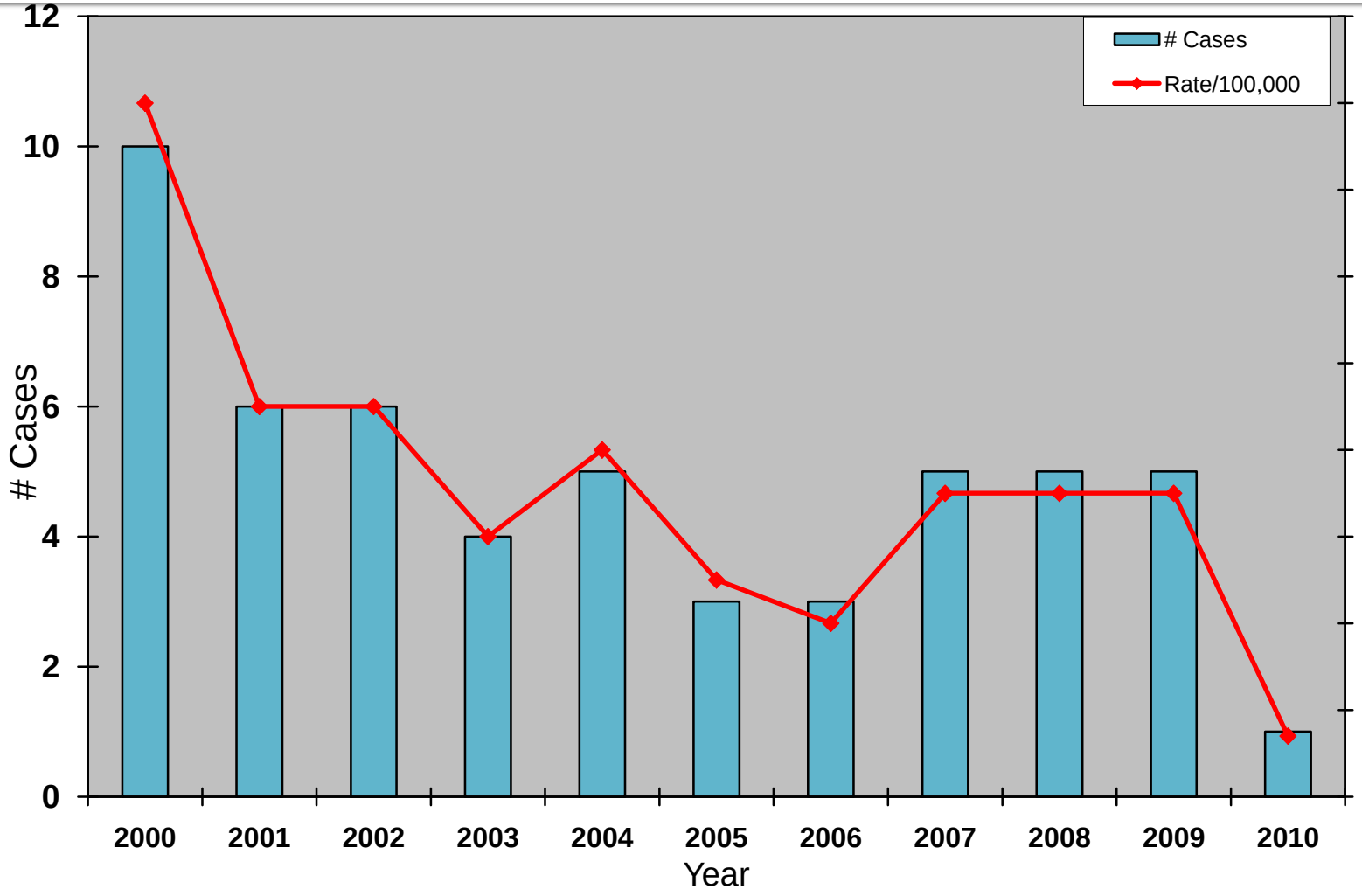
Meningococcus

- Meningococcal disease - rare but serious, rapidly progressive infection (meningococcemia, meningitis)
- Rate 0.5-2 per 100,000 persons/year
- Rates are highest among:
  - infants (not eligible for vaccine)
  - college freshmen living in dormitories
  - Military recruits in camps
- Case Fatality rate 9%-12%; up to 40% in meningococcemia
- Rates in Alaska Native people appear to be similar to other populations

Purpura fulminans

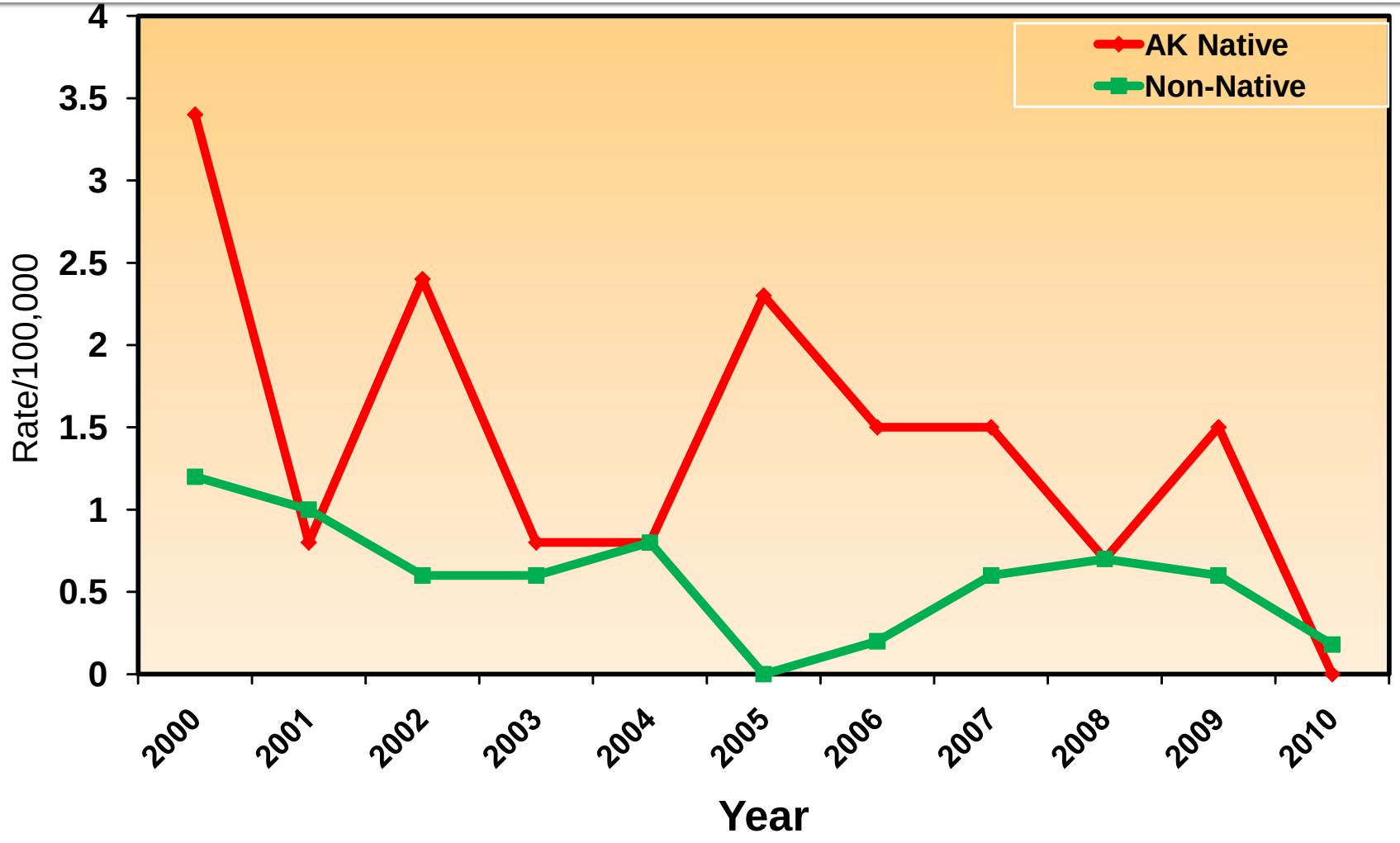
Courtesy of www.immunize.gov

Neisseria meningitidis Cases/Rates – Alaska, 2000-2010



AIP-CDC, State of Alaska

Neisseria meningitidis Rates – AK Native/Non-Native, 2000-2010



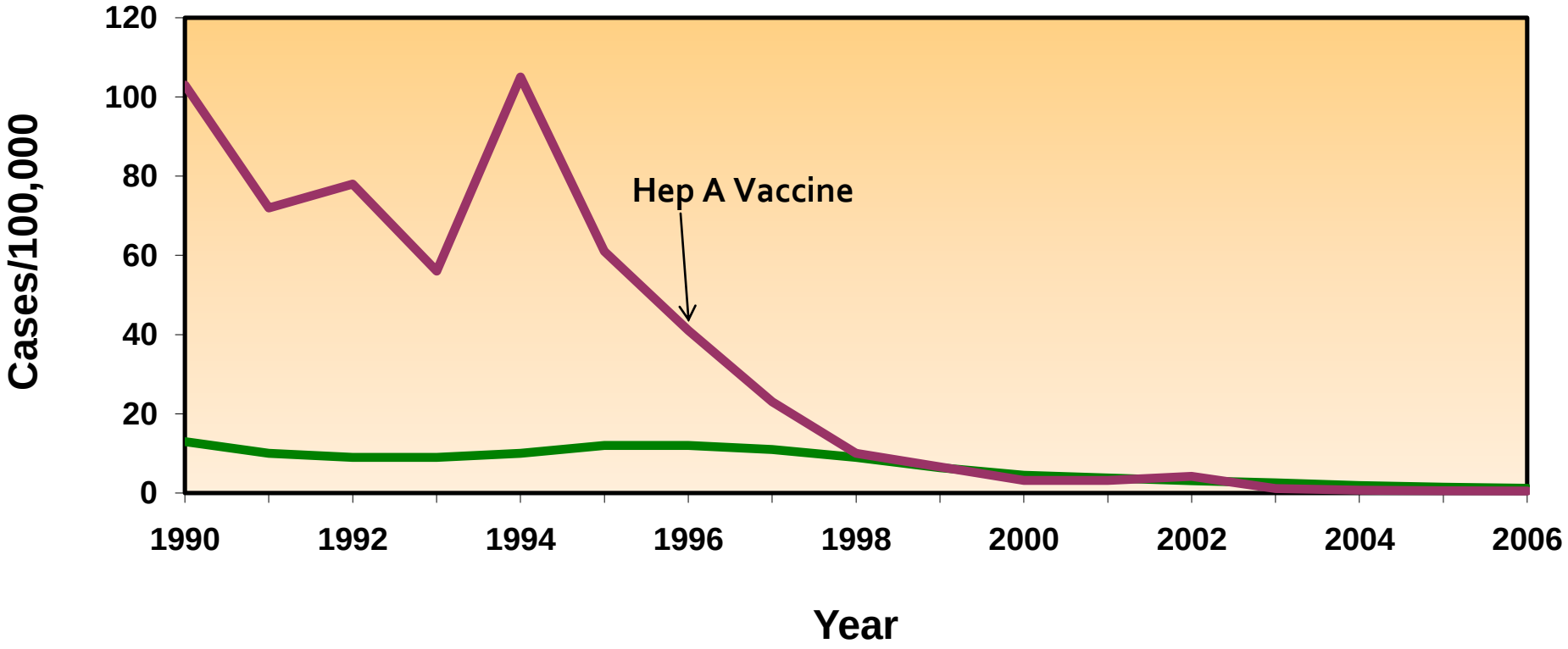
International Circumpolar Surveillance, AIP-CDC, State of Alaska

Hepatitis A in Alaska Native People

- Pre-Vaccine Incidence –
  - Large outbreaks
  - Lifetime risk in villages ~90%
  - 1992-3 : 4 deaths from fulminant Hep A
- Hepatitis A Vaccine (1996)
  - Universal vaccine for children
  - School requirement
- Rates have declined >99%
  - Rate now lower than US rate
  - No epidemics! – no transmission in villages

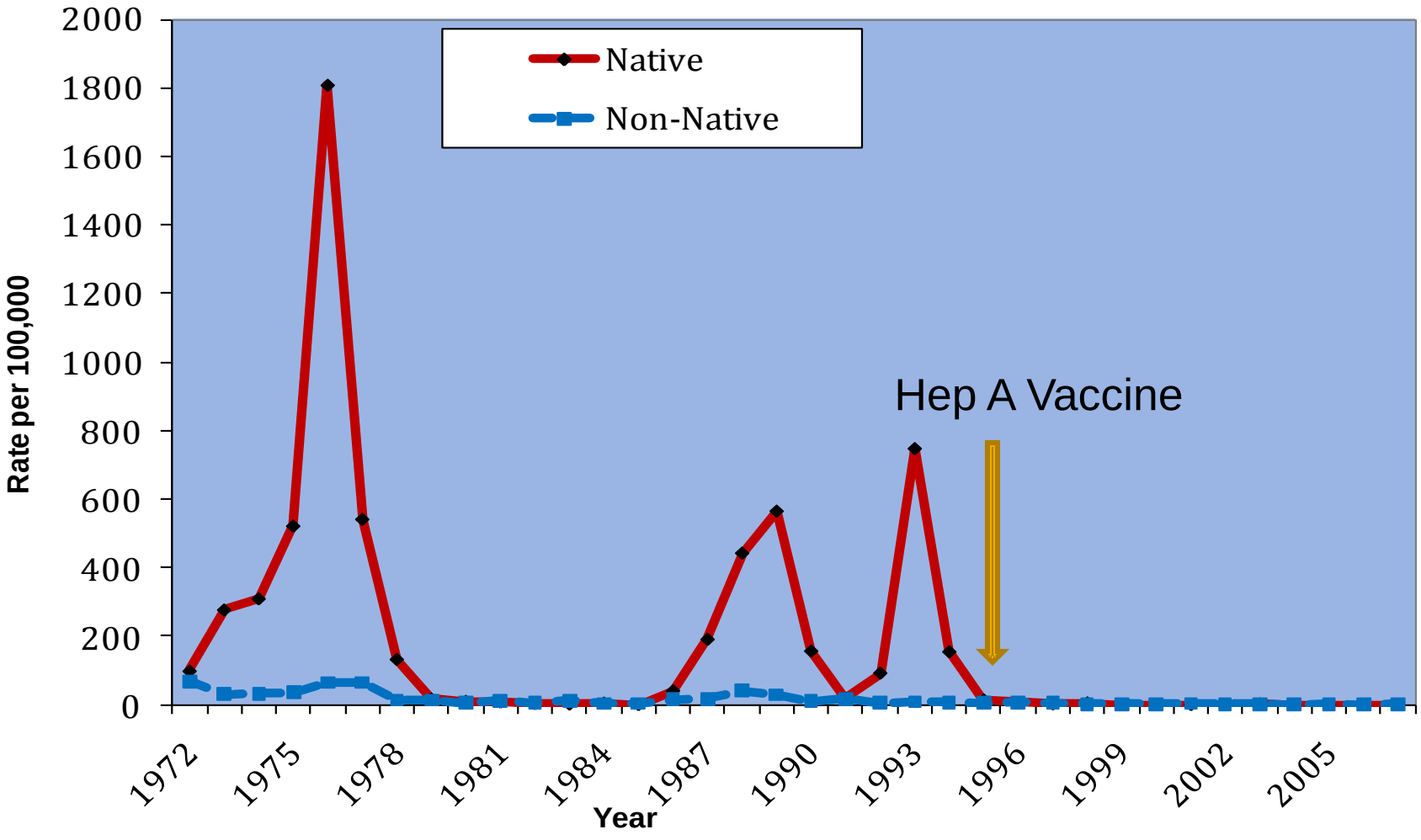
CDC MMWR 1992;41:6
Bialek. Hepatitis A in AI/AN. Am J Pub Hlth 2004;94 996-1001

Hepatitis A Incidence, American Indian/Alaska Natives & US, 1990-2006



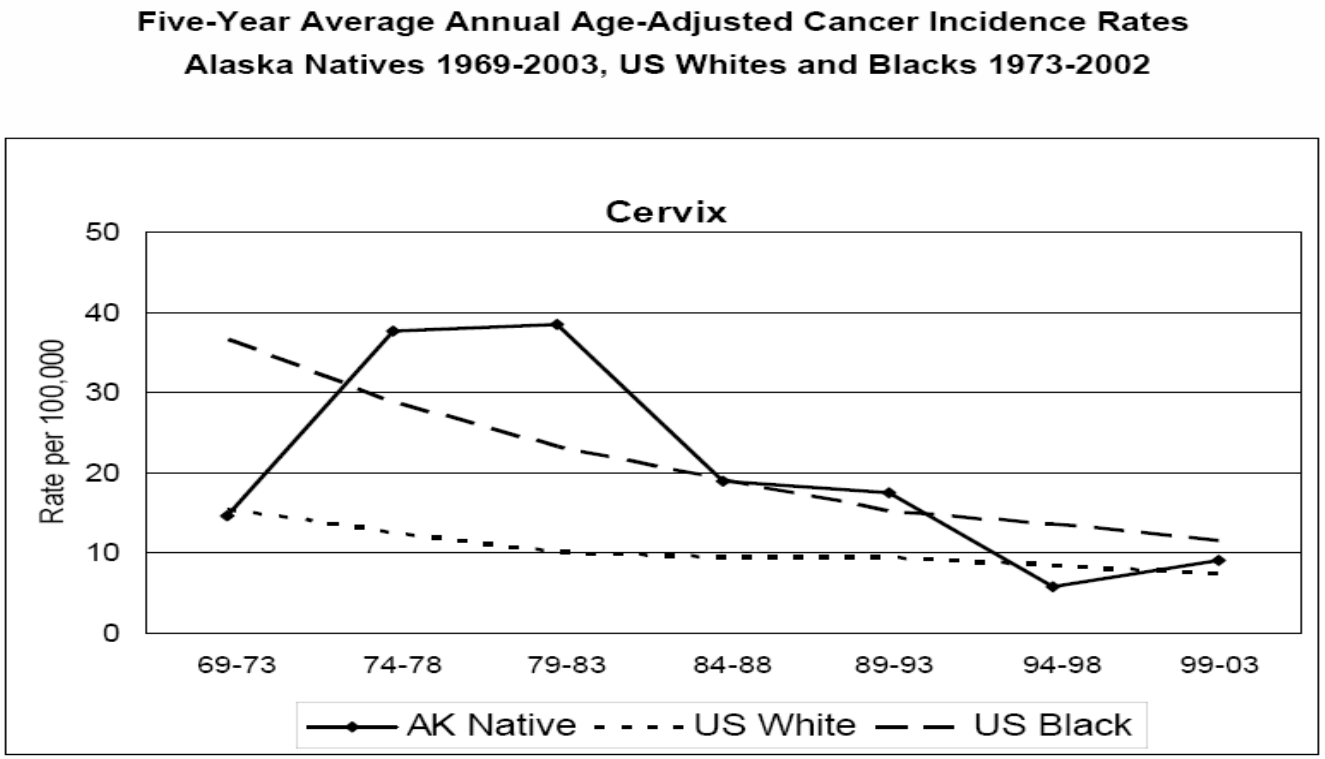
Bialek. Hepatitis A in AI/AN. Am J Pub Hlth 2004;94 996-1001

Incidence of Hepatitis A infections in Alaskans,
Native and Non-Native, 1972-2007



Singleton, McMahon, Castrodale et al. VACCINE 2010;28:6298-304

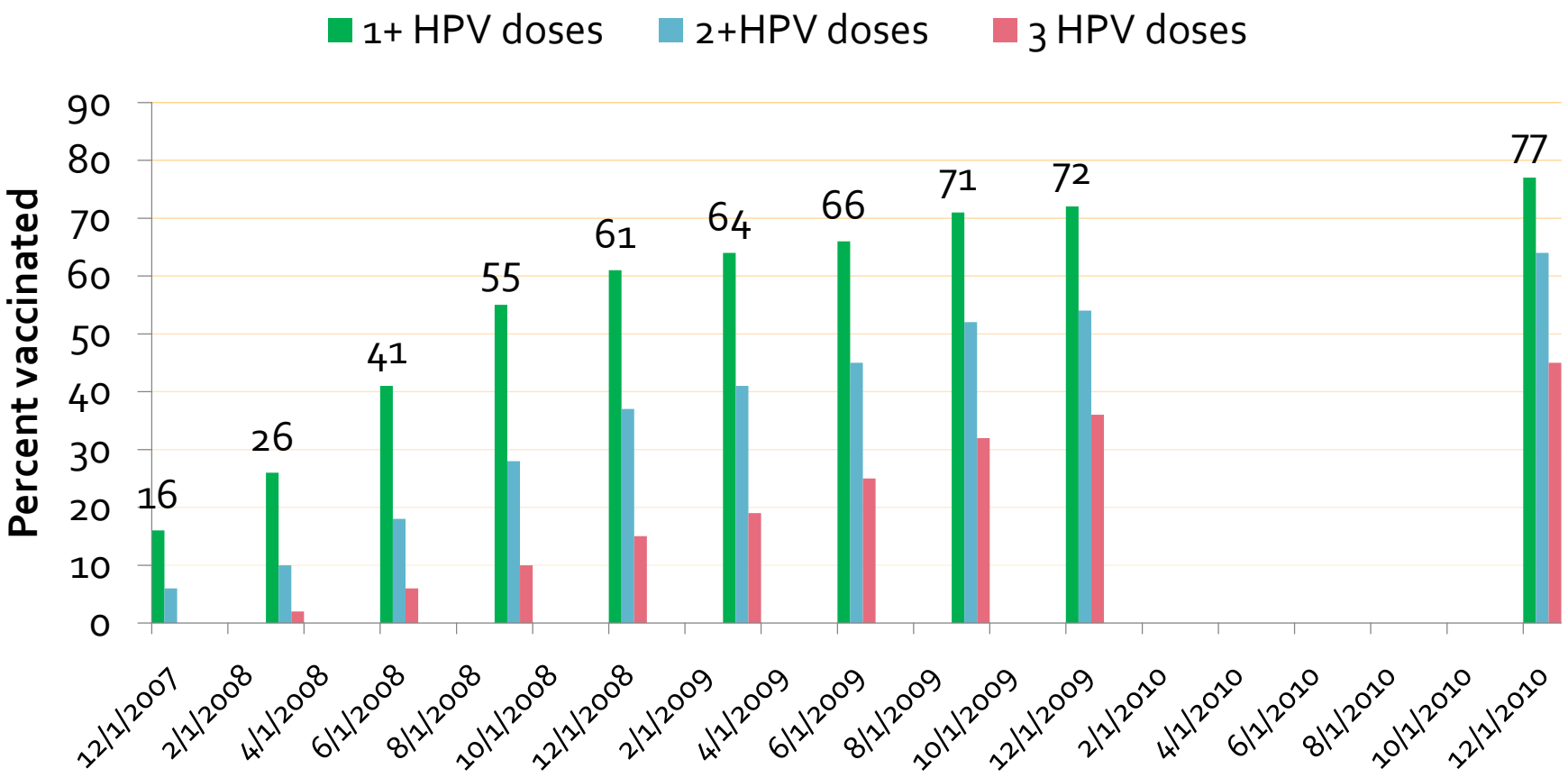
Cervical Cancer and HPV



- Cervical Cancer rate in Alaska Native women
  - 3.4 times higher than US white women during 1974-78.
- HPV = Necessary cause of 95% of Cervical Cancer

HPV Vaccine Uptake

HPV coverage rates, Alaska Native 13-17 year olds, 2007-2011



National Immunization Survey – 44.4% US teen girls ≥1HPV, 2009

Alaska Native teens have higher HPV vaccine coverage than US

SHAPE

Statewide HPV Vaccine Alaska Native Evaluation Project

- Goals
  - Help improve use of vaccine
  - Evaluate vaccine impact
- Participants
  - Alaska Native Tribal Health Consortium
  - Southcentral Foundation
  - CDC AIP- Anchorage; Division of STD Prevention - Atlanta
  - Alaska Division of Health ~ Immunization Program

Adult Vaccine Schedule 2010

- Vaccines currently supplied by the State for all:
  - 19-64 yrs. Influenza – yearly, Tdap/Td q10 yrs, PneumoVax -once in High Risk (50-65 yrs PneumoVax once Alaska Natives if none prior)
  - 65+ yrs. Influenza – yearly, Td q 10 yrs, PneumoVax once
- Additional vaccines for adults
  - Hep B non-immune unvaccinated adults in high risk groups, diabetics
  - Hep A non-immune adults with specific risk for hep A
  - HPV licensed up to 26 years
  - MMR health care workers – 2 doses or proof of immunity in born>1957
  - Varicella non-immune healthcare workers without contraindications
  - Zoster adults 60 years+ without contraindications

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CDC

MMWR

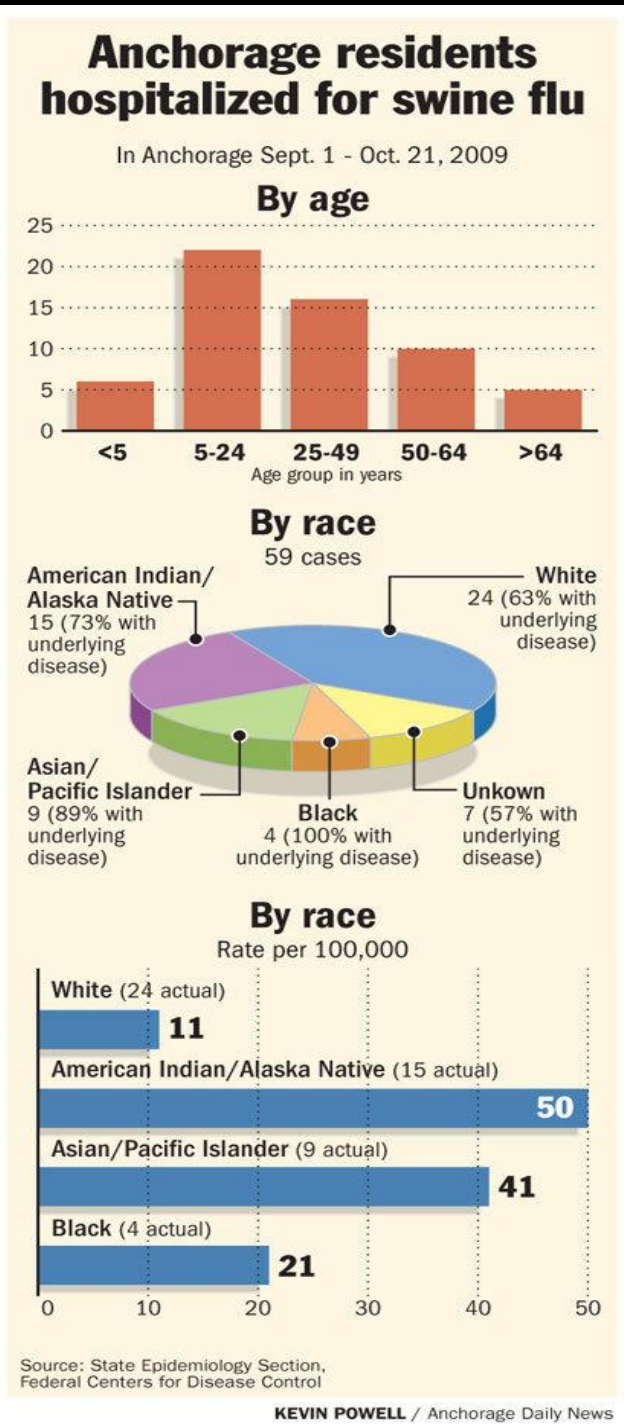
Weekly

December 11, 2009 / 58(48);1341-1344

Deaths Related to 2009 Pandemic Influenza A (H1N1) Among American Indian/Alaska Natives --- 12 States, 2009

"…during April 15--November 13, AI/ANs in the 12 participating states had an **H1N1 mortality rate four times higher** than persons in all other racial/ethnic populations combined.

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5848a1.htm?s_cid=mm5848a1_e



H1N1 retrospect

- 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

Influenza Hospitalizations — Municipality of Anchorage, September 1 – October 21, 2009 State of Alaska Epidemiology Bulletin No. 30 , November 25, 2009
http://www.epi.hss.state.ak.us/bulletins/docs/b2009_30.pdf

Hospitalization Rates by Region

	Anchorage		Fairbanks		Southwest	
Race	No. of cases (rate per 100,000)	Underlying Disease (%)	No. of cases (rate per 100,000)	Underlying Disease (%)	No. of cases (rate per 100,000)	Underlying Disease (%)
White	24 (11)	15 (63)	18 (21)*	9 (50)	-	-
AI/AN	15 (50)*	11 (73)	8 (57)#	5 (63)	16 (65)*	10(63)
A/PI	9 (41)*	8 (89)	-	-	-	-
Black	2 (21)	4 (100)	2 (33)	1 (50)	-	-
Unknown	7	4 (57)	-	-	-	-
Total	59 (21)	42 (71)				

* P<0.01 vs rate in Anchorage whites; # P<0.05 vs rate in Anchorage whites

Wenger et al, Clin Infect Dis 2010; 52:S189-197

MMWR™
Morbidity and Mortality Weekly Report
www.cdc.gov/mmwr
Early Release July 29, 2010 / Vol. 59

Prevention and Control of Influenza with Vaccines

Recommendations of the Advisory Committee on Immunization Practices (ACIP), 2010

• Universal vaccination of all ages…

•When vaccine supply is limited, vaccination efforts should focus on delivering vaccination to persons who:

- Are infants….
- Have chronic medical conditions…..
- Pregnant women…
- **Are American Indians/Alaska Natives**

http://www.cdc.gov/mmwr/pdf/rr/rr59e0729.pdf

Summary: Vaccine-Preventable Disease, Alaska

- BEFORE VACCINES:
  - Hib disease – 80 cases/yr children <5 yr
  - Pneumo disease – 50 cases/yr, <2 yr
  - Hep A – epidemics with 4,000 symptomatic cases
  - Hep B –10% Alaska Natives carriers in some areas

- BECAUSE OF VACCINES:
  - ~ 1 case of Hib per year!
  - Vaccine-type pneumo down 98%
  - No Hep A epidemics since vaccine!
  - No Hep B carriers in children!