

# What have vaccines done for you lately?



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# Impact of Vaccines

## Comparison of disease: before vaccine and 2006

Disease	Pre-vaccine Era*	2006**	% decrease
Diphtheria	175,885	0	100
Measles	503,282	55	99.9
Mumps	152,209	6,584	95.7
Pertussis	147,271	15,632	89.4
Polio (paralytic)	16,316	0	100
Rubella	47,745	11	99.9
Congenital Rubella Syn.	823	1	99.9
Tetanus	1,314	41	96.9
<i>H. influenzae</i> type b	20,000+	208	99.0
and unknown (<5 yrs)			
Total	1,064,854	22,532	97.9

\* Baseline 20<sup>th</sup> century annual morbidity

+ Estimated because no national reporting existed in the pre-vaccine era

\*\* Source: *MMWR* 2007;56(33):851-64

# Herd Immunity



If enough children are vaccinated then a disease cannot spread in their community. This is known as “community” or “herd immunity”



# Polio

- In 1952 there were 21,000 cases of paralytic polio in the US
- The last case of polio in the US occurred in 1979
- Polio continues in India, Nigeria, Afghanistan, and Pakistan
- Polio is just one plane flight away



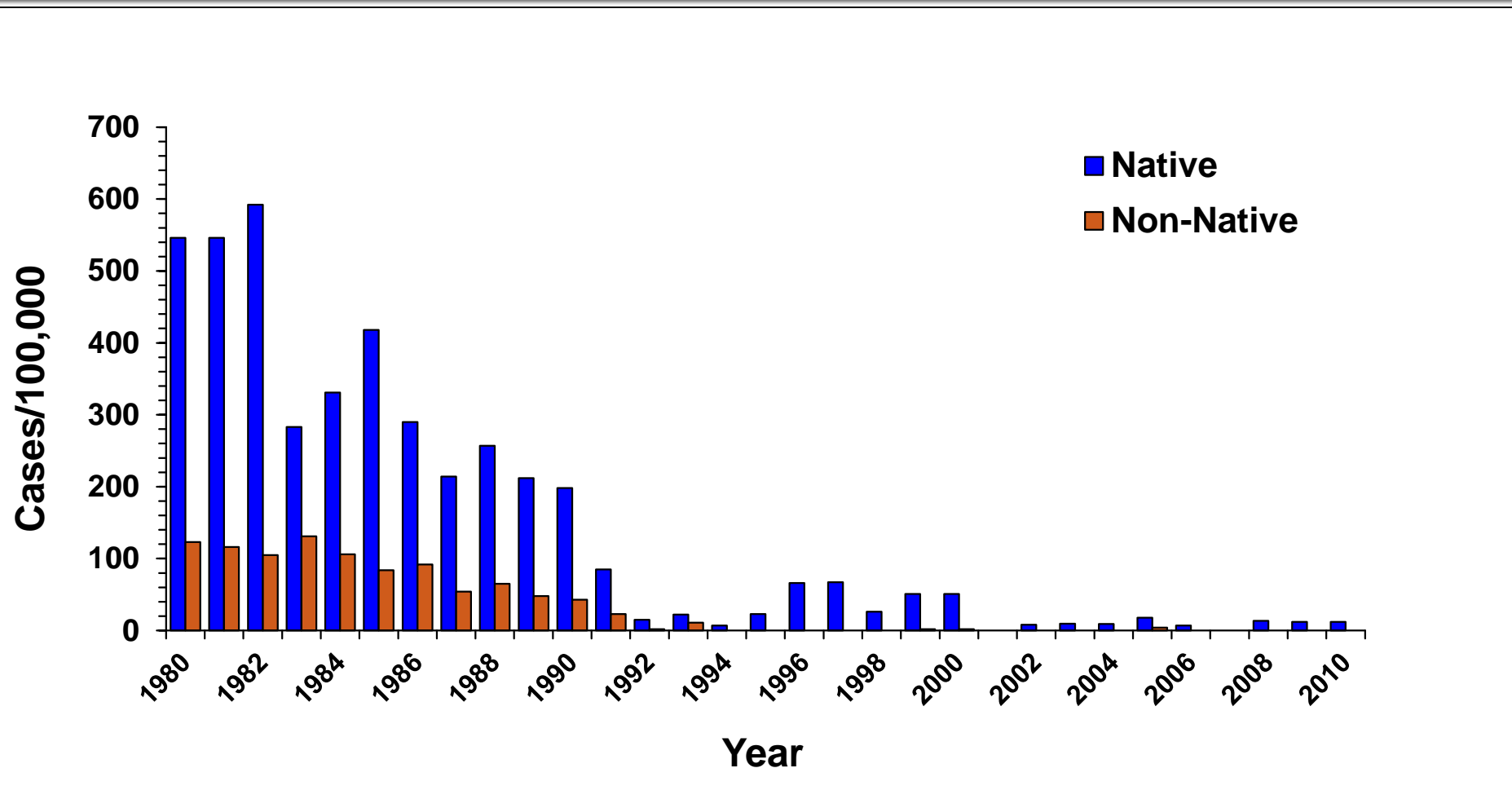
# Diphtheria



- In 1925 a diphtheria epidemic threatened Nome. The nearest serum was in Anchorage.
- A relay of dog teams rushed the vaccine from Nenana to Nome.
- Gunnar Kaasen and his dog Balto drove the final legs into Nome
- The serum arrived in time to prevent the epidemic and save hundreds of lives.



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

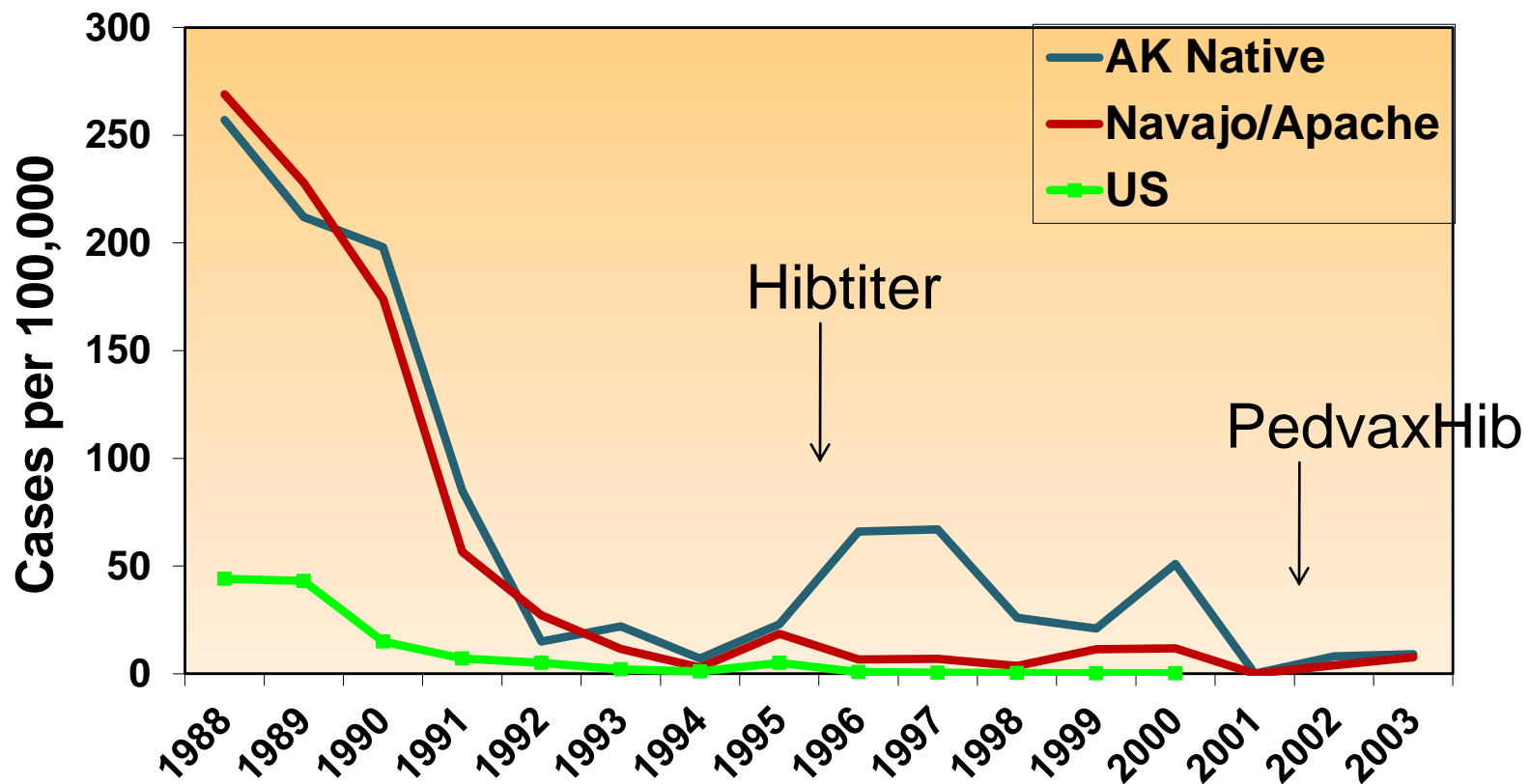


Singleton, Pediatrics 2006 & CDC unpublished data

# Decline in Hib Disease:

## US, Navajo/ Apache, AK Native, 1988-2003

*Before Hib vaccination started in 1990, Alaska Native children were 6 times more likely than other US children to get Hib meningitis. Now Hib meningitis is rare because of routine childhood vaccination.*



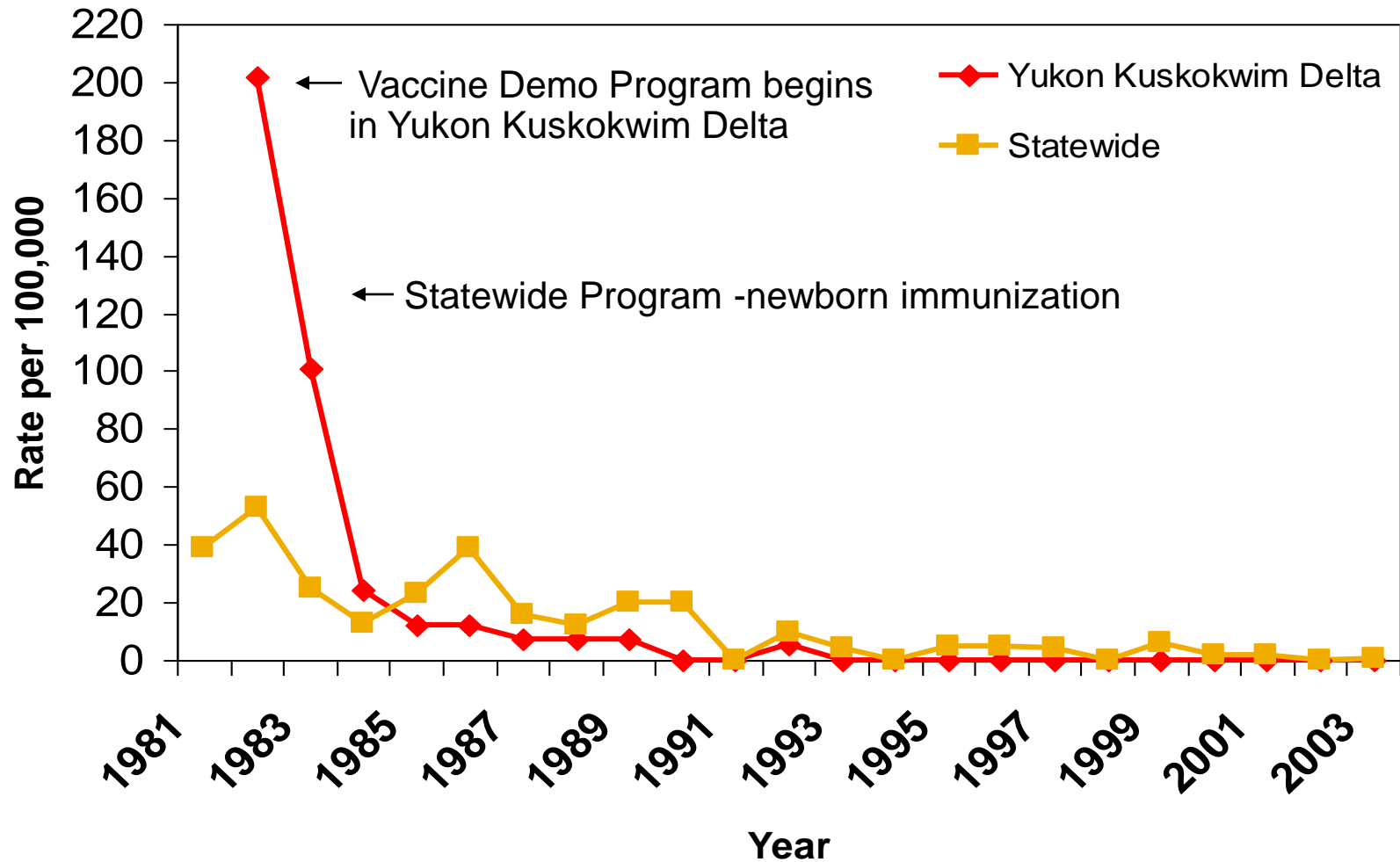
# Hepatitis B in Alaska Native persons

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





# Incidence Symptomatic Hepatitis B in AK Native Persons 1981- 2003

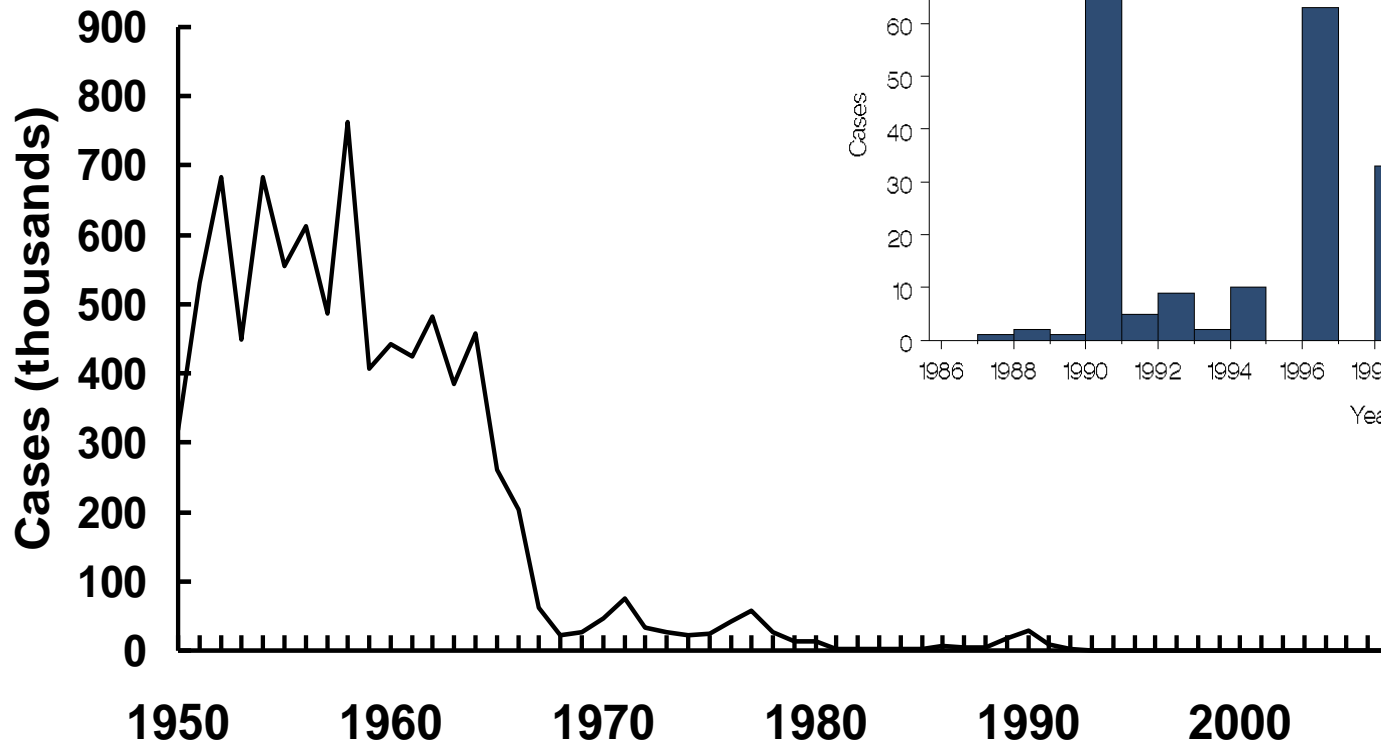


# Measles Clinical Features

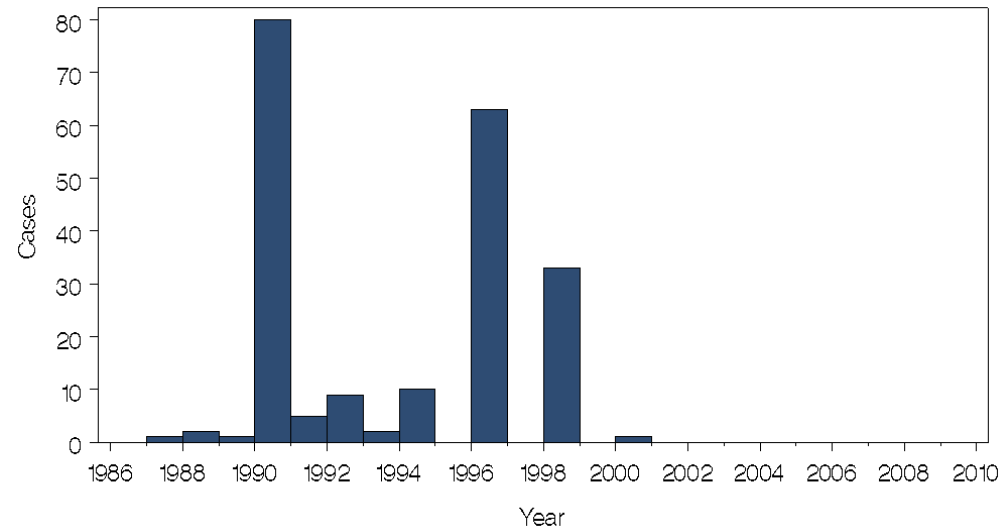
- Highly contagious viral illness
- Incubation period 10-12 days
- Prodrome
  - Stepwise increase in fever to  $103^{\circ}\text{F}+$
  - Cough, coryza, conjunctivitis
  - Rash – maculopapular, 2-4 days after prodrome beginning face and head



# Measles - United States, 1950-2007

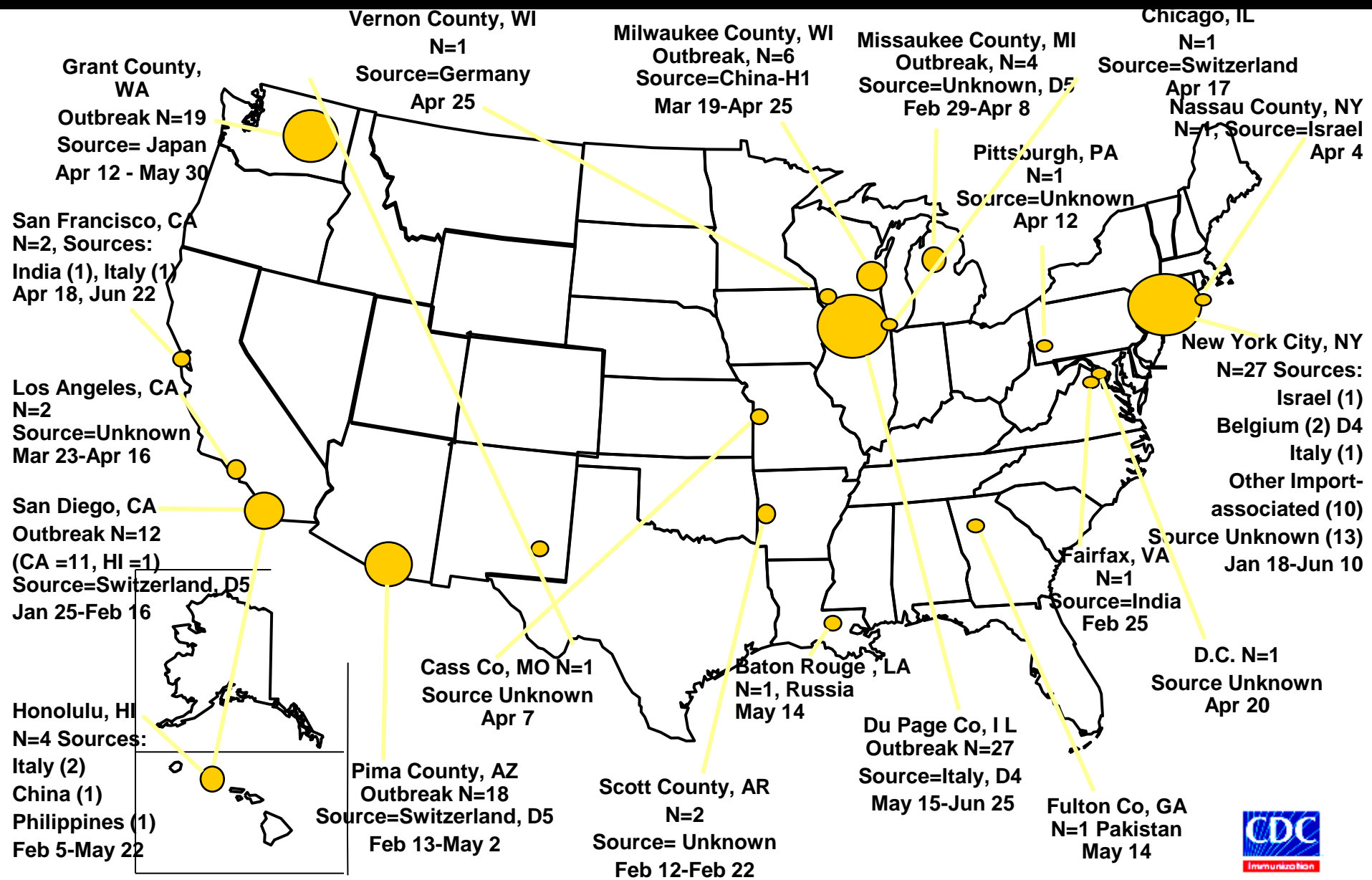


Measles in Alaska 1986-2010



# Measles Cases Reported to CDC/NCIRD

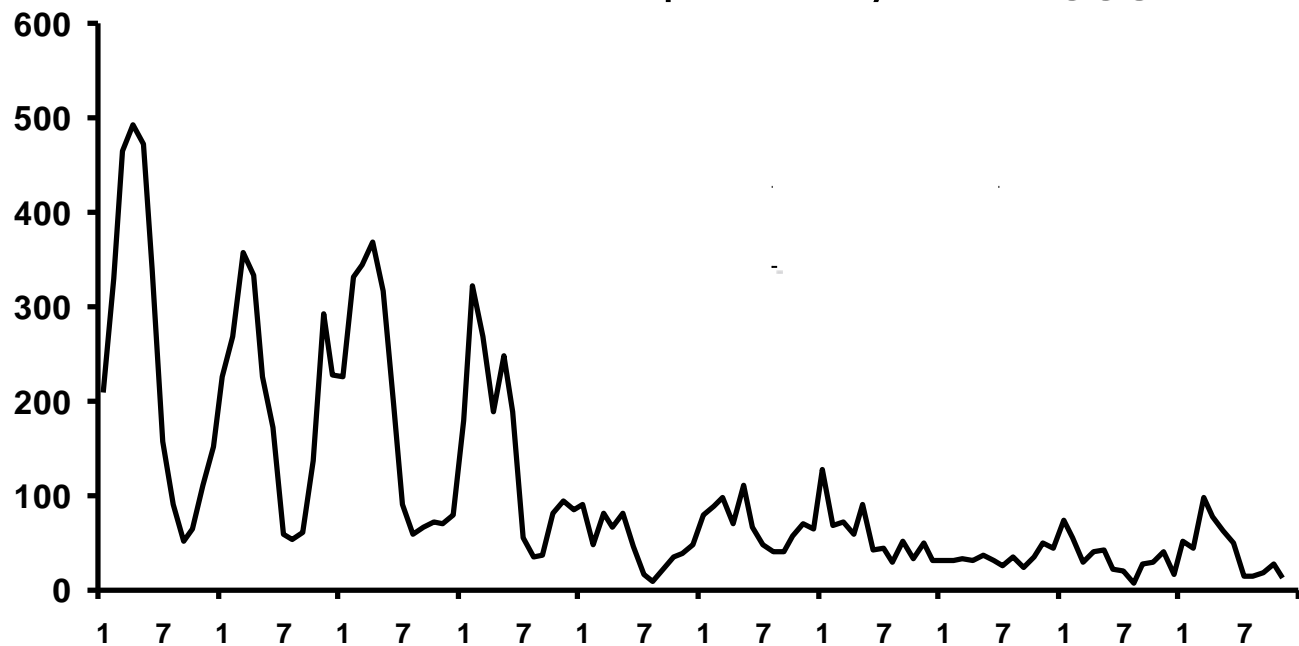
## January 1 to July 11, 2008 (N= 132)





# Varicella Cases by Month - Antelope Valley, CA, 1995-2004

- Varicella cases decrease in Antelope Valley, CA, 1995-2004



- Varicella hospitalizations decreased 80% since vaccine
- Varicella deaths have plummeted 88% since vaccine

# Hepatitis A in Alaska

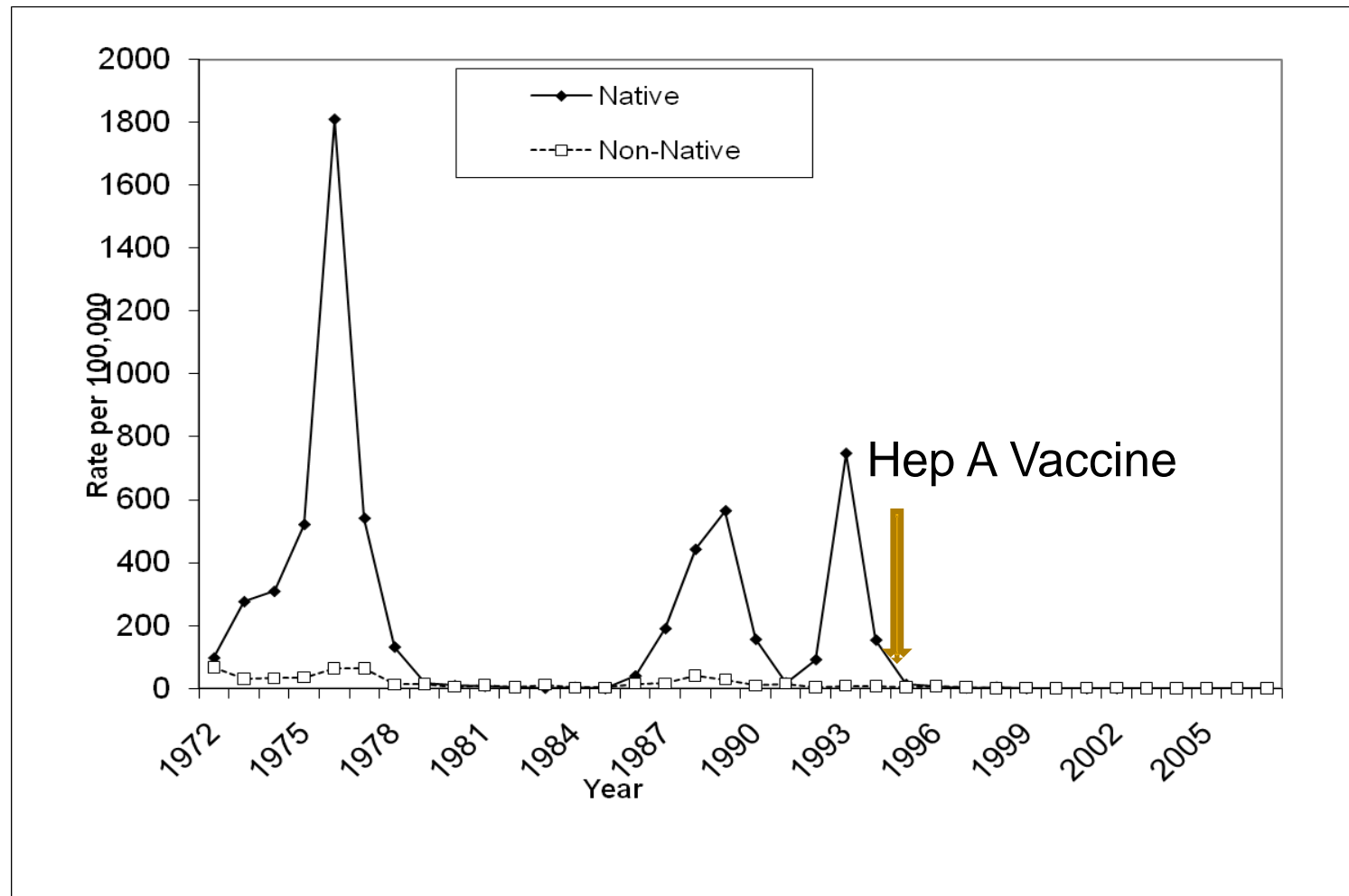
- Pre-Vaccine Incidence –
  - Large outbreaks
  - Lifetime risk in villages ~90%
  - 1992-3 : 4 deaths from fulminant Hep A
- Hepatitis A Vaccine (1996)
  - Universal vaccine for children
  - School requirement
- Rates have declined >99%
  - Rate now lower than US rate
  - No epidemics! – no transmission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



CDC MMWR 1992;41:6

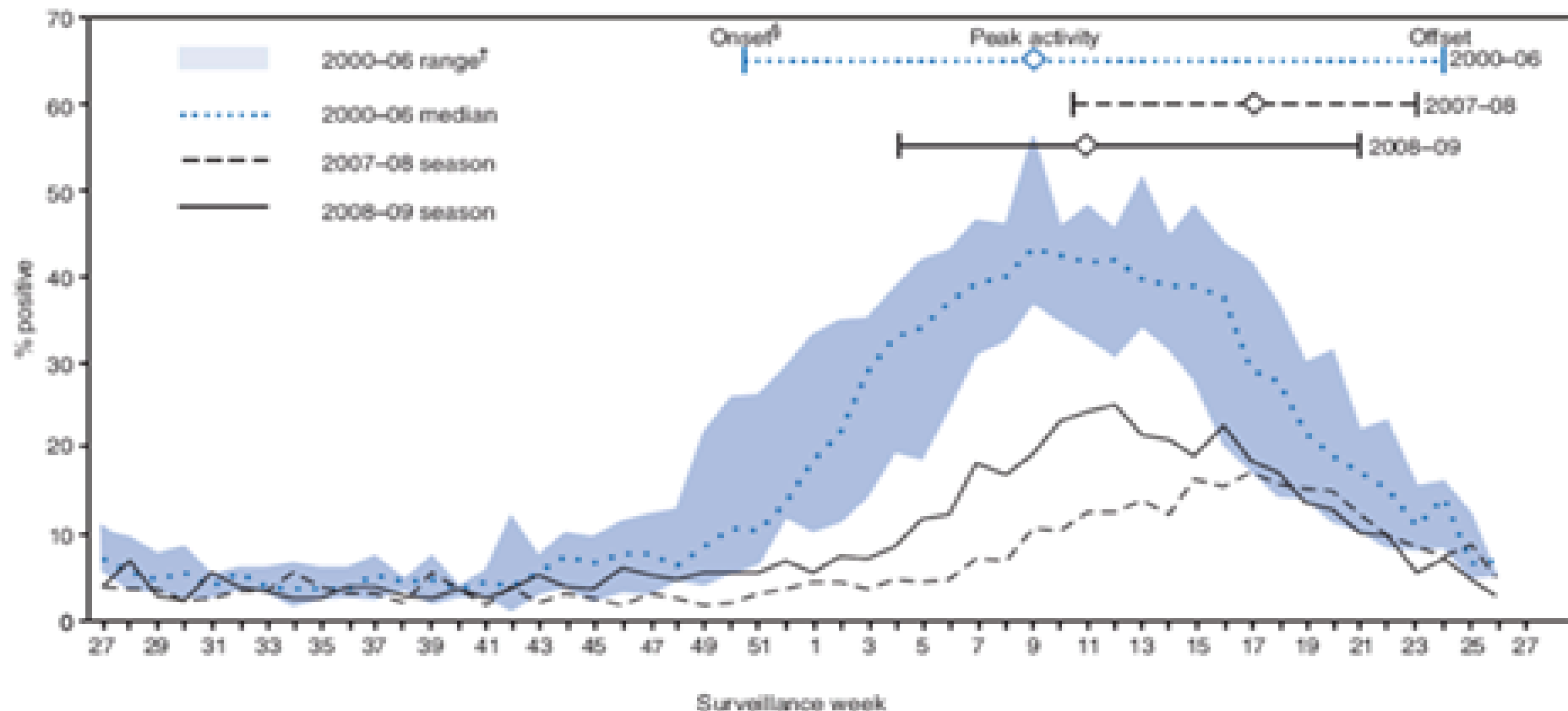
Bialek. Hepatitis A in AI/AN. Am J Pub Hlth 2004;94 996-1001

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



Singleton, McMahon, Castrodale et al. Impact of vaccine program in Alaska VACCINE 2010;28:6298-304

# National Rotavirus Surveillance



Percentage of rotavirus positive results, by surveillance week National Respiratory and Enteric Virus Surveillance System (NREVSS). United States. July 2000--June 2009\*.



# Varicella (Chickenpox): Not always a “Harmless” Childhood Disease

- Before vaccine there were 100 deaths/yr from complications of chicken pox
- Varicella deaths decreased 88% since routine vaccination
- Adolescents and adults get much sicker with natural chicken pox.
- Some breakthrough chicken pox infections after vaccine occur - usually very mild.
- Varicella vaccine is recommended at 1 year of age; second dose at school entry.



# Rotavirus Disease and Rotavirus vaccine



## ■ Rotavirus

- Most common cause of diarrhea, peak at 6-24 months
- 1/3 of diarrhea hospitalizations
- 55,000 hospitalizations in the US
- 550,000 clinic and ER visits in the US

## ■ Rotavirus vaccine - provided by the State

- Studies show Efficacy: 98% reduction of severe rotavirus

## ■ Rotavirus disease post-vaccine

- Significant decrease in diarrheal hospitalizations in children
- Significant drop in all Rotavirus hospitalizations in US since Rotavirus vaccine became available ~ 2007