

# VACCINE PREVENTABLE DISEASES IN ARIZONA

Karen Lewis, M.D.

16<sup>th</sup> Annual

Arizona Immunization Conference

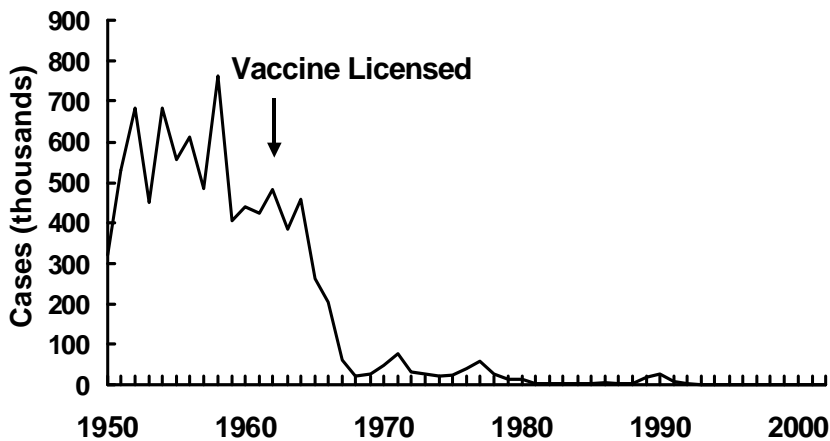
April 22, 2009

*Leadership for a Healthy Arizona*

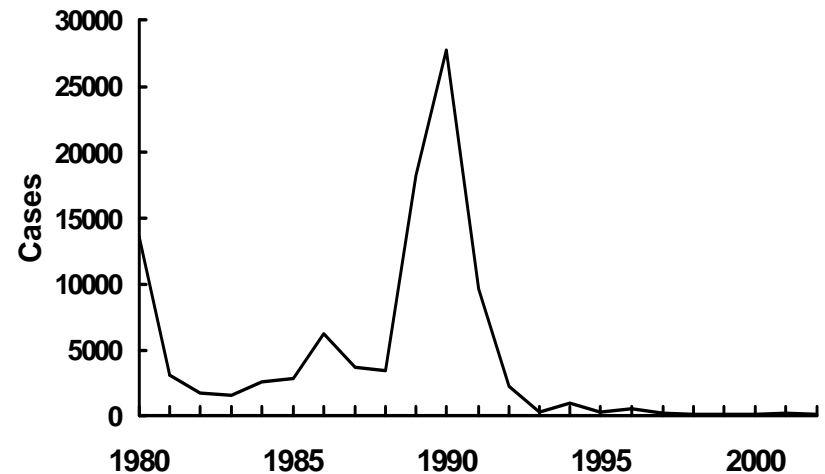


# Measles Epidemiology

Measles—United States, 1950-2002

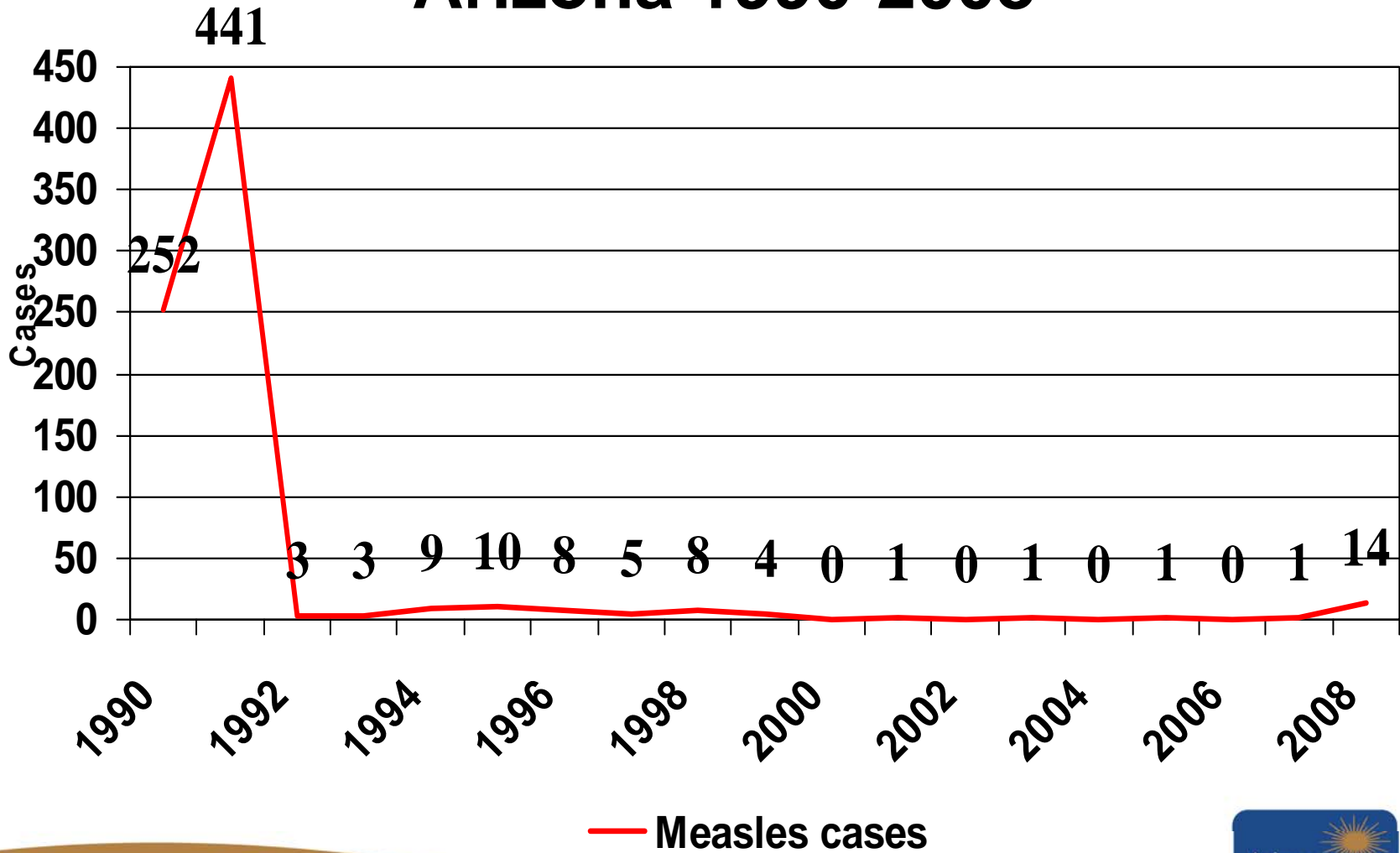


Measles—United States, 1980-2002



Epidemiology and Prevention of Vaccine Preventable Disease  
8<sup>th</sup> E. January 2005

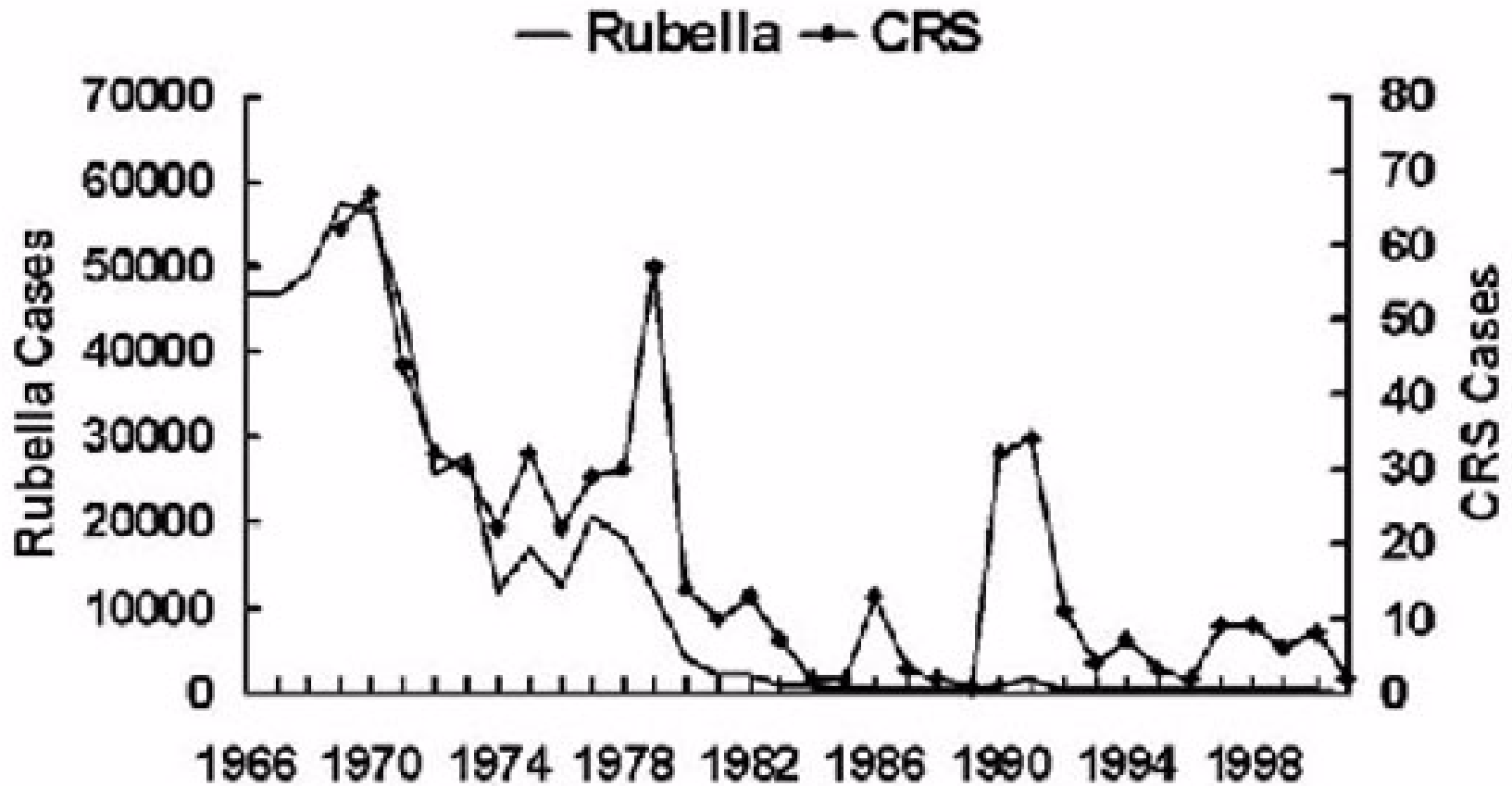
# Measles Cases Arizona 1990-2008



# Complications of Measles

Measles in US 1985-1992	
%	Complications
8	Diarrhea
7	Otitis media
6	Pneumonia
0.6-0.7	Seizures
0.1	Encephalitis
0.2	Death

# Rubella - United States, 1966-2001\*

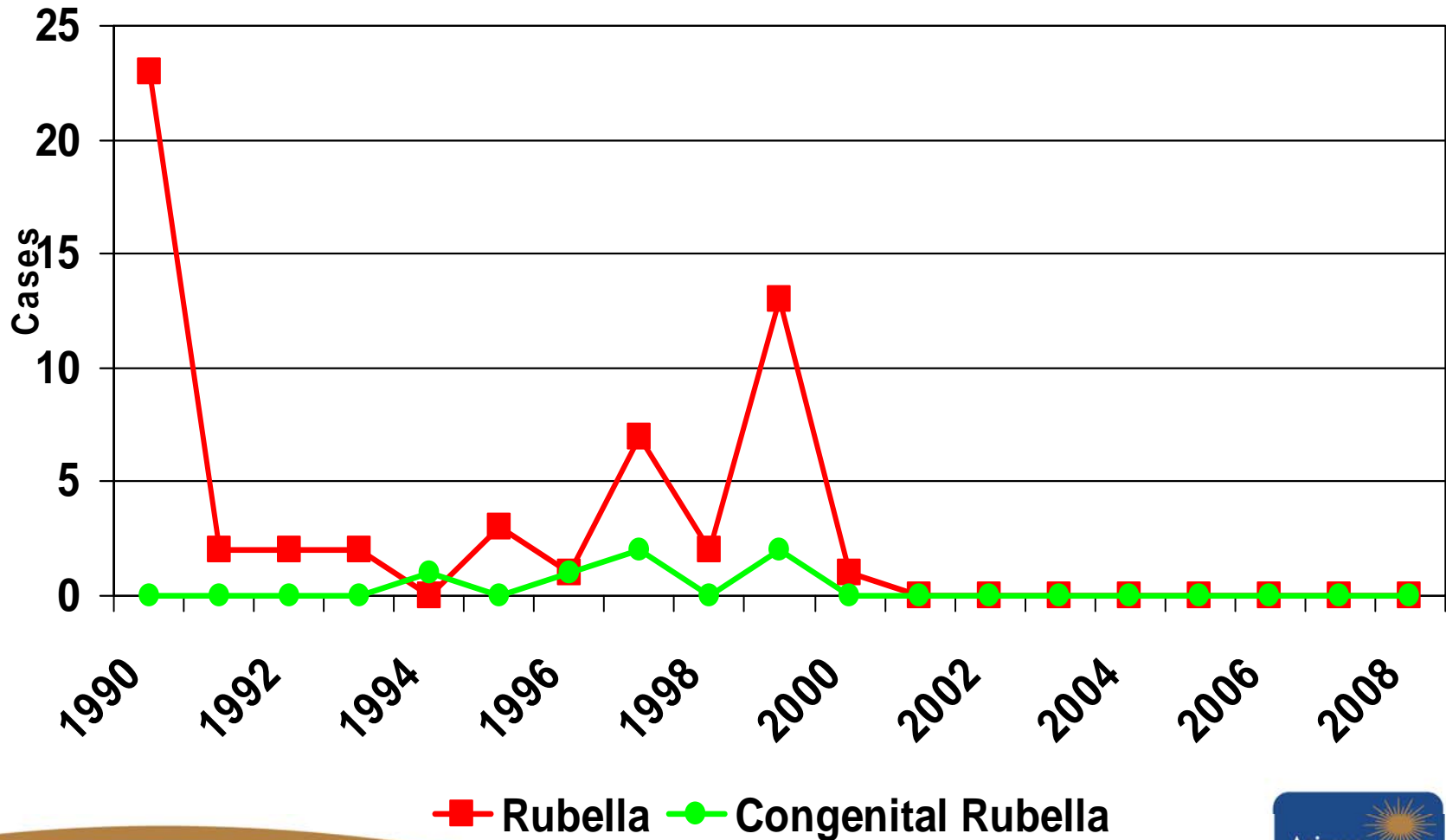


\*2001 provisional data

© CDC

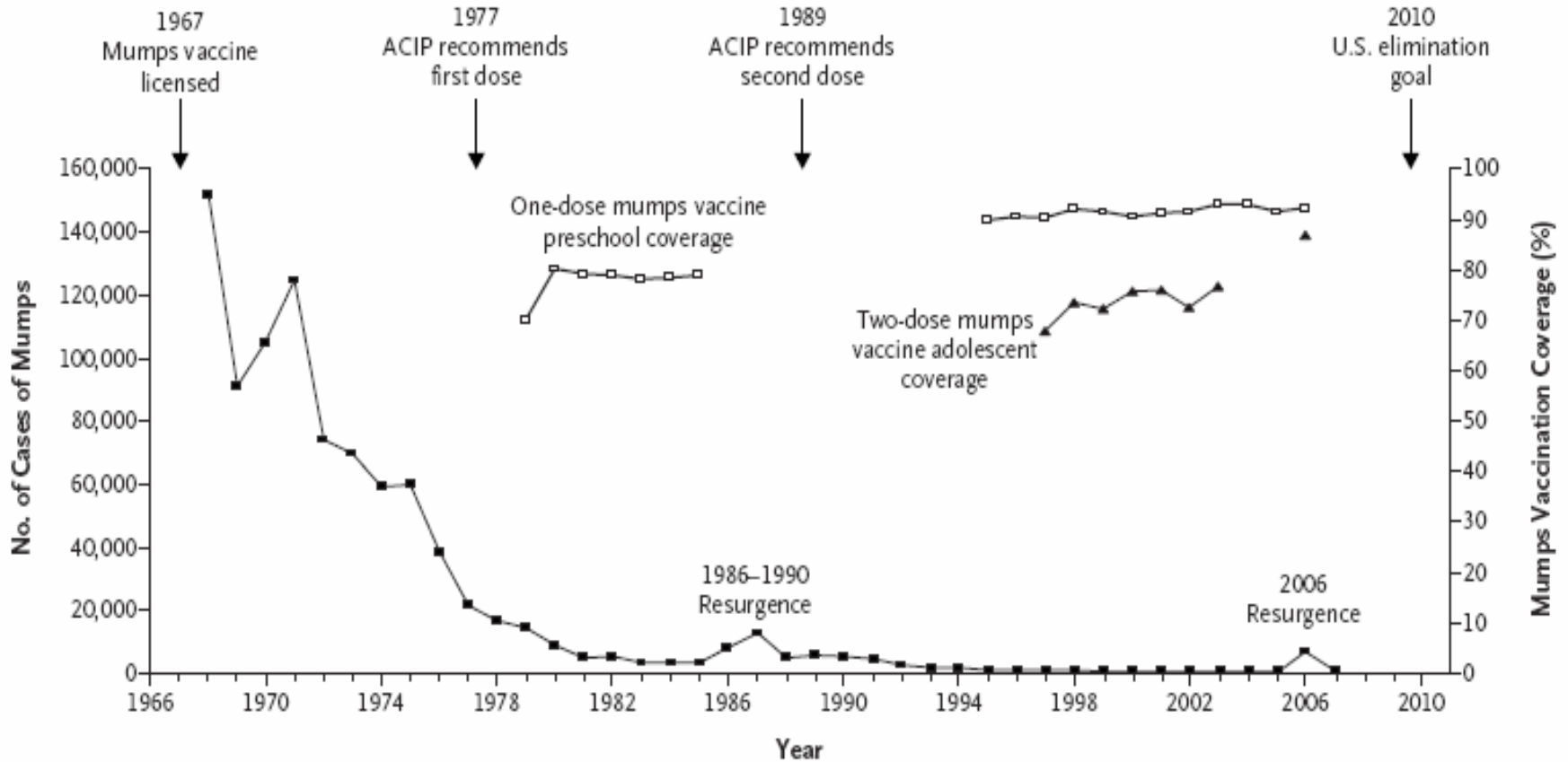


# Rubella and Congenital Rubella Cases Arizona 1990-2008



# Mumps and Mumps Vaccine US 1966-2006

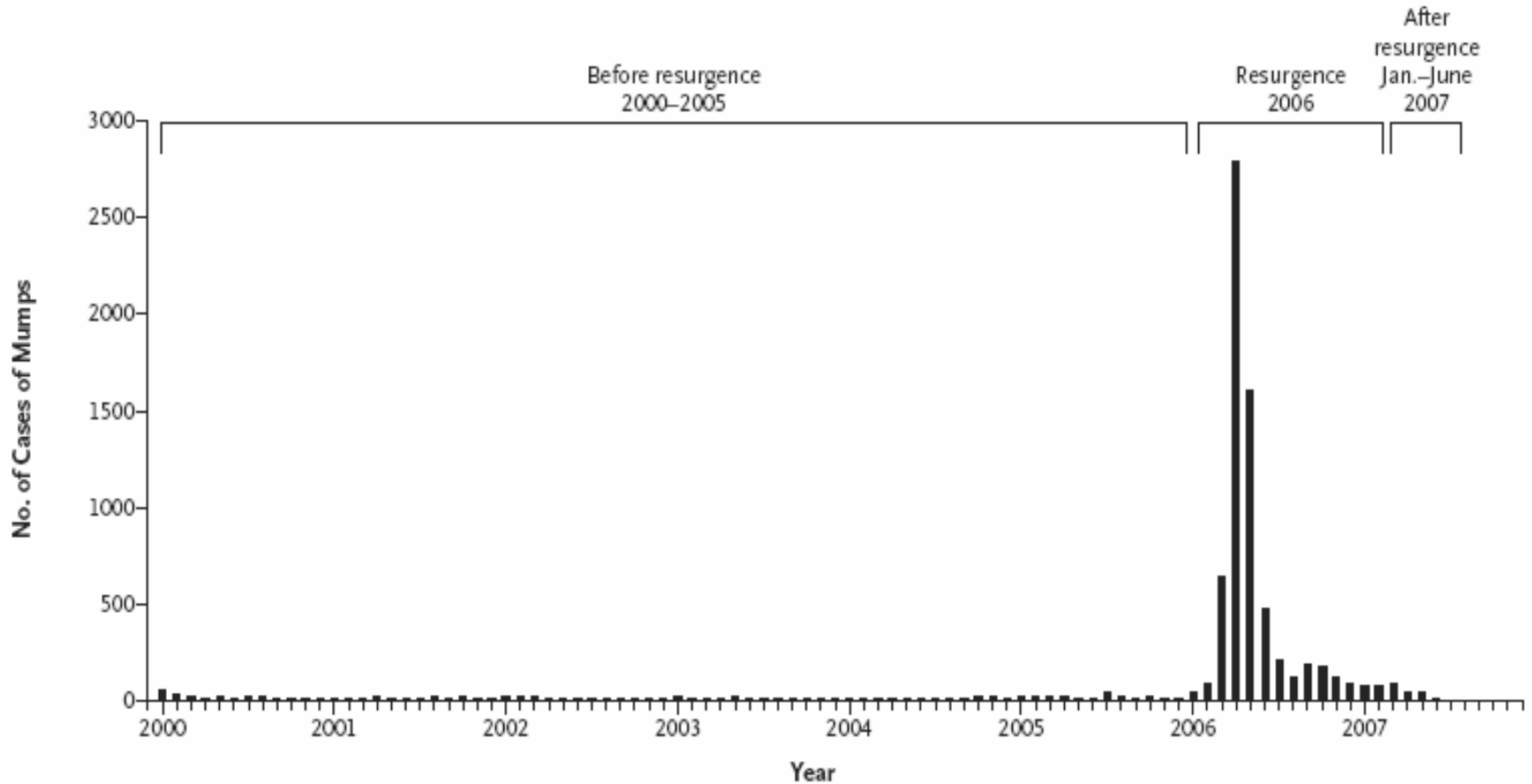
A



# Mumps Resurgence in US 2006

N = 6584

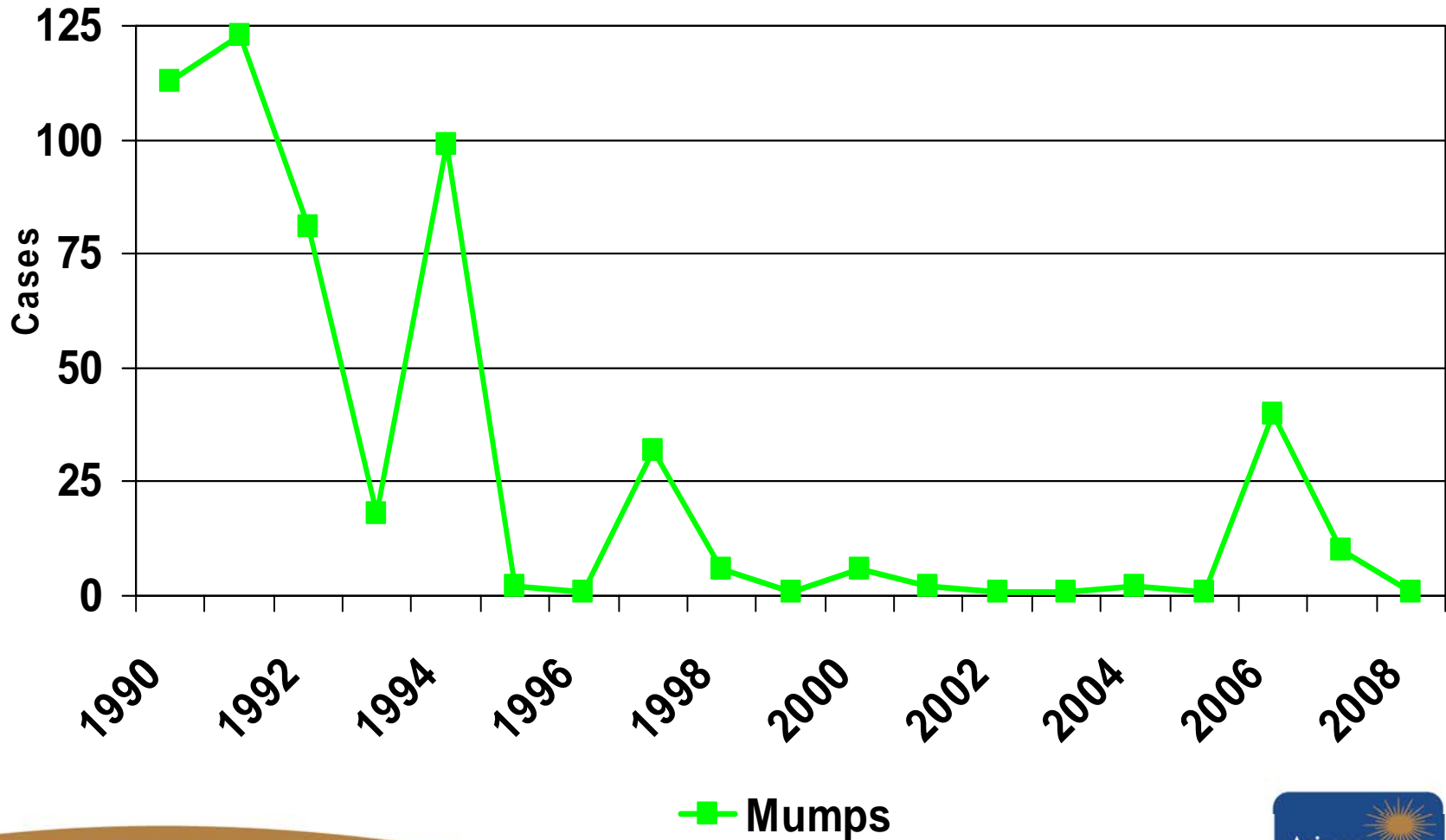
B



NEJM Apr 10, 2006



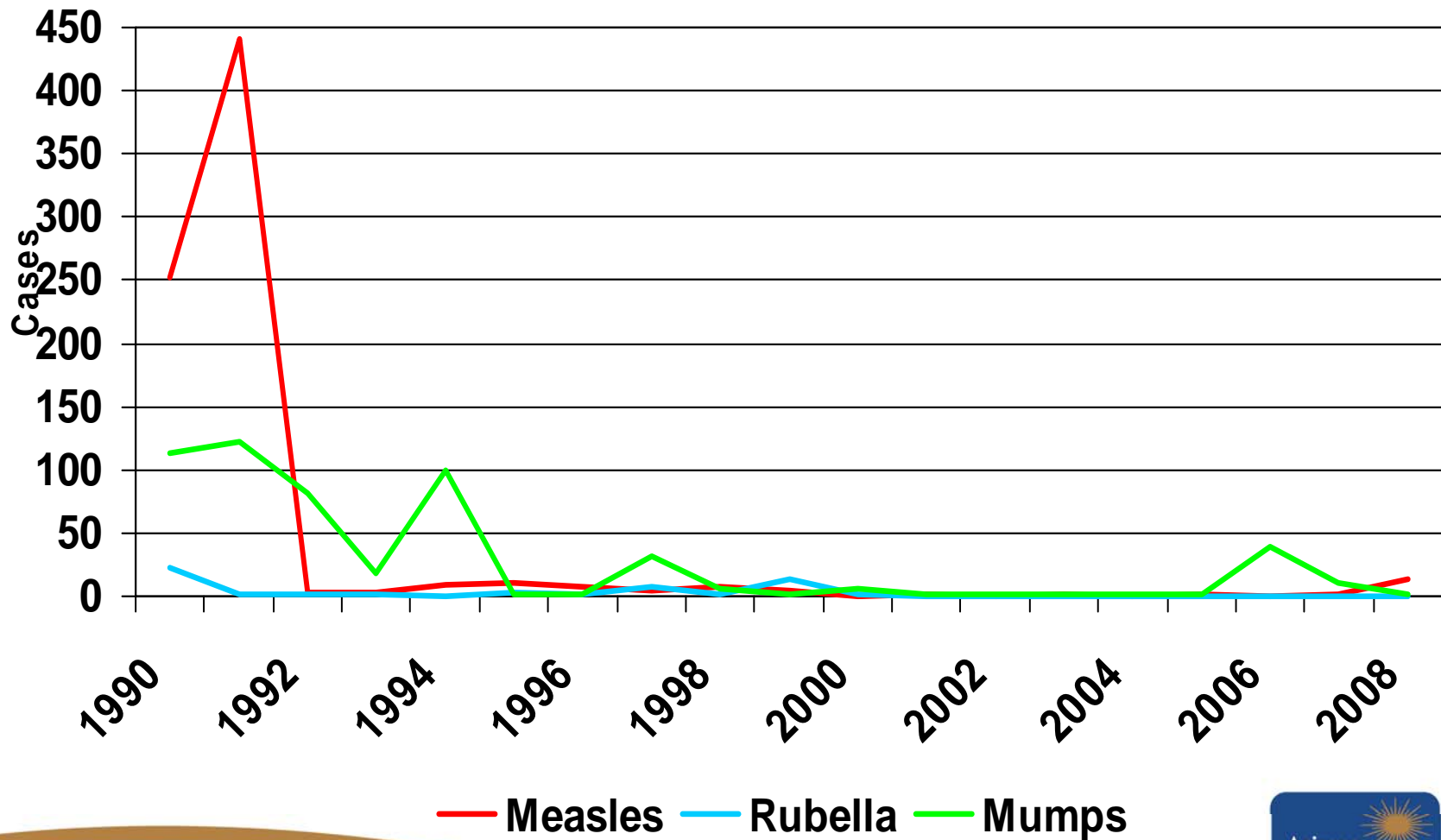
# Mumps Cases Arizona 1990-2008



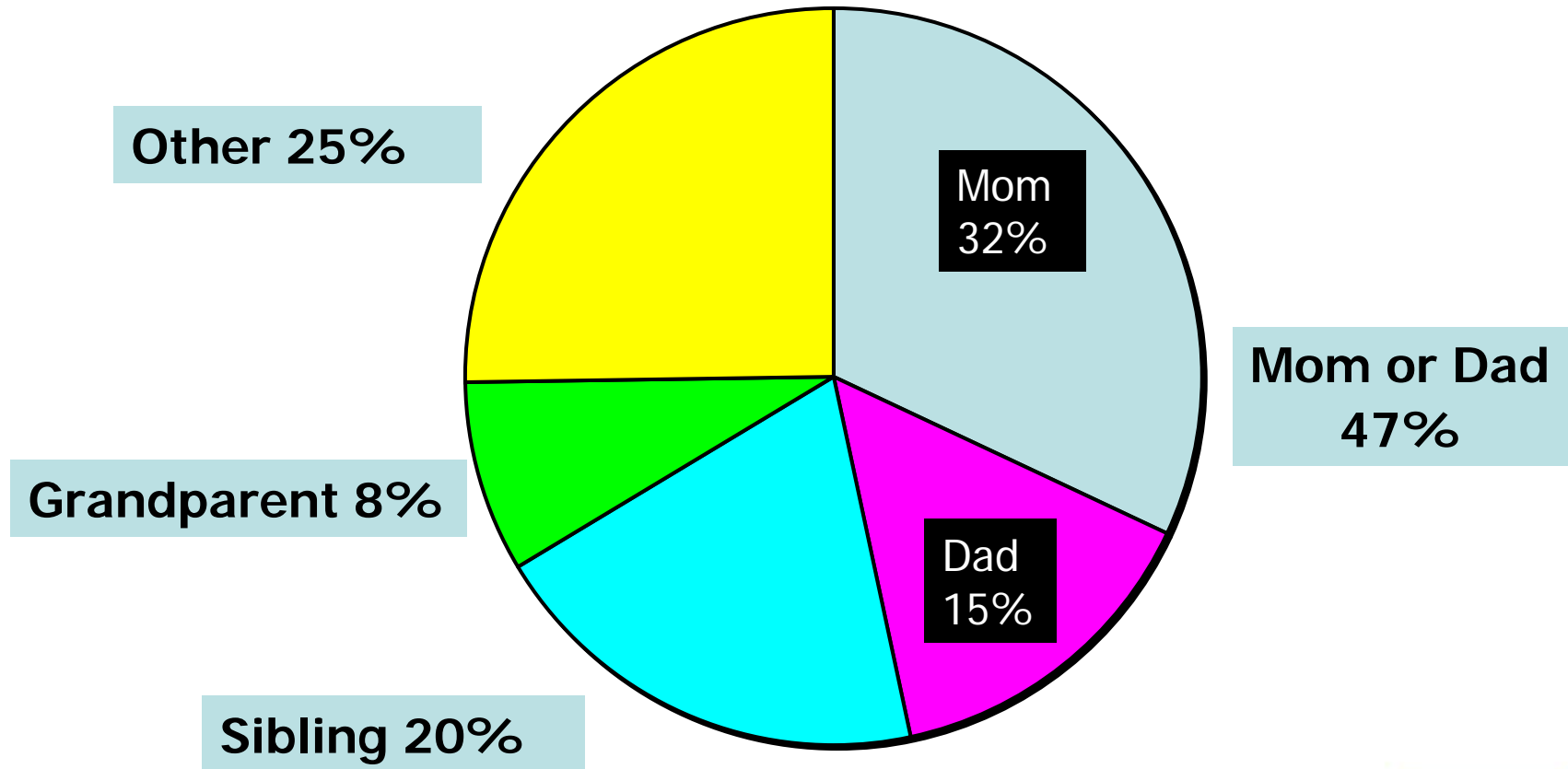
# Complications from Mumps

Illness	Frequency
CNS disease	15% clinical cases
Orchitis	20-50% post pubertal males
Pancreatitis	2-5%
Deafness	1/20,000
Death	~1/year (1980-1999)

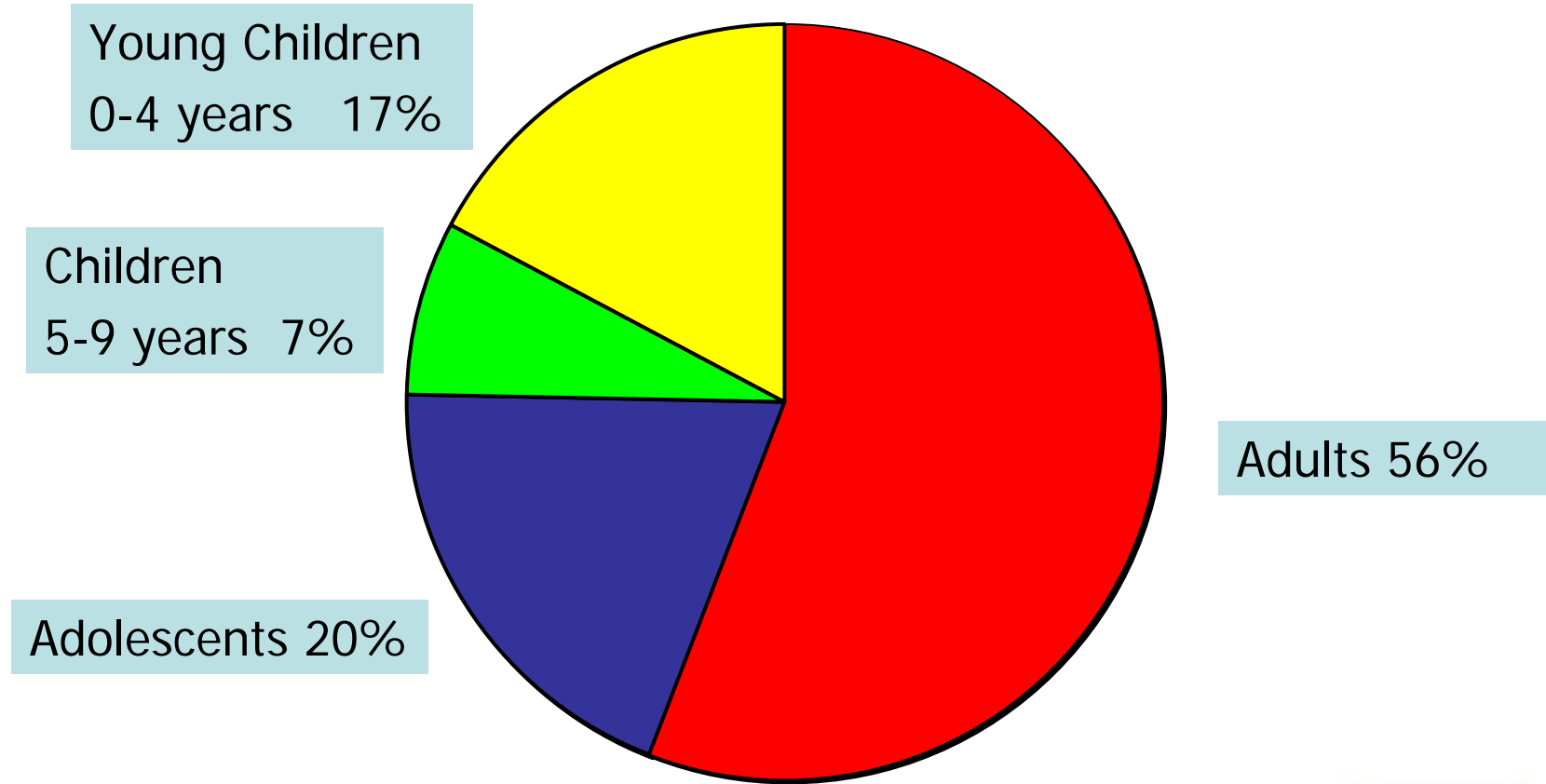
# Measles, Rubella, Mumps Cases Arizona 1990-2008



# 75% of suspected sources for infant pertussis cases were family members

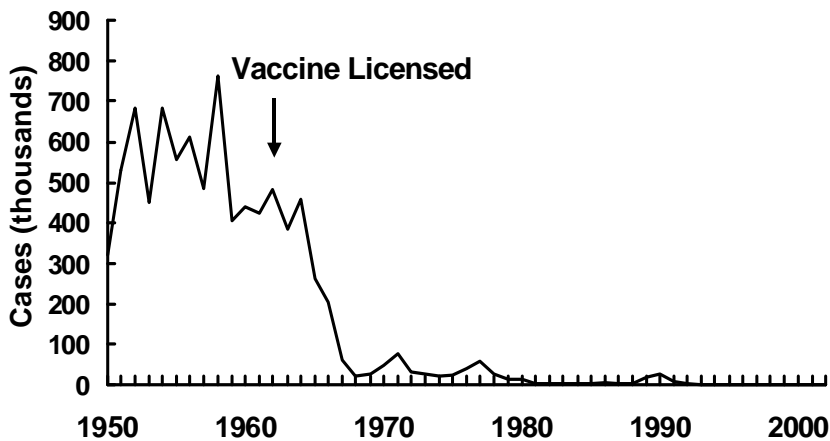


# 76% of suspected sources\* for infant pertussis cases were adolescents or adults

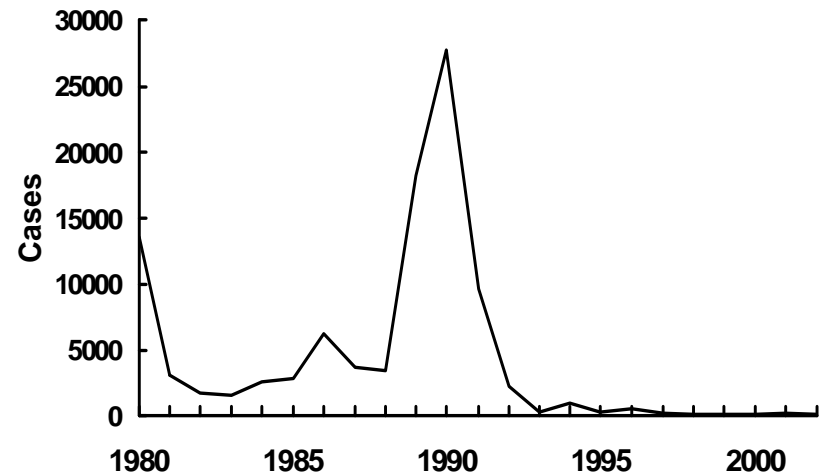


# Measles Epidemiology to Help Explain Pertussis Epidemiology

Measles—United States, 1950-2002



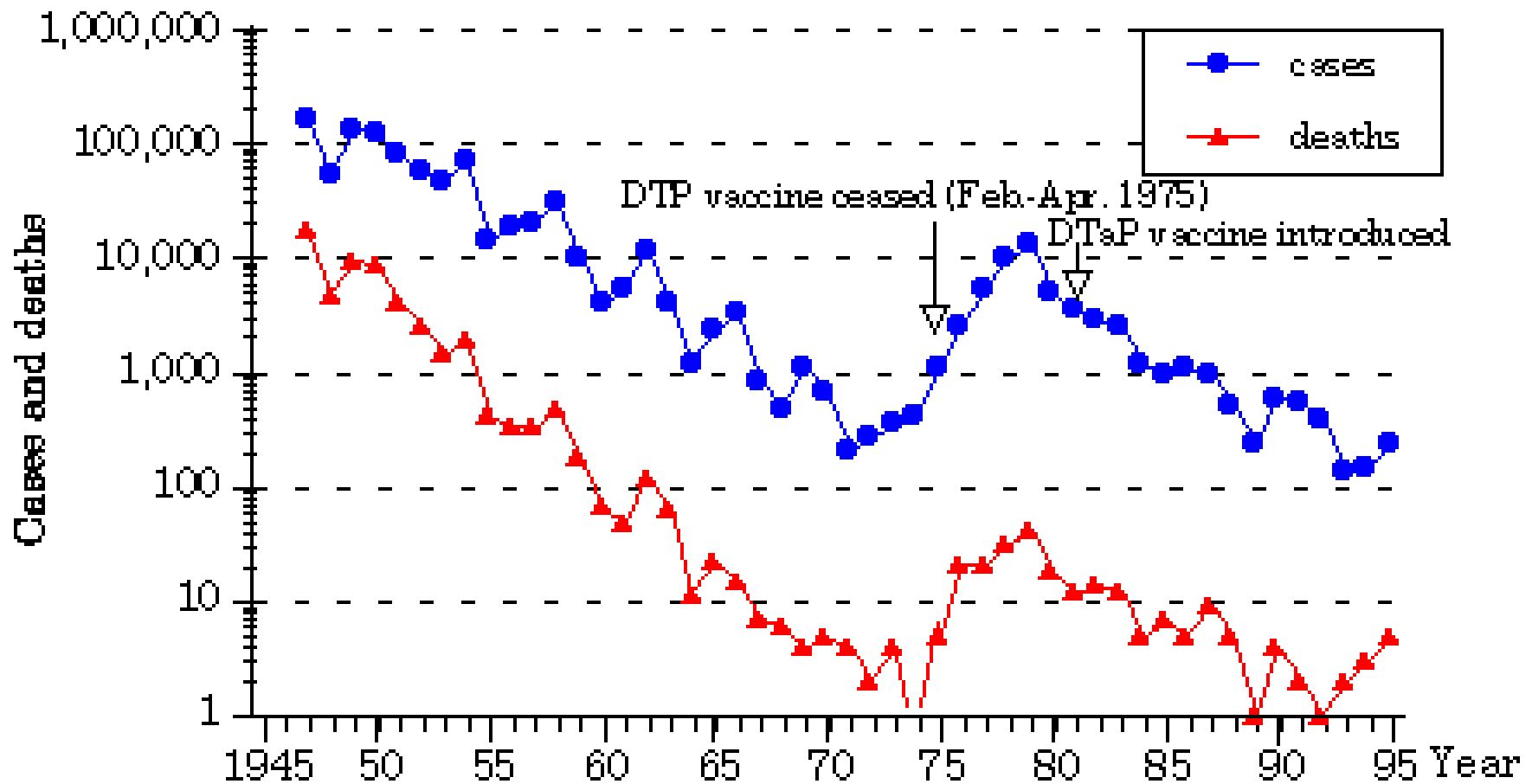
Measles—United States, 1980-2002



Epidemiology and Prevention of Vaccine Preventable Disease  
8<sup>th</sup> E. January 2005

# Pertussis in Japan

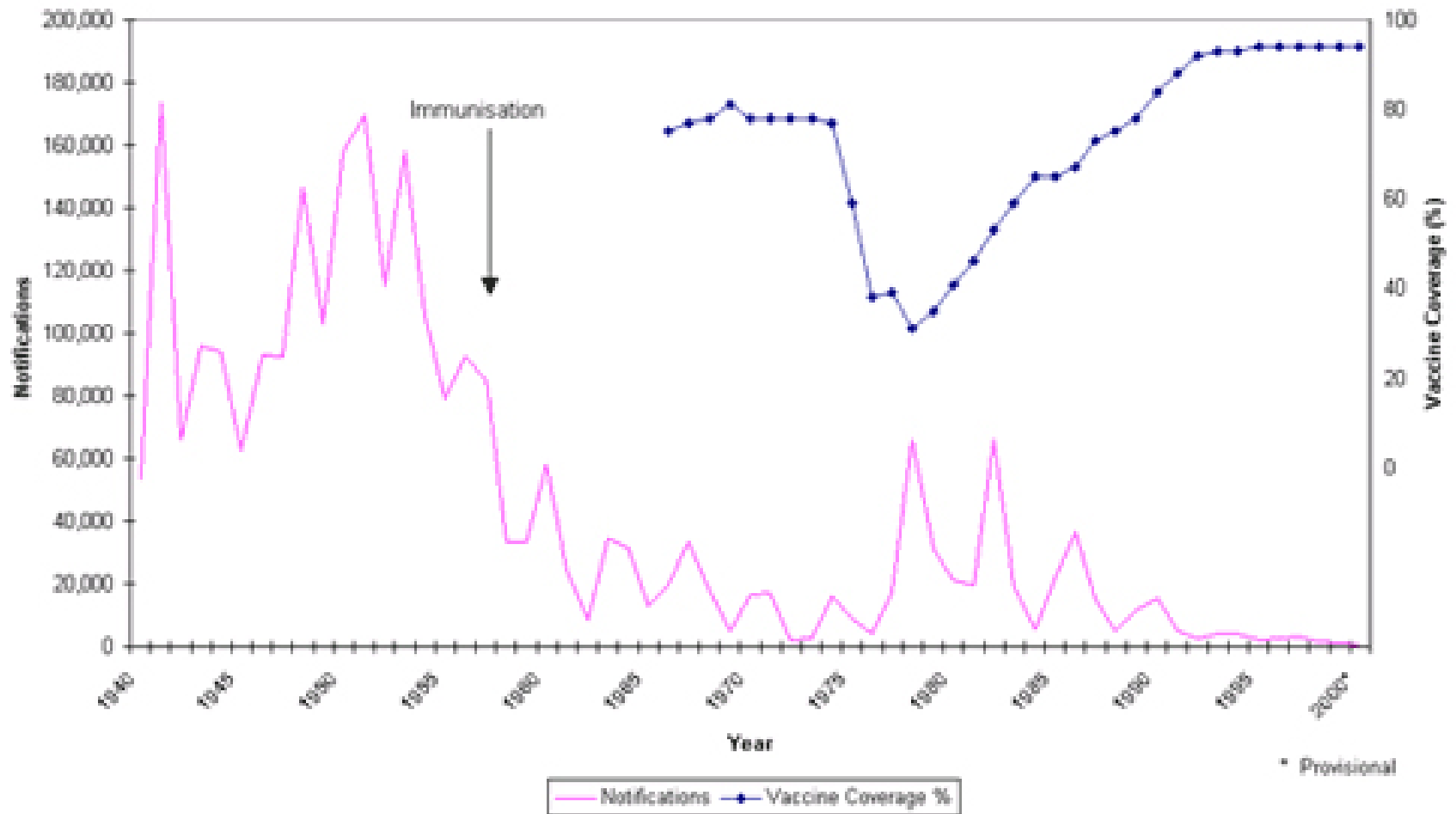
Figure 1. Reported cases of and deaths from pertussis in Japan, 1947-1995



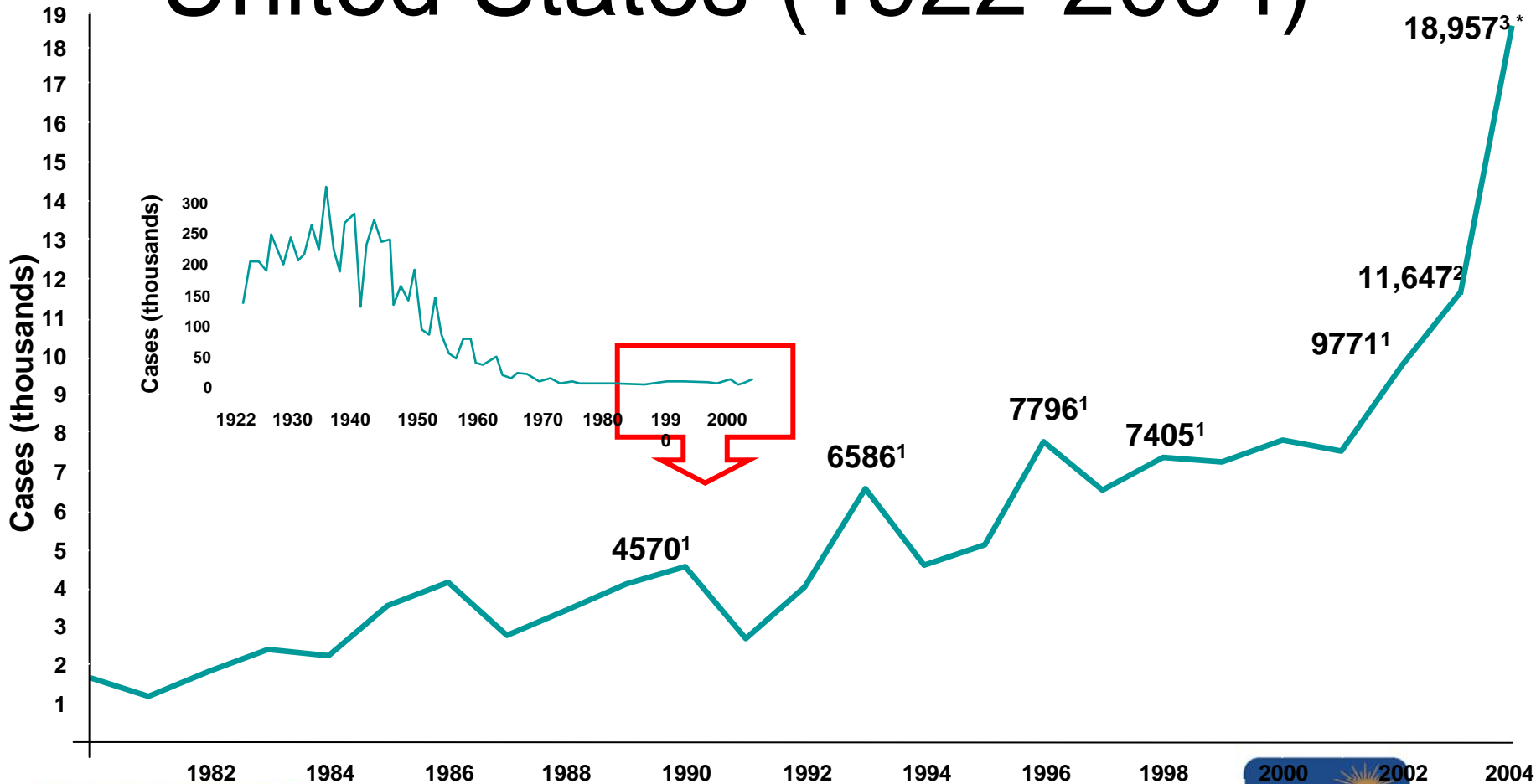
Cases : Statistics on Communicable Diseases in Japan  
Deaths: Vital Statistics of Japan  
( Ministry of Health and Welfare )

# Pertussis Cases in England & Vaccination Rates 1940-2000

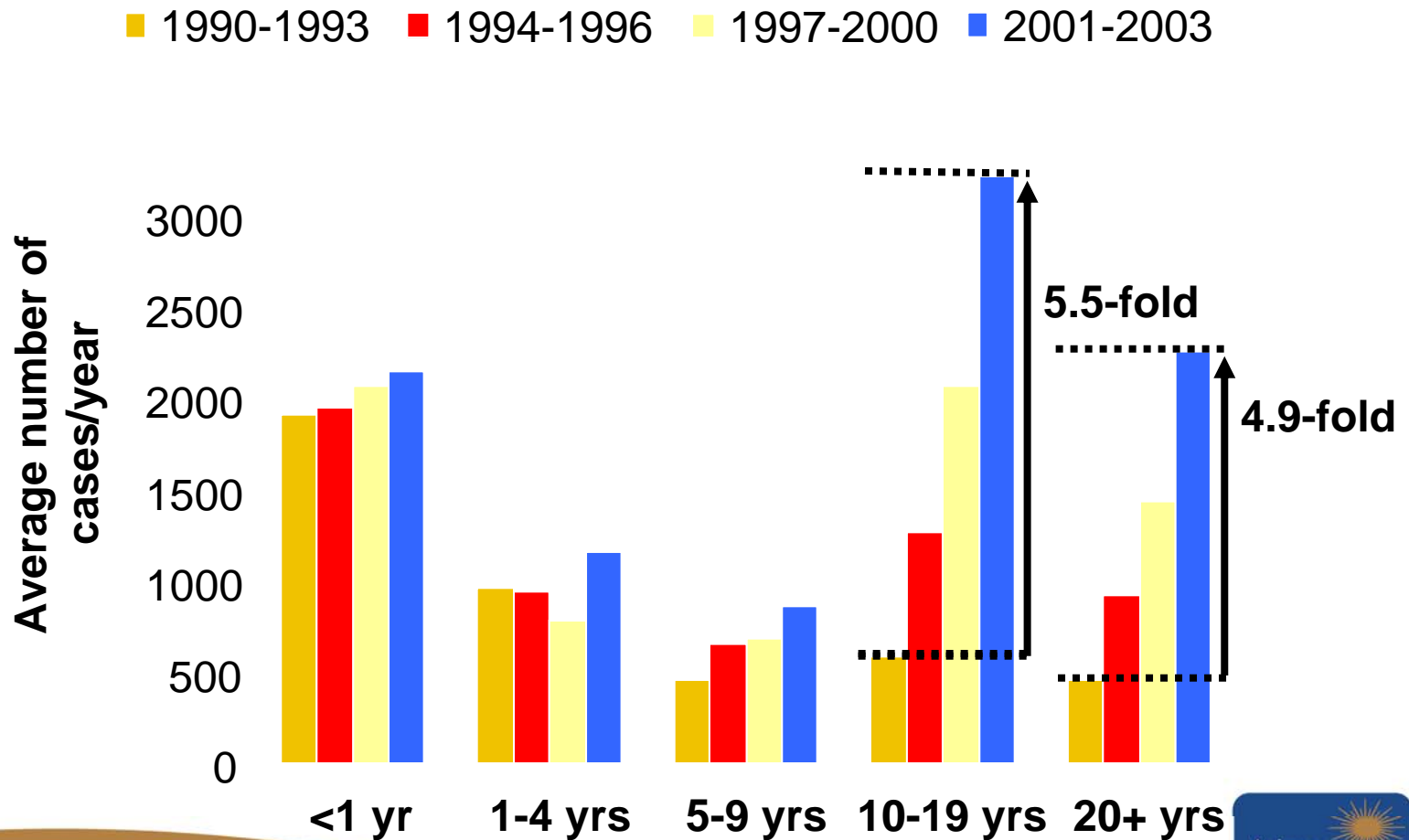
Whooping Cough Cases & Vaccine Coverage  
England and Wales 1940-2000\*



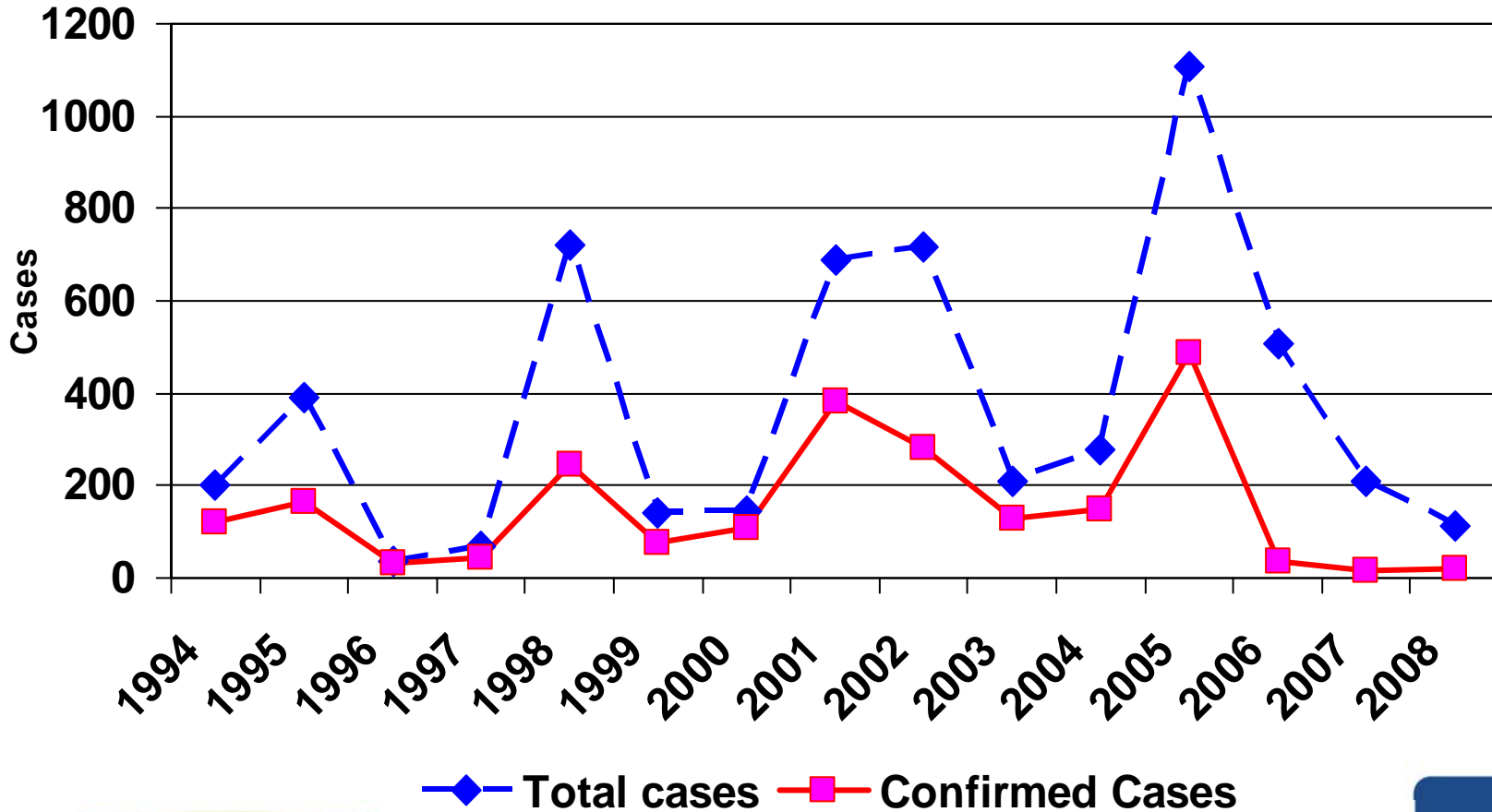
# Reported Pertussis Cases in the United States (1922-2004)



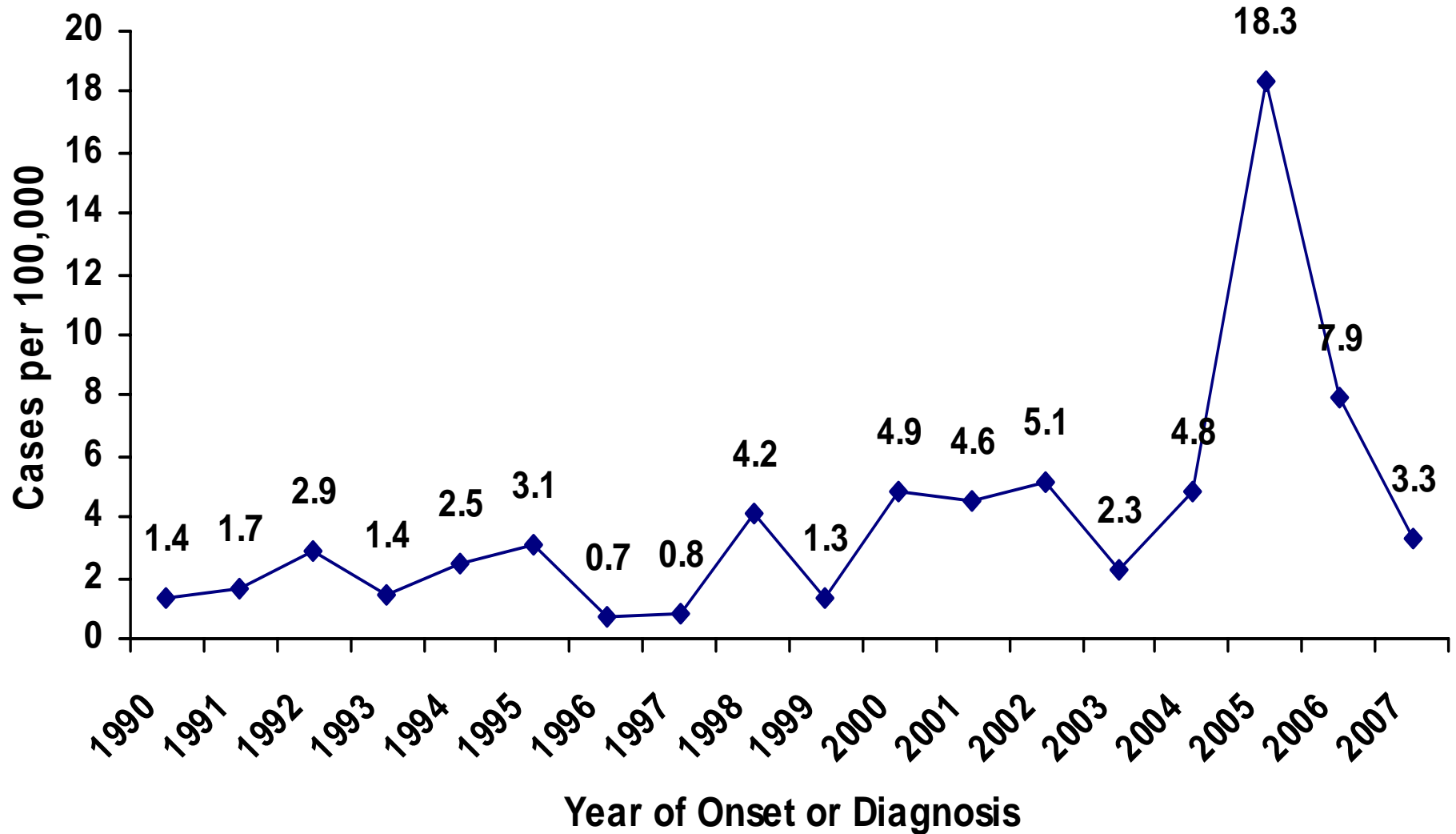
# Infant Pertussis Remains a Concern Despite Increases in Adult and Adolescent Pertussis



# Total and Confirmed Pertussis Cases Arizona 1994-2008



# Rates of Reported Pertussis in Arizona, 1990-2007



# Declared pertussis outbreaks

1: 1994: Yuma (70 cases)

2: 1995-6: Pinal (265)

3: 1998: Maricopa (270)

4: 1998: Pima (60)

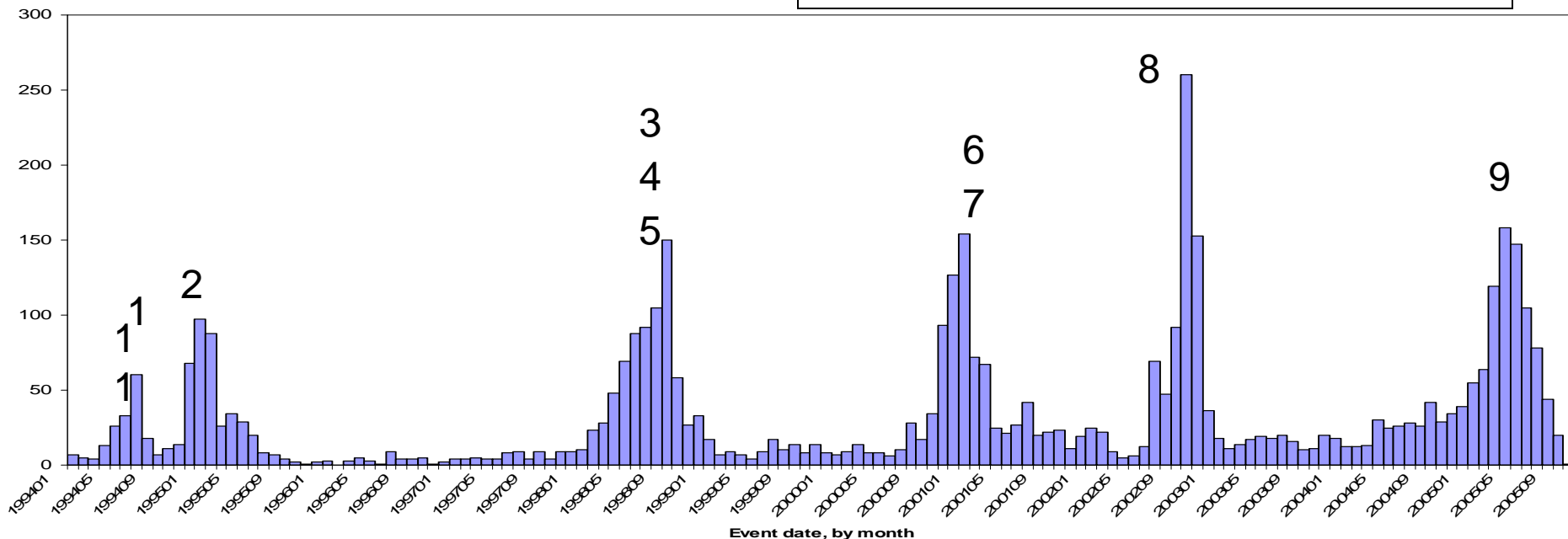
5: 1998: Mohave (180)

6: 2000-1: Pima (340)

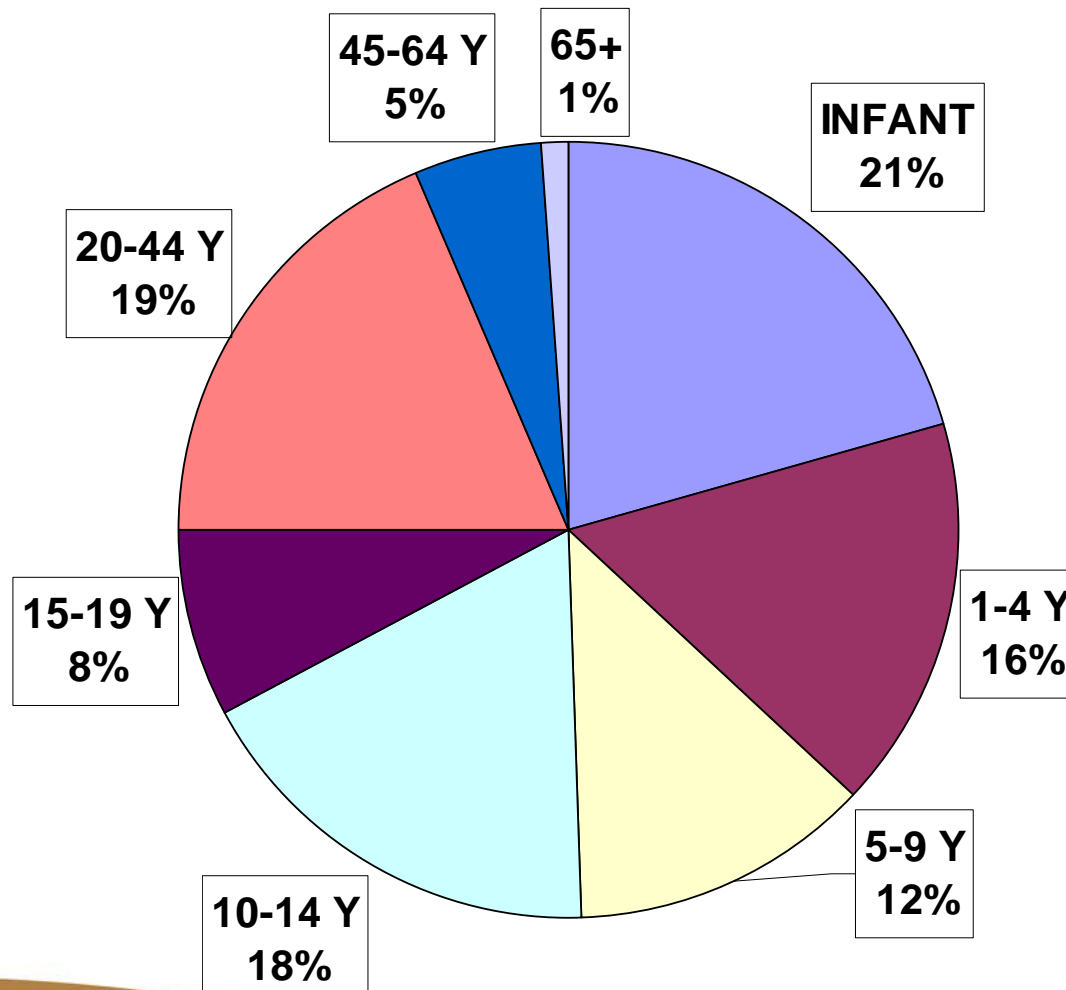
7: 2001: Mohave (80)

8: 2002-3: Yavapai (450)

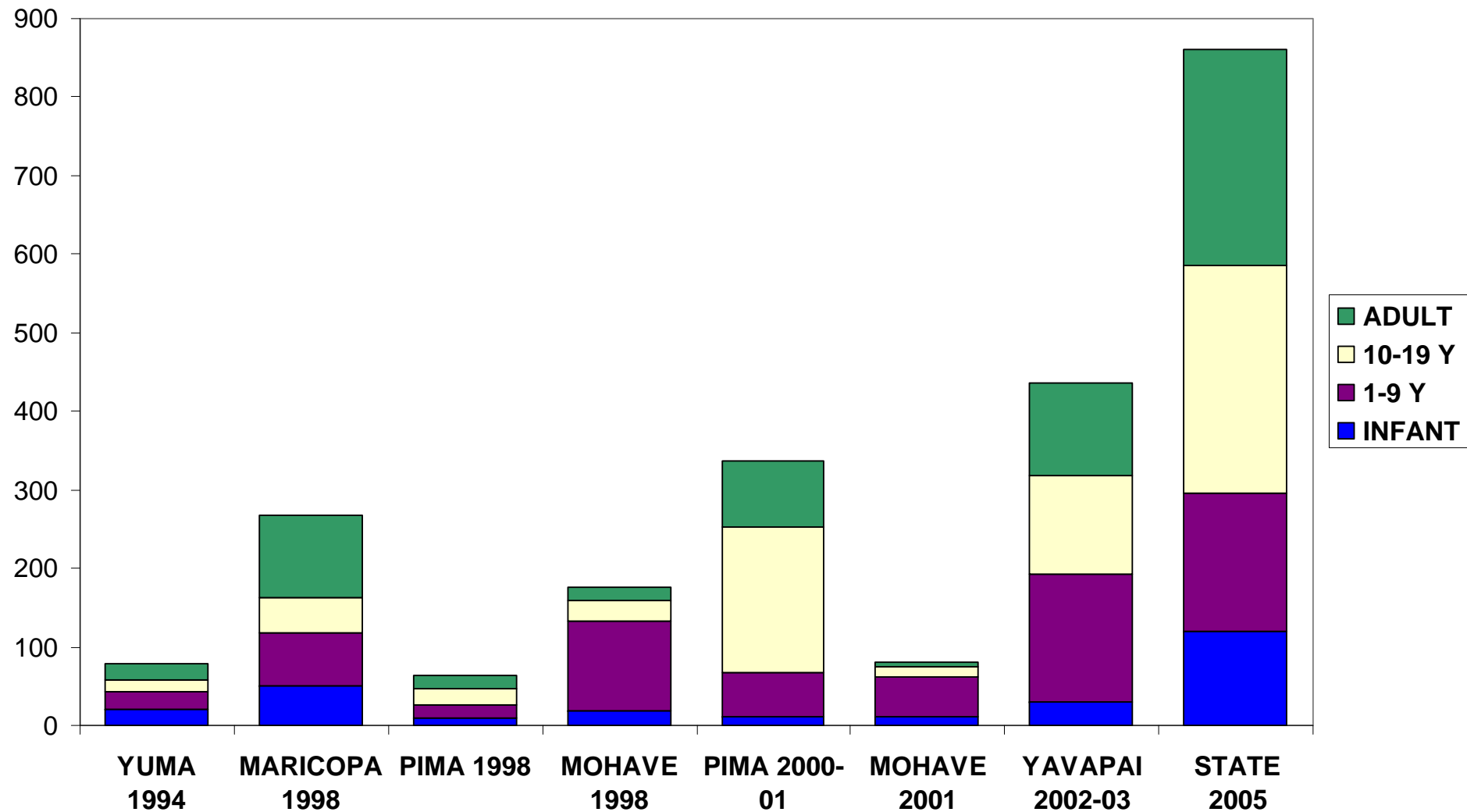
9: 2005: Arizona (1,108)



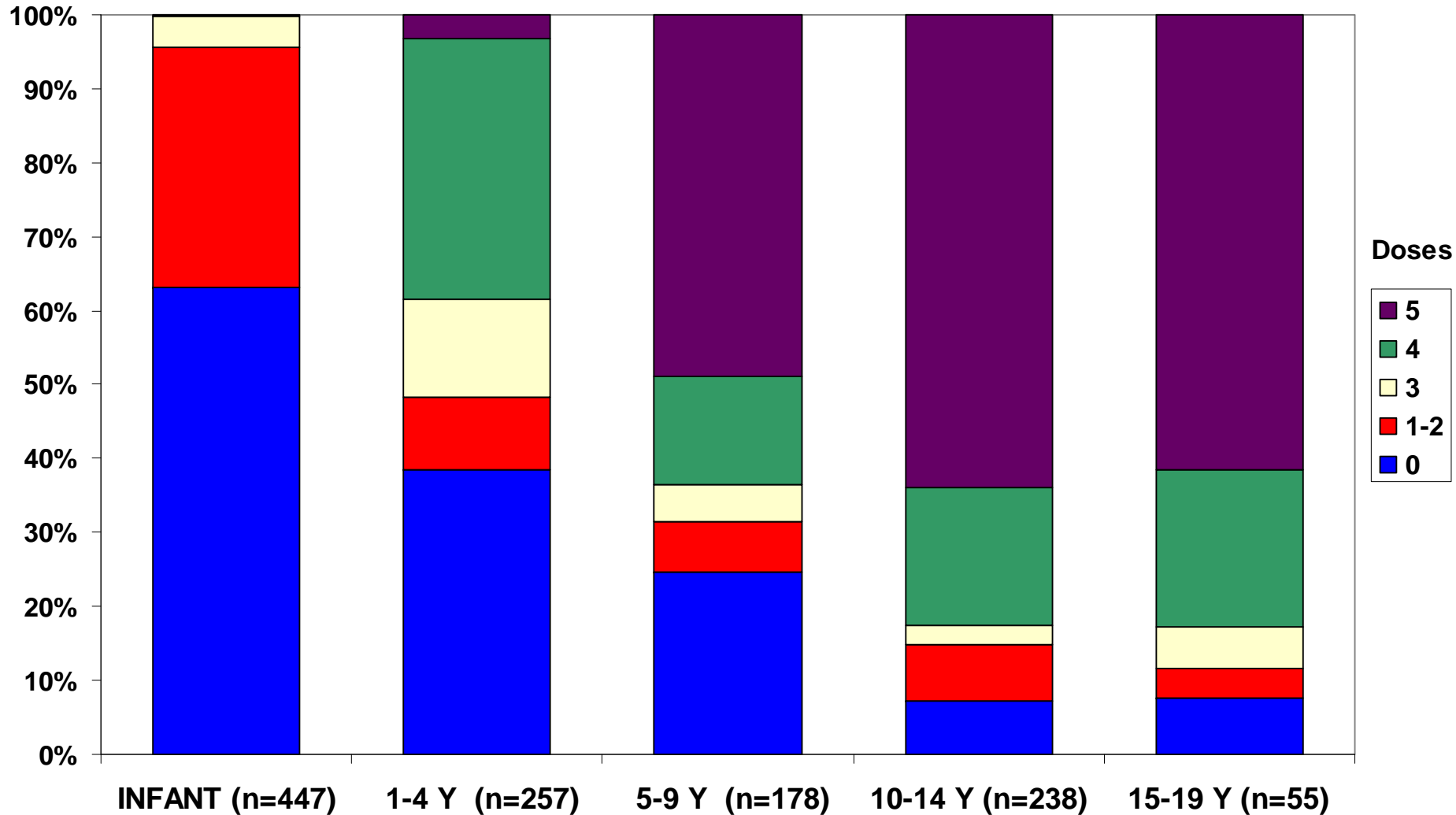
# Age groups of Arizona pertussis cases, 1994-2004



# Age groups in declared Arizona outbreaks, 1994-2005

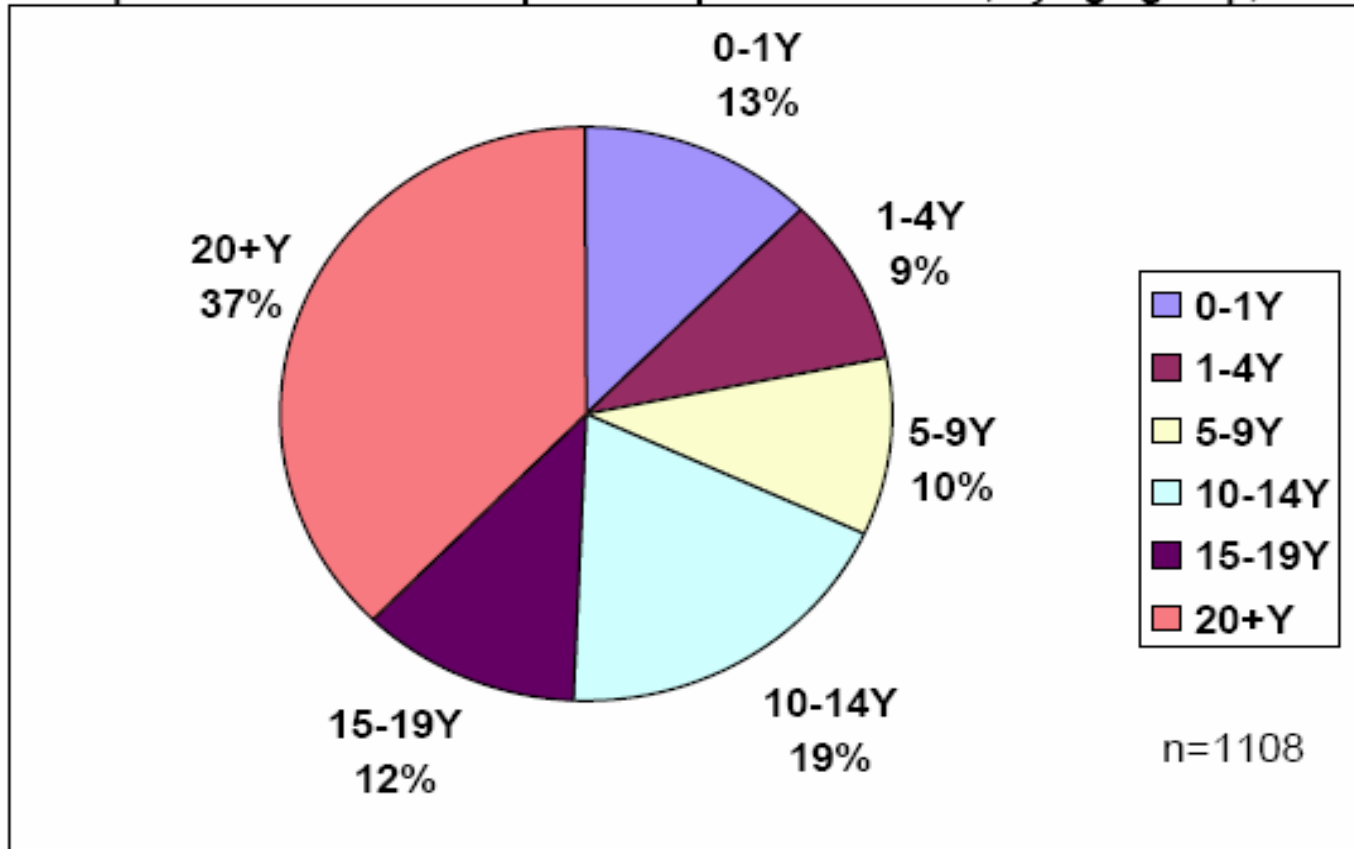


# Pertussis cases by number of doses of pertussis-containing vaccine before onset, Arizona 1994-2004

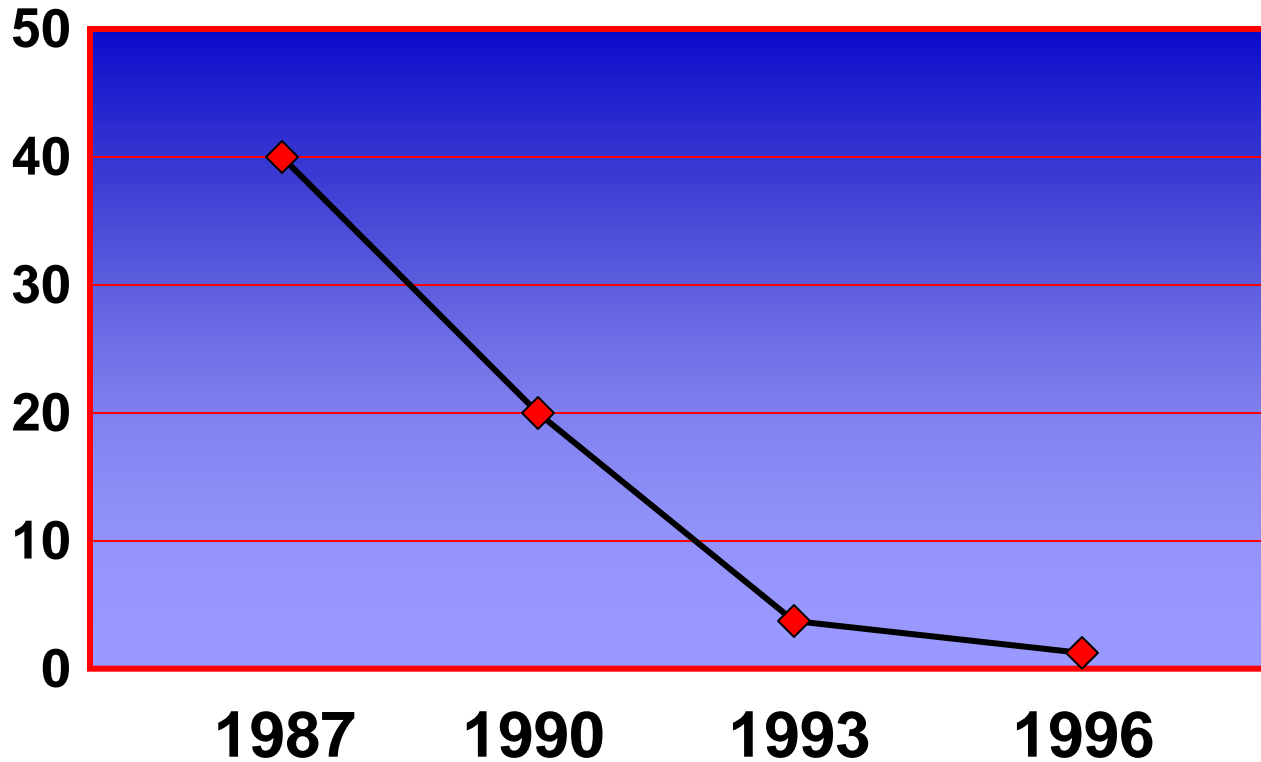


# Ages of Pertussis Cases, Arizona 2005

Figure 29. Reported confirmed and probable pertussis cases, by age group, Arizona, 2005

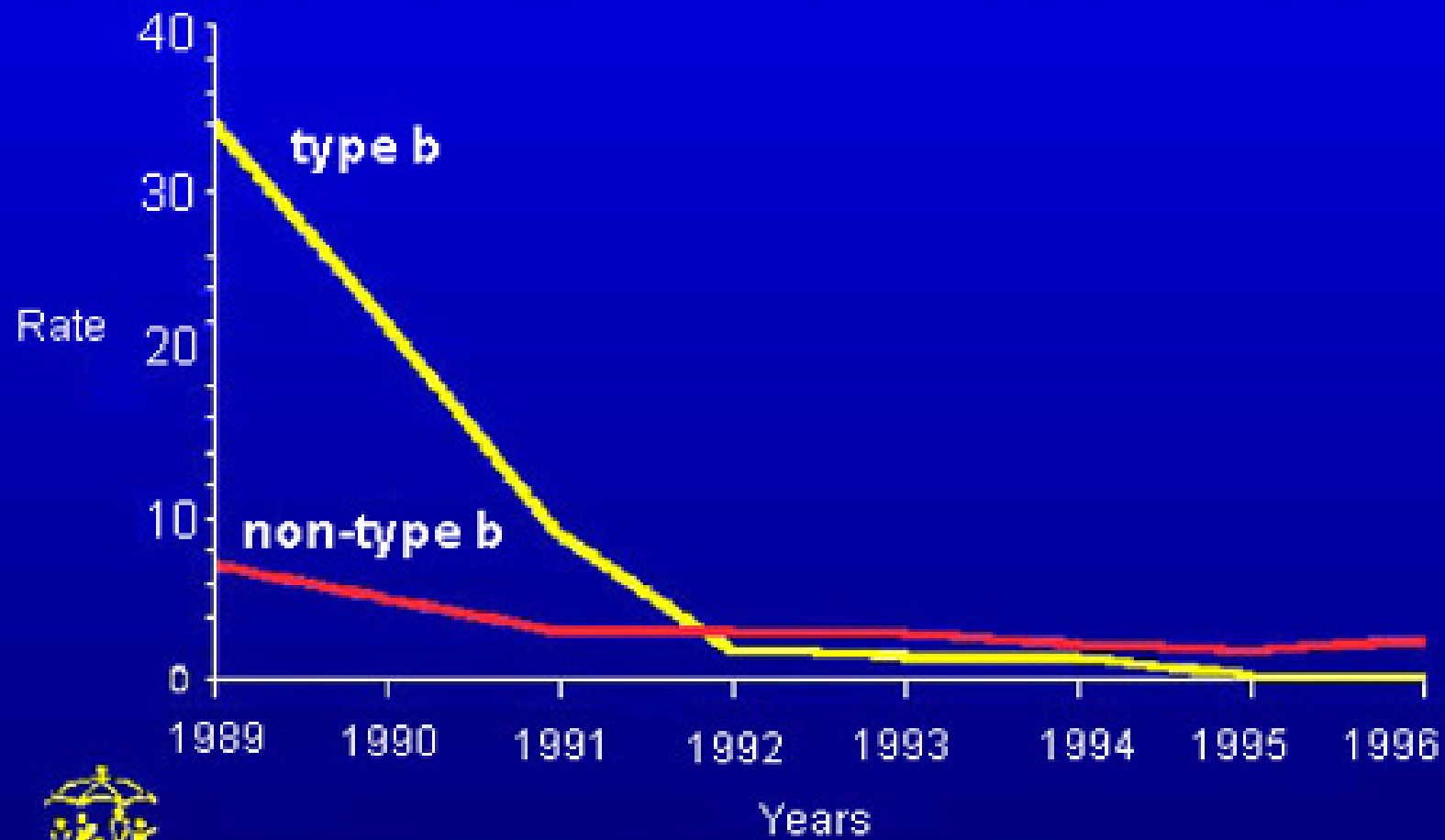


# Vaccine protection from *Hemophilus influenzae* type b (Hib)



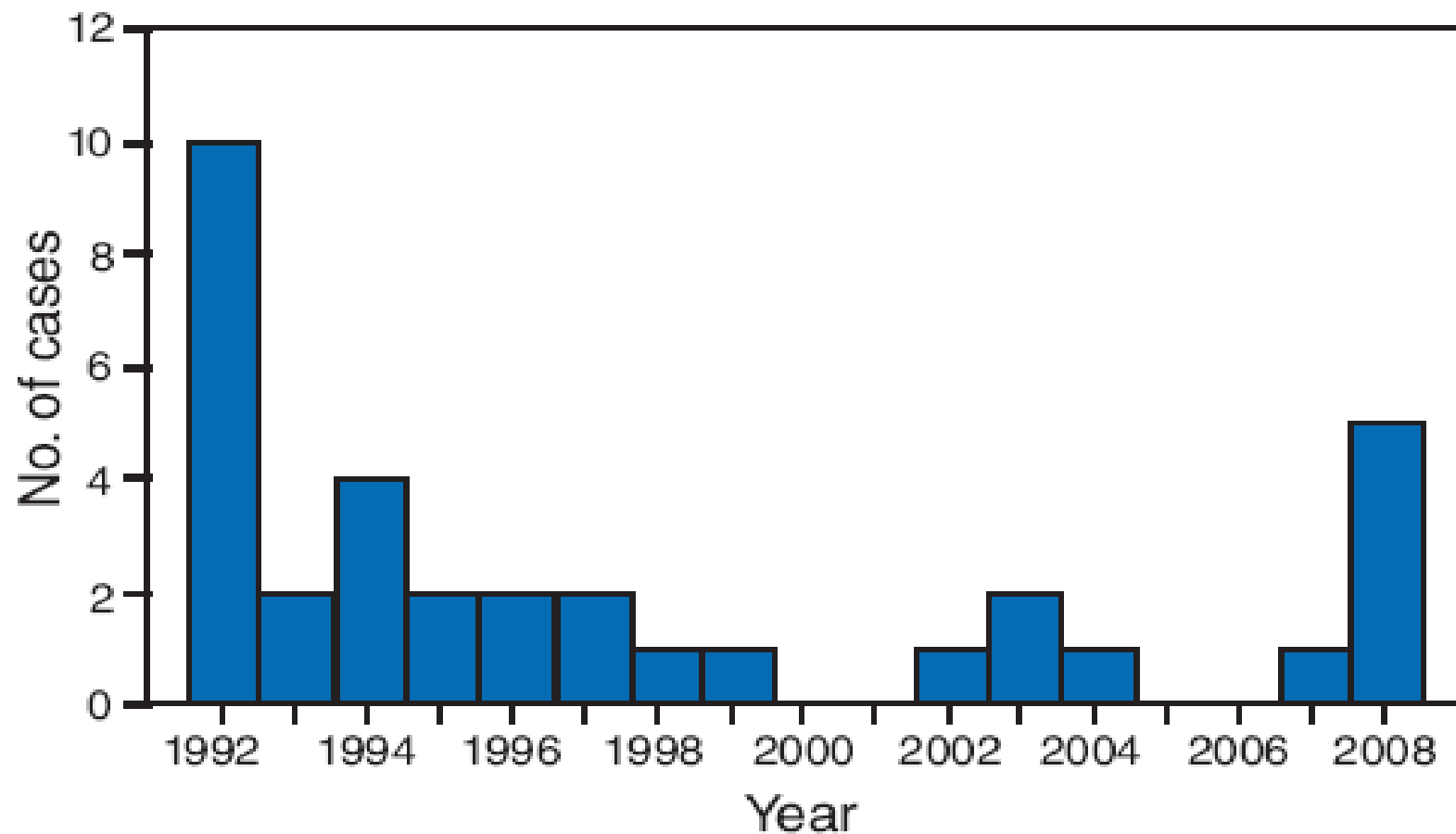
**US Estimated annual incidence of invasive Hib per 100,000 Children < 5 years of age, 1987-1996**

# *Haemophilus influenzae* type b (Hib) and non-type Invasive Disease, per 100,000 Population, United States, 1989-1996\*



\*For children aged <6 years; calculated from four active laboratory-based surveillance areas.

**FIGURE 1. Number of reported cases of invasive *Haemophilus influenzae* type b (Hib) disease in persons aged <5 years — Minnesota, 1992–2008**



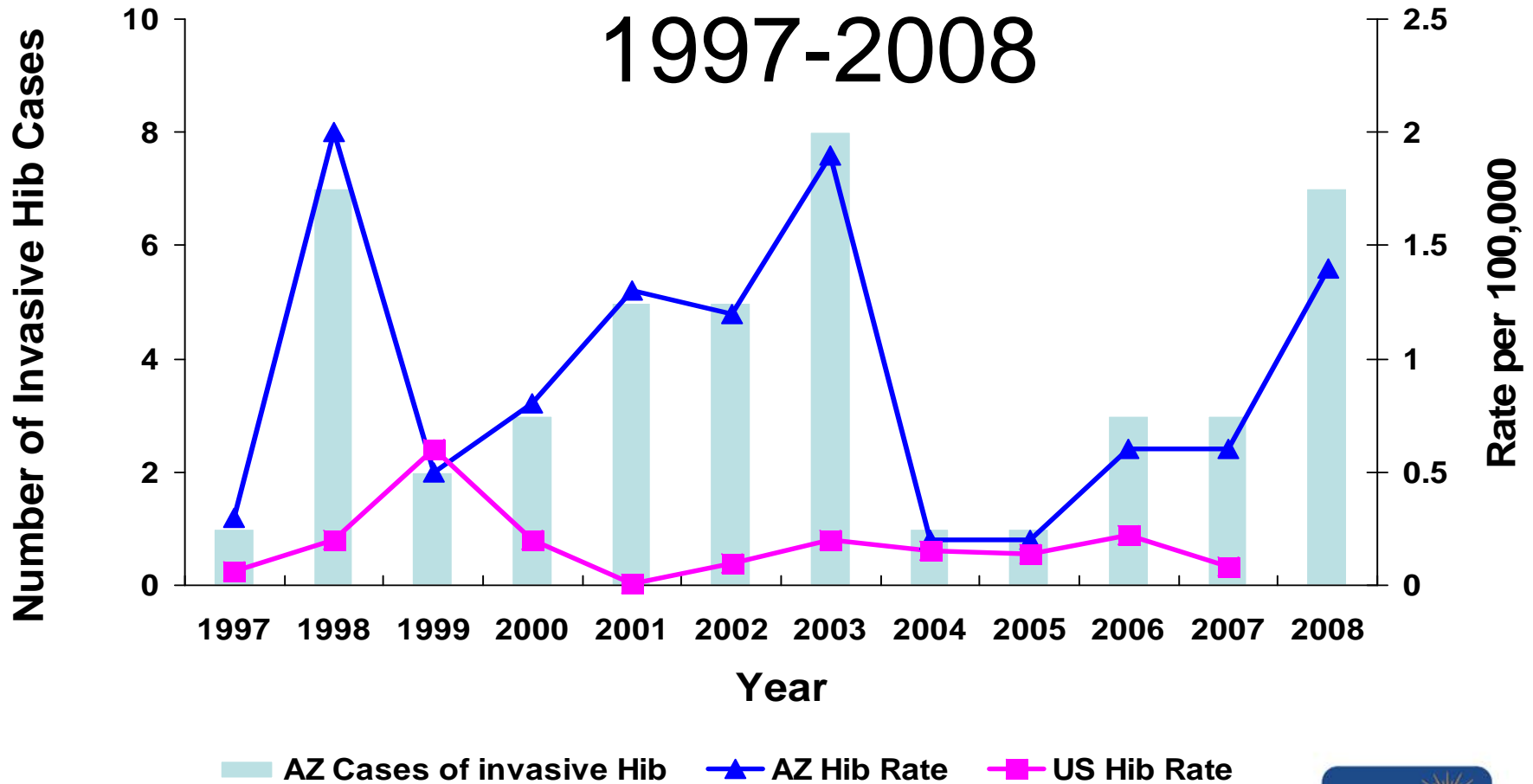
# Invasive Hib in Minnesota

	Age	Clinical	Outcome	Vaccine	Other
1	15 mo	Meningitis	Survived	PRP-OMP 2 & 5 mo	Low IgG
2	3 y	Pneumonia	Survived	0	Healthy
3	7 mo	Meningitis	Died	0	Healthy
4	5 mo	Meningitis	Survived	PRP-TT 2 & 4 mo	Healthy
5	20 mo	Epiglottitis	Survived	0	Healthy

# Other Recent Hib Disease in the US

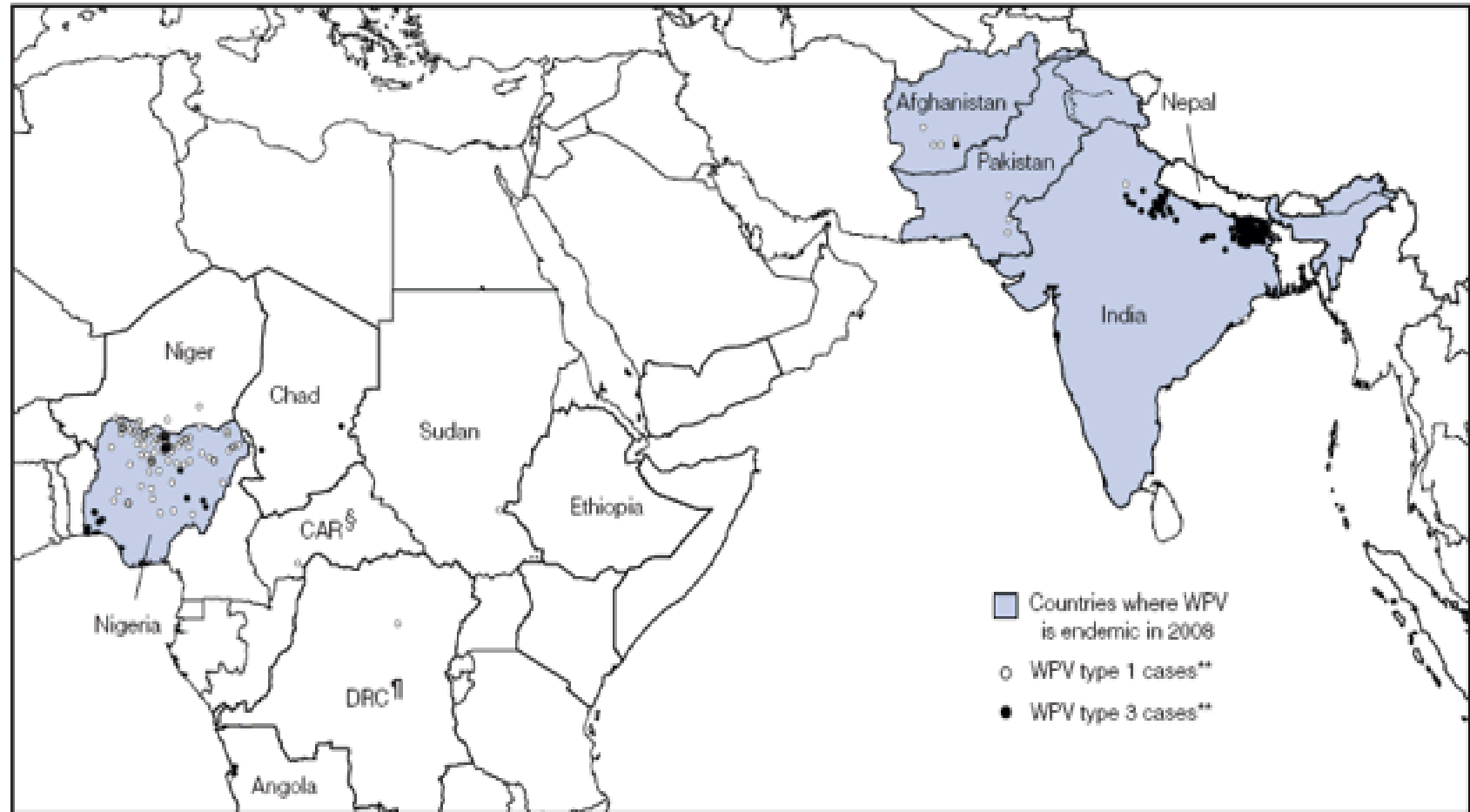
- 5 cases in PA since October 2008
  - Two deaths
    - 4 yo with Hib meningitis
  - All unvaccinated or under-vaccinated children
- Maine 2009
  - 3 yo partially vaccinated
  - Meningitis & bacteremia

# Invasive Hib Cases in AZ in Children < 5 years old 1997-2008



# Endemic Wild Polio Virus 2008

FIGURE 2. Number of wild poliovirus (WPV) cases\* — worldwide, 2008†



\* Data reported for 2008 to the World Health Organization as of April 30, 2008 (N = 354).

† Excludes polioviruses detected by environmental surveillance and vaccine-derived polioviruses.

§ Central African Republic.

¶ Democratic Republic of the Congo.

\*\* By place of patient residence.

MMWR May 9, 2008

# Polio Infections in the US

- 1979 Last Wild virus polio outbreak in US
  - 10 paralytic cases
- 1995 Vaccine Derived Poliovirus (VDPV)
  - SCID with paralysis
- 2005 Minnesota
  - 4 children with VDPV
- 2009 Minnesota
  - Paralysis & death in immunocompromised adult associated with VDPV

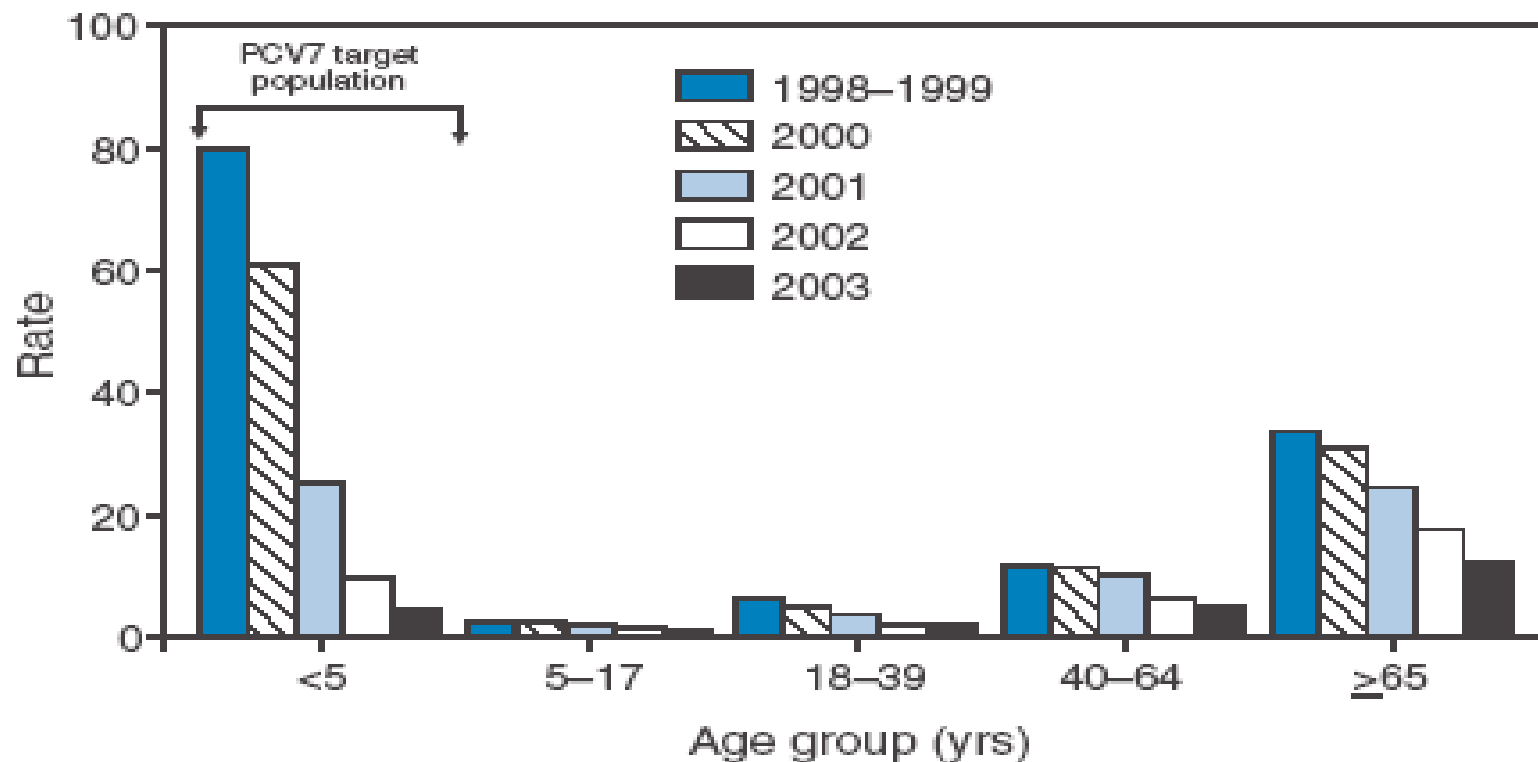
# Imported Vaccine-Associated Poliomyelitis into US

- 22 yo female, unvaccinated
- Study abroad in Costa Rica
- Lived with family with small children
- Illness:
  - Day 1: Sore throat, neck & back pain
  - Day 2: Fever and headache
  - Day 3: Acute leg weakness
  - Day 6: Flown to US

# Poliomyelitis

- Areflexic lower extremity weakness
- Respiratory failure needing ventilation
- Stool: Polio Vaccine serotypes 2 & 3
- Serum: Acute and convalescent  $\geq 1:10$  polio serotypes 1, 2 & 3
- Day 60: Residual leg weakness

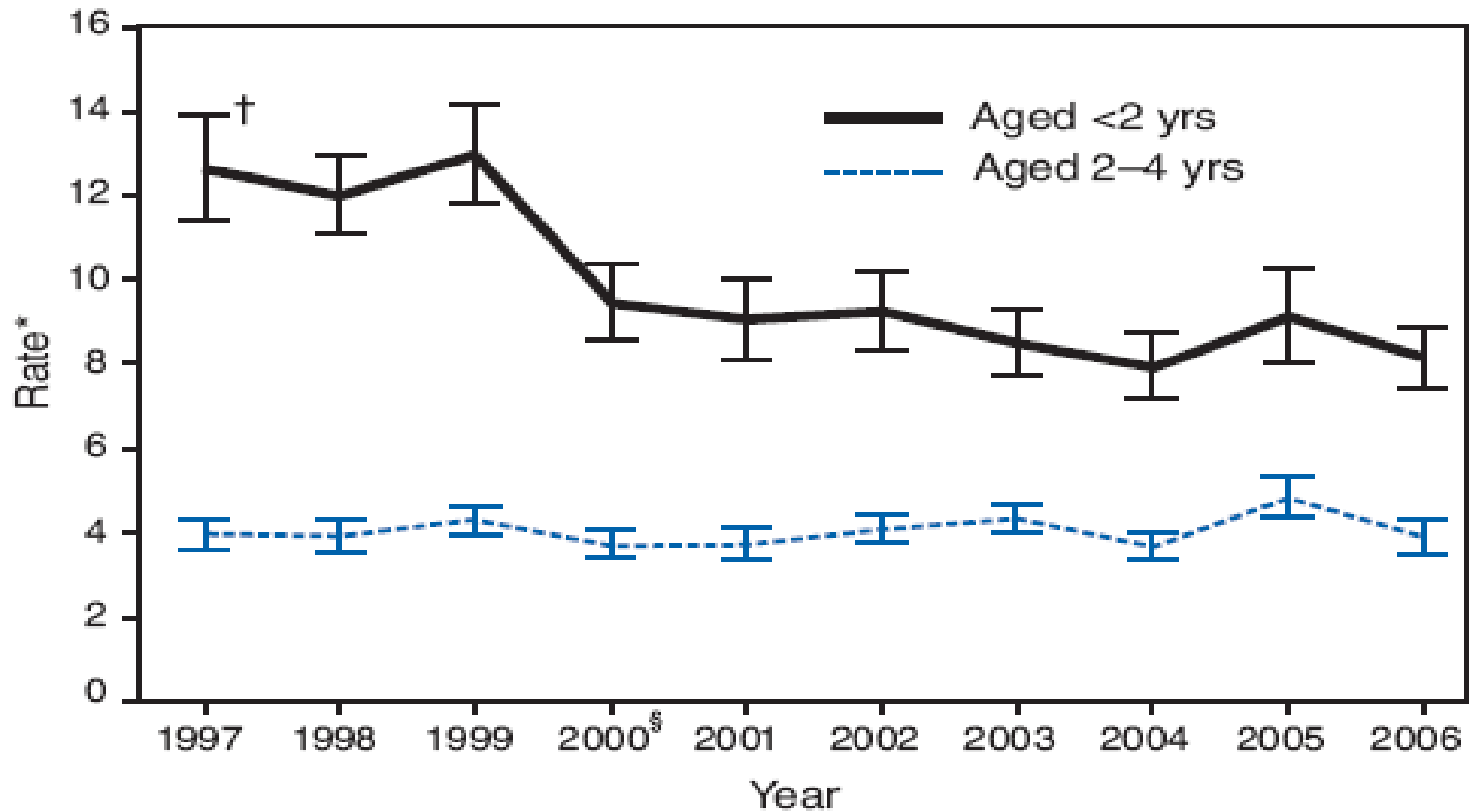
**FIGURE 1. Rate\* of vaccine-type (VT) invasive pneumococcal disease (IPD) before and after introduction of pneumococcal conjugate vaccine (PCV7), by age group and year — Active Bacterial Core surveillance, United States, 1998–2003**



\* Per 100,000 population.

† For each age group, the decrease in VT IPD rate for 2003 compared with the 1998–1999 baseline is statistically significant ( $p < 0.05$ ).

**FIGURE. Annual all-cause pneumonia hospitalizations rates\* among children aged <2 years and 2–4 years — Nationwide Inpatient Sample, United States, 1997–2006**



\* Per 1,000 population.

† 95% confidence interval.

§ 7-valent pneumococcal conjugate vaccine licensed in February 2000.

## Invasive *S. pneumoniae* Serotypes in AZ, 2008 (< 5 y.o.)

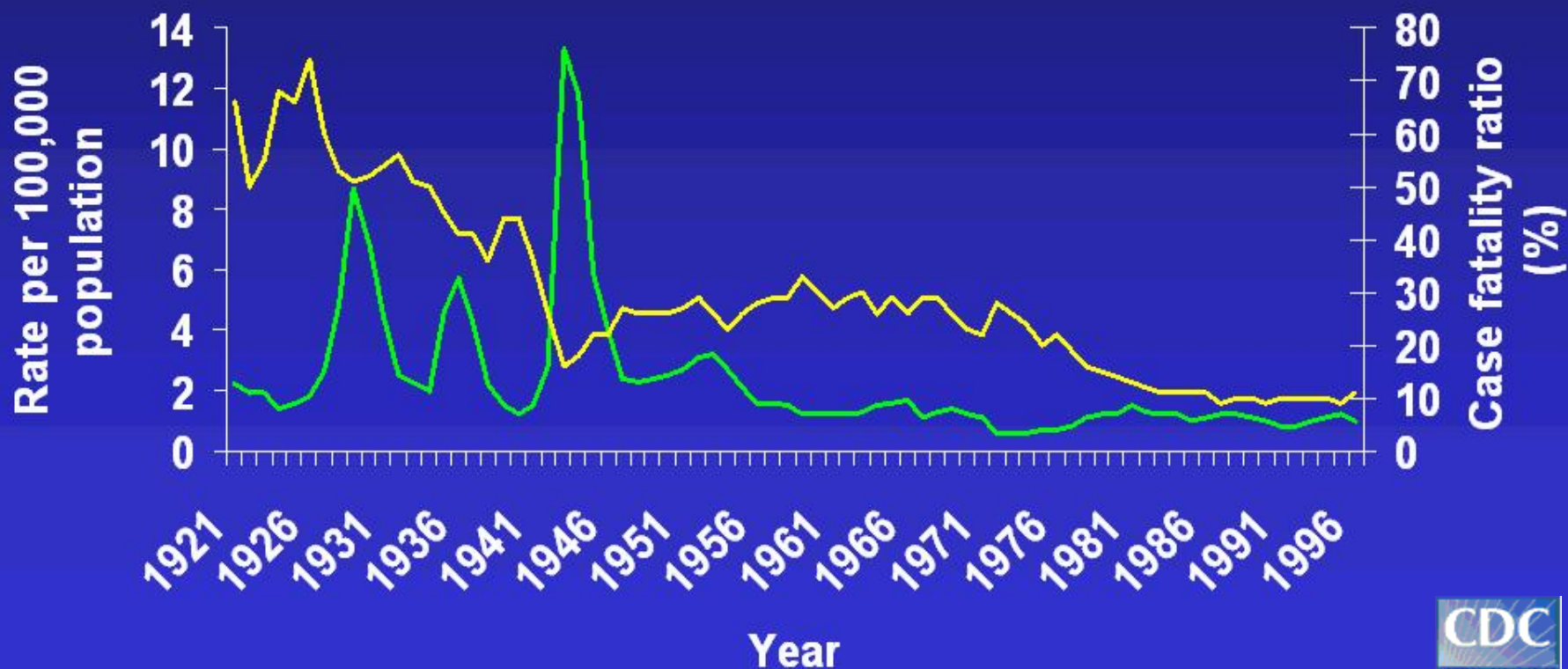
Serotype	Cases	%	Serotype	Cases	%
1	3	2.3%	12F	1	0.8%
3	1	0.8%	15	5	3.8%
5	12	9.0%	15B	2	1.5%
6	1	0.8%	19	5	3.8%
6B	1	0.8%	19A	13	9.8%
7	2	1.5%	22	1	0.8%
7F	16	12.0%	23	1	0.8%
8	1	0.8%	33A	1	0.8%
11	1	0.8%	Not typeable	11	8.3%
12	4	3.0%	Unknown	50	37.6%
12B	1	0.8%	TOTAL	133	100%

PCV-7 Vaccine Serotypes: **4, 9V, 14, 19F, 23F, 18C, 6B**

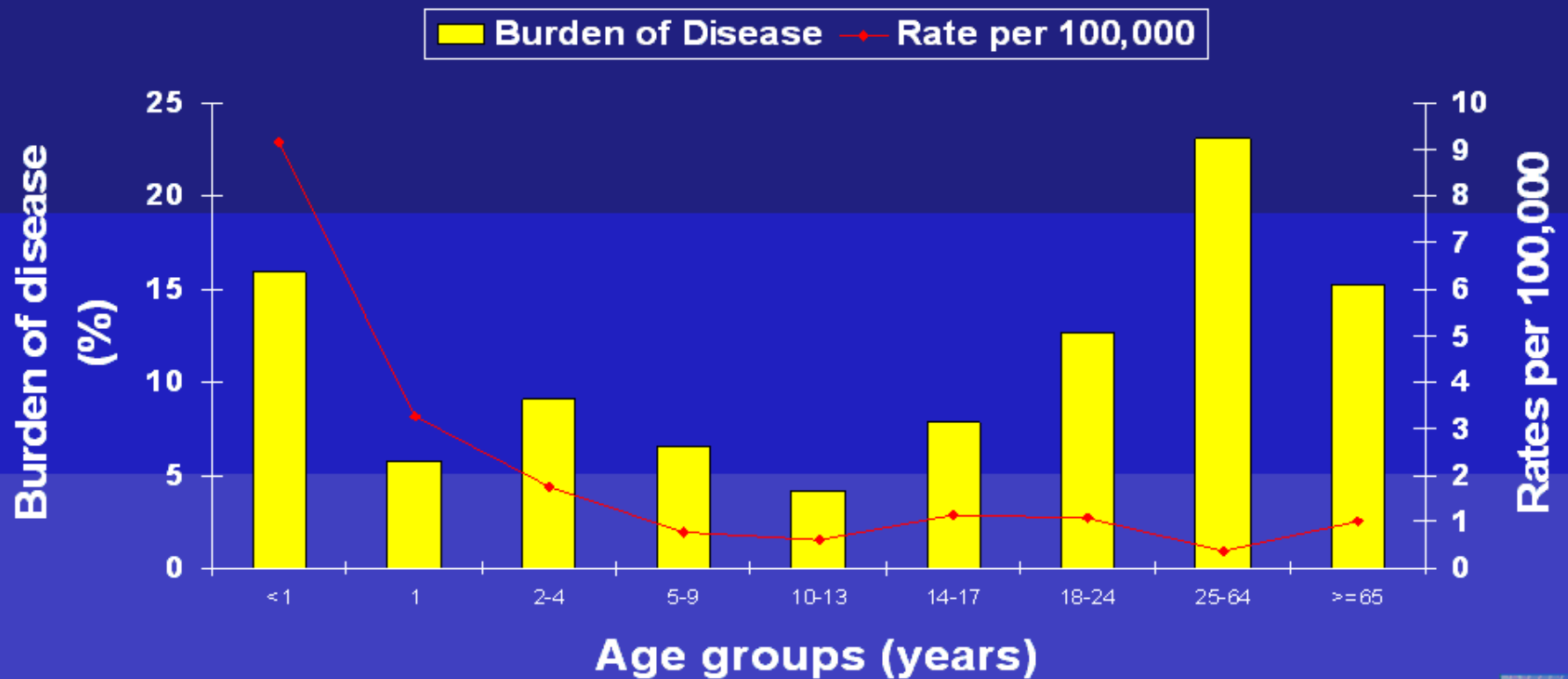
# Meningococcal

## Incidence and Case-Fatality, U.S., 1920-1996

— Incidence — Case-fatality ratio

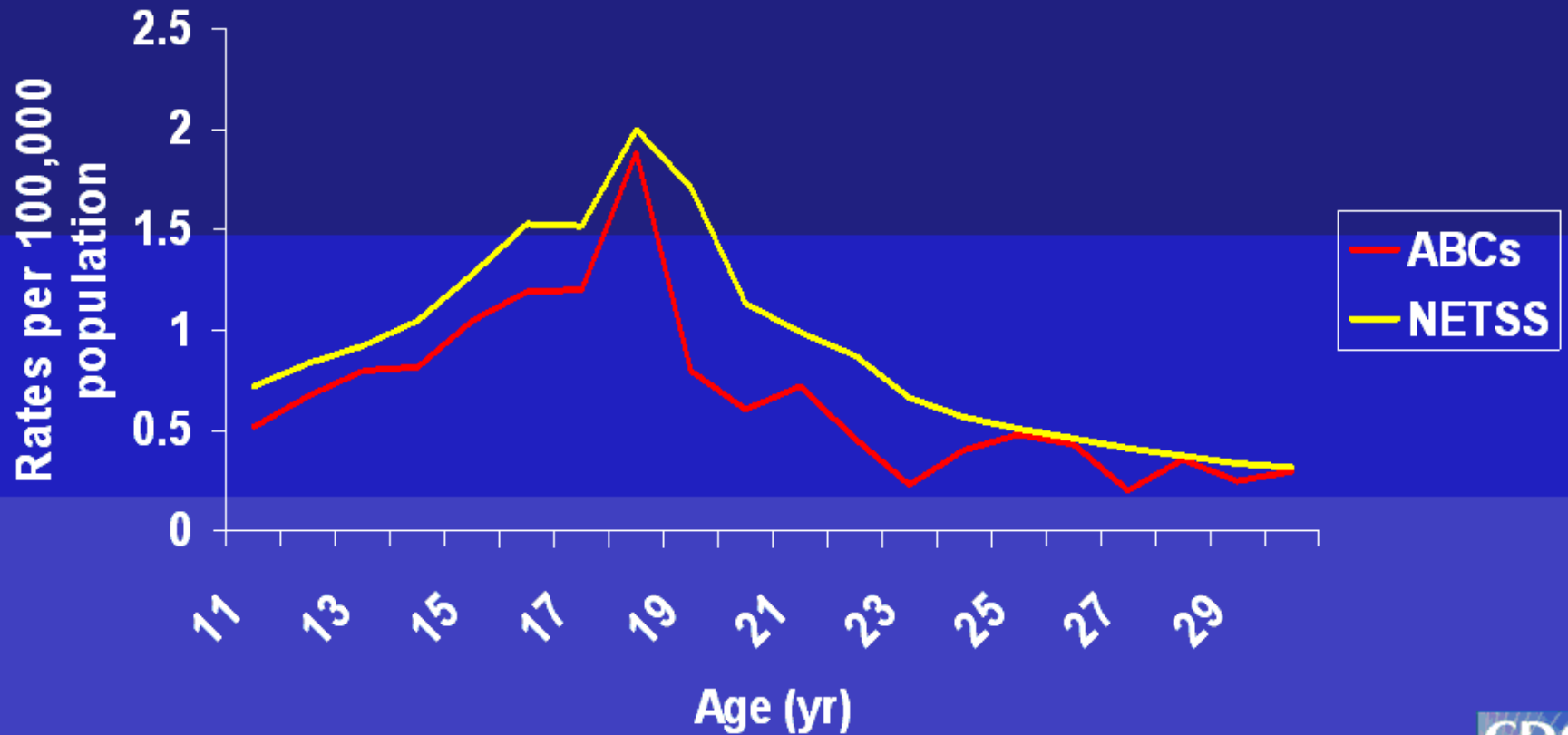


# Rates of Meningococcal Disease by Age Group and Burden of Disease, U.S., 1991-2002\*

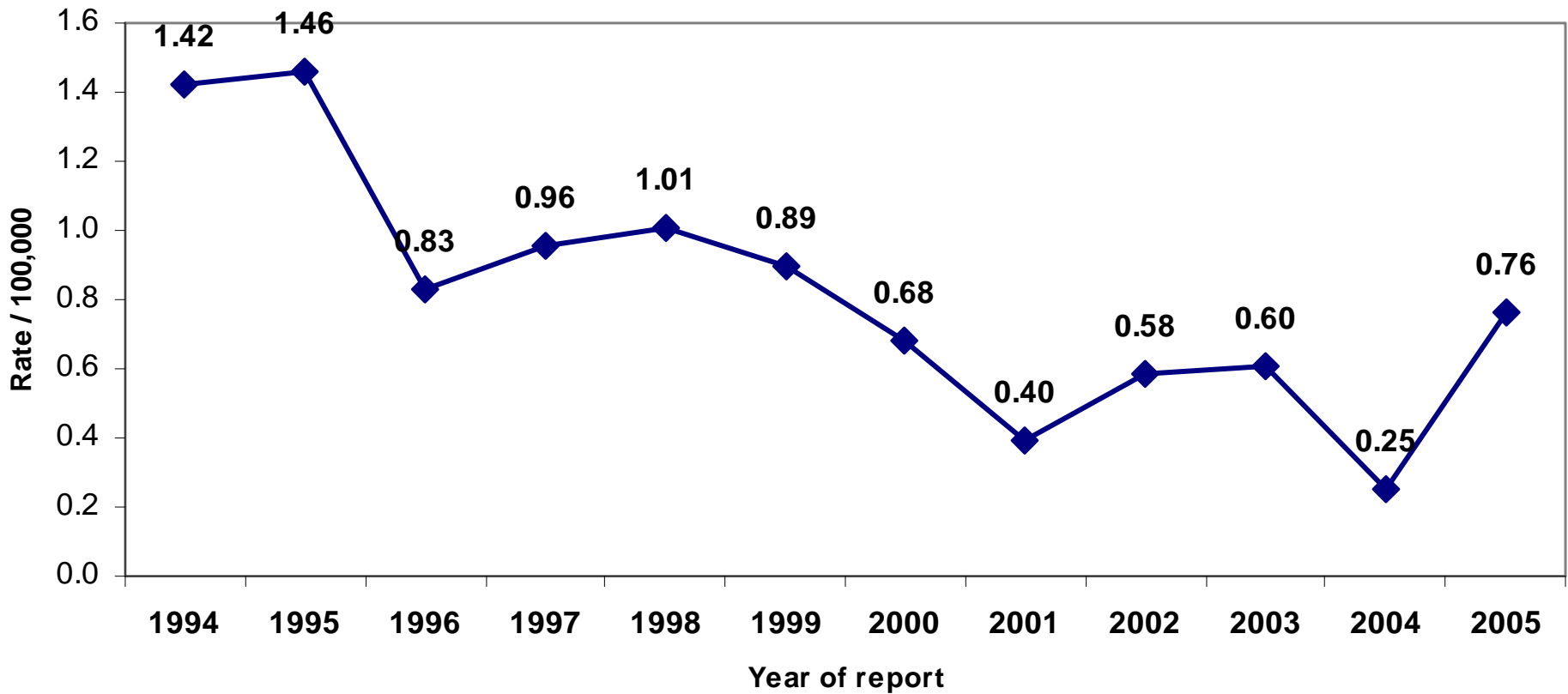


\*ABCs data

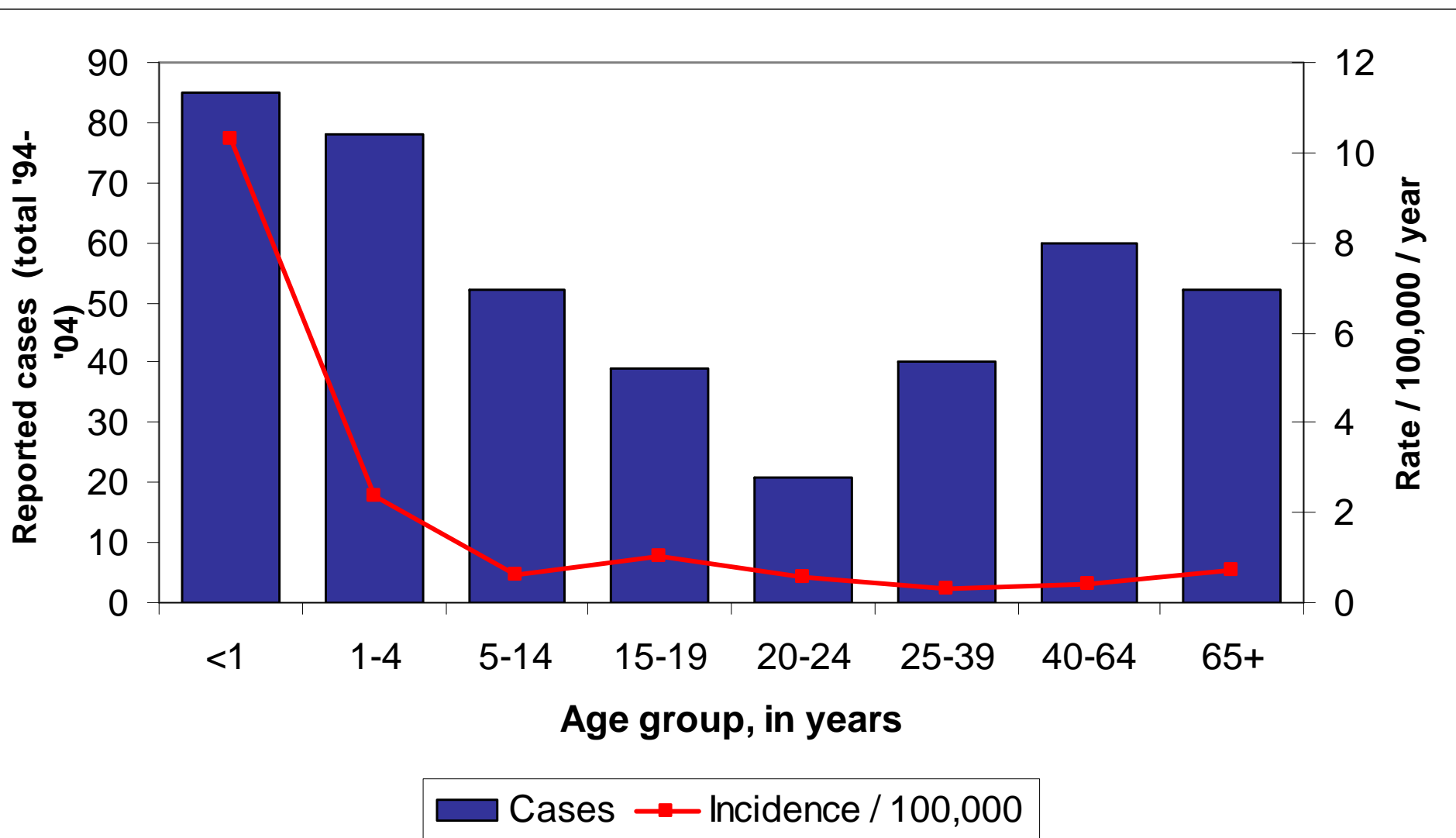
## Rates of Meningococcal Disease (A/C/Y/W135) by Age, 11-30yo, United States, 1991-2002



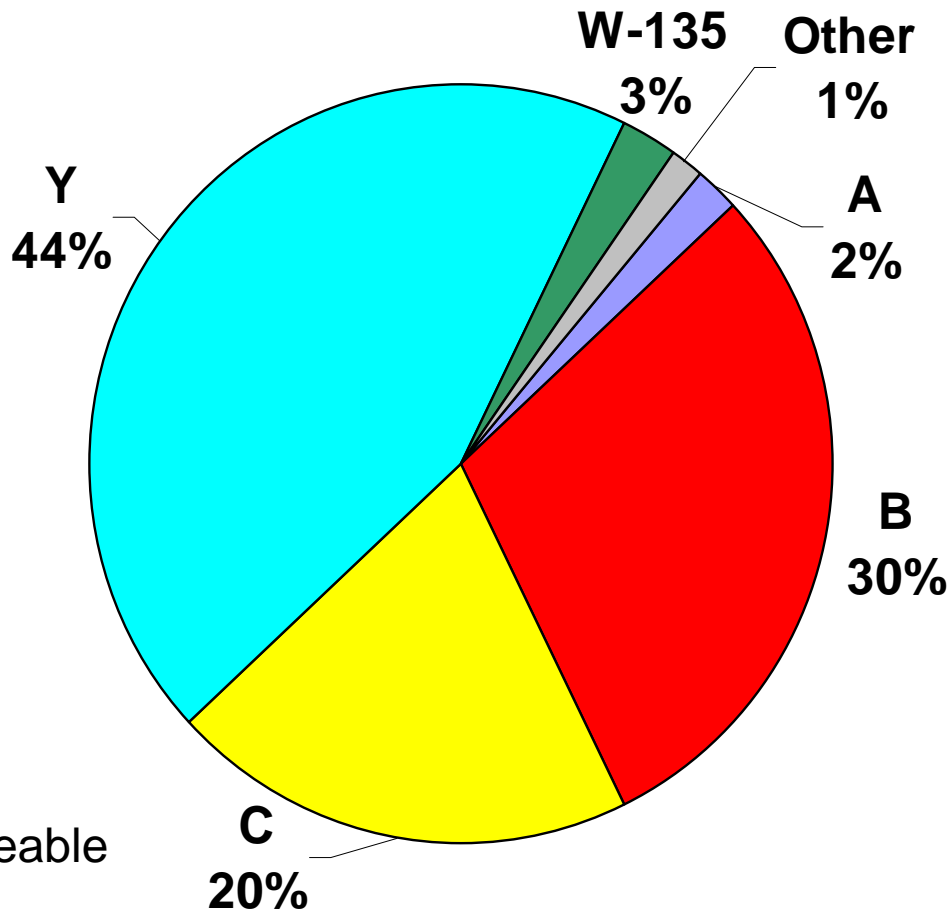
# Reported meningococcal disease, Arizona, 1994-2005



# Rates and cases of meningococcal disease, Arizona, 1994-2004

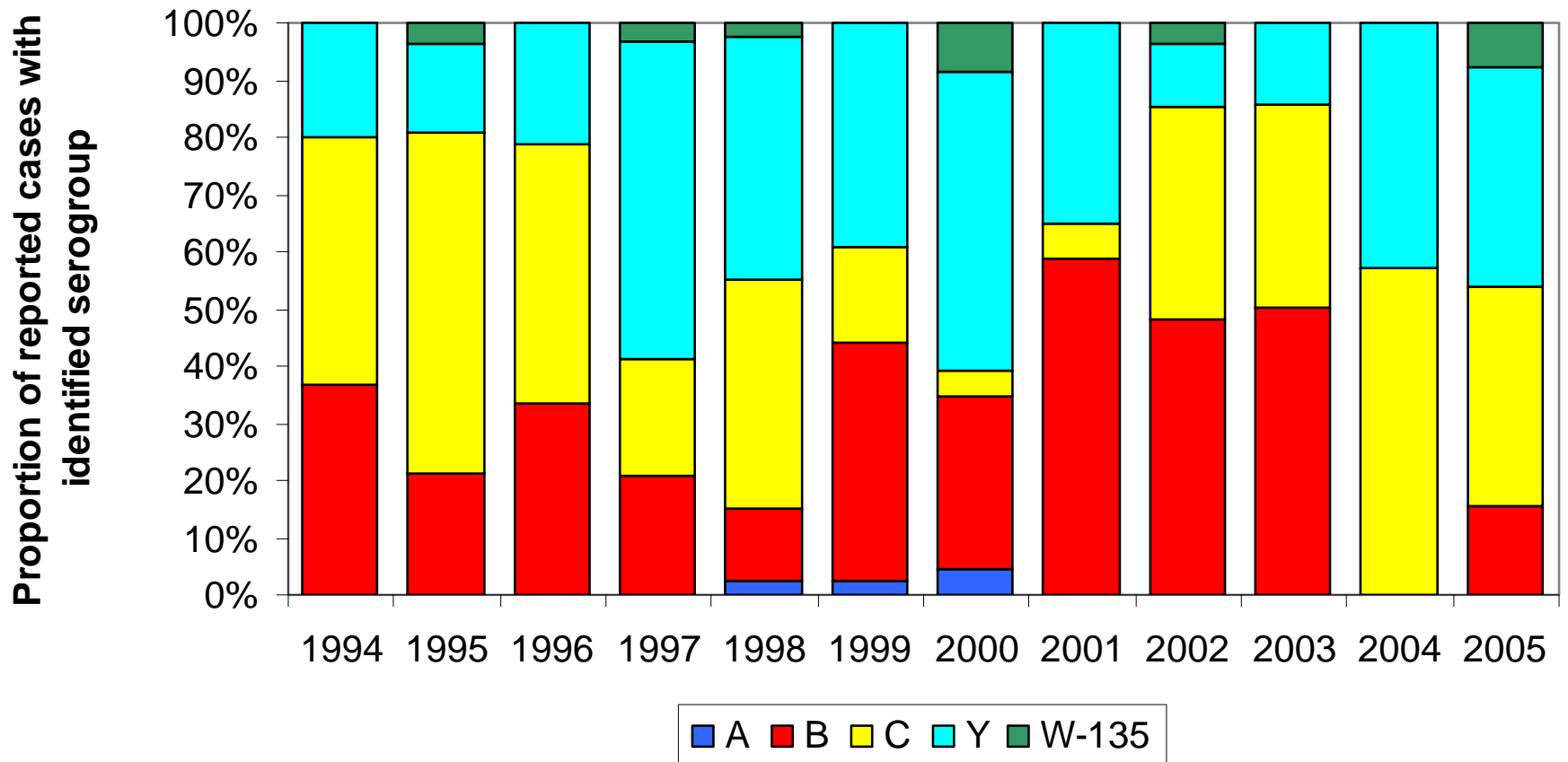


# Meningococcal serogroups, invasive disease, Arizona, 1997-2001

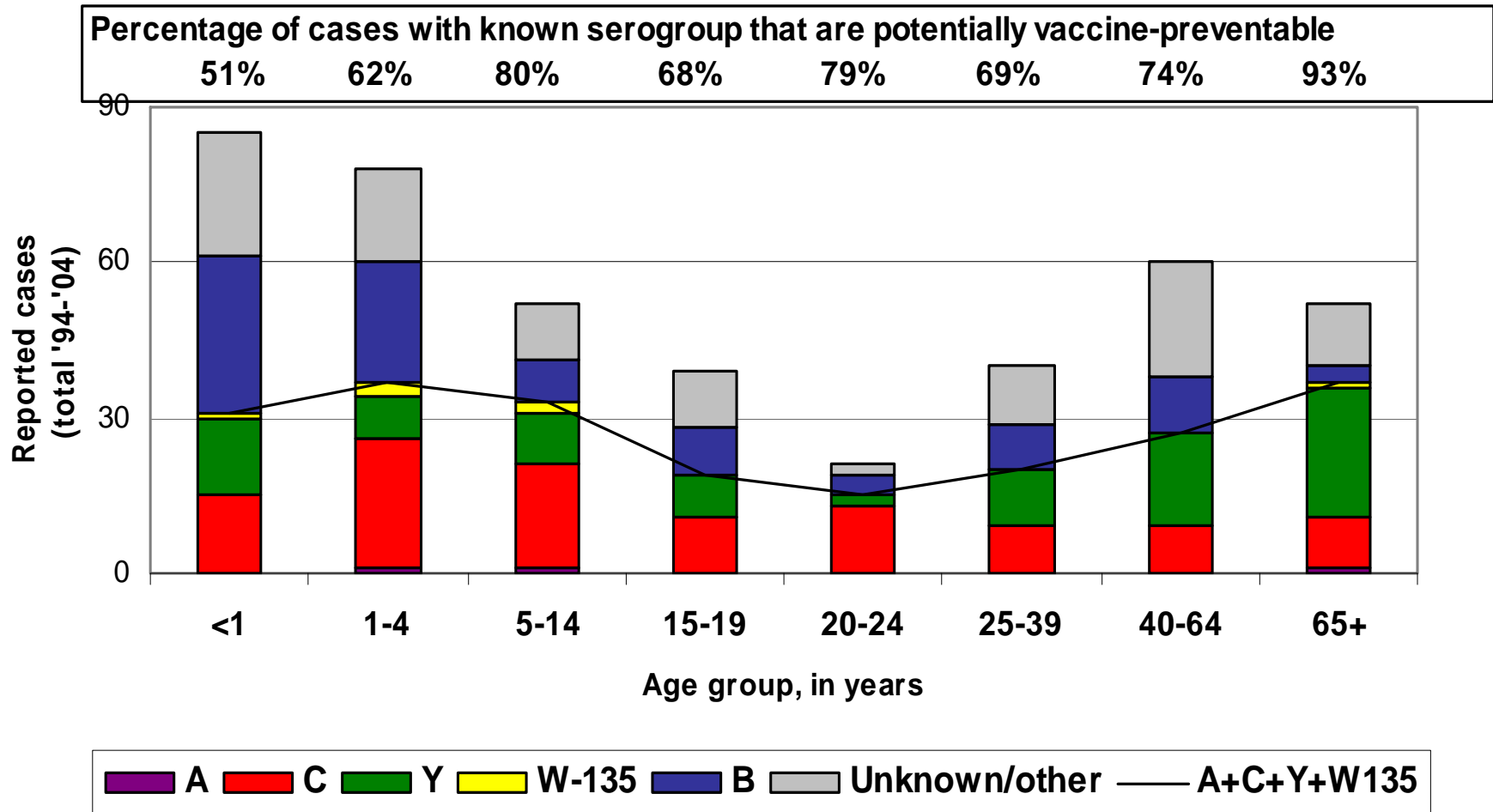


N=192  
40 Unknown/nontypeable

# Meningococcal serogroups, invasive disease, Arizona, 1994-2005

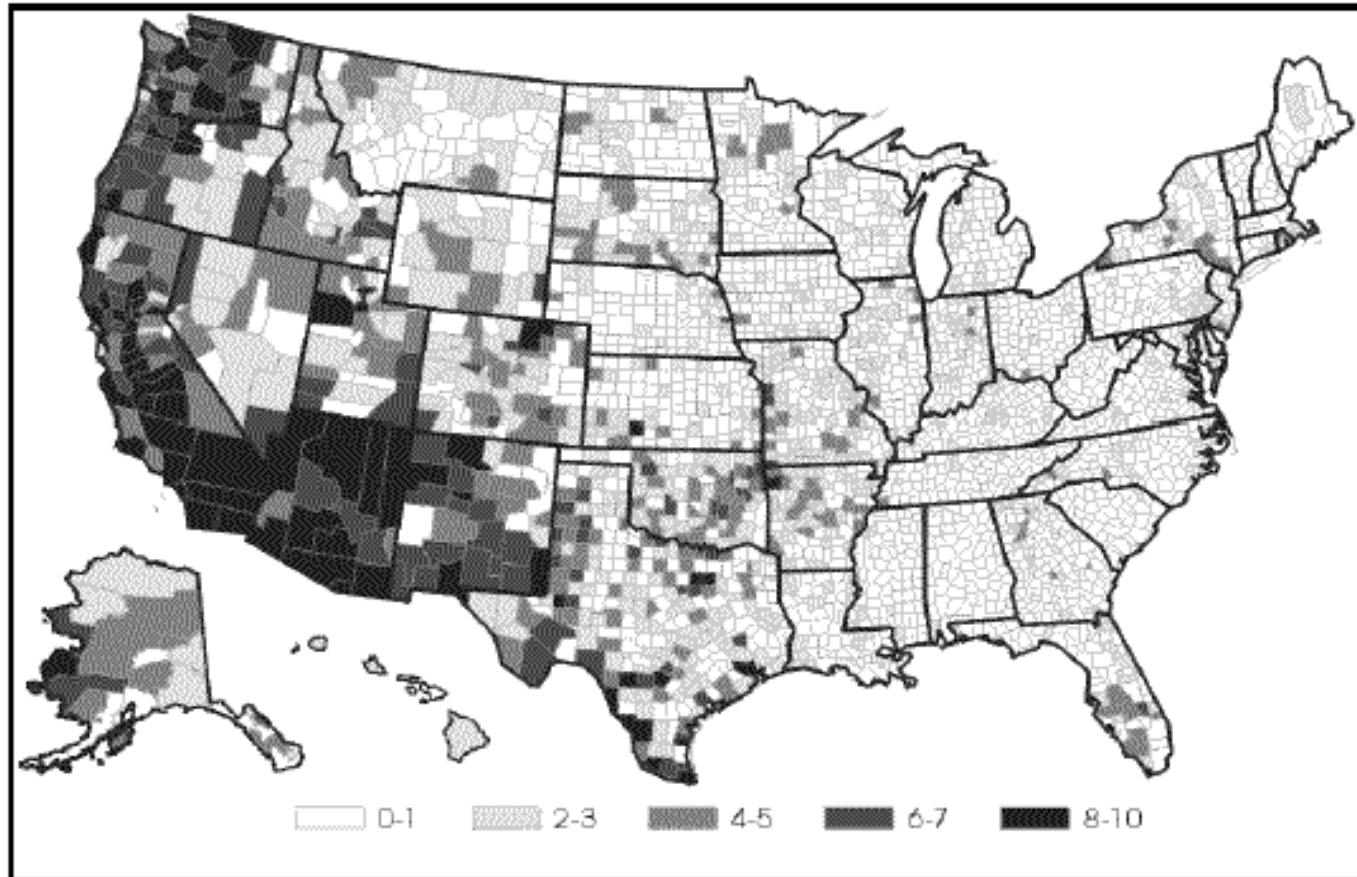


# Serogroup distribution by age group, meningococcal invasive disease, Arizona. 1994-2004



# Hepatitis A in US 1987-1997

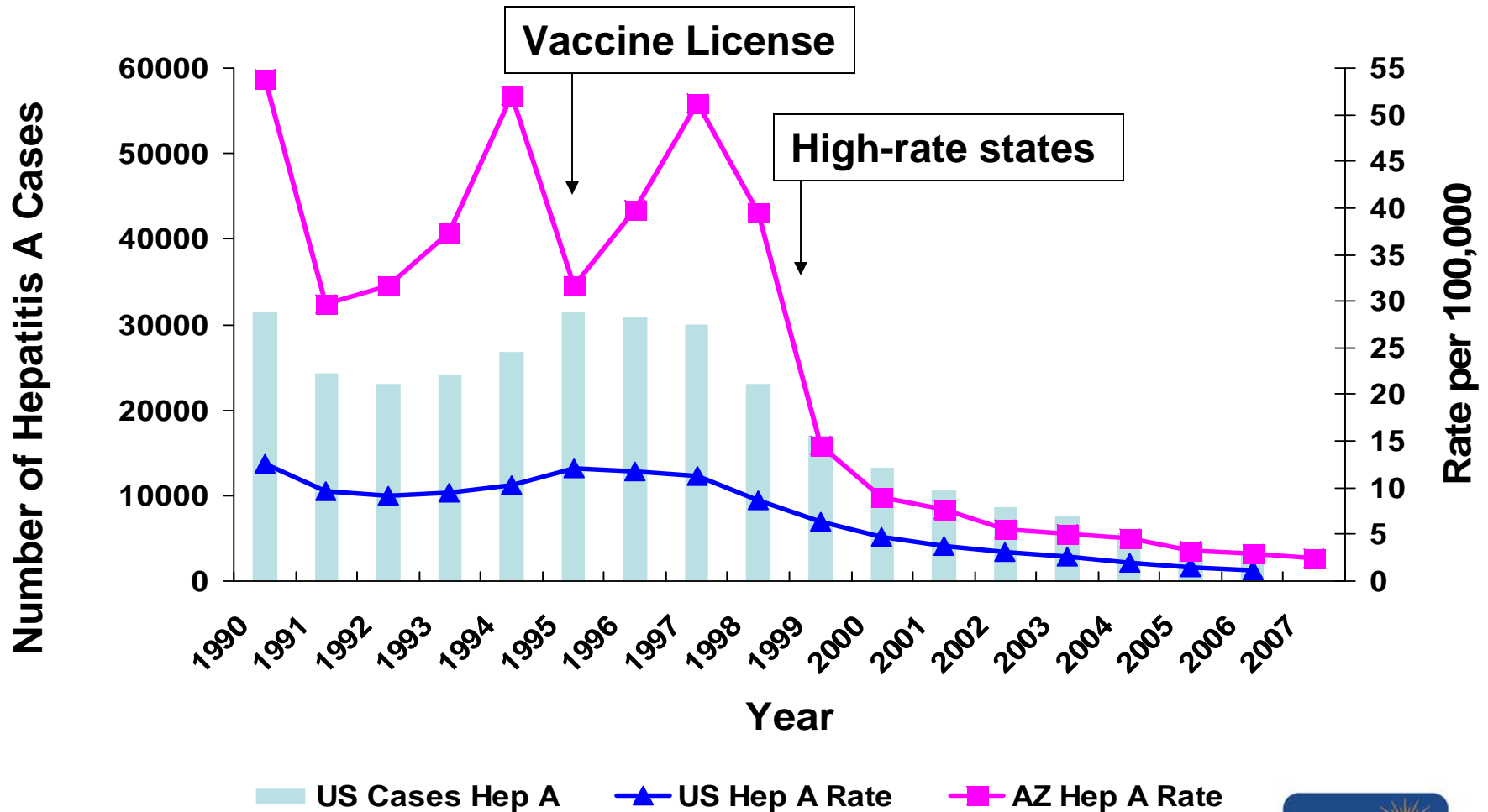
FIGURE 3. Number of years that reported incidence of hepatitis A exceeded 10 cases per 100,000\*, by county — 1987-1997



\* Approximately the national average during 1987-1997.

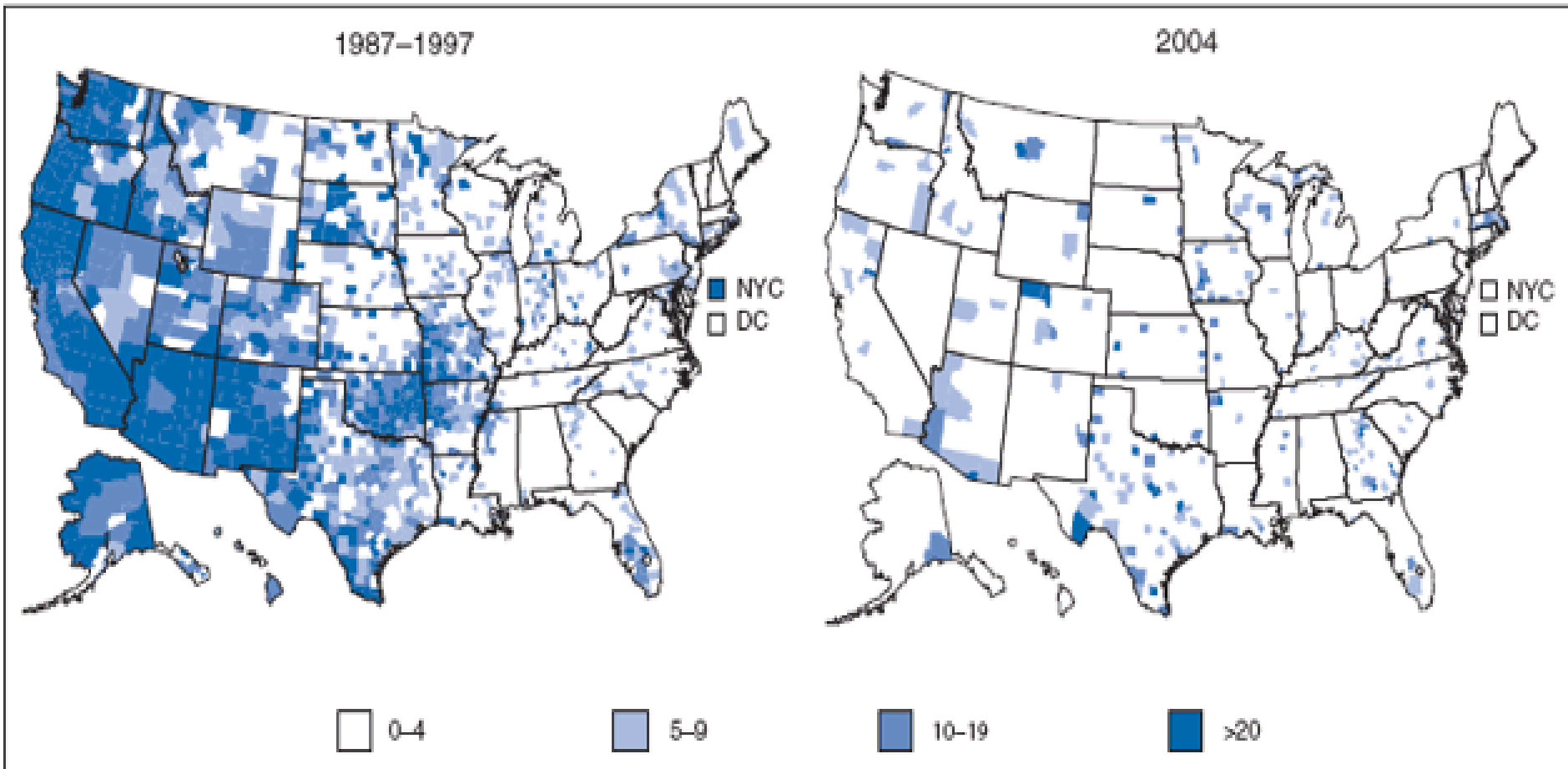
Source: National Notifiable Diseases Surveillance System.

# Hepatitis A Cases in US and AZ 1990-2007



# Decline in Hepatitis A with Vaccination

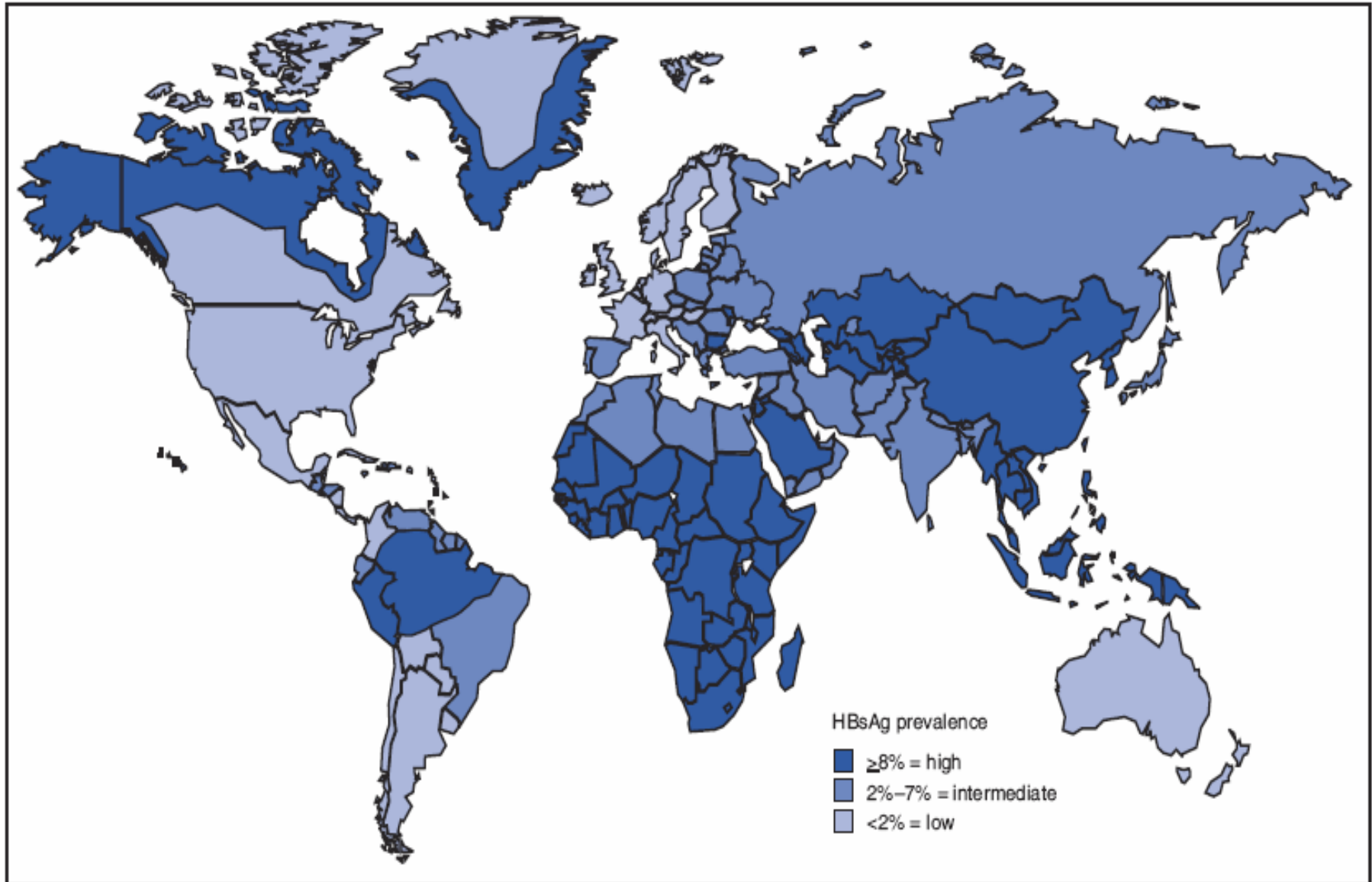
FIGURE 3. Rate\* of hepatitis A, by county — United States, 1987–1997 and 2004



SOURCE: National Notifiable Diseases Surveillance System.  
\* Per 100,000 population.

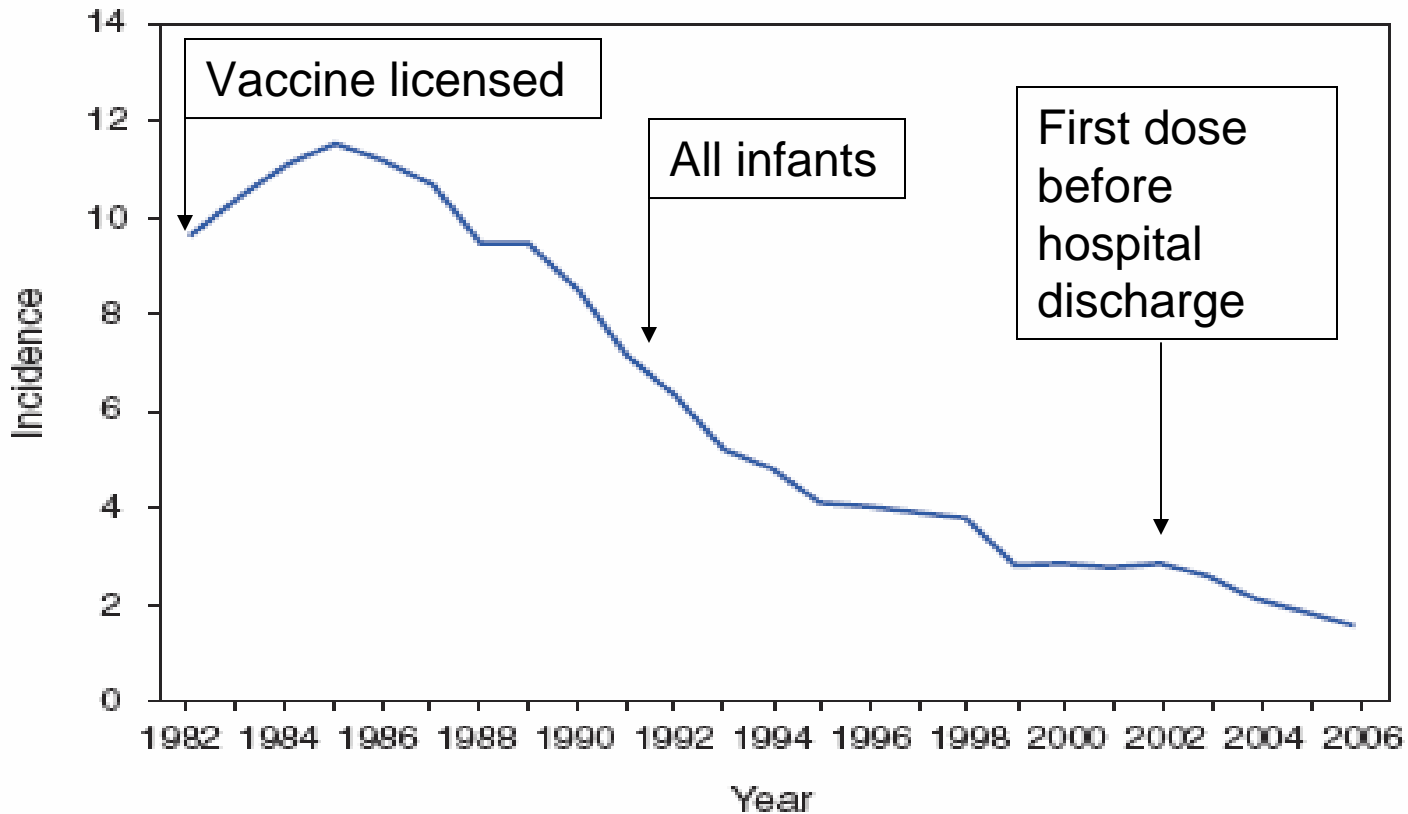
# Chronic Hepatitis B Infection 2005

FIGURE 4. Geographic distribution of chronic hepatitis B virus (HBV) infection — worldwide, 2005\*



# Acute Hepatitis B in US 1990-2006

FIGURE 9. Incidence\* of acute hepatitis B, by year — United States, 1982–2006



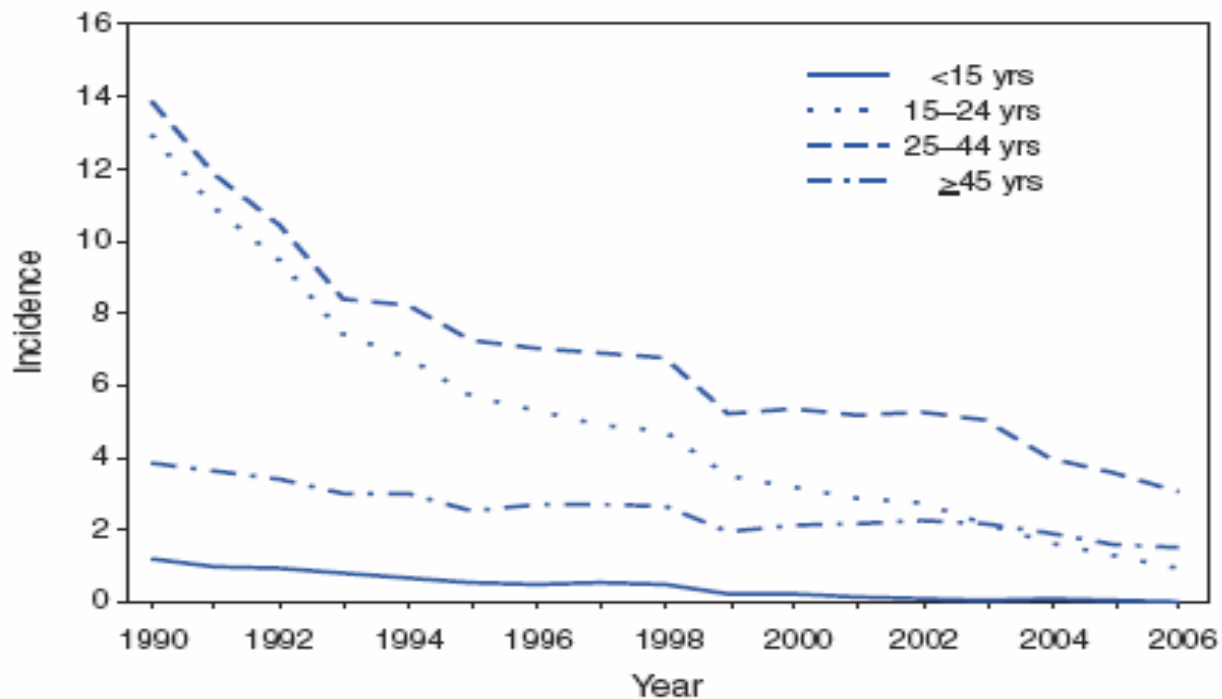
\* Per 100,000 population.

MMWR Mar. 21, 2008



# Acute Hepatitis B in US by Age Group 1990-2006

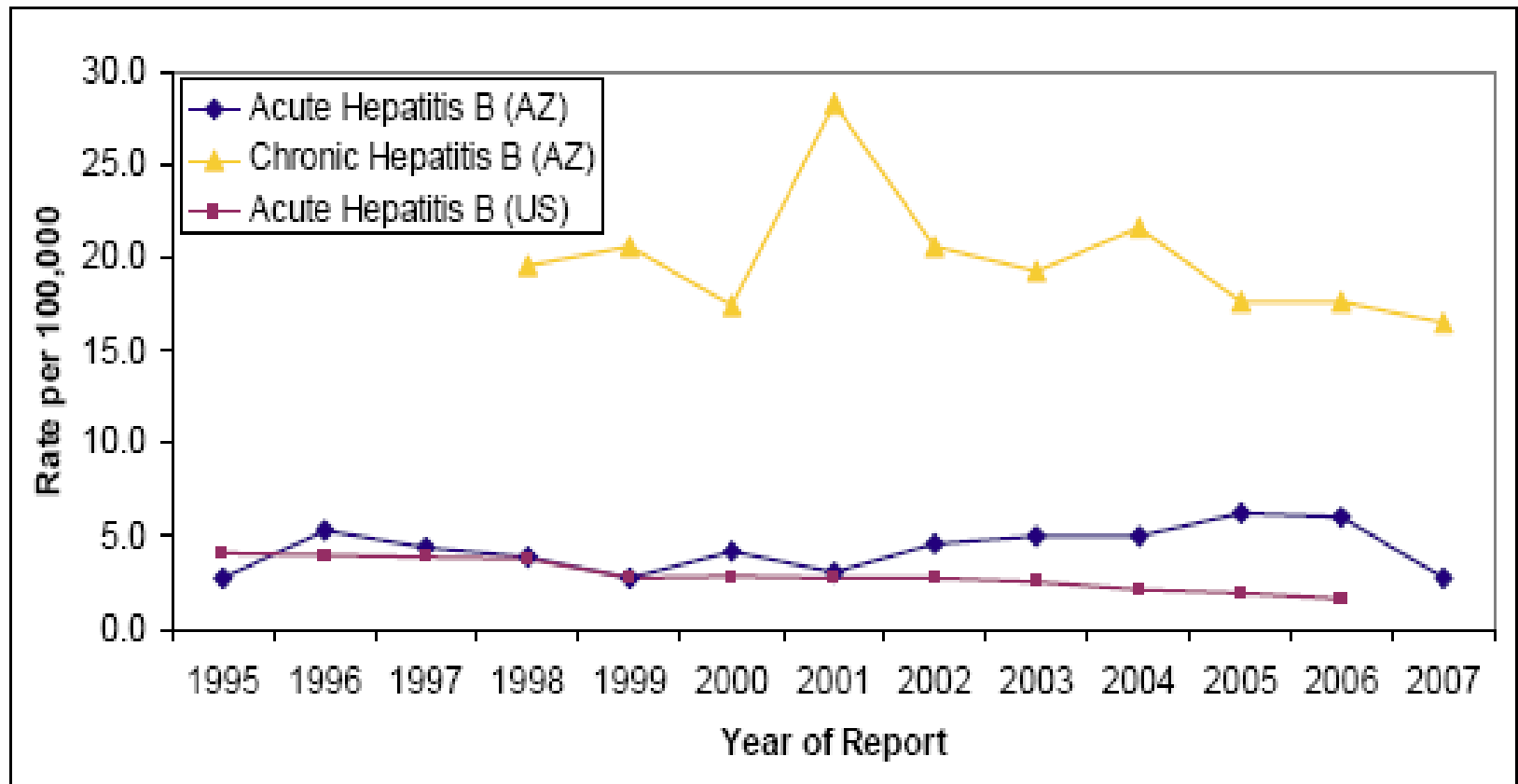
FIGURE 12. Incidence\* of acute hepatitis B, by age group and year — United States, 1990–2006



\* Per 100,000 population.

# Hepatitis B

Figure 5. US and AZ Hepatitis B Rates 1995 - 2007



IDS Annual Report 2007

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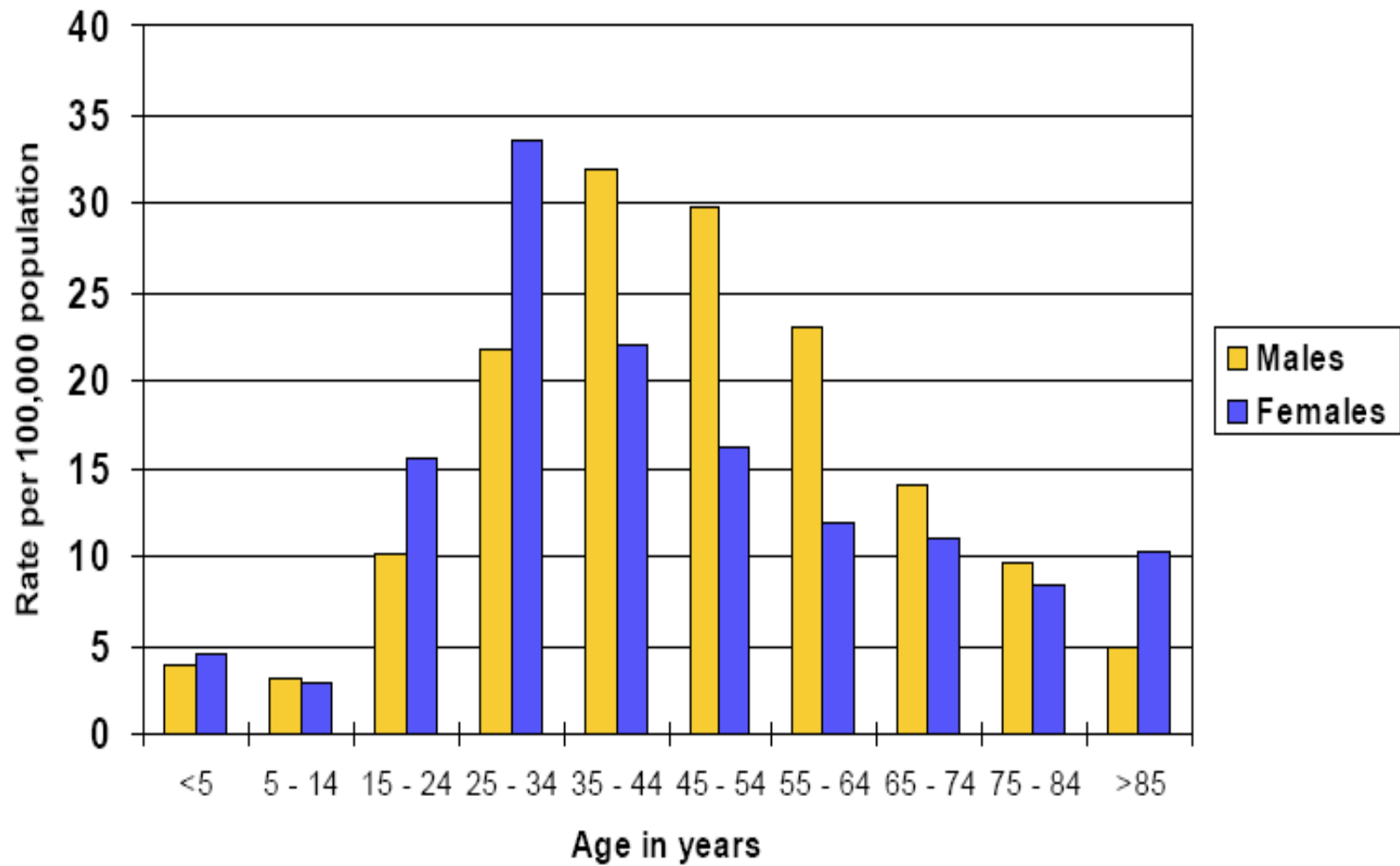
# Arizona Newly Reported Chronic Hepatitis B by Race, 2007

Race	Cases	Rate/100,000
Unknown	633	---
Asian/Pacific Islander	140	82.46
Black	52	20.51
Native American	59	3.28
Hispanic	30	8.88
White	145	3.74



# Chronic Hepatitis B in AZ by Age Groups, 2007

Figure 7. Rates of Newly Reported Chronic Hepatitis B in Arizona by Age, 2007



# Varicella Cases and Rates Arizona, 1994-2007

