Surveillance for acute hepatitis A and the link to prevention

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Characterizing Hepatitis A Epidemiology

- Prevalence of antibody
  - Exposures over lifetime
  - Demonstrates underlying pattern of immunity in population
- Disease incidence
  - New infections due to recent exposures
  - Characteristics reflect underlying pattern of population immunity

Describing the epidemiology of HAV: Prevalence vs. Incidence

	Prevalence	Incidence
Assess population immunity and susceptibility	+++	+
Monitor trends in incidence of and risk factors for disease	++	+++
Assess burden of disease	-	++
Identify and control outbreaks	-	+++
Identify infected persons and at-risk contacts for preventive interventions (i.e. post-exposure prophylaxis)	-	+++

Acute Viral Hepatitis Surveillance

- Acute Viral Hepatitis
  - Clinical syndrome
    - Acute illness with jaundice, liver inflammation
  - Multiple causes
    - Viral hepatitis – A, B, C, D, E, non A-E
    - Other – Yellow fever, malaria, leptospirosis, etc
    - Causes indistinguishable without diagnostic testing
- AVH reportable disease in most countries
    - Value limited due to incomplete use of diagnostic tests
    - Diagnostic tests exist for all causes, but availability and costs limit use, especially in less developed countries

Rationale for Surveillance for Acute Viral Hepatitis A (and other types)

- Quantify burden of disease
- Measure risk of acute hepatitis A in all age groups
- Evaluate risk factors for HAV infection
- Define the need for and identify target groups for vaccination programs
- Measure the impact of vaccination strategies
- Provide basis for further investigations of HAV epidemiology: case/control studies, outbreak investigations

Characteristics of surveillance systems for acute hepatitis A

1. Standardized case definitions
   - Clinical criteria
   - Laboratory testing
2. Scope/type
   - Sentinel vs. population-based vs. national
3. Case ascertainment
   - Active vs. passive
4. Case investigation and reporting
   - Clinical and laboratory characteristics
   - Descriptors of time, place and of person (e.g. age,sex,ethnicity)
   - Exposures and risk factors during 2-6 weeks before illness onset (*will vary by location and epidemiologic pattern)*

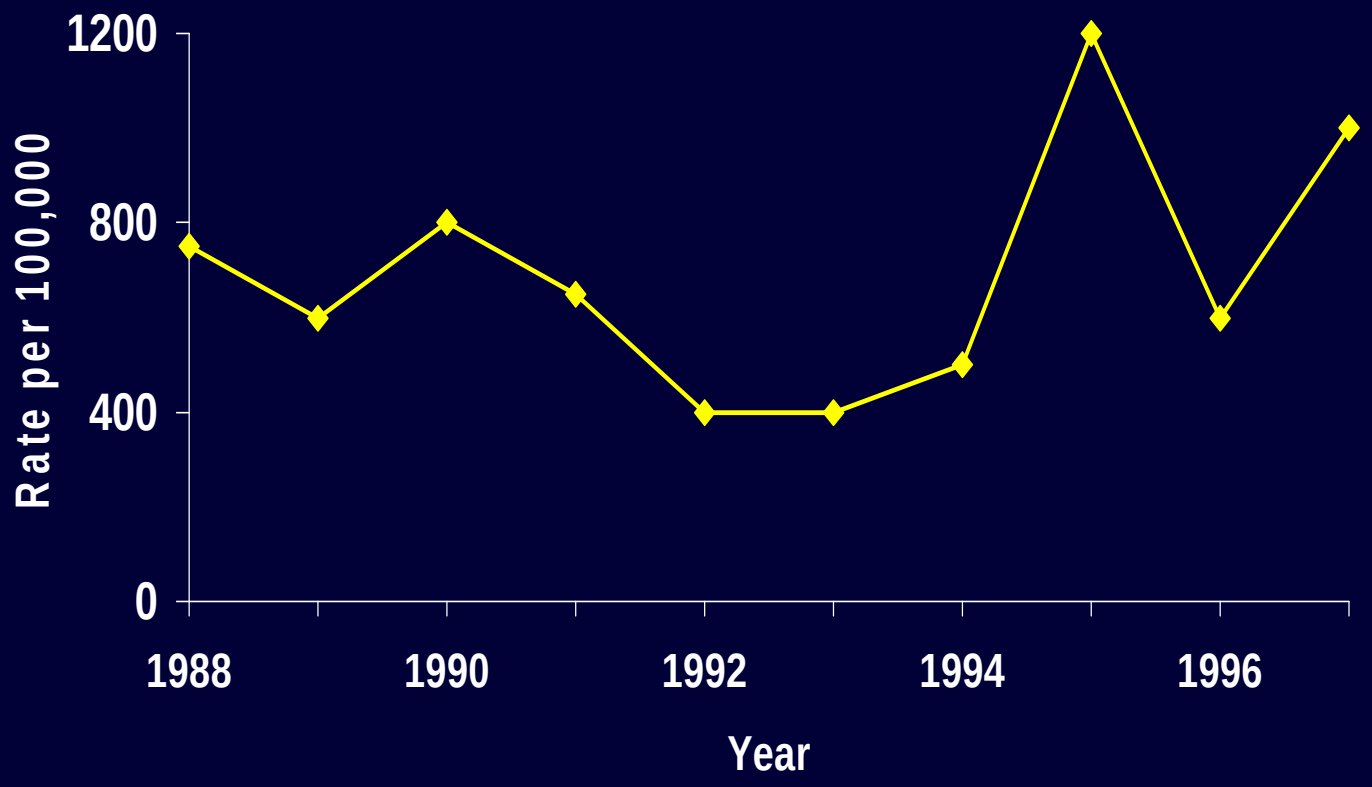
Acute Hepatitis A
Surveillance Case Definition

- **Clinical criteria**

  An acute illness with:
  - discrete onset of symptoms (e.g. fatigue, abdominal pain, loss of appetite, intermittent nausea, vomiting), **and**
  - jaundice or elevated serum aminotransferase levels

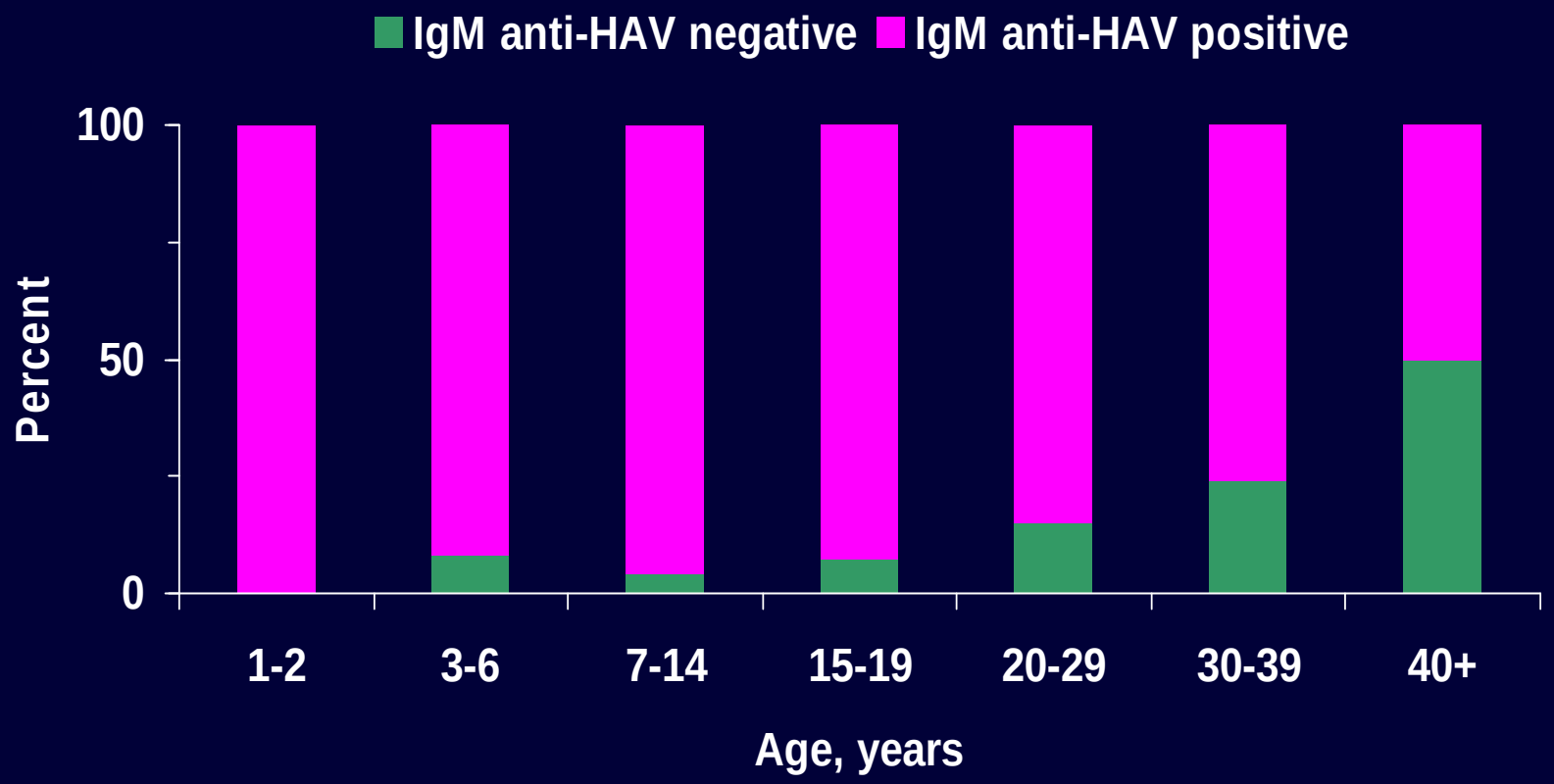
- **Laboratory criteria**
  - IgM antibody to hepatitis A virus (anti-HAV) positive

Incidence of Acute Viral Hepatitis; Tashkent, Uzbekistan; 1988-97



Source: M. Sharapov, Tashkent Pediatric Medical Institute

Distribution of Acute Viral Hepatitis Cases, by Age Group; Tashkent; 1997; n=243



Overall proportion anti-HAV positive = 85%

Source: M. Sharapov, Tashkent Pediatric Medical Institute

Surveillance systems for acute viral hepatitis incidence: A range of possible approaches

	Sentinel	Population-based	National
Characteristics	•Disease reporting from a subset of facilities	•Reporting from all facilities in a defined area (e.g.province)	•All facilities in country
Pros	•Fewer resources required •Describes trends in # and characteristics of cases	•Can measure incidence	•Most comprehensive (& representative) •Local data for all areas •~~Outbreak detection~~
Cons	•Chosen sites may not be representative •Doesn't measure incidence	•More resource intensive than sentinel surveillance	•Logistically difficult in large countries; feasible for small nations or if there is a strong, centralized infrastructure

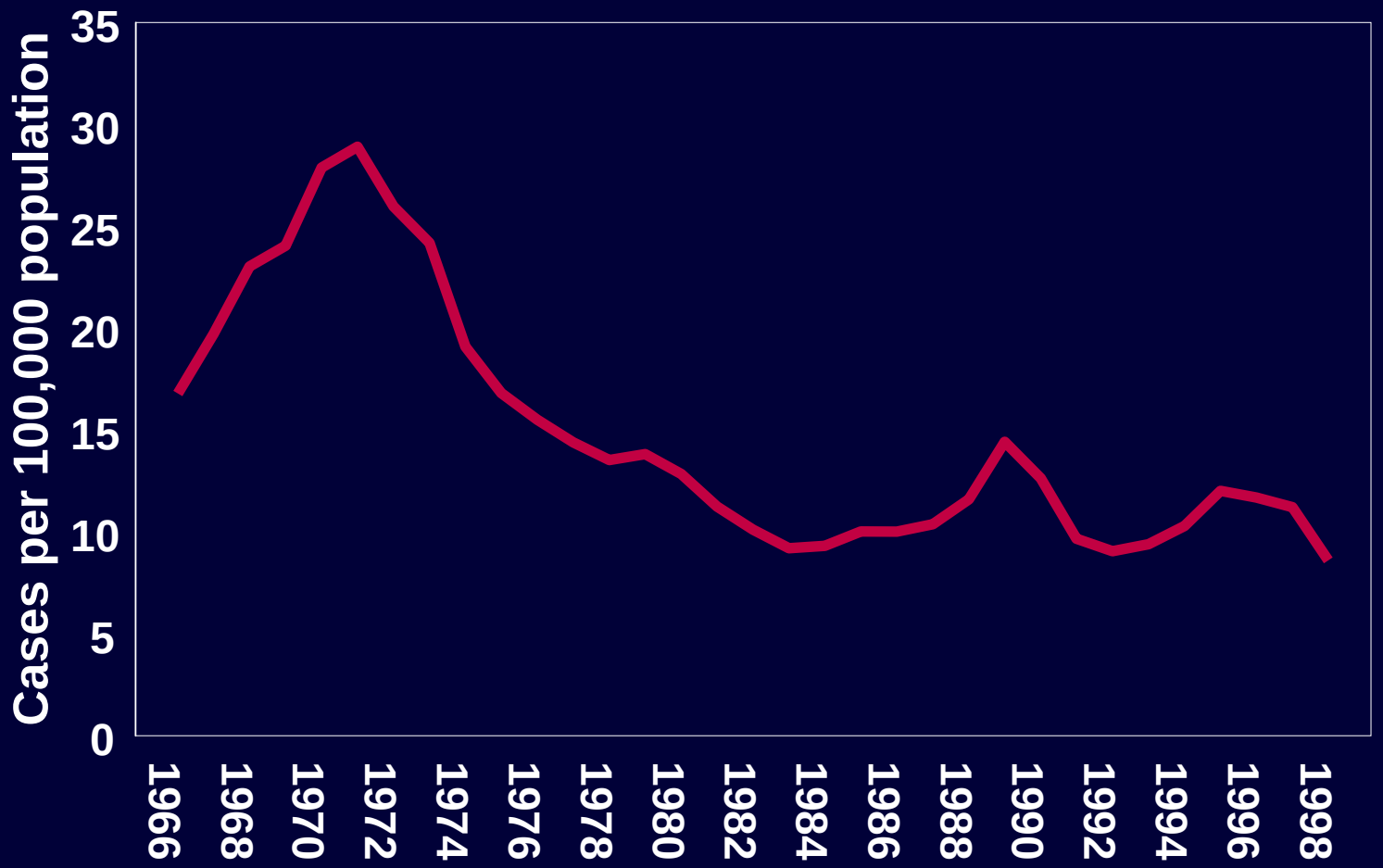
National Notifiable Diseases Surveillance System

- **Passive, universal system**
  - **~58 diseases currently notifiable**
    - **Includes hepatitis A, hepatitis B and hepatitis C**
  - **Voluntary reporting to state health department and then to CDC**
  - **Limited data elements: demographics &some clinical/risk factors**
- Critical for national trends
  - Reporting from all jurisdictions in the US
- Limitations
  - Underreporting of cases
  - Inconsistent application of case definition
  - Incomplete reporting of clinical and risk factor information

Sentinel Counties Surveillance Study and Emerging Infections Program

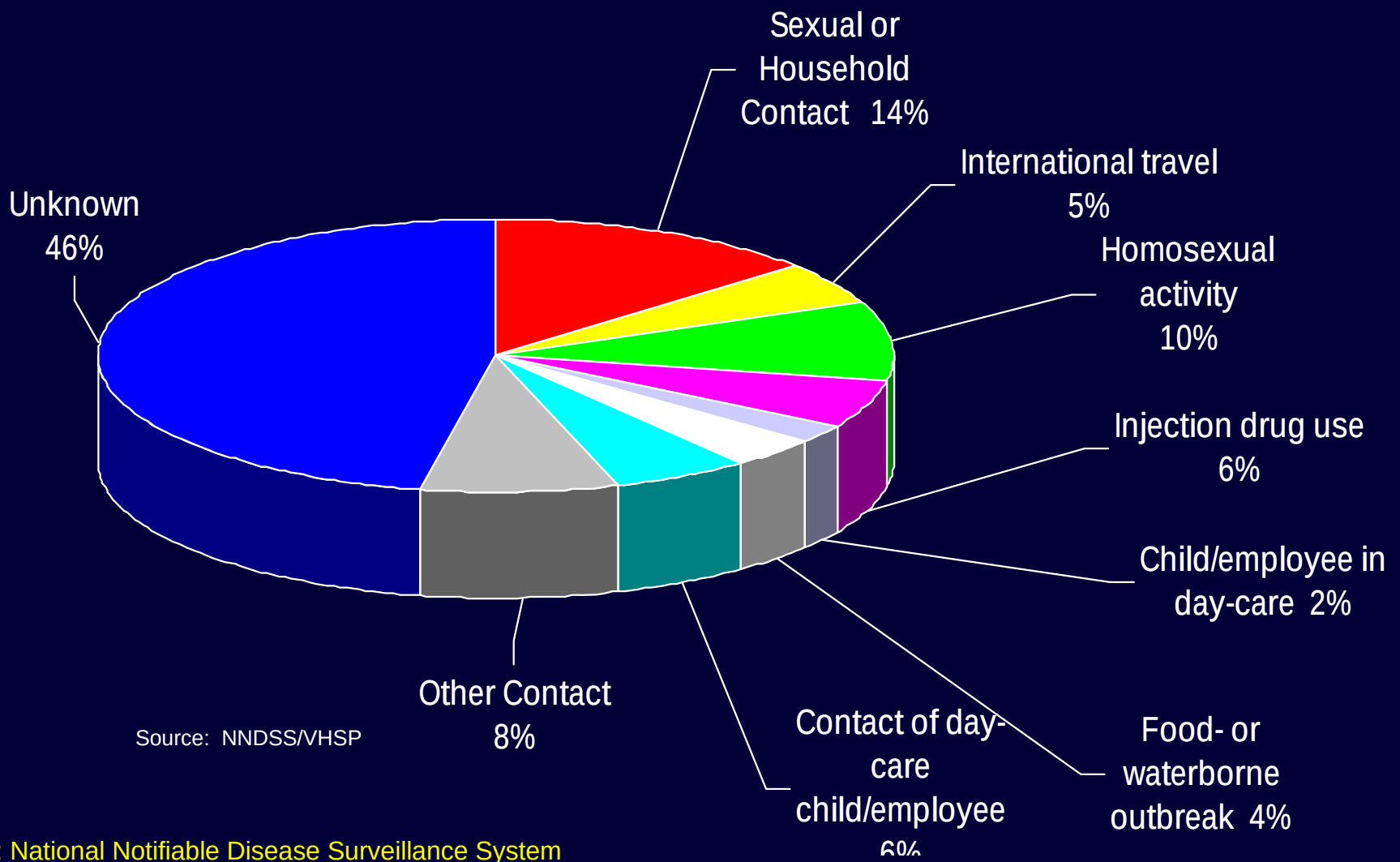
- Active, population based sentinel systems
  - Sentinel Counties Study of Viral Hepatitis
    - 6 US counties (total pop approx 4 million)
    - 1980s-2006
  - Emerging Infections Program
    - 5 US states + 1 cities (total pop approx. 25 million)
    - Established 2004
- Pros
  - More complete case ascertainment and investigation
  - More extensive information (including serum samples) collected for cases

Incidence of hepatitis A,
United States, 1966-1998



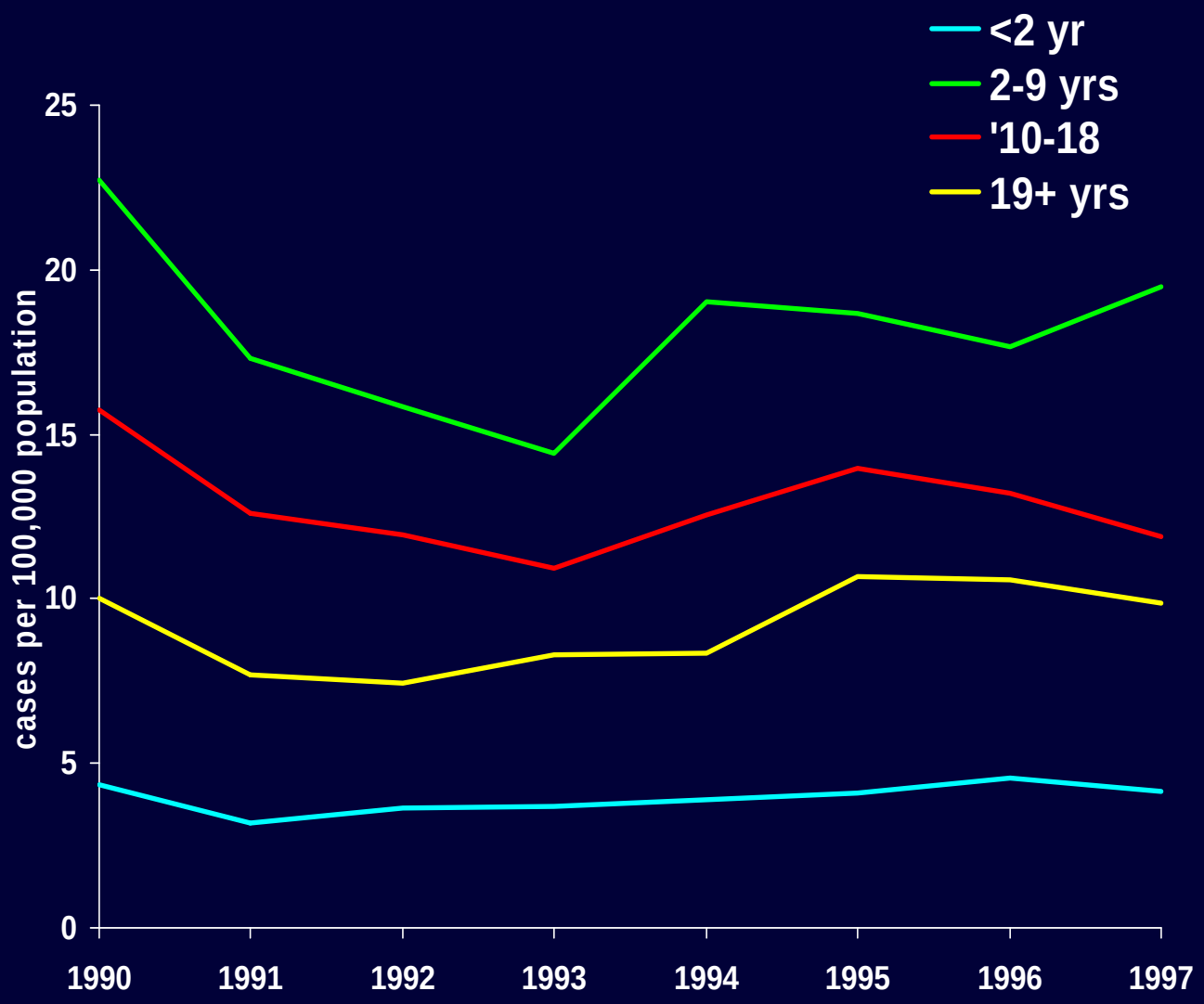
Source: NNDSS

Risk Factors Associated with Reported Hepatitis A, 1990-2000, United States



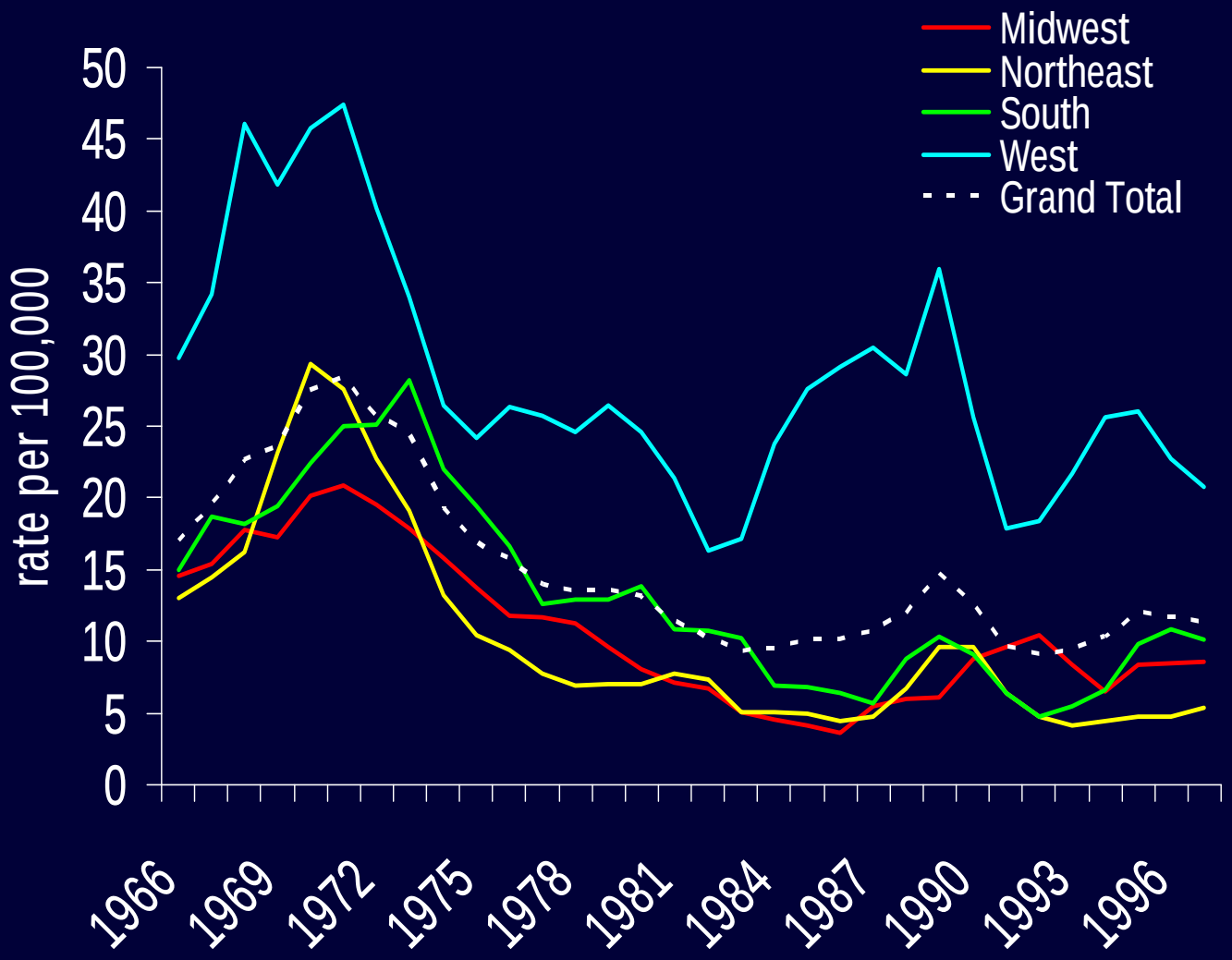
Source: National Notifiable Disease Surveillance System

Hepatitis A incidence by age, United States, 1990-1997



Source: National Notifiable Disease Surveillance System

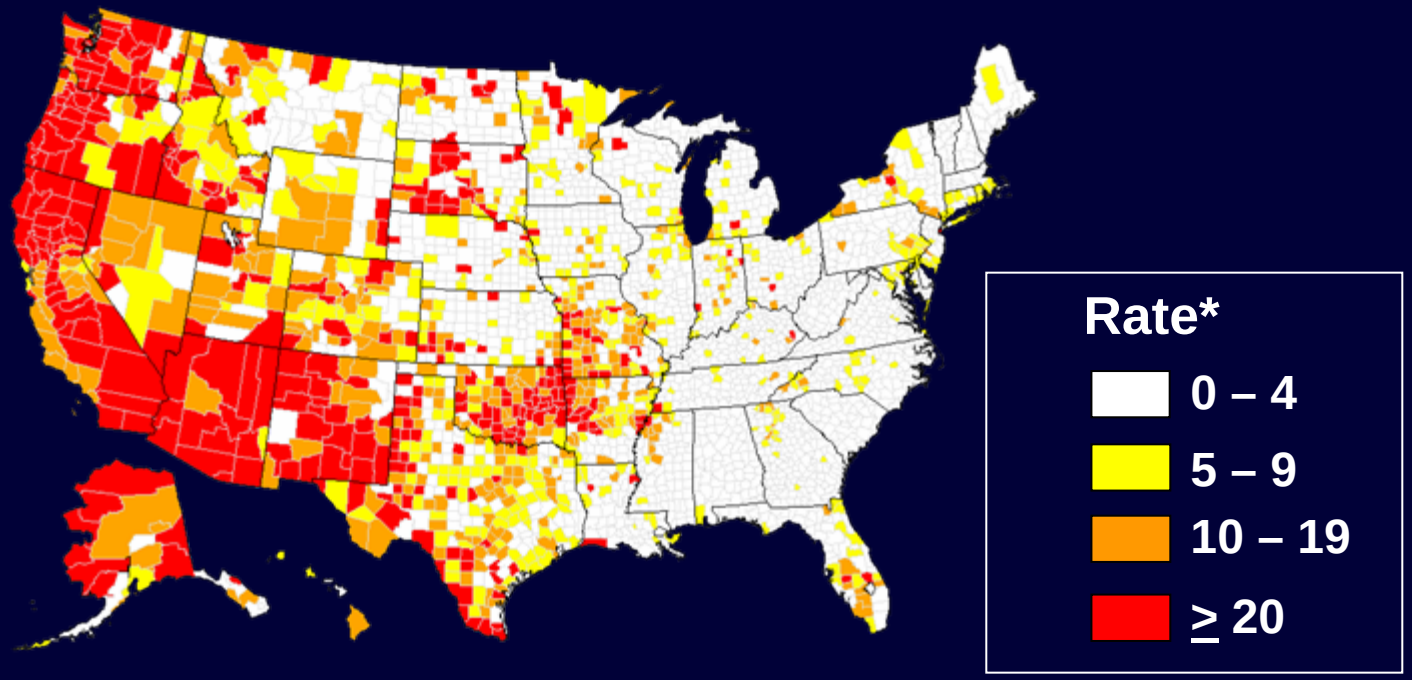
Hepatitis A Incidence by Region, United States, 1966-1997



Source: National Notifiable Disease Surveillance System

Hepatitis A Incidence

1987–1997



* Per 100,000 population

Source: NNDSS

HEPATITIS A IN THE UNITED STATES
Foundation for a vaccination policy

- Targeted vaccination of high risk groups
  - E.g Travelers to endemic countries, men who have sex with men (MSM) and Illegal drug users
- Routine vaccination of children
  - 1996 - “high rate” communities
  - 1999- 17 “high rate” states
  - 2006- All children aged 12-23 months nationwide

Summary

- **Decision on if/when/how to use vaccine requires multiple types of surveillance data**
  - **Prevalence data to**
    - **characterize patterns of immunity**
    - **identify who is susceptible and who is not**
  - **Acute disease incidence data to**
    - **assess burden of disease**
    - **identify individuals/groups/places at increased risk of disease**
- **In the U.S., acute hepatitis A incidence data provided basis for stepwise implementation of national vaccine policy**
  - **Defined the burden of disease**
  - **Identified groups and geographic areas where risk of hepatitis A and hepatitis A outbreaks was highest – and which accounted for majority of disease**
- **Acute disease incidence data critical to monitor impact of vaccination strategies and to modify those strategies to maximize impact**

Summary

- **Value of acute disease incidence data dependent on its quality**
  - **Requires**
    - **Consistent application of a standardized case definition**
      - **includes clinical criteria and laboratory confirmation**
    - **Mechanisms for systematic identification, investigation and reporting of cases**
  - **Approaches for implementing surveillance vary and are tailored to available resources and epidemiologic questions**
    - **Scope (sentinel/population-based/national)**
    - **Case ascertainment**
    - **Protocols and instruments for case investigation and reporting**