NIS & SLAITS Program Overview: National Immunization Survey

NCHS BSC Meeting
September 17, 2007
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NCIRD/CDC

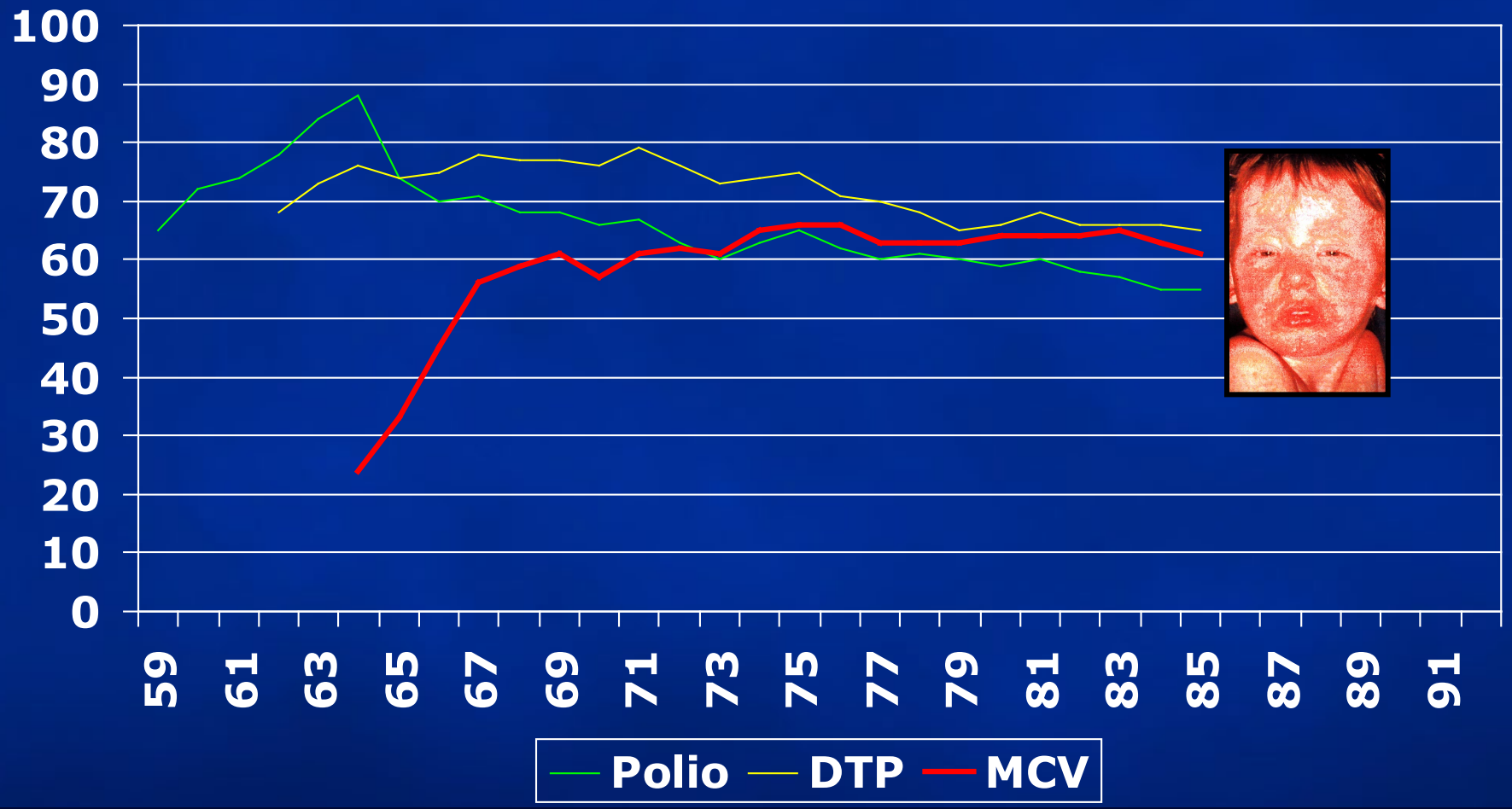
Outline

- History of the NIS
- Purpose
- Methods
- Resources
- Information Dissemination
- Proposed objectives of program review

Development of the U.S. Immunization Program

- Vaccination Assistance Act, 1962
  - Established Section 317 grant program
- Childhood Immunization Initiative, 1977
  - Focus on enacting school entry laws
- Vaccine coverage monitoring, 1957-91
  - U.S. Immunization Survey, CPS
    - Parental report of vaccinations
    - Dropped after 1985; cost, validity concerns
  - Retrospective school surveys, 1985-91

Polio, DTP, Measles-Containing Vaccination Coverage Levels: 1959-1990, U.S. Immunization Survey



U.S. Measles Resurgence 1989-1991

Cases	55,622
Age group affected	<5 yrs
Hospitalizations	>11,000
Deaths	132
Direct medical costs	>$150 million

Childhood Immunization Initiative (CII), 1993

- Achieve 90% coverage for preschool children
- Vaccines for Children Program
  - Entitlement program funded by Medicaid
  - ACIP recommendations translated into appropriations
- Increase in Section 317 funding
- Funding for the National Immunization Survey (NIS)
  - Created in 1994 to measure coverage goals of the CII by state and selected urban areas
- NHIS NIPRCS 1994-1999
  - National provider-reported data on vaccination of children 19-35 mo
  - Used in NIS weighting adjustments for households without telephones

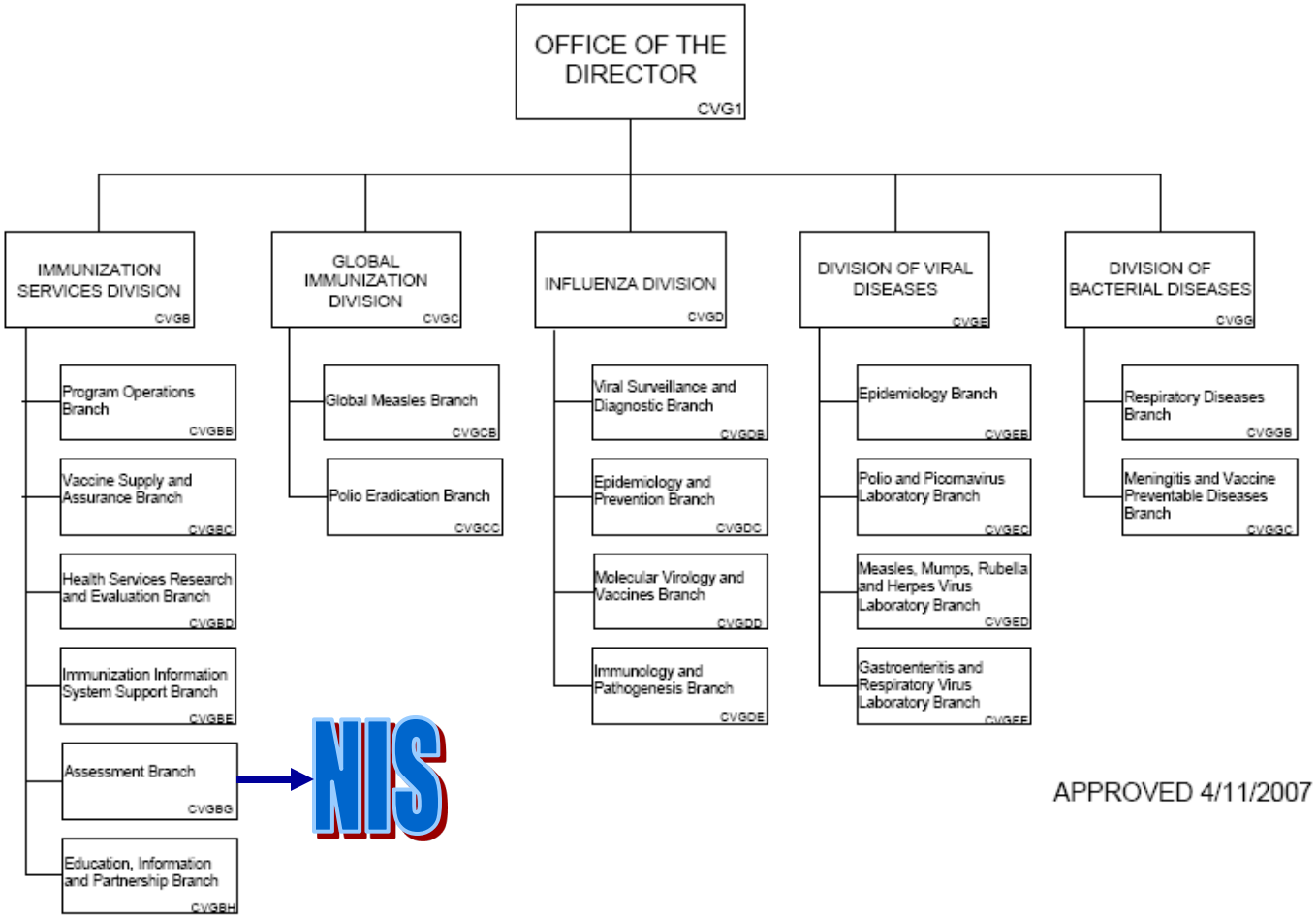
Mission

- National Center for Immunization and Respiratory Diseases (NCIRD)
  - Prevent disease, disability and death through immunization and by control of respiratory and related diseases
- Immunization Services Division
  - Protects individuals and communities from vaccine-preventable diseases through provision of federal funds and contracts to purchase vaccine, the provision of technical and financial support of immunization programs, provider and public education, evaluation and research

DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC)

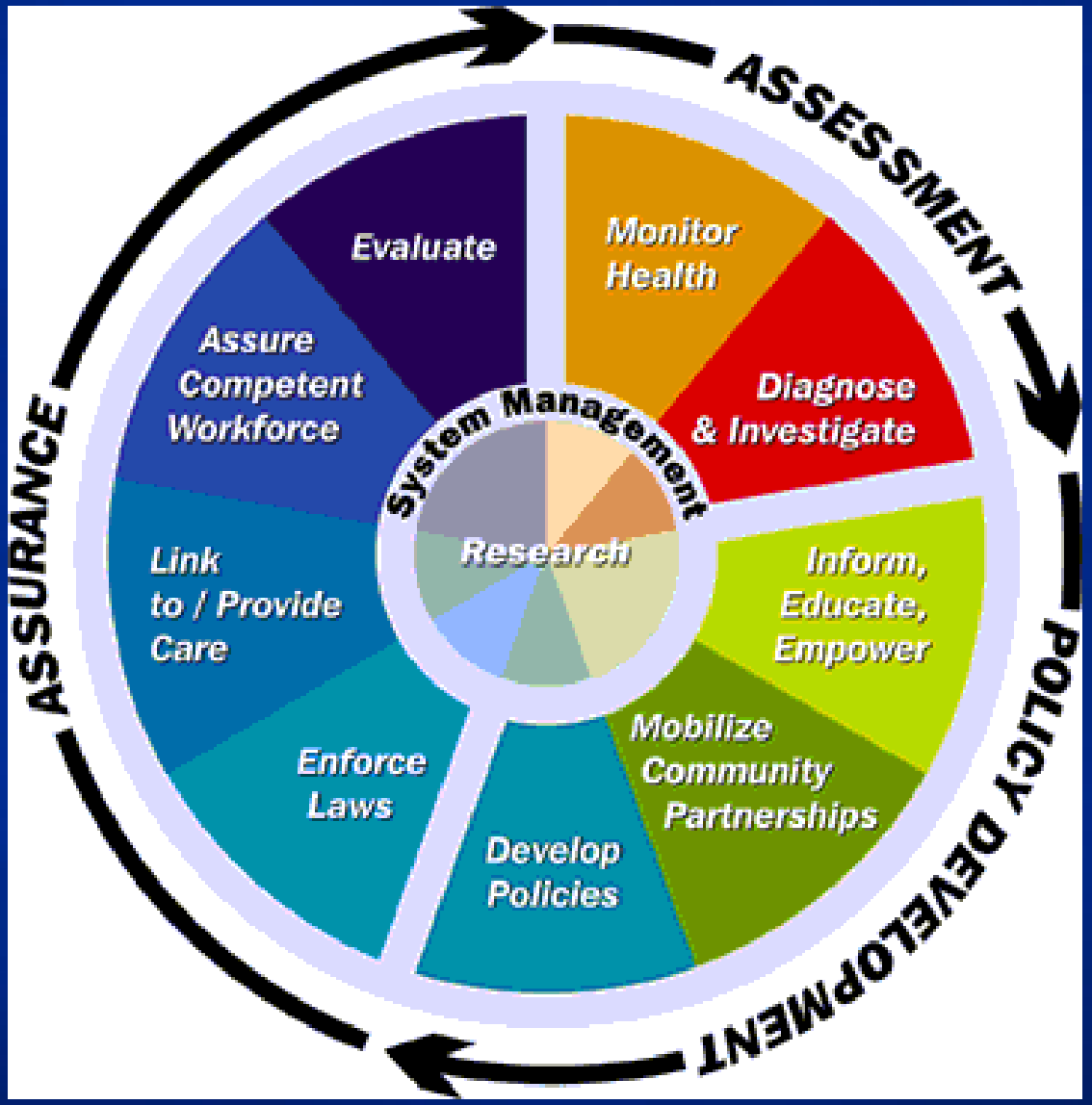
COORDINATING CENTER FOR INFECTIOUS DISEASES (CV)

NATIONAL CENTER FOR IMMUNIZATION AND RESPIRATORY DISEASES (CVG)



APPROVED 4/11/2007

What gets measured – gets done



Purpose of CDC Vaccine Assessment

- Overarching goal - facilitate program improvement and behavior change leading to increased vaccination levels, thus reducing health and societal impact of vaccine-preventable diseases (VPD's)
- Need vaccine assessment system for immunization programs
  - Children <3, 4-6, 11-18 years
  - Adults

Purpose of CDC Vaccine Assessment

- Evaluate effectiveness of immunization grant programs over time
- Help with allocation of Vaccines for Children (VFC) program resources
- Monitor progress toward national *Healthy People* objectives
- Build and maintain support for national & state immunization programs

Purpose of CDC Vaccine Assessment

- Identify subgroups at higher VPD risk
- Identify facilitators & barriers to vaccination to improve interventions
- Evaluate implementation of vaccine recommendations from the Advisory Committee on Immunization Practices (ACIP)
- Assess differential impact of vaccine shortages
- Evaluate uptake of new vaccines

Purpose of CDC Vaccine Assessment

- Assist in evaluating health impact of vaccination
  - Proxy for immunity
  - Ecologic analysis of trends
  - Vaccine effectiveness studies
  - Vaccine safety studies
- Emergency preparedness
  - Influenza pandemic monitoring

Designing a Vaccine Coverage Assessment System

- Target population
- Sampling method
- Vaccines assessed
- Auxiliary data collected
- Geographic specificity
- Periodicity of data collection and reporting
- Timeliness (vaccination to data availability)
- Comparability across areas and over time
- Representativeness
- Accuracy
- Resources

Overview of the National Immunization Survey (NIS)

Target Population

- Noninstitutionalized children aged 19-35 months at time of telephone interview

Sample Design

- Stratified, two phase survey:
  - List-assisted, random-digit-dialing survey to identify age-eligible children
    - Spanish interviewers & CATI version
      - 9% of 2005 interviewers conducted in Spanish
    - Language Line Services used for 187 interviews (0.67%) in 2005
  - Mailed survey to providers identified during telephone interview to collect provider-reported vaccination histories

National Immunization Survey
Immunization History Questionnaire

CDC — SAFER · HEALTHIER · PEOPLE

Confidential Information. If received in error, please call 1-800-817-4316.

START HERE ➡ Please review your records and complete this questionnaire for the child identified on the label to the right. Then return the questionnaire in the postage-paid envelope provided or fax toll-free to (866) 324-8659. These medical records are confidential. If faxing, please take extra care to dial the correct number.

1. Which of the following best describes your immunization records for this child?
   - ☐ You have all or partial immunization records for this child, for vaccines given by your practice or other practices.
     - Was any of the immunization information for this child obtained from your community or state registry? ☐ Yes ☐ No ☐ Don't Know
     - Go to question 2 below.
   - ☐ This facility gives immunizations only at birth (hospital). Go to question 2 below.
   - ☐ Other-Explain
   - ☐ You have provided care to this child, but do not have immunization records.
   - ☐ You have no record of providing care to this child.

   Please complete item 9 and return form as instructed above.

2. According to your records, what is this child's date of birth?
   Month | Day | Year ☐ Don't know

3. What was the date of this child's *first* visit, for any reason, to this place of practice?
   Month | Day | Year ☐ Don't know

4. What was the date of this child's *most recent visit*, for any reason, to this place of practice?
   Month | Day | Year ☐ Don't know

5. How many physicians work at this practice, including those who work part-time?
   ☐ 1 ☐ 2 ☐ 3 ☐ 4-6 ☐ 7-10 ☐ 11 or more

6. Which of the following best describes this facility? Check only one box, representing the most specific description.
   - ☐ Federally-qualified health center including community/migrant/rural/Indian health center
   - ☐ Hospital-based clinic, including university clinic, or residency teaching practice.
   - ☐ Private practice, including solo, group practice, or HMO.
   - ☐ Public health department-operated clinic
   - ☐ Military health care facility
   - ☐ WIC clinic
   - ☐ Other-Explain

7. Does your practice order vaccines from your state or local health department to administer to children?
   ☐ Yes ☐ No ☐ Don't know

8. Did you or your facility report any of this child's immunizations to your community or state registry?
   ☐ Yes ☐ No ☐ Don't know
   ☐ Not applicable (No registry in my community/state)

9. Contact information for the person returning this form.
   Name:
   ☐ Physician ☐ Nurse
   ☐ Office Manager/ Receptionist ☐ Medical Records Administrator/Technician
   ☐ Other
   Phone: ( ) ext.
   Fax: ( ) ext.

10. Go to next page ➡

Vaccine		Date Given Month	Day	Year	Given by other practice?	Type of Vaccine (Mark one box for each vaccine dose)
DTP	1				☐ Yes	☐ DTP ☐ DTaP ☐ DTaP-Hib ☐ DTP-Hib ☐ DTaP-HepB-IPV
	2				☐ Yes	☐ DTP ☐ DTaP ☐ DTaP-Hib ☐ DTP-Hib ☐ DTaP-HepB-IPV
	3				☐ Yes	☐ DTP ☐ DTaP ☐ DTaP-Hib ☐ DTP-Hib ☐ DTaP-HepB-IPV
	4				☐ Yes	☐ DTP ☐ DTaP ☐ DTaP-Hib ☐ DTP-Hib ☐ DTaP-HepB-IPV
	5				☐ Yes	☐ DTP ☐ DTaP ☐ DTaP-Hib ☐ DTP-Hib ☐ DTaP-HepB-IPV
Hib	1				☐ Yes	☐ Hib ☐ HepB-Hib ☐ DTaP-Hib ☐ DTP-Hib
	2				☐ Yes	☐ Hib ☐ HepB-Hib ☐ DTaP-Hib ☐ DTP-Hib
	3				☐ Yes	☐ Hib ☐ HepB-Hib ☐ DTaP-Hib ☐ DTP-Hib
	4				☐ Yes	☐ Hib ☐ HepB-Hib ☐ DTaP-Hib ☐ DTP-Hib
	5				☐ Yes	☐ Hib ☐ HepB-Hib ☐ DTaP-Hib ☐ DTP-Hib
Hepatitis B	1				☐ Yes	Given at birth? ☐ Yes — ☐ HepB Only ☐ HepB-Hib ☐ DTaP-HepB-IPV
	2				☐ Yes	☐ HepB Only ☐ HepB-Hib ☐ DTaP-HepB-IPV
	3				☐ Yes	☐ HepB Only ☐ HepB-Hib ☐ DTaP-HepB-IPV
	4				☐ Yes	☐ HepB Only ☐ HepB-Hib ☐ DTaP-HepB-IPV
MMR	1				☐ Yes	☐ MMR ☐ Measles only ☐ MMR-Varicella
	2				☐ Yes	☐ MMR ☐ Measles only ☐ MMR-Varicella
Polio	1				☐ Yes	☐ OPV ☐ IPV ☐ DTaP-HepB-IPV
	2				☐ Yes	☐ OPV ☐ IPV ☐ DTaP-HepB-IPV
	3				☐ Yes	☐ OPV ☐ IPV ☐ DTaP-HepB-IPV
	4				☐ Yes	☐ OPV ☐ IPV ☐ DTaP-HepB-IPV
Varicella	1				☐ Yes	☐ Varicella only ☐ MMR-Varicella
	2				☐ Yes	☐ Varicella only ☐ MMR-Varicella
Pneumo-coccal	1				☐ Yes	☐ Conjugate ☐ Polysaccharide
	2				☐ Yes	☐ Conjugate ☐ Polysaccharide
	3				☐ Yes	☐ Conjugate ☐ Polysaccharide
	4				☐ Yes	☐ Conjugate ☐ Polysaccharide
Hepatitis A	1				☐ Yes	
	2				☐ Yes	
Influenza	1				☐ Yes	
	2				☐ Yes	
	3				☐ Yes	
Other	1				☐ Yes	Please enter a description of each vaccine dose.
	2				☐ Yes	
	3				☐ Yes	
	4				☐ Yes	

Please remember to answer question 9 on page 1.

If you need more space to report vaccines, please attach additional sheets.

DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION
CDC Immunization
SAFER · HEALTHIER · PEOPLE

Vaccines

- All ACIP recommended vaccines that children should have received by 19 months of age

DEPARTMENT OF HEALTH AND HUMAN SERVICES • CENTERS FOR DISEASE CONTROL AND PREVENTION

Recommended Immunization Schedule for Persons Aged 0–6 Years—UNITED STATES • 2007

Vaccine ▼ Age ►	Birth	1 month	2 months	4 months	6 months	12 months	15 months	18 months	19–23 months	2–3 years	4–6 years
Hepatitis B[1]	HepB	HepB		*see footnote 1*	HepB				HepB Series		
Rotavirus[2]			Rota	Rota	Rota						
Diphtheria, Tetanus, Pertussis[3]			DTaP	DTaP	DTaP		DTaP				DTaP
Haemophilus influenzae type b[4]			Hib	Hib	***Hib***[4]	Hib		Hib			
Pneumococcal[5]			PCV	PCV	PCV	PCV				PCV PPV	
Inactivated Poliovirus			IPV	IPV	IPV						IPV
Influenza[6]					Influenza (Yearly)						
Measles, Mumps, Rubella[7]						MMR					MMR
Varicella[8]						Varicella					Varicella
Hepatitis A[9]						HepA (2 doses)				HepA Series	
Meningococcal[10]										MPSV4	

Range of recommended ages

Catch-up immunization

Certain high-risk groups

This schedule indicates the recommended ages for routine administration of currently licensed childhood vaccines, as of December 1, 2006, for children aged 0–6 years. Additional information is available at http://www.cdc.gov/nip/recs/child-schedule.htm. Any dose not administered at the recommended age should be administered at any subsequent visit, when indicated and feasible. Additional vaccines may be licensed and recommended during the year. Licensed combination vaccines may be used whenever any components of the combination are indicated and other components of the vaccine are not contraindicated and if approved by the Food and Drug Administration for that dose of the series. Providers should consult the respective Advisory Committee on Immunization Practices statement for detailed recommendations. Clinically significant adverse events that follow immunization should be reported to the Vaccine Adverse Event Reporting System (VAERS). Guidance about how to obtain and complete a VAERS form is available at http://www.vaers, hhs.gov or by telephone, 800-822-7967.

Demographics and Other Data Collected

- Household
  - Race/ethnicity of mother, child
  - Mother's age, education, marital status
  - Family income
  - Health insurance
  - WIC participation
  - Shot card available
  - Breastfeeding
- Providers
  - # physicians at practice
  - Facility type
  - VFC provider

NIS Special Purpose Supplements (Topical Modules)

- Subsamples of NIS survey can be asked special-purpose questions
  - Insurance Status (2001-02; 2006+)
  - Day Care and Breast Feeding (2001-02)
  - Attitudes and Beliefs (2001-02)
  - Vaccine Safety (2003-04)
  - Vaccine Shortage (2003-04)
  - Childhood Influenza (2004)
  - SES (planned 2008)
  - Parental concerns (planned 2008)

New NIS Modules

- Develop 2007, collect data 2008
- SES Module (national)
  - Barriers to immunization
  - Factors associated with racial/ethnic and income-related coverage disparities
  - Add key questions to NIS core later
- Parental Concerns Module
  - Early warning system for parental concerns about vaccination
  - Developed with NVAC Subcommittee on Public Engagement
  - Consider periodic state-specific estimates

Geographic Specificity

- National level
- State level
- City level
  - Six cities receiving Section 317 immunization grant funding
- Other city/county areas
  - chosen/funded by state grantees
  - Eight areas chosen for 2007

NIS is More Than One Survey…

Periodicity

- Conducted continuously based on quarterly samples
- Reported biannually based on data delivered in June and December
- Focus on data reporting each summer using calendar year data

Timeliness

- Average time from *vaccination* to delivery of calendar year data (months):
  - 38m for HepB birth dose (range 25-52m).
    - (19m in Dec + 6m till data deliv. = 25)
    - (34m in Jan + 12m data col. y + 6m till data deliv. = 52)
  - 32m for 3rd Rota (range 19-46m).
  - 26m for MMR1, VAR1 (range 13-40m).
  - 19m for DTaP4 (range 6-33m).
  - 17m from end of flu vacc. Period (Jan)

Comparability

- Same methods and contractor conduct survey in all sampling areas
- Sample size chosen to achieve effective sample size of 180 children with adequate provider data in each area
- 95% CI half-width of 7.5% or less
- Comparability of methodology means estimates are comparable among states and urban areas over time

Representativeness

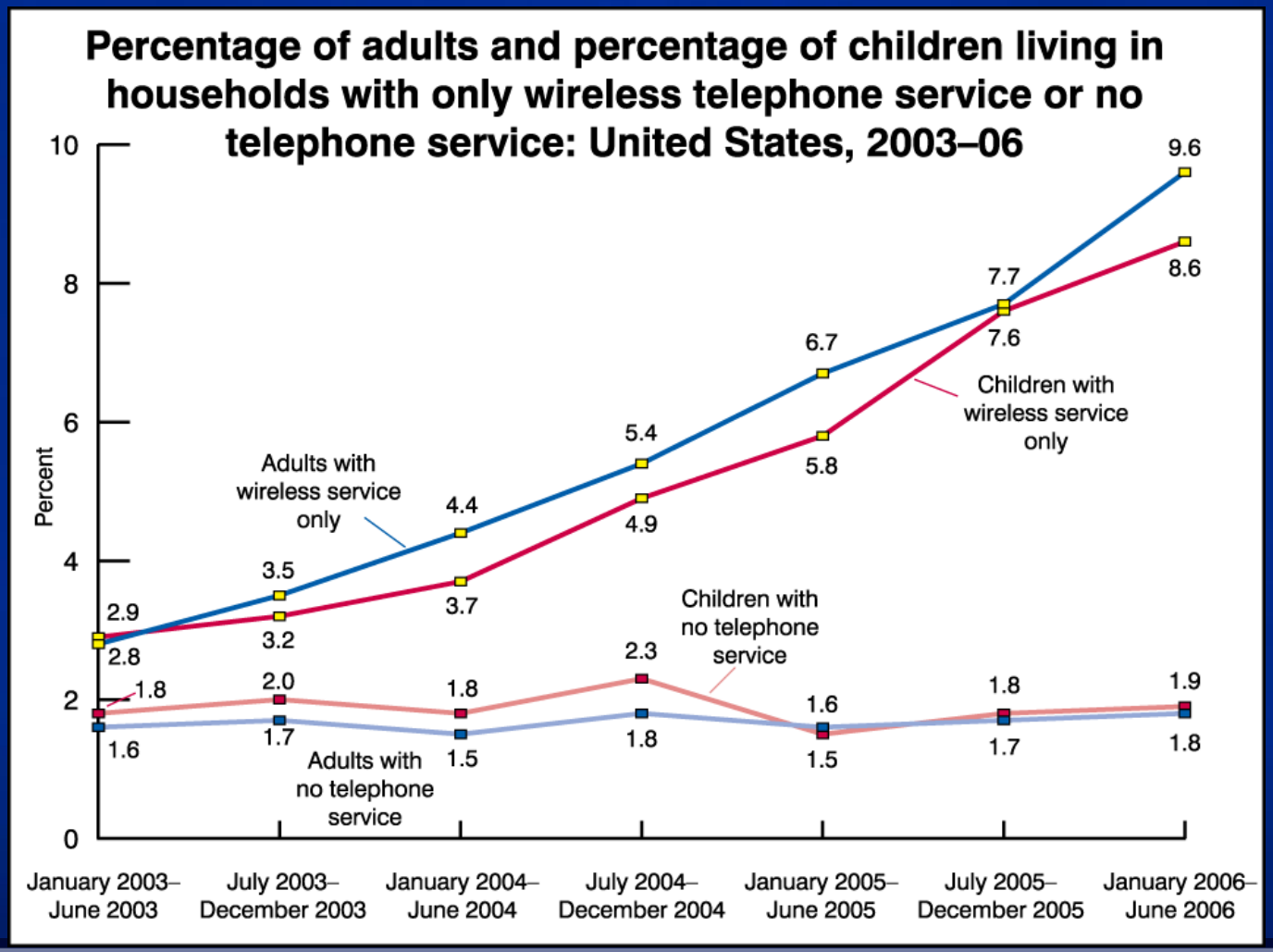
- Data weighted to account for households without landline phones and for nonresponse
- In Q1/Q2 of 2006, 10.4% of children in US lived in HH w/o landline phones
- Research underway to possibly improve the noncoverage adjustments

NIS 2005 Sample

Total sample released	4,465,261
Resolved sample	3,721,224 (83%)
Households identified	1,085,040
Households screened	1,006,435 (93%)
Eligible households	31,909 (3.2%)
Complete interviews	26,867 (84%) 27,627 children
Children with adequate Provider data	17,448 (63%)

Wireless Substitution: Preliminary Data from the 2006 National Health Interview Survey

NCHS E-Stat article by S.J. Blumberg and JV Luke, NCHS



Accuracy

- Parental report of childhood vaccination has been shown to be unreliable
- For all NIS estimates, only provider-reported vaccinations are used for estimation of vaccine coverage

Recommended Immunization Schedule for Persons Aged 7–18 Years—UNITED STATES • 2007

Vaccine ▼ / Age ▶	7–10 years	11–12 YEARS	13–14 years	15 years	16–18 years
Tetanus, Diphtheria, Pertussis[1]	*see footnote 1*	Tdap	Tdap		
Human Papillomavirus[2]	*see footnote 2*	HPV (3 doses)	HPV Series		
Meningococcal[3]	MPSV4	MCV4	MCV4[3] / MCV4		
Pneumococcal[4]	PPV				
Influenza[5]	Influenza (Yearly)				
Hepatitis A[6]	HepA Series				
Hepatitis B[7]	HepB Series				
Inactivated Poliovirus[8]	IPV Series				
Measles, Mumps, Rubella[9]	MMR Series				
Varicella[10]	Varicella Series				

Range of recommended ages

Catch-up immunization

Certain high-risk groups

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NIS-Teen

- Children aged 13-17 years at time of telephone interview with parent
- Vaccination histories from providers
- Measures vaccinations ages ≥11 years
- Conducted national survey Q4 2006
  - 5,483 completed interviews
- Repeat Q4 2007
- Expansion to state/grantee level survey high priority for 2008

Strengths of the NIS

- States and selected city/county areas use estimates for program improvement
- Comparability of methodology means estimates are comparable among states and urban areas over time
- Identifies areas, populations and factors associated with under-immunization
- Provider-verified results
- Provides sampling frame for other health surveys (SLAITS)

Challenges for NIS

- Declining telephone survey response rates - 87% (1994) to 64.5% (2006)
- Wireless-only households
- Some non-coverage and non-response bias may remain after weighting adjustments
- Increasing costs

NIS Operational/Methods Research

- Research to decrease bias, increase cost-efficiency, and guide future NIS methodology
  - Use of IIS sample frame & age-targeted phone lists, 2+ phone banks, redesign questionnaire, advance letter, calling rules, answering machine messages, sensitivity analysis model to evaluate potential bias
- Research to address wireless only and phoneless households
  - Analysis of NHIS by phone status
  - Pilot studies calling cell phones

NIS and Immunization Information Systems (IIS)

- "*The quality and completeness of the registry data must be improved and must be comparable across all states before consideration may be given to supplement or replace the provider-reported data in the NIS.*"
  - Khare et al., Arch Pediatr Adolesc Med 2006
- NIS provider question on use of IIS to obtain vaccination histories (2006)
- Offering service to grantees to evaluate IIS via match with NIS sample

NIS and Immunization Information Systems (IIS)

- Conducting NIS survey & provider record check on IIS sample in 2 states
  - Dual frame approach may reduce cost, increase validity
  - Evaluate use of provider record check on IIS sample to estimate local vaccination coverage
  - Evaluate non-response bias in the RDD frame using IIS data as “gold” standard
- Encourage use of IIS for local assessment

Vaccine Assessment Funding Sources (FY07)

- Total $23.3m
  - <1% of annual $2.5b VFC vaccine purchase
- $12.8m PHS Evaluation
- $ 7.7m Vaccines for Children Program
  - Additional VFC $ for NIS-Teen, FY08
- $ 1.4m state Section 317 grants
  - NIS oversampling in areas chosen by state
- $ 0.9m Division (ISD) research funds
- $ 0.6m influenza pandemic planning

Vaccine Assessment Funding Allocation (FY07)

- $20.5m NIS contract (NORC)
  - $12.2m core NIS
  - $ 2.2m NIS-Teen
  - $ 2.7m modules (adult, SES, Concerns)
  - $ 1.5m operational/methods research
  - $ 1.4m NIS oversampling in selected areas
  - $ 0.6m influenza pandemic survey module
- $ 1.1m IAA's with NCHS
  - Support of NHIS immunization questions
  - NCHS staff support of NIS (~1.5 fte)
- $ 1.7m other assessment activities

Vaccine Assessment Staff Resources

- Assessment Branch (AB), ISD/NCIRD
  - 14 FTE's, 3 contractors
    - Statisticians, epidemiologists, health scientists
    - ~ 9 FTE-equivalents devoted to NIS
- NCHS (~1.5 FTE)
  - NIS contract originally managed by NCHS
  - Effective 2005, co-project officers established
    - AB/ISD responsible for NIS
    - NCHS responsible for SLAITS
      - Also handles NIS IRB
  - Statistician
    - Methods research, public use file development

Information Dissemination

- Annual MMWR articles
  - Briefings with states/local grantees
- Post detailed tables online twice yearly
  - Q3-4 2005 + Q1-2 2006 data ~ Jan. 2007
  - Q1-4 2006 data ~ summer 2007
- Public use file available annually
- In-house analysis
  - 13 NIS papers published in 2006
- Ad hoc requests from states, CDC, other
- Developing online data query system

Uses of NIS Data

- State immunization program improvements
- Assist in management of the Vaccines for Children (VFC) entitlement program (health insurance)
- Monitoring *Healthy People 2010* objectives
- Uptake of new vaccines
- Factors associated with coverage
- Racial/ethnic disparities
- Parental vaccine safety concerns
- Quality performance measures
  - timeliness, age-appropriate & validly-spaced doses
- Use of combination vaccines
- County-level coverage estimation
- Coverage trends by birth cohort
- Cost-effectiveness analysis
- Vaccine-effectiveness studies

Strategic Planning

- April 2007 External Review of Intramural Research
  - Prioritization of vaccination assessment
    - "What should we be assessing?"
- CDC vaccination assessment work group
- Feedback on priorities
  - National Vaccine Advisory Committee
  - Immunization stakeholders
- October 2007 CCID BSC NCIRD subcommittee
  - Issues in data analysis and reporting

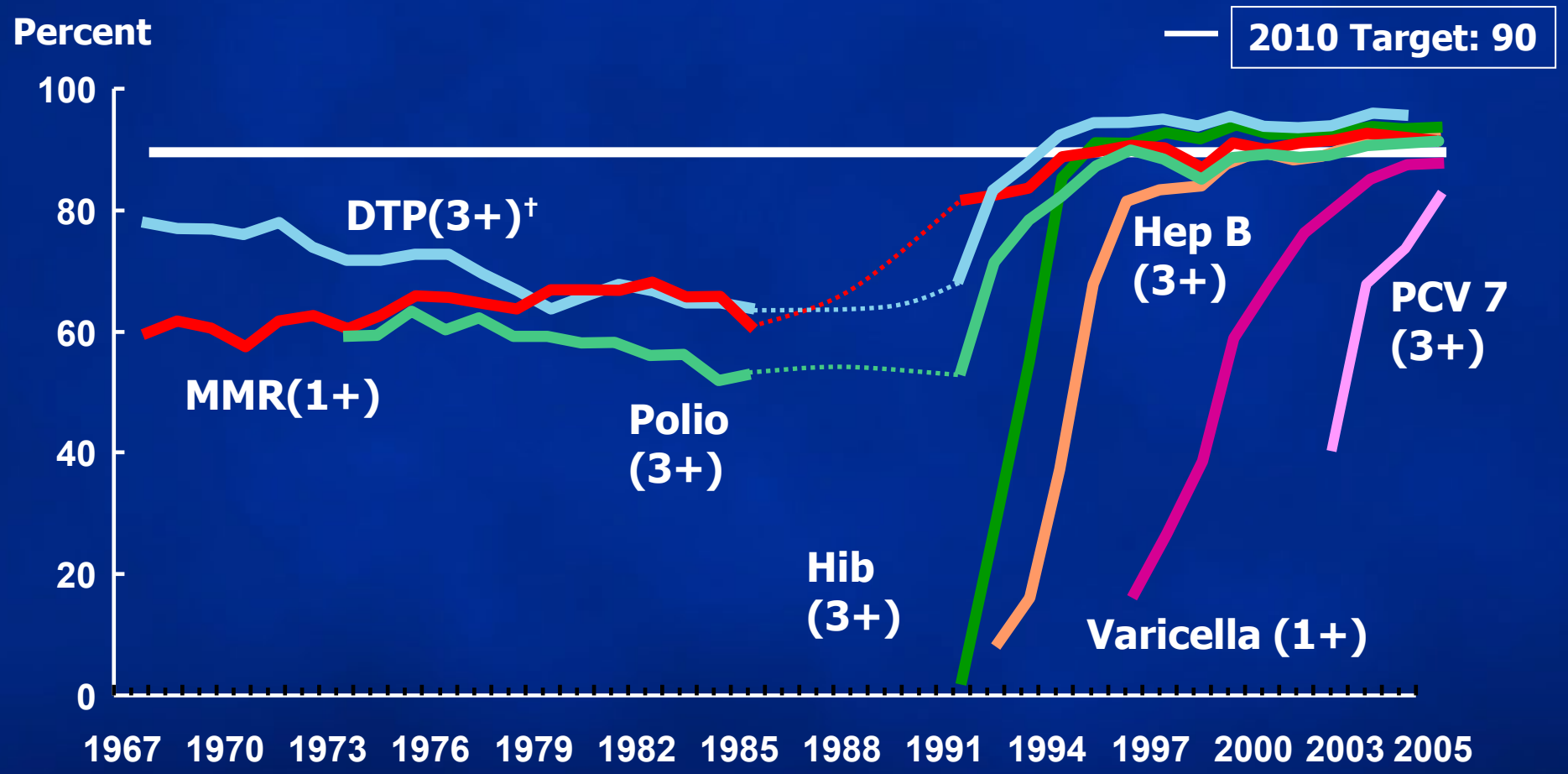
NCHS Program Review Proposed Questions

- What could be done to improve the validity and efficiency of the NIS?
- Are we conducting the appropriate types of methods research to guide improvement of the NIS?
- How should we deal with increasing prevalence of households with only cell phones?
- What alternative sampling designs should be considered?

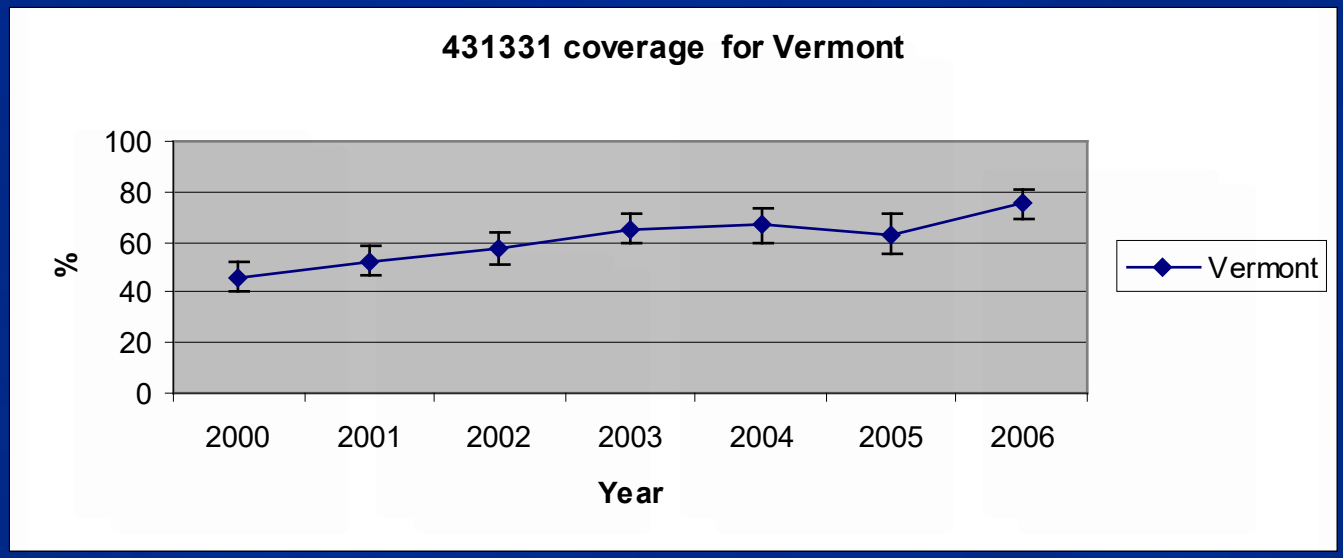
Additional Slides

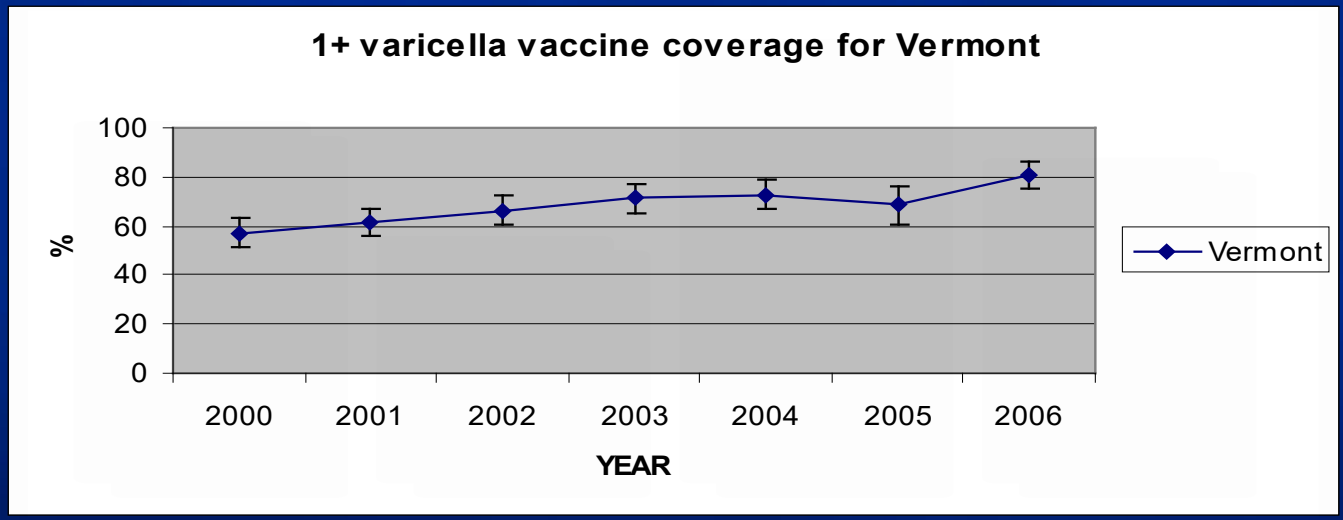
Vaccine-Specific Coverage: Preschool-Aged Children

Note: † DTP(3+) is not a Healthy People 2010 objective. DTP(4) is used to assess Healthy People 2010 objective 14-22a.
Source: USIS (1967-1985), NHIS (1991-1993) CDC, NCHS, and NIS (1994-2005), CDC, NCIRD and NCHS;

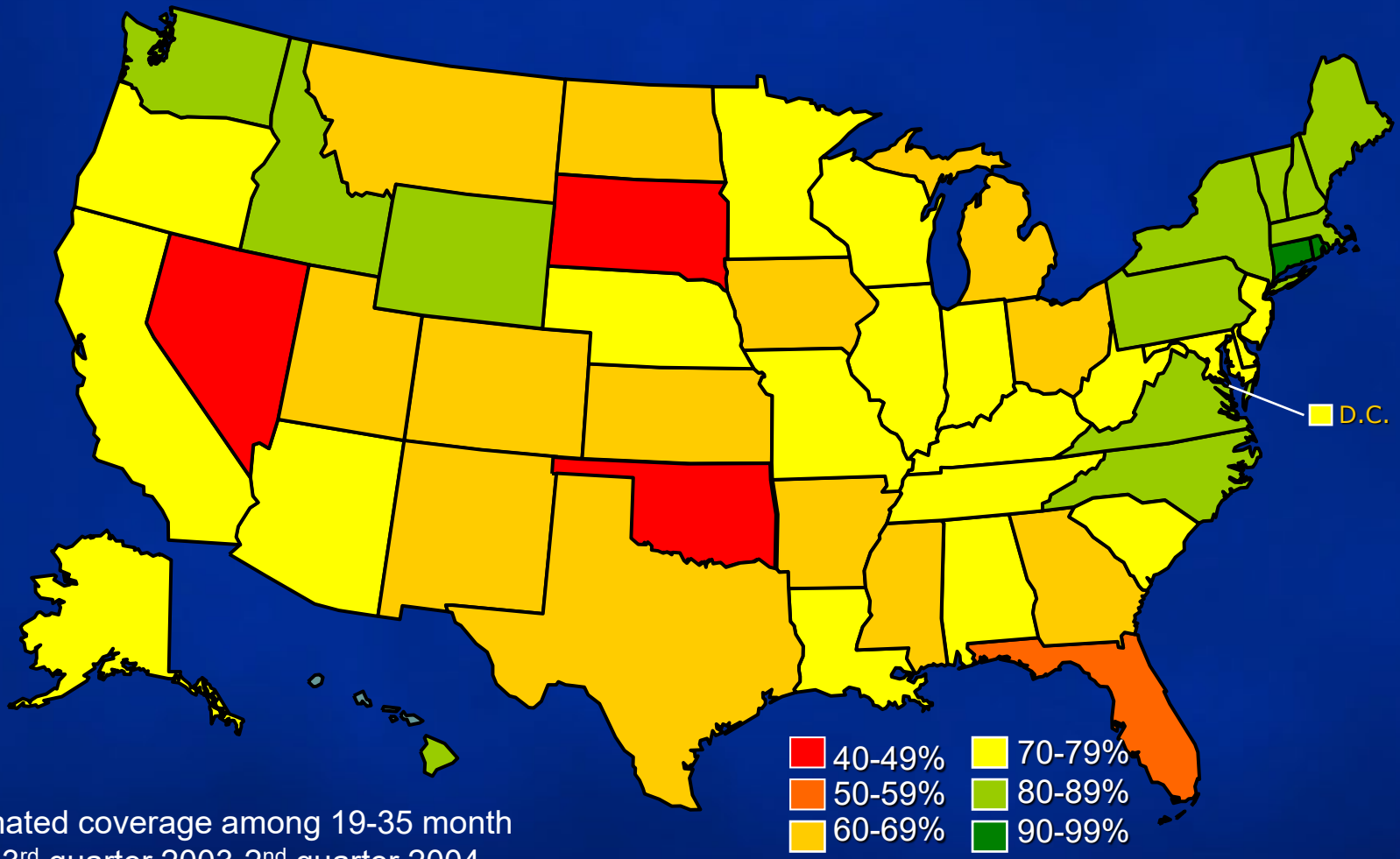


Trends in Vaccine Coverage in Vermont, NIS 2000-2006





Estimated PCV7 Coverage (3+ doses), by State, National Immunization Survey, U.S., 2004



Estimated coverage among 19-35 month olds, 3rd quarter 2003-2nd quarter 2004

Data Analysis & Reporting

- Reporting coverage for vaccine series
- Defining vaccination outcome
- Other measures of coverage
  - Timeliness
  - Cumulative % vaccinated by age
- Trends by birth cohort vs. data collection year
- Small area estimation
  - Estimates for 181 counties using data from 2004-05 combined