

2009-10 Influenza Season Vaccination Coverage, US

2009-10 Influenza Vaccination Surveillance Systems

Gary L Euler, DrPH, Epidemiologist
Jim Singleton, PhD(c), Chief
Assessment Branch
ISD/NCIRD/CDC

Influenza Summit
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*The findings and **conclusions** in this presentation are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.*



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April 2, 2010 MMWR Articles

- CDC/RAND/Knowledge Networks panel
October 2009 survey of HCP
- State-specific monovalent ('H1N1')
vaccination
 - Methods of estimating coverage
 - Kaplan-Meier survival estimates of
vaccinations through January using interview
data collected through February
 - Combined BRFSS and NHFS state-level
estimates



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Centers for Disease Control and Prevention
MMWR Morbidity and Mortality Weekly Report
 Weekly / Vol. 59 / No. 12 April 2, 2010

Interim Results: Influenza A (H1N1) 2009 Monovalent and Seasonal Influenza Vaccination Coverage Among Health-Care Personnel — United States, August 2009–January 2010

H1N1 Coverage Among HCP by Mid-January

RAND/KN	37%
NHFS	39%
BRFSS	31%

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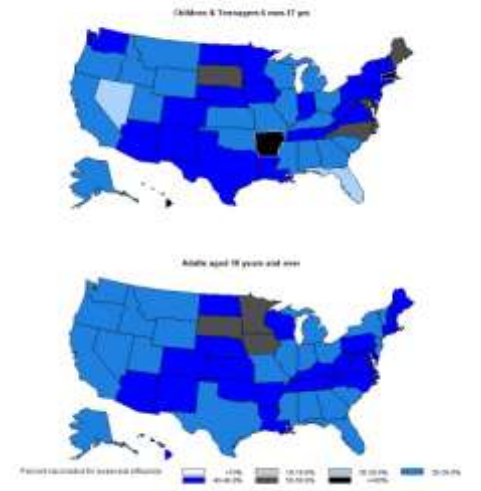
April 30, 2010 MMWR Article

- State-specific trivalent ('seasonal') vaccination
- Same methods as April 2 monovalent article
 - Kaplan-Meier survival estimates of vaccinations through January using interview data collected through February
 - Combine BRFSS and NHFS state-level estimates

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Interim results of state-specific trivalent coverage

FIGURE 1. Estimates of child and adult state-specific cumulative seasonal influenza vaccination coverage, Behavioral Risk Factor Surveillance System (BRFSS) and National H1N1 Flu Survey (NHS) combined - United States, 50 states and the District of Columbia, 2009-10



What is already known on this topic?

The 2009-10 influenza season was highly unusual because 1) public awareness of the potential seriousness of influenza was heightened by media coverage of H1N1 pandemic-associated hospitalizations and deaths, especially among younger persons; 2) in the fall, the distribution of two separate influenza vaccines began, with distinct, although overlapping, recommendations from the Advisory Committee on Immunization Practices (ACIP); and 3) it was the first full season in which ACIP's recommendation to vaccinate all children aged 5-18 years was implemented.

What is added by this report?

Compared with the previous influenza season, 2009-10 saw a 67% relative increase in estimated coverage for children and a 30% relative increase for adults aged 18-49 years without high-risk conditions.

What are the implications for public health practice?

Health departments should identify strategies that increase coverage (e.g., school-located vaccination programs and office-based protocols, such as reminder/recall and standing orders) and other community interventions to supplement the routine vaccination services provided by health-care providers.

MMWR 2010;59:478-84



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Swine Flu Fears Push Seasonal Shots to Record High

CDC: Record number of Americans got seasonal flu shots; fear of swine flu contributed

The Associated Press

By MIKE STOBBE AP Medical Writer

ATLANTA April 29, 2010 (AP)



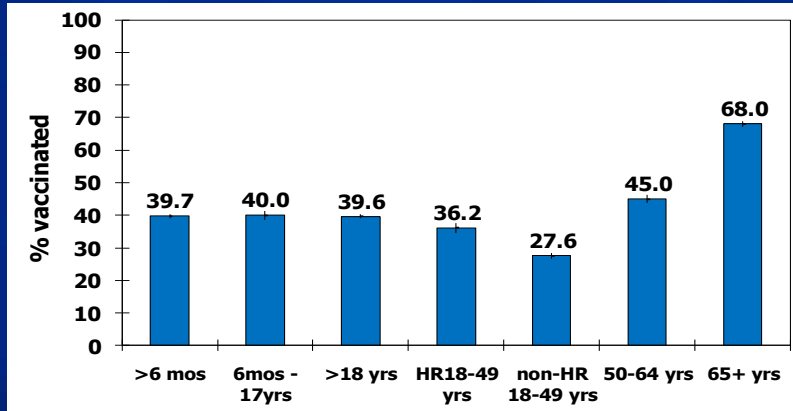
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2009-10 Trivalent Vaccination Coverage

as of January 31, 2010, BRFSS and NHFS
 n=79,154 children/adolescents plus 183,263 adults



Source: MMWR 2010;59:478-484

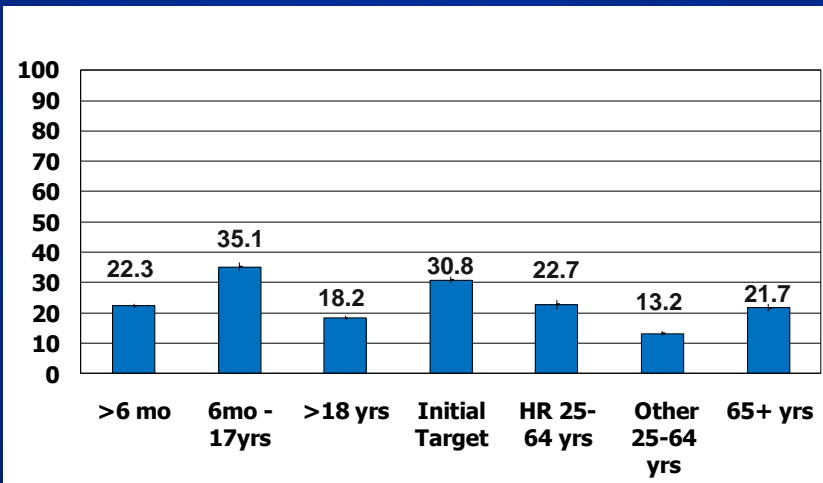


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H1N1 Vaccination Coverage as of end of January 2010, BRFSS and NHFS



Source: MMWR 2010;59:363-8



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National 2009 H1N1 Flu Survey (NHFS)

- Conducted October 2009 – June 2010 by National Opinion Research Center (NORC)
- Random-digit-dialed telephone survey of 6,000 households / month
 - 18% from households that are cell phone-only or mainly
- Additional children from NIS sample frame
 - ~8,000 per month
- Weekly national H1N1 & seasonal estimates
- Coverage, intent, reasons, opinions, place of vaccination



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Behavioral Risk Factor Surveillance System (BRFSS)

- Conducted October 2009 – June 2010
- State-based random-digit-dialed telephone survey of >29,000 households per month
 - Landline only for influenza-related questions
- Children: 46 states, DC, PR, USVI
- Adults: 49 states, DC, PR, USVI
- Monthly H1N1 & seasonal coverage
 - Primary source of state-level data
 - Aggregate “national” estimates



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Five Other Sources

- **SDI Health**
 - CLAIMS of vaccinations administered in provider offices
- **RAND/Knowledge Networks Internet Panel Surveys of Health-care Personnel (HCP)**
 - Monthly national estimates of H1N1 and seasonal coverage and behavioral factors
- **Harvard School of Public Health Flu Polls**
 - Eight national polls conducted April 2009 – January 2010
- **Pregnancy Risk Assessment Monitoring System (PRAMS)**
 - ~30,000 women with live births to be surveyed in 31 states
- **National Health Interview Survey (NHIS)**
 - National in-person survey



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RDD Databases: New Analytic Approaches – 1 Improving Precision Kaplan-Meier survival estimates



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New Analytic Approaches – 2 Improving Precision, Filling Gaps

Combining Surveys

*Fill in with NHFS for states missing BRFSS data
Improve precision for state-level child estimates*

$W_c(0.5 \cdot \text{BRFSS child state A} + 0.5 \cdot \text{NHFS child state A}) +$
 $W_a(0.8 \cdot \text{BRFSS adult state A} + 0.2 \cdot \text{NHFS adult state A})$

$W_c(\text{NHFS child state B})$

+

$W_a(0.9 \cdot \text{BRFSS adult state B} + 0.1 \cdot \text{NHFS adult state B})$

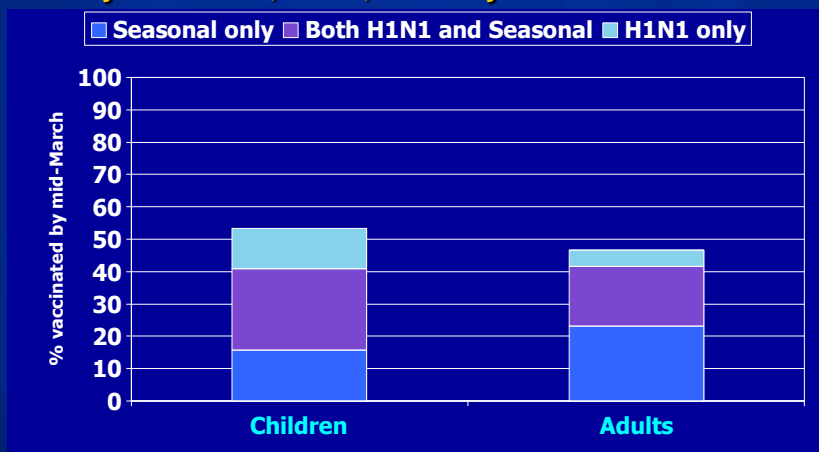


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Percent of Children and Adults Vaccinated with Trivalent, Monovalent or Both Vaccines by mid-March, NHFS, February 28 – March 27 2010



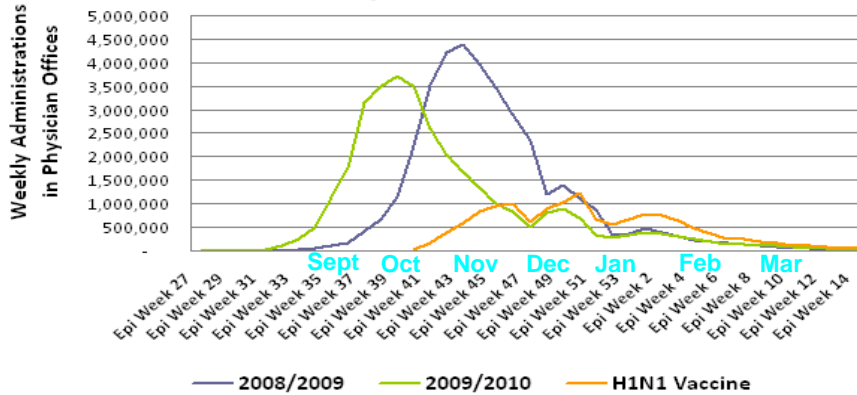
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Weekly uptake of tri- and monovalent influenza vaccines through April 10, 2010, SDI Health

Weekly Uptake of Seasonal and H1N1 Vaccine in Physician Offices



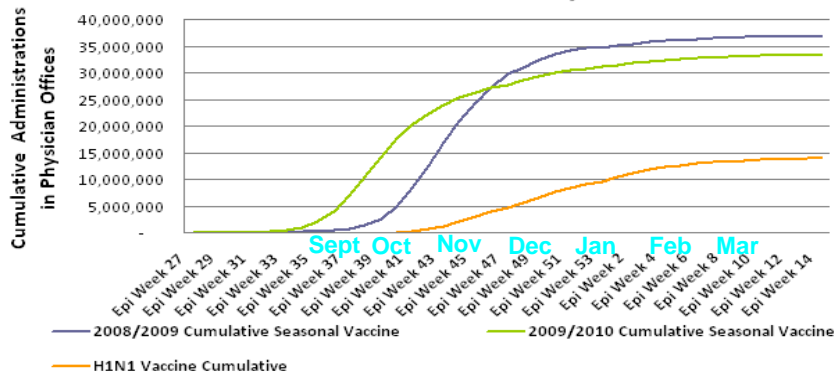
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Cumulative doses administered in physician offices for tri- and monovalent vaccine through April 10, 2010, SDI

Cumulative Doses of Seasonal and H1N1 Vaccine Administered in Physician Offices

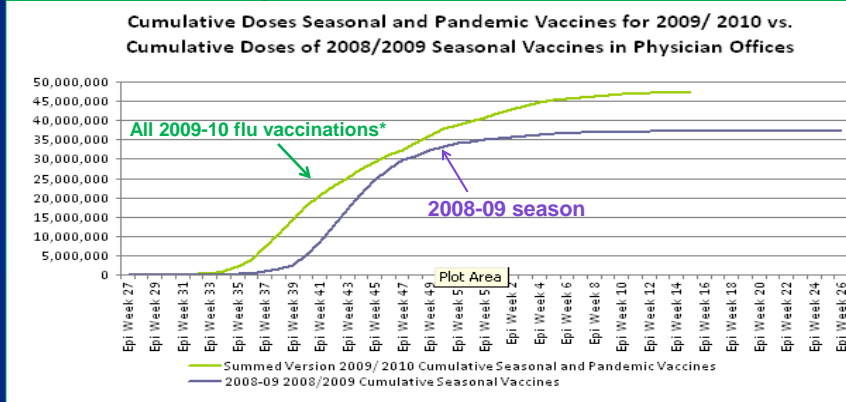


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Projected 2009-10 Influenza Vaccination Cumulative Uptake of Either Vaccine (tri- or monovalent) through April 17 Compared to Previous Season, SDI



*This uptake line shows all flu vaccinations (H1N1 or seasonal) billed in physician offices

NOTE: Combining tri- and monovalent vaccinations, influenza vaccination uptake in 2009-10 is 27% higher than for the 2008-09 season.

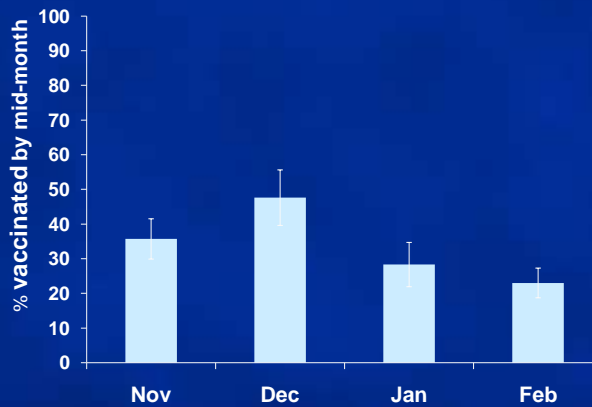


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Seasonal Vaccination Coverage Pregnant Women, BRFSS

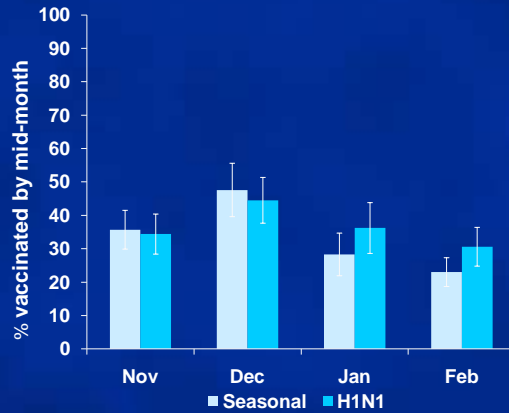


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Tri- vs. Monovalent Vaccination Coverage Pregnant Women, BRFSS



Sample sizes for seasonal were 221, 163, 144 and 199 of currently pregnant women in Nov, Dec, Jan and Feb, respectively. For H1N1, sample sizes were 218, 161, 136, and 185 currently pregnant women in Nov, Dec, Jan and Feb, respectively. States not included: VT in Nov and Dec; AZ, CT, DC, RI, UT, VT in Jan; DC, VT in Feb.



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Second H1N1 Dose Receipt, Children 6m – 9y NHFS, February 28 – March 27 2010

- 40% (95% CI 35-44) received ≥ 1 dose
- 20% (95% CI 17-23) received ≥ 2 doses
- Among children receiving at least one dose, 50% received a second dose



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Racial/Ethnic Disparities in Seasonal and H1N1 Vaccination Coverage by mid-March, NHFS, February 28 – March 27, 2010

	Difference in coverage Black – White		Difference in coverage Hispanic – White	
	Seasonal	H1N1	Seasonal	H1N1
Children	-5.6	-4.2	-2.6	5.5
Adults	-16.5*	-9.8*	-21.7*	-11.5*
All	-13.7*	-7.6*	-16.5*	-6.3*

* Coverage difference statistically significant, $p < 0.05$

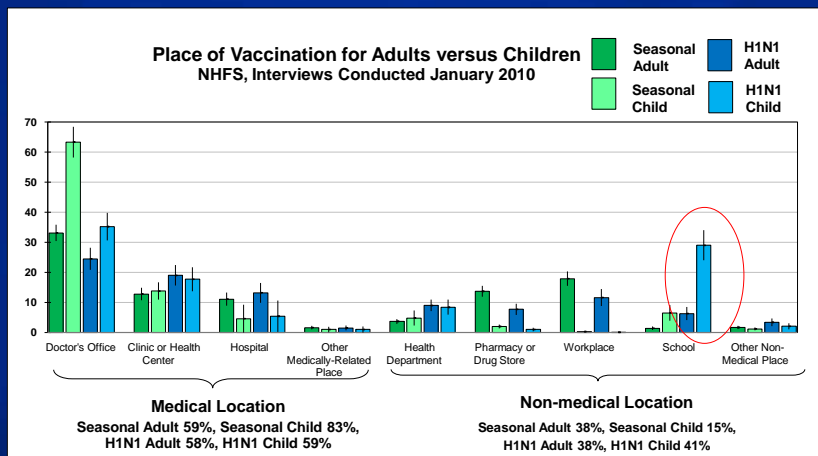


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NHFS – Place of Vaccination



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State-specific Influenza Vaccination Coverage Estimates Shared with States

- Estimates using December data sent mid-January
- Estimates using January data sent mid-February
- Detailed tables by age and target group
- 2009-10 H1N1 and seasonal reported levels
- 2007-08 seasonal for comparison
- Regional and national estimates
- Child BRFSS and NHFS estimates combined to provide child data in all states and improve precision

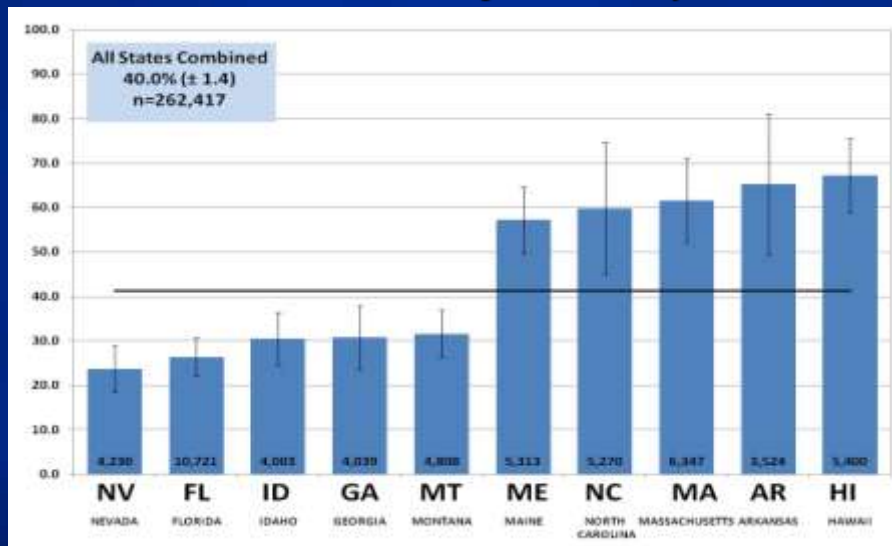


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2009-10 Trivalent Influenza Coverage Top and Bottom 5 states Children/Adolescents Aged 6 mos to 17 yrs



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2009-10 Trivalent Influenza Coverage Top and Bottom 5 states Persons Aged ≥18 years



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2009-10 Estimated Trivalent Influenza Vaccination Coverage Top Highest States

IN A TOP 5	n	ALL	Children	ADULTS	18 to 49 y	18 to 49 y	50 to 64 y	≥65 yrs
		≥6 mos	6 m to 17 y	≥18 y	at high risk	not at high risk		
MN	4,638	HI		HI	HI	HI	HI	
SD	4,016	HI		HI	HI	HI	HI	
HI	5,400	HI	HI				HI	HI
MA	6,347	HI	HI				HI	HI
RI	3,156	HI		HI	HI			
IA	4,571			HI		HI		HI
NE	8,873			HI	HI	HI		
ME	5,313		HI					
AR	3,524		HI					
NC	5,270		HI					
CO	5,387				HI			
DC	2,843					HI		
UT	3,853						HI	
NM	5,536							HI
AK	2,585							HI
Median	4,670	40.6	41.2	40.6	38.3	28.8	45.5	69.3
All states combined	262,417	39.7	40.0	39.6	36.2	27.6	45.0	68.0

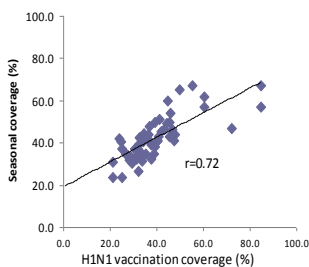
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2009-10 Estimated Seasonal Influenza Vaccination Coverage Bottom Lowest States

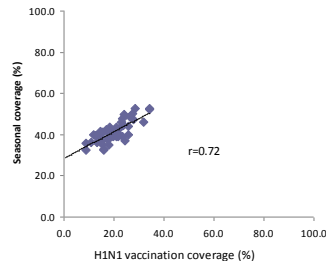
In a Bottom 5	n	All ≥ 6 m	Children 6 m to 17 y	ADULTS ≥ 18 yrs	18-49 y High risk	18-49 y Not high risk	50-64 y	≥ 65 yrs
		%	%	%	%	%	%	%
OK	3,976				LO			
MI	5,371					LO		
CA	7,225				LO			
NJ	5,683						LO	LO
MT	4,808		LO					LO
AL	4,903					LO	LO	
MS	6,443	LO		LO	LO		LO	
GA	4,039	LO	LO	LO	LO			LO
ID	4,003	LO	LO	LO		LO		LO
NV	4,230	LO	LO	LO		LO	LO	LO
FL	10,721	LO	LO	LO	LO	LO	LO	
Median	4,670	40.6	41.2	40.6	38.3	28.8	45.5	69.3
All states combined	262,417	39.7	40.0	39.6	36.2	27.6	45.0	68.0

Are H1N1 and seasonal vaccination coverage by state correlated, this season?

Children: H1N1 vs Seasonal, 2009-10



Adults: H1N1 vs. Seasonal, 2009-10

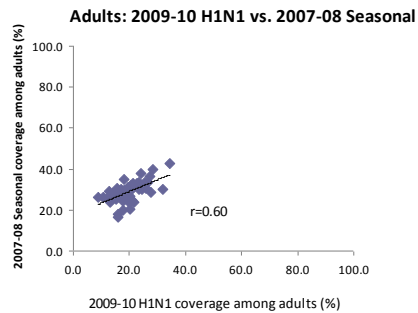
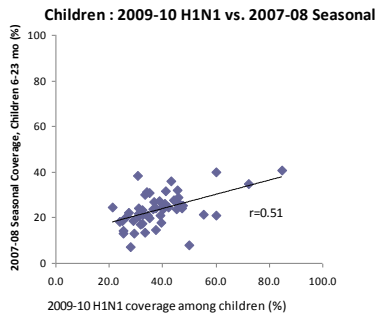


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Is H1N1 coverage by state correlated with past seasonal coverage?



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Summary: Seasonal Vaccine Coverage – 1

- Seasonal vaccination started in August and peaked in October; Seasonal vaccination in September was higher than any past season.
- An estimated 29 million children and 90 million adults vaccinated for Seasonal flu during August 2009-January 2010
- This is the first full season to implement the universal child recommendation
- A 67% relative increase of seasonal vaccination among children and a 30% relative increase among healthy young adults compared to 2008-9 season.
- Seasonal coverage for recommended adults (18-49 HR, >50-64, ≥ 65) were similar compared to 2008-09 season
- State specific child and adult coverage correlated positively ($r=0.68$) with wider range among children than adults



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Summary of Seasonal Vaccine Coverage – 2

- Seasonal state coverage correlated positively with 2009 H1N1 coverage among both children ($r=0.72$) and adults ($r=0.72$)
- An estimated 62% of health care workers vaccinated for seasonal flu by January 2010 (from MMWR-Rand estimates)
- An estimated 38% of pregnant women vaccinated for seasonal flu by the end of January (BRFSS KM estimates)
- Seasonal vaccine coverage in adults was significantly higher in whites than blacks or Hispanics,
- Seasonal coverage in children was higher in whites than blacks, but similar to Hispanics.

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Summary of Seasonal Vaccine Coverage – 3

- State coverage among children ranged from 23.6%(Nevada) to 67.2% (Hawaii)
- State coverage among adults ranged from 32.4% (Nevada) to 52.5% (Minnesota)
- For adults $\geq 65y$, state coverage ranged from 59.3% (Idaho) to 81.6% (Alaska)



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Caveats – 1

- Vaccination status and target group status based on self or parental report
- Respondents may have confused H1N1 and seasonal vaccinations
- Non-response bias may remain after weighting adjustments
- NHFS estimates > BRFSS estimates
- Survey estimates of coverage consistent with vaccination patterns observed with SDI data



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Caveats – 2

- Survey respondents reported 119 million doses of seasonal vaccines administered to non institutionalized persons, however, of the 114-115 million distributed no more than about 105* were available to the surveyed population indicating a over-reporting bias of 10-15%.

– Recommendation:

- Private sector doses wasted/unused need to be measured to allow for validation of self-reported coverage levels

*115 minus 6 m wasted/unused; 2 m administered to LTCF;
2 m administered to members of the military



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Intent for 2010-11 Influenza Vaccination April 3-10, 2010, NHFS

Please think ahead to the upcoming flu season, that is, the flu season that will begin in the fall of 2010. How likely are you to get a flu vaccination during the upcoming flu season? Would you say you:

- (1) will definitely get one
- (2) will probably get one
- (3) will probably not get one
- (4) or, will definitely not get one
- (77) DON'T KNOW
- (99) REFUSED

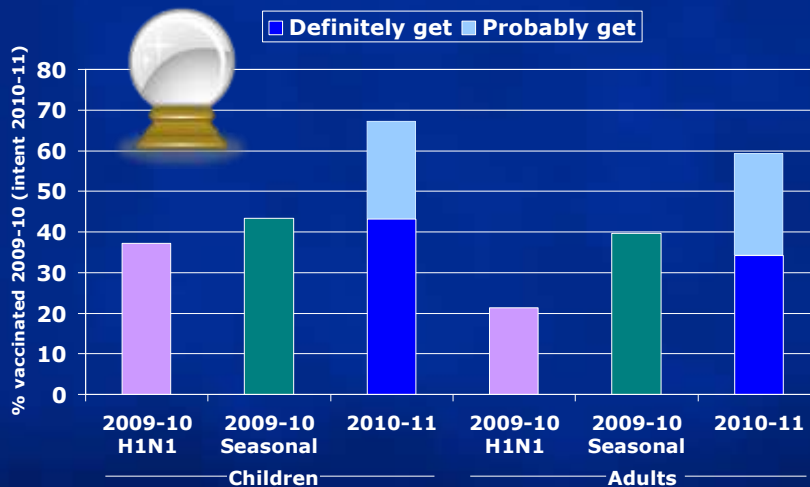


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Intent for 2010-11 Influenza Vaccination April 3-10, 2010, NHFS



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Post-season Evaluation Using Survey Data

- Developing 2009-2010 season research agenda
- Provide information to improve planning and implementation of next flu season and future pandemics
- Implementation – what worked and what didn't
 - Collect data from states on their program activities
 - Relate activities to vaccination coverage
 - Number and type of providers enrolled as H1N1 vaccinators
 - Proportion of vaccine given through public venues
 - School-located vaccination
 - Case studies based on states with high and low coverage
- Provide BRFSS data analysis assistance to states
 - Team of 8+ full time staff

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Plans for 2010-2011 Season Influenza Vaccination Surveillance

- BRFSS adult data monthly
- Children from NIS sample frame
 - Sample size ~8,000 per month
 - National weekly estimates
 - State-level estimates after accumulate several months of data
- “Snapshot” surveys, n~1,400
 - National and in 10 selected metro areas
 - Mid-season and March snapshots
 - Vaccination, opinions, behaviors
- Special population surveys, mid-season & March
 - Health care personnel
 - Pregnant women
- PRAMS, SDI, College Health Database



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Conclusions

- CDC established a comprehensive vaccine coverage monitoring system for 2009 H1N1
- Results from this system helped CDC and possibly states manage the campaign
- Further analysis of data aimed at providing useful information for future seasons
- Lessons learned from assessment this season already applied to plans for 2010-11
- States should consider use of BRFSS to collect additional influenza vaccination data
 - Children (got vaccinated, place of vaccination)
 - Adult health-care personnel
- Improved measurements of unused doses are needed to allow for assessment of the validity of coverage surveys



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Acknowledgements 2009-10 Coverage Team

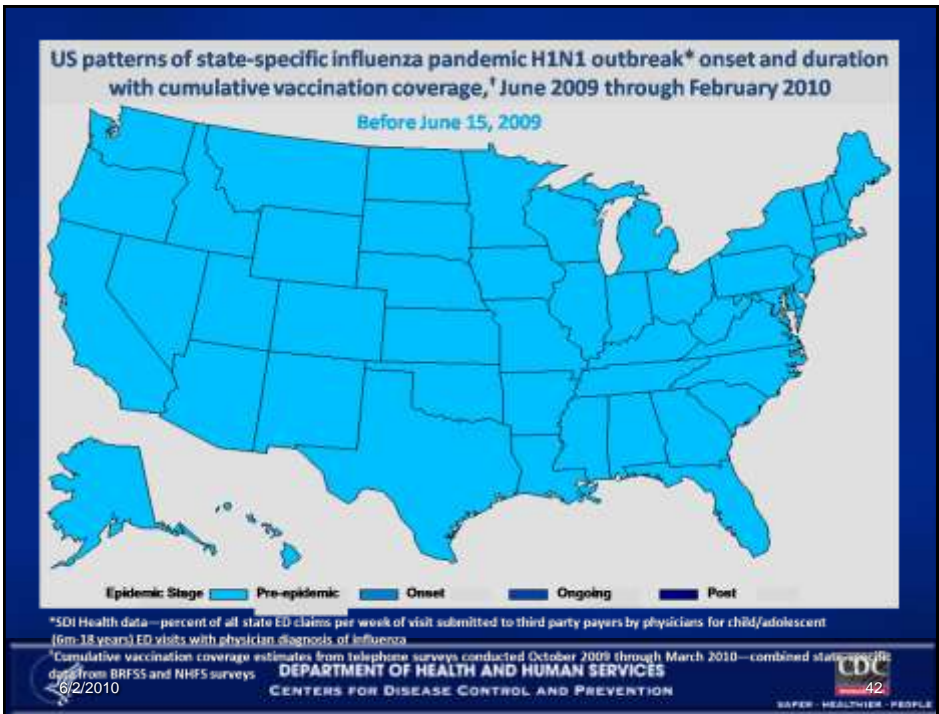
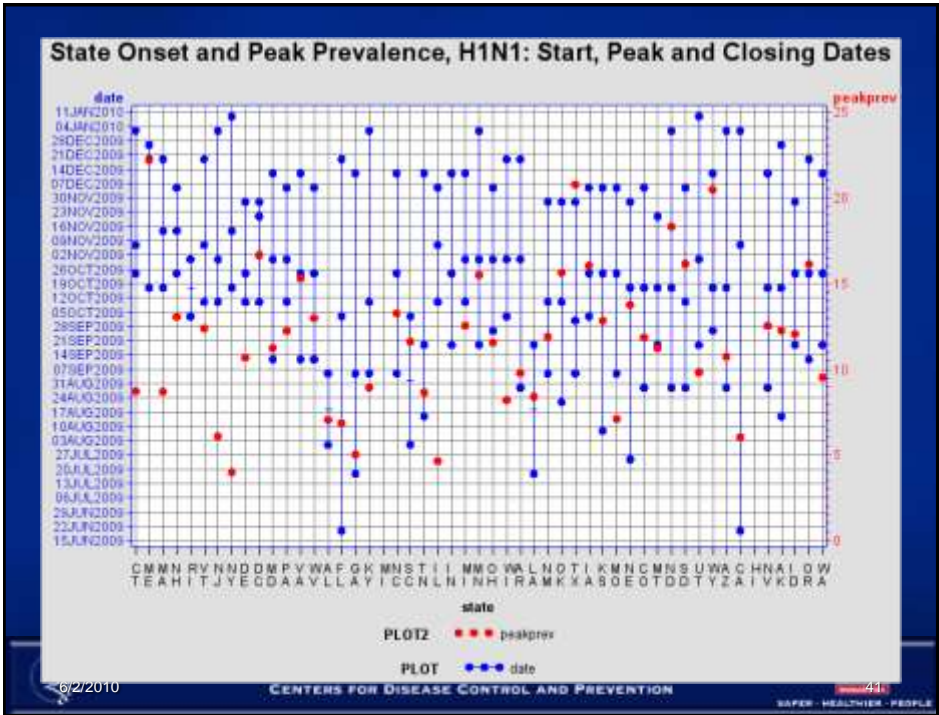
- CDC/NCIRD – Barbara Bardenheier, Carla Black, Daoling Bi, Leah Bryan, Helen Ding, Gary Euler, Carolyn Furlow, Amparo Gonzalez-Feliciano, Charles LeBaron, Pengjun Lu, Elizabeth Luman, Liz Monsell, Rachel Patzer, Tammy Santibanez, Rosana Setse, Jim Singleton, Phil Smith, Larry Wilkinson, Carla Winston, Karen Wooten, David Yankey, Surasak Youngpairaj, Fan Zhang, John Zhang, Zhen Zhao
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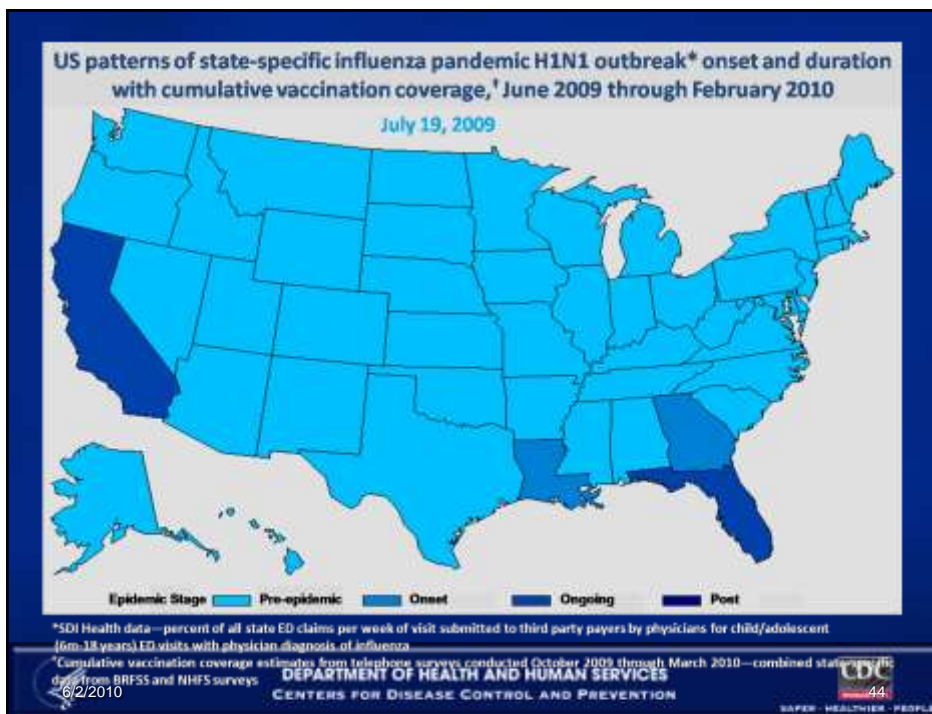
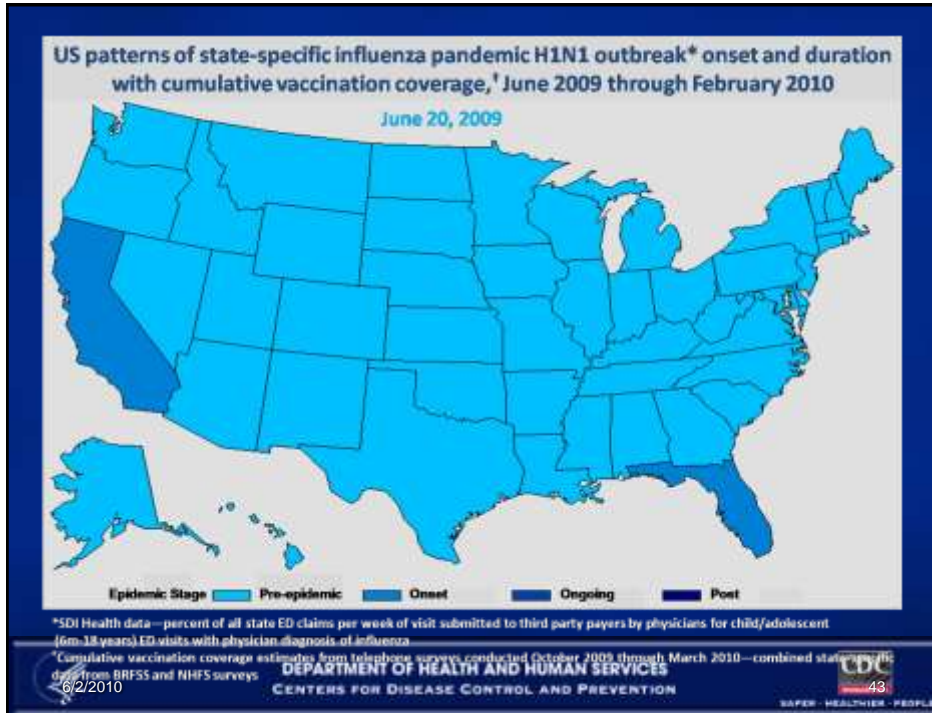


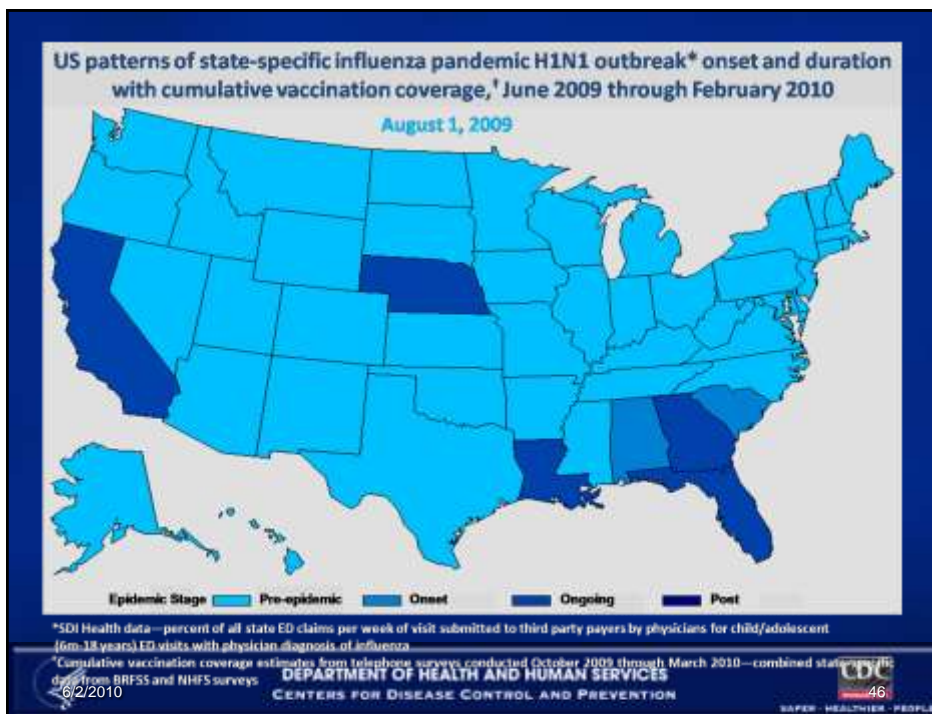
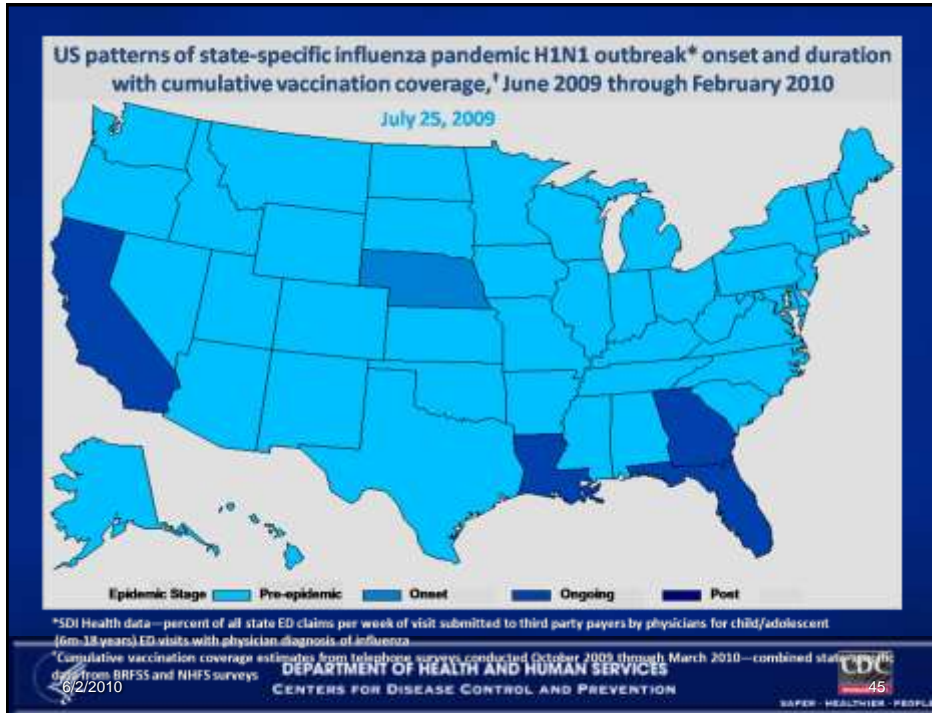
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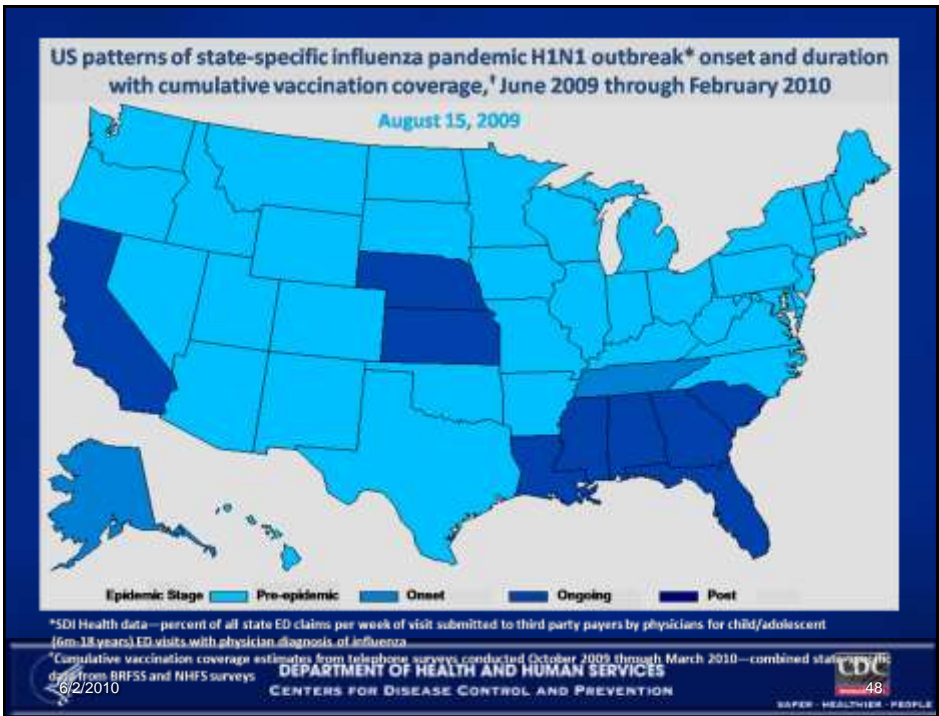
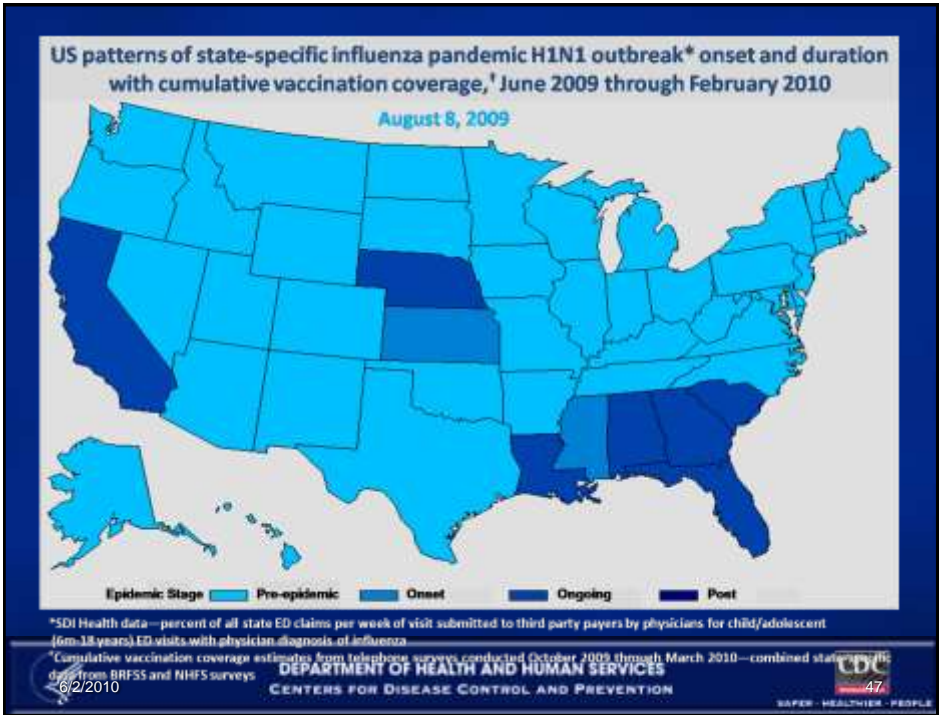


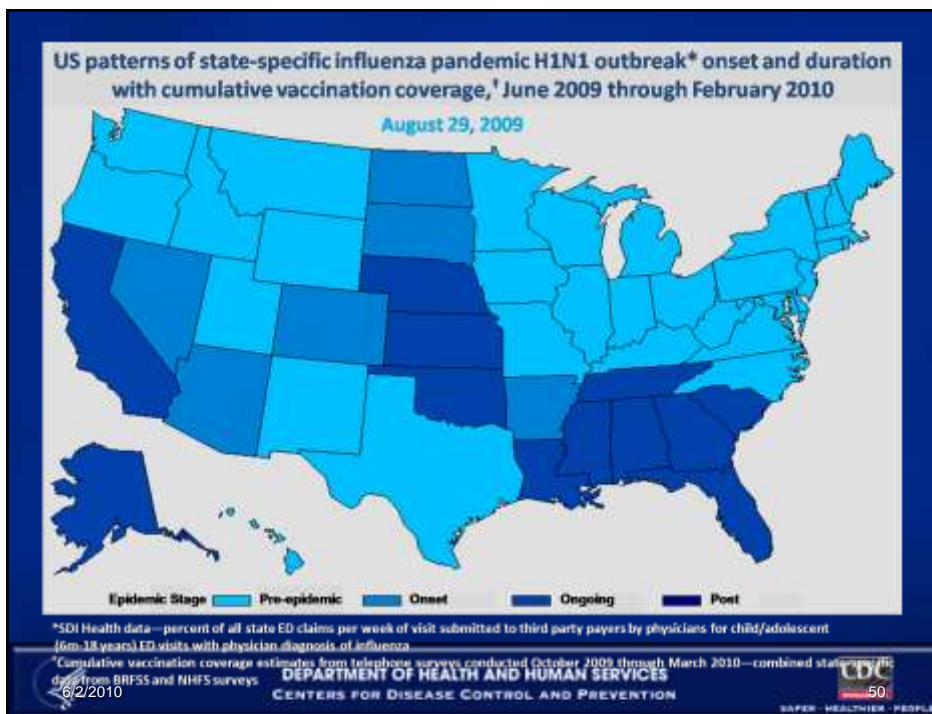
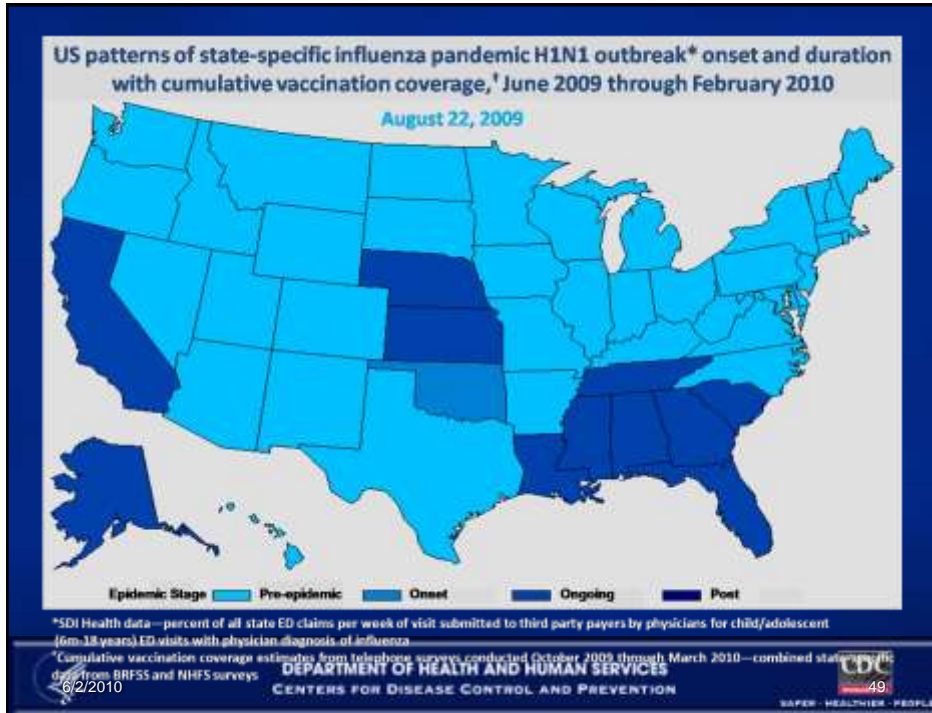
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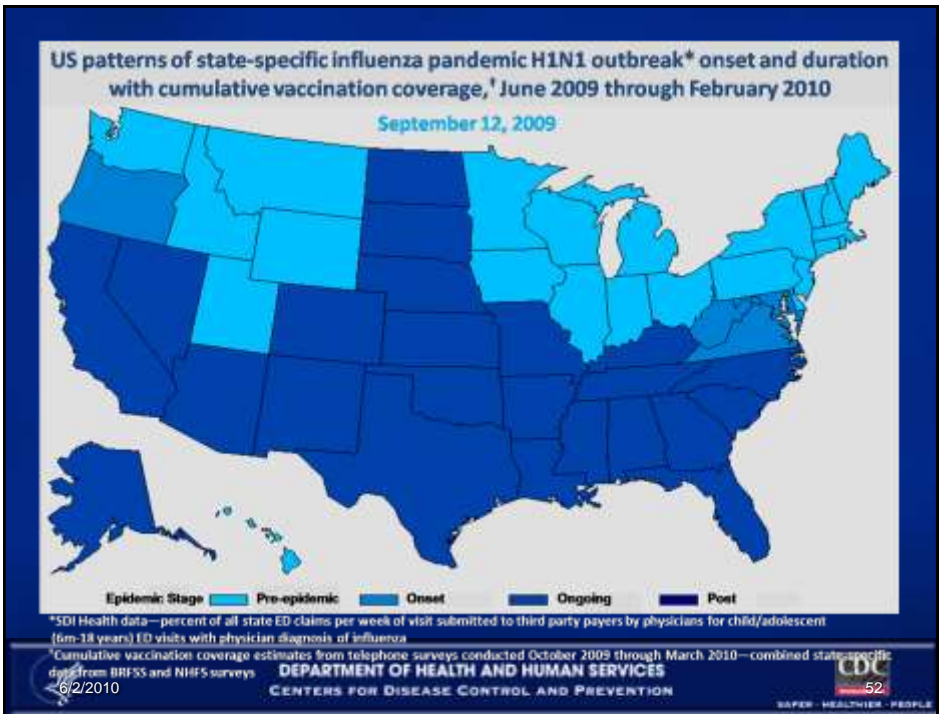
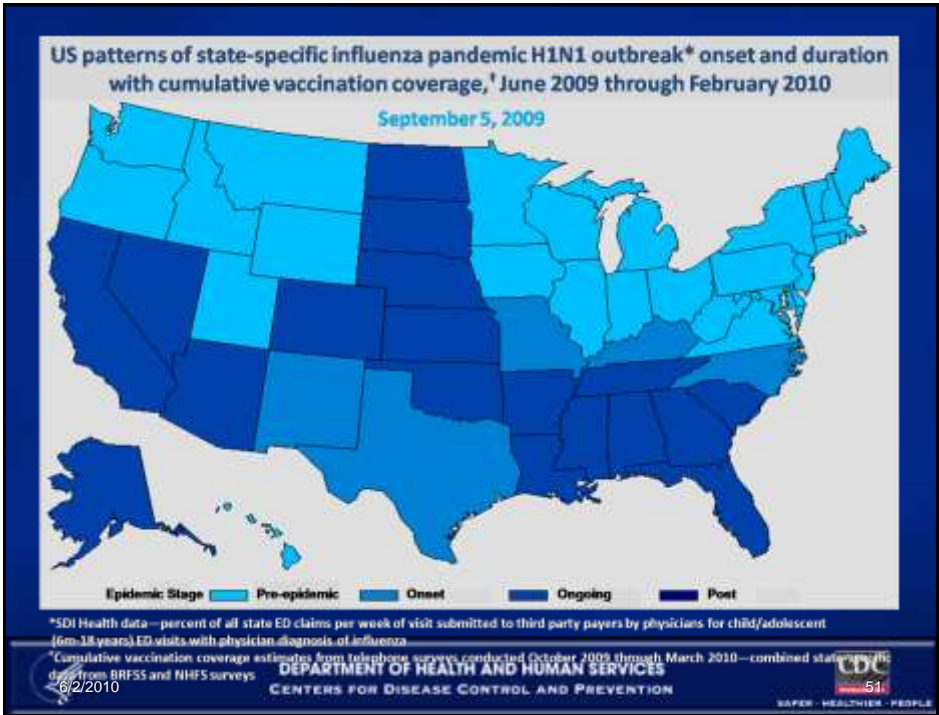


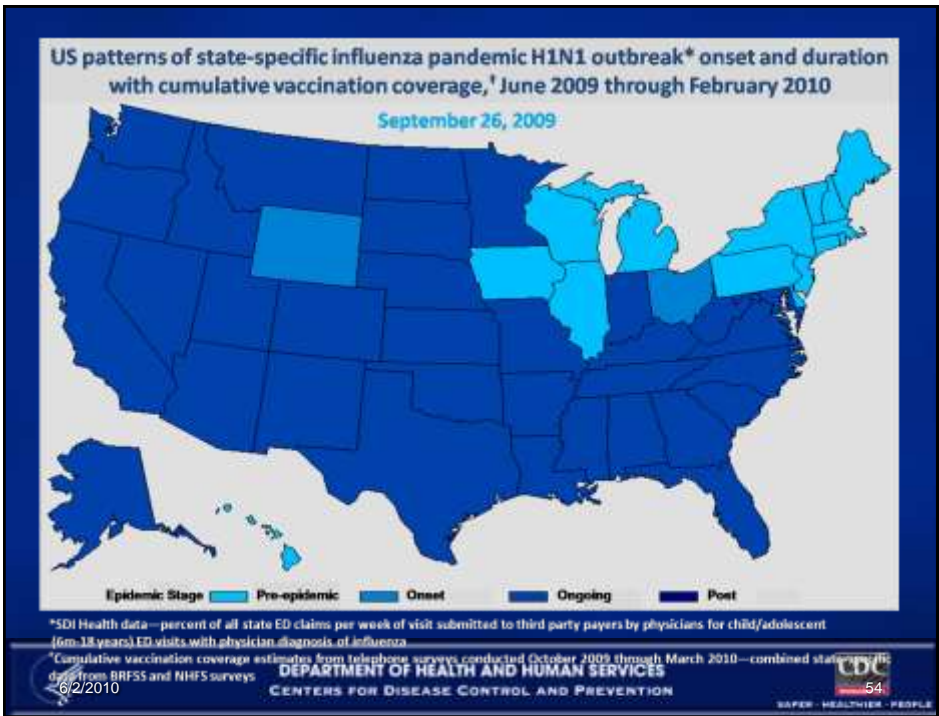
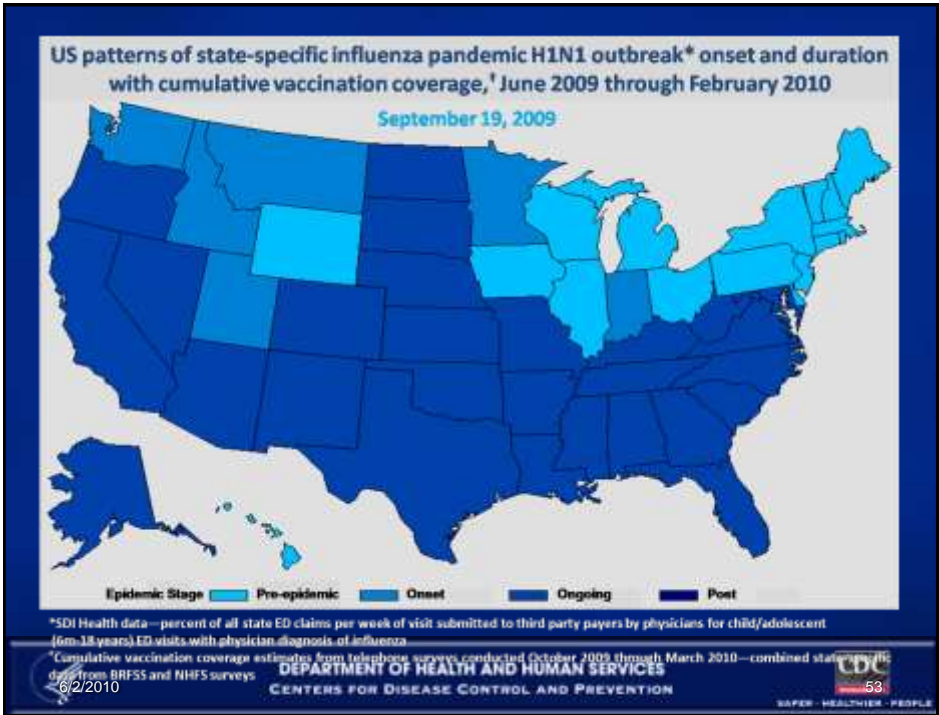


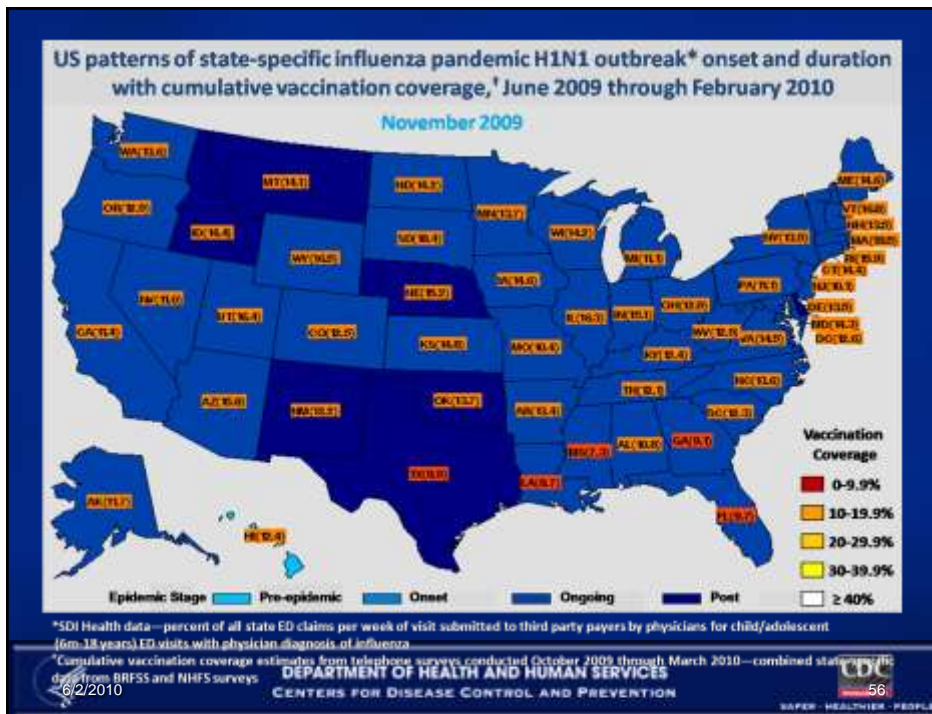
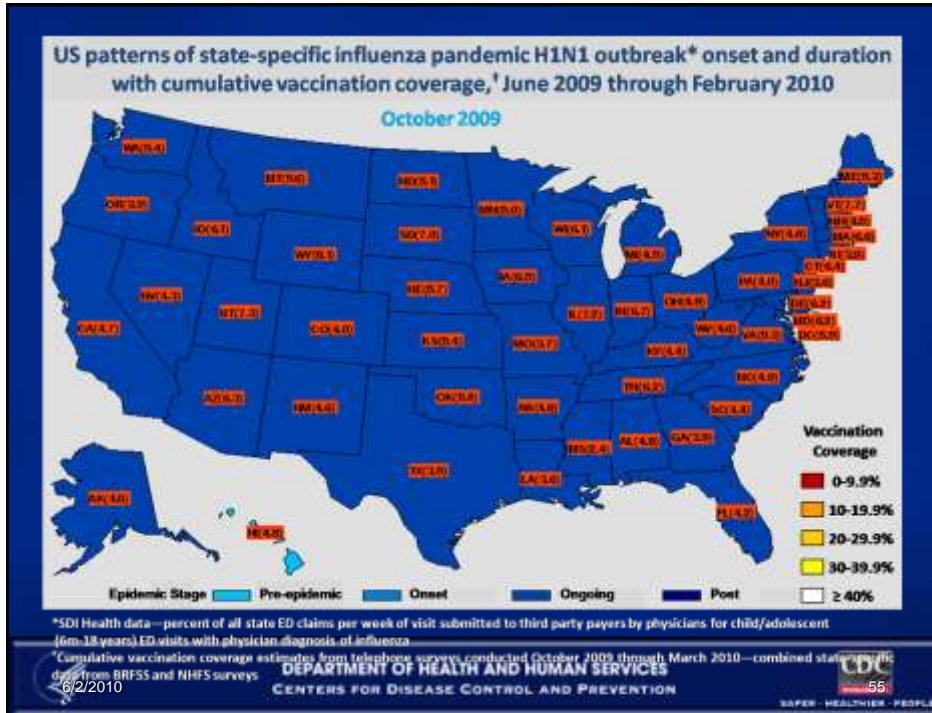


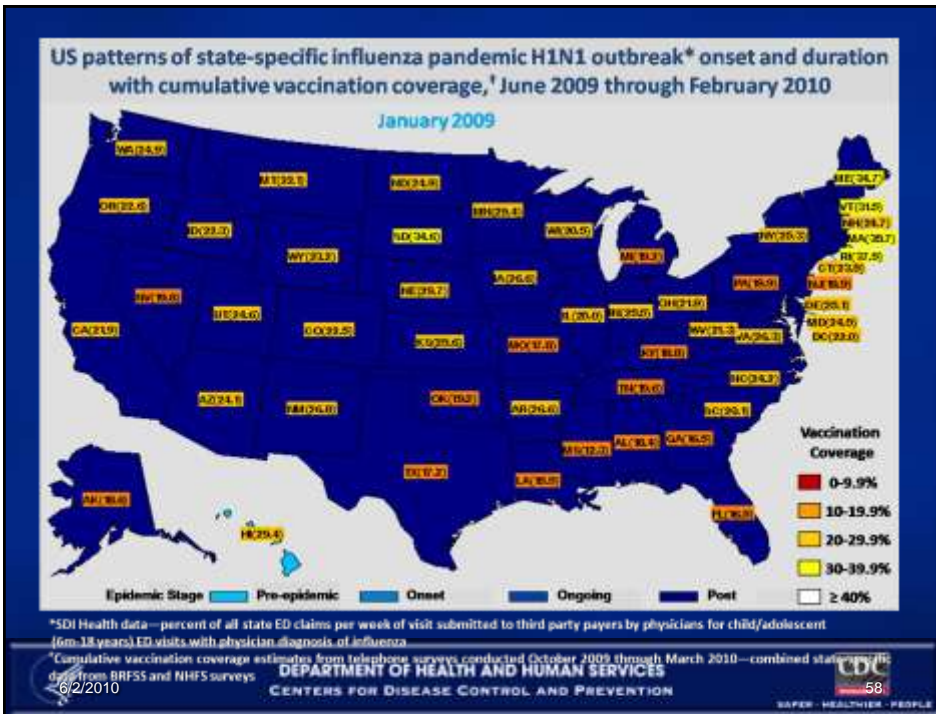
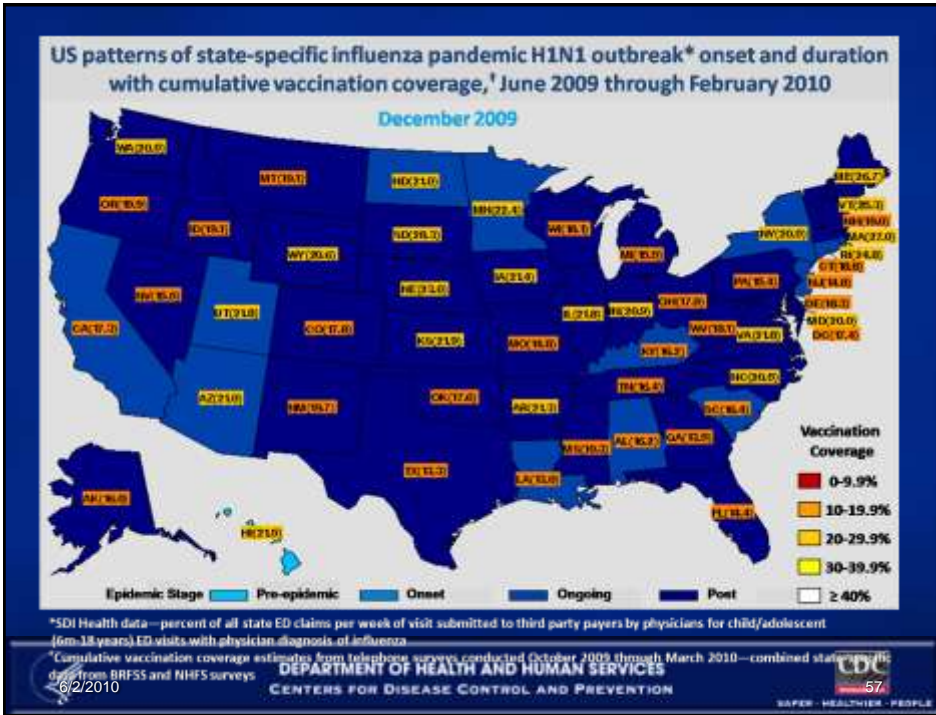


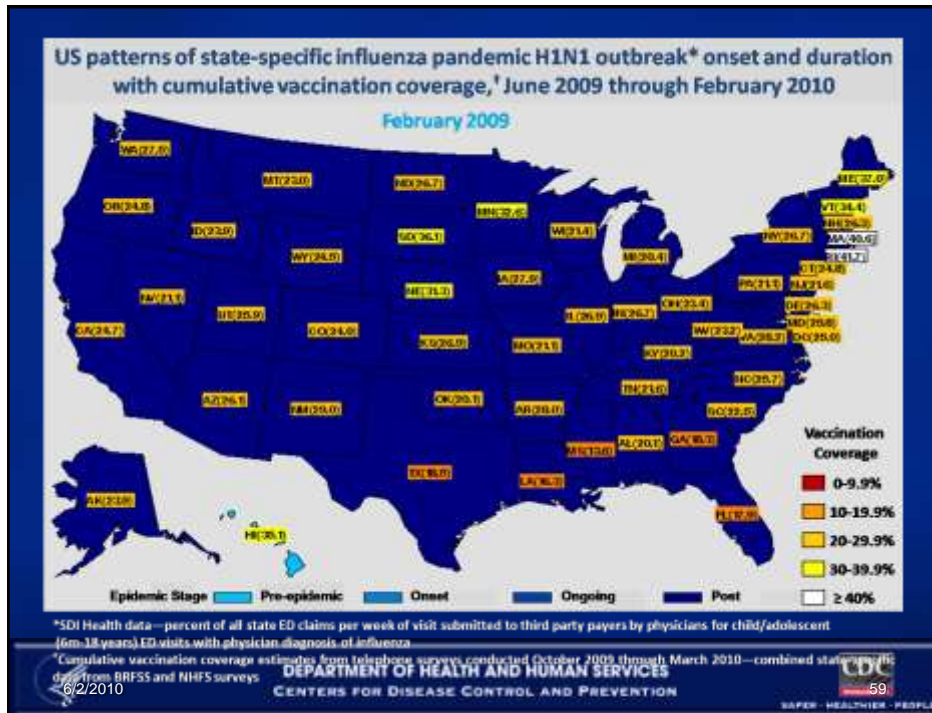












Lessons learned from this map sequence

- States' involvement in the pandemic to the level of recognized increases among children and adolescents in ED visits for MD diagnosed influenza started in CA and FL and skipped to NE early, then filled in states next to NE and the southern half of the country, moved into the Northwest and from there across to the northern mid-western states and finally into the northeastern or New England states.
- Vaccination levels remained lower in the southern coastal states where the pandemic started earlier indicating factors other than those within the state's control may have been at least partially responsible for lower vaccination coverage.
- It may be true that increased demand for vaccination was at least in part driven by concurrent startup of state epidemics in early and mid October about the time of H1N1 vaccine's initial availability.



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



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