

Epidemiology of Pandemic H1N1 Influenza

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Acknowledgements

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- JEOC, EPO, OPA
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Pandemic H1N1 Influenza

- In April 2009, a novel strain of H1N1 influenza was identified in California
 - Imperial and San Diego Counties
 - Border Health surveillance
- A quadruple reassortant
 - Human influenza, N. American avian influenza, N. American swine influenza, Eurasian swine influenza
- A/California/7/2009-like pandemic H1N1 2009 virus (WHO)

Pandemic H1N1 Influenza

- **Community transmission implicated by investigation**
 - No common source
 - No swine contact
- **Respiratory outbreak in Mexico described**
 - Significant morbidity & mortality, especially among younger individuals
 - Association suspected for U.S. cases



Swine Influenza A (H1N1) Infection in Two Children --- Southern California, March--April 2009

On April 21, this report was posted as an MMWR Early Release on the MMWR website (<http://www.cdc.gov/mmwr>).

On April 17, 2009, CDC determined that two cases of febrile respiratory illness occurring in children who resided in adjacent counties in southern California were caused by infection with a swine influenza A (H1N1) virus. The viruses from the two cases are closely related genetically, resistant to amantadine and rimantadine, and contain a unique combination of gene segments that previously has not been reported among swine or human influenza viruses in the United States or elsewhere. Neither child had contact with pigs; the source of the infection is unknown. Investigations to identify the source of infection and to determine whether additional persons have been ill from infection with similar swine influenza viruses are ongoing. This report briefly describes the two cases and the investigations currently under way. Although this is not a new subtype of influenza A in humans, concern exists that this new strain of swine influenza A (H1N1) is substantially different from human influenza A (H1N1) viruses, that a large proportion of the population might be susceptible to infection, and that the seasonal influenza vaccine H1N1 strain might not provide protection. The lack of known exposure to pigs in the two cases increases the possibility that human-to-human transmission of this new influenza virus has occurred. Clinicians should consider animal as well as seasonal influenza virus infections in their differential diagnosis of patients who have febrile respiratory illness and who 1) live in San Diego and Imperial counties or 2) traveled to these counties or were in contact with ill persons from these counties in the 7 days preceding their illness onset, or 3) had recent

Pandemic H1N1 Influenza

- **Rapid spread through California and U.S.**
- **Public Health Emergencies declared for U.S. and for California**
- **WHO raises pandemic alert level to Phase 6 on June 11, 2009**
- **Outbreak persists through summer**



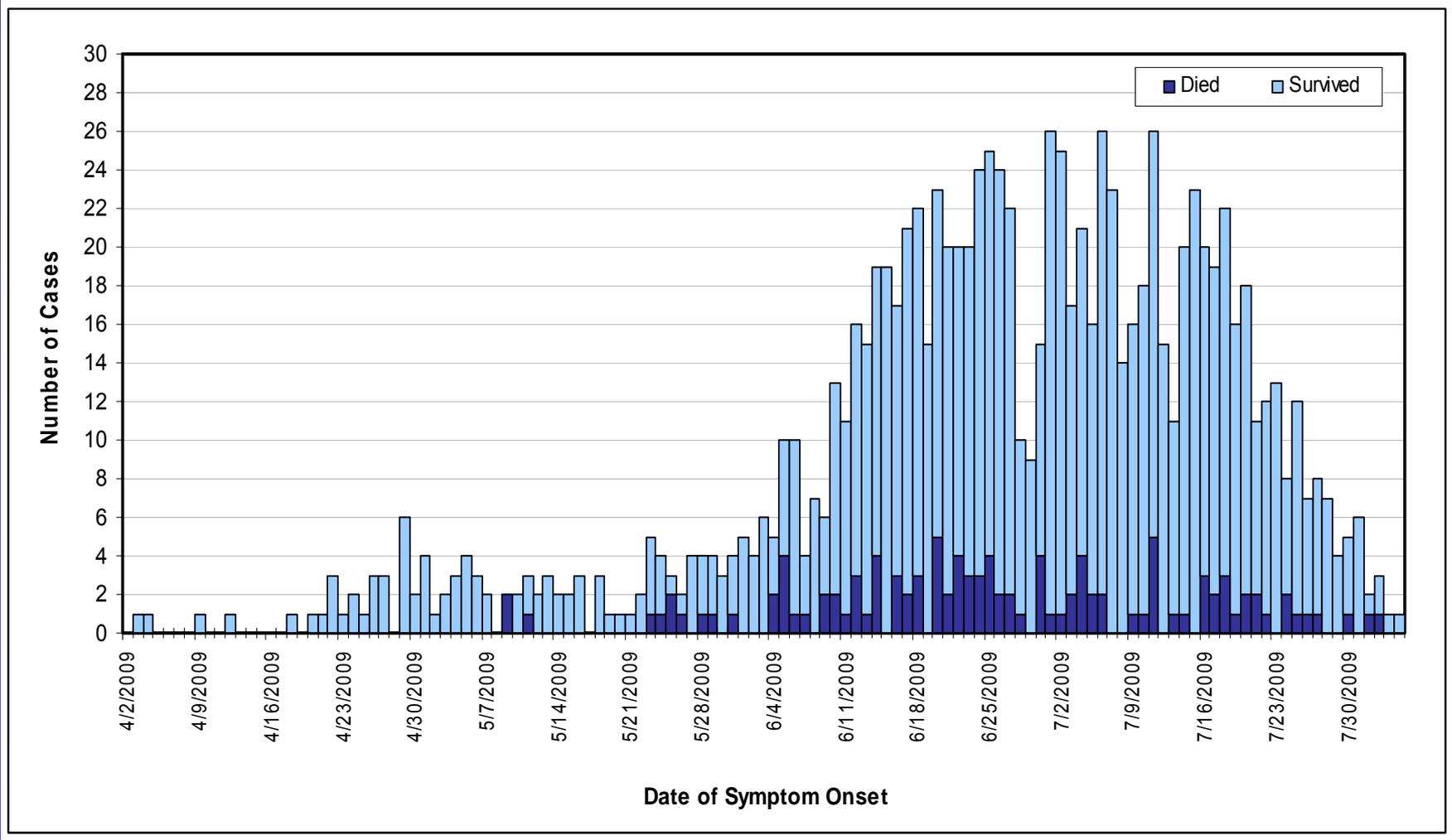
Update: Swine Influenza A (H1N1) Infections --- California and Texas, April 2009

[MMWR en Español](#)

On April 24, this report was posted as an MMWR Dispatch on the MMWR website (<http://www.cdc.gov/mmwr>).

On April 21, 2009, CDC reported that two recent cases of febrile respiratory illness in children in southern California had been caused by infection with genetically similar swine influenza A (H1N1) viruses. The viruses contained a unique combination of gene segments that had not been reported previously among swine or human influenza viruses in the United States or elsewhere ([1](#)). Neither child had known contact with pigs, resulting in concern that human-to-human transmission might have occurred. The seasonal influenza vaccine H1N1 strain is thought to be unlikely to provide protection. This report updates the status of the ongoing investigation and provides preliminary details about six additional persons infected by the same strain of swine influenza A (H1N1) virus identified in the previous cases, as of April 24. The six additional cases were reported in San Diego County, California (three cases), Imperial County, California (one case), and Guadalupe County, Texas (two cases). CDC, the California Department of Public Health, and the Texas Department of Health and Human Services are conducting case investigations, monitoring for illness in contacts of the eight patients, and enhancing surveillance to determine the extent

Novel H1N1(2009) influenza Cases reported by LHDs California, April-August 2009



Source: VRDL, IDB, IZB, DCDC – all data provisional



What Went Well During Initial Response

- **Detecting the new virus**
 - Surveillance system in place prior to outbreak
- **Successful, integrated response**
 - Between federal, state and local levels
- **Antivirals from State stockpile**
 - Distributed to local jurisdictions
 - Received supplies from national stockpile

Lessons Learned During Initial Response

- **Activation of Incident Command System**
 - Management of response to large public health emergency
- **Difficulty sustaining prolonged response**
- **Private sector supply chain for critical supplies needs strengthening**
 - Antivirals, masks, lab supplies
- **Policy changed rapidly**
 - Required effective communication between all partners

How is H1N1 Different from Other Emergencies?

- Response is a marathon
- Little capacity for mutual aid
- State and local jurisdictions are simultaneously a responder and victim
- Our response will continue to be shaped by:
 - Global, national & local events and actions
- Unknowns will be present throughout

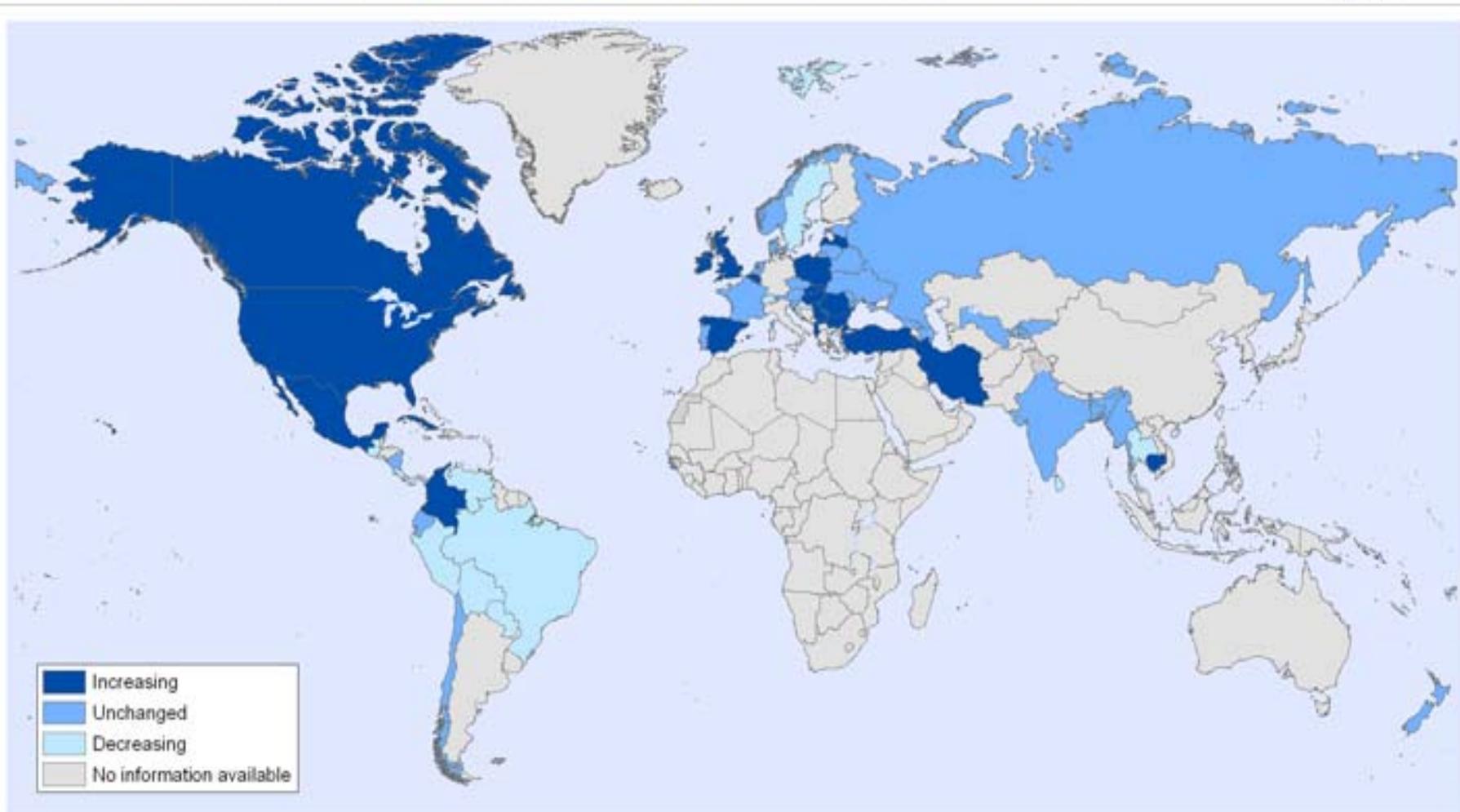
Goals of Fall Pandemic Response

- **Decrease number and severity of illness**
 - **Distribute H1N1 and seasonal flu vaccines**
- **Decrease transmission to high-risk groups**
- **Decrease burden on & maximize capacity of healthcare system**
- **Minimize disruption of critical community services (medical/ER, fire, police, rescue, etc)**
- **Keep public and clinicians informed, updated**



Status as of: week 40, 2009 (28 September–04 October)

◀
Previous



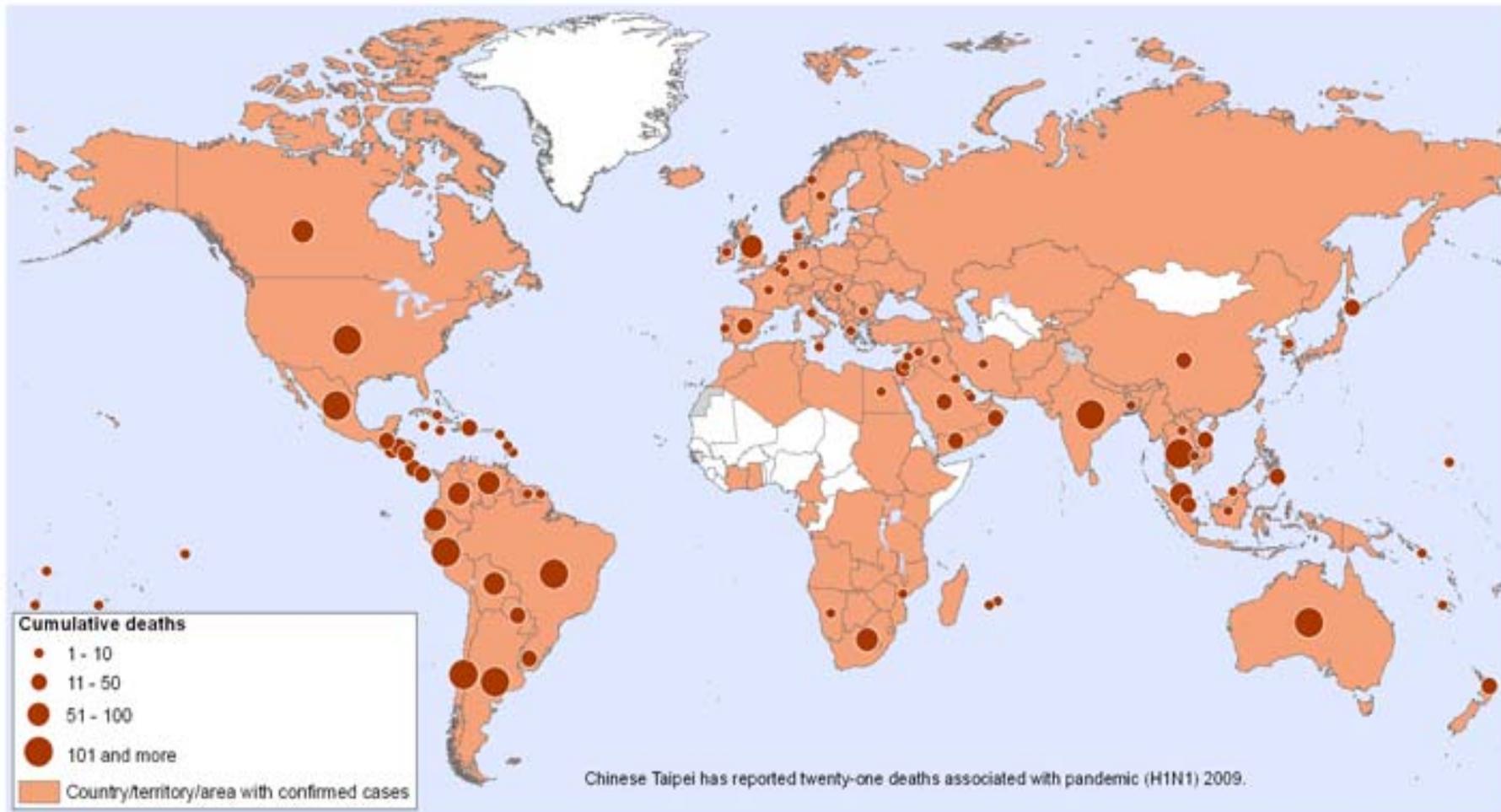
Epidemiology of Pandemic H1N1 Influenza Worldwide

- **Nearly 400,000 laboratory-confirmed cases of pandemic H1N1 influenza have been reported worldwide to WHO, as of October 11, 2009**
 - **Over 4735 deaths**
- **Worldwide distribution of virus**



Status as of: 11 October 2009

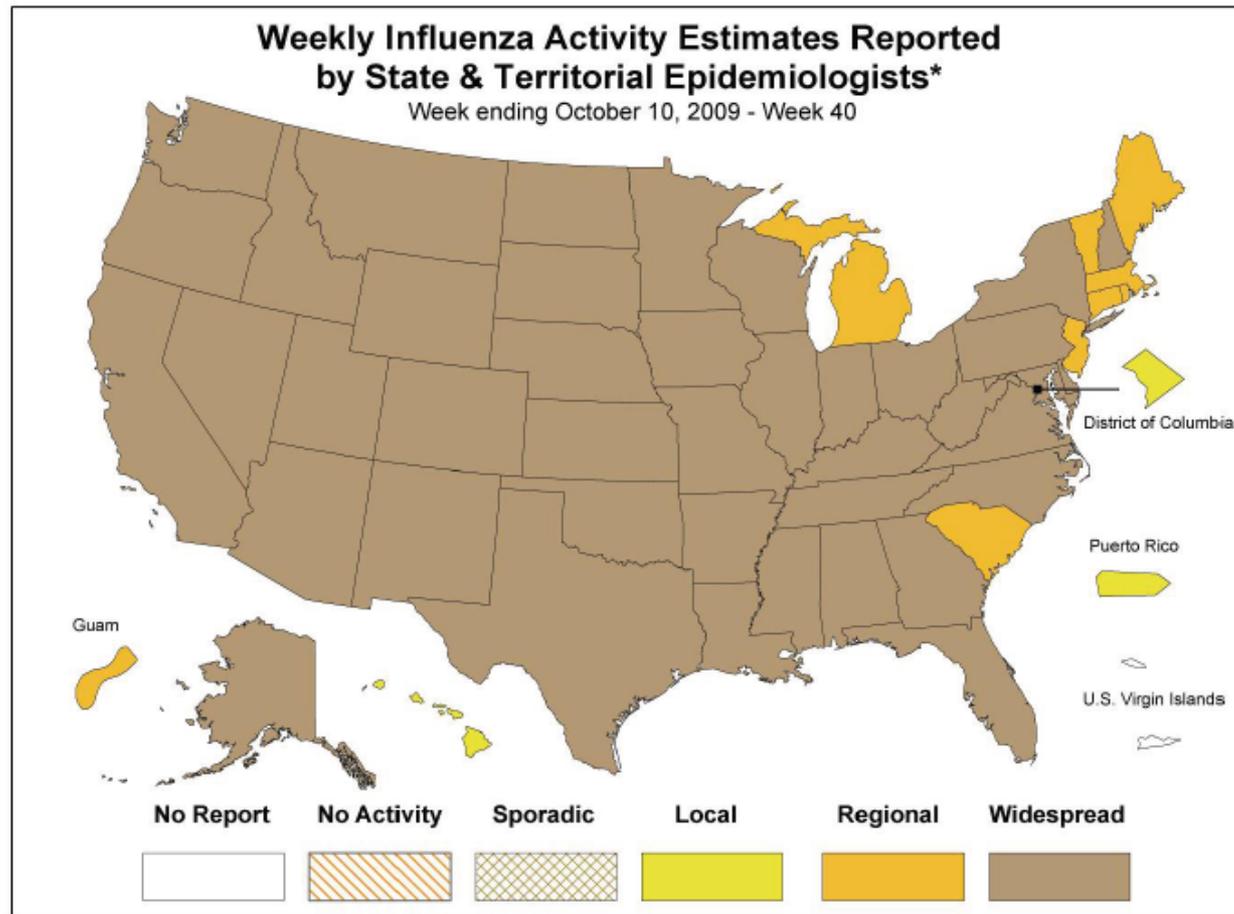
 Previous



Preliminary Data: Influenza Activity by State

Source: CDC, Week of October 10, 2009

Weekly Influenza Activity Reported by SLTT's



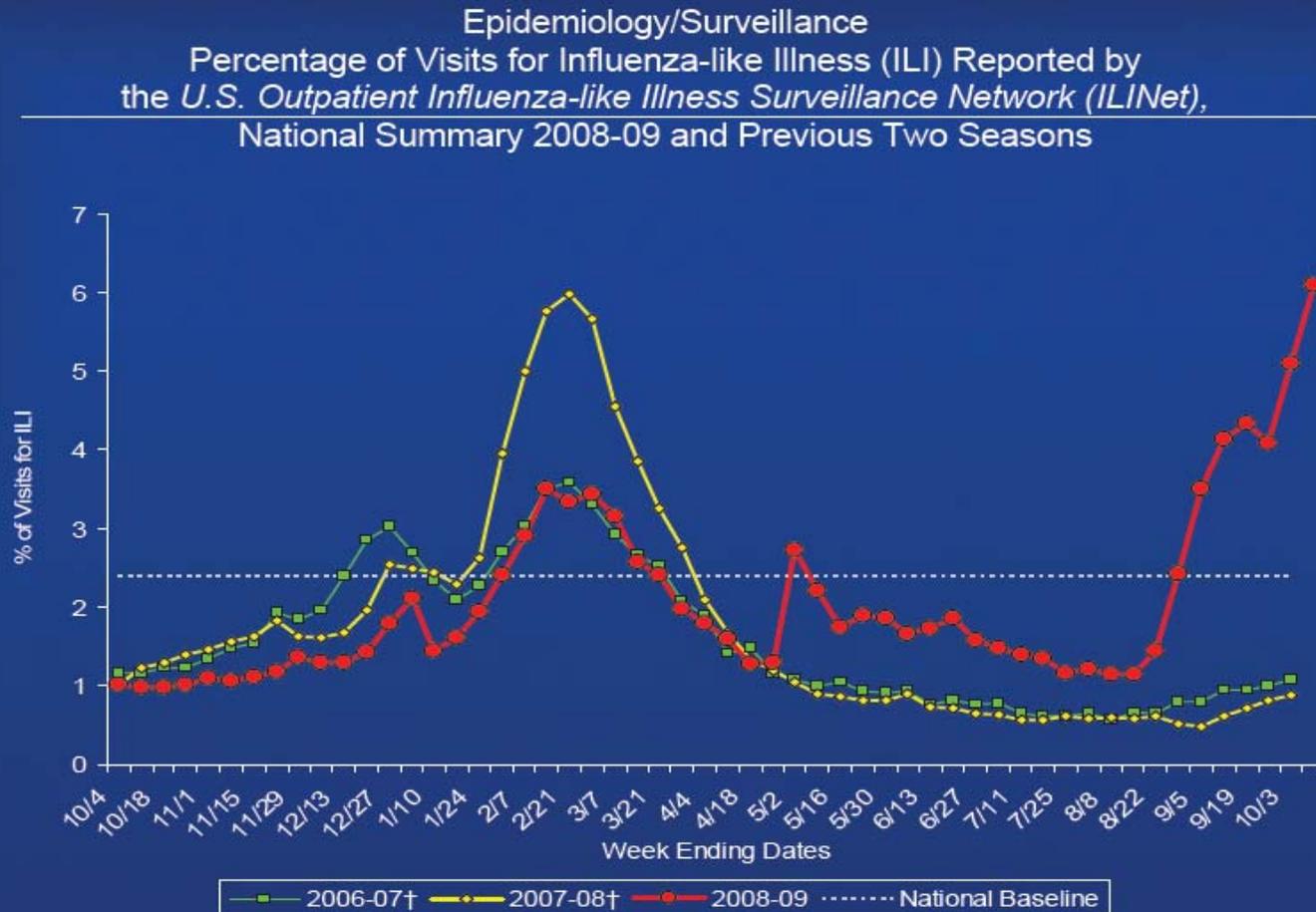
* This map indicates geographic spread & does not measure the severity of influenza activity

Epidemiology of Pandemic H1N1 Influenza in the U.S.

- Sixth week of aggregate reporting (Week 40)
- 33 jurisdictions reporting confirmed influenza
- 17 jurisdictions reporting syndromic ILI

	confirmed	syndromic
hospitalizations	8039	21823
deaths	404	2416

National Reporting of Influenza-like Illness (ILI), Flu Season (Oct. – Sept) by Year: 2006--2009



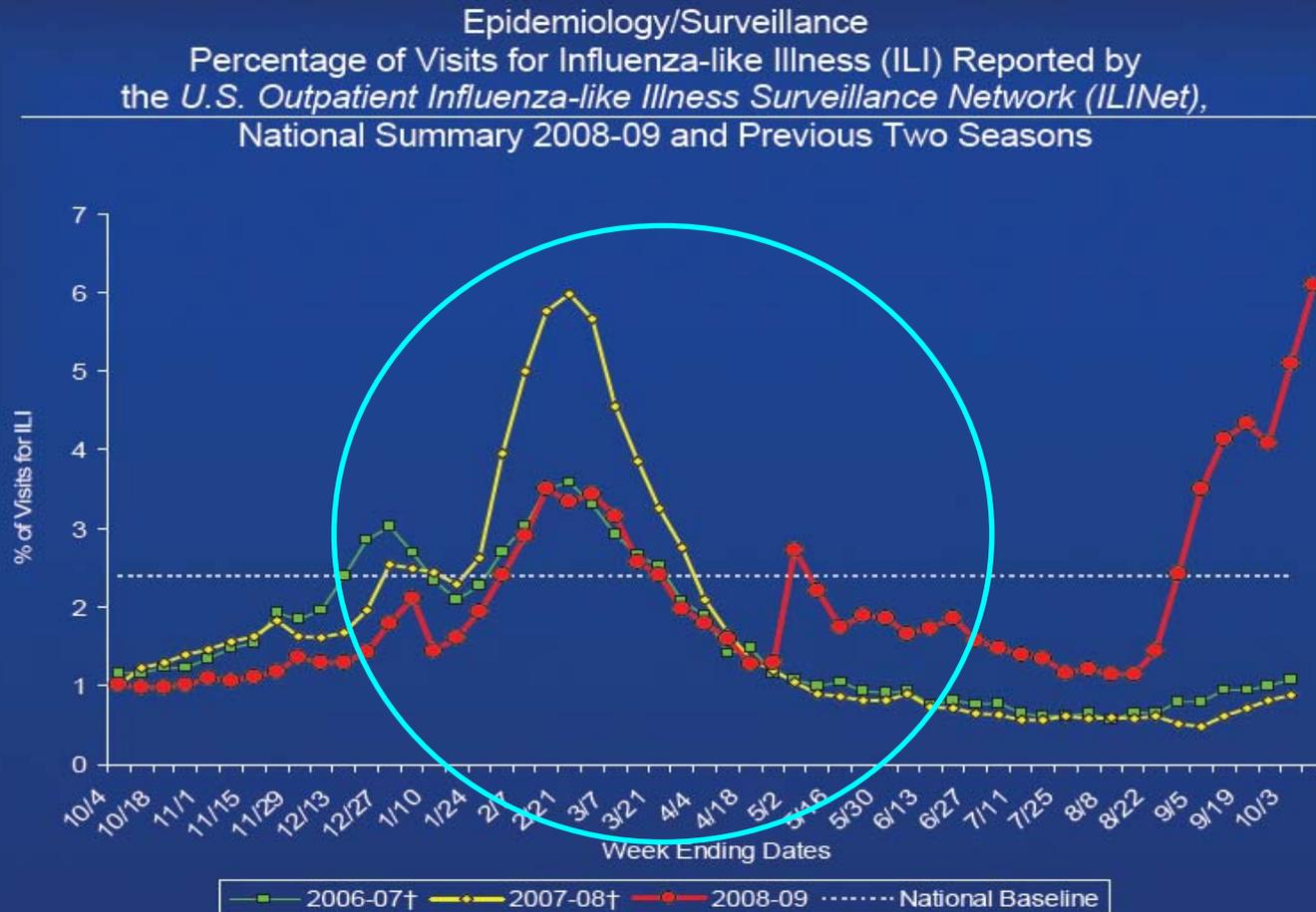
novel 2009-H1N1 – 16 OCT 2009

Data are provisional and will not be officially released by the CDC until 1100 EDT
 Internal Use Only (FIUO)—For Official Use Only (FOUO)

Source: CDC, CSTE, – all data provisional



National Reporting of Influenza-like Illness (ILI), Flu Season (Oct. – Sept) by Year: 2006--2009



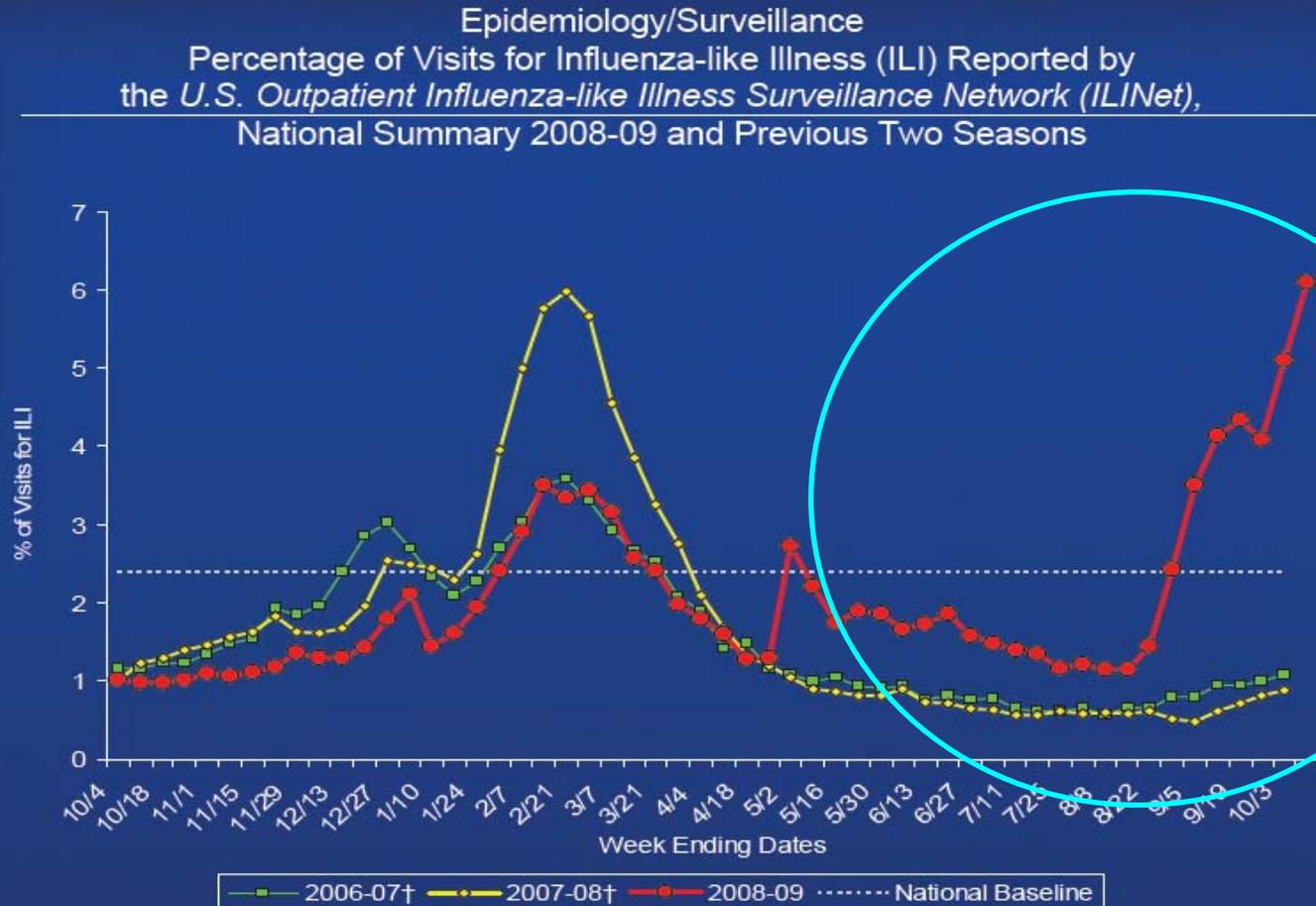
novel 2009-H1N1 – 16 OCT 2009

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Source: CDC, CSTE, – all data provisional



National Reporting of Influenza-like Illness (ILI), Showing Increased Activity in Second half of 2009



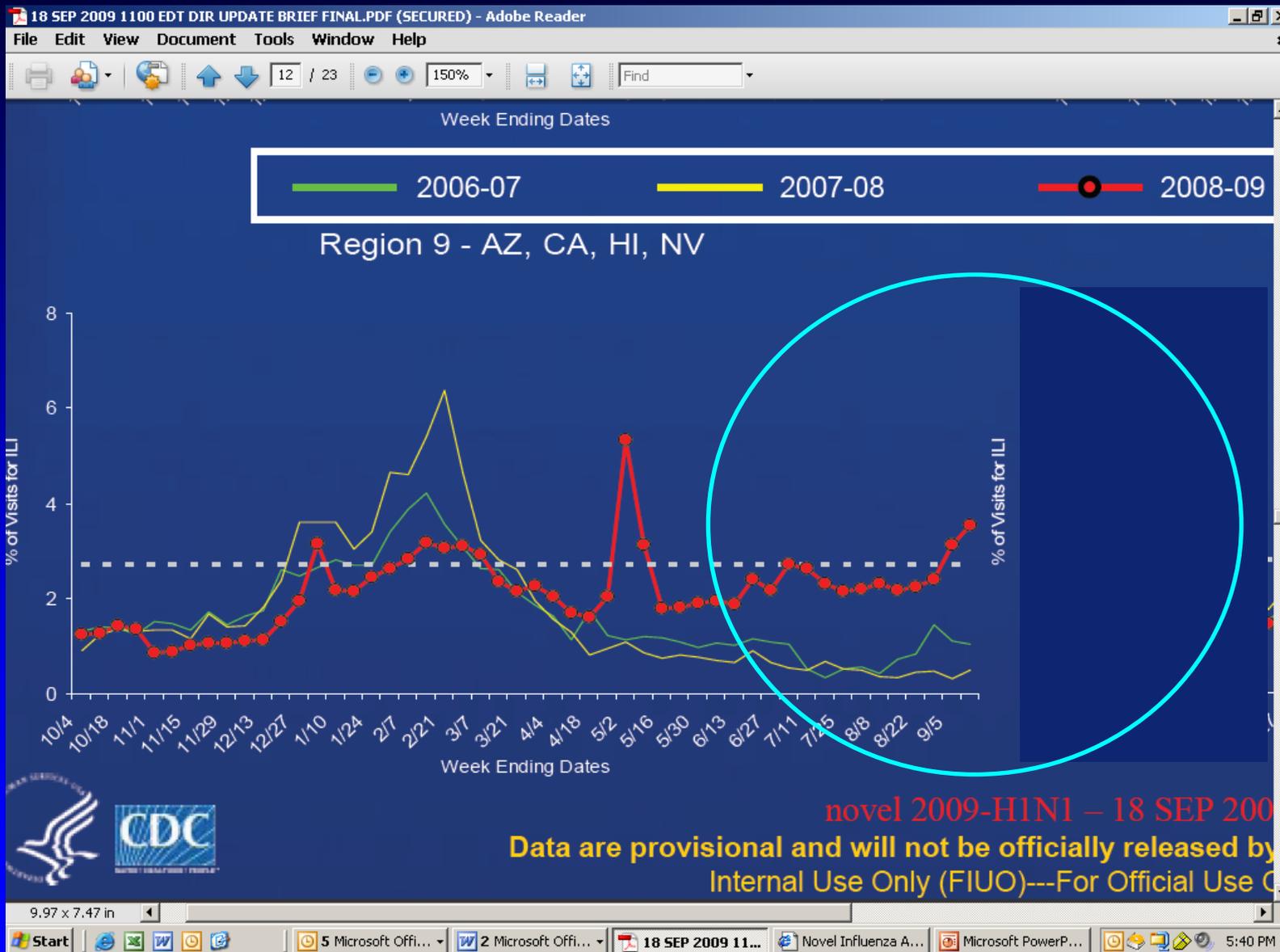
novel 2009-H1N1 – 16 OCT 2009

Data are provisional and will not be officially released by the CDC until 1100 EDT
 Internal Use Only (FIUO)—For Official Use Only (FOUO)

Source: CDC, CSTE, – all data provisional



ILI Visits reported by CDC for Western U.S. States Showing Increased Activity in Second half of 2009



Source: CDC, CSTE, – all data provisional

Surveillance for H1N1 in California

- Reportable as “unusual condition”
- Initially, intensive case and contact investigation (first several cases)
- Mid-April through mid-July, all cases
- Mid-July through mid-August, all fatal & hospitalized cases and clusters only
- Mid-August through present, aggregate hospitalized as well as fatal and ICU cases and clusters only

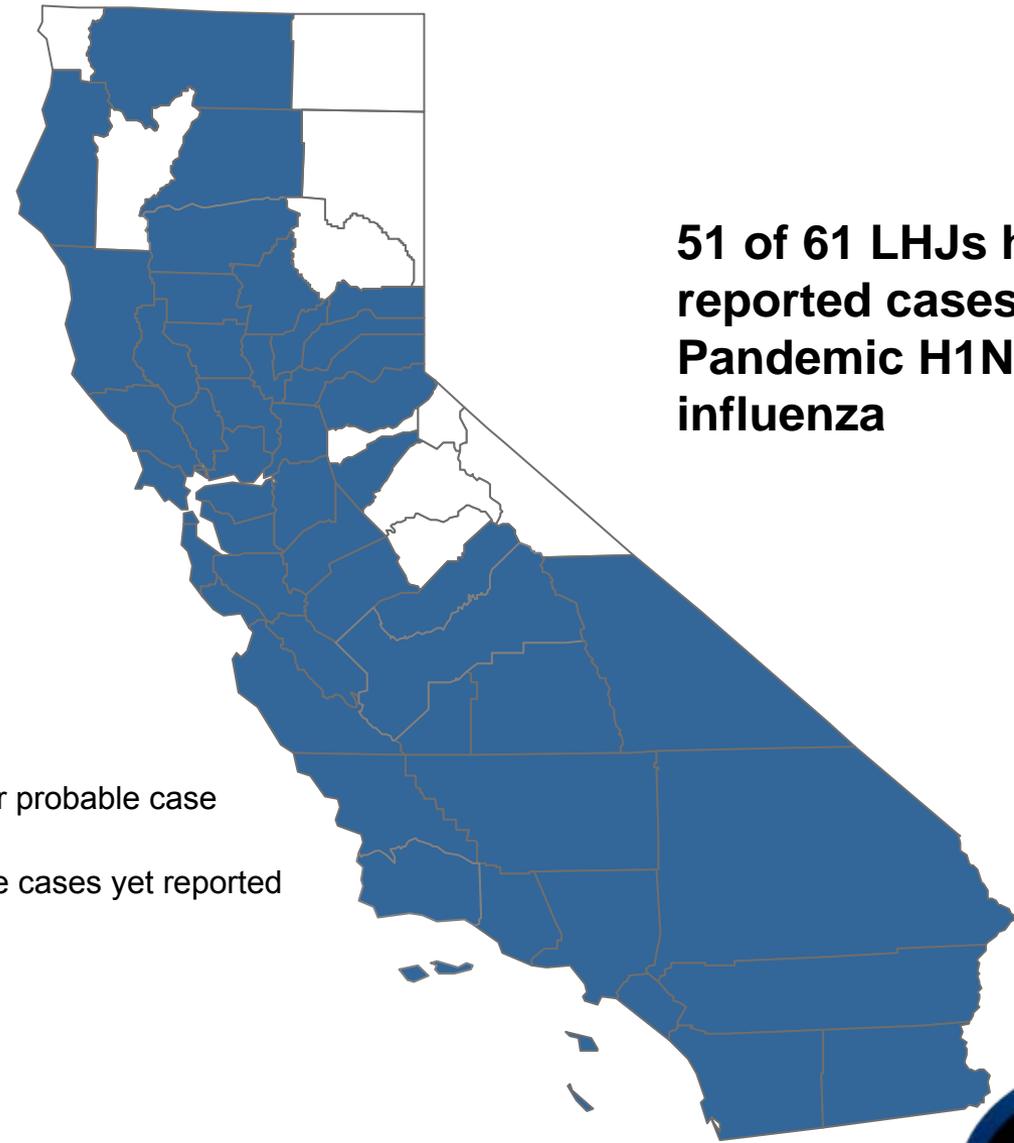
Epidemiology of Pandemic H1N1 Influenza in California

- **3556 hospitalizations &/or fatalities reported as of October 17, 2009**
 - 748 cases requiring intensive care
 - Statewide incidence rate 9.2 per 100,000
- **233 fatalities reported as of Oct. 17**
 - Hospitalized case-fatality ratio (all ages, to date) 6.6%
- **Nearly all influenza A-positive specimens in past month are confirmed/probable H1N1**

California counties reporting hospitalized or fatal pandemic (H1N1) 2009 virus infections in humans, current as of October 17, 2009

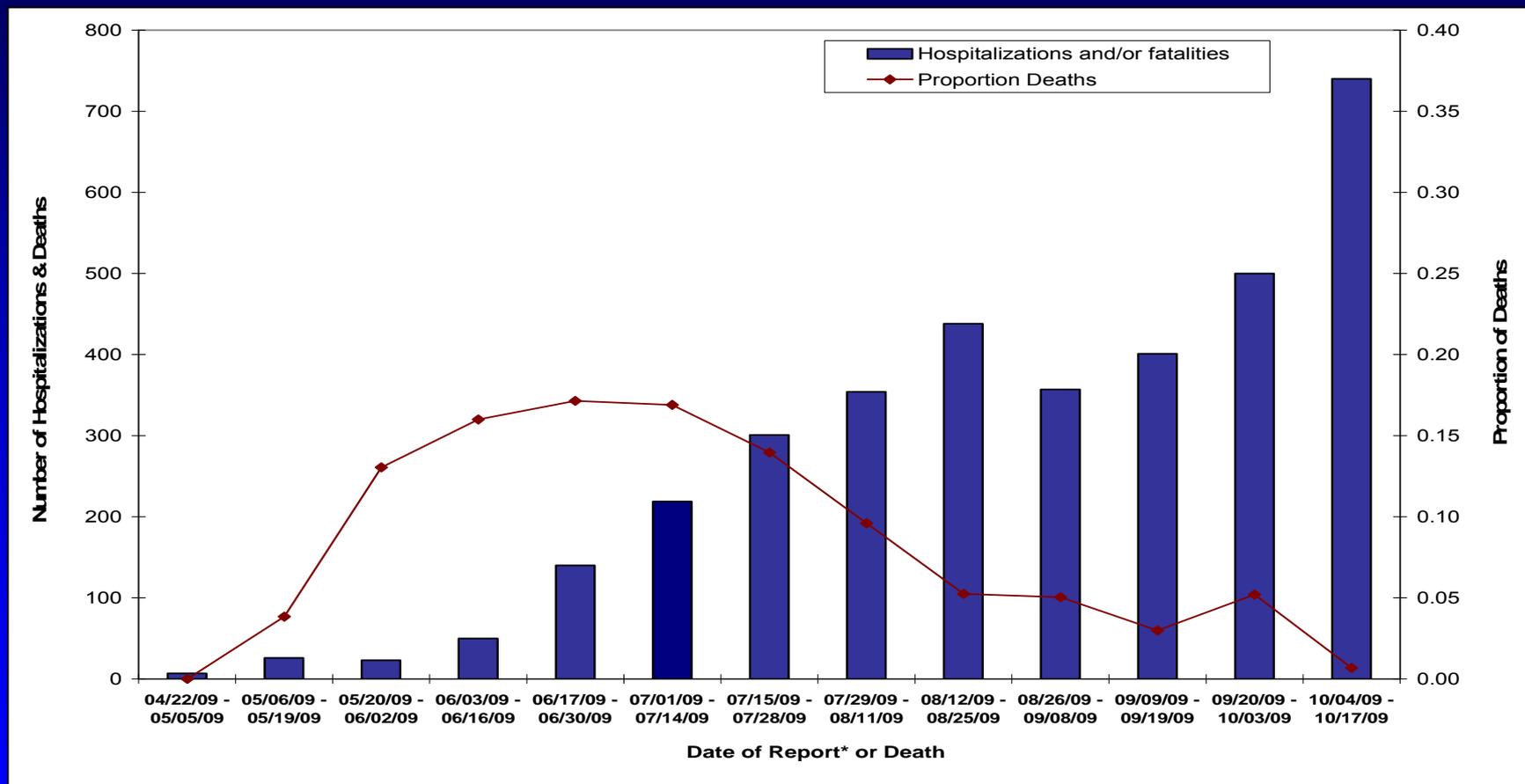
51 of 61 LHJs have reported cases of Pandemic H1N1 influenza

-  At least one confirmed or probable case
-  No confirmed or probable cases yet reported



Hospitalizations & Deaths from H1N1 in California

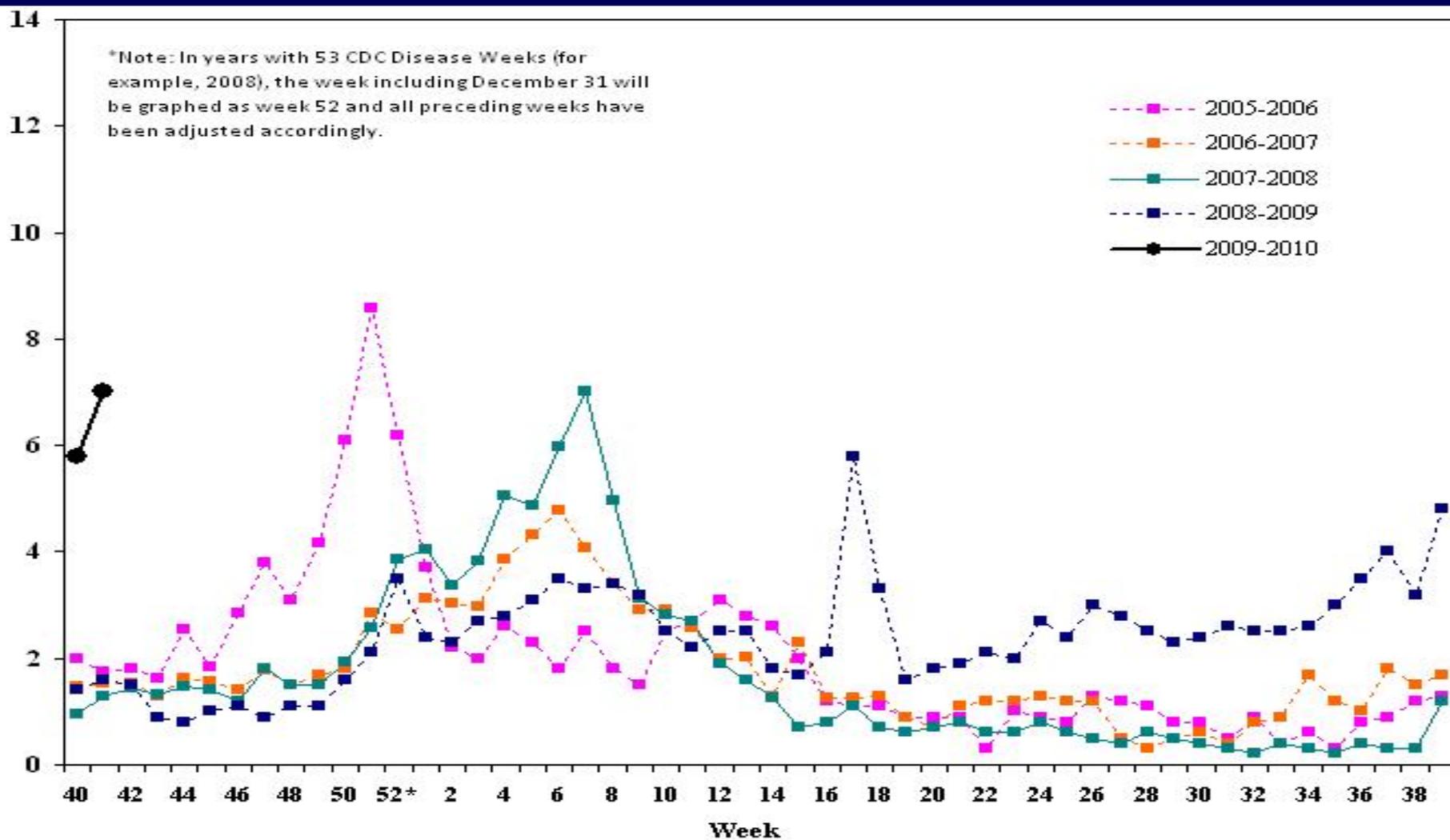
Number of reported hospitalized and/or fatal pandemic (H1N1) 2009 cases and proportion of fatalities in California, by report or death date, April 3 – October 17, 2009. The number of reported cases is calculated using date of report to CDPH and the proportion of deaths is calculated using date of death



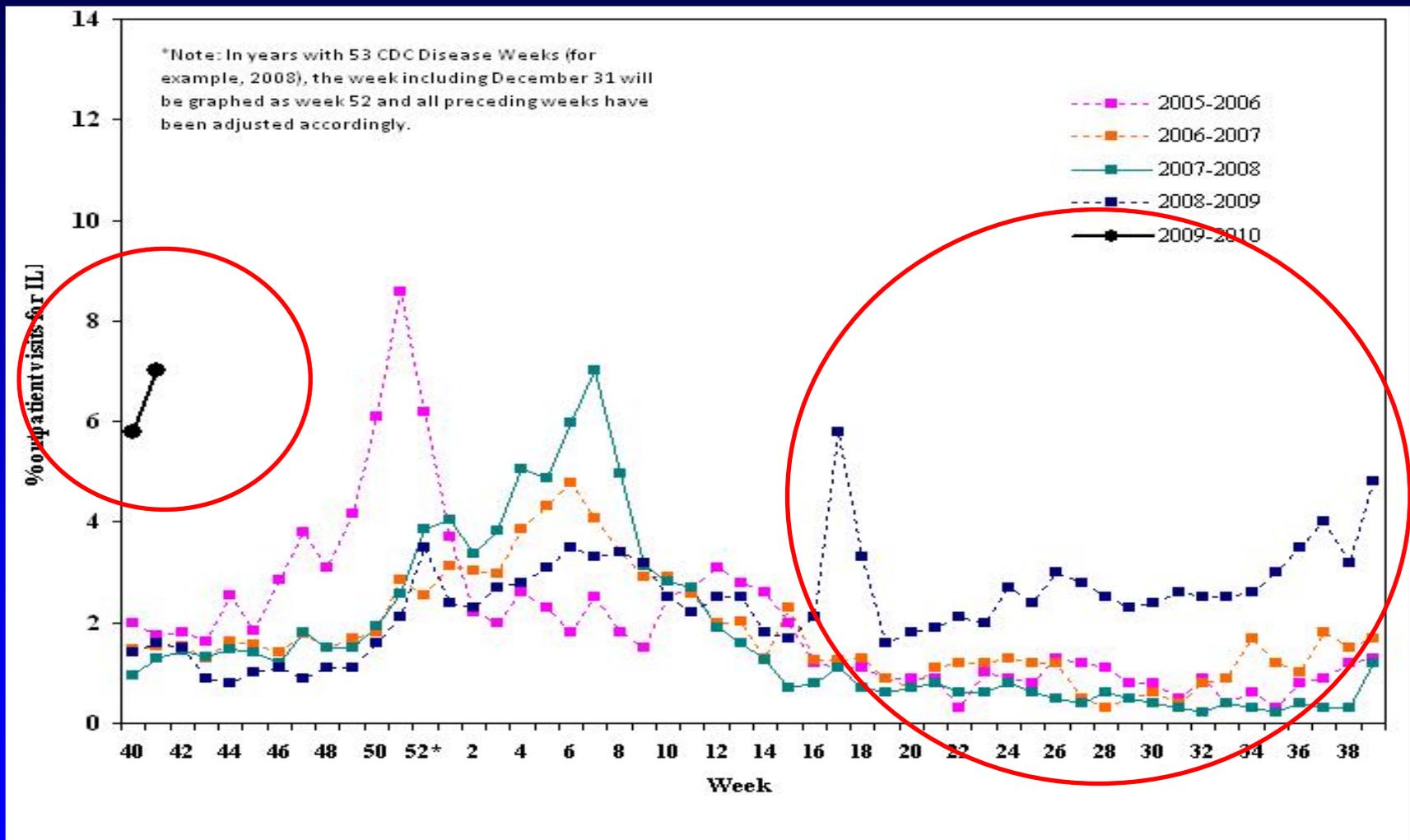
* Effective September 8th, the reporting period was changed (from Tuesday afternoon through the following Tuesday morning) to the MMWR disease week (Sunday through the following Saturday). As such, starting this week, the time interval for Figure 1 has changed to reflect the new reporting period.



California Sentinel Providers: Outpatient Influenza-Like Illness, 2004-2009

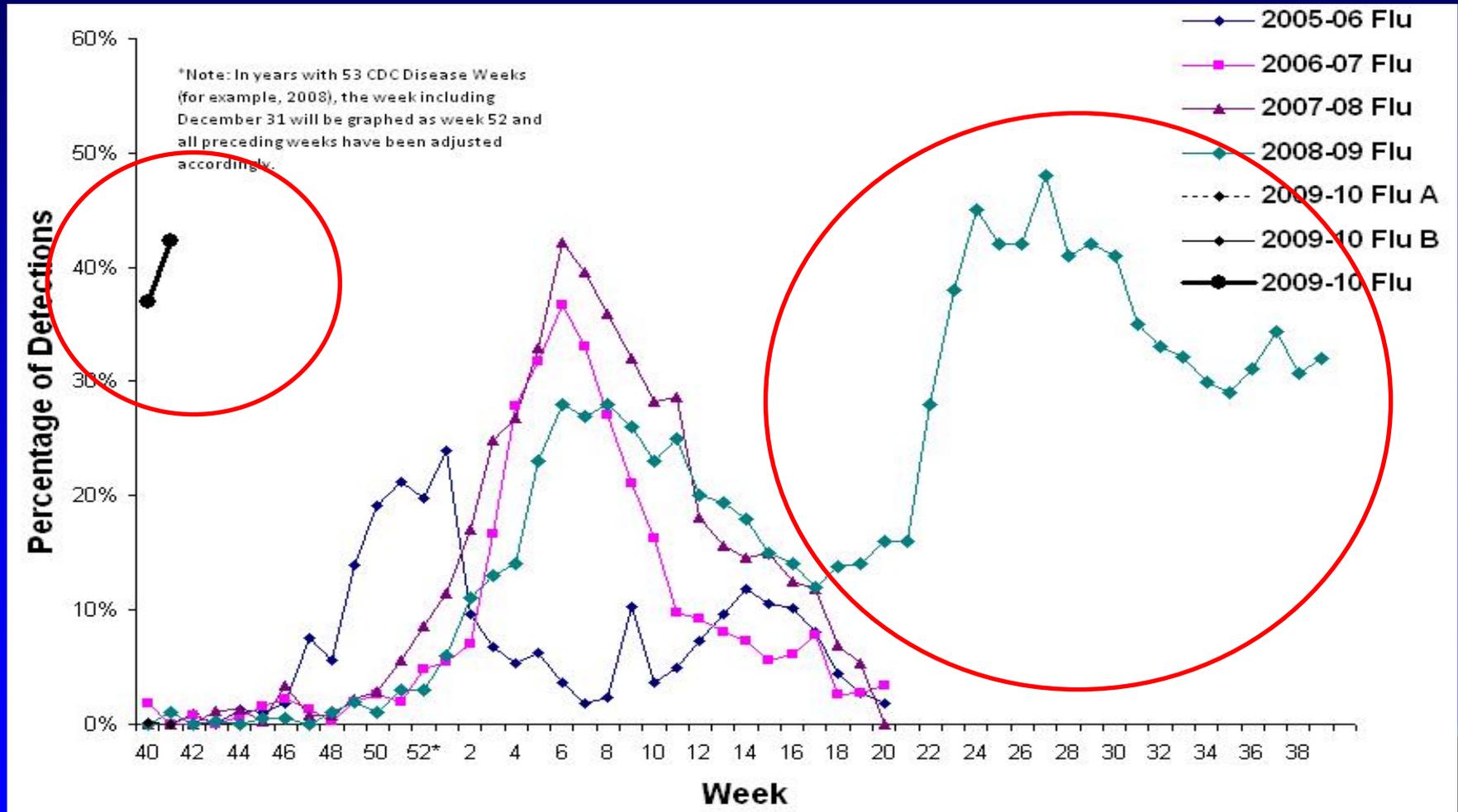


California Sentinel Providers: Outpatient Influenza-Like Illness, 2004-2009



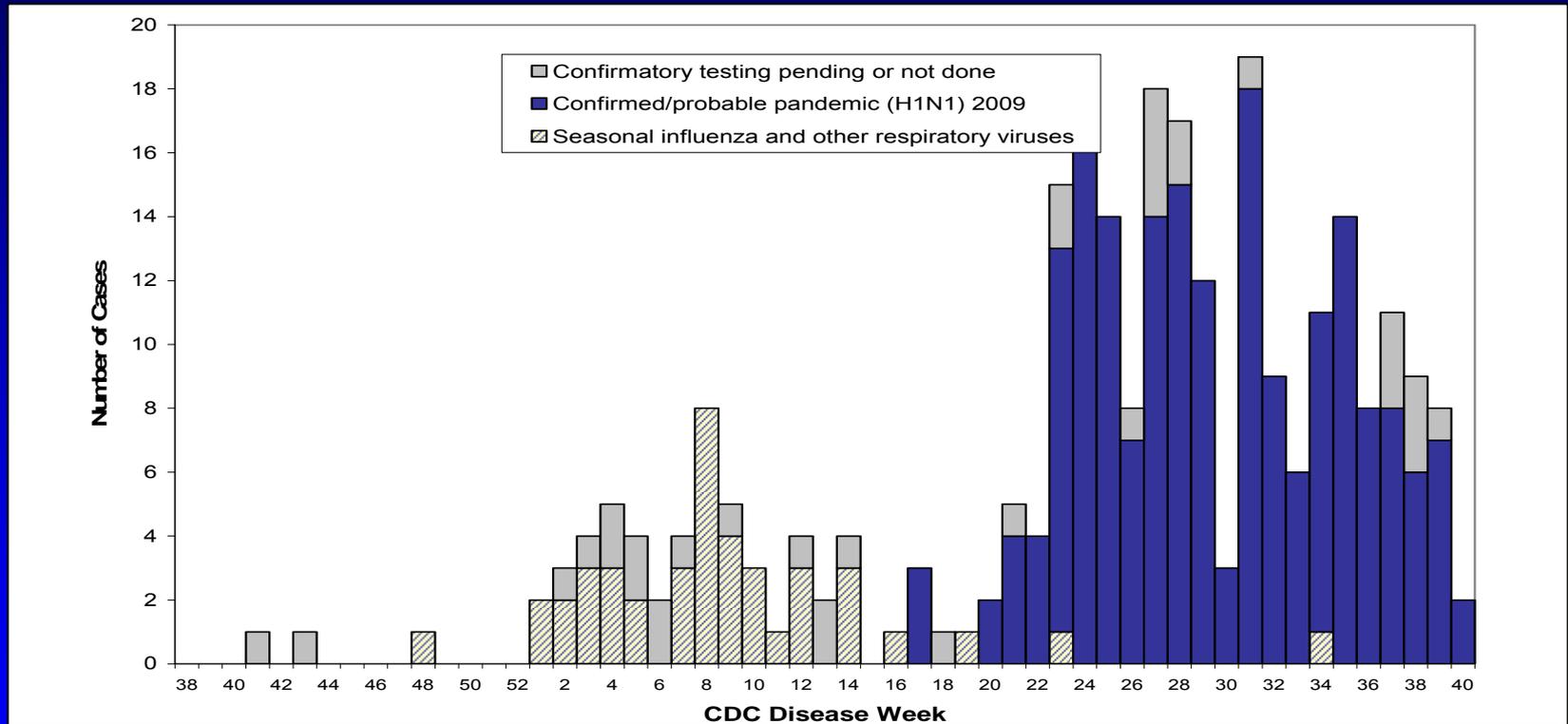
Influenza Detections at Sentinel Labs

Influenza detections at sentinel laboratories/Respiratory Laboratory Network (RLN), 2005-2009



Severe Pediatric Influenza

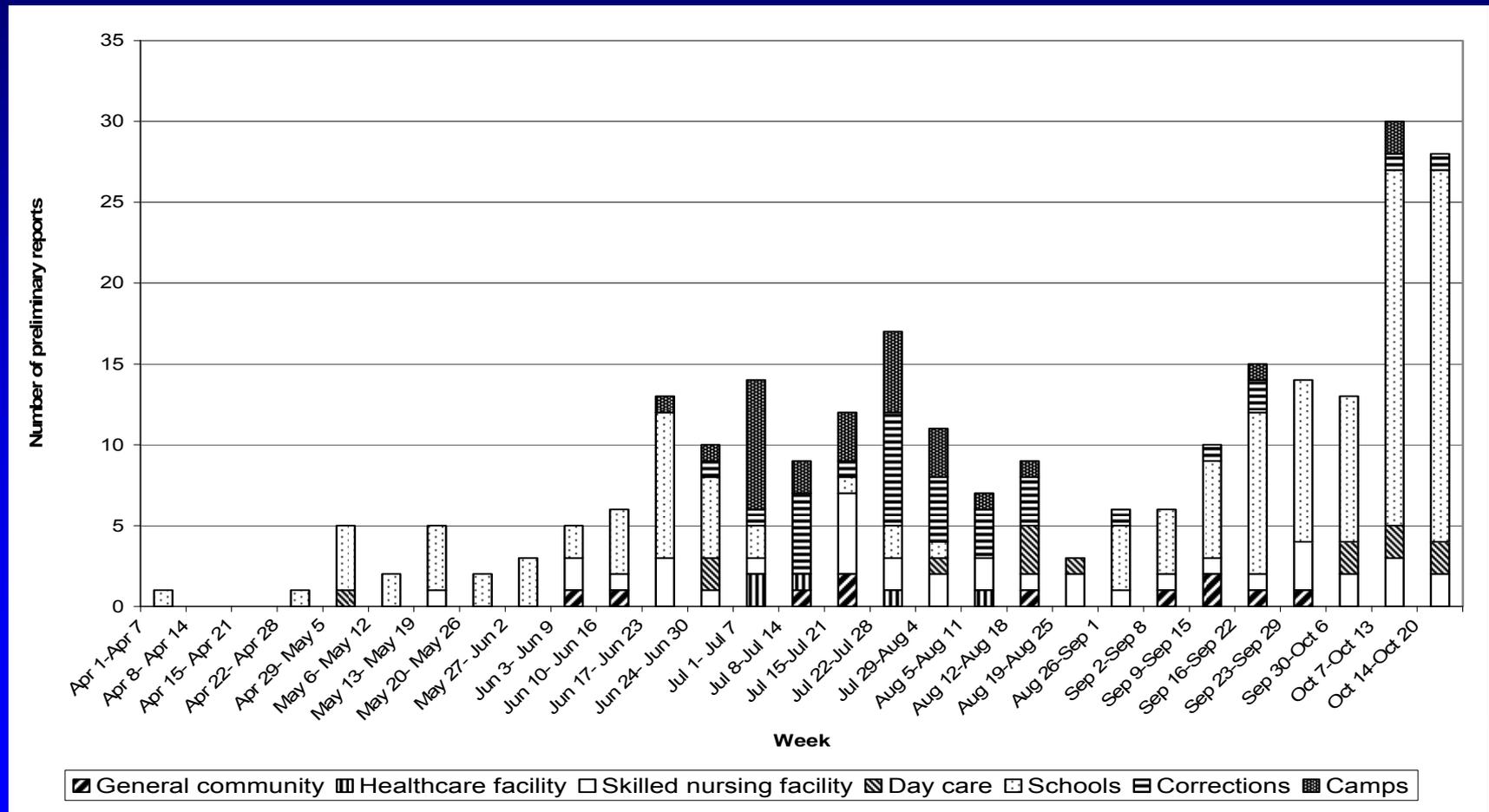
Severe pediatric influenza*, by date of onset and laboratory diagnosis, 2008-2009



*Case definition: age 0-17 years; a clinical syndrome consistent with influenza or complications of influenza; confirmation by laboratory testing; and have been hospitalized in the ICU or died (with no period of complete recovery between the illness and death)

Preliminary ILI Outbreak Reports

Number of Respiratory/ILI Preliminary Reports of Outbreaks from Local Health Departments to the CDPH, April 1 through October 20, 2009



Hospitalizations and Deaths from H1N1 by Age Category

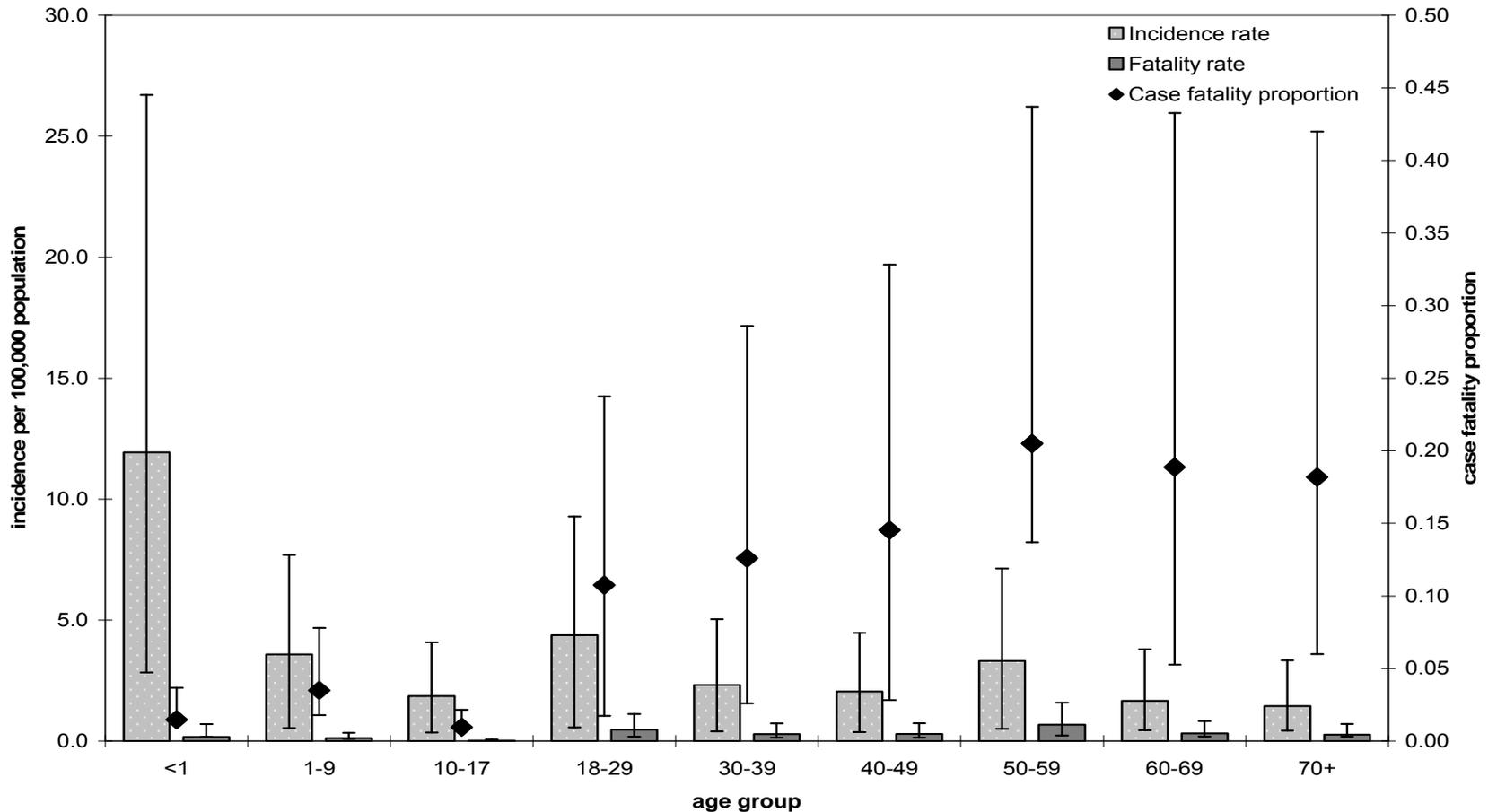
Total number of hospitalized and/or fatal cases reported, incidence rate and age-specific case-fatality ratio of pandemic (H1N1) 2009 in California, by age category, April 3 – October 17, 2009

Age category, in years	HOSPITALIZED AND/OR FATAL CASES [§]			FATAL CASES		
	Number of cases	Cumulative number of cases	Incidence per 100,000 population	Number of cases	Cumulative percentage of fatalities	Case-fatality ratio*
<1	233	233	40.89	4	1.72%	1.7%
1-4	295	528	13.36	3	3.00%	1.0%
5-18	705	1233	9.32	21	12.02%	3.0%
19-24	398	1631	11.47	21	21.03%	5.3%
25-35	530	2161	9.01	40	38.20%	7.5%
36-49	536	2697	6.69	56	62.23%	10.4%
50-64	630	3327	9.41	67	90.99%	10.6%
65+	229	3556	5.25	21	100.00%	9.2%
ALL AGES	3556		9.17	233		6.6%

[§]Includes the following individuals: (1) hospitalized non-fatal cases, (2) hospitalized fatal cases, (3) non-hospitalized fatal cases

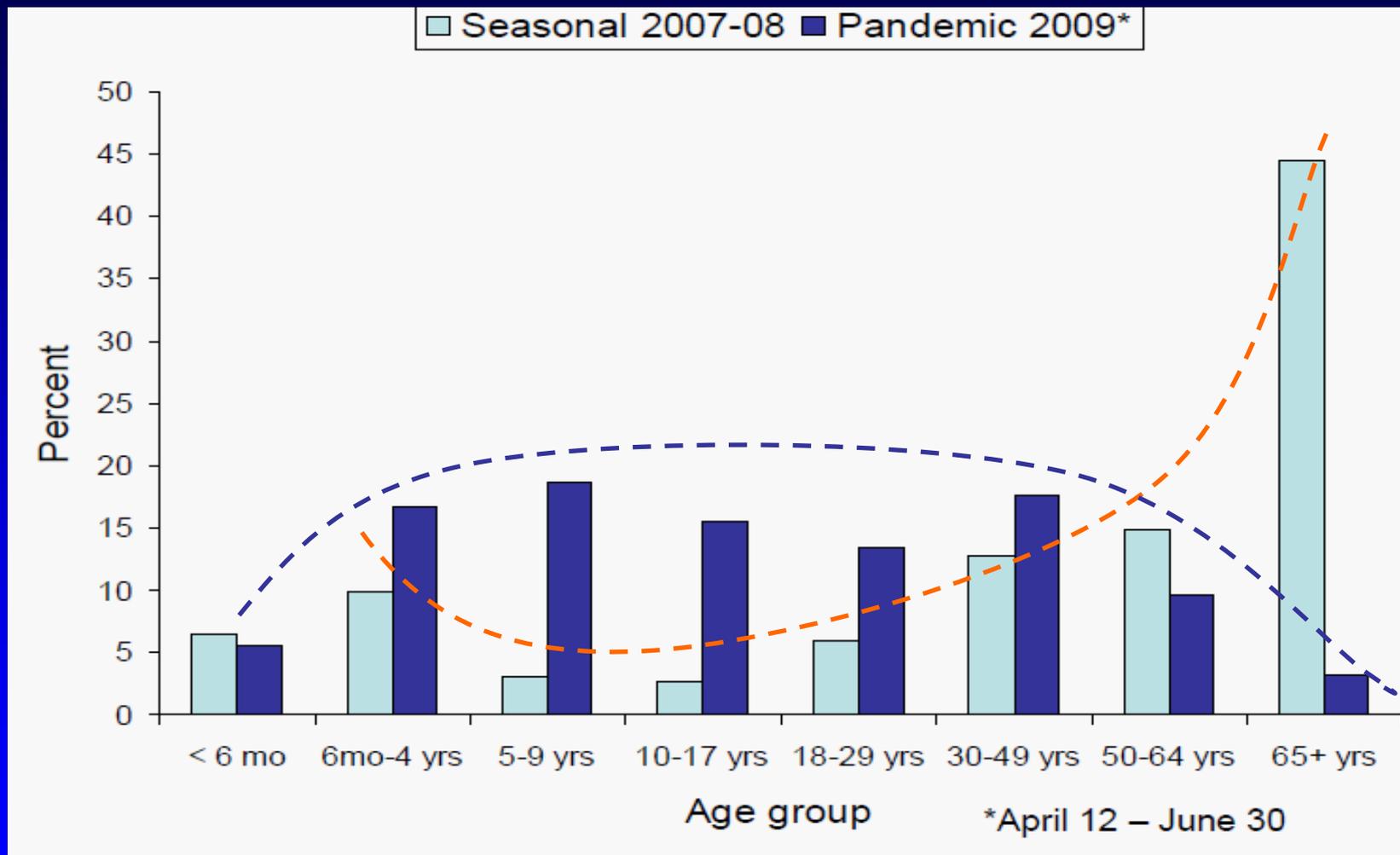
*The case-fatality ratio is calculated using the following formula: (number of fatalities from age group due to H1N1/ total number of hospitalized and/or fatal cases within that age group due to H1N1)*100.

H1N1(2009) Incidence (Grey Bars) & Mortality (Diamond) by Age-Group, LHD Reporting California, April-August 2009



Source: VRDL, IDB, IZB, DCDC – all data provisional

Comparison of Seasonal vs. Pandemic Flu Age Distribution of Hospitalized Cases



Risk Factors for Fatal H1N1

List of characteristics that are statistically significantly different between fatal and non-fatal ICU cases, April 3 – October 17, 2009

	NON-FATAL ICU CASES			FATAL CASES			SUMMARY STATISTICS		
	Number of cases with condition	Number of cases without condition	Proportion of cases with condition	Number of cases with condition	Number of cases without condition	Proportion of cases with condition	Chi-Square p-value	Odds Ratio	95% Confidence Intervals
Symptoms									
Shortness of breath	370	181	67%	173	60	74%	0.049	1.4	1.0-2.0
Chronic co-morbid illness [†]	397	154	72%	194	39	83%	0.001	1.9	1.3-2.9
Immunosuppression**	55	496	10%	51	182	22%	<0.0001	2.5	1.7-3.8
Metabolic disease	133	418	24%	79	154	34%	0.005	1.6	1.1-2.5
Obesity [†]	179	211	46%	115	78	193%	0.002	1.7	1.2-2.5
Infiltrates on chest radiograph	372	179	68%	191	42	82%	<0.0001	2.2	1.5-3.2
Mechanical ventilation [†]	243	244	50%	197	14	93%	<0.0001	14.1	8.0-25.0
Mean age (in years)			29			38	<0.0001		

[†] Includes cases with known information only

[‡] Symptoms and conditions listed are not mutually exclusive due to the presence in some patients of multiple symptoms and multiple underlying chronic diseases

^{||} Includes cases ≥ age 2 years where BMI ≥ 30 (adults) or BMI-for-age is above the overweight percentile (age 2-19 years) and/or those who were clinically considered obese

** Includes immunosuppressive drugs, cancer, congenital immunodeficiency, transplant and HIV

Antiviral Resistance of H1N1

Antiviral resistance testing at VRDL, 2009*

Pandemic (H1N1)	Oseltamivir Resistant	Adamantanes Resistant
VRDL testing	1/782	142/142

* Two additional oseltamivir-resistant viruses have been identified in California residents; the first in a San Francisco resident who traveled to Hong Kong, and a second in a San Diego resident that was tested by the CDC

H1N1 Vaccine

Distribution Policy For H1N1 Vaccine

- **Centralized system**
 - McKesson Specialty awarded federal contract to be the major vaccine distributor for United States
 - Manufacturers will ship to McKesson
 - McKesson will ship directly to the sites identified by the States
 - California assigned >12,000 sites

Web-Based System For Ordering H1N1 Vaccine

- CDPH Immunization Branch created a website www.CalPanFlu.org
- Activated on September 1, 2009
- Potential vaccinators register (>12,000 to date)
- Order vaccine
- Receive vaccine information and updates
- Report doses of vaccine administered

This website is for those who are interested in giving 2009 Influenza A (H1N1) vaccine in California, including

- Local health departments
- Clinics, public and private
- Independent physicians
- Community Health Centers
- Vaccines for Children Program medical providers
- Student Health Centers
- Hospitals
- Health plans that directly provide vaccines
- Employee health programs
- Community vaccinators
- Pharmacies, chain and independent
- Other vaccinators

I am a health professional interested in providing H1N1 vaccine in California

Continue

I am interested in protecting myself against pandemic and seasonal influenza

Continue

If you have questions, click here for answers to [Frequently Asked Questions](#). Download and print [step-by-step](#) instructions to assist you with registration, ordering, and reporting. If you have trouble signing on or need additional information about using this website, call our toll-free line during normal business hours at: 1-888-865-0564.

Allocation of H1N1 Vaccine

- State and local public health are working together to identify vaccinators
- Vaccine will initially be allocated in proportion to each local jurisdiction's population
- Separate, federal allocation for active duty military and federal prisons

H1N1 Vaccine Order Review Process

- For first 6.25 million doses of vaccine in CA:
 - Each LHD receives an allocation
 - Each LHD receives a list of registered vaccinators and their respective orders
 - LHDs review vaccinators and adjust orders
 - CDPH receives LHD list & orders vaccine
 - Orders filled as vaccine is released, with LHD clinic orders as top priority

H1N1 Vaccine Ordering Status

- CDPH has ordered 99% of allocation
 - CDPH orders vaccine as allocations are released (and LHD approved orders are available)
- CDPH vaccine orders represent 14% of total US vaccine orders (vs. 12% population representation)
- Secondary distributor has been identified for below-threshold orders (100 doses per formulation)
- LHDs will be able to view shipping logs for their jurisdiction by week's end

H1N1 Vaccine Availability in CA

- **First week of October: ~ 400,000 doses of nasal spray vaccine (LAIV)**
- **Second week of October: ~ 150,000 doses of LAIV and >200,000 doses of injectable vaccine**
- **1.7 million doses ordered**
- **Project over 10 million doses by mid-December**

H1N1 Vaccine Challenges

- **Manufacturing delays and decreased production nationally**
- **VacMan (last active release of base software was in mid-1990s)**
- **Unprecedented volume of orders**
- **Shipping information format (difficult to reconcile shipments with orders)**
- **H1N1 vaccine campaign represents creation of a new distribution system**

H1N1 Vaccine Target Groups

- **Initial target groups:**
 - Children age 6 months through 24 years-old
 - Pregnant women
 - Healthcare and EMS personnel
 - Household and caregiver contacts of children younger than age 6 months
 - Persons 25 through 64 years-old with high-risk medical conditions

Vaccine Administration

- Doses recommended per person:
 - ≥ 10 years: 1 dose
 - 6 months – 9 years: 2 doses
 - Recommended interval btwn doses 4 weeks
 - H1N1 vaccine supply & availability projected to increase over time; vaccine SHOULD NOT be kept in reserve for later administration of a 2nd dose
- Thimerosal exemption granted

Community Mitigation

- **School dismissal guidance**
- **Infection control and N95 respirator use guidance**
- **Hand hygiene & respiratory etiquette for general public**
- **Public events, businesses, transportation**

H1N1 information available on CDPH website

The screenshot shows a Microsoft Internet Explorer browser window displaying the CDPH website. The address bar shows the URL: <http://www.cdph.ca.gov/HealthInfo/discond/Pages/SwineInfluenza.aspx>. The page header includes the CDPH logo and navigation links: Home, Programs, Services, Health Information, Certificates & Licenses, Publications & Forms, and Data. The main content area features a large graphic with the text "H1N1 INFLUENZA Center for Infectious Diseases". Below this, the title "Novel Influenza A (H1N1) Virus (Swine Flu)" is displayed. The text describes the virus as a type of influenza (flu) virus that causes respiratory disease and can spread between people. It also mentions that while most people who have been sick have recovered without needing medical treatment, hospitalizations and deaths from infection with this virus have occurred. The text further explains that the spread of H1N1 virus is thought to occur in the same way that seasonal flu spreads, primarily from person to person through coughing or sneezing, but also sometimes through surfaces or objects. A section titled "Symptoms" lists common signs like fever, cough, sore throat, body aches, headache, chills, and fatigue, and notes that some people may also experience diarrhea and vomiting. On the right side of the page, there is a section titled "Information And Resources" with several links: "Facts and Information for the Public", "Influenza H1N1 (gripe porcina) Datos e Información", "CDPH Guidances for H1N1 Influenza", "CDC and Other Guidances for H1N1 Health Professionals", "Schools and Higher Education", "Businesses and Employers", "Travelers", and "Laboratories". On the left side, there is a "Most Popular Links" section with links to "Birth, Death, & Marriage Certificates", "Drinking Water", "H1N1 (Swine) Flu", and "WIC". Below that is a "Quick Links" section with links to "About Us", "Decisions Pending & Opportunities for Public Participation", "Diseases & Conditions", "Job Opportunities", "Local Health Services", "Multimedia", "Newsroom", "Public Availability of Documents", and "Related Links" which includes "California Health and Human Services Agency" and "Department of Health Care".

: www.cdph.ca.gov -- click on "H1N1 Swine Flu" from LINKS on left side of webpage

Questions?

The Swine Flew

