Influenza Surveillance
2008-09
United States and Global

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With grateful thanks to
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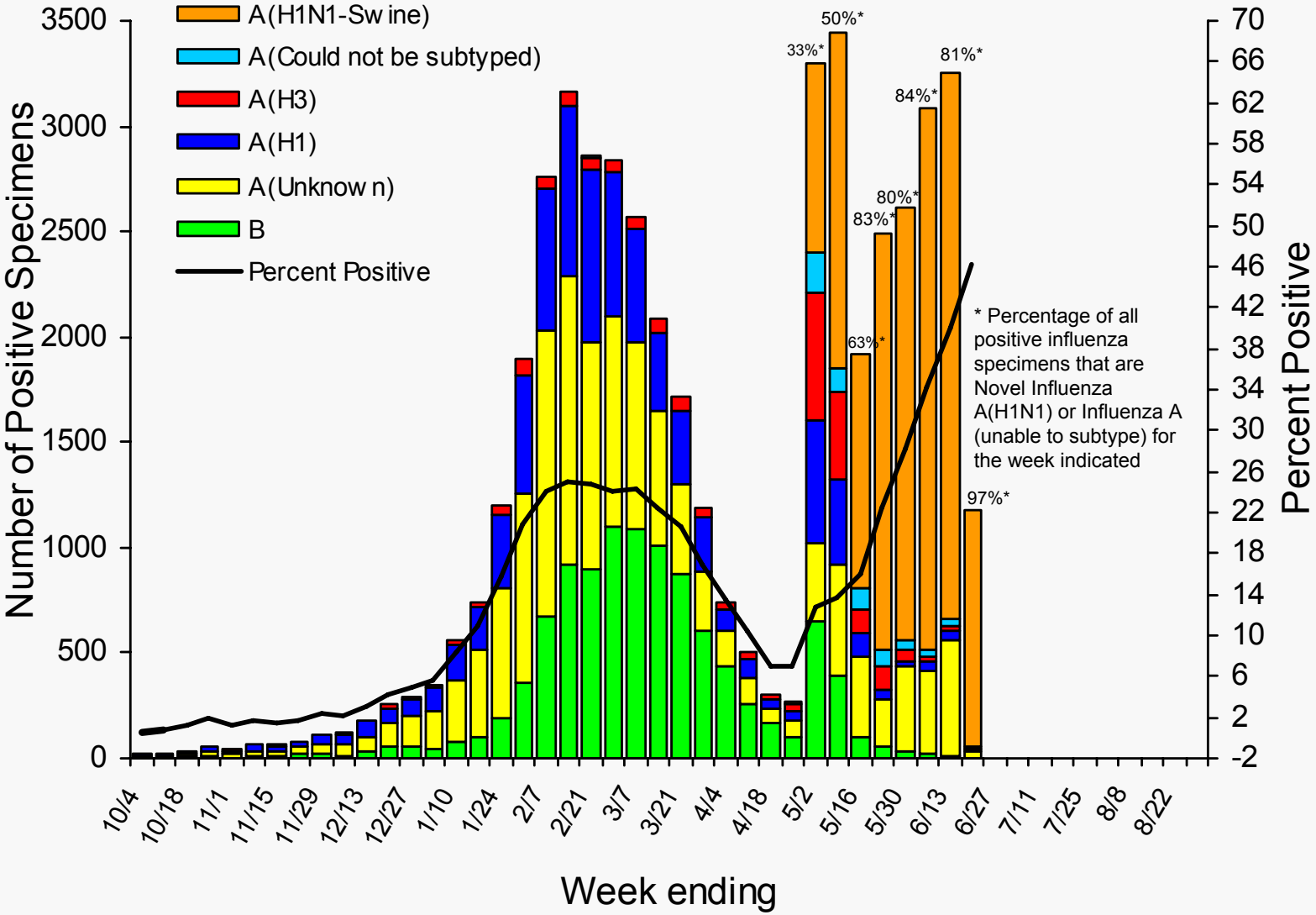
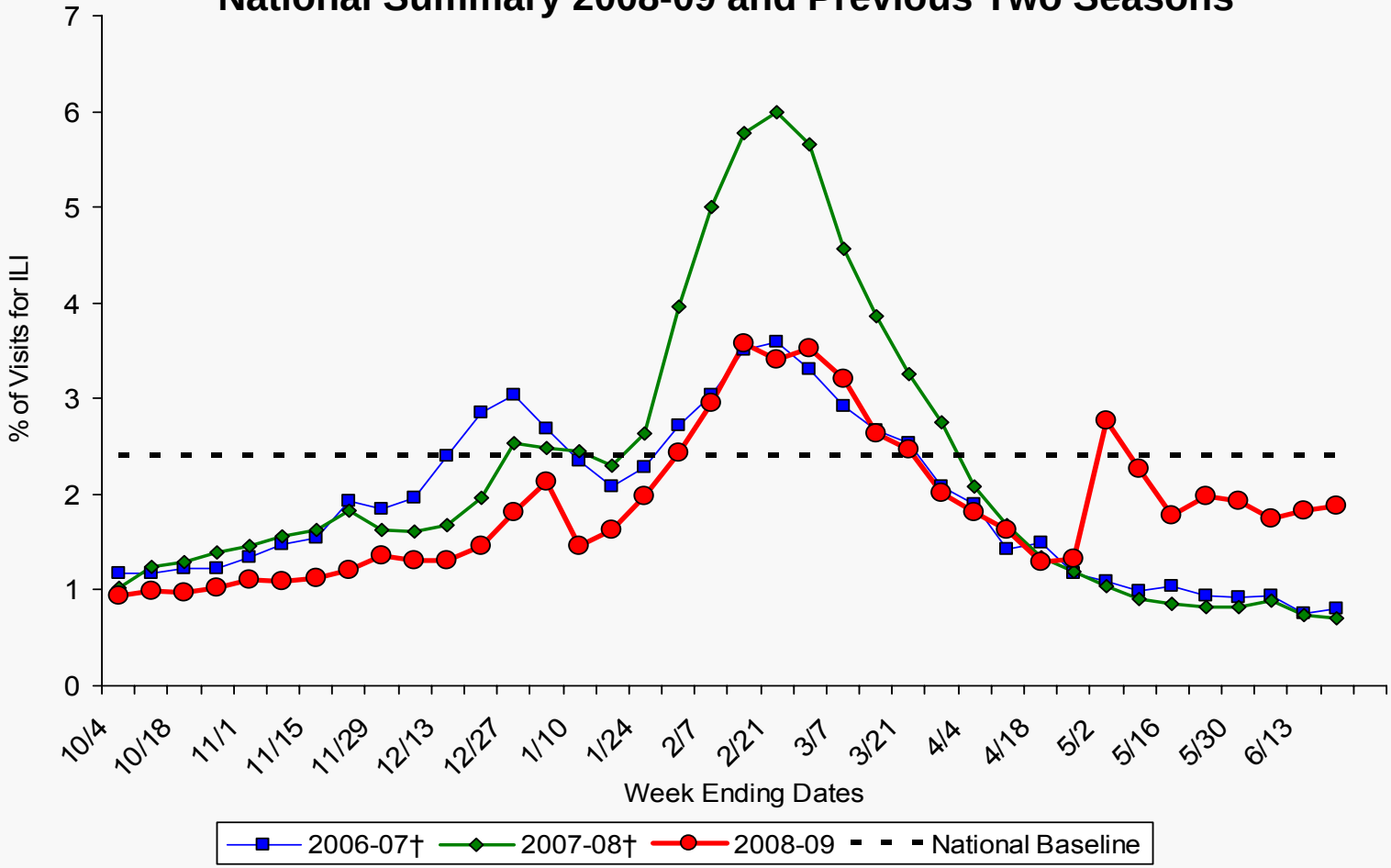
Epidemiology/Surveillance
Pandemic (H1N1) - 25 JUN 2009
U.S. WHO/NREVSS Collaborating Laboratories Summary, 2008-09



Epidemiology/Surveillance
Pandemic H1N1 – 25 JUN 2009 EDT
Percentage of Visits for Influenza-like Illness (ILI) Reported by the *US Outpatient Influenza-like Illness Surveillance Network (ILINet)*, National Summary 2008-09 and Previous Two Seasons

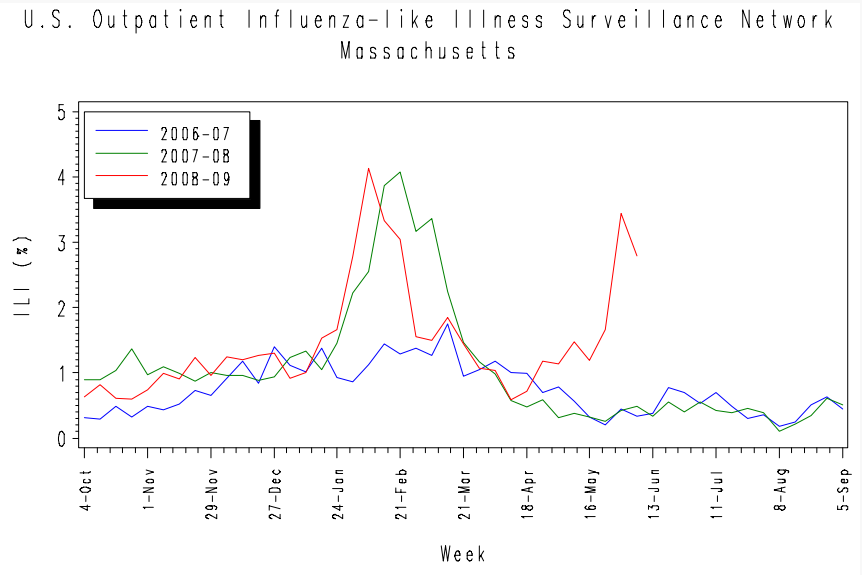


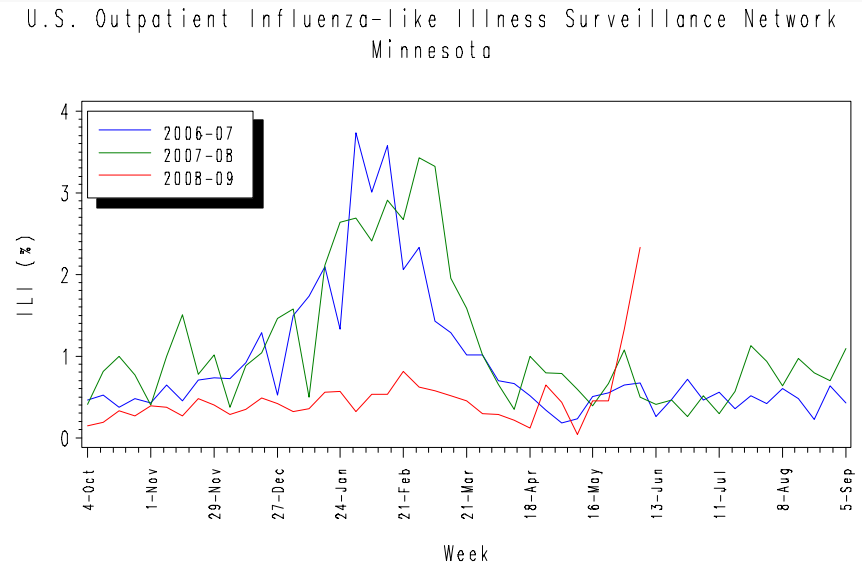
NOTE: Week ending dates vary by influenza season

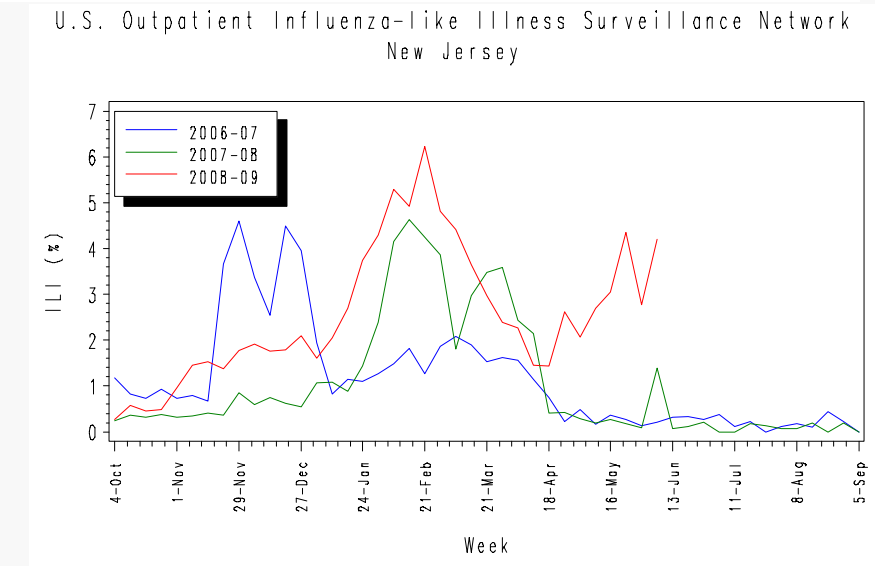
***Preliminary ILI data for week 24, as of June 24, 2009 (n=818 weekly ILI reports received from 50 states)**

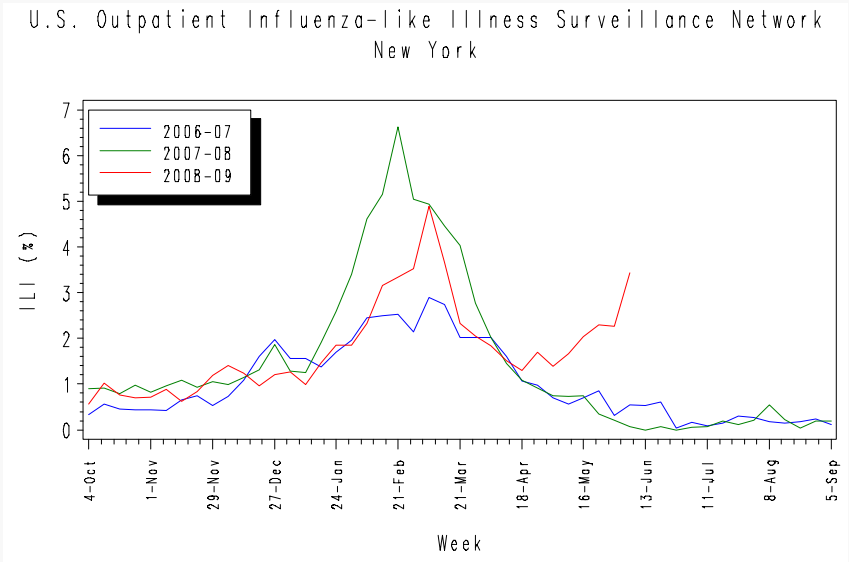
† There was no week 53 during the 2006-07 and 2007-08 seasons, therefore the week 53 data point for those seasons is an average of weeks 52 and 1.

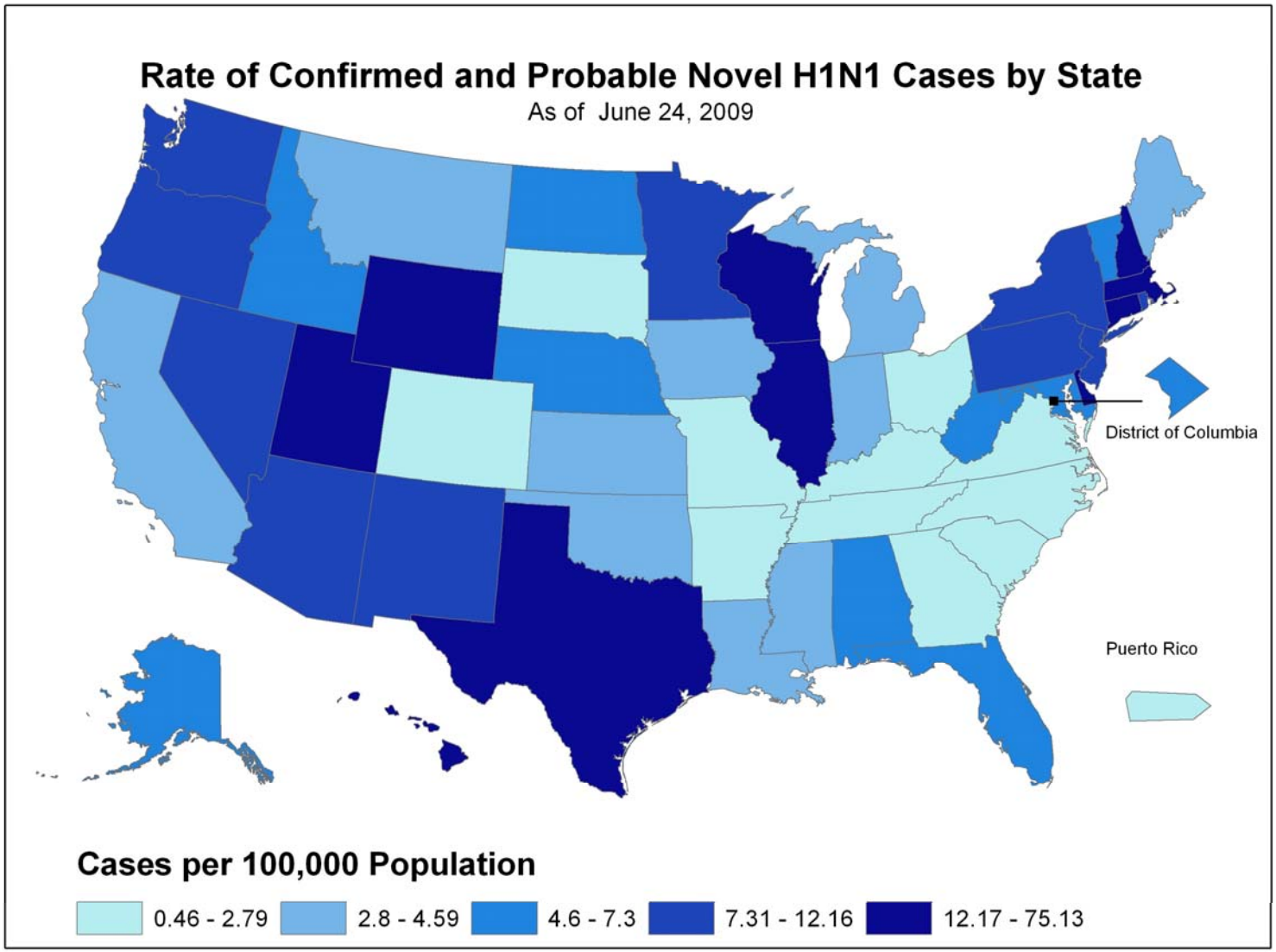
Epidemiology/Surveillance
State ILINet Week Ending 13 June
23 JUN 2009

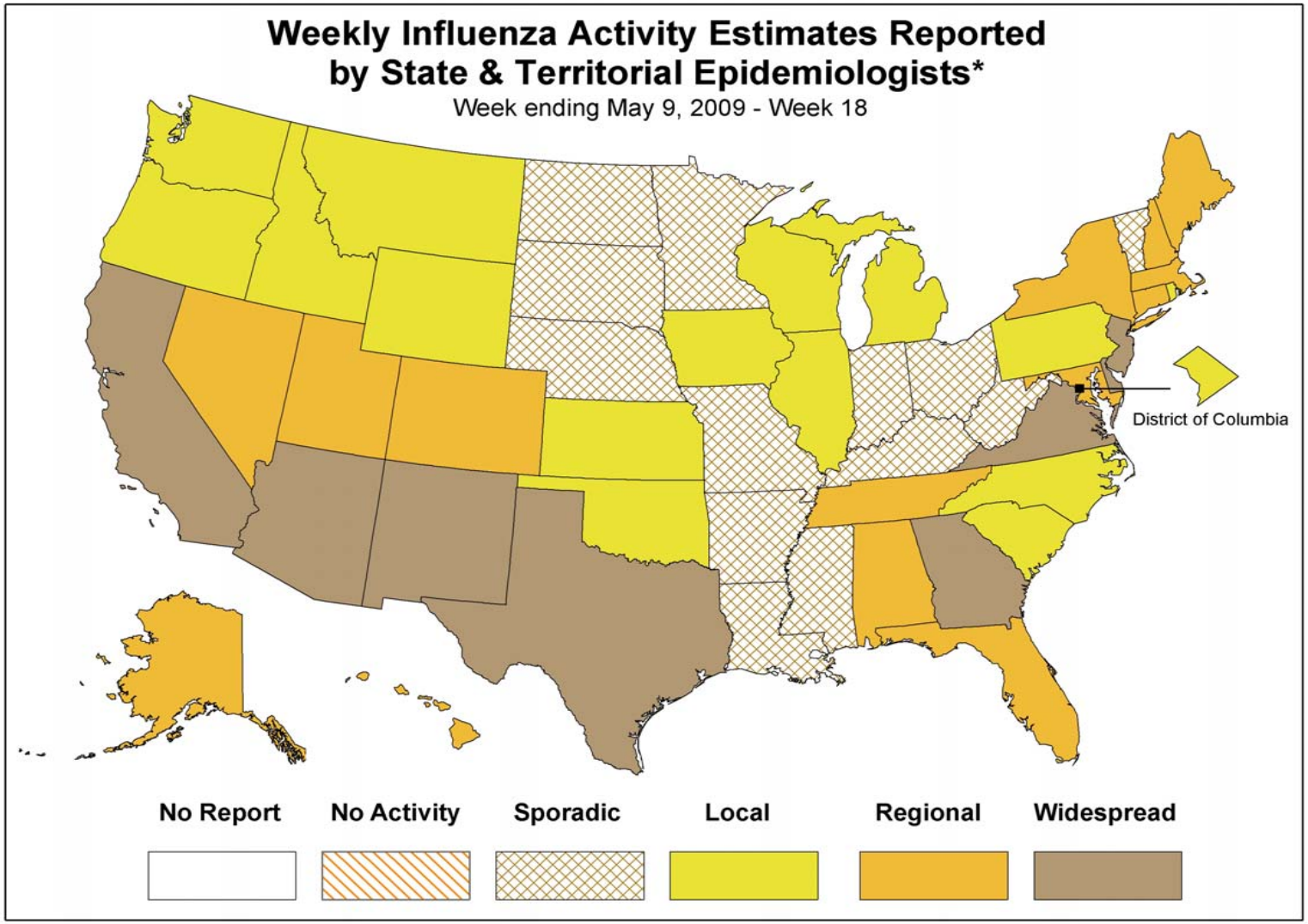




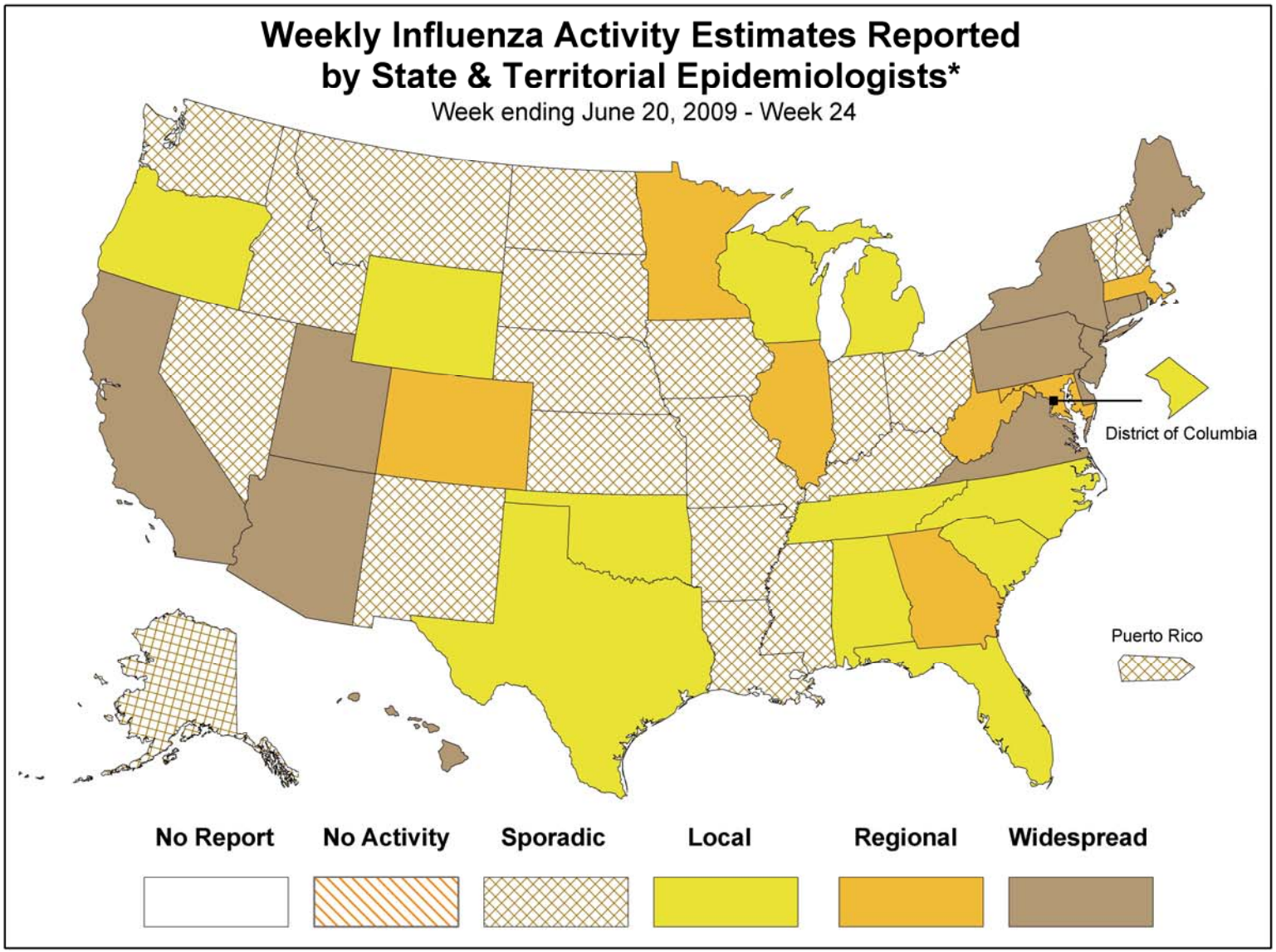





Rate of Confirmed and Probable Novel H1N1 Cases by State
As of June 24, 2009
District of Columbia
Puerto Rico
Cases per 100,000 Population
0.46 - 2.79
2.8 - 4.59
4.6 - 7.3
7.31 - 12.16
12.17 - 75.13

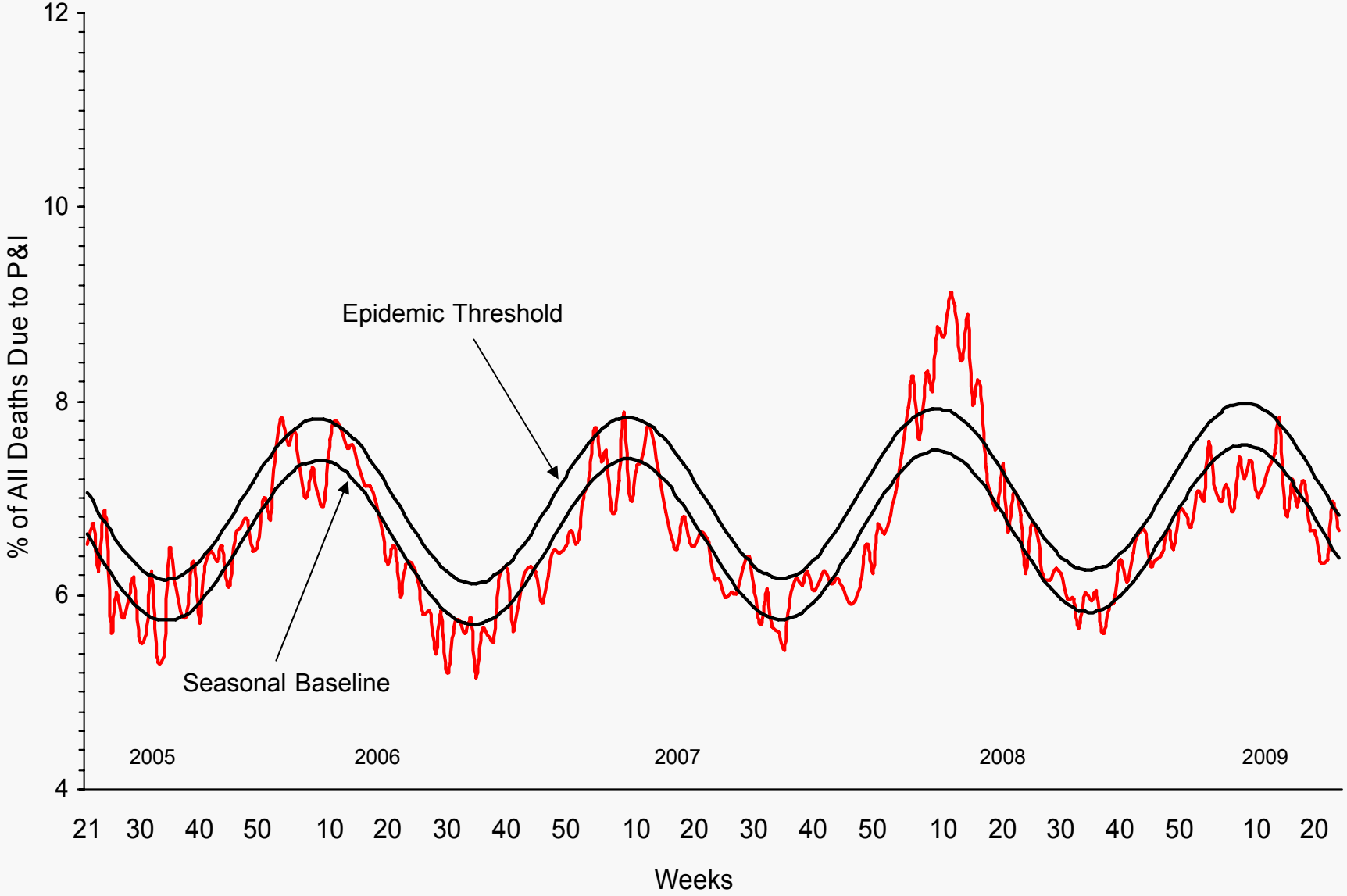


* This map indicates geographic spread & does not measure the severity of influenza activity

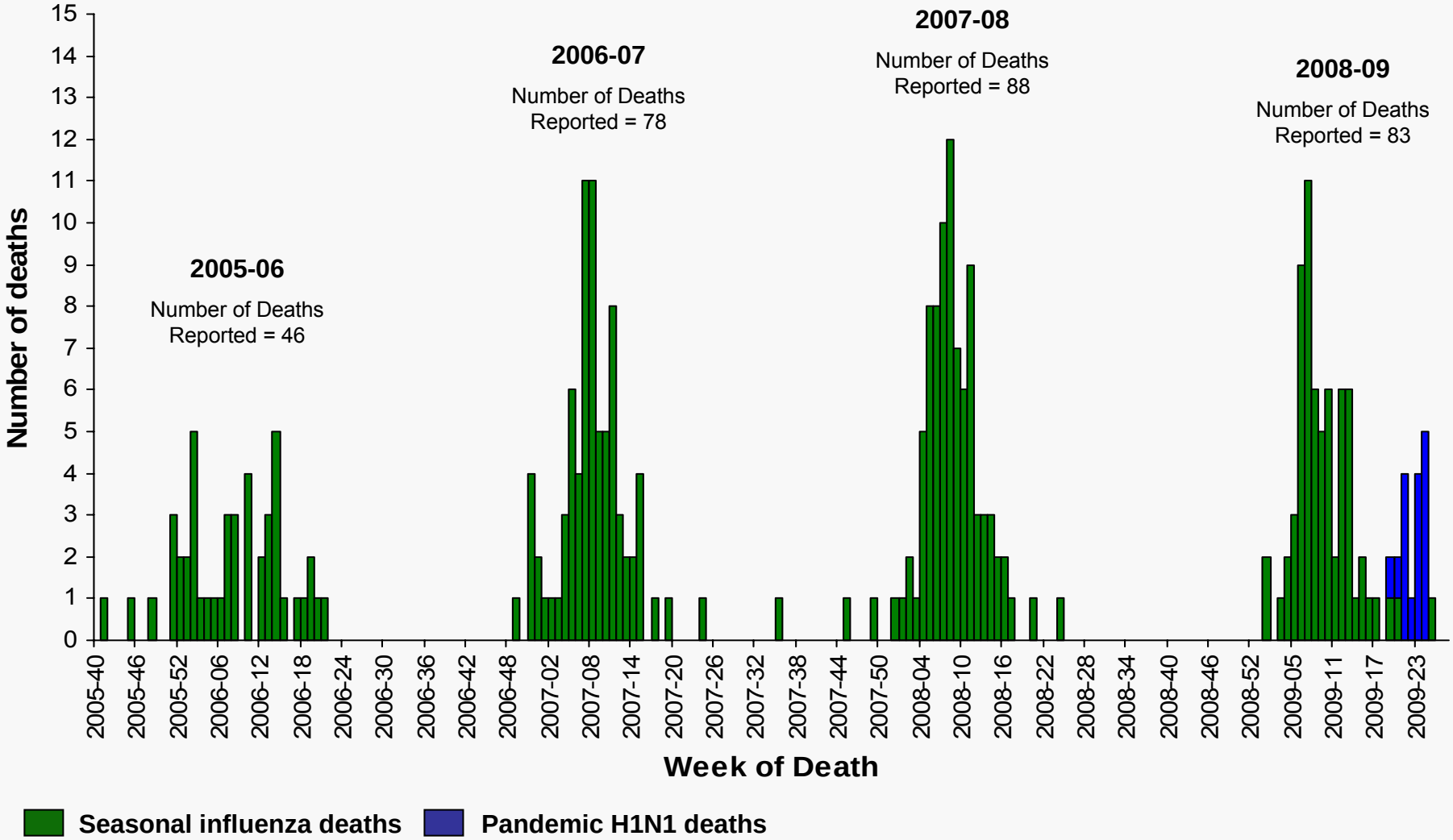


* This map indicates geographic spread & does not measure the severity of influenza activity

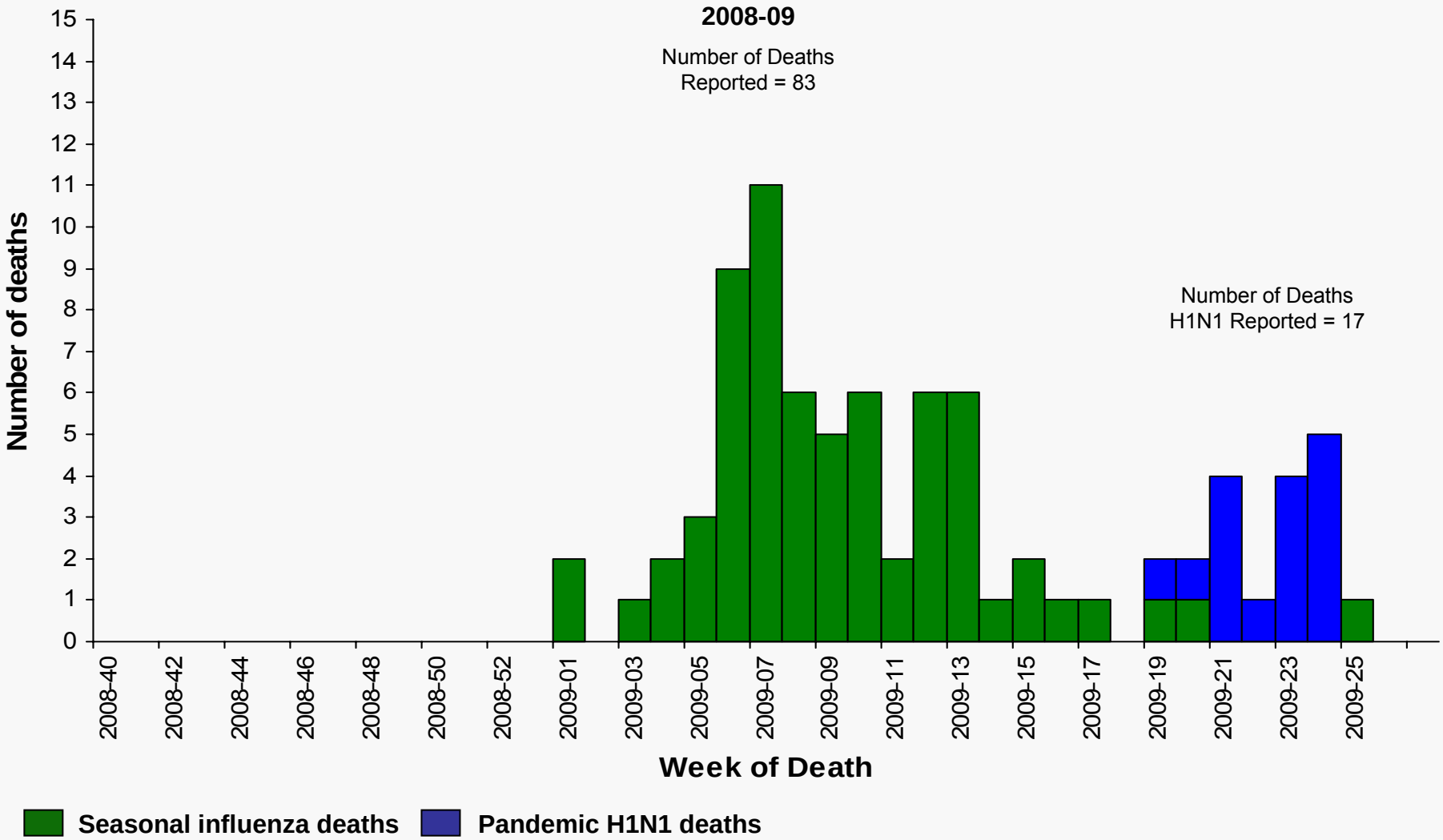
Epidemiology/Surveillance
Pandemic H1N1 - 25 Jun 2009
Pneumonia and Influenza Mortality for 122 U.S. Cities
Week Ending 06/20/2009



Number of Influenza-Associated Pediatric Deaths by Week of Death:
2005-06 season to present



Number of Influenza-Associated Pediatric Deaths by Week of Death: **2008-09 season to present**



Antigenic Characterization, 2008-09 Influenza Viruses, United States

CDC characterized 1,626 influenza viruses since October 1, 2008*

Seasonal influenza A(H1N1) [n=947]:

- 947 (100%) similar to A/Brisbane/59/2007 (2008-09 vaccine strain)
- Includes H1N1 resistant to oseltamivir

Influenza A(H3N2) [n=162]

- 162 (100%) similar to A/Brisbane/10/2007 (2008-09 vaccine strain)

Influenza B [n=517]

- 65 (13%) in B/Yamagata lineage
  - Similar to B/Florida/04/2006 (2008-09 vaccine strain)
- 452 (87%) in B/Victoria lineage

Pandemic influenza A (H1N1) [n=125]

- 125 (100%) similar to prototype a/California/07/2009 – proposed pandemic influenza vaccine strain

***as of June 12, 2009**

CDC
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Pandemic H1N1 in the United States

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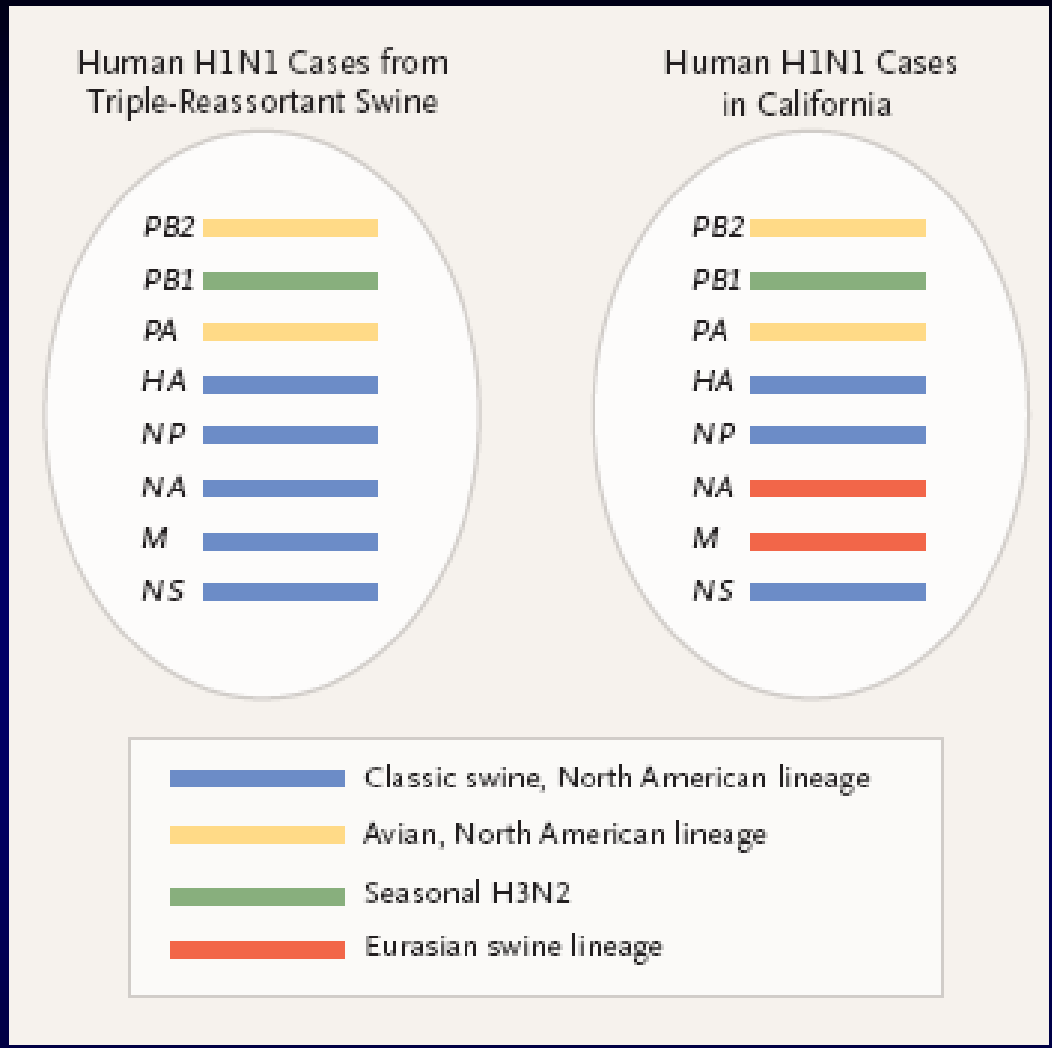

HA denotes the hemagglutinin gene, M the M protein gene, NA the neuriminidase gene, NP the nucleoprotein gene, NS the nonstructural protein gene, PA the polymerase PA gene, PB1 the polymerase PB1 gene, and PB2 the polymerase PB2 gene

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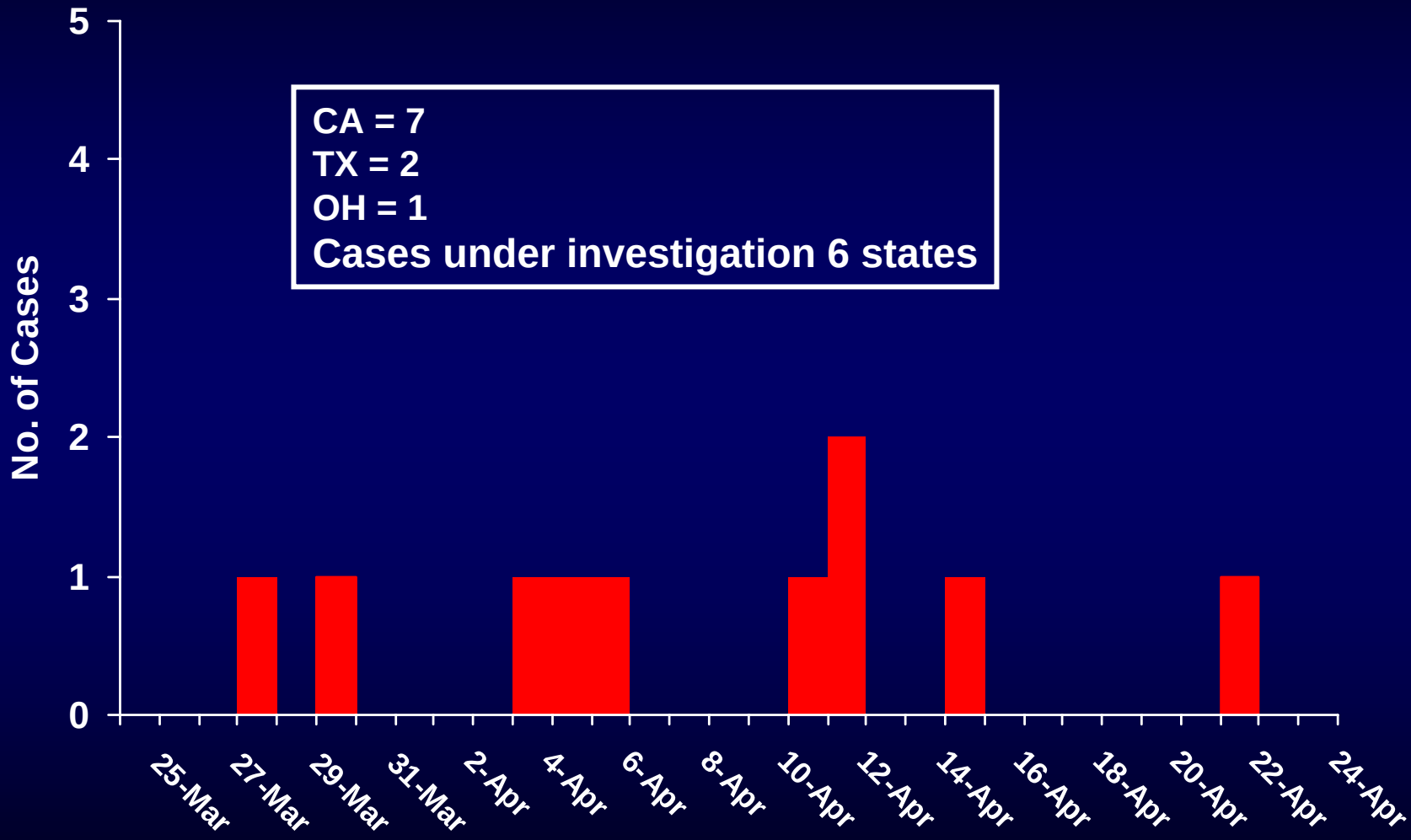
Summary of Events

- Between April 15-17, 2009,
  - 2 cases of febrile respiratory illness
  - residents of adjacent counties in southern California
  - swine influenza A (H1N1) virus

- Both viruses are genetically closely related to each other
  - resistant to amantadine and rimantadine
  - contain a unique combination of gene segments previously not recognized among swine or human influenza viruses in the United States

- Neither child had contact with pigs

Epidemiology/Surveillance
Number and onset dates of confirmed cases, SwIV infection, (n=10*) 26 Apr 2009 0200 EDT



*onset dates available for 10/20 cases

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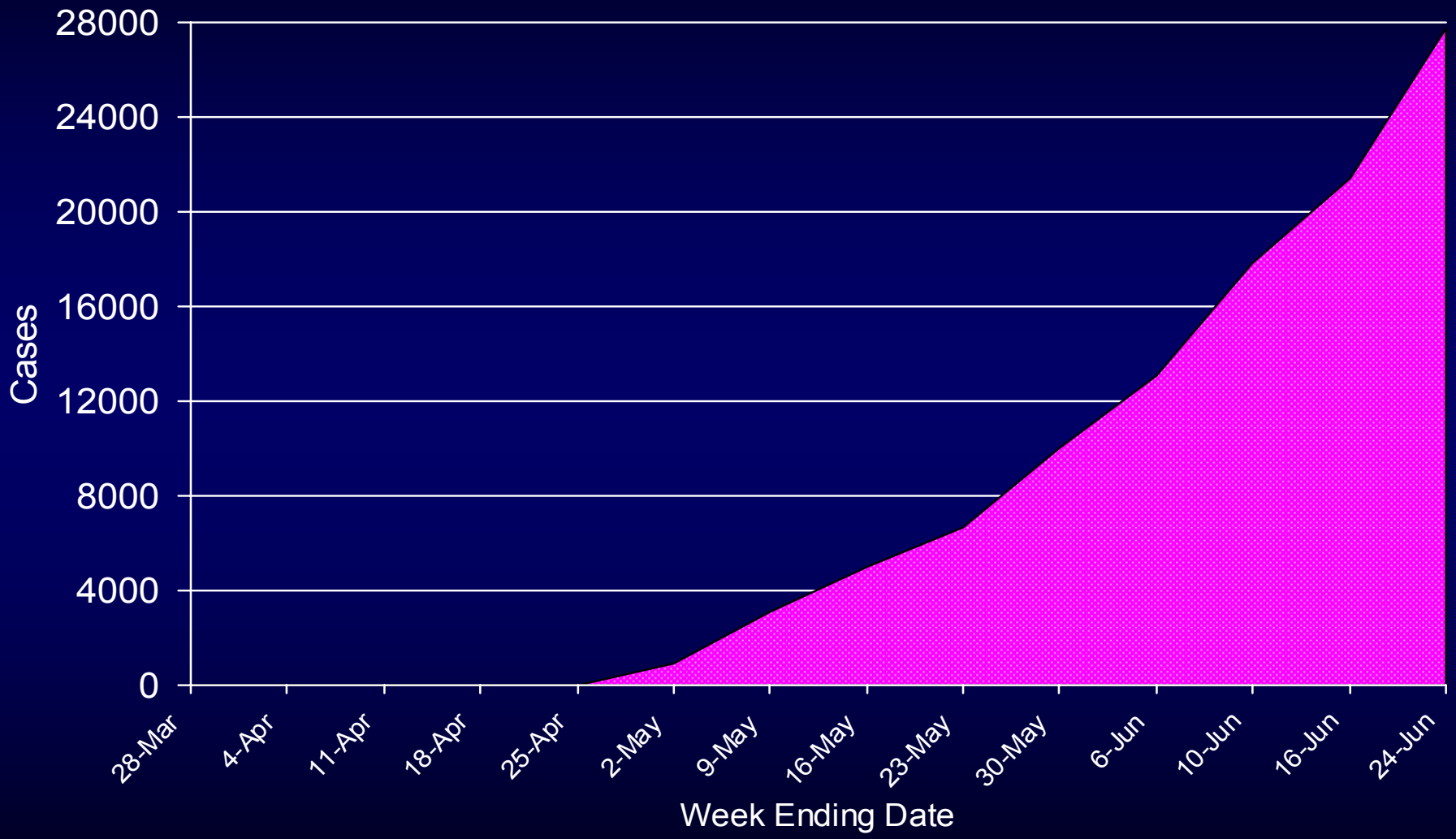
Confirmed and Probable Novel H1N1 Cases by Report Date
17 JUN 2009 (N=27,717)



www.pandemicflu.gov

www.cdc.gov/flu

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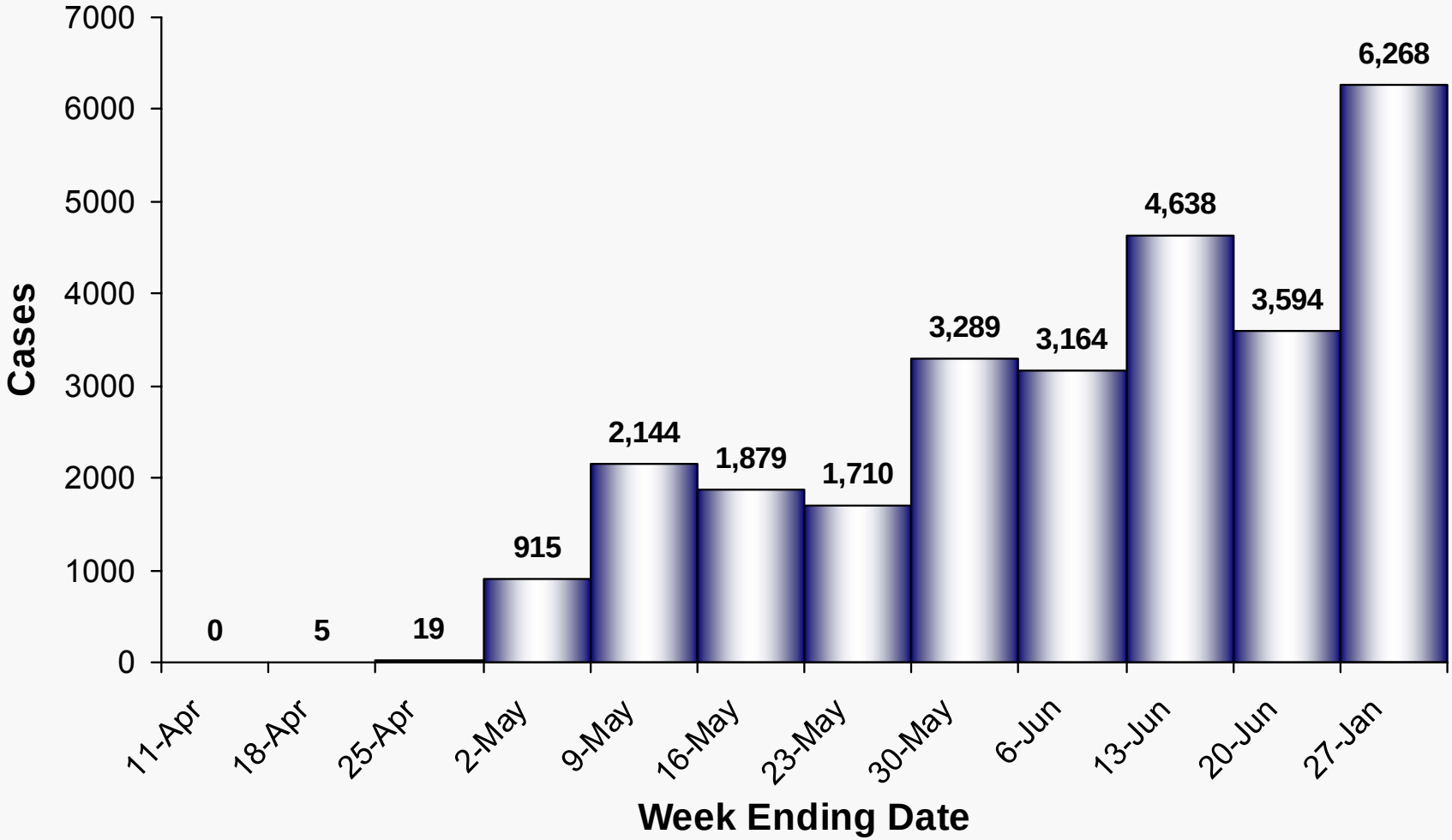
Descriptive Statistics of Novel Influenza A (H1N1) Cases Reported to CDC by States-- 17 JUN 2009 (n=27,717)

- 27,717 cases reported to CDC
- Hospitalizations: 3,065 (11%)
- Deaths: 127 (0.4%)
- Sex: 50% male/female
- Median age:
  - all cases 12 years
  - hospitalized 20 years
  - died 37 years

Epidemiologic Parameters

- **Secondary attack rate in household contacts:**
  - **ARI— 18-19%**
  - **ILI—8-12%**
- **Generation time:**
  - **ARI—2.0-3.1 days**
  - **ILI—2.4-3.1 days**
- **Community incidence (ILI)**
  - **NYC telephone survey 6.9%**
  - **Chicago door-door survey 6%**
  - **Delaware 6%-11% (University)**

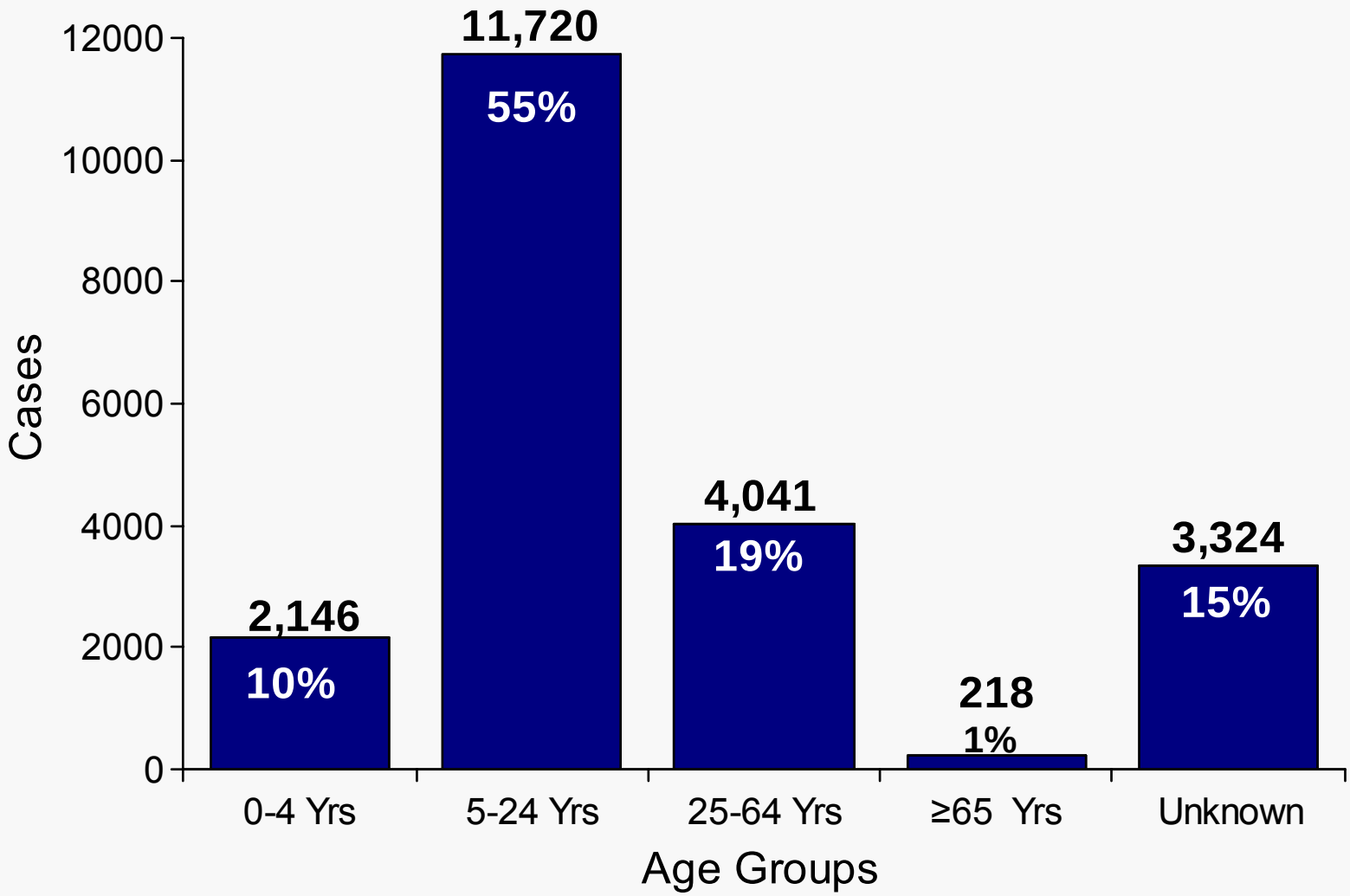
Epidemiology/Surveillance
Pandemic H1N1 Cases by Report Date
As of 18 JUN 2009 (n=27,717) (Weekly*)



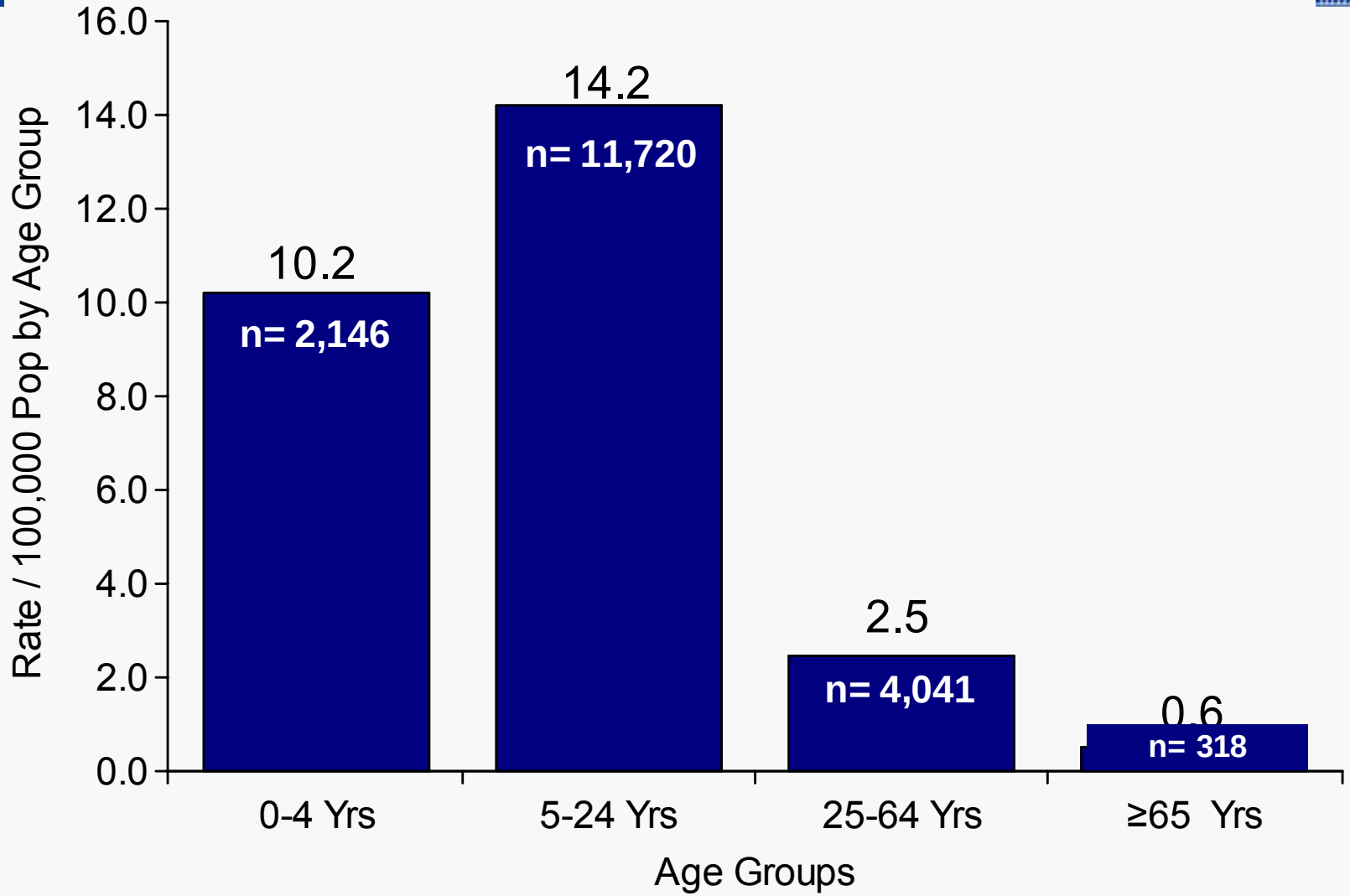
*Data for week ending 20 June 2009 include reports submitted between 1:00 AM EDT 6/17/2009 and 11:00 AM.
Dates not available for 92 cases.

Epidemiology/Surveillance
Pandemic H1N1 Cases by Age Group
Data reported as of 18 JUN 2009 (n=21,449)

Percentages represent proportion of total cases

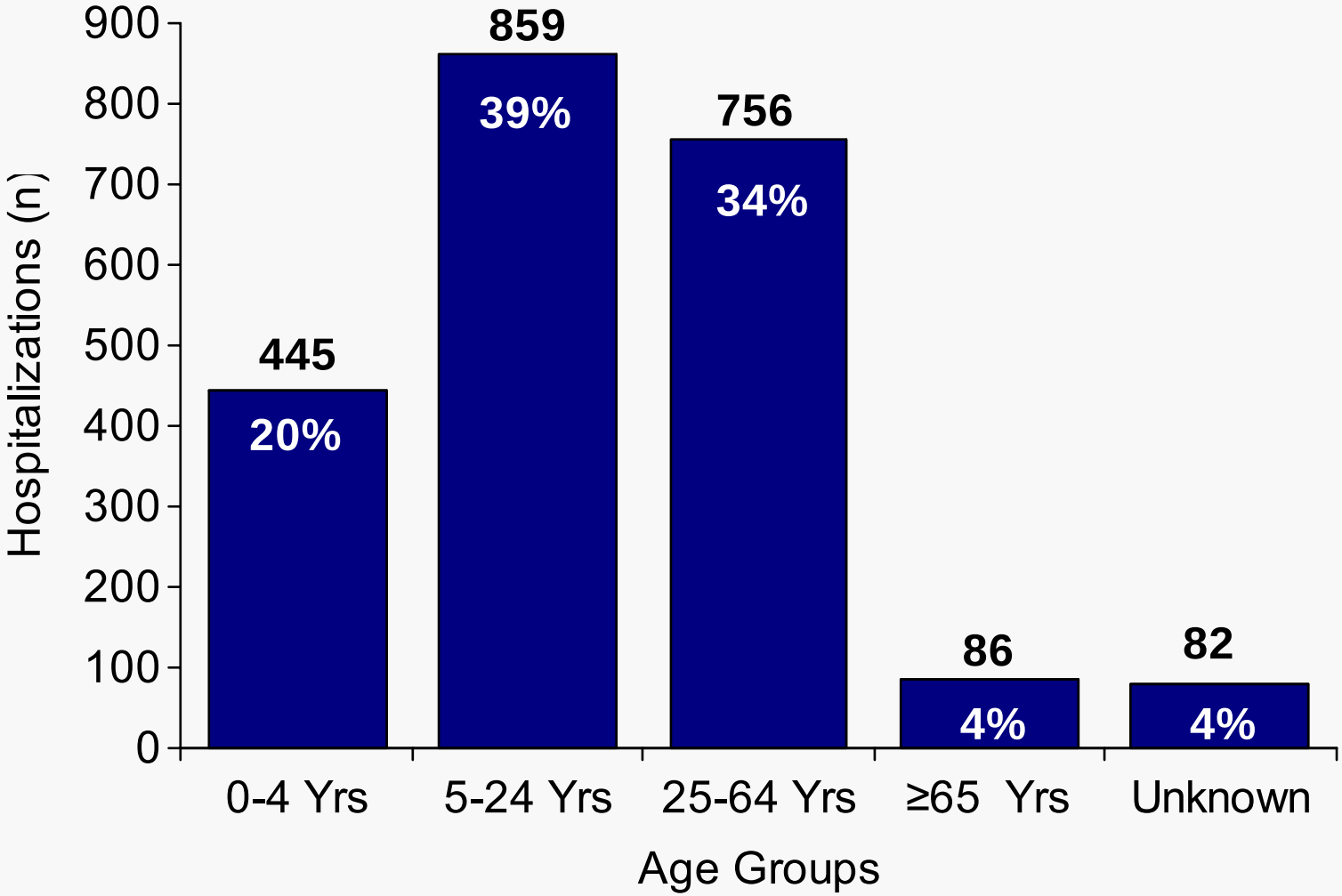


Epidemiology/Surveillance
Pandemic H1N1 Cases Rate per 100,000 Population by Age Group
As of 18 JUN 2009 (n=18,125*)

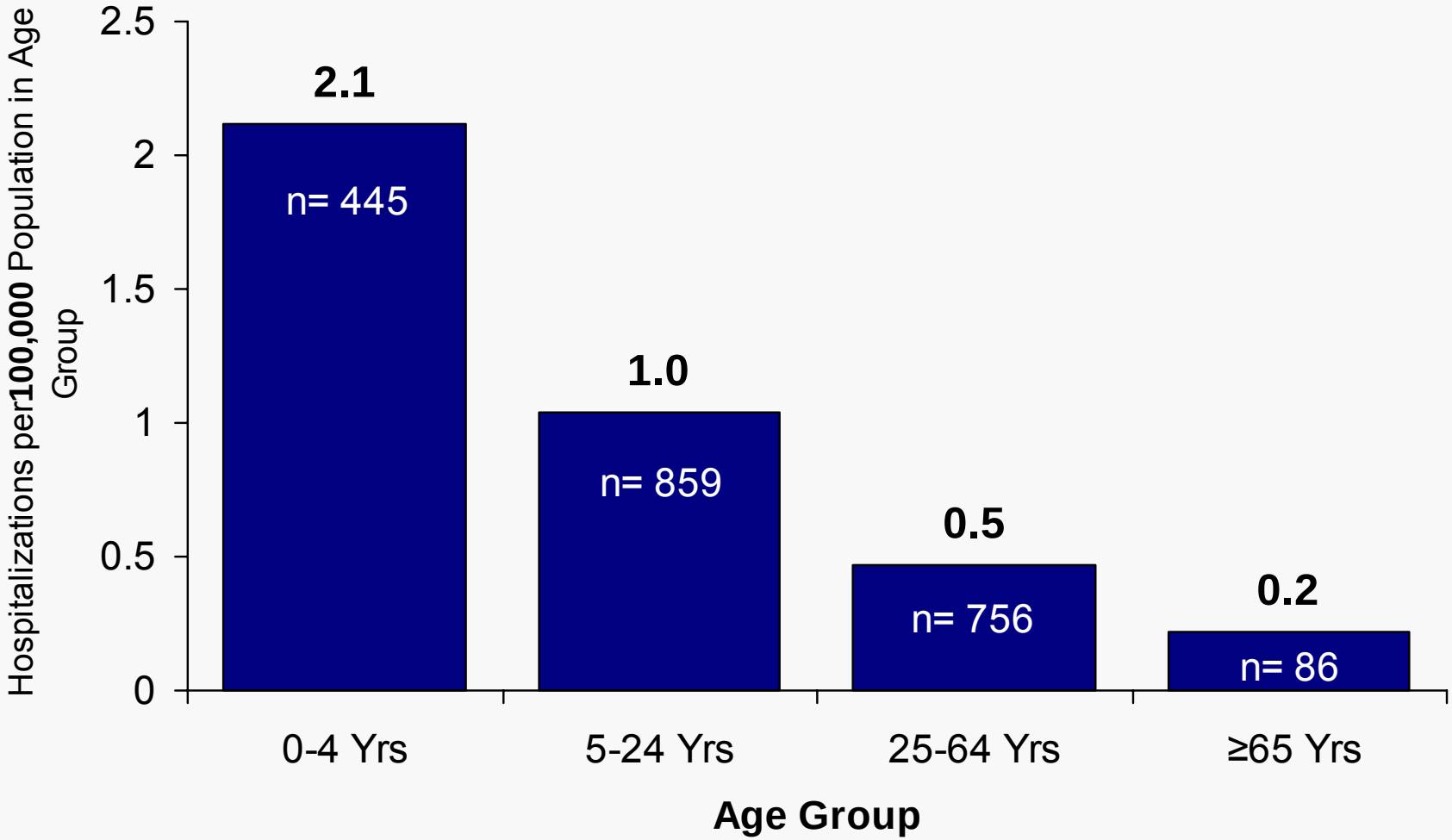


*Excludes 3,324 cases with missing ages.
Rate / 100,000 by Single Year Age Groups: Denominator source: 2008 Census Estimates, U.S. Census Bureau at:
http://www.census.gov/popest/national/asrh/files/NC-EST2007-ALLDATA-R-File24.csv

Epidemiology/Surveillance
Pandemic H1N1 Hospitalizations by Age Group
Data reported as of 18 JUN 2009 (n=2,228)
Percentages Represent Proportion of Total Hospitalizations



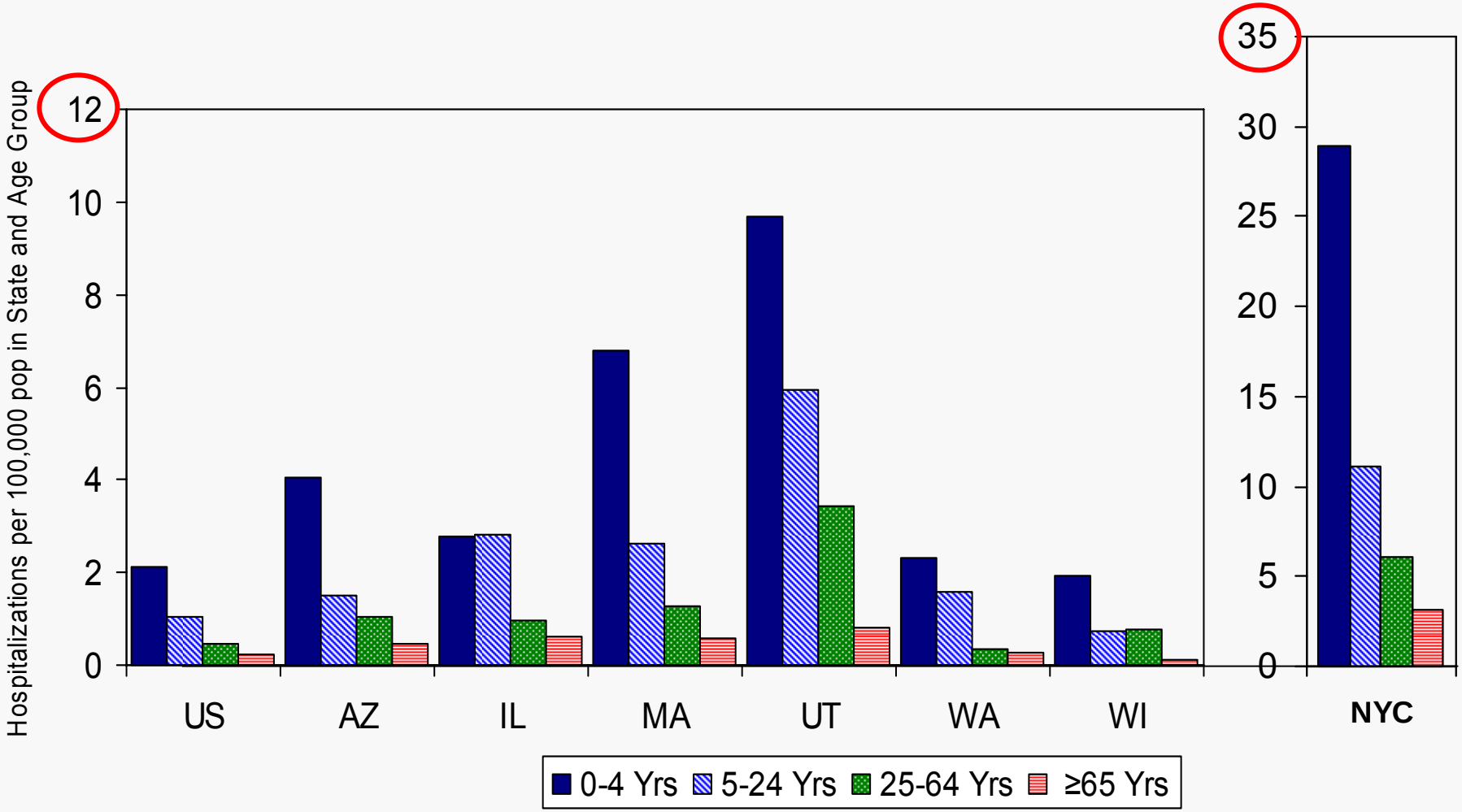
Epidemiology/Surveillance
Pandemic H1N1
Hospitalization Rates* by Age Group (n=2,228)
As of 18 Jun 2009



*Hospitalizations with unknown ages are not included (n=82)
*Rate / 100,000 by Single Year Age Groups: Denominator source: 2008 Census Estimates, U.S. Census Bureau at:
http://www.census.gov/popest/national/asrh/files/NC-EST2007-ALLDATA-R-File24.csv

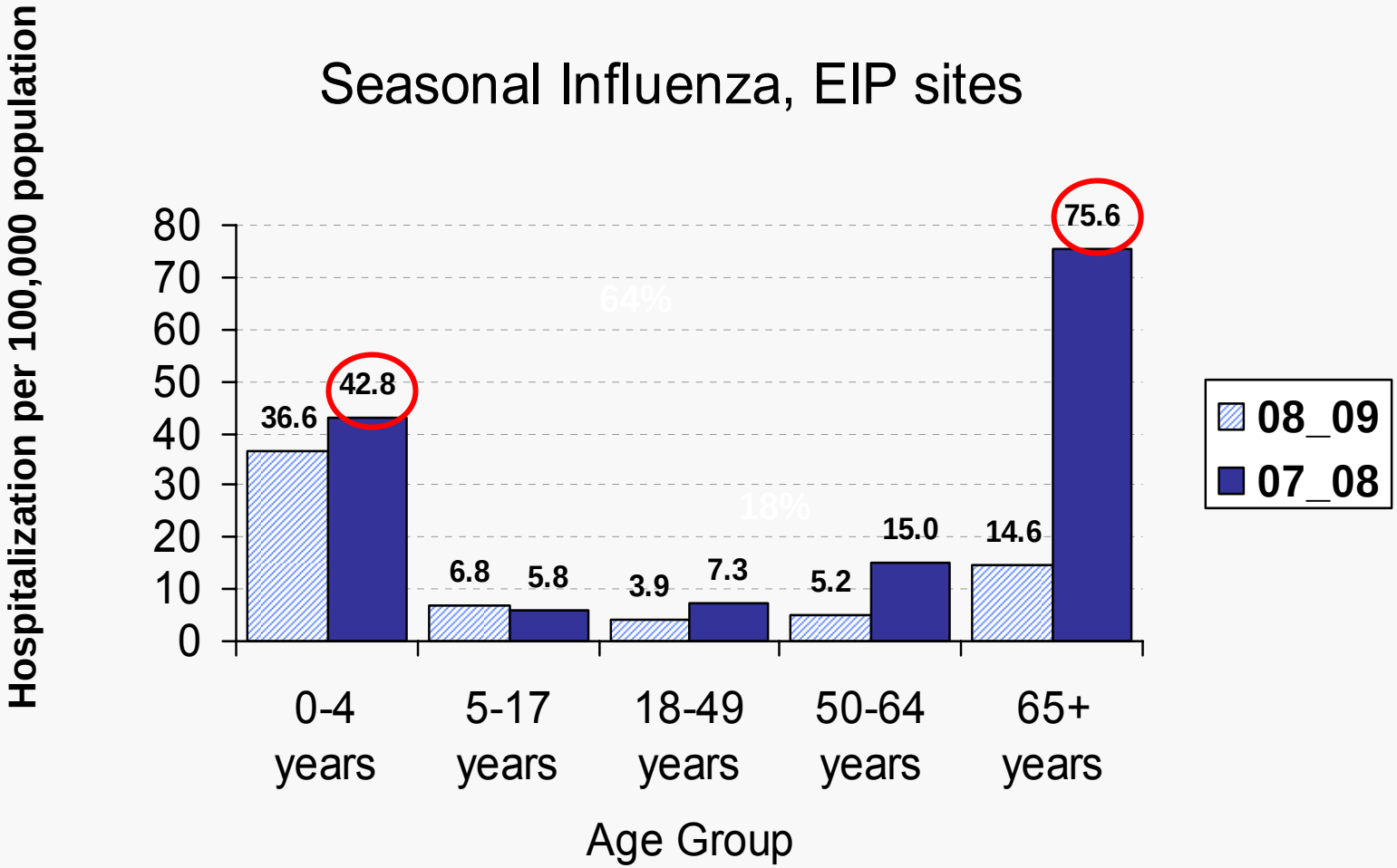
Epidemiology/Surveillance
Incidence* of Hospitalization for Pandemic H1N1 by Age Group and Selected Sites - 18 Jun 2009

(Note Different Scale for NYC)



*Denominator: U.S. Census population estimates for July 2008 for all states, 2007 American Community Survey for NYC
Hospitalizations with unknown ages are not included (US=90, AZ=1, IL=24, WA=1, WI=19)

Epidemiology/Surveillance
Cumulative Seasonal Influenza Hospitalization Rates by Age, Emerging Infections Program (EIP) sites



Hospitalizations

- 3,065 hospitalizations among 27,717 cases
- Detailed clinical data available on ~268 patients
  - 21% admitted ICU
  - 13% mechanical ventilation
  - 17 deaths
- Median time from onset of illness to hospital admission
  - 3 days (range 1-14 days)
- Median length of stay
  - 3 days (range 1-53)

Descriptive Epidemiology

- 128 female (48%), 140 male (52%)
- Median age 22 years (range 21 days-86 years)

Age Groups	Hospitalized No (%) n=268
0-23 months	24 (9)
2-4 years	20 (8)
5-9 years	28 (10)
10-18 years	55 (20)
19-49 years	95 (35)
50-64 years	31 (12)
≥65 years	15 (6)

Underlying Conditions

Condition	No (%)
Asthma or COPD	32%
Diabetes	16%
Immunocompromised	12%
Chronic cardiovascular disease**	11%
Neurocognitive disorder	8%
Neuromuscular disorder	8%
Current Smoker	10%
Pregnant	7%
Chronic Renal Disease	8%
Seizure disorder	6%
Cancer	3%

* * Excludes hypertension

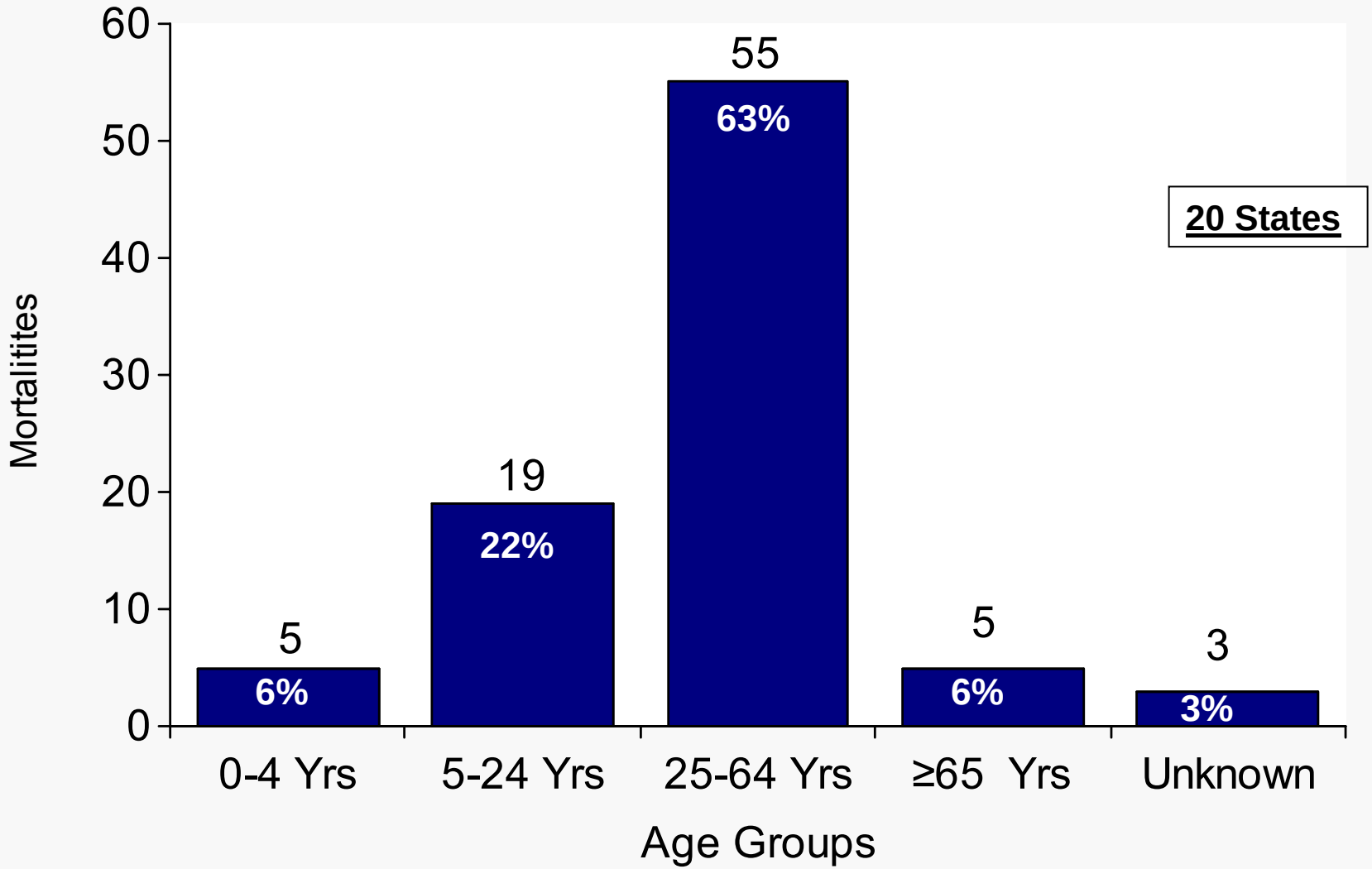
71% with underlying conditions

* 51 people had more than one underlying condition; median 1 (range 1-6)

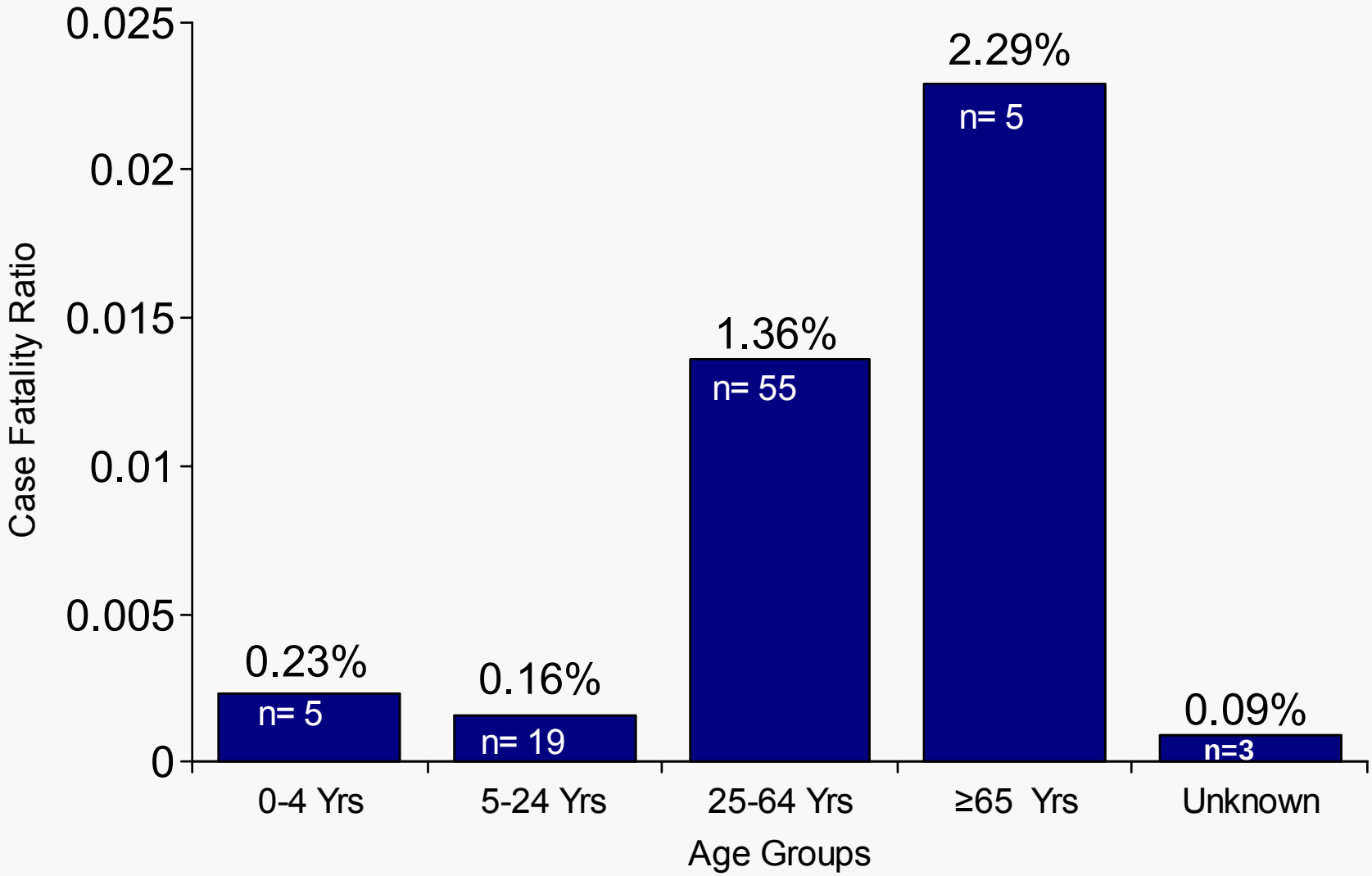
Clinical Information

Chest radiograph with pneumonia at admission	35%
ARDS	16%
Dx with sepsis at admission	12%
Mechanical ventilation	13%
Treated with antivirals	73%
Treated with antibiotics	78%
Treated with steroids	35%
Recovered	94%

Epidemiology/Surveillance
Pandemic H1N1 Deaths by Age Group
As of 18 JUN 2009 (n=87)



Epidemiology/Surveillance
Pandemic H1N1 Case Fatality Ratio by Age Group
Data reported as of 18 JUN 2009 (n=87)



Epidemiology/Surveillance
Pandemic (H1N1) Deaths Reported to CDC by States as of 25 JUN 2009

- Limited data available on 99/111 deaths in 20 states

- 49 Female (53%), 44 Male (47%)

- Race/Ethnicity (N=47)
  - 6 non-Hispanic Black (13 %)
  - 19 non-Hispanic White (40%)
  - **19 Hispanic (40%)**
  - 3 Other (6%)

- Median time from illness onset to death
  - 7.5 days (range 0 - 40 days)

Epidemiology/Surveillance
Pandemic (H1N1) Deaths Reported to CDC by States
as of 25 JUN 2009
n=99

- 12 (12%) persons with **no** underlying conditions
- Conditions may overlap for individual cases

Condition	Percent Deceased Cases with Condition
Asthma	11%
Other Pulmonary disease	24%
Diabetes	13%
Chronic cardiovascular disease	14%
Neurocognitive disorder	15%
Neuromuscular disorder	11%
Pregnant	8%
Seizure disorder	7%
Morbid obesity	**11%**
Obesity	**34%**
Other serious (hepatic, cancer, immunosuppressed)	13%

Conclusions

- On April 15, 2009 a novel swine-origin influenza A H1N1 virus was identified in a boy in California

- 27,717 reported cases in US
- 55,000 reported worldwide

- Majority of persons hospitalized and who died had underlying conditions

- Given the rapidly evolving outbreak more cases are expected and transmission will likely continue into the influenza season

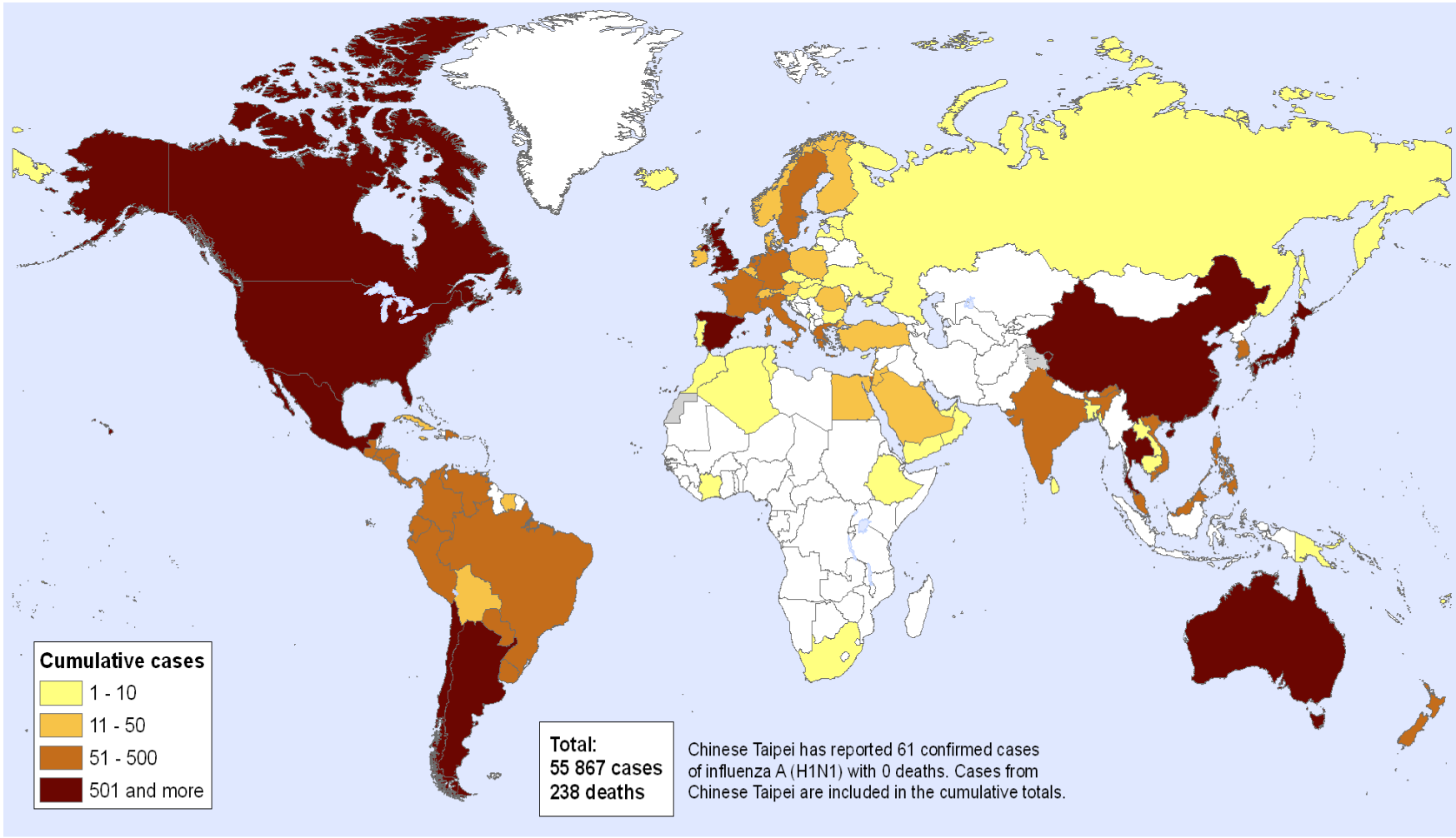
Surveillance Plans

- Continue enhanced surveillance this summer
- Convene CSTE - CDC working group to solidify surveillance plans for fall and winter (July 1)
- Likely less focus on case counts as they grow larger and become less representative
- Focus on more severe outcomes, syndromic surveillance data and laboratory data
- Continue enhanced virologic surveillance
- In process of developing revised screening recommendations, and guidance for prioritization of laboratory testing with CSTE and APHL

Influenza Surveillance, 2009-09: Data from other Countries

New Influenza A (H1N1), Number of laboratory confirmed cases as reported to WHO

Status as of 24 June 2009 06:00 GMT



Map produced: 24 June 2009 10:00 GMT

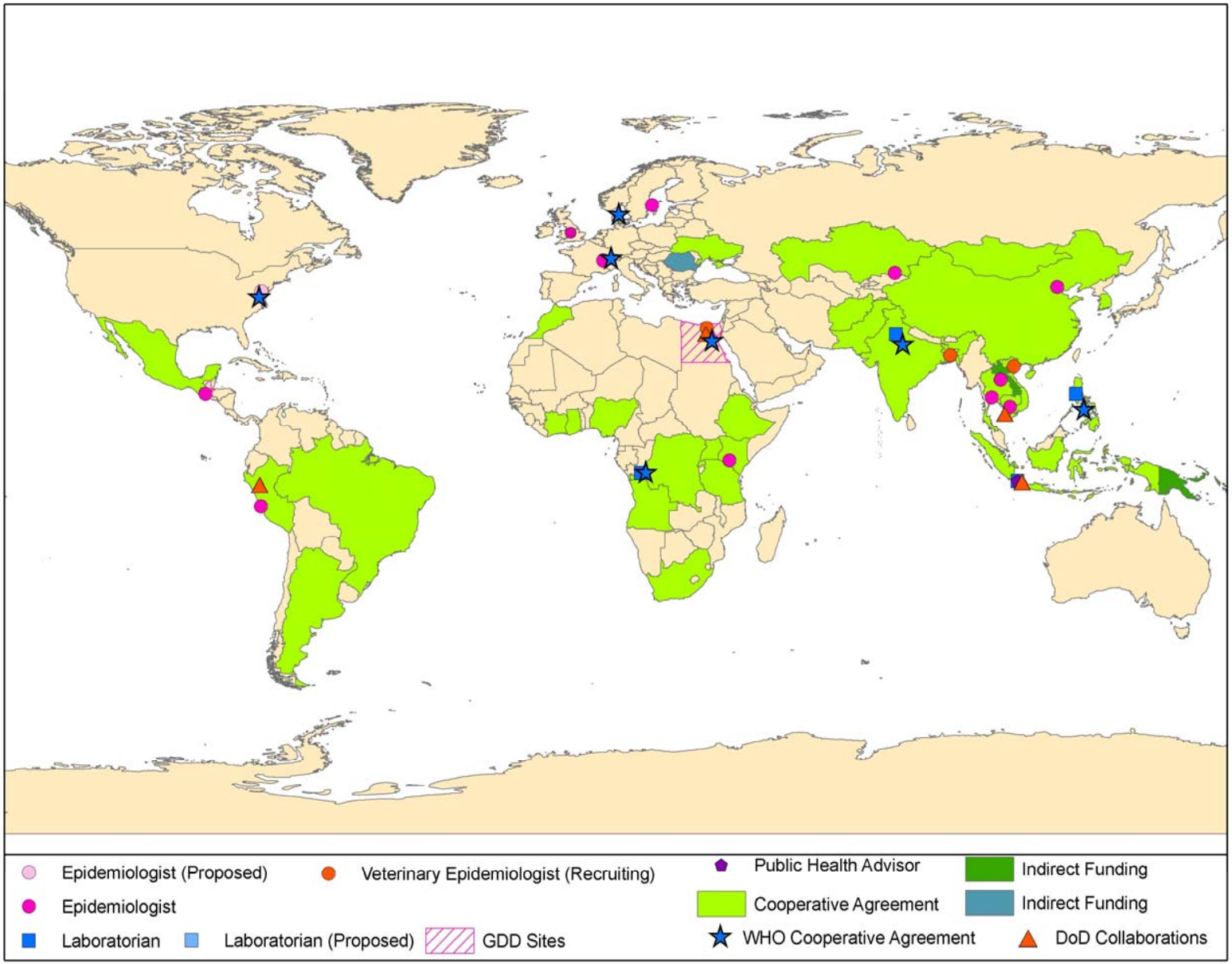
Data Source: World Health Organization
Map Production: Public Health Information and Geographic Information Systems (GIS)
World Health Organization

World Health Organization

Epidemiologic Data from Countries with Jun-Sep Influenza Seasons

- Respiratory Syndrome Surveillance
  - Influenza Programs in 32 Countries
    - Built over last 5 years for pandemic preparedness
    - Laboratory capacity improved, reagents provided
- Types of disease surveillance information available
  - Influenza-like illness (ILI)
  - Severe acute respiratory illness (SARI)
  - ILI or SARI with lab confirmation

International CDC Personnel and influenza study sites, 2009



WHO Global Surveillance Network

- Viral surveillance network established in 1952
- 4 WHO Collaborating Centres (WHO CCs)
- National Influenza Centres (NICs): 126 institutions in 97 countries recognized by WHO
  - Collect specimens in their country
    - ~175,000 patient samples annually
  - Perform primary virus isolation and preliminary antigenic characterization
  - Ship newly isolated strains to WHO CCs for high level antigenic, genetic and antiviral sensitivity analyses
    - ~2,000 viruses sent annually to the WHO CCs
  - 25 NIC's in S hemisphere
  - Additional NICs in countries in N hemisphere with circulation during Jun-Sep (e.g., Thailand, Bangladesh, Central America)

Summary: Information from surveillance in countries with Jun-Sep influenza virus circulation

- Is the pandemic virus continuing to circulate?
  - Yes
- Are pandemic viruses circulating at same time as other influenza viruses?
  - Preliminarily, yes
- Are viruses changing?
  - Viral surveillance plans in place, existing platform to monitor
- Are epidemiologic parameters changing (e.g., attack rate, incubation period, etc.)?
  - Will be difficult to obtain representative data in most countries
  - Ongoing outbreaks in U.S. also provide data
- Are clinical manifestations changing (e.g., severity, secondary infections)?
  - Difficult given different healthcare parameters
  - Getting viruses from unusual or severe cases feasible
- Are community mitigation interventions working?
  - Perhaps possible to study in several countries, likely won't have lab confirmed outcomes

The Difference between Avian Influenza and Swine Influenza

- The best solution for avian influenza is tweetment!

- The best solution for swine influenza is oinkment!

Acknowledgements

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David Swerdlow
Sonja Olsen
Seema Jain
Anna Bramley
Steve Benoit
Alicia Fry

State and Local Health Departments
CSTE