COUNTY OF LOS ANGELES DEPARTMENT OF PUBLIC HEALTH
IMMUNIZATION PROGRAM
VACCINE-PREVENTABLE DISEASE SURVEILLANCE REPORT
QUARTER 2: APRIL - JUNE 2009

PREPARED BY: VI NGUYEN

COUNTY OF LOS ANGELES
Public Health

BACKGROUND

- The Los Angeles County Immunization Program (LACIP) Epidemiology Unit is responsible for the surveillance and control of the following vaccine-preventable diseases (VPDs): diphtheria, invasive *Haemophilus influenzae* (age<15), measles, mumps, pertussis, polio, rubella (acute and congenital cases), tetanus, and varicella (hospitalized cases, deaths, and outbreaks).
- The current surveillance system is a passive system, with suspect reports coming to LACIP via fax, phone, mail, or a web-based confidential morbidity reporting system (VCMR).
- All suspect reports are investigated. Epidemiology Unit staff conduct an initial assessment via interviews with the reporting physician, reporting laboratory, and patient. Information on patient demographics, symptoms, treatment, laboratory tests, immunization history, exposure history, and transmission potential are collected. If the suspect report meets the case definition and further investigation/management or post-exposure prophylaxis is needed for contacts, the case report is sent out to the appropriate public health district (*i.e.,* health district where patient resides) for a home visit. At the end of the investigation, the case is closed as false, probable, confirmed, or out of jurisdiction.
- Note that the data in this report is provisional and may be incomplete due to time lags in disease reporting and investigation.

SURVEILLANCE OVERVIEW

- Los Angeles County's first measles case in over a year was reported this quarter (Table 1).
- More *Haemophilus influenzae*, mumps, and hospitalized varicella cases were reported this quarter compared to the previous 5-year average for the same time period (Table 1). With the exception of one hospitalized varicella case, none of the cases were linked to any other cases or outbreaks.
- Fewer pertussis, rubella (acute and congenital), tetanus cases and varicella outbreaks were reported this quarter compared to the previous 5-year average for the same time period (Table 1).

TABLE 1. REPORTED VPD CASES, 2009 VS. PREVIOUS 5-YEAR AVERAGE

Disease	Suspect Reports Received Year to Date 2009[1]	Confirmed and Probable Cases			
		2nd Quarter 2009[2]	Year to Date 2009[3]	Year to date 2004-2008 Five-year average[3]	Percent Change
Diphtheria	0	0	0	0	0%
***Haemophilus influenzae* (age<15, all serotypes)**	18	4	9	7.2	25.0%
Measles	63	1	1	0.6	66.7%
Mumps[4]	34	3	4	3.4	17.6%
Pertussis	126	26	59	77.0	-23.4%
Poliomyelitis	0	0	0	0	0%
Rubella (acute)	24	0	0	0.4	-100%
Rubella (congenital)	1	0	0	0.2	-100%
Tetanus	0	0	0	1.0	-100%
Varicella (Hospitalized cases)[5]	34	11	15	10.8	38.9%
Varicella (Fatal cases)	1	0	1	0.2	400%
Varicella outbreaks	7	0	5	29.4	-83.0%

[1] Suspect reports with disease onset between January 1 – June 30, 2009. Totals include confirmed, probable, false, and out of jurisdiction cases/outbreaks, as well as suspect cases/outbreaks still under investigation.
[2] Cases reported with disease onset between April 1 – June 30, 2009. For pertussis, date of cough onset is used. For mumps, date of parotitis onset is used. For measles, rubella, and varicella, date of rash onset is used. For varicella outbreaks, date of first case rash onset is used. Numbers may be incomplete due to time lags in disease reporting and investigation.
[3] Cases reported with disease onset between January 1 – June 30.
[4] Mumps totals only include confirmed cases since the case definition for probable mumps cases was different pre-2006, 2006-2007, and 2008-2009.
[5] Hospitalized varicella totals include hospitalized cases that were fatal.

TABLE 2. SURVEILLANCE INDICATORS FOR VPDS WITH PROBABLE AND CONFIRMED CASES

Disease	# of Cases		Median Reporting Lag Time (Days)[1]		Cases that are Lab-Confirmed n (%)		Cases that are Epi-Linked[2] n (%)		Case Fatalities n (%)	
	2nd Qtr 2009[3]	YTD 2009[4]	2nd Qtr 2009[3]	YTD 2009[4]	2nd Qtr 2009[3]	YTD 2009[4]	2nd Qtr 2009[3]	YTD 2009[4]	2nd Qtr 2009[3]	YTD 2009[4]
Haemophilus influenzae (age<15, all serotypes)	4	9	9.0	10.0	4 (100%)	9 (100%)	0 (0%)	0 (0%)	0 (0%)	1 (11.1%)
Measles	1	1	11.0	11.0	1 (100%)	1 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Mumps	3	4	8.0	8.0	3 (100%)	4 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Pertussis	26	59	20.5	23.0	15 (57.7%)	27 (45.8%)	6 (23.1%)	12 (20.3%)	0 (0%)	0 (0%)
Varicella (Hospitalized cases)	11	15	6.0	7.0	8 (72.7%)	10 (66.7%)	1 (9.1%)	2 (13.3%)	0 (0%)	1 (6.7%)

[1] Median number of days from symptom onset to public health report
[2] Cases that have epidemiological linkages to another case (*e.g.,* relatives, classmates, coworkers, teammates, etc.)
[3] Cases reported with disease onset between April 1 – June 30, 2009.
[4] Cases reported with disease onset between January 1 – June 30, 2009.

TABLE 3. VACCINATION RATES FOR VPDS WITH PROBABLE AND CONFIRMED CASES

Disease	# of Cases		Cases Too Young to Be Vaccinated n (%)		Cases Eligible for Vaccination and Up-To-Date[1] n (%)		Cases Eligible for Vaccination and Not-Up-To-Date[2] n (%)		Cases Age <18 Years with PBE School Vaccine Waivers[3] n (%)	
	2nd Qtr 2009[4]	YTD 2009[5]	2nd Qtr 2009[4]	YTD 2009[5]	2nd Qtr 2009[4]	YTD 2009[5]	2nd Qtr 2009[4]	YTD 2009[5]	2nd Qtr 2009[4]	YTD 2009[5]
Haemophilus influenzae (age<15, all serotypes)	4	9	3 (75.0%)	4 (44.4%)	1 (25.0%)	4 (44.4%)	0 (0%)	1 (11.1%)	0 (0%)	0 (0%)
Measles	1	1	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1 (100%)	0 (0%)	0 (0%)
Mumps	3	4	0 (0%)	0 (0%)	1 (33.3%)	1 (25.0%)	2 (66.7%)	3 (75.0%)	0 (0%)	1 (25.0%)
Pertussis	26	59	8 (30.8%)	16 (27.1%)	6 (23.1%)	13 (22.1%)	12 (46.1%)	30 (50.8%)	0 (0%)	2 (3.4%)
Varicella (Hospitalized cases)	11	15	2 (18.2%)	2 (13.3%)	0 (0%)	0 (0%)	9 (81.8%)	13 (87.7%)	0 (0%)	0 (0%)

[1] Cases that are up-to-date with the VPD-specific vaccine recommendations for their age. For *Haemophilus influenzae*, data only includes cases that are up-to-date with the Hib vaccine primary series. Due to the vaccine shortage, the CDC's interim guidelines recommended temporary deferral of the booster dose. On June 26, the CDC's updated guidelines recommended reinstatement of the booster dose for children age 12-15 months.
[2] Includes cases that have unknown immunization status, have PBE school vaccine waivers, or have no valid documentation of receiving vaccinations prior to disease onset.
[3] Personal beliefs exemption school vaccine waivers
[4] Cases reported with disease onset between April 1 – June 30, 2009.
[5] Cases reported with disease onset between January 1 – June 30, 2009.

DISEASE-SPECIFIC SURVEILLANCE TRENDS AND HIGHLIGHTS DURING 2ND QUARTER 2009

Diphtheria:

- No cases have been reported in Los Angeles County (LAC) since 1994 (Table 1).

***Haemophilus influenzae* (age <15):**

- Since June 2007, the only cases of invasive *Haemophilus influenzae* investigated in LAC are those in persons less than 15 years of age.
- There are many strains/serotypes of *Haemophilus influenzae* and they are grouped as follows: 1) serotype B (Hib), 2) non-B (serotypes a, c, d, e, f, and non-typeable), and 3) unknown serotypes. Serotype B is the only serotype that is vaccine-preventable.
- 4 cases (4 confirmed, 0 probable) were reported this quarter (Table 1).
- To date, 9 cases (9 confirmed, 0 probable) have been reported in 2009 (Table 1).
- 44.4% (n=4) were up-to-date with Hib vaccines (Table 3).
- None of the cases were serotype B, 8 cases were non-B, and 1 was of an unknown serotype. Thus, none of the cases were known to be vaccine-preventable (Table 4).
- 8 cases were hospitalized.
- There was one fatality from February 2009.
- All 9 cases were less than 5 years of age.
- SPA 3 reported three cases and SPA 6 reported two cases. SPA 1, SPA 2, SPA 4, and SPA 8 reported one case each. None of the cases were epidemiologically linked to each other (Table 2).
- Since December 2007, the CDC has recommended a temporary deferral of the Hib booster dose due to the vaccine shortage. On June 26, the CDC recommended the reinstatement of the booster dose for children age 12-15 months.[1]

***Haemophilus influenzae* (age 15+):**

- Invasive *Haemophilus influenzae* cases in this age range are not investigated unless they are confirmed to be serotype B cases.
- No confirmed serotype B cases in this age range were reported this quarter.

Measles:

- One confirmed case was reported this quarter (Table 1).
- The case did not know his vaccination status (Table 3).
- The case was 39 years of age.
- The case resided in SPA 2.
- The case had no known exposure to another measles case but reported a history of travel to New York and New Jersey within 18 days of rash onset.
- No secondary cases were identified.
- The reporting lag time was 11.0 days (Table 2). This is problematic because the maximum incubation period for measles is 18 days and the maximum communicability period is 4 days after onset. Extended reporting lag times lead to delayed or missed opportunities for effective public health intervention.
- Although the case was suspected to have measles by both his primary care physician and a local emergency room physician, the case was not reported to public health by either healthcare facilities. Instead, the case was initially reported by the testing laboratory after laboratory results were finalized. The delay in reporting could have led to significant secondary transmission.
- The identification of a measles case attending a multi-state youth program (visiting West Virginia, Washington D.C., and Maryland) in April led to a multi-state investigation involving approximately 620 contacts. 19 LAC residents were identified as contacts but none developed measles from the exposure.

Mumps:

- 3 cases (3 confirmed, 0 probable) were reported this quarter (Table 1).
- To date 4 cases (4 confirmed, 0 probable) have been reported in 2009 (Table 1).
- Of the three cases that were not up-to-date with the mumps vaccine recommendations, one case from Q1-2009 had a personal beliefs exemption (Table 3).
- Two of the cases were children (ages 2 and 3 years) and two of the cases were adults (ages 33 and 34 years).
- The cases resided in SPA 1, SPA 2, SPA 5, and SPA 6. None of the cases were linked to each other.

Pertussis:

- 26 cases (18 confirmed, 8 probable) were reported this quarter (Table 1).
- To date, 59 cases (33 confirmed, 26 probable) have been reported in 2009, which is a 23.4% decrease from the previous 5-year average (Table 1) but nearly twice as many cases as were reported during the same time period in 2008 (n=31).
- Of the 33 confirmed cases, 27 were lab-confirmed and 6 were epi-confirmed (*i.e.,* linked to a lab-confirmed case) (Table 2).
- Half (50.8%, n=30) of the cases were not up-to-date with the pertussis vaccination recommendations for their age (Table 3).
- Sixteen cases (27.1%) were less than 2 months of age and were too young to be vaccinated (Table 3).
- Two cases had a personal beliefs exemption. (Table 3).
- The majority of cases were in the <1 age group (52.5%, n=31) followed by the 15-34 age group (15.3%, n=9), and 45-54 age group (8.5%, n=5) (Figure 2).
- The majority of the cases resided in SPA 6 (23.7%, n=14) followed by SPA 4 (17.0%, n=10). SPA 2 and SPA 7 reported eight cases each, SPA 3 and SPA 5 reported six cases each, SPA 1 reported four cases, and SPA 8 reported three cases.
- Epidemiologically-linked cases were reported in SPA 6 (n=5), SPA 2 (n=3), SPA 3 (n=2), and SPA 5 (n=2) (Table 2).

Polio:

- No cases have been reported in LAC since 1987 (Table 1).

Rubella (acute):

- No cases have been reported in LAC since May 2008 (Table 1).

Rubella (congenital):

- No cases have been reported in LAC since November 2008 (Table 1).
- The suspect case identified in Q1-2009 was closed as a false case since the CDC's laboratory results were negative.

Tetanus:

- No cases have been reported in LAC since July 2008 (Table 1).

Varicella (Hospitalized Cases):

- 11 cases (9 confirmed, 2 probable) were reported this quarter (Table 1).
- To date, 15 cases (11 confirmed, 4 probable) have been reported in 2009, which is a 38.9% increase from the previous 5-year average (Table 1).
- None of the cases were up-to-date with varicella vaccine recommendations (Table 3).
- More than half of the cases (n=8) were immunocompromised. One was pregnant.
- The cases were hospitalized from 1 – 45 days, with a median of 6.0 days.
- 3 of the cases also had pneumonia.

- The majority of cases were reported in SPA 3 (n=5). One of the cases in SPA 3 was linked to a varicella school outbreak. SPA 4, SPA 6, SPA 7, and SPA 8 reported two cases each while SPA 1 and SPA 2 reported one case each.

Varicella (Fatal Cases):

- No cases have been reported in LAC since January 2009 (Table 1).

Varicella (Outbreaks):

- No outbreaks were reported this quarter (Table 1).
- To date, 5 outbreaks have been reported in 2009, which is an 83.0% decrease from the previous 5-year average (Table 1).
- All of the outbreaks were in schools (Table 5).
- There was an average of 7.2 cases per outbreak (Table 5).
- SPA 3 reported two outbreaks, while SPA 5, SPA 6, and SPA 7 reported one outbreak each.

LESSONS LEARNED

Haemophilus influenzae

- Since December 2007, the CDC has recommended a temporary deferral of the Hib booster dose due to the vaccine shortage. Although production of the Merck vaccine is still suspended, Sanofi Pasteur will be increasing its supply of Hib vaccine beginning in July 2009. Thus, on June 26, the CDC recommended the reinstatement of the booster dose for children age 12-15 months.[1]

  Lesson 1: Although the supply of Hib vaccine is anticipated to be sufficient enough to reinstate the booster dose, it is not yet adequate enough to support an active recall of all children who need the catch-up vaccination. As a result of this, LACIP will likely play a role in ensuring that all providers are aware of the updated immunization recommendations. LACIP should also prepare providers to be able to: 1) explain to parents the reasons behind the updated recommendations, 2) begin to identify children in need of the booster dose (via review of medical records or queries from immunization registries such as CAIR), and 3) work with Field Services or VFC staff to evaluate if their current vaccine ordering practices will need to be adjusted.

Pertussis

- Similar to previous years, approximately half of the pertussis cases reported in 2009 were not laboratory-confirmed (Table 2). The acceptable methods to confirm a pertussis infection are to collect a nasal aspirate or nasopharyngeal swab for culture and polymerase chain reaction (PCR) testing. Because a culture and PCR can be difficult to perform because they require specialized techniques and materials (*i.e.*, Dacron swabs, Regan-Lowe transport media), many providers seem to prefer ordering serological tests to check for pertussis antibodies. However, because serological tests have not been standardized and clinically validated, they are not accepted by the CDC for pertussis confirmation. Thus, all cases for which only serological tests were performed are classified as probable cases. To date, 44.1% (n=26) of the 2009 pertussis cases are probable cases.

  Diagnosing providers have reported to LACIP surveillance staff that they order serological tests because: 1) they are not aware that culture and PCR are recommended, 2) they did not know that serological tests were unreliable for pertussis diagnosis, 3) they have never performed a nasopharygeal swab collection, and 4) they do not have the proper supplies available. All of these factors are important because inappropriate testing, specimen collection, and transportation can affect proper diagnosis and treatment.

  Lesson 2: Although pertussis laboratory guidelines have been posted on various websites, including CDC, California Department of Public Health, and LACIP websites, it is clear that not all providers have access to the appropriate information. Although LACIP surveillance staff have been educating

providers on a case-by-case basis, LACIP should have a role in the broader distribution of VPD resources to our healthcare providers, as is indicated in the strategic plan (Goal 2: Objective 2.4). Surveillance staff could collaborate with Nursing Unit staff to incorporate these materials into in-service trainings, as well as work with AEP unit staff to ensure that the most current VPD resources are included in the inventory of health education materials. Furthermore, LACIP's website could be expanded to include relevant surveillance topics.

Disease Reporting

- According to Title 17, Section 2500 of the California Code of Regulations, suspect measles, pertussis, and *Haemophilus influenzae* cases are reportable within one working day of identification while suspect mumps and varicella cases are reportable within seven working days.[2] The reporting lag times observed this quarter show that the reporting timeframes are not being followed consistently (Table 2). As mentioned previously in this report, delays in reporting can lead to missed opportunities for public health intervention and secondary disease transmission.

  Lesson 3: Although the Acute Communicable Disease Control program annually publishes a special disease reporting issue in "The Public's Health," many providers have reported to LACIP surveillance staff that they are not aware of the disease reporting requirements. Furthermore, some providers incorrectly assume that only confirmed or unusual cases are reportable. As is indicated in the strategic plan (Goal 4: Objectives 4.1 and 4.5), LACIP surveillance staff have a major role in ensuring that all suspect VPD cases are systematically reported by providers and laboratories. Surveillance staff could collaborate with Nursing Unit and AEP staff to incorporate disease reporting information in in-service trainings and outreach activities.

NEXT STEPS

- At the request of the Los Angeles Unified School District (LAUSD) Communicable Disease Nursing Director, present *Haemophilus influenzae* history, epidemiology, and vaccine recommendations to LAUSD nurses and physicians on September 10.
  - Addresses Strategic Plan Goal 4: Objective 4.5
- By the end of September, meet with LACIP Nursing Unit to discuss ways in which surveillance data can be incorporated into in-service trainings and other activities.
  - Addresses Strategic Plan Goal 2: Objective 2.4 and Goal 4: Objectives 4.1 and 4.5
- Submit an abstract for the 44th National Immunization Conference on the congenital rubella syndrome case series analysis.
  - Addresses Strategic Plan Goal 4: Objective 4.4 and 4.5
- The examination of 10-year surveillance data to assess personal belief exemption rates among LAC cases is currently in progress.
  - Addresses Strategic Plan Goal 2: Objective 2.1 and Goal 4: Objective 4.4

OTHER TABLES AND CHARTS

TABLE 4. *HAEMOPHILUS INFLUENZAE* CASES (AGE <15) BY SEROTYPE

	Serotype B			Serotype Non-B			Serotype Unknown		
	2nd Quarter 2009[2]	YTD 2009[3]	YTD 2004-2008 5-Yr Avg[3]	2nd Quarter 2009[2]	YTD 2009[3]	YTD 2004-2008 5-Yr Avg[3]	2nd Quarter 2009[2]	YTD 2009[3]	YTD 2004-2008 5-Yr Avg[3]
Total Cases	0	0	0.2	4	8	6.8	0	1	0.2
Age at Onset (years)									
Mean[1]	--	--	6.0	<1	<1	2.7	--	1.0	<1
Median[1]	--	--	6.0	<1	<1	<1	--	1.0	<1
Range[1]	--	--	6.0 – 6.0	Birth – 2.0	Birth – 4.0	Birth – 12.0	--	1.0 – 1.0	<1 - <1
Case Fatality[1]	--	--	0%	0%	0%	9.8%	0%	100%[4]	100%

[1] Five year average calculation in each serotype category only includes years in which cases were identified.
[2] Cases reported with disease onset between April 1 – June 30, 2009.
[3] Cases reported with disease onset between January 1 – June 30.
[4] One fatality was reported.

FIGURE 1. PERTUSSIS CASES BY MONTH OF DISEASE ONSET

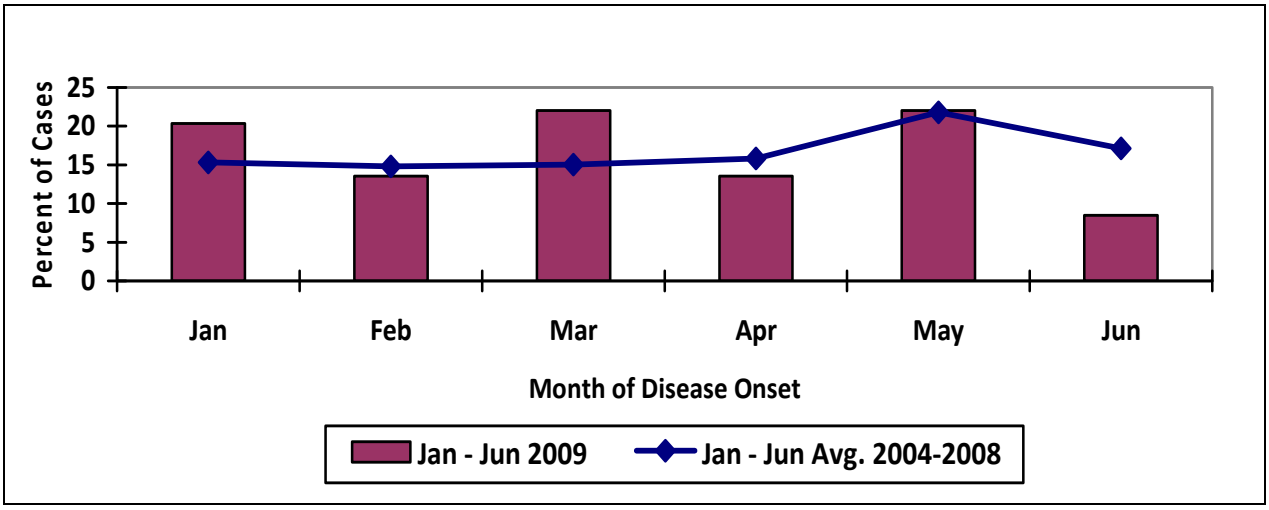

FIGURE 2. PERTUSSIS CASES BY AGE GROUP

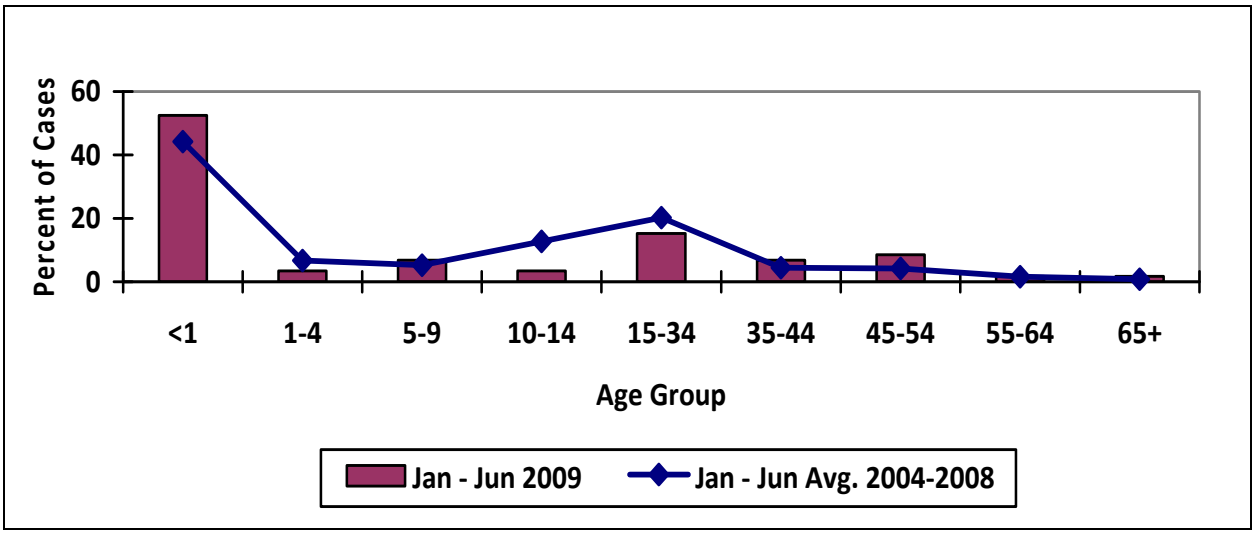

TABLE 5. VARICELLA OUTBREAKS[1]

	2nd Quarter 2009[2]		Year to Date 2009[3]		Year to Date 2004-2008 Five-year average [3]	
	Health Facility	*Non-Health Facility*	*Health Facility*	*Non-Health Facility*[4]	*Health Facility*	*Non-Health Facility*
Number of outbreaks	0	0	0	5	0.2	29.2
Average number of cases per outbreak[5]	--	--	--	7.2	0.4	11.6

[1] A non-health facility outbreak is defined as 5 or more cases within a 21-day period. A health facility outbreak is defined as 2 or more cases within a 21-day period.
[2] First case rash onset was between April 1 – June 30, 2009.
[3] First case rash onset was between January 1 – June 30.
[4] 3 outbreaks were in elementary schools, one was in a middle school, and one was in a university.

REFERENCES

[1] CDC. Updated Recommendations for Use of *Haemophilus Influenzae* Type B (Hib) Vaccine: Reinstatement of the Booster dose at Ages 12-15 Months. MMWR 2009; 58(24);673-674.

[2] http://lapublichealth.org/acd/cdrs.htm

ADDITIONAL RESOURCES

- National Center for Immunization and Respiratory Diseases – www.cdc.gov/vaccines
- CDPH Immunization Branch – www.cdph.ca.gov/programs/immunize
- LAC Immunization Program – www.publichealth.lacounty.gov/ip